CHAPTER 8.

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PROJECT ANALYSIS

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8.1 Technical Analysis

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The work to be planned and implemented under the Social Forestry Project is shown in Table 8-1, mainly featuring technologies for the planting of trees intended to provide foodstuffs, fruit and sap, etc. Of these technologies, those relating to the asexual propagation of fruit trees are the only ones new to the Project Area and the rest have either been experienced by farmers or implemented by local government agencies before and, therefore, are not particularly advanced technologies. Therefore, judging from current technical levels, the Social Forestry Project is considered to be sufficiently feasible.

However, in order to efficiently implement the Social Forestry Project, it is necessary to improve and raise the technology level of traditional coffee cultivation by considering the sustainability of soil fertility through mulching (prevention of surface soil runoff and fertilizer application, etc.). Moreover, as the Social Forestry Project involves the large-scale introduction of fruit trees, etc., technologies for asexual propagation are important. Considering that only the most simple asexual propagation technologies are currently available to limited groups of farmers, it is necessary to research and disseminate technologies that enable new varieties to be grown and the fructification starting ages to be reduced.

Technical development is required in all fields of the Social Forestry Project and not just those mentioned above. For this reason, components relating to training and extension have been included in the Social Forestry Project and it is hoped that the training and extension activities involved will be fully implemented.

Division	Work Objective	Work Contents
National Forest	Social oriented rehabilitation	Planting of forestry species and fruit species, etc.
	Social oriented border tree planting	Planting of palm species (aren, salak, pinang)
Private Land	Agroforestry complex development	Upper tree planting (fruit trees, etc.)
	(both existing and new)	Wood-fenced conservation work, etc.
	Conservation plantation development	Bamboo, kapok, kayu res
	Dry crop field improvement	Bench terrace formation (guidance by Ministry of
		Agriculture-related agencies)
	Check dams	Executed by Ministry of Public Works-related agencies
	Riverside afforestation	Bamboo planting
Common	Forest road construction	Executed by Ministry of Public Works-related agencies
Common	Infrastructure development	Domestic water supply measures (executed by Ministry of Public Works-related agencies)
	Semi-temporary central nursery	Raising of seedlings of unusual species (including asexual propagation)

Table 8-1	Components of Social Forestry
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8.2 Social Analysis

Social analysis refers to the evaluation of how far the Social Forestry Project will be accepted by local people and contribute to the needs of local people based on the findings of the previously described analysis of the characteristics of local people, social organizations and social and cultural conditions, etc.

(1) Characteristics of Village Communities

1) Characteristics of Local People

The Rejang people, the original inhabitants and largest ethnic group in the Project Area, have a strong tendency of not moving away from their homeland, so much so that even school leavers do not like to move away from their homes. In contrast, the people of Sumatera origin, such as the Serawi and Lemba ethnic groups, are all immigrants to the Project Area and many of these people continue to arrive today. In addition, immigrants from Bali and Jawa also form communities in small and large groups, resulting in a mixed ethnic nature of the local population.

As the Rejang people have a relatively liberal approach to social norms and customs, there is no conflict between old and new ways even in ethnically mixed villages and people live in harmony without creating mutual friction. In the case of immigrants from Jawa and Bali, these are hard working and active in conducting civit engineering works, dry crop field cultivation and terrace building, etc. (a reflection of the technologies and culture of their homelands) and their activities influence other ethnic groups.

2) Norms and Customs of Rejang People

In regard to the development of non-irrigated farmland, after obtaining the permission of the village chief, piles are placed, the surrounding land is cleared and bamboo and other trees are planted around the farmland plot concerned. The village chief has extensive knowledge of the land ownership along footpaths. There are relatively few disputes concerning ownership and those that do arise are settled by customary law.

In regard to the use of non-irrigated farmland, the original Rejang people tend to possess the largest plots. The size of plots owned by other ethnic groups tend to increase with a longer period of living in the Project Area.

Tenant farming exists in the case of paddy fields but is generally not observed in the case of non-irrigated farmland.

Few people have a registration certificate to prove their right to land ownership.

3) Village Structure

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Villages came to act as the grass roots units of local government during the Fourth Five Year Plan period. Village administration is executed with the assistance of the village chief (publicly elected every five years) and deputy chief and the cooperation of leaders in each sector, religious leaders and elders, etc. chosen according to customary law. The authority of the village chief is absolute. The village council (LMD) is consulted when major problems arise.

Regarding development activities, the village development council (LMKD) presents and discusses the development plan with the village council and, if approved, the plan becomes the official development plan of the village for one year.

(2) Compatibility of Social Forestry Project with Village Communities

The compatibility of social forestry with the afore-mentioned conditions of village communities is summarised in Table 8-2. As the Rejang people, who are averse to travel and open-minded towards changes in social norms and customs, etc., form the bulk of most village populations and as other ethnic groups who have immigrated to Project Area on their own accord or under government resettlement programmes blend in with the local lifestyle while still retaining their own cultural traits, it is believed that there will be no problems regarding the implementation of social forestry. Moreover, as the Social Forestry Project does not conflict with the above-mentioned characteristics of local village communities, its implementation is judged to be feasible.

Village Communities	Social Forestry Project	Compatibility
1-1 Cultural composition of various ethnic groups	1-1 Awareness of being local people and attitude towards work greatly differ between different ethnic groups. Consideration needs to be given to ethnic traits and ethnic composition when examining and providing guidance on people's participation.	Separate consideration for individuals and groups
1-2 Continued influx of population	1-2 Population influx will be maintained and will be examined at the end of Social Forestry Project.	
1-3 Coexistence of old and new norms and customs (open-mindedness of Rejang people)	1-3 Coexistence of old and new standards and customs means that there will be no major obstacle to the introduction of new farming technologies during social forestry implementation.	Potential for technical advancement
2. Support for younger generation via the family system	 Support will be provided to landless young people through new projects. 	Completely compatible
 Land use respecting existing boundary trees/bamboo and markings 	 Work will be divided between individuals with respective responsibility being made clear. 	Practical in terms of progress control and management
 Village structure is guided by LMKD, LMD and customary law and religious leaders. 	 Decisions on whether existing organizations or new village groups should be the responsible local organizations will be made for each village (examined based on capability). 	Capability of village structure is the key.

Table 8-2 Compatibility of Social Forestry Project with Village Communities

8.3 Organizational Analysis

Whether or not the organizations being considered under the Social Forestry Project are compatible with the existing local community organizations is examined here in order to evaluate the feasibility of the Social Forestry Project in organizational terms.

(1) Social Forestry Organizations

The organizations to be responsible for the Social Forestry Project are likely to be national, provincial and prefectural advisory committees, the Information Centre, village level village groups, NGO extension workers and participant groups.

1) Character of Advisory Committees

The formation of national, provincial and prefectural advisory committees is a common means of obtaining the cooperation of related agencies in determining social forestry implementation policy and results, etc. and their character is believed to be sufficiently compatible with the existing organizations and administration.

2) Character of Social Forestry Information Centre

The Information Centre will be established under the supervision of the provincial forestry authority and will act as a body to support the activities of the two agencies in charge of national forests and private land at the prefectural level (Dinas PKT and Cabang Dinas Kehutanan) and NGO extension workers at the village level by collecting, compiling and presenting (including awards) social forestry-related information.

While some technical issues concerning the coordination of the two responsible agencies still remain unsolved, similar coordination has been carried out until now and compatibility is believed to be fully possible providing that conscious efforts are made.

- 3) Main Roles of Village Groups
 - ① Main Roles

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In the workshop, it was said that it may be difficult for the LMKD (village development councils) to handle social forestry and there was a strong call by villagers for the establishment of a committee composed of four sections and eight officials to implement social forestry in both national forests and at private land. However, further surveys have found that there are some villages where the LMKD is capable of handling social forestry issues.

Inn terms of maintaining unified village administration, it is desirable to make use of the existing village organizations in villages where such organizations are capable of handling social forestry issues. Moreover, this would enable the existing personnel to be used in their existing and new roles to lead social forestry implementation. For this reason, it has been decided to leave the choice of whether to maintain existing organizations or to establish new organizations to each village.

As a result, no problems concerning compatibility will arise in those villages where the LMKD is retained. In regard to new village groups, providing that the administrative authority of the all-powerful village chief (adviser for village group) and support of religious and customary law informal leaders are available, it is believed that sufficient compatibility can be established. ② Roles of NGO and Extension Workers

It is intended to station NGO and extension workers in villages to assist the village groups. As these personnel will be used to obtain consent for people's participation using various discussion techniques, it is hoped that they will act as catalysts to encourage people's participation in the Social Forestry Project.

Moreover, NGO and extension workers are well versed in the functions of provincial and district administrative agencies and can play an important role in providing advice to village chiefs and village groups and also as representatives of the people. ۲

4) Obligations of Participant Groups

After the Social Forestry Project for local communities and people's groups is prepared and submitted and an agreement is signed by the competent provincial authority, these communal groups will acquire the rights stipulated in Ministerial Notification Article 8 and also bear the obligations (9 items) stipulated in Article 11.

The contents of the obligations include execution in accordance with the Project plans, prevention of damage to trees and others, reporting of illegal hunting and so on. As any failure by individuals to abide by the obligations will be viewed as violation by the whole group, it will be necessary to provide clear explanations and to carefully select members when forming groups to ensure that there is no lack of understanding.

(2) Compatibility of Organizations

In consideration of the above-mentioned organizations being considered under the Social Forestry Project, it is judged that their sufficient compatibility will be achieved with the administrative and informal organizations, etc. operating in local communities.

8.4 Financial and Economic Analyses

The purpose of the financial analysis is to study financial feasibility of the project itself while the purpose of the economic analysis is to study economic feasibility of the project for the country as a whole. The analysis looks at the expected cash flow when the project is implemented (With Project Case) and when the project is not implemented (Without Project Case), and then finds the net present value (NPV) for each of the two cases. The incremental difference, obtained by subtracting the latter from the former, will provide a measure used for judging whether or not the project is feasible. It is planned that the project is implemented by Cabang Dinas Kehutanan in national forests, by Dinas PKT in private lands. The village level village groups are under the both in the implementation scheme. Information centers will be also planned to be set up under regional office of the Ministry of Forestry (KANWIL Kehutanan) and Sub BRLKT. However, the implementation body of social forestry is a group of farmers living in the project areas and they are main beneficiaries of the project. Benefits enjoyed by farmers will account for a large proportion of project benefits. Consequently, the role of the Ministry of Forestry, as an implementation agency, is to assist farmers to participate in social forestry, and financial and economic analyses will be conducted by considering that the Ministry of Forestry (which provides assistance for social forestry) and farmers (who are directly involved in social forestry) are one implementation body.

(1) Precondition for Financial Analysis

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1) Implementation Period and Project Life

The project is planned to commence in 1998. The implementation period of the project is set at 7 years, commencing in 1998. The financial analysis calculation is made over the 30 years of the project life.

2) Base Year Prices

The financial analysis calculations are based on market prices prevailing in June, 1997. In case of agricultural inputs and products, farm gate prices are used for the analysis.

3) Inflation Rate

The domestic inflation rate is estimated at 7% per year and the foreign inflation rate is at 2 % per year (based on Japanese statistical data in 1997) throughout the project life.

4) With Project Case

Project costs required for investment, maintenance, and agricultural production have been estimated as in Tables 7-28 to 7-29 based on the project work plan. (see Appendix H-2 for further details)

In order to strengthen KUD activities, training such as seminars has been provided. In the project, in order to strengthen KUD management, some of expert staff will be employed for first three years and relevant costs have been included in the project cost. With these inputs, it is expected that sales prices of agricultural products and added values of processed products will be increased. These benefits will be estimated at 0.5 % of the value of the total agricultural production in the first year of the project and gradually increased up to 1.8 % in the sixth year and thereafter.

There are two kinds of environment related benefits which are considered in the project. One is benefits arising out of preventing soil outflow, which is estimated at 14,000 Rp per ton of soil prevented. This unit cost is calculated as transportation costs of soil to be brought back to its original place. The other is benefits which stem from maintenance and recovery of soil fertilities once the project is implemented. (see Appendix H-6)

5) Without Project Case

Under the "Without Project Case" scenario, the existing cropping pattern will be maintained for a certain period of time. In national forests (1,592 ha), coffee production (Robusta) will be continued. It is expected that over the 30 years of the project life, production of coffee (Robusta) will be continued in the private land (25,201 ha) and production of upland paddy, etc. will be continued in the private farm land (1,468ha). (Refer to H-3 in Appendix for details)

6) Financial Discount Rate

In order to calculate the net present value, the nominal financial discount rate of 18% has been used based on the long-term interest rates in Indonesia. The following show the long-term interest rates in the past five years:

						(Unit:%)
	1992	1993	1994	1995	1996	Average
Time Diposit (2 years)	20.55	18.27	15.03	14.48	15.52	16.77
Investment Creidt	19.21	17.06	14.96	15.75	16.38	16.67
Investment Credit (Private Bank)	21.45	20.54	18.14	19.79	20.07	20.00
Source: Laporan Perekonomian Indo	nesia 1990	5				

(2) Results of Financial Analysis

1) Net Present Value

The expected cash flows for both With Project Case and Without Project Case have been obtained, and the net present values (with the nominal discount rate of 18 %) for the respective cases have been compared as follows (Refer to Table 8-3 and Appendix H-1 to 3 for details):

With Project Case	467,568 Mil. Rp
Without Project Case	408,390 Mil. Rp
Incremental NPV	59,178 Mil. Rp
IRR	20.6 %

The incremental NPV is calculated at 59,178 million Rp and the Internal Rate of Return is at 20.6%. Based on the above result, it will be concluded that the project is financially feasible over the 30 years.

2) Sensitivity Analysis

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Present values of benefits have been calculated for each project component as shown in Table 8-4. As seen from the table, an increase in benefits is attributed largely to coffee production in project components such as Agroforestry Complex Development (Existing). For example, benefits from Agro-Forestry Complex Development (Existing) (Elevation 0-900m and 901-1,500m) account for 79.1% of total benefits on a present value basis. For this reason, a sensitivity analysis is conducted by changing the value of coffee production for the following four project components:

- a) Agroforestry Complex Development (Existing) (Elevation 0-900m)
- b) Agroforestry Complex Development (Existing) (Elevation 901-1500m)
- c) Agroforestry Complex Development (New) (Elevation 0-900m)
- d) Agroforestry Complex Development (New) (Elevation 901-1500m)

Financial Analysis Project Effect With Project - Without Project Estimation (Nominal Price) Table 8-3 Results of Financial Analysis

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ues (With Project) (2) tio Present Value (2)-(1)			enduts in nominal terms (Mith Project)	529,666			
tio Present Value (2)-(1)		Dracent Values	(With Project) (2)		467,568			
Present Value (2)-(1)	005	t Benefit Ratio			1.38			
Present Vaue (k/T/L/)	-		10-10 (0)-(1)		59.178			
	2	emental Net Pre-	sent vaue (s/~/·/		20.6%			

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Project Component	Code	Present Value (Million Rp)	% of Total
Agroforestry Complex Development, etc.		964,886	96.8
Social Oriented Rehabilitation (Elevation 0-900m)	Ichi-3	16,884	1.7
Social Oriented Rehabilitation (Elevation 901-1500m)	Ichi-4	16,464	1.7
Social Oriented Rehabilitation (Elevation 1500m-)	Ichi-5	589	0.1
Present Coffee Plantation in Private Land	Ichi-6	9,964	1.0
Agroforestry Complex Development (Existing) (Elevation 0-900m)	Ichi-7	650,304	65.2
Agroforestry Complex Develop.(Existing) (Elevation 901-1500m)	Ichi-8	138,807	13.9
Wood-fenced and Strip Planting	Ichi-9	437	0.0
Agroforestry Complex Develop.(New) (Elevation 0-900m-1)	Ichi-10-1	48,985	4.9
Agroforestry Complex Develop.(New) (Elevation 0-900m-2)	Ichi-10-2	10,880	1.1
Agroforestry Complex Develop. (New) (Elevation 901-1500m)	Ichi-11	12,866	1.3
Conservation Plantation Development	Ichi-12	4,820	0.5
Dry Crop Field Improvement	Ichi-14	50,621	5.1
Social Oriented Boundary Tree Planting	Ichi-15	3,265	0.3
KUD Activity		16,708	1.7
Semi-Temporal Central Nursery		1,064	0.1
Cattle+Goat+Bcc+lkanmas		3,722	0.4
Riparian Afforestation		757	0.1
WP & Terrace		7,220	0.7
Prev. Soil Flow		1,829	0.2
Prev. Soil Fertility	_ <u> </u>	1,048	0.1
Total		997,233	100.0

Table 8-4 Breakdown of Present Value of Benefits (With Project Case)

Discount Rate 18%

The following table shows the result of the analysis:

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Change in Coffee Sales Values	Incremental Net Present Value (Mil. Rp)	Internal Rate of Return (%)
20% increase in coffee sales values	180,397	25.9
10% increase in coffee sales values	119,787	23.3
5% increase in coffee sales values	89,483	22.0
5% decrease in coffee sales values	28,873	19.3
10% decrease in coffee sales values	-1,432	17.9
20% decrease in coffee sales values	-62,042	15.2

As seen in the above table, the project feasibility is sensitive to a change in coffee sales values (unit sales price x an amount of coffee sold). Ten percent (10%) decrease in coffee sales values will make the project not feasible any more.

If environment related benefits are not taken into account, the incremental NPV and the IRR are calculated at 56,301 million Rp and 20.5%, respectively.

(3) Cash Flow Analysis for An Average Farmer

A cash flow analysis has been conducted for an average farmer based on With Project Case scenario to find if there is any cash flow problem arising from the project implementation. Due to limited availability of statistical data, an analysis has been made for trial plots (50ha) planned in the private farm land and for trial plots (140 ha) planned in the national forest.

1) Cash Flow Analysis for An Average Farmer in the Private Farm Land

In order to examine the cash flow for an average farmer, a survey was made on farm households in Desa Tebat Pulau. To grasp the existing conditions of the household economy for an average farmer, ten households were selected: three households from a richer class, four households from a middle class, and three households from a poorer class. The results of the survey is shown in Appendix H-4. The average of these ten households is considered to reflect economic conditions of an average farm household in Desa Tebat Pulau.

Since the total area of the trial plots will be 50 ha, one-point-three-seven-five over fifty (1.375/50) of the total cash flow from the trial plots, which is a cash flow from 1.375ha of the trial plots, is considered as a cash flow from an average farm size. The cash flow analysis was made on a farm of 1.375 ha as shown in Table 8-5 and Appendix H-4. The relevant items on the cash outflow side are project costs, living expenses adjusted with the expected inflation rate, and taxes. Items on the cash inflow side are all the benefits arising out of the trial plots in proportion to the relevant size of the farmer's land, family labor costs, and payments from the government. In this analysis, labor costs are not regarded as a cash outflow assuming that the farmer uses the family labor force.

Given these conditions, there will be no difficulties to be forescen in the farmer's net cash flow as in Table 8-5 and Appendix H-4. However, once these preconditions are altered in a less beneficial way to farmers, it will become difficult for a farmer to participate in the project. An example is shown in Appendix H-4 in case of a farmer whose farm size is 0.3 ha. Therefore, in case of small farmers, it will be important to incorporate different types of assistances as well which will not necessarily be based on the size of farm areas. Such assistances include beekeeping.

Cash Flow Analysis for an Average Farmer in the National Forest

Referring to the data from Desa Air Lanang, existing conditions of an average farmer in the national forest is estimated as follows:

Conditions of an average farmer

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A number of family members	5 persons
Area	1.4 ha
Receipt	2,000,000 Rp
Annual living expenses	1,190,000 Rp
Savings	730,000 Rp

The cash flow analysis is conducted to investigate project impacts on the average household economy. (see Appendix H-4) The size of the trial plots in the national forests will be 140ha in total, consisting of 128 ha for a project component "Social Oriented Rehabilitation (Elevation 0-900m)" and 12ha for a project component "Social Oriented Rehabilitation (Elevation 901m-1,500m)." Household living expenses and income taxes are also included in the analysis in order to examine if the project is practicable from a viewpoint of a farmer.

On the cash inflow side, included are one hundredth (1/100) of the total project benefits in the trial plots, which mean benefits from 1.4ha of the trial plots, inflow from existing farm practices, family labor costs, and payments from the government. The cash inflow from the existing farm practices is expected to diminish over the initial 5 years of the project period. On the cash outflow side, included are one hundredth (1/100) of the total project costs in the trial plots which farmers are expected to bear, living expenses and income taxes. Thus, labor costs are not treated as a cash outflow assuming that the farmer uses the domestic labor force for the project.

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of an Average Farmer in Private Land (farming Area, 1
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Table 8-5 Cash Flow of
Table 8-

CASH FLOW OF AN AVERAGE FARMER FINANCIAL ANALYSIS (Private Farm Land)

1.375 he

E am		Cost Estimates	Cost Estimation for 50 ha			Benefit Estimation for 50 ha	tion for 50 ha				Cush Flo	I O I IN AVE!	Cash Plow of an average and the Plow of the	1275 NA/			
	Farmer' A/C	Project (Government), A/C	mmers) A/C	Total	Total Cost	ج بندم، A/C	SVC.	Flow for	Project	Living Expenses	pen sa s	Ă	Project	Family	Payment	Net Cath	Accumulative
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1 87 600 000		l.	41,658,519	119.985.250	137372258	202.500,000	231,842,250	94 459 992	2.632.125	1,643,400	1 581 529 ¹	38.254	5.375.662	5254250	ĉ	7.089.004	12,765,272
110200000	Ĺ	1_	0	1.0200.000	134	202.500,000	248,071,208	113,071,469	3,712,493	1,543,400	2.013.236	40.932	6.821.958	5.524.944	0	5 560 242	20,345,514
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14 130,526,250			0	138,528,250	352	200,000,000	515.706.830	163.669.232	9,661,034	1.643,4001 4,237,563	4 237 563	85,092 14,181,938	_	12,827,3891		14.005.6391	152.974.192
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142 690 250		Ō	ō	142,680,250	42	297,587,500	878.527.030	457,311,568 11,583,425 1,543,400	11,583,425		4,851,585	144.957 24.159.493		16.161.237		23.740.762	194,194,793
134.27B.750			0	134.278.750	424,161,758	328,125,000	1.036.486.241	512,324,483 11,684,448 1,543,400	11.084.448		5.191.197	171.0201 28.503.372		16.504,809		27.981.516	222.176.309
133 108 750	÷	0	0	133,108,750	449,898,560	328.125.000	1,109,040,278	\$59.141.718 12.372.210 1.543.400	12,372,210		5,554,581	182,9921,20,498,509		17.660.146		30.048.971	252.225.220
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NCFs(Project Benefit=Fanity Labor=Payment from the Government)=(Farmer's Project Cost*inflated Living Expense of Tax Payment)

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The result of the cash flow analysis shows that there will be no problem for an average farmer to participate in the project as seen from Appendix H-4. However, this analysis will produce different results if preconditions are altered. For example, a farmer who uses only 0.6 ha of land for farming is expected to face difficulties in participating in the project as shown in Appendix H-4. Farmers whose farm areas are smaller than this size will probably find it more difficult to participate in the project. In these cases, other means, such as bee-keeping, which do not require large farm land need to be considered in order to extend supports to such farmers.

(4) Economic Analysis

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1) Precondition for Economic Analysis

For the economic analysis, a price adjustment has been made on sales and income taxes as transfer items within the country. There is no price adjustment being made on labor costs as it is assumed that labor costs used for the financial analysis have less distortion from market prices of labor costs. Coffee and fertilizers are main tradable commodities used for the analysis. In Indonesia, import and export tax rates are not significant against import and export values. Accordingly, the foreign exchange rate is considered to reflect the market exchange rate and no price adjustment has been made on these tradable commodities. For the calculation of the net present value, the nominal economic discount rate of 18% (about 10% in real terms) has been used.

2) Results of Economic Analysis

The incremental net present value for With Project Case against Without Project Case is calculated at 68,473 million Rp. From an economic point of view, the project is found to be feasible. (See Table 8-6 and Appendix H-5 for details)

The Net Present Values at the nominal economic discount rate of 18% are:

With Project Case	486,419 million Rp
Without Project Case	417,945 million Rp
Incremental NPV	68,473 million Rp
IRR	21.0 %

Similar to the financial analysis, the impact on the project feasibility has been examined by changing sales values of coffee. The following table shows the result of the sensitivity analysis.

Change in Coffee Sales Values	Incremental Net Present Value (Mil. Rp)	Internal Rate of Return (%)
20% increase in coffee sales value	190,412	26.3
10% increase in coffee sales value	129,443	23.6
5% increase in coffee sales value	98,958	22.3
5% decrease in coffee sales value	37,989	19.7
10% decrease in coffee sates value	7,504	18.3
20% decrease in coffee sales value	-53,465	15.6

As seen in the above table, the economic feasibility of the project is sensitive to the sales values (unit sales price × sales amount).

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If environmental benefits are not considered, the incremental net present value is expected to decrease to 65,692 million Rp and the corresponding IRR is calculated at 20.9%.

Difference(f)=(0)-(e) -1(3(5)) -1(3(5) -1(3(5)) -1(3((Unit	1,000,000	Rupiah)
Project Direct,			Cost estimation			Benefit Estimation		Incremental NCF
5/56 5/58 -45/50 5/57 115/56 113/56 -113/56 7/201 5/201 -7010 5/311 112/50 -77.965 7/201 5/201 -7010 5/314 112/50 -77.965 7/201 5/201 -7010 5/314 112/50 -77.965 7/201 7/201 5/310 -7010 5/310 -77.965 111 7/201 5/310 -77.965 19.260 -97.126 111 7/201 5/310 -97.121 -97.126 -97.126 111 7/201 5/310 -97.121 -97.126 -97.126 111 7/201 5/310 -97.126 -97.126 -97.126 111 7/201 117.202 97.262 -97.126 -97.126 111 7/201 117.203 97.262 117.226 -97.126 112.501 117.501 127.201 127.201 127.226 -97.226 200501 117.6201 127.202	Ţ	Denient Plan(a)	Without project(b)	Difference(c)=(b)	Project Plan(d)	Without project(e)	Difference(f)=(d)-(e)	(t)-(c)
20.56 50.60 20.200 51.800 173.501 50.50 -50.50 -50.5	1.	545		-44,037	5,377	119,160	1	-69,746
56.66 56.73 -00.162 5.14 135.06 -13965 7.22.80 61.740 7.3.41 65.66 135.66 -13165 -57.735 7.22.80 61.740 7.3.45 61.740 173.050 -135.65 -135.65 7.11.1 7.2.30 65.71 25.35.25 10.13.056 -34.13 7.11.1 7.2.30 25.71 25.35.25 10.25.65 -34.13 7.11.1 7.2.30 25.71 25.35.25 10.25.65 -34.13 7.11.1 7.2.30 25.72 25.35.25 10.25.65 -34.73 7.12.200 25.72 25.74 25.95.65 10.55.65 10.55.65 7.15.57 17.15.67 17.15.63 26.5.77 36.7.17 17.5.5.6 10.55.56 7.15.58 17.55.77 17.13.63 44.5.2.5 17.5.5.6 17.5.5.6 17.5.5.6 17.5.5.6 17.5.5.6 17.5.5.6 17.5.5.6 17.5.5.6 17.5.5.6 17.5.5.6 17.5.5.6 17.5.5.6.6 17.5.5.5.6 17.5.5.	- ,	20.746			31,803			-63,391
5/2/30 6/3/30 -7/4/2 6/5/60 192/6/2 -5/7/20 72/34/1 6/1/1/20 72/20 10/20 10/20 -5/7/20 72/34/1 72/20 6/1/20 72/20 10/20 -5/7/20 72/34/1 71/20 72/20 10/20 10/20 -5/7/20 11/1/1/20 72/20 8/1/20 72/20 10/20 10/20 11/1/20 72/20 8/1/20 72/20 10/20 10/20 11/1/20 8/1/20 72/20 10/20 10/20 10/20 11/1/20 12/200 8/2/20 2/2/20 10/20 10/20 11/1/20 11/20 11/20 11/20 10/20 10/20 11/20 11/20 11/20 11/20 11/20 10/20 11/20 11/20 11/20 11/20 10/20 10/20 11/20 11/20 11/20 11/20 10/20 10/20 11/20 11/20 11/20 10/20 10/20		26,65A			57.141			-57,862
Total Total Title Title Total Total <th< td=""><td>7.</td><td>500,00</td><td></td><td></td><td>85.890</td><td></td><td>-57,7321</td><td>-50,320</td></th<>	7.	500,00			85.890		-57,7321	-50,320
(5/23) (6/13) 24/50 16/300 15/16 -1.356 1114.208 77/2171 35/305 25/305 25/305 25/305 1114.208 83.006 83.006 35.44 203.55 36.445 1114.208 83.006 83.006 35.44 203.55 35.95 35.95 1114.200 83.006 93.720 11.016 100.57 100.57 100.55 1114.200 83.006 93.720 11.016 100.55 100.55 100.55 36.45 100.55 36.45 100.55 36.45 100.55 36.45 100.55 36.55	، ∣۰	170.00			118,554			-41,462
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539 470 348,169 211 301 1 397 127 403,660 993,467 509 442 372,540 230 902 1 408,242 276,559 1 131,713 Inflation rate 75 500,157 5,080,703 2,569,454 1 7625,1449 9,060,756 8,564,392 5 Discount Rate(nominal) 7% Unit: Mil. Rp) 78 Unit: Mil. Rp) 8,564,392 5 1,131,713 5 Present Values of benefits in nominal terms (Without Project) 878,698 8,564,392 5 8,564,392 5	3	518.668			1,339,025	512,974		632,775
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Inflation rate Discount Rate(nominal) Present Values of benefits in nominal terms (Without Project) Present Values of costs in nominal terms (Without Project) Net Present Values (Without Project) (1) Cost Benefit Ratio Present Values of benefits in nominal terms (With Project) Present Values of costs in nominal terms (With Project) Cost Benefit Ratio Cost Benefit Ratio Incremental Net Present Value (2)–(1) Internal Rate of Return		7.650.157	ŝ		17,625,148	9,060,756		5,994,938
18% (Unit terms (Without Project) ms (Without Project) (1) ms (With Project) ms (With Project)		Inflation rate						
terms (Without Project) ms (Without Project) (1) terms (With Project) ms (With Project)		Discount Rete(nomi	inal)	18%	(Unit: Mil, Rp)			
ms (Without Project) (1) terms (With Project) ms (With Project)	•	Dreeart Values of h	venefits in nominal te	arms (Without Project)	878.698			
(1) terms (With Project) ms (With Project)	-	Present Values of C	costs in nominal terr	ts (Without Project)	460,753			
terms (With Project) ms (With Project)		Mat Dranaat Values	Mehour Project) (1		417.945			
terms (With Project) ms (With Project)		Cost Benefit Ratio			1.9.1			
lerms (With Project) ms (With Project)								
ms (With Project)		Present Values of b	penefits in nominal te	erms (With Project)	997,138			
4		Present Values of c	costs in nominal terr	as (With Project)	510,719			
		Net Present Values	: (With Project) (2)		480.419			
		Cost Benefit Ratio			-			
	e7.	incremental Net Pre	esent Value (2)-(1)		68,473			
	•	Internal Rate of Ret	E .		21.0%			

Table 8-6 Results of Economic Analysis Economic Analysis Project Effect

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CHAPTER 9.

ENVIRONMENTAL CONSIDERATION

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CHAPTER 9. ENVIRONMENTAL CONSIDERATION

9.1 Environmental Consideration Approach

(1) Background to Environmental Consideration

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The Social Forestry Development Project is an environmental conservation project from the aspects of both natural and social environments, aimed at improving the living environment of inhabitants and carrying out forest conservation. It is forecast that the Project will improve the water quality of Musi River, nurture water sources and generally have a positive effect on the water environment in the upper Musi watershed. Moreover, Indonesia has experienced similar projects in the past and this Project, too, is one that should be actively implemented based on decision by the Minister of Forestry, and so on.

The target area of the Social Forestry Development Project, which is being compiled based on the S/W, covers an area of approximately 50,000 ha, of which approximately 13,000 ha is protection forest. In view of its objectives, the Project will not alter the functions or uses of protection forest areas, however, since revision of the Environmental Impact Assessment System (AMDAL) following the Cabinet Ordinance on Environmental Impacts of 1993 (see Table 9-1, Note 5) has made the Project area a protected area subject to application of AMDAL, it is necessary to give full consideration to the environment when compiling the Project implementation plan.

For this reason, a more thorough approach to environmental consideration than is usually adopted in social forestry development projects has been taken in this case.

(2) Results of Screening Based on AMDAL

The Directorate of Planning and Programming, Directorate General of Reforestation and Land Rehabilitation of the Ministry of Forestry submitted a formal letter to the AMDAL Committee of the Ministry of Forestry¹ requesting that screening be carried out with respect to the application of AMDAL (see Table 9-1). As a result of the screening (see Appendix I-1: Copy of Letter of Notification), it was judged that ample environmental consideration can be achieved through preparation of a position paper on environmental control measures (UKL) and a position paper on environmental monitoring measures

¹ The Office of the Minister of Environment and Interior (Kantor Menteri Negara Lingkungan Hidup) is responsible for environmental policy formulation and coordination and the Environmental Control Agency (BAPEDAL: Badan Pengendalian Dampak Lingkungan) is responsible for the implementation of the environmental administration. Implementation of the AMDAL is carried out by the AMDAL Committees established in main ministries and agencies (including the Ministry of Forestry) and provincial governments.

(UPL) in accordance with Article 2, Item 2 of the Cabinet Ordinance on Environmental Impacts of 1993. As a result, it was judged¹ within the AMDAL system that any anticipated negative environmental impacts (scenery factor, etc. according to Letter of Notification of Screening Results) and items requiring environmental monitoring can be prevented by ordinary methods, and the Project was given the same status² as a reforestation project following decision by the Minister of Forestry (see Table 9-1, Note 3).

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(3) Outline of the Approach to Environmental Consideration

Based on the S/W and the results of screening by the AMDAL Committee of the Ministry of Forestry, the Social Forestry Development Project in the Project Area was examined by means of the two-staged approach indicated in Fig. 9-1.

① Environmental Consideration in the Project Formulation Stage

Since UKL and UPL documents are prepared at the same time as Project formulation, concerning anticipated negative environmental impacts, mitigation measures need to be investigated and the Social Forestry Development Project improved in advance during the stage of Project formulation. For this reason, outline scoping was carried out using a draft plan of the Social Forestry Development Project at the time of the environmental impact assessment for preparation of the UKL and UPL documents. Mitigation measures were then incorporated into each Project component plan concerning Project sites found in the scoping to be located next to protected areas or in risk of suffering a negative impact from the Project.

② Environmental Impact Assessment Survey and Preparation of Environmental Control and Monitoring Measures Required in the Implementation Stage

Environmental impacts that may occur as a result of implementation of the formulated plans were forecast, and negative impacts were extracted. Based on these, plans for environmental control and monitoring measures were prepared in order to prevent negative impacts and preserve positive impacts. The prepared measures will be examined by related agencies headed by the Directorate General of Reforestation and

- None of the above cases : No serious negative impact is anticipated.

¹ Through the results of interviews (July 1996) by The Office of the AMDAL Committee of the Ministry of Forestry.

⁻ ANDAL-RKL-RPL subject cases: Serious negative environmental impact is anticipated, and prevention by normal method is difficult.

⁻ UKL-UPL subject cases : Serious negative impact is anticipated but can be prevented by normal method.

² According to the Minister of Forestry's decision (305/kepts-11/95), the development project of Hutan Kemasyarakatan and Hutan Rakyat, a main component of social forestry development, is not the subject case of ANDAL-RKL-RPL, but rather the subject of UKL-UPL.

Land Rehabilitation of the Ministry of Forestry and will form the basis for the implementation of measures in the implementation stage.

Date	Occasion	Issue		Reference Document (Item No.)
November, 1995	Meeting on S/W	1	AMDAL (ANDAL/RKL/RPL) made compulsory for the Project (1)	S/W (III/(5)/(c)
March, 1996	Meeting to	2	Preparation of TOR (KA) (2) for AMDAL	M/M [8]
	Explain IC/R	3	AMDAL Committee of Ministry of Forestry to be in charge of AMDAL for the Project	
July, 1996	Meeting to Explain P/R	4	Ministerial decision (3) and notification of Directorate General of Reforestation and Land Rehabilitation (4) suggest that the Project may be classified in the category requiring the compulsory preparation of UKL-UPL	P/R 2.4
		5	AMDAL Committee will decide whether TOR or UKL-UPL are required regarding AMDAL for the Project	M/M [4]
	Request for Screening	6	Request made to AMDAL Committee to make a judgment on whether or not the Project falls in the category requiring UKL-UPL preparation pursuant to Article 2 Item (2) of the 1993 cabinet ordinance (5)	1378/V/Bp-3/1996 (8)
August, 1996	Notice of Screening	7	UKL-UPL not required as no civil engineering work is planned on-site at the F/S stage	174/DJ-VI/AMDAL/98 (9) (see Appendix I-1)
	Results			[1]
		8	UKL-UPL required if work involving changes of the landscape is planned (6)	[2]
		9	AMDAL compulsory if the social forestry development project involves an area of some 200,000 ha (7)	[3]
RK RF (2) KA (3) Ke NG (4) M	L : Rencana L : Rencana L : Kerangka putusan Menteri pmor 218/Kpts - ekanisme Pelaks;	Pengel Peman Acuar Kehut H/1994 anaan	k Lingkungan (Environmental Impacts Assessment folaan Lingkungan (Environmental Management Plar auan Lingkungan (Environmental Monitoring Plan) - ANDAL anan Nomor: 305/Kpts - 11/95 Tentang Perubahan K Tentang Analisis Mengenai Dampak Lingkungan P JKL dan UPL (014/V - RKT/1995) publik Indonesia Nomor 51 Tahun 1993 Tentang	n) oputusan Menteri Kehutan embangunan Kehutanan

Table 9-1	Confirmed AMDAL-Related Issues and Their Descriptions for Social Forestry
	Development Project

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Lingkungan(6) Natural landscape : Betang AlamAs the Project does not plan the involvement of prominent natural landscape, the scale of any possibly

serious negative impacts will be small. (7) As the subject area of the Project is some 50,000 ha, this provision is not applicable to the Project.

(8) Document issued by the Director of Planning and Programming

(9) Document issued by the Chairman of the AMDAL Committee of Ministry of Forestry

Environmental Consideration in the Project – Formulation Stage Environmental Impact Assessment and Preparation of Environmental Control and Monitoring Measures Required in the Implementation Stage

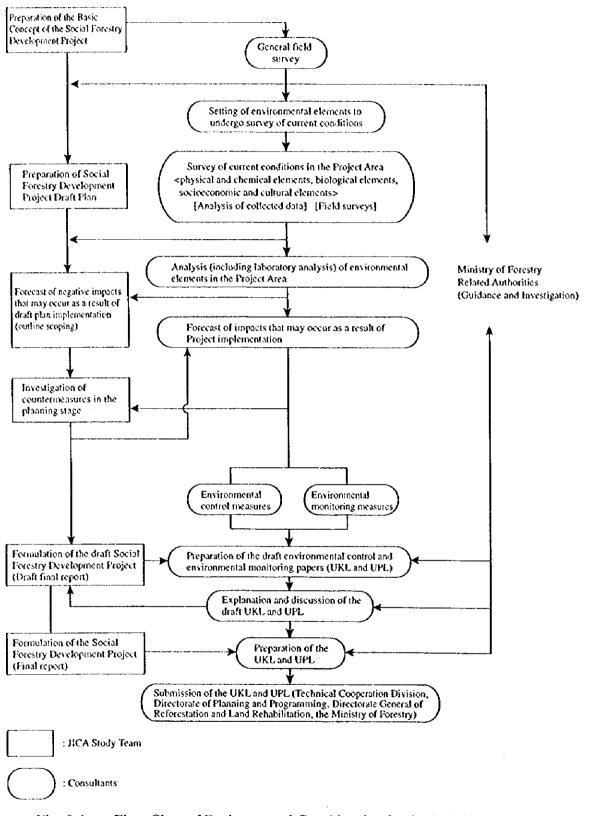


Fig. 9-1 Flow Chart of Environmental Consideration for the Social Forestry Development Project in the Project Area

9.2 Environmental Consideration in the Project Formulation Stage

Using the draft plan of the Social Forestry Development Project and in accordance with the JICA Development Study Environmental Consideration Guidelines (Forestry), etc., outline scoping was carried out on the environmental impacts it is forecast may occur as a result of Project implementation (see Appendix I-2) and important points regarding environmental consideration were extracted. Based on the results of the survey of current conditions and the forecasts and assessments carried out in the environmental impact assessment study, mitigation measures were incorporated into the Social Forestry Development Project (see Table 9-2) with regard to negative environmental impacts it is considered can be mitigated through making improvements to the Project contents.

9.3 Environmental Impact Assessment Survey/Environmental Control and Monitoring Measures (UKL)

- (1) Environmental Control and Monitoring Measures (UKL and UPL)
 - ① Targeted Project

The Social Forestry Development Project (Target Area : inside protection forest area 1,597 ha, outside protection forest area 29,019 ha) which was compiled based on the S/W to cover the Project Area of approximately 52,833 ha in the upper Musi watershed is the target. The objectives of the Social Forestry Development Project are to improve the living environment for local inhabitants, carry out forest conservation and raise watershed conservation functions. The Social Forestry Development Project in the Project Area will be advanced together with village and inhabitant support activities (public subsidy undertakings, etc.) by the Directorate of Planning and Programming, Directorate General of Reforestation and Land Rehabilitation of the Ministry of Forestry (responsible agency for planning and implementation) in cooperation with other related agencies, and it is planned for local inhabitants to prepare implementation plans and to execute forest development and management.

② Related Laws, Ordinances and Regulations

The laws, ordinances and regulations that form the basis for preparation of UKL-UPL required for the Social Forestry Development Project in the Project Area are as follows:

• Cabinet Ordinance on AMDAL of 1993 (see Table 9-1, Note 5)

- Decision by the Minister of Forestry (1995) on Revision of the Decision by the Minister of Forestry Regarding AMDAL for Forestry Development (No. 218/Kepts-II/1994) (see Table 9-1, Note 3)
- Decision by the AMDAL Committee Chairman and Director General of Natural Protection Regarding Standards for the Preparation of Environmental Control Measures and Environmental Monitoring Measures (1994)¹

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In addition to the above, laws, ordinances and regulations related to UKL-UPL are listed in Appendices I-3.

③ Process of Environmental Control and Monitoring Measures (UKL and UPL) Preparation

A recommended consultant² was selected based on experience in the environmental field from a list of consultants registered with the Directorate General of Reforestation and Land Rehabilitation of the Ministry of Forestry and consigned to prepare the environmental impact assessment survey, and the UKL and UPL.

Following explanation and discussion of the Draft Final Report (December 1997), the Directorate General of Reforestation and Land Rehabilitation held a meeting on December 17, 1997 to explain and discuss the draft UKL and UPL regarding the Social Forestry Development Project in the Upper Musi Watershed. Amendments and adjustments concerning the final report were made by the consultant based on guidance from the Directorate General of Reforestation and Land Rehabilitation. It was scheduled for the consultant to present the UKL and UPL final report³ to the Technical Cooperation Division, Directorate of Planning and Programming, Directorate General of Reforestation of the Ministry of Forestry.

This section gives an outline report of UKL-UPL based on the December 17, 1997 draft UKL-UPL prepared with the environmental impact assessment survey and its findings.

Keputusan Direktur Jenderal Perlindungan Hutan dan Pelestarian Alam/Ketua Komisi Pusat AMDAL Departemen Kehutanan tentang Pedoman Teknis Penyusunan Upaya Pengelolaan Lingkungan (UKL) dan Upaya Pernantauan Lingkungan (UPL) Nomor: 222/Kpts/DJ-VI/1994

² PT. BAKTI MULTIPERSADA (Tel.; (021) 8626493, Fax.; (021) 8626494, Puri Sentra Niaga Blok No. 30., JI. Raya Kalimalang, Jakarta Timur 13620) Researchers of Bogor University of Agricultural Science cooperated on the research and preparation of the report (see Appendix 1-4).

³ Since the English version of UKL-UPL is a translation, the Indonesian version of UKL-UPL is the valid environmental management and monitoring measures.

e Social Forestry Development Project (1/2)
on for Negative Environmental Impacts in the So
Table 9-2 Outline of Consideration

Pavimum	Environmental Items Forecast to be	Degree	Degree of Environmental Impact ¹	imental	Connection of Maritina Tunian	Project Countermeasures	Reference
Subje	Subject to Negative Impact ¹	Large	Middle	Small			
Social Lifestyle	Lifestyle of inhabitants - Non-voluntary resettlement		0		 It is possible that agencies of the Government of Indonesia may take non-voluntary resettlement measures against people who practice illegal cultivation in protection areas. In cases where there are prospective 	a) It is estimated (as a result of the environmental impact assessment study) that most illegal cultivators are nearby willage residents of relatives of local inhabitants who have migrated from other prefectures. Therefore, decisions regarding their disposition will be left to the discretion of authorized village social forestry promotion active areas have local conventment acenters.	Current Conditions • Land use and vegetation • Socioeconomic and cultural conditions • Workshop • Appendices and data
	 Conflict among people 		0		participants who live outside of Project Area within the protection forests, participants may be screened and the amount of land allotted to each reduced. Friction could easily arise in such a situation between participants and non- participating people.	 b) Local NCO will intervene in cases of conflict between inhabitants and government agencies or conflicts between inhabitants. c) Village social forestry promotion group will screen the qualifications of paracipants. If the procedures required by the committees are taken, inhabitants claiming rights (including non- villagers) will be able to obtain qualification for participation. 	concerning environmental consideration <u>Project</u> • Project in national forests • Organization and extension plan
Social Lifestyle	Systems and customs Systems and customs • Readjustment of common rights to forest use		0		© For inhabitants who still give priority to the old traditional boundantes of protection forests and existing eustoms it will be difficult to understand the concept of social forestry and some inhabitants may voice opposition to indomentation of the Protect.	a) Education regarding the concept of social forestry will be carried out through raising the mobility of extension advisors and encouraging information exchange among inhabitants by holding training programmes b) Regarding inhabitants who are opposed to the Project because of personal feelings, the social forestry information center will spend personal feelings.	Current Situation • Charactenstics of local community • Socioeconomic and cultural conditions Protect
	Reform of existing systems and customs		0		s 	ample time carrying out public relations activities concerning the concept of social forestry during the period of Project implementation.	• Organization and extension plan
Health and Hygiene	 Increased use of agricultural chemicals 			0	The use of agricultural chemicals will increase as a result of the development of private shrub land for coffee culturation. Depending on the routes through which	a) Training for farmers will teach them about the correct use of agricultural chemicals, chemicals with low negative impact on environment and human health and pet damage prevention and weeding measures that do not require the use of chemicals.	Current Conditions - Experience and water quality - Actual state of social forestry
	 Accumulation of residual toxicity (agricultural chemicals) 			0	interns purchases source of high possible that increased quantities of high toxicity chemicals such as paraquat, herbicide, insecticide of carcinogen organic chlorine etc. will be used. © Agricultural chemicals will also be used to raise healthy seedlings during the nursery period.	not require the use of chemicals will be adopted and only chemicals of low residual toxicity will be used if necessary.	Protect Protect on private land Plan Organizatioon and extension plan marketing status through KUD

Note 1) Taken from the results of outline scoping (see Appendix I-2)

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Table 9-2 Outline of Consideration for Negative Environmental Impacts in the Social Forestry Development Project (2/2)

Environmental Items Forecast to be	Degree of Environmental Impact ¹	of Environ Impact ¹	rnental	Contractive Interaction	Project Countermeasures	Reference	
Subject to Negative Impact	Large Middle	Middle	Small	כמונכוני מי ויכצאוריל ויוידאייי			
Changes in vegetation			0	© Construction of riparian afforestation and major facilities (nurseries, check dams, roads, extension facilities) may reduce surface	 a) Confirmed areas of rare flora and natural protection areas will be omitted from riparian afforestation and major facilities sites (buffer zones will be established). 	Current Conditions • Kare wildlife and habitat • Land use and vegetation	
Impact on tare species and indigenous wildlife			0	veccention and have a negative impact on rare species and their living environment.	b) Roads will not be planned in protection forest of 5 ha natural forest and secondary forest in order to avoid the destruction of natural landscape and living environments of rare wildlife.	<u>Proyect</u> • Project on private land • Infrastructure development plan	
Hydrology • Change of flow regime of surface water			0	 The establishment of major facilities may affect the flow regime of surface water. The intake of water by semi-temporary central nurseries and water supply facilities may affect the flow regime of surface water. 	 a) Many drainage facilities will be planned to promote water percolation into the ground. b) Small-scale facilities will be planned in a dispersed manner to ensure that the water intake per site is limited. The village nursenes will be used for nursing whenever possible. 	Current Situation - Hydrology and water quality - Land use and vegetation <u>Project</u> - Intrastructure development plan	
Water Quality - Water poliution and decline of water quality		· · · · · · · · · · · · · · · · · · ·	0	 Muddy water may be generated by the construction of roads and extension facilities works. Muddy water may be generated during construction of check dams and other major facilities. 	 a) The effective width of forest roads and in-site roads at major facilities will be paved in order to roduce bare land. Also, slopes will be planted with grass and plants. b) Local NGO, etc. will participate in order to strengthen the environmental monitoring setup during construction works. 	Current Conditions - Hydrology and water ounhty - Land use and vegetation <u>Project</u> - Project on private land - Infrastructure development plan - Organization plan - Monitoring and evaluation plan	

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(2) Outline Project Implementation Plan

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Table 9-3 shows gives a stage-separate outline of the Project implementation plan that was described in Chapter 7.

No.	Project Item	Quantity	Unit	Məin Materials	Main Power	Contents
1	Building of implementation organizations	1.0	Set			Establishment of advisory committees and social forestry information center
2	Procurement	1.0	Set			Social forestry information center-related officials (NGO, private sector, etc.), consultants, equipment and materials
3	Overall implementation plan preparation	1.0	Set			Preparation of technical guidelines and manuals, preparation of plan for social forestry center (public relations, support for KUD, etc.) and social forestry facilitator activities, etc., preparation of extension and training activities plan, etc.
4	System building for inhabitants participation	1.0	Set			Establishment of village social forestry village groups, leader training, study of implementation design in villages, advertisement for participants. procedures for participation.
5	Implementation design	1.0	Set			Design of civil engineering works and trial plots surveying of implementation sites, tender for civi engineering works

Table 9-3 Outline of the Project Implementation Plan (1/3) – Preparatory Stage –

Table 9-3 Outline of the Project Implementation Plan (2/3)– Facilities Construction and
Planting Implementation Stage (1) Civil Engineering Works --

No.	Project Item	Quantity	Unit	Main Materials	Main Power	Contents
1	Social forestry information center	1.0	Site	Concrete, bricks	Labor Heavy machinery	(Private land, semi-temporary central nursery field)
2	Semi-temporary central nursery	1.0	Site	Bamboo, timber	Labor	(Private land, approximately 1 ha)
3	Forest road construction	26.8	km	Gravel, asphalt	Heavy machinery Labor	Road width: 4.0 m, shoulder: 1.0 m (private land)
4	Check dam construction	16.0	Sites	Sediment, concrete	Heavy machinery Labor	Crown height: 8.0 m, dam length: 50 m, storage area: more than 2,000 m ² (private land)
5	Water supply facilities	1.0	Site	Concrete, pipes, pump	Labor	Target households: 200 households, reservoir: 20.0 m ³ , storage tanks: 3.0 m ³ \times 3, conveyance pipe: 400.0 m (Air Lanang private land)
6	Social forestry promotion village offices	30	Sites	Timber	Labor	Private land or national land

No.	Project Item	Quantity	Unit	Main Materia†s	Main Power	Contents
1	Social oriented rehabilitation	1,597	ha	Local species nursery stock		(Coffee fields in protection forest area)
				- [Altitude 900 - 1,500 m or m		7 species, altitude 901-1,500 m: 5 species, altitude ries]
2 a	Agroforestry complex	24,809	ha	Local species nursery stock	Labor	(Coffee fields on private land not of immature soil)
	development (Existent)			[Altitude 900	m or less:	7 species, altitude 901-1,500 m: 4 species]
2 Ь	Agroforestry complex development (Existent)	6,330	ha	Timber, bamboo	Labor	Wood-ferced conservation work (10-20 m intervals), bean family tree planting
	Soil conservation we 2 species (bean famil			(coffee fields cambisols)	on sloping	private land consisting of acrisols, andosols and
3 a	Agroforestry complex development(Newly)	2,145	Sites	Coffee Local species planting]	Labor nursery ste	(Private shrub land not of immature soil) ock (same as 2a.), farm crops [4 species, 2 years after
3 b	Agroforestry complex development(Newly)	545	ha	Timber, bamboo	Labor	Wood-ferced conservation work (10-20 m intervals), bean family tree planting
	Soil conservation work	2 species and cambi		mily, etc.) (coff	ce fields on	sloping private land consisting of acrisols, andosols
4	Conservation plantation development	418	ha	Bamboo seedlings,	Labor	(Other than private land immature soil rock)
				2 species of	nursery sto	ck (bean family)
5	Dry crops field improvement	1,442	ha		Labor	Bench terraces (5 m intervals) (Sloping private land consisting of acrisols, andosols and cambisols)
6	Riparian Afforestation	128.0	km	Bamboo seedlings	Labor	(Along main rivers, width: 10.0 m)
7	Social oriented border tree planting	30.0	km	3 local species nursery stock	Labor k	(Protection forest boundaries)

Table 9-3 Outline of the Project Implementation Plan (2/3)– Facilities Construction andPlanting Implementation Stage (2) Planting Related Works –

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Table 9-3 Outline of the Project Implementation Plan (3/3)

- Facilities Provision and Management Stage --

No.	Project Item	Quantity	Unit	Main Materials	Main Power	Contents
1	Social forestry information center	1.0	Site	Water	Electricity	Extension, training, public relations, coordination (private land, Semi-temporary central nursery land)
2	Semi-temporary central nurseries	1.0	Site	Seedlings, water	Labor	Raising of seedlings (private land), approximately 1 ha
3	Forest roads	26.8	km	Labor	Heavy machinery Labor	Vehicle transportation, maintenance and repair (private land)
4	Check dams	16.0	Sites	Young fish	Labor	Water storage, water use, fish cultivation (private land)
5	Water supply facilities	1.0	Site		Electricity	Water intake (Air Lanang private land)
6	Social forestry promotion village offices	30	Sites		Labor	Extension and implementation of social forestry
7	Model plots	300.0	Sites	Honey bees, cattle, goat	, Labor	30 villages alongside protection forest boundary, 10 plots per village, apiculture and animal raising (cows, goats)
8	Social oriented rehabilitation	1,597	ha		Labor	Collection of non-timber forest products, extension, forest monitoring (coffee fields in protection forest areas)
9	Agroforestry complex development (Existent)	27,372	ha		Labor	Coffee cultivation, collection of non-timber fores products, timber collection, extension
	Agroforestry complex development (Newly)					
	Conservation plantation development					
10	Dry crops field improvement / Soil conservation work	1,442	ha	Seedlings	Labor	Production of agricultural products (Stoping private land consisting of acrisols, andosots and cambisols)
11	Riparian afforestation	205	ha		Labor	Bamboo shoot picking (Along main rivers, width: 10.0 m)
12	Sociat oriented border tree planting	30.0	km		Labor	Collection of non-timber forest products, forest monitoring (Protection forest boundaries)

Note 1) Table 9-3 is in accordance with the format established in Note 1) of 9-3 (1) @.



(3) Current Environmental Conditions in the Project Area

Current environmental conditions in the Project Area were examined in Chapters 3 through 6. Tables 9-4 and 9-5 give a general survey of the Project Area.

In the survey of conditions in the environmental impact assessment survey, in addition to making use of data surveyed and collected for compilation of the Social Forestry Development Project, field surveys were carried out to gather supplementary data focusing mainly on flora and fauna, hydrology and water quality, aquatic lives, and socioeconomic and cultural conditions. The survey results and main data collected with respect to current environmental conditions are outlined in Appendix 1-5~12.

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No.	Item	Contents
1	Area of Project Area	52,832.54 ha
	Area of Target Area	Inside protection forest area : approx. 1,597 ha. outside protection forest area : approx. 29,019 ha.
2	Latitude and longitude	Approximately Lat. 3° 20' 3° 98' N. Long. 102' 21' 102'45' E.
3	Project Area boundaries	North: Dingin River and Kerinci Seblat National Park Boundary
		South: Provincial boundary
		East: Provincial road and Musi River (north of Curup)
		West: Rejang Lebong prefectural boundary
4	Altitude	275 – 2,457 m above sea level
5	Uses of the Project Area	Protection forest areas and private land mainly used for coffee cultivation (according to provincia and prefectural spatial plans)

Table 9-4	Survey of	the Project Area
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Note 1) Table 9-4 is in accordance with the format established in Note 1) of 9-3 (1) @.

Item	Description			
Land Ownership and Land Use, etc.	Rough ratio of own land on coffee field: 70 - 90%			
Main Economic Activity	Cultivation of coffee			
Local Customs/Systems	Common right to forests: the lower elevation side of the national forest boundaries established in the Dutch colonial period used to be sites for customary use by local inhabitants. Water rights and fishing rights: details unknown			
Local Inhabitants	Mainly indigenous Rejang people. With the increased arrival (resettlement) of people with different ethnic backgrounds from other parts of Indonesia, the local customs in daily life are being erected. It is unknown if there are minority ethnic groups living in the high elevation mountain areas.			
Public Health	Outbreaks of such contagious diseases as malaria and cholera have been recorded in the past Skin diseases are also reported.			
Population	Total population: approx. 120,000Population density: 160 - 235 persons/km²Natural growth rate: annual average of 2.3%Settlers - compulsory settlement up to 1974 voluntary settlement since 1975Highly populated areas :along the main road to the east of Musi River			

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Table 9-5 Outline of Environmental Elements in the Project Area (1/3)

Table 9-5 Outline of Environmental Elements in the Project Area (2/3)

Item	Description				
Climate	Annual rainfall: 2,500 - 3,700 mmMonthly rainfall: 270 - 480 mm (highest months: November - January and March); 90 - 170 mm (lowest months: June - August)				
	Mean annual temperature : 23.9°C Mean monthly temperature : 28.8 - 30.9°C (highest months: April - June); 19.0 - 21.4°C (lowest months: July - August)				
Hydrology and Drainage	Main channel of Musi River Tributaries: A. Dendan, A. Mundu, A. Pikat Kering, A. Lanang and A. Teretik, etc.				
Topography	Rough elevation guidance: 2,475 m (north) to 275 m (south) Many mountains and steep sloping land				
Soil	In general, acidy and fine to medium-grained. Special soil: wettish/swampy soil				
Vegetation	Main crops : coffee Main land cover : coffee fields Forests : secondary, natural and man-made forests Forest type : lowland rain forest - quasi-lowland rain forest - mountain rain forest				
Rare Wildlife and Nature	Rare flora possibly found in the area : three species, including RafflesiaRare fauna possibly found in the area : five genera • species, including Sumateran tigerRare nature : natural forests (quasi-fowland forest - mountain forest)				

Special Locational Conditions to be Noted		Relevance					
		Inside Project Area			Outside Project Area		
(Specially Designated Area)							
S1: Habitat of flora and fauna covered by Washington Convention		Ν	U	(\mathbf{Y})	N	U	
S2: Habitat of birds protected by bilateral treaty, etc.	Y	N	0	Y	N		
S3: Wetland specified by Ramsar Convention		(\mathbb{N})	U	Y	(\mathbf{N})	U	
S4: Designated area by World Heritage Convention		(\mathbb{N})	U	Y	(บ	
S5: Protection Forest		N	U	\odot	N	U	
S6: Natural Park		\mathbb{N}	U	\odot	N	U	
S7: Protection Forest/Nature Reserve		N	<u> </u>	\odot	N	U	
(Social Environment)				1			
S8: Indigenous people/minority group		N	U	\odot	N	U	
Site of historical remains, cultural heritage or exceptionally, beautiful landscape	Y	N	U	\odot	Ν	U	
S10: Area of economic activity causing with much negative impact	Y	N	U	Y	(\mathbb{N})	U	
(Natoral Environment)	-						
S11: Arid or semi-arid area (including savannah, rangeland, etc. and arid tropical forest)		N	U	Y	\mathbb{N}	U	
S12: Monsoon forest area		(\mathbb{N})	U	Y	R	U	
S13: Tropical rain forest area		Ν	U	\odot	N	U	
S14: Tropical highland forest are (including mossy forests)		N	U	\odot	N	υ	
S15: Wetland (swamp)		N	U	Y	N		
\$16: Peat moor		Ν		Y	N		
S17: Mangrove forest belt		(\mathbb{N})	U	Y	(\mathbb{N})	U	
S18:Coral reef		(\mathbb{N})	U	Y	\mathbb{N}	ម	
S19: Rocky land, steep land, eroded land and devastated land		N	U	\odot	N	υ	
S20: Closed water body (lake, pond and artificial reservoir)		Ν	U	\odot	N	U	

Table 9-5 Outline of Environmental Elements in the Project Area (3/3)

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Note: Y = yes, N = no, U = unknown

(4) Forecast of Major Impacts

Using the results of the above-mentioned examination and based on existing legislation, research cases from similar projects and experiences of the experts, assessment was carried out on the nature, seriousness and degree of environmental impacts that will occur as a result of Project implementation. Table 9-6 gives an outline of the forecast and assessment results.

(5) Environmental Control Measures

With respect to the items that are forecast will be subject to major impact, environmental control measures were examined for execution in the stages of Project preparation and implementation, to reduce negative impact and to increase positive impact (see Table 9-6). Moreover, to ensure that the items expected to have positive impact will not give negative impact by implementation of the Project, it is necessary to maintain an implementation setup so that the Project is carried out according to plan.

(6) Environmental Monitoring Measures

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With respect to the items that are forecast will be subject to major impact, environmental monitoring measures were examined for execution in the stages of Project preparation and implementation (see Table 9-6).

(7) Implementation Setup for Environmental Control and Monitoring Measures

The agencies concerned with the implementation of the above-mentioned environmental control and monitoring measures are as indicated below.

① Control and Monitoring Implementing Agencies:

Cooperation between the Sub-Centre of Land Rehabilitation and Soil Conservation of Ketahun and universities (possessing biology and forestry studies departments)

- ② Control and Monitoring Responsible Agencies:
 - The Directorate General of Reforestation and Land Rehabilitation and the Directorate General of Natural Conservation of the Ministry of Forestry
 - The Environmental Control Agency (BAPEDAL)
- ③ Sites for Public Posting of Control and Monitoring Results:
 - Sub-Centre of Land Rehabilitation and Soil Conservation of Ketahun
 - Living Environment Planning Division (provincial government)
 - Regional Forestry Office
 - Regional Forestry Office of Bengkulu Province
 - Environmental Control Agency
 - Universities
 - Social Forestry Village Groups (new organizations in each village)

9.4 Items to be regarded in the implementation of the Project

As discussed in 9.1~3, the Social Forestry Development Project thoroughly considers the environment through a two-staged approach: environmental consideration and environmental impact assessment survey in the Project formulation stage; and preparation of environmental management and monitoring measures. Negative environmental impact foreseen from the Project implementation may be prevented by attending to the environmental considerations in its implementation. However, the anticipated positive impact may have a negative environmental impact from the Project implementation if environmental considerations are not carried out in its implementation. This section examines the management of environmental considerations in the implementation will be supported by the consultant service, mainly in the preparatory stage and facility and planting implementation stages (see 7.12).

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(1) Plan and design works that include environmental considerations in the implementation plan and design

In the preparatory stage of the implementation plan and design, the plan contents will be further examined for the items brought up in the preparatory process of UKL-UPL, mainly environmental factors anticipated to be subject to negative impact, in order to reduce the negative impact foreseen in UKL-UPL. Major items to be examined are shown in Table 9-7.

(2) Preparation of environmental monitoring and conservation implementation plan, and environmental monitoring and conservation measures implementation.

While environmental control and monitoring measures of UKL-UPL are revised following the implementation plan and design, the implementation plan will be prepared regarding necessary environmental monitoring and conservation measures, mainly environmental factors anticipated to be subject to negative impact, in order to concretely execute environmental control and monitoring. Items expected to require environmental monitoring and conservation measures are shown in Table 9-7.

Based on the prepared environmental monitoring and conservation plan, the Project body should implement the environmental monitoring and conservation measures by taking budgetary measures. Draft UKL-UPL proposed a system that implements the environmental monitoring and conservation measures, mainly in cooperation with the Sub-Centre of Land Rehabilitation and Soil Conservation of Ketahun/Bengkulu and universities with departments of biology and forestry.

(3) Environmental conservation supervision

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Supervision is necessary to fully realize the plan concept in the field at the time of facility construction and planting, so that measures may be taken for environmental factors foreseen to have negative impact and precautions may be made for those foreseen to have positive impact from changing to a negative impact by the Project implementation. Supervision will be conducted on physical, chemical, and biological environmental factors that cannot be fully covered by NGO: the facilitator of social forestry; communications staff; and the social forestry information center, such as soil/water quality (especially soil runoff measures at the civil engineering stage), fauna and flora (preparatory survey on living and growing conditions of rare species prior to construction, apart from the protection area), etc.

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	Category	No.	Environmental factors		.							65¥)aci		Tues	D.	6164 	Inspection netus	Environmental control i Method	Location	Monitoring iteras	Location	Period and	Monitoring
				Period	Within nation: bound D	al forest	•	®	Out	Cau side natio		(B)	9	All areas	Туре	Positive	Negative		PA USA	Excallor	Montoring ficins	EX SIGN	frequency	techniques
	A Physical and chemical factors	1	Hydrology		0		a b O	a b		a b	a b O►	abc (abcd	ab c	River flow rate	₹ F		Maximum flow in dry season Maximum flow in rainy season Annual flow distribution Soil ecosion	Appropriate implementation of Project conforming to technical specifications	All subject areas within Project area	River flow (Maximem and mininum flow)	 Pikat kering river, Tanjung Dalam village Ketapan river; Cirebon Baru village Teretik river; Lubuk Saung village Mendu river; Tabarenah village Deadan river; Tasikmalaya village 	During and after Project	River hydrology observation facility construction or flow measuring method (using buoy method or current networ)
		2	Soil		0		0				•		••••		Surface soil erosion rate River sediment accumulation	* +	-	TSS, TDS Check dam sediment accumulation	Appropriate implementation of Project conforming to technical specifications	All subject areas within Project area	• TSS, TDS • River sediment accumulation	Musi river, undecided Check dam construction sites Sumber Rejo village Sentral Baru village Sentral Baru village Air Mundu village Baru Manis village Air Pikat village Pagar Gunung village Air Lanang village Dutaran Tapus village Dusun Bawah village Luguk Bar village Tanjung Alam village	• TSS, TDS Once per month During and following implementation • Once anoually (beginning of dry season) During and following implementation	 Laboratory analysis of TSS and TDS of sampling water Stick method for sediment accumulation depth measurement
		333	Water quolity		0		0	0	0	0	0->	0			River water quality	* +		Covernment ordinance No. 20 (categories A and B) of 1990 regarding water pollution control, and similar ordinances of local governments	 Clarifying responsibilities of Project-related government agencies (Ministry of Forestry, local governments, etc.), and cooperation among organizations, and with NGO Environmental education and information publicity regarding Project henefits for local inhabitants Regular monitoring, and penalty system for inhabitant activities that are disadvantageous to Project (felling of upper trees or riparian forests for soil conservation purposes, and insecticide use) 		pH, DO CO, hardness N- NH, BOD, COD Color, turbidity TSS, electric conductivity, water temperature, insecticides	 Lanang river: Suro Bali village Pikat kering river: Tanjung Dalam village Ketapan river: Cirebon Baru village Teretik river: Taba Padang village Mundu river: Tabarenah village Dendan river: Tabarenah village Musi river: Lubuk Penyamun village Musi river entrance: Seguring village Musi river dam site: Ujan Mas Bawah village Musi river cait: Kunduran Baru village 		Field survey (pH, DO, CO, ekcuric conductivity) Laboratory analysis (N-NH, hardness COD, BOD, TSS, insecticides)
		36			0		0	0		0	0				Well water qualit	y #+		\$	\$	~	pH, DO CO, hardness N- NH, BOD, COD Color, hardnes TSS, electric conductivity, water temperature, insecticides	 Air Sclimang village Ujan Mas Bawah village Suro Bali village Tebat Monok village Tebat Lau village Sekaranu village Air Lanaag village Tabarenab village Tanjuag Dalam village Kampung Melayu village 	Twice annually (dry and raidy seasons)	 Field survey (pH, DO, CO, electrical conductivity) Laberatory analysis (N-NH, hardness COD, BOD, ISS, insecticides, nucroor ganisms)
	B. Biological factors)	Flora and faun	a	0										Flora and fauna	**		Species diversity Apokat and mahogany are not local species Concerns over influence o allelopathy of mahogany on other species Concerns over soil acidification in high elevation areas (1,000- 1,500 m or more) by planting of Merkus pine (<i>Pinus merkusii</i>) Surface cover Quantity and quality of wildlife habitats	• mixed planting of species	within Project area t	 Deterioration rate of natural vegetation (settkneent area within forest areas) Increase and decrease of species composition (both flora and fauna) Surface coverage rate 	urea	Once annually During implementation	Quantitative monitoring of changes at regular intervals by satellite image analysis or aerial photograph interpretation Field survey (qualitative monitoring)

Table 9-6 Outline of Environmental Control and Monitoring Measures, and Forecast Results of Serious Impacts in the Project area, with Regard to the Social Forestry Development Project (Draft: December 17, 1997)

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3			(actors	Period	Withie pation: bound	al forest			Out	Cat side nati	isë*			All areas	Type	D Positive	veree Negative		Method	Location	Monitoring items	Location	Period and frequency	Monitoring techniques
	Ì			1	©	Ø	(3) A b	(1) 3 b	\$	<u>ژ</u> ه م h	_	10 2) (§ abcdi	ĝj ab c										
					 					a U	0				Flora and fausa	*+		Surface coverage rate Quantity and quality of wildlife habitats Quantity and quality of bamboo production and harvest system	Mixed planting of species that provide non-wood forest products	All subject areas within Project area	0	4	4	3
					}	1	 					0			*			Theft of forest products	Measures against theft of forest products		*	*	3	*
		2	Aquatic organisms		0		0	0	0	0	0	0			Aquatic organisms	++		Precedent research by specialists	Appropriate implementation of Project conforming to technical specifications	All subject areas within Project area	Diversity and homogeneity of species Remaining species Donvinant species		Twice annually (dry and rainy seasons)	• Laboratory analy of collected samples
	C. Social, economic and cultural factors	1	Labor opportunities		0		0			•	0				Labor opportunities	**		Local Project-related labor	Priority employment and Project use of local people Priority for historical fandowners Training of workers and local Project participants	All areas in Project area	Labor opportunities	All villages in Project area	Twice annually (dry and rainy seasons) Once every five years	 Analysis of field interview survey results and secondary data Inspection of regular report (monthly, guarterly, annual from social fores) village group Interview for loc: people monitori (comparison with pre-Project implementation)
		2	Business opportunities		0		0			•	0		· ○ →		Business opportunities	++		Varieties and number of production businesses that are expected to grow	Training and financial support for existing production businesses Creation of business to augment value of Social Forestry Development Project Implementation of Social Forestry Development Project under definite system		Business opportunities		6	3
		3	Income lovel		0		<u> </u>			►	0		0	0	Income level	++		Household income	 Training with regard to independent enterprises Training and publicity in the agricultural field 	*	Income level	Ø	*	*
		4	Education level	-	0	1	0-	+	+		0		o•	0 0	Education level	++		Educational level and average of local people	Aid for educational facilities Introduction of scholarships	*	Education level	*	"	4
		5	Public health		0		0		-		0		○ ►	0 0	Public level	++		Infant mortality rate Life expectancy Number and percentage of medical facilities	Aid for public health facilities Increase of diffusion Development of social interaction	*	Public health	*	*	*
		6	Cultoral values		0		0				0		0	0	Cultural values	++		Change in concepts of agricultural livelihood and lifestyle	 Improvement of infrastructure Absorption of labor Increase of income 		Coltural values	*	*	2
		7	Inhabitant awareness of natural environment		Ó		0				0			0	Inhabitant awareness of natural environment	++		Participation level and concepts of environmental conservation and control Participants for Social Forestry Development Project Settlement region in forest areas	Establishment of demonstration plot for land management	>	Inhabitant awareness of natural environment	*	*	*
		8	Population		0	}	0-				0				Population	++		Extent of social problems and population density	Establishment of cooperation system with South Bengkul prefecture Prevention of social problems	a g U	Population	\$	*	*
		9	Organization		-				1					0 0	Organization	++		Degree of foundation and management of organization conforming to objectives	Promotion of new organization foundation by	*	Organization	5	*	*
	Note 1)	- 1	ject components			nted reh ated bos			(3) 12	Agrofor develop a. Uppe b. Soil c	estry col ment (E) r tree pla onservat	mplex cisting) anting tion	deve a. U b. Sc © Con	oforestry comp lopment (New pper free planti oil conservation servation planti lopment	ing I	Dry crops a. Planting b. Soil con	field improv servation	ement Ø Reinforce control a. Check	dams an afforestation	Infrastructure d a. Roads b. Semi-temport nursery c. Water supply	ery central	 Businesses not large dependent on land a. Cattle b. Goats c. Bees d. Ikan mas 	a. Su or b. In	rengthening of ganization crease in training d extension

2) Table 9-6 summarizes format established in Note 1) of 9.3 (1)2

Table 9-7 Major Examination Items and Measures of Environmental Consideration for Project Implementation

Project components	Environmental	N	legative impact		Examination items	Measures to be taken in Social Forestry Development Project	Measures at implementation planning and design stages		conservation and monitoring	Measures at environmental conservation and control stage
	factors	Types	Details	Division	Reasons for examination	rolesily tevelophicm roject	314663	Concept of environmental conservation measures	Concept of environmental monitoring	
1. Project in national forests (1) Social oriented rehabilitation	Biological factors	Flora and fauna		Species to be planted	Tocal species	• Project modification is unnecessary, since there is negligible impact on species diversity except within planting sites due to low natural reproducibility and little possibility of natural propagation	 a) If during discussions the participating inhabitants request alternative species (a vegetation survey will be conducted for species that meet Project needs, among local species except for apokat and mahogany) it should be altered. b) A vegetation survey should be conducted on natural reproduction in existing apokat and mahogany plantations. In the likelihood of influence on existing local species, the number of planting trees should be reduced. 		 a) A vegetation survey will be conducted once a year by establishing trial and fixed plots in existing apokat and mahogany plantations. 	
				a	© Concerns over allelopathy of mahogany	 Project modification is unnecessary, since planting has been practiced in the existing plantation within the protection forest (enlisted in national park after establishing the border), and no potential problems were identified. 	a) Sanie as above b)		a) Same as above	-
					③ Planting of Metkusi pine (Pinus merkusii) in high elevation areas (1,000-1,500 m or higher) might accelerate soil acidification	 Project modification is unnecessary, since the Project area of Merkusi pine (<i>Pinus merkusii</i>) is no more than 1,700 m above sea level and thus soil conditions for podzolization are less likely to occur. Moreover, the Project will avoid strong acid soil areas, and anticipated problems are considered less likely to occur. 	a) A soil survey is conducted in subject sites during implementation design, to evaluate the degree of acidity and decomposition of humus, in order to ensure against acidification	_	a) A soil survey (degree of acidity and decomposition of humus) is conducted once a year in subject sites	_
					Planting of other local species such as Manggis Cempedak, Jambu-jambua, Puspa, Mcdang, etc. should be considered	 Project modification is unnecessary, since the Project avoids tree species with spreading crowns that have negative impact on coffce production, and species without a market for non-wood forest products, from the aspect of coexistence with traditional culturing methods for cash crops such as coffce, the fundamental agriculture of participating inhabitants. 	a) Market research is conducted for non-wood forest products of proposed local species whose erown will not have a negative impact on coffee production. If a market exists, they will be adopted as planting species.	-		-
					A floor culture of medicinal herbs should be considered	 There are no plans, due to hindrance for management and harvest works, and no existing market as described above in Project modification is unnecessary 				
	Social, economic and cultural factors	Income level Cultural values Population Organization	 Income/household Change in concept for agricultural works and life style Population density Degree of social problems Establishment of organization and management conditions 	Incentive	S Actual economic ments and demerits for settlers cannot be estimated	 Not a Project subject, since the effect on household income cannot be estimated until the participants and their sections have been decided. 	 a) The effect on household income is estimated by conducting a survey of household income when the participants have been decided upon. 	a) In the event that a negative effect is estimated for household income, agricultural funds, etc. should be given priority.	a) A follow-up survey of household income will be conducted once a year for the trial plot participants, to examine the effect on household income, and problems and measures when there is a small effect.	
			managenk is considers	Ŭ	There is no system at present to stop inhabitants entering from without Project area					
(2) Social oriented border tree planting	Biological factors	Hora and fauna	Species diversity	Species to be planted	() Palmae exclusively	 The purpose of border tree planting is to make the border line readily visible from a distance. Since only the Palmae tree form suits this purpose. Project modification is unnecessary. 	a) During the course of discussions, if local people request border tree species that are readily visible from a distance, these species should be mixed in planting.			
2. Project within private land										
(1) Common to all sub- components	Biological factors	Flora and faun	a Species diversity	Species to be planted	© Same as 1. (1) © @Use of much fuel wood for sugar	Same as 1. (1) @	Same as 1. (1) @	Same as 1. (1) @		Some as I. (1) ®
	Social, economic and cultural factor		Social, economic and cultural	Incentive	refining © Economic merits and demerits for settlers cannot be estimated	coffee tree and coffee overwood Same as I (1) Social, economic and cultural factors	Same as 1. (1) Social, economic and cultural factors	Same as 1. (1) Social, economic and cultural factors		Same as 1. (1) Social, con and cultural factors
				Organization	Without a land control system (roles of inhabitants) after Project completion, land control might be practiced with no regard for Project intentions, in the event of absence or change of land owners.					

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Project components	Environmental	N	legative impact		Examination items	Measures to be taken in Social	Measures at implementation planning and design		conservation and monitoring	Measures at environmental conservation and control stage
	factors	Types	Details	Division	Reasons for examination	Forestry Development Project	stages		ges Concept of environmental monitoring	COnservation and control seag
2) Agroforestry complex development (Newly)	Biological factors	Flora and fauna	Species diversity	Subject sites	Land preparation in private shrub land might destroy habitats of rare species (rafflecia, etc.) outside areas where rare species are identified.	Areas with rare species are established as protection areas and excluded from the Project area.	Survey on flora and fauna will be conducted to confirm existence of rare species, impact on habitat and living environment of rare species.	Construction incusores	Existence and living environment of rare	Supervision will be conducted on the assessment before construction and management conditions with regard to the results of the assessment
	Physical and chemical factors	Seil	Softerosion	Soil conservation measures	 Cost performance of bench terraces with 15-40% inclination is low Construction of bench terraces of 40% with 5 m intervals is difficult and might cause landslides. 	The land-use plan of Rejang Lebong prefecture designates the sites with 15%-40% inclination as possible, but not optimum, coffee culture sites. From the aspect of river sediment accumulation, the soil crosion is low. However, since it must be considered in maintaining necessary land productivity to continue technical agricultural production, the land productivity should be maintained by constructing terraces. Therefore Project modification is unnecessary.	Appropriate terrace type should be selected according to local conditions of each section	Gully plug is installed downstream of terrace construction sites to prevent chance of landslide of terrace.	-	Supervision of construction appropriate to design concept the event of terrace construction.
4) Construction of check dams	Physical and chemical factors	Soil	Soil crusion	Soil conservation measures	① Application of measures for vegetation, and reduction of civil engineering type measures will suffice.	Check dam constructions are planned in catchment basins where the erosion is expected to exceed Indonesian critical land standards (14 t/ha, with soil solum 1 m or more) and the allowable soil erosion (20 t/ha.) in tropics. Measures for vegetation (agroforestry method; upper tree planting, etc.) are inadequate preventives. Therefore Project modification is unnecessary	- -	-		-
					© Establishment of river hydrology observation facility should be planned	Subject of environmental monitoring measures and not Social Forestry Development Project.		_	In the event of insufficient monitoring by the existing river hydrology observation facility, a new facility should be constructed.	
(5) Riparian afforestation	Biological factors	Flora and fauna	Species diversity	Subject sites	Land preparation for bamboo culture might destroy habitats of rare species (rafflecia, etc.) outside areas where rare species are identified.	Areas with rare species are established as protection areas and excluded from the Project area.	Same as 2. (2)	Same as 2. (2)		Same as 2. (2)
3. Infrastructure										
development (1) Roads	Biological factors	Flora and fauna	Species diversitys	-	• Access to national forests is facilitated and settlement increased	Better product access development to market is planned in major roads of private lands that have a sparse road network. This will not improve the access of national forests. Therefore Project modification is		The monitoring and publicity station of the socio forestry village group is established at each road terminal.	Border patrol of national forests, mainly road construction areas, is strengthened.	
					Dand preparation for planting might destroy habitats of rare species (rafilecia, etc.) outside areas where rare species are identified.	unnecessary. Areas with rare species are established as protection areas and excluded from the Project area.	Same as 2. (2)	Same as 2. (2)		Same as 2. (2)
4. Promotion of businesses that are not largely land- dependent										
	Social, economic and cultural factors		Social, economic and cultural		© Processing facility for non-woo forest products should be introduced.	d Unfamiliar technology for inhabitants is avoided, for inhabitar participation or oriented-type approach. Project modification is unnecessary.		If the local people become familiar with the new technology by reinforced training and publicity, the Social Forestry Information Center will serve as coordinator for the solicitir of private capital.	n	_
5. Common to all	-	•								
components	Common to physica	ी कॅंग्रेन संस्कृतिक किंग	ctors and biological factors		O There is no system appropriate Project implementation that conforms to technical specifications.	to People-oriented monitoring is planned, with mainly work rotation of NGO staff members. A secure NGO staff work rotation will perm Project implementation according technical specifications. Project modification is unnecessary.	ait			In addition to the NGO stat the Social Forestry Informa Center consultant participat field supervision to improve supervisory capability at implementation.

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CHAPTER 10.

TRIAL PLOT PROJECT IMPLEMENTATION PLAN

CHAPTER 10. TRIAL PLOT PROJECT IMPLEMENTATION PLAN

The trial plot project implementation plan is formulated in accordance with the previously mentioned basic concept and social forestry project implementation plan for the Project Area.

10.1 Trial Plot in National Forest

The Type A trial plot is intended to conserve protection forests, in particular areas upstream from dams, without stopping the collection of forest byproducts and use of forest land by local people.

(1) Survey of Type A Trial Plot

As shown in Fig. 10-1, the Type A trial plot is located south of Desa Air Lanang in Kec. Curup in the Bukit Daun protection forest to the western edge of the centre of the Project Area and covers an area of 305 ha.

In terms of current land use and vegetation, the plot consists of coffee fields (140 ha) and secondary forests (165 ha). The area of coffee fields in terms of elevation breaks down to 128 ha of land at El. 900 m or fess and 12 ha of land at El. 901 – 1,500 m.

(2) Plan for Type A Trial Plot

Table 10-1 gives outlines the Type A trial plot.

Trial Plot	Location	Current Land Use and Vegetation	Elevation (n)	Area (ha)	Work Contents
Type A (1 site)	Bukit Daun Protection Forest (Kec. Curup)	Coffee field	900 m or less	128	Social oriented rehabilitation
:			901–1,500 m	12	
		Secondary forest		165	No work
		Total		305	

Table 19	0-1	Outline o	f Type	A Trial Plot
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Species conversion will be carried out at the existing coffee fields by means of planting useful species (afforestation species and multi-purpose species).

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It will be possible to harvest coffee for approximately five years following the planting of useful species.

As the Dinas Kehutanan TK I is planning a bamboo project along the national forest boundary, the planned area for social oriented rehabilitation work will be separated by at least 500 m from the national forest boundary areas subject to the bamboo project.

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1) Planting Species

The species to be planted will be selected in the same manner as those for social oriented rehabilitation for national forests in the Project Area. Coffee fields will be divided into land at El. 900 m or less and land at El. 901–1,500 m and useful species suitable for each elevation level will be planted. Species suitable for El. 900 m or less are mahogany, damar mata kucing, durian, aren, jengkol, petai and kemiri. Species suitable for El. 901 – 1,500 m are merkussi pine, damar mata kucing, apokat, melinjo and kemiri.

2) Planting Method

The trees will be planted between October and February (rainy season). Around 400 afforestation trees (mahogany, damar mata kucing and merkussi pine) per hectare will be planted and multi-purpose trees (roughly 100 trees/ha) will be planted between them. Each tree species will be planted in alternating rows.

① The species and number of trees to be planted at coffee fields at El. 900 m or less are as follows.

Mahogany (200 trees/ha), damar mata kucing (200 trees/ha), durian (20 trees/ha), aren (20 trees/ha), jengkol (20 trees/ha), petai (20 trees/ha) and kemiri (20 trees/ha) will be planted.

The species and number of trees to be planted at coffee fields at El. 901–1,500 m are as follows.

Merkussi pine (200 trees/ha), damar mata kucing (200 trees/ha), apokat (30 trees/ha), melinjo (30 trees/ha) and kemiri (40 trees/ha) will be planted.

3) Tending

The planted trees will be tended at appropriate times.

4) Harvesting

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The harvesting ages of the multi-purpose species are shown in Table 7-2.

The planned area for the implementation of the Type A trial plot project is shown in Table 10-2 and the planting pattern is shown in Fig. 7-2.

Trial Plot		Planned Area		
Type A trial plot (1 site)	Social oriented rehabilitation	Planting of roughly 500 trees/ha of useful species (140 ha)		128 ha
			El. 901 - 1,500 m	12 ha

In order to clarify the location of each work area, the national forest trial plot project implementation plan map was prepared using the land use and vegetation map (scale 1/25,000). The respective work areas are shown in Fig. 10-1.

10.2 Trial Plots on Private Land

The Type B trial plots are intended to improve the welfare of local people and to mitigate forest devastation through the introduction of more rational methods of land use on private land.

- (1) Outline of Type B Trial Plots
 - 1) Trial Plot at Desa Tebat Pulau

As is indicated in Fig. 10-2, this trial plot is located on a roadside slope south of Desa Tebat Pulau in Perw. Pal Delapan and covers an area of 50 ha. Coffee cultivation is popular in this area and, because it is located in the upperstream of a dam catchment area, the effect in terms of water and soil conservation should be significant.

In regard to the current land use and vegetation, the whole area is covered by coffee fields. In terms of the crown density of upper trees, the crown density is 10% or less at 9 ha of land and between 31% and 70% at 41 ha. The elevation of the entire area ranges between 901 and 1,500 m.

In terms of soil and slope gradient, 6 ha of land consists of the Cambisols group with a slope gradient of 40% or more.

2) Trial Plot at Desa Tanjung Alam

As shown in Fig. 10-3, this trial plot is located on a roadside slope west of Desa Tanjung Alam in Perw. Ujun Mas and covers an area of 50 ha. Because this area is also located in the upperstream of a dam catchment area, the effect in terms of water and soil conservation should be significant.

In regard to the current land use and vegetation, the entire area is covered by coffee fields with an upper tree crown density of between 31% and 70%. The elevation range is 900 m or less for the entire area.

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In terms of soil and slope gradient, 25 ha of land consists of either the Andosols group with a slope gradient of 15-40% or the Cambisols group with a slope gradient of 40% or more.

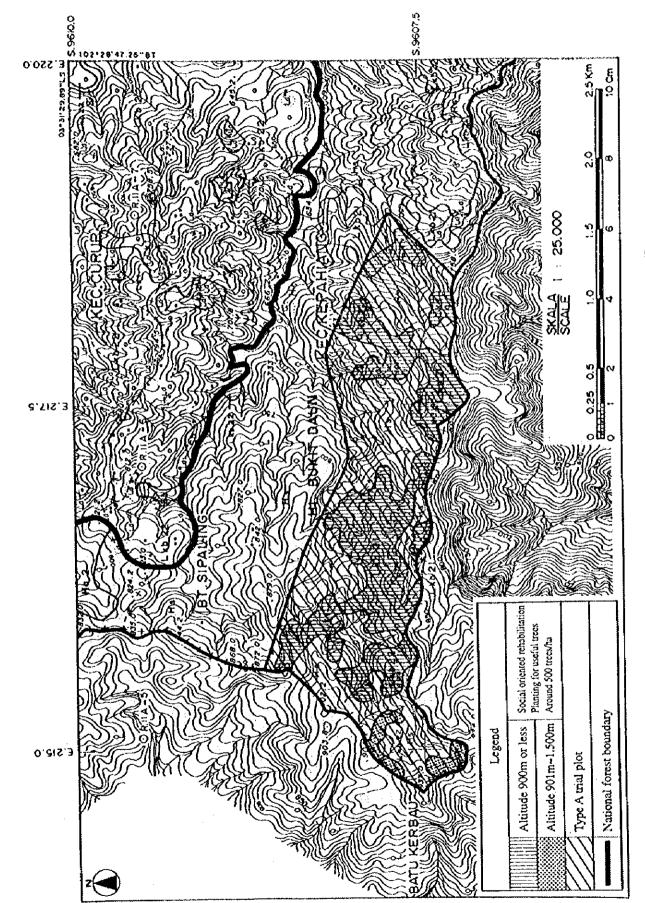
(2) Plan for Type B Trial Plots

At existing coffee fields, except for areas of LPR soil, agroforestry complex development (existing) will be carried out by means of improving upper trees and introducing soil conservation measures.

The B Type trial plot project implementation plan will be formulated in accordance with the work plan for private land in the Project Area.

1) Trial Plot at Desa Tebat Pulau

Table 10-3 outlines the Tebat Pulau trial plot plan.



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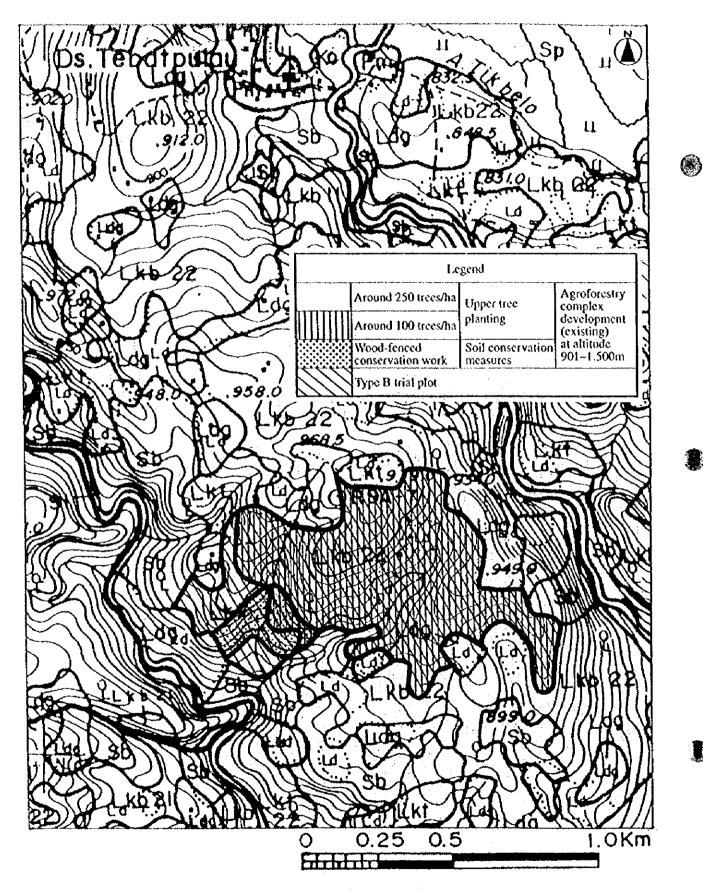
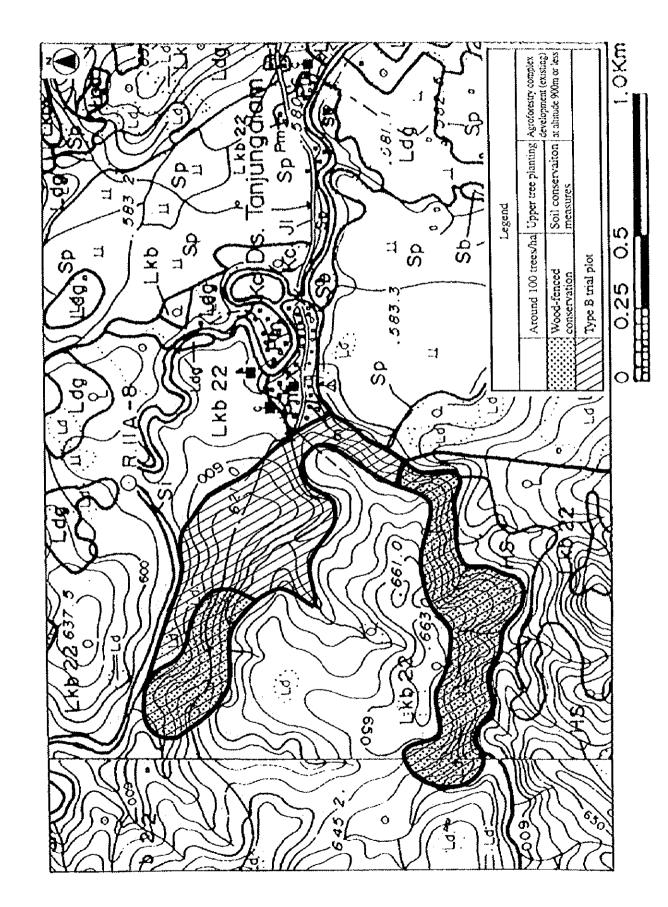


Fig. 10-2 Trial Plot Project Implementation Plan for Desa Tebat Pulau



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Fig. 10-3 Trial Plot Project Implementation Plan for Desa Tanjung Alam

Trial Plot	Current Land Use, Vege	station, Soil and Slope	Area (ha)	Work Contents	
Type B trial plot (1 site)	Coffee fields at EL. 901 - 1,500 m (50 ha)	Upper tree crown density 10% or less	9	 Agroforestry complex development (existing) 	
		Upper tree crown density 31-70%	41		
		Cambisols group with slope gradient of 40% or more	6	Wood-fenced conservation work	

Table 10-3 Outline of Tebat Pulau Trial Plot

- ① Planting of Upper Trees
 - a. Planting Species

The species for planting will be selected in accordance with the method described under social oriented rehabilitation.

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In regard to upper trees that are suitable for an elevation range of 901 - 1,500 m of the Tebat Pulau trial plot, suitable multi-purpose species are apokat, melinjo and kayu manis while a suitable shade species is lamtoro.

b. Increase of Crown Density of Upper Trees

In regard to coffee fields where the crown density of upper trees is currently 70% or less, trees will be planted at intervals of roughly 5 m \times 5 m (400 trees/ha when fully grown) in order to increase the said crown density.

a) Coffee fields where the crown density of upper trees is 10% or less

Useful species (100 trees/ha) and shade species (150 trees/ha) will be planted (250 trees/ha in total).

- b) Coffee fields where the crown density of upper trees is 31-70%Useful species (roughly 100 trees/ha) will be planted.
- c. Planting Method

The species and numbers of trees to be planted are as follows.

- a) Coffee fields where the crown density of upper trees is 10% or less
 Apokat (15 trees/ha), melinjo, (15 trees/ha), kayu manis (70 trees/ha)
 and lamtoro (150 trees/ha) will be planted.
- b) Coffee fields where the crown density of upper trees is 31-70%
 Apokat (15 trees/ha), melinjo, (15 trees/ha) and kayu manis (70 trees/ha) will be planted.
- d. Tending Method

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In regard to the tending of planted trees, the same method used in the case of agroforestry complex development (new) at private land in the Project Area will be adopted.

e. Harvesting

The cutting age of kayu manis will be five years.

The cutting ages of useful species and coffee are shown in Table 7-2.

② Soil Conservation Measures

In order to prevent soil erosion at coffee fields, wood fencing conservation works will be crected along the contour lines in areas of the Cambisols group with a slope gradient of 40 % or more.

In regard to materials for the wood fencing conservation work, cut coffee trees, bamboo and shade tree branches will be used for banding and kayu res which has an excellent sprouting capacity will be used for piles. The wood fencing conservation work will be repaired at an interval of 3 - 5 years.

The planned area for the Tebat Pulau trial plot project work is shown in Table 10-4 and the planting pattern is shown in Fig. 7-4. The standard cross-section of the wood fencing conservation work is shown in Fig. 7-5.

Trial Plot			Planned Area		
	Agroforestry complex development (existing) for coffee fields located at EL 901 - 1,500 m	Upper tree planting	250 trees/ha	9 ha 41 ha	
	a n. 201 - 1,200 m	Soil conservation measures	Wood-fenced conservation work	6 ha	

Table 10-4 Planned Area for Type B Trial Plot Project at Desa Tebat Pulau

Fig. 10-2 shows the Tebat Pulau trial plot project implementation map.

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2) Trial Plot at Desa Tanjung Alam

Table 10-5 outlines the Tanjung Alam trial plot.

Table 10-5	Outline of	Tanjung	Alam	Trial Plot
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Trial Plot	Current Land Use, Veg	Area (ha)	Work Contents		
	Coffee fields at Hl. 901 m or less (50 ha)	Upper free crown density 31-70%	50	Agroforestry complex development (existing	
		Andosols group with slope gradient of 15 - 40% or Cambisols group with slope gradient 40% or more	25	Wood fencing conservation work	

① Planting of Upper Trees

a. Planted Species

The species for planting will be selected in accordance with the method described under social oriented rehabilitation.

In regard to upper trees that are suitable for an elevation of 900 m or less at the Tanjung Alam trial plot, suitable multi-purpose trees are durian, aren, jack fruit, petai, kayu bawang and kayu manis.

b. Increase of Crown Density of Upper Trees

In regard to coffee fields where the crown density of upper trees is currently 31–70%, roughly 100 useful species trees per hectare will be planted in order to increase the said crown density.

c. Planting Method

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Useful species will be planted together with shade species at equal intervals. Kayu manis and aren, etc., which have a relatively low level of light intensity below the crown, will be planted at boundary sections away from the central areas of coffee fields.

The species and numbers of trees to be planted at coffee fields at El. 900 m or less and an upper tree crown density of 31-70% are as follows.

Durian (5 trees/ha), aren (5 trees/ha), jack fruit (5 trees/ha), petai (10 trees/ha), kayu bawang (5 trees/ha) and kayu manis (70 trees/ha) will be planted.

d. Tending Method

In regard to the tending of planted trees, the same method used in the case of agroforestry complex development (new) at private land in the Project Area will be adopted.

e. Harvesting

The cutting age of kayu manis will be five years and that of kayu bawang will be 10 years.

The cutting ages of useful species and coffee are shown in Table 7-2.

② Soil Conservation Measures

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

As materials for wood fencing conservation work, cut coffee plants, bamboo and shade tree branches will be used for banding and kayu res which has an excellent sprouting capacity will be used for piles. The wood fencing conservation work will be repaired at an interval of 3-5 years.

The planned area for the Tanjung Alam trial plot work implementation is shown in Table 10-6 and the planting pattern is shown in Fig. 7-4. The standard cross-section of the wood fencing conservation work is shown in Fig. 7-5.

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Table 10-6	Planned Are	a for Type B	Trial Plot	Project at Des	a Tanjung Alam
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Trial Plot		Planned Area		
Type B trial plot (1 site)	Agroforestry complex development (existing)	Upper tree planting	100 trees/ha	50 ha
	for coffee fields located at EI. 900 m or less	Soil conservation measures	Wood-fenced conservation work	25 ha

Fig. 10-3 shows the Tanjung Alam trial plot project implementation map.

The planned area, number of trees to be planted and breakdown of the trees to be planted in each work area under the trial plot work implementation plan are shown in Table 10-7, Table 10-8 and Table 10-9 respectively.

Trial Plot		Planned Area		
Type A (1 site)	Social oriented rehabilitation (140 ha)	Useful species (planting of 500 trees/ha)	El. 900 or less	128 ha
	Bukit Daun protection forest (Kec. Curup)		El. 901 - 1,500 m	12 ha
Type B (1 site)		Upper tree planting	250 trees/ha	9 ha
	for coffee fields located at EL 901 - 1,500 m Desa Tebat Pulau (Perw. Pal Delapan)		100 trees/ha	41 ha
		Soil conservation measures	Wood-fenced conservation work	6 ha
Type B (1 site)	Agroforestry complex development (new) for	Upper tree planting	100 trees/ha	50 ha
	coffee fields located at El. 900 m or less Desa Tanjung Alam (Perw. Ujan Mas)	Soil conservation measures	Wood-fenced conservation work	25 ha

Table 10-7 Planned Area for Trial Plot Project

Planned Species and Numbers of Trees Total Area Trees	128 ha Mahogany (200 trees/ha), damar mata kucing (200 trees/ha), durian (20 trees/ha), aren (20 trees/ha), jengkol (20 trees/ha), petai (20 trees/ha), kemiri (20 trees/ha)	 12 ha Merkusi pine (200 trees/ha), damar mata 6.000 kucing (200 trees/ha), apokat (30 trees/ha). melinjo (30 trees/ha), kemiri (40 trees/ha) 	140 ha 70.000	9 ha Apokat (15 trees/ha). melinjo (15 trees/ha). 2.250 kayu manis (70 trees/ha). lamtoro (150 trees/ha)	41 ha Anokat (15 trees/ha). melinio (15 trees/ha). 4.100	kayu manis (70 trees/ha)	kayu manis (70 trees/ha)
	500 trees/ha	500 trees/ha		250 trees/ha	100 trees/ha		
Work	Planting of useful El. 900 m or less species	E. 901 - 1,500 m	Subtotal	Upper tree planting El. 901 - 1.500 m			Subtotal
	Social oriented rehabilitation		_1	Agroforestry complex development (avieting)	(gamero)		
Location	A Bukit Daun S (1 site) protection forest, r Kee. Curup (305	Ĩ		BTebat Pulau,Agrofore(1 site)Perw. Pal Delapancomplex(50 ha)(50 ha)developm			
Trial Plot	Type A (1 site)			Type B (1 site)			

Table 10-8 Number of Trees to be Planted

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Location	Type A Pl	ot (1 site)	Type B Plots (2 sites)			
	Bukit Daun protection forest (Kee, Curup) Social oriented rehabilitation Planting of useful species		Desa Teb (Perw. Pal	at Pulau	Desa Tanjung Alam (Peaw, Ujan Mas)	
Work			Agroforestry	Total		
			Upper tree			
	EL 900 m or less	El. 901 - 1,500 m	El. 901 - 1,500 m		El. 900 m or less	
Species	400 trees/ha (128 ha)	400 trees/ha (12 ha)	250 trees/ha (9 ha)	100 trees/ha (41 ha)	100 trees/ha (50 ha)	
Aren	2,560	0	0	0	250	2,810
Durian	2,560	0	0	0	250	2,810
Jengkol	2,560	0	0	0	0	2,560
Kemiri	2,560	480	0	0	0	3,040
Melinjo	0	360	135	610	0	1,110
Jack fruit	0	0	0	0	250	250
Apokat	0	360	135	610	0	1,110
Petai	2,560	0	0	0	500	3,060
Merkusi pine	0	2,400	0	0	0	2,400
Damar mata kucing	2,560	2,400	0	0	0	28,000
Mahogany	2,560	0	0	0	0	25,600
Kayu bawang	. 0	0	0	0	250	250
Kayu manis	0	0	630	2,870	0	7,000
Lamtoro	0	0	1,350	0	3,500	1,350
Total	64,000	6,000	2,250	4,100	5,000	81,350

Table 10-9 Breakdown of Trees to be Planted by Work Type

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