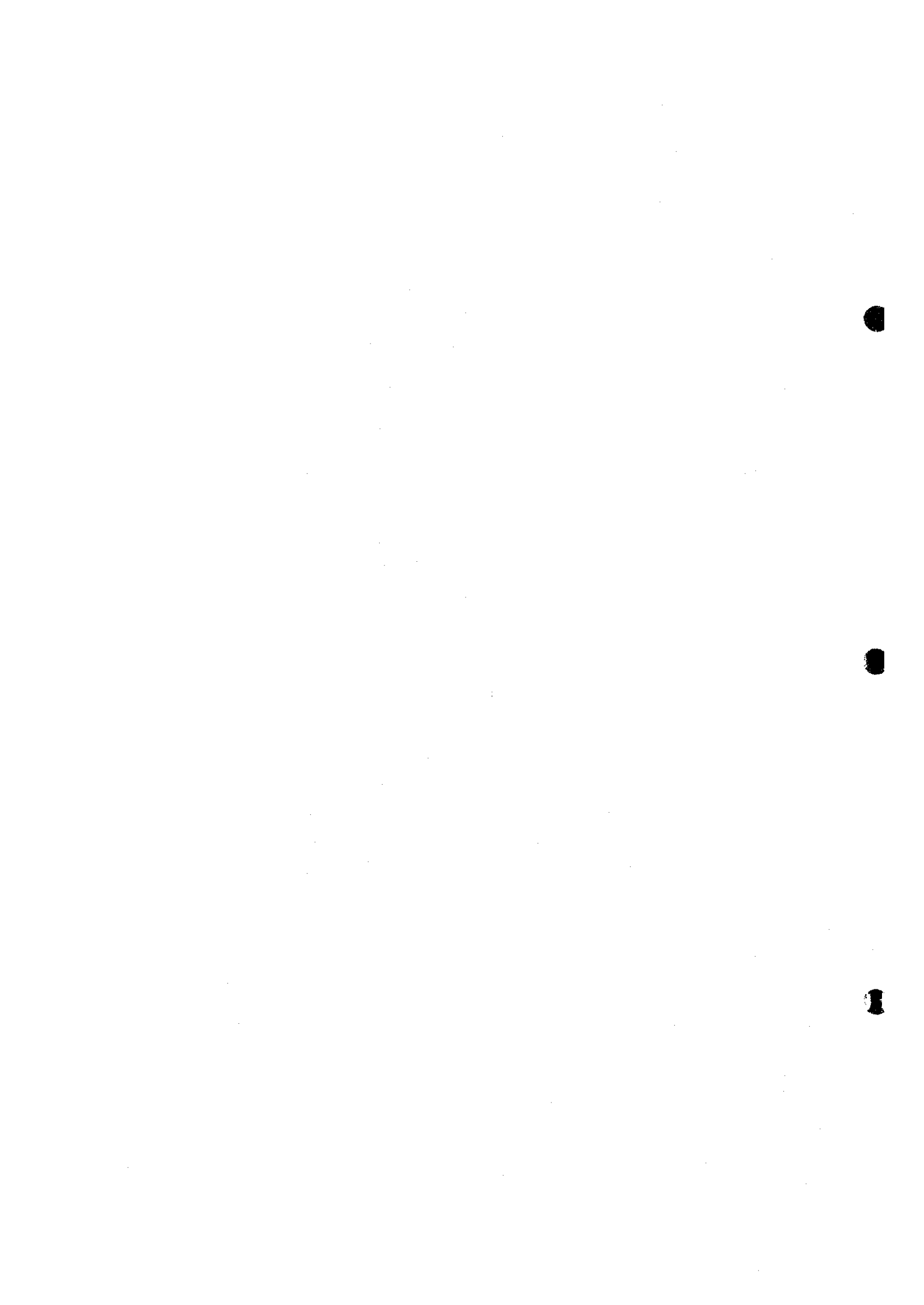


CHAPTER 8.
PROJECT ANALYSIS



CHAPTER 8. PROJECT ANALYSIS

8.1 Technical Analysis

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.

Table 8-1 Components of Social Forestry

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 (both existing and new)	Upper tree planting (fruit trees, etc.) 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
	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)

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 civil 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

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.

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

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	2. Support will be provided to landless young people through new projects.	Completely compatible
3. Land use respecting existing boundary trees/bamboo and markings	3. Work will be divided between individuals with respective responsibility being made clear.	Practical in terms of progress control and management
4. Village structure is guided by LMKD, LMD and customary law and religious leaders.	4. 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.

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

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.

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

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 Dipozit (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 Indonesia 1996

(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

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)

Table 8-3 Results of Financial Analysis
Financial Analysis
Project Effect

	Cost estimation			Benefit Estimation			Incremental NCF (f)-(g)
	Project Plan(a)	Without project(b)	Difference(c)=(a)-(b)	Project Plan(d)	Without project(e)	Difference(f)=(d)-(e)	
1	5,810	50,550	-44,740	5,377	119,160	-113,783	-69,044
2	21,467	54,088	-32,621	31,806	127,502	-95,696	-63,074
3	37,949	57,874	-19,925	51,147	135,106	-77,959	-59,034
4	55,188	61,925	-6,737	85,899	143,622	-57,723	-50,985
5	74,861	56,260	8,601	118,565	152,667	-34,102	-42,703
6	95,841	69,460	26,380	160,396	161,736	-1,341	-27,721
7	115,025	74,323	40,703	207,510	173,058	34,452	-6,251
8	118,430	79,525	38,904	233,552	132,562	100,989	62,025
9	127,308	85,092	42,216	259,875	104,313	155,562	113,346
10	136,734	91,048	45,685	281,057	71,460	209,596	163,911
11	149,413	235,828	-86,415	301,611	159,053	142,559	228,974
12	182,134	169,044	13,090	338,751	170,186	168,565	155,475
13	218,539	120,329	98,210	380,312	112,138	268,174	169,964
14	239,601	128,762	110,839	397,887	172,623	225,264	114,415
15	262,284	137,765	124,519	433,286	241,026	192,260	67,741
16	288,559	147,408	141,151	494,136	318,160	175,977	34,326
17	307,957	157,727	150,230	569,464	340,431	229,034	78,803
18	339,890	168,768	171,122	612,825	364,261	248,564	117,441
19	392,725	180,582	112,144	656,732	389,759	266,973	154,829
20	310,964	193,222	117,742	737,050	417,042	320,018	202,276
21	333,348	206,748	126,600	816,492	446,235	370,257	243,657
22	353,757	221,220	132,537	880,137	477,472	402,665	270,129
23	376,133	236,706	139,427	939,319	510,895	428,425	288,998
24	402,393	253,275	149,118	1,002,609	546,657	455,952	306,834
25	430,552	271,004	159,548	1,072,445	584,923	487,522	327,974
26	467,849	289,975	177,874	1,164,926	625,868	539,058	361,184
27	501,115	310,273	190,842	1,242,715	669,679	573,036	382,194
28	539,799	331,992	207,807	1,339,122	712,974	626,148	418,341
29	581,870	355,231	226,639	1,397,231	762,570	634,660	456,932
30	626,900	380,097	246,802	1,409,353	792,529	616,824	444,324
Total	7,954,445	5,186,092	2,768,353	17,626,596	9,060,756	8,565,840	5,797,487

Inflation rate 7%
Discount Rate(nominal) 18%
1 Present Values of benefits in nominal terms (Without Project) 878,698
Present Values of costs in nominal terms (Without Project) 470,308
Net Present Values (Without Project) (1) 408,390
Cost Benefit Ratio 1.87
2 Present Values of benefits in nominal terms (With Project) 997,233
Present Values of costs in nominal terms (With Project) 529,666
Net Present Values (With Project) (2) 467,568
Cost Benefit Ratio 1.88
3 Incremental Net Present Value (2)-(1) 59,178
Internal Rate of Return 20.6%

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

Discount Rate 18%

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+Bee+Ikanmas		3,722	0.4
Riparian Afforestation		757	0.1
WF & Terrace		7,220	0.7
Prev. Soil Flow		1,829	0.2
Prev. Soil Fertility		1,048	0.1
Total		997,233	100.0

The following table shows the result of the analysis:

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 56,301million 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 foreseen 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.

2) 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

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 II-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.

Table 8-5 Cash Flow of an Average Farmer in Private Land (farming Area, 1.375 ha)

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

1.375 ha

Year	Cost Estimation (p. 5) ha			Benefit Estimation (p. 20) ha			Net Cash Flow for Project			Cash Flow of an average farmer (1.375 ha)					Net Cash Flow	Accumulative NCF	
	Famer A/C	Project (Government) A/C	Total Cost	Original Estim. (Inf. New Estim.)	Original Estim. (Inf. New Estim.)	Famer A/C	Project	Net Cash	Project Cost	Original Estim. (Inf. New Estim.)	Original Estim. (Inf. New Estim.)	Project Benefit	Tax	Benefit			Family Labor
1	82,000,000	87,740,000	169,740,000	82,184,750	87,929,750	170,114,500	170,114,500	170,114,500	2,412,800	1,738,458	3,151,258	3,151,258	3,151,258	3,151,258	100,000	0	5,302,516
2	93,000,000	95,713,840	188,713,840	122,329,238	122,329,238	244,658,476	244,658,476	244,658,476	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	6,507,425
3	110,200,000	124,989,739	235,189,739	134,999,739	134,999,739	269,999,478	269,999,478	269,999,478	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	9,662,334
4	110,200,000	144,449,720	254,649,720	144,449,720	144,449,720	288,899,440	288,899,440	288,899,440	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	12,817,243
5	110,200,000	154,581,201	264,781,201	154,581,201	154,581,201	313,162,402	313,162,402	313,162,402	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	15,972,152
6	115,200,000	172,894,137	288,094,137	179,181,710	179,181,710	358,363,420	358,363,420	358,363,420	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	19,127,061
7	115,557,500	193,380,993	308,938,493	189,599,993	189,599,993	379,199,986	379,199,986	379,199,986	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	22,281,970
8	114,700,000	197,073,955	311,773,955	197,073,955	197,073,955	398,147,910	398,147,910	398,147,910	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	25,436,879
9	115,200,000	211,780,501	326,980,501	211,780,501	211,780,501	417,160,411	417,160,411	417,160,411	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	28,591,788
10	115,200,000	228,613,938	343,813,938	228,613,938	228,613,938	436,174,876	436,174,876	436,174,876	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	31,746,697
11	124,871,500	262,939,021	387,810,521	262,939,021	262,939,021	525,878,042	525,878,042	525,878,042	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	34,901,606
12	223,073,150	304,491,396	527,564,546	304,491,396	304,491,396	614,985,792	614,985,792	614,985,792	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	38,056,515
13	170,520,250	371,193,611	541,713,861	371,193,611	371,193,611	700,387,222	700,387,222	700,387,222	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	41,211,424
14	170,520,250	392,007,998	562,528,248	392,007,998	392,007,998	739,535,246	739,535,246	739,535,246	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	44,366,333
15	142,680,250	471,713,482	614,393,732	471,713,482	471,713,482	828,206,964	828,206,964	828,206,964	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	47,521,142
16	133,108,750	491,991,460	625,099,210	491,991,460	491,991,460	867,190,420	867,190,420	867,190,420	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	50,676,051
17	133,108,750	515,088,892	648,197,642	515,088,892	515,088,892	906,174,876	906,174,876	906,174,876	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	53,830,960
18	133,108,750	491,991,460	625,099,210	491,991,460	491,991,460	867,190,420	867,190,420	867,190,420	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	57,000,870
19	133,108,750	515,088,892	648,197,642	515,088,892	515,088,892	906,174,876	906,174,876	906,174,876	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	60,155,779
20	133,108,750	538,186,324	671,294,074	538,186,324	538,186,324	945,159,332	945,159,332	945,159,332	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	63,310,688
21	133,108,750	561,283,756	694,390,506	561,283,756	561,283,756	984,143,788	984,143,788	984,143,788	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	66,465,597
22	133,108,750	584,381,188	717,485,938	584,381,188	584,381,188	1,023,128,244	1,023,128,244	1,023,128,244	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	69,620,453
23	133,108,750	607,478,620	740,580,370	607,478,620	607,478,620	1,062,112,700	1,062,112,700	1,062,112,700	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	72,775,362
24	133,108,750	630,576,052	763,675,802	630,576,052	630,576,052	1,101,102,156	1,101,102,156	1,101,102,156	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	75,930,271
25	133,108,750	653,673,484	786,770,234	653,673,484	653,673,484	1,140,091,612	1,140,091,612	1,140,091,612	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	79,085,180
26	142,871,500	676,770,916	819,642,416	676,770,916	676,770,916	1,179,081,068	1,179,081,068	1,179,081,068	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	82,240,089
27	137,375,000	699,868,348	837,243,348	699,868,348	699,868,348	1,218,070,524	1,218,070,524	1,218,070,524	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	85,394,998
28	137,375,000	722,965,780	860,340,780	722,965,780	722,965,780	1,257,060,980	1,257,060,980	1,257,060,980	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	88,549,907
29	137,375,000	746,063,212	883,438,212	746,063,212	746,063,212	1,296,050,436	1,296,050,436	1,296,050,436	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	91,704,816
30	137,375,000	769,160,644	906,535,644	769,160,644	769,160,644	1,335,040,892	1,335,040,892	1,335,040,892	1,311,509	1,843,400	3,154,909	3,154,909	3,154,909	3,154,909	0	0	94,859,725
Total	3,955,978,000	4,154,000,000	8,109,978,000	3,955,978,000	3,955,978,000	8,109,978,000	8,109,978,000	8,109,978,000	15,972,152	18,434,000	31,406,152	31,406,152	31,406,152	31,406,152	0	0	314,061,515

(Note) The net cash flow for an average farmer has been obtained in the following way:
NCF=(Project Benefit-Family Labor-Payment from the Government)-(Famer's Project Cost-Infated Using Expenses)*Tax Payment

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 II-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 II-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

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 sales 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 \times sales amount).

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%.

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

	Cost estimation		Difference (c)-(b)		Project Plan (d)		Benefit Estimation		Difference (f)-(e)		Incremental NCF (f)-(c)
	Project Plan (e)	Without project (b)	Difference (c)-(b)	Project Plan (d)	Without project (e)	Difference (f)-(e)	Without project (e)	Difference (f)-(e)			
1	5,545	49,582	-44,037	5,377	119,160	-113,783					-69,746
2	20,746	53,053	-32,307	31,803	127,502	-95,698					-63,391
3	36,664	56,766	-20,102	57,141	135,106	-77,965					-57,862
4	53,328	60,740	-7,412	85,890	143,622	-57,732					-50,320
5	72,341	64,992	7,349	118,554	152,667	-34,113					-41,462
6	92,733	68,103	24,630	160,380	161,736	-1,356					-25,986
7	111,208	72,871	38,337	207,491	173,058	34,433					-3,904
8	114,417	77,972	36,445	233,529	182,562	100,967					64,521
9	122,903	83,430	39,474	259,848	194,313	155,535					116,061
10	132,004	89,270	42,734	281,025	209,555	209,555					166,830
11	144,353	93,667	50,686	301,575	228,836	228,836					228,836
12	175,659	163,522	12,137	338,712	170,186	168,526					156,388
13	210,464	117,937	92,527	380,270	112,138	268,132					175,605
14	230,823	126,192	104,630	397,842	172,623	225,219					120,589
15	252,649	135,026	117,623	433,238	241,026	192,212					74,588
16	277,864	144,478	133,386	494,087	318,160	175,928					42,541
17	296,045	154,591	141,453	569,415	340,431	228,984					87,530
18	288,334	165,412	122,921	612,775	364,261	248,514					125,593
19	281,654	176,991	104,662	656,679	389,759	266,920					162,258
20	298,915	189,381	109,535	737,003	417,042	319,961					210,426
21	320,274	202,637	117,636	816,431	446,235	370,196					252,560
22	339,560	216,822	122,738	880,072	477,472	402,601					279,862
23	360,604	231,999	128,604	939,250	510,895	428,356					299,551
24	386,005	248,239	137,766	1,002,535	546,657	455,878					318,112
25	413,019	265,616	147,403	1,072,366	584,323	487,442					340,039
26	449,034	284,209	164,825	1,164,841	625,368	538,973					374,148
27	481,232	304,104	177,128	1,242,624	669,679	572,945					395,817
28	518,668	325,391	193,276	1,339,025	712,974	626,051					432,775
29	559,470	348,169	211,301	1,397,127	763,467	683,467					472,166
30	603,442	372,540	230,902	1,408,242	818,529	742,166					514,811
Total	7,650,157	5,080,703	2,569,454	17,625,149	9,060,756	8,564,392					5,994,938

Inflation rate 7% (Unit: Mil. Rp)

Discount Rate (nominal) 18%

1 Present Values of benefits in nominal terms (Without Project) 878,698

Present Values of costs in nominal terms (Without Project) 460,753

Net Present Values (Without Project) (1) 417,945

Cost Benefit Ratio 1.91

2 Present Values of benefits in nominal terms (With Project) 997,138

Present Values of costs in nominal terms (With Project) 510,719

Net Present Values (With Project) (2) 486,419

Cost Benefit Ratio 1.95

3 Incremental Net Present Value (2)-(1) 68,473

Internal Rate of Return 21.0%



CHAPTER 9.

ENVIRONMENTAL CONSIDERATION



CHAPTER 9. ENVIRONMENTAL CONSIDERATION

9.1 Environmental Consideration Approach

(1) Background to Environmental Consideration

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).

(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

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.

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

² According to the Minister of Forestry's decision (305/kepts•II/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.

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

Date	Occasion	Issue No.	Confirmed 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 Explain IC/R	2	Preparation of TOR (KA) (2) for AMDAL	M/M [8]
		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 Results	7	UKL-UPL not required as no civil engineering work is planned on-site at the F/S stage	174/DJ-VI/AMDAL/96 (9) (see Appendix I-1)
		8	UKL-UPL required if work involving changes of the landscape is planned (6)	[1]
		9	AMDAL compulsory if the social forestry development project involves an area of some 200,000 ha (7)	[2]
				[3]

- Notes: (1) ANDAL: Analisis Dampak Lingkungan (Environmental Impacts Assessment Paper)
RKL : Rencana Pengelolaan Lingkungan (Environmental Management Plan)
RPL : Rencana Pemantauan Lingkungan (Environmental Monitoring Plan)
- (2) KA : Kerangka Acuan - ANDAL
- (3) Keputusan Menteri Kehutanan Nomor: 305/Kpts - II/95 Tentang Perubahan Keputusan Menteri Kehutanan Nomor 218/Kpts - II/1994 Tentang Analisis Mengenai Dampak Lingkungan Pembangunan Kehutanan
- (4) Mekanisme Pelaksanaan UKL dan UPL (014/V - RKT/1995)
- (5) Peraturan Pemerintah Republik Indonesia Nomor 51 Tahun 1993 Tentang Analisis Mengenai Dampak Lingkungan
- (6) Natural landscape : Betang Alam
As 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

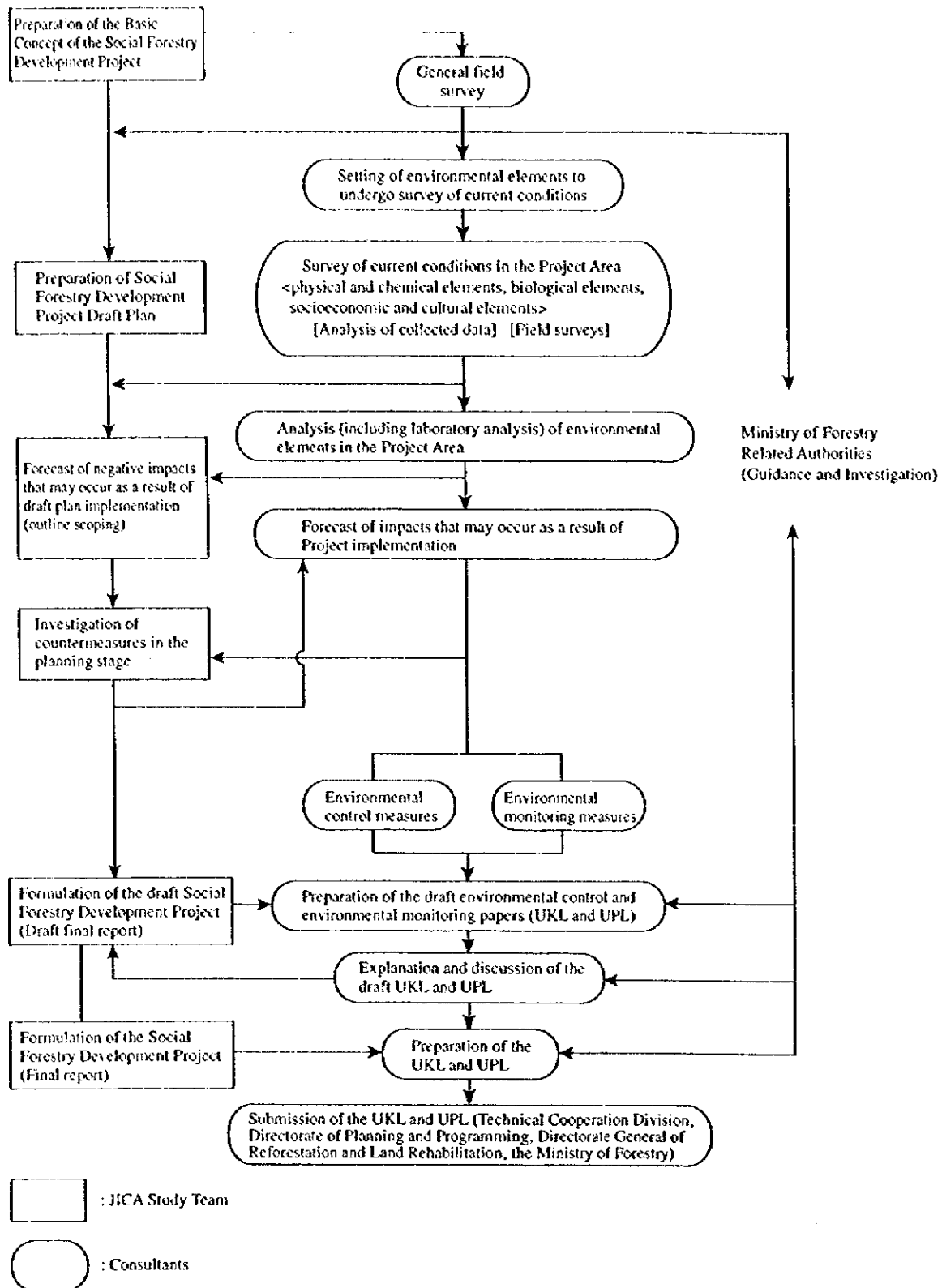


Fig. 9-1 Flow Chart of Environmental Consideration for the Social Forestry Development Project in the Project Area

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

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 and Land Rehabilitation 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.

¹ Keputusan Direktur Jenderal Perlindungan Hutan dan Pelestarian Alam/Ketua Komisi Pusat AMDAL Departemen Kehutanan tentang Pedoman Teknis Penyusunan Upaya Pengelolaan Lingkungan (UKL) dan Upaya Pemantauan Lingkungan (UPL) Nomor: 222/Kpts/DJ-VI/1994

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

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

Environmental Items Forecast to be Subject to Negative Impact ¹	Degree of Environmental Impact ¹			Contents of Negative Impact	Project Countermeasures	Reference
	Large	Middle	Small			
Social Lifestyle <ul style="list-style-type: none"> • Lifestyle of inhabitants • Non-voluntary resettlement • Conflict among people 		○	○	<p>① 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.</p> <p>② In cases where there are prospective 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.</p>	<p>a) It is estimated (as a result of the environmental impact assessment study) that most illegal cultivators are nearby village residents or 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 group rather than local government agencies.</p> <p>b) Local NGO will intervene in cases of conflict between inhabitants and government agencies or conflicts between inhabitants.</p> <p>c) Village social forestry promotion group will screen the qualifications of participants. If the procedures required by the committees are taken, inhabitants claiming rights (including non-villagers) will be able to obtain qualification for participation.</p>	Current Conditions <ul style="list-style-type: none"> • Land use and vegetation • Socioeconomic and cultural conditions • Workshop • Appendices and data concerning environmental Project • Project in national forests • Organization and extension plan
Social Lifestyle <ul style="list-style-type: none"> • Systems and customs • Readjustment of common rights to forest use • Reform of existing systems and customs 		○	○	<p>① For inhabitants who still give priority to the old traditional boundaries of protection forests and existing customs it will be difficult to understand the concept of social forestry and some inhabitants may voice opposition to implementation of the Project.</p>	<p>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.</p> <p>b) Regarding inhabitants who are opposed to the Project because of personal feelings, the social forestry information center will spend ample time carrying out public relations activities concerning the concept of social forestry during the period of Project implementation.</p>	Current Situation <ul style="list-style-type: none"> • Characteristics of local community • Socioeconomic and cultural conditions • Project in national forests • Project in national forests • Organization and extension plan
Health and Hygiene <ul style="list-style-type: none"> • Increased use of agricultural chemicals • Accumulation of residual toxicity (agricultural chemicals) 			○	<p>① The use of agricultural chemicals will increase as a result of the development of private shrub land for coffee cultivation. Depending on the routes through which farmers purchase such chemicals, it is possible that increased quantities of high toxicity chemicals such as paraquat, herbicide, insecticide of carcinogen organic chlorine etc. will be used.</p> <p>② Agricultural chemicals will also be used to raise healthy seedlings during the nursery period.</p>	<p>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 pest damage prevention and weeding measures that do not require the use of chemicals.</p> <p>b) In nurseries, pest damage prevention and weeding measures that do not require the use of chemicals will be adopted and only chemicals of low residual toxicity will be used if necessary.</p>	Current Conditions <ul style="list-style-type: none"> • Hydrology and water quality • Actual state of social forestry Project • Project on private land • Infrastructure development plan • Organization and extension plan • Plan for raising of marketing status through KUD

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

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

Environmental Items Forecast to be Subject to Negative Impact	Degree of Environmental Impact			Contents of Negative Impact	Project Countermeasures	Reference
	Large	Middle	Small			
Rare Wildlife and Habitat • Changes in vegetation • Impact on rare species and indigenous wildlife			○	<p>① Construction of riparian afforestation and major facilities (nurseries, check dams, roads, extension facilities) may reduce surface vegetation and have a negative impact on rare species and their living environment.</p>	<p>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). 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.</p>	<p><u>Current Conditions</u> • Rare wildlife and habitat • Land use and vegetation <u>Project</u> • Project on private land • Infrastructure development plan</p>
Hydrology and Water Quality • Change of flow regime of surface water			○	<p>① The establishment of major facilities may affect the flow regime of surface water. ② The intake of water by semi-temporary central nurseries and water supply facilities may affect the flow regime of surface water.</p>	<p>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 nurseries will be used for nursing whenever possible.</p>	<p><u>Current Situation</u> • Hydrology and water quality • Land use and vegetation <u>Project</u> • Infrastructure development plan</p>
Hydrology and Water Quality • Water pollution and decline of water quality			○	<p>① Muddy water may be generated by the construction of roads and extension facilities which require a lot of civil engineering works. ② Muddy water may be generated during construction of check dams and other major facilities.</p>	<p>a) The effective width of forest roads and in-site roads at major facilities will be paved in order to reduce 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.</p>	<p><u>Current Conditions</u> • Hydrology and water quality • Land use and vegetation <u>Project</u> • Project on private land • Infrastructure development plan • Organization plan • Monitoring and evaluation plan</p>

(2) Outline Project Implementation Plan

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

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

No.	Project Item	Quantity	Unit	Main 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 civil engineering works

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 × 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

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

No.	Project Item	Quantity	Unit	Main Materials	Main Power	Contents
1	Social oriented rehabilitation	1,597	ha	Local species nursery stock	Labor	(Coffee fields in protection forest area) [Altitude 900 m or less: 7 species, altitude 901-1,500 m: 5 species, altitude 1,500 m or more: 1 species]
2 a	Agroforestry complex development (Existent)	24,809	ha	Local species nursery stock	Labor	(Coffee fields on private land not of immature soil) [Altitude 900 m or less: 7 species, altitude 901-1,500 m: 4 species]
2 b	Agroforestry complex development (Existent) Soil conservation work 2 species (bean family, etc.)	6,330	ha	Timber, bamboo	Labor	Wood-fenced conservation work (10-20 m intervals), bean family tree planting (coffee fields on sloping private land consisting of acrisols, andosols and cambisols)
3 a	Agroforestry complex development(Newly)	2,145	Sites	Coffee Local species nursery stock	Labor	(Private shrub land not of immature soil) (same as 2a.), farm crops [4 species, 2 years after planting]
3 b	Agroforestry complex development(Newly) Soil conservation work	545 2 species (bean family, etc.)	ha	Timber, bamboo	Labor	Wood-fenced conservation work (10-20 m intervals), bean family tree planting (coffee fields on sloping private land consisting of acrisols, andosols and cambisols)
4	Conservation plantation development	418	ha	Bamboo seedlings, 2 species of nursery stock (bean family)	Labor	(Other than private land immature soil rock)
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	(Protection forest boundaries)

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) Agroforestry complex development (Newly) Conservation plantation development	27,372	ha		Labor	Coffee cultivation, collection of non-timber forest products, timber collection, extension
10	Dry crops field improvement / Soil conservation work	1,442	ha	Seedlings	Labor	Production of agricultural products (Sloping private land consisting of acrisols, andosols and cambisols)
11	Riparian afforestation	205	ha		Labor	Bamboo shoot picking (Along main rivers, width: 10.0 m)
12	Social 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) ②.

(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 I-5~12.

Table 9-4 Survey of the Project Area

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 provincial and prefectural spatial plans)

Note 1) Table 9-4 is in accordance with the format established in Note 1) of 9-3 (1) ②.

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

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	Y	N	U	Y	N	U
S2: Habitat of birds protected by bilateral treaty, etc.	Y	N	U	Y	N	U
S3: Wetland specified by Ramsar Convention	Y	N	U	Y	N	U
S4: Designated area by World Heritage Convention	Y	N	U	Y	N	U
S5: Protection Forest	Y	N	U	Y	N	U
S6: Natural Park	Y	N	U	Y	N	U
S7: Protection Forest/Nature Reserve	Y	N	U	Y	N	U
(Social Environment)						
S8: Indigenous people/minority group	Y	N	U	Y	N	U
S9: Site of historical remains, cultural heritage or exceptionally beautiful landscape	Y	N	U	Y	N	U
S10: Area of economic activity causing with much negative impact	Y	N	U	Y	N	U
(Natural Environment)						
S11: Arid or semi-arid area (including savannah, rangeland, etc. and arid tropical forest)	Y	N	U	Y	N	U
S12: Monsoon forest area	Y	N	U	Y	N	U
S13: Tropical rain forest area	Y	N	U	Y	N	U
S14: Tropical highland forest are (including mossy forests)	Y	N	U	Y	N	U
S15: Wetland (swamp)	Y	N	U	Y	N	U
S16: Peat moor	Y	N	U	Y	N	U
S17: Mangrove forest belt	Y	N	U	Y	N	U
S18: Coral reef	Y	N	U	Y	N	U
S19: Rocky land, steep land, eroded land and devastated land	Y	N	U	Y	N	U
S20: Closed water body (lake, pond and artificial reservoir)	Y	N	U	Y	N	U

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

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 essential to the Project implementation. 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).

- (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

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.



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)

(1)

Category	No.	Environmental factors	Impact										Inspection items	Environmental control measures		Environmental monitoring measures								
			Period	Cause*										Type	Degree	Method	Location	Monitoring items	Location	Period and frequency	Monitoring techniques			
				Within national forest boundaries			Outside national forests															All areas	Positive	Negative
				①	②	③	④	⑤	⑥	⑦	⑧	⑨												
A	1	Hydrology			○	○	○	○	○	○	○	○	○		++		Maximum flow in dry season Maximum flow in rainy season Annual flow distribution Soil erosion	Appropriate implementation of Project conforming to technical specifications	All subject areas within Project area	River flow (Maximum and minimum flow)	Lanang river: Suro Bali village/ Pikat kering river: Tanjung Dalam village Ketapan river: Cirebon Baru village Teretik river: Lubuk Saung village Mendu river: Tabareneh village Dendan river: Tasikmalaya village Musi river: undecided	Once annually During and after Project implementation	River hydrology observation facility construction or flow measuring method (using buoy method or current meter)	
	2	Soil			○	○	○	○	○	○	○	○		++	-	• Surface soil erosion rate • River sediment accumulation	Appropriate implementation of Project conforming to technical specifications	All subject areas within Project area	• TSS, TDS • River sediment accumulation	Check dam construction sites • Sumber Rejo village • Sentral Baru village • Kampung Sajad village • Air Munda village • Baru Manis village • Air Pikat village • Pagar Gunung village • Air Lanang village • Dataran Tapus village • Dusun Bawah village • Luguk Bar village • Tanjung Alam village	• TSS, TDS Once per month During and following implementation • Once annually (beginning of dry season) During and following implementation	• Laboratory analysis of TSS and TDS of sampling water • Stick method for sediment accumulation depth measurement		
	3	Water quality			○	○	○	○	○	○	○	○		++		Government 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 benefits 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)	Entire Project area	• pH, DO, CO ₂ , hardness, N-NH ₃ , 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: Toba Padang village • Mendu river: Tabareneh village • Dendan river: Tabareneh village • Musi river: Lubuk Penyanun village • Musi river entrance: Segoring village • Musi river dam site: Ujan Mas Bawah village • Musi river exit: Kundaran Baru village	Twice annually (dry and rainy seasons)	• Field survey (pH, DO, CO ₂ , electric conductivity) • Laboratory analysis (N-NH ₃ , hardness, COD, BOD, TSS, insecticides)		
	3b				○	○	○	○	○	○	○	○		++				• pH, DO, CO ₂ , hardness, N-NH ₃ , BOD, COD • Color, hardness, TSS, electric conductivity, water temperature, insecticides	• Air Sulimang village • Ujan Mas Bawah village • Suro Bali village • Tebat Monok village • Tebat Lau village • Sekaranu village • Air Lanang village • Tabareneh village • Tanjung Dalam village • Kampung Melayu village	Twice annually (dry and rainy seasons)	• Field survey (pH, DO, CO ₂ , electric conductivity) • Laboratory analysis (N-NH ₃ , hardness, COD, BOD, TSS, insecticides, microorganisms)			
B	1	Flora and fauna		○										++	--	Species diversity Apokat and mahogany are not local species Concerns over influence of allelopathy of mahogany on other species Concerns over soil acidification in high elevation areas (1,000-1,500 m or more) by planting of <i>Merkus pine (Pinus merkusii)</i> Surface cover Quantity and quality of wildlife habitats	• Increase in mixture ratio and local species • mixed planting of species that provide non-wood forest products • Planting of spieces for forestation among remaining coffee trees instead of hewing them down	All subject areas within Project area	• Deterioration rate of natural vegetation (settlement areas within forest areas) • Increase and decrease of species composition (both flora and fauna) • Surface coverage rate	• all protection forest areas within Rejang Lebong prefecture • All subject areas in Project area	Once annually During implementation	• Quantitative monitoring of changes at regular intervals by satellite image analysis or aerial photograph interpretation • Field survey (qualitative monitoring)		

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

(1)

Project components	Environmental factors	Negative impact		Examination items		Measures to be taken in Social Forestry Development Project	Measures at implementation planning and design stages	Measures at environmental conservation and monitoring stages		Measures at environmental conservation and control stages
		Types	Details	Division	Reasons for examination			Concept of environmental conservation measures	Concept of environmental monitoring	
1. Project in national forests (1) Social oriented rehabilitation	Biological factors	Flora and fauna	Species diversity	Species to be planted	① Apokat and mahogany are not local 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.	-
					② 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) Same as above b)	-	a) Same as above	-
					③ Planting of Merkusi pine (<i>Pinus merkusii</i>) 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	-
					④ Planting of other local species such as Manggis Cempedak, Jambu-jambua, Pupa, Medang, etc. should be considered	• Project modification is unnecessary, since the Project avoids tree species with spreading crowns that have negative impact on coffee 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 coffee, the fundamental agriculture of participating inhabitants.	a) Market research is conducted for non-wood forest products of proposed local species whose crown will not have a negative impact on coffee production. If a market exists, they will be adopted as planting species.	-	-	-
					⑤ 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 ④. 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	⑥ Actual economic merits 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.	-
				Organization	⑦ There is no system at present to stop inhabitants entering from without Project area	-	-	-	-	-
				-	-	-	-	-	-	-
				-	-	-	-	-	-	-
				-	-	-	-	-	-	-
(2) Social oriented border tree planting	Biological factors	Flora and fauna	Species diversity	Species to be planted	⑧ 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 fauna	Species diversity	Species to be planted	① Same as 1. (1) ①	Same as 1. (1) ①	Same as 1. (1) ①	Same as 1. (1) ①	Same as 1. (1) ①	Same as 1. (1) ①
					② Use of much fuel wood for sugar refining	Use of pruned or felled wood of coffee tree and coffee overwood	-	-	-	-
	Social, economic and cultural factors	Same as 1. (1) Social, economic and cultural factors	Incentive	③ Economic merits and demerits for settlers cannot be estimated	Same as 1. (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, economic and cultural factors	Same as 1. (1) Social, economic and cultural factors	Same as 1. (1) Social, economic and cultural factors
				Organization	④ 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 factors	Negative impact		Examination items		Measures to be taken in Social Forestry Development Project	Measures at implementation planning and design stages	Measures at environmental conservation and monitoring stages		Measures at environmental conservation and control stages
		Types	Details	Division	Reasons for examination			Concept of environmental conservation measures	Concept of environmental monitoring	
(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 (rafflesia, 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.	-	Existence and living environment of rare species, and also change of existence and living environment of rare species of pre-survey and pre-implementation, should be monitored from fixed observation points.	Supervision will be conducted on the assessment before construction and management conditions with regard to the results of the assessment.
(3) Dry crop field improvements	Physical and chemical factors	Soil	Soil erosion	Soil conservation measures	① Cost performance of bench terraces with 15-40% inclination is low ② 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 erosion 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 in the event of terrace construction.
(4) Construction of check dams	Physical and chemical factors	Soil	Soil erosion	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.	-	-	-	-
					② Establishment of river hydrology observation facility should be planned					
(5) Riparian afforestation	Biological factors	Flora and fauna	Species diversity	Subject sites	Land preparation for bamboo culture might destroy habitats of rare species (rafflesia, 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 diversitis		① 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 unnecessary.	-	-	The monitoring and publicity station of the social forestry village group is established at each road terminal.	Border patrol of national forests, mainly road construction areas, is strengthened.
					② Land preparation for planting might destroy habitats of rare species (rafflesia, 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)
4. Promotion of businesses that are not largely land-dependent										
	Social, economic and cultural factors	Same as 1 (1) Social, economic and cultural factors			① Processing facility for non-wood forest products should be introduced.	Unfamiliar technology for inhabitants is avoided, for inhabitant 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 soliciting of private capital.	-
5. Common to all components										
	Common to physical and chemical factors and biological factors				① There is no system appropriate to Project implementation that conforms to technical specifications.	People-oriented monitoring is planned, with mainly work rotation of NGO staff members. A secure NGO staff work rotation will permit Project implementation according to technical specifications. Project modification is unnecessary.	-	-	-	In addition to the NGO staff, the Social Forestry Information Center consultant participates in 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 less 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.

Table 10-1 Outline of Type A Trial Plot

Trial Plot	Location	Current Land Use and Vegetation	Elevation (m)	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	

Species conversion will be carried out at the existing coffee fields by means of planting useful species (afforestation species and multi-purpose species).

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.

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, jengköl, 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), jengköl (20 trees/ha), petai (20 trees/ha) and kemiri (20 trees/ha) will be planted.

② 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

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.

Table 10-2 Planned Area for Type A Trial Plot Project

Trial Plot	Work			Planned Area
Type A trial plot (1 site)	Social oriented rehabilitation	Planting of roughly 500 trees/ha of useful species (140 ha)	El. 900 m or less	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 upstream 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.

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.

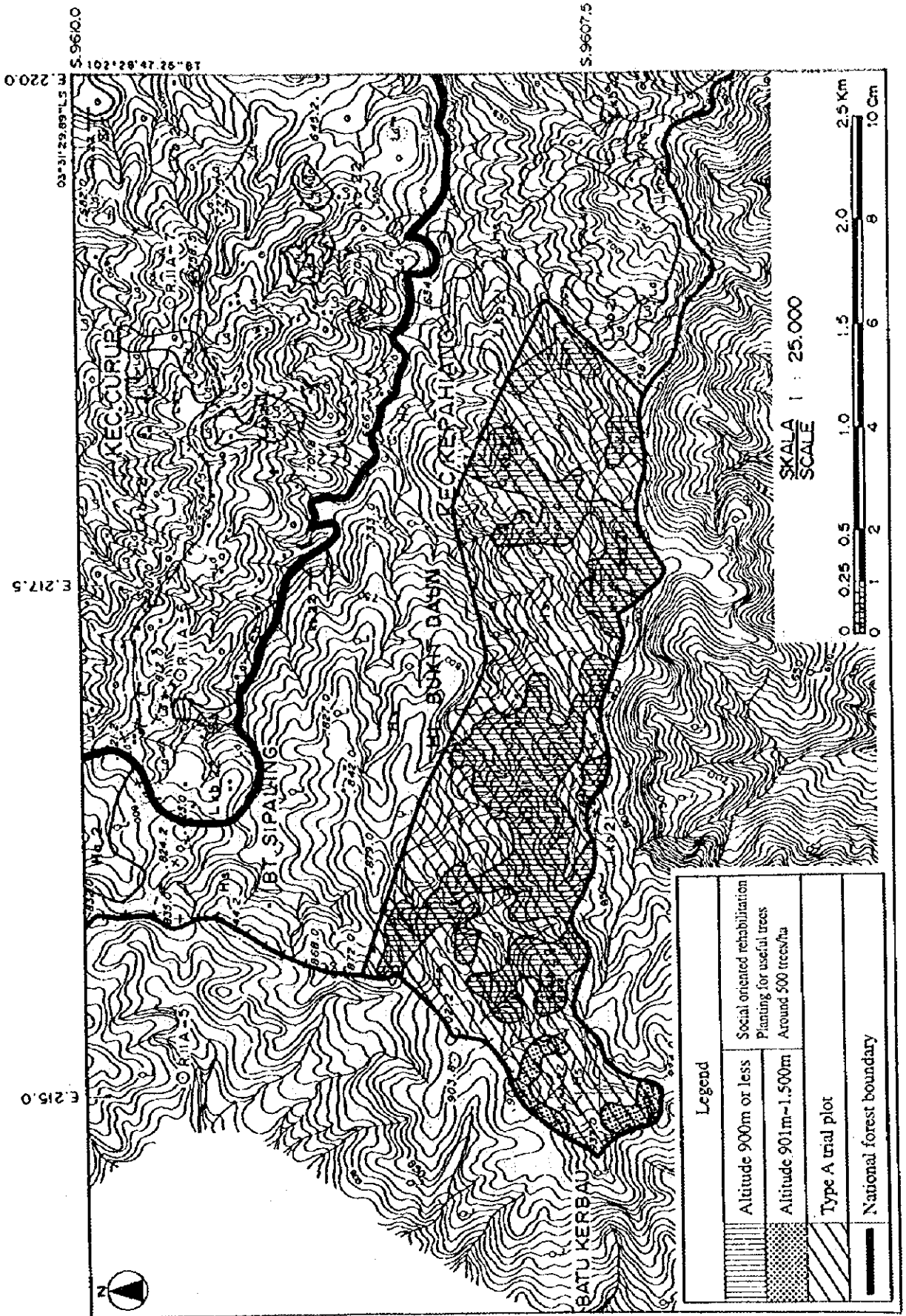


Fig. 10-1 Trial Plot Project Implementation Plan for Bukit Daun Protection Forests

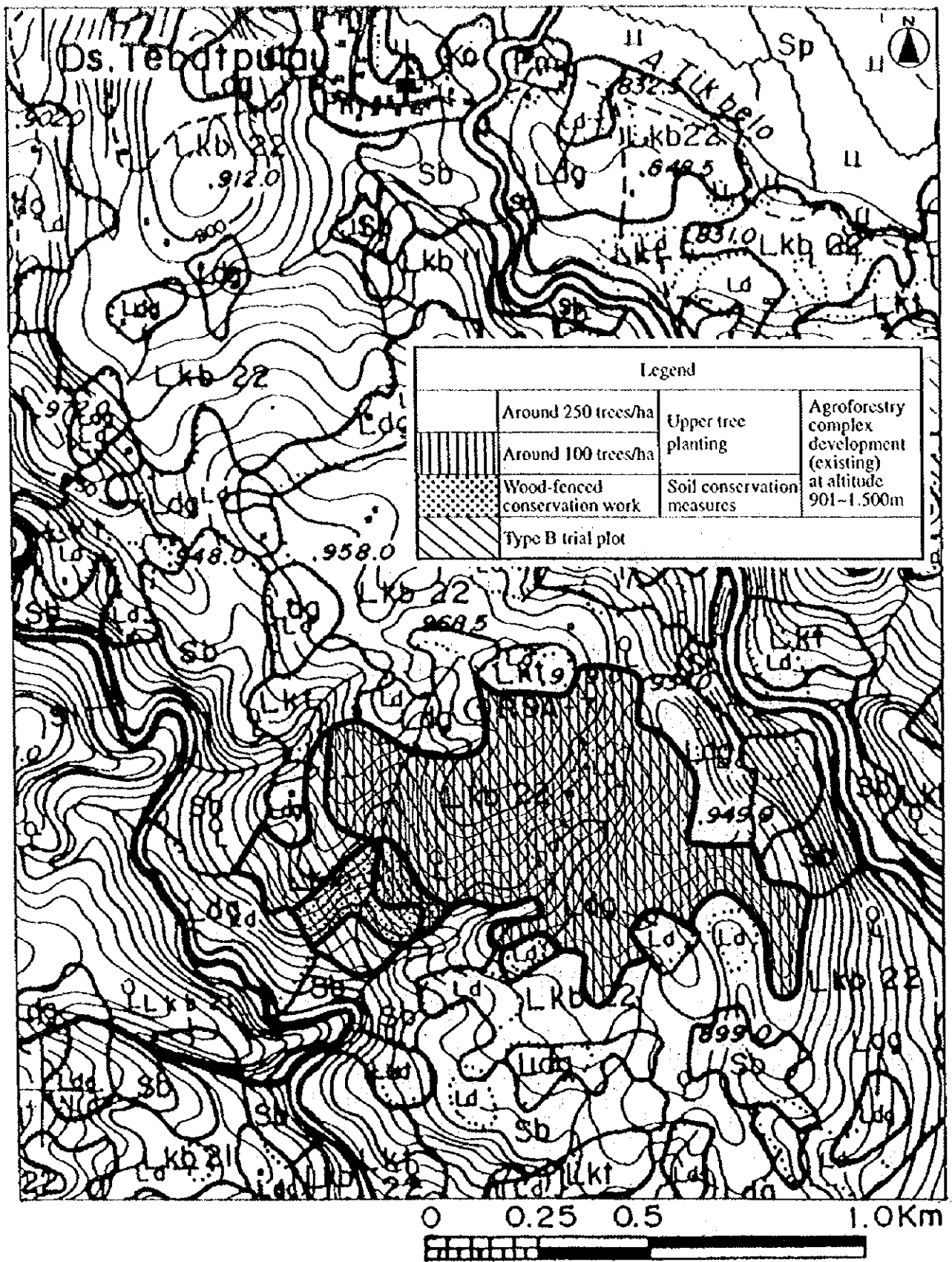


Fig. 10-2 Trial Plot Project Implementation Plan for Desa Tebat Pulau

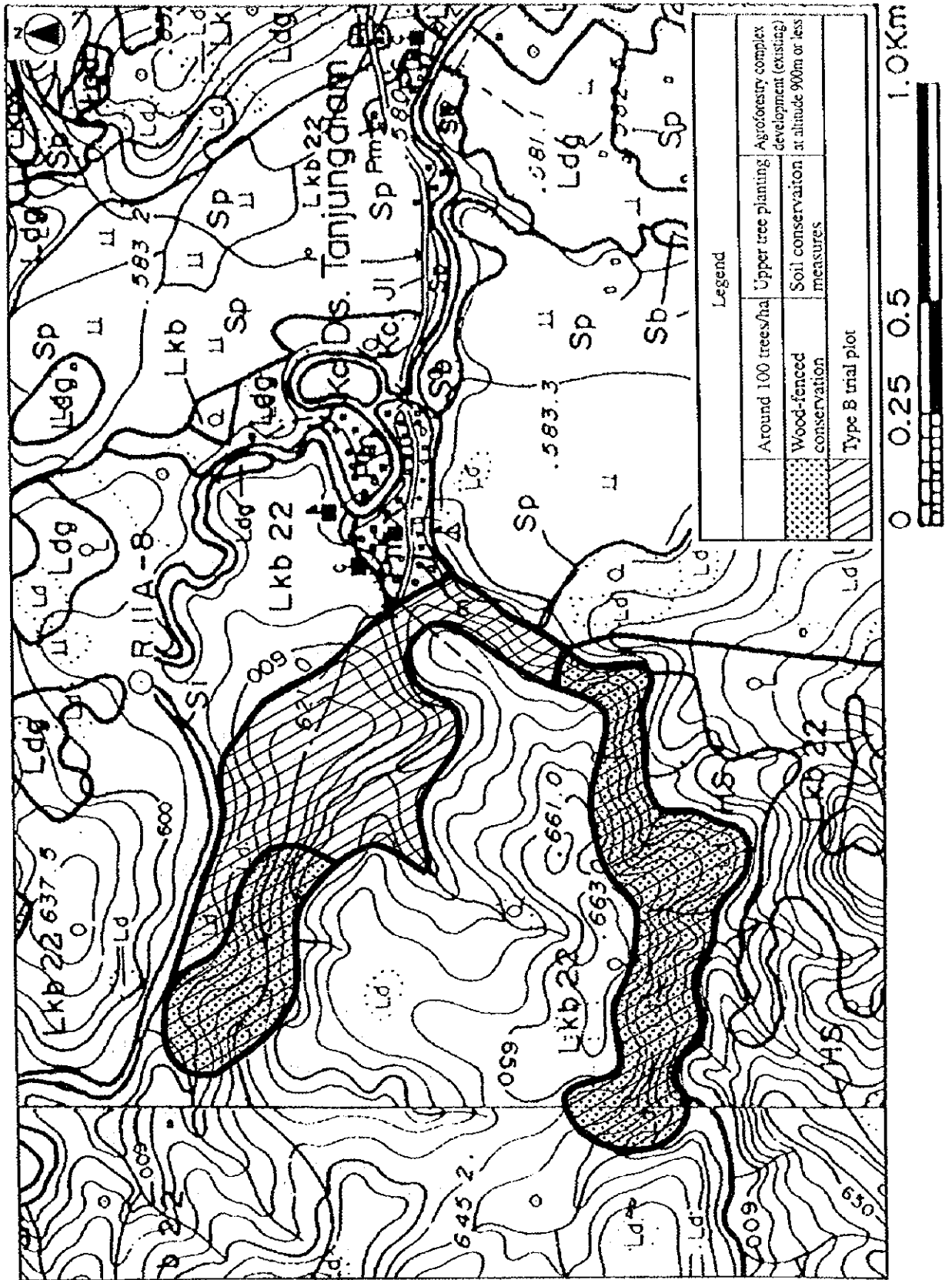


Fig. 10-3 Trial Plot Project Implementation Plan for Desa Tanjung Alam

Table 10-3 Outline of Tebat Pulau Trial Plot

Trial Plot	Current Land Use, Vegetation, 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

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.

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 × 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

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 erected 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.

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

Trial Plot	Work			Planned Area
Type B trial plot (1 site)	Agroforestry complex development (existing) for coffee fields located at El. 901 - 1,500 m	Upper tree planting	250 trees/ha	9 ha
			100 trees/ha	41 ha
		Soil conservation measures	Wood-fenced conservation work	6 ha

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

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

Trial Plot	Current Land Use, Vegetation, Soil and Slope		Area (ha)	Work Contents
Type B trial plot (1 site)	Coffee fields at El. 901 m or less (50 ha)	Upper tree 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

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.

Table 10-6 Planned Area for Type B Trial Plot Project at Desa Tanjung Alam

Trial Plot	Work			Planned Area
Type B trial plot (1 site)	Agroforestry complex development (existing) for coffee fields located at El. 900 m or less	Upper tree planting	100 trees/ha	50 ha
		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.

Table 10-7 Planned Area for Trial Plot Project

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

Table 10-8 Number of Trees to be Planted

Trial Plot	Location	Work	Planned Area	Species and Numbers of Trees	Total Number of Trees
Type A (1 site)	Bukit Daun protection forest, Kec. Curup (305 ha)	Planting of useful species	500 trees/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)	64,000
				Merkusi pine (200 trees/ha), damar mata kucing (200 trees/ha), apokat (30 trees/ha), melinjo (30 trees/ha), kemiri (40 trees/ha)	6,000
		Subtotal	140 ha		70,000
Type B (1 site)	Tebat Pulau, Perw. Pal Delapan (50 ha)	Upper tree planting	250 trees/ha	Apokat (15 trees/ha), melinjo (15 trees/ha), kayu manis (70 trees/ha), lamtoro (150 trees/ha)	2,250
			100 trees/ha	Apokat (15 trees/ha), melinjo (15 trees/ha), kayu manis (70 trees/ha)	4,100
		Subtotal	50 ha		6,350
Type B (1 site)	Tanjung Alam, Perw. Ujan Mas (50 ha)	Upper tree planting	100 trees/ha	Durian (5 trees/ha), aren (5 trees/ha), jack fruit (5 trees/ha), petai (10 trees/ha), kayu bawang (5 trees/ha), kayu manis (70 trees/ha)	5,000
		Total			81,350

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

(Unit: trees)

Location	Type A Plot (1 site)		Type B Plots (2 sites)			Total
	Bukit Daun protection forest (Kec. Curup)		Desa Tebat Pulau (Perw. Pal Delapan)	Desa Tanjung Alam (Perw. Ujan Mas)		
Work	Social oriented rehabilitation		Agroforestry complex development (existing)			
	Planting of useful species		Upper tree planting		Upper tree planting	
Species	El. 900 m or less	El. 901 - 1,500 m	El. 901 - 1,500 m		El. 900 m or less	
	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

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