CHAPTER 7.

SOCIAL FORESTRY PROJECT

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7.1 Concept of Social Forestry Development

(1) Basic Concept of Social Forestry Development

Social forestry is defined as a specific forest management system which is implemented through the voluntary and vigorous activities of local people utilising forest functions and has the following three objectives.

① Promotion of the welfare of local people living in or around forests

② Enhancement of the character and productivity of forests

③ Sustainment of forests and the living environment for local people

In view of the above definition and objectives of social forestry, the basic concept of the Social Forestry Project was examined in the following order.

1) Identification of Problems and Analysis of Their Causes

Based on the findings of the natural, socioeconomic and cultural conditions surveys, the current problems and people's needs were identified and the causes of problems were analysed.

2) Examination of Improvement Measures

Measures to eradicate the identified causes of problems were examined to solve current problems and to satisfy people's needs.

The basic examination results are shown schematically in Fig. 7-1 - Structure of Social Forestry Project.

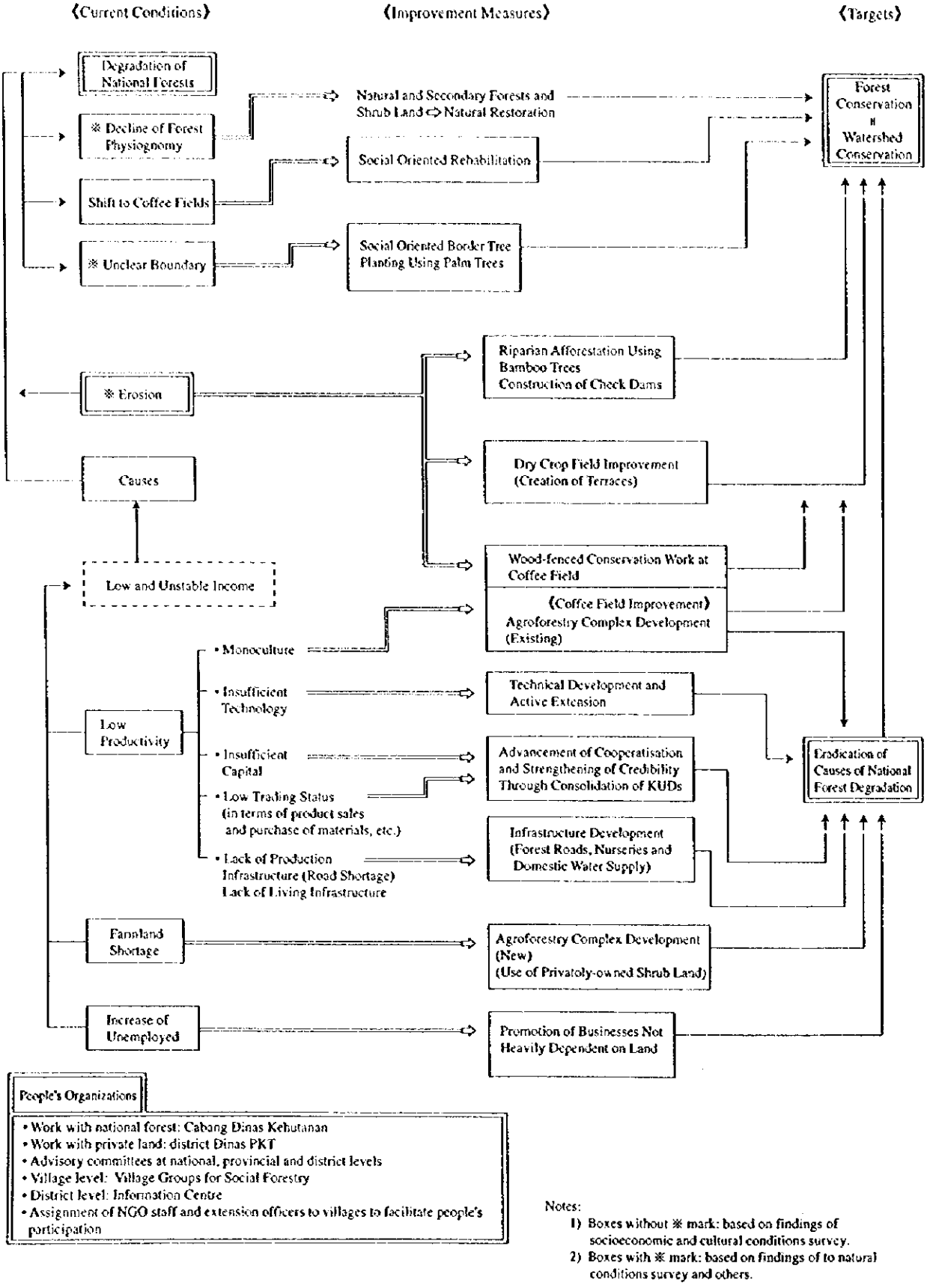


Fig. 7-1 Structure of Social Forestry Project

(2) Current Conditions and Problems of Project Area and Local People

1) National Forests

The area of national forests (some 13,300 ha) is entirely designated as protection forests as described earlier. Their forest types are natural forests, shrub land, secondary forests, plantations, bare land, grassland (scattered in small areas) and coffee fields which have been developed and cultivated inside national forests by local people. The forestry administration has been dealing with this illegal land use by issuing warnings and even enforcing eviction. Consequently, most coffee field sites have been converted to secondary forests although some (1,599 ha, i.e. 12% of the national forest area) still remain as shown in Table 3-3. Thorough weeding at coffee fields has led to conspicuous exposure and loss of the top soil, resulting in unfavourable conditions for protection forests.

2) Private land

Of the private land area of some 39,500 ha, 64% (25,201 ha) is currently used as coffee fields as shown in Table 3-3. Although traditional coffee cultivation is familiar work for local people, the "low and unstable income", which is the combined result of many factors, is said to be the largest causative factor for the degradation of national forests. The present conditions and problems regarding the main causes of the "low and unstable income" are discussed below.

① Shortage of Farmland

Farmland, including coffee fields, accounts for some 70% of the subject area. Even if efforts are made to develop new farmland, only 3,600 ha of privately-owned shrub land is available for conversion to farmland. Taking site access and other conditions into consideration, it is expected that some 2,100 ha can be converted to farmland. Even if 2,100 ha shrub land is converted to farmland, this will only be equivalent to 6% of the current farmland area. Meanwhile, the number of households has recorded a natural increase of 20% in the last five years, making the shortage of farmland a serious problem together with other factors.

② Low Productivity

Farming productivity is directly related to people's lives and is extremely important as its level determines the local standard of living. On the one hand, the Project Area which is characterised by steep topography does not have many paddy fields and the production volume of rice, the staple food, is not sufficient

to meet the local demand. On the other hand, the local climate is suited to the cultivation of coffee and other cash crops. Coffee cultivation has been particularly popular since the colonial period except for certain special soils due to the little presence of diseases and harmful insects and the simple work requirements of weeding and pruning for continuous production for more than 10 years even though hard work is required at the preparatory stage for planting. Today, coffee fields account for 70% of the total farmland area. The productivity is determined by a number of factors, including the adverse effects of monoculture, marketing factors and factors related to the cultivation techniques.

a. Adverse Effects of Monoculture

Coffee is an international commodity and large fluctuations of the price and yield, which are beyond the control of local farmers, may drastically reduce the income of coffee farmers. In order to stabilise the livelihood of local farmers, therefore, it is desirable to introduce a new income source(s) which can compensate for the decline of income from coffee cultivation.

b. Insufficient Technology

Local coffee cultivation techniques are said to be traditional techniques which have not changed since the colonial period. Although the bold introduction of new varieties and the employment of such new cultivation techniques as mulching, recommended by research organizations, are necessary, local farmers tend to be conservative in terms of technical innovation as they do not wish to jeopardise their familiar lives.

c. Insufficient Capital

While large farmers with several hectares of coffee fields may possibly accumulate capital, average farmers with some 1.5 ha of coffee fields have little surplus income to build up capital. The Ministry of Forestry and KUDs provide loans for farmers without capital accumulation but many farmers appear reluctant to apply for such loans due to their concern regarding the profitability of coffee cultivation and regular repayment.

d. Low Trading (Marketing and Purchase) Status

Trading companies and buyers which collect and export coffee beans characterised by substantial price fluctuations are in a superior position vis-a-vis farmers in terms of information gathering and individual farmers are

generally unable to bargain with these companies and buyers. The use of KUDs, etc. is desirable as the collective marketing of coffee beans and the collective purchase of farming materials and equipment are often advantageous for local farmers.

e. Lack of Production and Living Infrastructure

The lack of living infrastructure often directly or indirectly adversely affects the productivity of farming in those areas where such farming infrastructure as access roads is lacking or where the transportation of drinking water, etc. from distant areas disrupts local farming activities.

③ Increased Unemployment

As already stated, the number of households is said to have increased by 20% in the Project Area in the last five years. Given the virtual non-existence of industries other than agriculture in the area, the number of jobless households is increasing, particularly among young couples. Facing a lack of appropriate employment opportunities, young people are trying to make a living with the financial support of their parents, waged farm labour, subcontracted coffee cultivation and miscellaneous urban work.

3) Enhanced Soil and Water Conservation

Musi River is one of Indonesia's most important rivers and enhancement of its soil erosion control function and water yielding function is increasingly demanded. Moreover, the construction of a hydroelectric power station in the Project Area means increased importance of Musi River. The Spatial Plan of Propinsi Bengkulu and the Land Use Plan of Kab. Rejang Lebong demand the introduction of conservation measures to both maintain and enhance the land fertility of soils vulnerable to erosion and at steep farmland in order to sustain local farming practices. The Five Year Erosion Control Programme (from 1994 onwards) prepared by the Sub-Balai RLKT plans the creation of various terraces over 10,000 ha in the subject area in Kec. Curup alone to ensure soil conservation and the preservation of land fertility. Insufficient land conversion is not listed as a major problem by the socioeconomic and cultural conditions survey. However, much private land faces a problem of deteriorating land conditions because of the site conditions and current land use methods.

(3) Improvement Measures

1) National Forests

As the continuation of coffee cultivation in national forests is inappropriate from the viewpoint of maintaining these forests as protection forests, multi-purpose species which are beneficial for forest conservation will be planted to replace coffee trees so that the resulting consolidation of forest functions, including the use of fruit and sap, etc. produced by the newly planted trees, can actually improve the welfare of local people while enhancing the conservation function of forests. While efforts to improve the character of other types of forests, such as natural, secondary forests and shrub land, are also believed necessary, the present Social Forestry Project suggests natural restoration for these forests. Local people who have participated in forest rehabilitation work can continue to collect non-timber forest products while tending and managing the planted trees. The planting of palm trees (suitable species for the Project Area) which can be easily identified from a distance is planned as a forest degradation prevention measure.

2) Private Land

① Farmland Development of Unused Land

To improve the farmland shortage, infrastructure development will be conducted to improve the access with a view to converting privately-owned shrub land, etc. to coffee fields and other productive farmland through the selection of suitable cultivation methods.

② Low Productivity

a. Agroforestry

In order to improve the adverse effects of the monoculture of coffee, it is necessary to secure the availability of crops which can provide a supplementary income to coffee when the yield and/or price of coffee declines.

The development of coffee fields as mixed farmland (through an agroforestry development project and other means) where fruit trees and/or timber trees are planted at coffee fields, taking the shading effects of these trees into consideration, should be promoted with a view to contributing to an overall increase as well as stabilisation of income.

b. Wider Extension and Training Activities

Escape from low productivity which will directly increase the income of local farmers is the largest task faced by farmers. In order to allow farmers to enjoy a continued high yield with a low cost, it is necessary to achieve the wider extension of productivity improvement measures (see Attached Appendix G-4) and breeding and the popular use of high yield varieties through training and other extension activities.

One effective way of inducing unwilling and conservative farmers to improve the productivity of local farming is the annual selection of excellent farmers who have achieved good results through productivity improvement and their commendation together with a cash prize as an incentive.

c. Advancement of Cooperatisation and Strengthening of Creditability Through Consolidation of KUDs

At present, local people completely depend on middlemen for the marketing of coffee and the purchase of necessary goods, resulting in inferior trading status vis-a-vis middlemen.

In order to improve this situation, all villages should use the KUD system to improve their creditability and should also try to uniformatise the quality of coffee, which is the basis for an enlarged trading unit and more advantageous marketing practices. In addition, training courses and guidance sessions, etc. should be provided to improve the access of local people to market and basic technical information.

d. Infrastructure Development

Infrastructure development in the Project Area has made progress in terms of drinking water supply and access road construction. New infrastructure should be introduced in areas with a high priority.

③ Measures for Unemployed and Landless Farmers

Landless farmers and slightly better off farmers with small dry crop fields can participate in social oriented rehabilitation work and have the opportunity to work as employed labourers for agroforestry complex development work. However, the prospect of their establishing their own businesses is rather limited. In order to increase the cash income opportunities for less privileged farmers, small-scale stock raising, apiculture and the raising of beef cattle on the grounds that fodder

crops are grown on their small dry crop fields, etc. will be promoted as all of these activities are not heavily dependent on the availability of a large land area.

3) Enhanced Soil Conservation Measures

In line with the purport of the Project, the following soil loss prevention measures are planned for those soils which are vulnerable to the erosion of top soil or surface organic matters and also for sloping farmland in order to enhance soil conservation.

① Measures Related to Soil and Inclination

Farming methods and measures which are effective in preventing soil loss will be introduced for hazardous soils and steep slopes with soil loss to ensure stable agriculture and to improve the standard of living of local people.

a. Sites of the Acrisols Group (AC, ACCI and ACCII) and Andosols Group (ANC, ANI and ANII) have an inherent risk of top soil erosion, making it necessary to ensure ground cover by trees to prevent them from becoming bare land. In the case of these soil groups, if the site inclination is steeper than 15%, bench terraces (for dry crop fields), wood-fencing and strip planting conservation work (for coffee fields) will be employed for the planting of trees in and around the sites.

b. The soil loss hazard is low at sites of the Cambisols Group (CMI, CMII, CMIII and CMIV) and WS (wettish/swampy soil). At sites with an inclination of 40% or more, perennial trees (for building timber and fruit production, etc.) will be planted in and around the sites, followed by the cultivation of annual crops.

c. LPR soil (immature soil) is observed at steep slopes which virtually lack top soil. Existing forests with this type of soil will be conserved while measures to stimulate the establishment of conservation forests will be introduced at sites of poor vegetation.

② Strengthening of Watershed Management

Sediment discharge prevention measures will be introduced in watersheds with large soil loss, mainly focusing on the upper reaches of dams which must be given priority in soil and water conservation efforts. If village communities wish to use dam reservoirs following the completion of check dams, they should be allowed to do so for fresh water fish culture.

The creation of riparian forests is planned along the riverbanks of major rivers to prevent soil erosion. The species used for these forests should be bamboo and others with a strong soil holding capacity and, therefore, a strong disaster prevention effect and will be used to provide household materials and marketable products for local people.

7.2 Basic Items of Social Forestry Development

(1) Assistance for People's Participation

1) Project Implementation Body at Village Level

As a village level project implementation body, a project village group for social forestry will be established with the key members consisting of leading members of the LKMD which functions as an administrative organization. This group will cooperate with NGO staff and extension workers to ensure the smooth progress of social forestry and will also make efforts to establish a new land management system in those areas where the customary land management system has lost its regulatory function in order to maintain and even enhance order within a village.

2) Strengthening of Support Organizations

The section of the Ministry of Forestry to be responsible for social forestry development will be the forestry office kabupaten level for national forests and the Dinas PKT for private land. Because of the planned participation of local people in village cooperatives, the jurisdiction for social forestry development will be shared by the above sections of the Ministry of Forestry and those of the Ministry of Cooperatives (at the national, provincial and kabupaten levels).

As social forestry is an integral approach involving agriculture and forestry, an advisory committee will be established at each of the national, provincial and kabupaten levels to facilitate liaisoning and communication between the various organizations involved.

An information centre will be established under the supervision of the provincial forestry office to coordinate the work of such implementation organizations as the advisory committees, competent agencies and village groups, etc., to gather information on the progress of social forestry, to provide guidance/advice and training courses, to conduct extension and public relations work and to liaise between promoters and extension workers.

3) Assistance by Promoters/Arbitrators

Social forestry development is characterised by a people's participation system and the ideal is the natural formulation and implementation of such development by a people's group. However, local people differ in terms of the farming scale (and standard of living) and the grouping of local people to cooperate in a social forestry project is often difficult when their interests clash in terms of project site allocation or other issues. People's participation in the planned Social Forestry Project may result in sharp conflicts as it could affect people from other kabupatens who are engaged in tree planting and other activities in the subject protection forests.

Under these circumstances, the Project plans the dispatch NGO staff with rich experience in village development to stay in the villages concerned as already conducted for social forestry development in Indonesia. While maintaining equal distance between villagers to ensure their impartial status, these experts will liaise with the village leaders and local government officials, etc. and will conduct honest and intense dialogues with local people with a view to assisting social forestry development, playing multiple roles as promoters and arbitrators, in cooperation with extension workers.

(2) Strengthening of Training and Extension Activities

Due to the insufficient agricultural and forestry extension activities targeting local people and other reasons, it is currently difficult to gather and disseminate information on agricultural and forestry management from and to local people. Against the background of a sluggish productivity increase, efforts will be made to strengthen the field extension capabilities of extension workers and social forestry training will be provided for the members of village groups and KUDs and also for extension workers. This training will be held twice a year for three years or so and the prospective lecturers will be agricultural and forestry experts from universities, research institutes, export organizations, estates and NGOs.

(3) Species for Planting

1) Selection of Species for Planting

In the selection of the multi-purpose species to be planted at coffee fields, inappropriate species were removed from the list given in the notification of the Director General of Reforestation and multi-purpose species used locally were added to prepare a list of suitable species (Attached Appendix G-1). Those species of which

the existence in natural forests has not been confirmed were then removed from this list. Intercropping items, etc. were added to prepare the "Suitability Table of Planting Species and Intercropping Items" (see Table 7-1 and Attached Appendix G-2), taking the growth suitability, prospective use and shade tolerance, etc. of each species in terms of soil and elevation (three categories above El. 900 m) into consideration.

2) Combination of Planting Species

The planned species for planting are selected from the species listed in the said table. If the planned species are found to be unsuitable as a result of discussions with local people, species other than those listed in Table 7-1 may be selected.

Various species will be combined so that the distribution of labour and income is levelled throughout the year. In this context, special attention will be paid to the seasonal concentration of labour as well as income fluctuations associated with coffee cultivation.

3) Planting Distance

The planting distance under the Project will remain flexible so that an appropriate distance can be decided depending on the specific species or combination of species. Shade trees will be planted at equal intervals (approximately 5 m × 5 m) between coffee trees. Kayu manis, Aren and other species with a strong shading effect will be planted along the boundaries and their planting in central areas should be avoided. From the viewpoint of land fertility conservation, shade trees should preferably be leguminous species and more than one species should be planted in order to avoid simultaneous damage due to disease or harmful insects. Deeply rooted leguminous shade trees will fix nitrogen and their fallen leaves will create a humus layer.

(4) Planned Project Period

The implementation period of the Social Forestry Project is set at seven years based on a general judgement of the extent of people's understanding of social forestry, the historical relationship between national forests and local people and the project size, etc. Implementation priority will be given to 30 villages located near national forests and the work will be roughly completed in the first three years. The highest priority will be given to trial plots so that the work will be roughly completed in the first year. The social forestry development work will then move to 33 villages located near the first group of 30 villages and the work will commence in the third year and will be roughly completed in the

fifth year. In the case of the last group of 30 villages, the work will be roughly completed in the final seventh year.

(5) Government Subsidy for People's Participation

The types of work associated with social forestry and the necessary funding for such work can be classified in terms of the project site, work objectives and existence of specific beneficiaries, etc.

While the work in national forests (to be entirely paid for by the government) and the work at private land will, in principle, be paid for by the owners, seedlings and fertiliser will be provided once. In the case of landless people, the government will provide the initial investment for stock raising or apiculture with a view to promoting businesses which do not rely on farming. In the case of work of a public character, government funding is generally planned (see Table 7-22).

(6) Project Implementation System

As part of the project implementation system, the assignment of foreign consultants and Indonesian engineers to assist the foreign consultants is planned to provide effective guidance/training on financial issues and supervision for special technical fields.

1) Foreign Consultants

As the Project intends the use of simple technologies/techniques which can be easily adopted by local people, it can be implemented without much external assistance. However, the use of foreign consultants is planned in relation to the general procurement of the necessary materials and equipment and guidance/training on financial issues. Moreover, guidance/supervision by foreign consultants is also planned regarding technical issues related to civil engineering/construction, hydrology/water quality, soil loss/soil conservation and environmental conservation, etc. (see Table 7-27).

2) Supplementation by Domestic Engineers

At the beginning of the Project, the civil engineering and construction work will be concentrated to the point that the foreign consultants will be unable to meet all of the relevant demands for technical guidance and supervision. For this period, Indonesian engineers will be recruited to assist the foreign consultants to deal with technical issues related to civil engineering/construction, hydrology/water quality, soil loss/soil conservation and environmental conservation, etc. Moreover, the appointment of two

assistants to help the foreign consultants in regard to project implementation and guidance on financial issues is also planned.

Table 7-1 Suitability of Species and Intercrops to be Planted

	Soil / Species and Intercrops / Altitude	Andosols			Others			Aim			Place		Market-ability	Shade tolerance	Remarks
		900m or less	901-1,500m	1,501m or more	900m or less	901-1,500m	1,501m or more	Timber	Multi	Shade	National Forest	Private land			
Species	Aren	○	×	×	○	×	×	×	○	×	○	○	○	×	
	Salak	○	×	×	○	×	×	×	○	×	○	○	○	×	
	Pinang	○	×	×	○	×	×	×	○	×	○	○	○	×	
	Durian	○	×	×	○	×	×	○	○	×	○	○	○	×	
	Duku	○	×	×	○	×	×	×	○	×	○	○	○	○	
	Jengkol	○	×	×	○	×	×	×	○	×	○	○	○	×	
	Kemiri	○	○	×	○	○	×	×	○	×	○	○	○	×	
	Melinjo	○	○	×	○	○	×	×	○	×	○	○	○	×	
	Jack Fruit	○	×	×	○	×	×	○	○	×	○	○	○	×	
	Apokat	○	○	×	○	○	×	×	○	×	○	○	○	×	
	Petai	○	×	×	○	×	×	×	○	○	○	○	○	×	
	Kapok	○	×	×	○	×	×	×	○	×	○	○	○	×	
	Mangosteen	○	×	×	○	×	×	×	○	×	×	○	○	×	
	Panili	○	×	×	○	×	×	×	○	×	×	○	○	○	
	Coffee (arabica)	×	○	×	×	○	×	×	○	×	×	○	○	○	
	Coffee (robusta)	○	×	×	○	×	×	×	○	×	×	○	○	○	
	Bamboo	○	○	×	○	○	×	○	○	×	○	○	○	×	
	Meranti	○	×	×	○	×	×	○	×	×	○	×	○	○	*
	Mahogany	○	○	×	○	○	×	○	×	×	○	○	○	×	
	Merkusi Pine	○	○	○	○	○	○	○	○	×	○	×	○	×	
	Damar mata kucing	○	○	×	○	○	×	○	○	×	○	○	○	×	
	Kayu manis	○	○	×	○	○	×	○	○	×	×	○	○	×	
	Kayu bawang	○	×	×	○	×	×	○	×	○	○	○	○	×	**
	Kayu res	○	○	×	○	○	×	×	×	○	×	○	×	×	
	Lantoro	○	○	×	○	○	×	×	○	○	×	○	×	×	
	Kaliandra	○	○	×	○	○	×	×	○	×	×	○	×	×	
Intercrops	Upland rice	○	○	×	○	○	×				×	○	○	×	
	Maize	○	○	×	○	○	×				×	○	○	×	
	Beans	○	×	×	○	×	×				×	○	○	×	
	Cabbages	○	○	○	○	○	○				×	○	○	×	
	Carrot	○	○	○	○	○	○				×	○	○	×	
	Chili	○	○	×	○	○	×				×	○	○	×	
	Ginger	○	○	×	○	○	×				×	○	×	×	

Notes:
○: Suitable ×: Not suitable
*: Plant heights of 10 cm or less have shade resistance.
**: Can be used as shade trees for 5 years after planting
The suitability of species and intercrops with respect to natural conditions (rainfall, temperature, altitude, soil, etc.) has been determined based on the following data
(1) Jenis Pohon Serbaguna/Multi Purpose Tree Species (MPTS). Department Kehutanan, Sept. 1996
(2) Pedoman Agroforestry Dalam Perhutanan Sosial. Perum Perhutani, 1990
(3) Oldeman, L.R. : An Agro-Climatic Map of Sumatra. Contributions fromthe Central Research Institute for Agriculture Bogor, No. 52, 1979
Aim – Timber; for the purpose of timber
– Multi; multi-purpose
– shade; shade tree

7.3 National Forest Plan

(1) Social Oriented Rehabilitation

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

It is assumed that it will be possible to harvest coffee for approximately five years following the planting of effective species in consideration of the workshop discussion results and the effective fructification age of coffee (5 – 8 years).

As the Dinas Kehutanan TK I is planning a bamboo project along national forest boundaries, the subject areas of the social oriented rehabilitation plan will be separated from the national forest boundaries in the areas subject to the said bamboo project by at least 500 m.

1) Species for Planting

The suitable species for planting are mahogany, damar mata kucing, durian, aren, jengkol, petai, kemiri, apokat, melinjo and merkussi pine, etc.

2) Planting Method

The trees will be planted between October and February (rainy season). Alternating rows of each species will be planted along the contour lines. Kemiri and other useful species which quickly grow and become large trees will be planted in border areas, avoiding the central areas of planting sites. Coffee fields will be divided into land at an elevation of 900 m or less, land at an altitude of 901 – 1,500 m and land at an elevation of 1,501 m or more and useful species which are suitable for each altitude level will be planted. The species and number of trees to be planted at coffee fields according to elevation are described below.

① Coffee Fields at El. 900 m or Less

Mahogany (200 trees/ha) and damar mata kucing (200 trees/ha) will be planted for afforestation purposes (400 trees/ha in total) and multi-purpose species consisting of durian (20 trees/ha), aren (20 trees/ha), jengkol (20 trees/ha), petai (20 trees/ha) and kemiri (20 trees/ha) will be planted between the said afforestation trees (100 trees/ha in total).

② Coffee Fields at El. 901 – 1,500 m

Merkussi pine (200 trees/ha) and damar mata kucing (200 trees/ha) will be planted for afforestation purposes (400 trees/ha in total) and multi-purpose species consisting of apokat (30 trees/ha), melinjo (30 trees/ha) and kemiri (40 trees/ha) will be planted between the said afforestation trees (100 trees/ha in total).

③ Coffee Fields at El. 1,501 m or More

Merkussi pine will be planted at intervals of roughly 3 m × 2 m (1,660 trees/ha).

3) Tending

The planted trees will be tended at appropriate times.

4) Harvesting

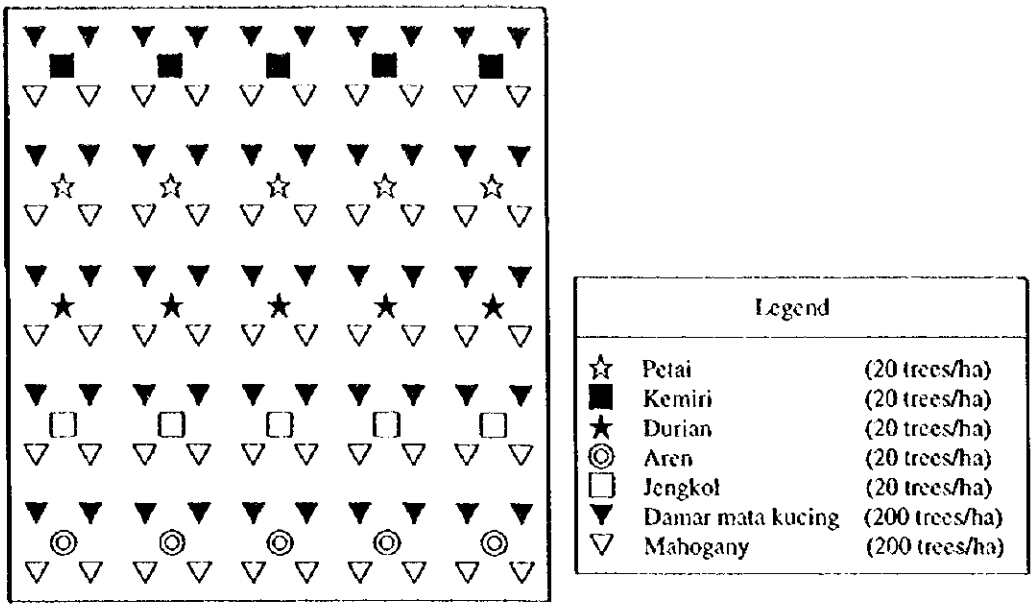
The harvesting ages of the multi-purpose species are given in Table 7-2.

The planned area of social oriented rehabilitation is shown in Table 7-3 while the planting pattern is shown in Fig. 7-2.

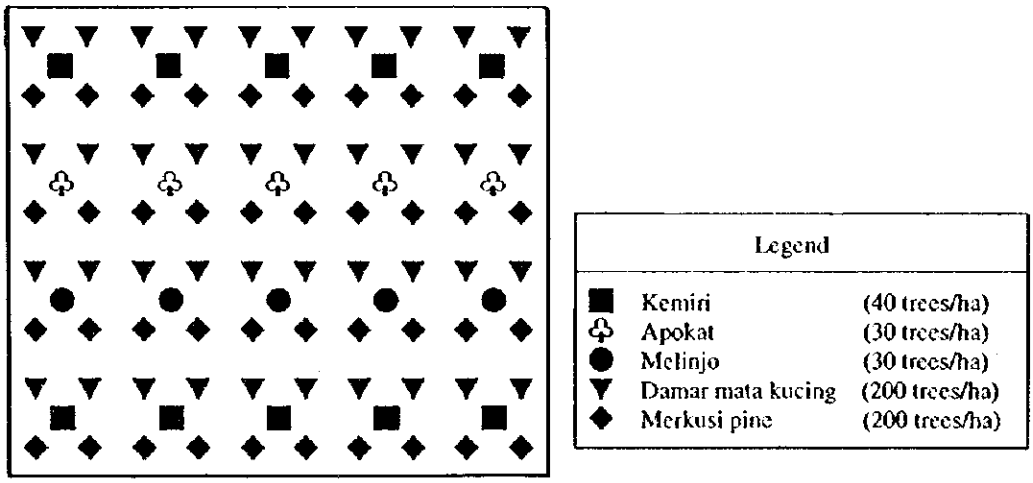
Table 7-2 Characteristics of Multi-Purpose Species in Terms of Extra Side Income and Increased Coffee Fields

Species	Harvest Age (years)		Flowering Period (month)	Bearing Period (month)	Propagation Method	Remarks
	Start	Finish				
Aren	10	15	Year-round	Year-round	Seed	
Salak	3	25	Year-round	Year-round	Seed	Dioecious
Pinang	7	25	Year-round	Year-round	Seed	
Durian	8	40	12~1, 7~8	6~8, 11~1	Seed, Grafting	Grafting is easy. Harvest is possible from fourth year in case of grafting beds
Jengkol	4	30	7~8	6~8	Seed	
Kemiri	3	20	2~3	2~8	Seed	Fast growing species
Melinjo	6	50	7~8	10~11	Seed	Dioecious
Jack Fruit	5	30	Year-round	Year-round	Seed	
Apokat	5	30	2, 8	6~7, 11~12	Seed	
Petai	5	30	4~5, 8~9	8, 12~1	Seed	
Kapok	3	30	1, 7	4, 10	Seed, Cutting	
Mangosteen	7	50	3~4, 9~10	7~8, 1~2	Seed, Grafting	Harvest is possible from fifth year in case of grafting beds
Orange	3.5	11~	12~1	7~8	Cutting	
Panili	3	11	7~8	3~4	Cutting	
Coffee (arabica)	2.5	20~25	5~8	4~6	Seed, Cutting, Grafting	
Coffee (robusta)	2.5	20~25	5~8	4~6	Seed, Cutting, Grafting	
Bamboo	5	–	–	11~3	Cutting, Division	
Merkusi pine	11	30	–	–	Seed	Sapping
Damar mata kucing	30	100	2	8	Seed (Natural growing)	Sapping
Kayu manis	–	5	9~10	2~3	Seed	Harvest is possible from fifth years
Kayu bawang	–	10	5~6	–	Seed, Cutting	Felling time 10 years
Kayu res	–	–	7~8	–	Cutting	Cutting is easy, Nitrogen fixation.
Lamtoro	–	–	4~5	6~8	Cutting	Nitrogen fixation
Kaliandra	–	–	Year-round	Year-round	Seed	Nectar origin
Dadap	–	–	7~8	–	Cutting	Nitrogen fixation

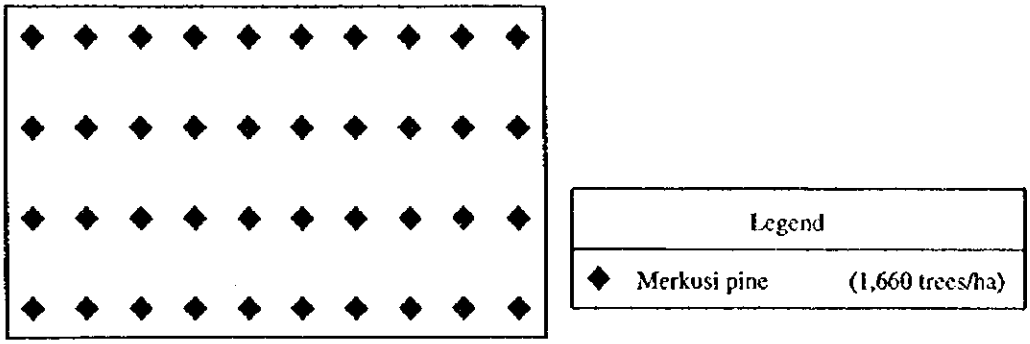
Note: Since damar mata kucing has difficulty germinating and seeding, wildings will be used for nursery stock.



(1) Coffee fields of altitude 900 m or less



(2) Coffee fields of altitude 901–1,500 m



(3) Coffee fields of altitude 1,501 m or more

Fig.7-2 Planting Pattern for Social Oriented Rehabilitation

Table 7-3 Planned Area for Social Oriented Rehabilitation

Work				Planned Area
National forest	Social Oriented Rehabilitation	Planting of useful species (1,597 ha)	Altitude 900 m or less	930 ha
			Altitude 901 – 1,500 m	637 ha
			Altitude 1,501 m or more	30 ha

(2) Social Oriented Border Tree Planting

As the Dinas Kehutanan TK I is planning a bamboo project along national forest boundaries, the subject sections of the said project will be excluded from the Project.

1) Species for Planting

Multi-purpose species of the palm family (salak, pinang and aren, etc.) will be planted to clearly demarcate the boundaries with national forests.

2) Planting Method

Alternating rows of salak (one tree/10 m), pinang (one tree/10 m) and aren (one tree/50 m), etc. will be planted at 10 m intervals along the boundaries with national forests.

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 extension of social oriented border tree planting is shown in Table 7-4 while the planting pattern is shown in Fig. 7-3.

Table 7-4 Planned Extension of Boundary Tree Planting

Work		Planned Extension
National forest	Social Oriented Border Tree Planting	30 km

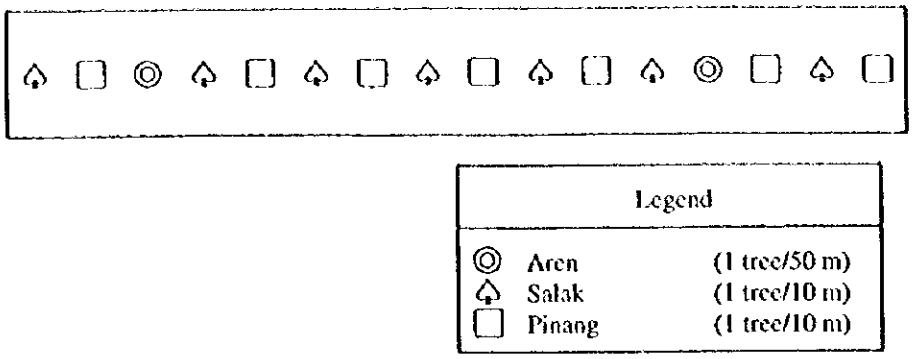


Fig. 7-3 Planting Pattern for Social Oriented Border Tree Planting

7.4 Private Land Plan

7.4.1 Tree Planting and Soil Conservation Measures

(1) Agroforestry Complex Development (Existing)

In regard to coffee fields which are one of the main forms of land use in the Project Area, agroforestry complex development (existing) is planned through the introduction of soil conservation measures and agroforestry techniques intended to achieve sustained production through the long-term combination of trees and crops. The purpose of these measures is the achievement of the goals of conserving soil, increasing income, achieving a fairer income distribution and supplying timber and materials for domestic use, etc.

At existing coffee fields, excluding areas of LPR soil and estate sites (land subject to HGU rights), the planting of useful species is intended to improve the upper trees and to achieve sustained coffee production.

The agroforestry complex development (existing) plan is mainly based on the results of surveys conducted in the Study Area and by the Indonesian Coffee and Cocoa Research Institute (Pusat Penelitian Kopi dan Kakao, Jember), etc.

1) Planting of Upper Trees

① Species for Planting

The trees to be planted will be selected in accordance with the method described under social oriented rehabilitation. Suitable multi-purpose trees are durian, aren, jackfruit, petai, kayu bawang, apokat, melinjo, kayu manis and lamtoro which is a shade species. Tembaga is an advantageous type of durian in the Project Area according to the Dinas Pertanian. The age at which the harvesting of durian can

commence is usually the eighth year after planting but this can be reduced to the fourth year if grafting beds are used. The grafting of durian can be easily conducted.

② Increase and Maintenance of Crown Density of Upper Trees

In regard to coffee fields where the crown density of the upper trees is currently 70% or less, trees will be planted at intervals of approximately 5 m × 5 m (400 trees/ha when fully grown) in order to increase the said crown density. In the case of coffee fields where the crown density of the upper trees is 71% or more, the crown density will be maintained through conversion of the upper tree species.

a. Species for Planting (Crown Density of 70% or Less)

a) Coffee Fields With Upper Tree Crown Density of 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 With Upper Tree Crown Density of 11 – 30%

Useful species (100 trees/ha) and shade species (50 trees/ha) will be planted (150 trees/ha in total).

c) Coffee Fields With Upper Tree Crown Density of 31 – 70%

Useful species (approximately 100 trees/ha) will be planted.

b. Species Conversion (Crown Density of 71% or More)

a) Coffee Fields With Upper Tree Crown Density of 71% or More

Useful species (approximately 100 trees/ha) will be planted.

③ Planting Method

Coffee fields will be divided into those with an elevation of 900 m or less than those with an elevation of 901 – 1,500 m and upper tree species which are appropriate for each elevation level will be planted. The species and number of trees to be planted according to elevation are described below.

a. Coffee Fields at El. 900 m or Less

Durian (5 trees/ha), aren (5 trees/ha), jackfruit (5 trees/ha), petai (10 trees/ha), kayu bawang (5 trees/ha), kayu manis (70 trees/ha) and lamtoro (0 – 150 trees/ha) will be planted.

b. Coffee Fields at El. 901 – 1,500 m

Apokat (15 trees/ha), melinjo (15 trees/ha), kayu manis (70 trees/ha) and lamtoro (0 – 150 trees/ha) will be planted.

④ Tending Method

In regard to the tending of the planted trees, the method employed for agroforestry complex development (new) will be adopted.

⑤ Harvesting

The cutting age for kayu manis will be five years while that for kayu bawang will be 10 years. The cutting ages of useful species and coffee are shown in Table 7-2.

The upper trees at coffee fields, pruned coffee limbs and cut coffee trees will be used as firewood for the refining of sugar from aren planted at coffee fields. According to the "Analisa, Usaha Tani Tanaman Aren" published by the Mejorejo Agricultural Extension Station in Kec. Padang Ulak Tanding, 0.016 m^3 of firewood is required to refine 1.5 kg of muscovado per day from one aren.

2) Soil Conservation Measures

In order to maintain soil fertility and to prevent the deterioration of coffee fields as well as to prevent soil erosion at coffee fields, wood-fencing conservation work or wood-fencing and strip planting conservation work will be conducted depending on the soil characteristics and slope degree.

① Wood-Fencing Conservation Work

Wood-fencing conservation work will be conducted along the contour lines in areas of Andosols and Acrisols soil group with a slope gradient of 15 – 40% and in areas of Cambisols soil group with a slope gradient of 40% or more.

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

② Wood-Fencing and Strip Planting Conservation Work

Wood-fencing and strip planting conservation work will be conducted in areas of Andosols and Acrisols soil group with a slope gradient of 40% or more.

The wood-fencing conservation work method will be the same as that described in ① above.

The species used for strip planting will be kayu res which has a high soil conservation effect and kayu manis, etc. which is very economical.

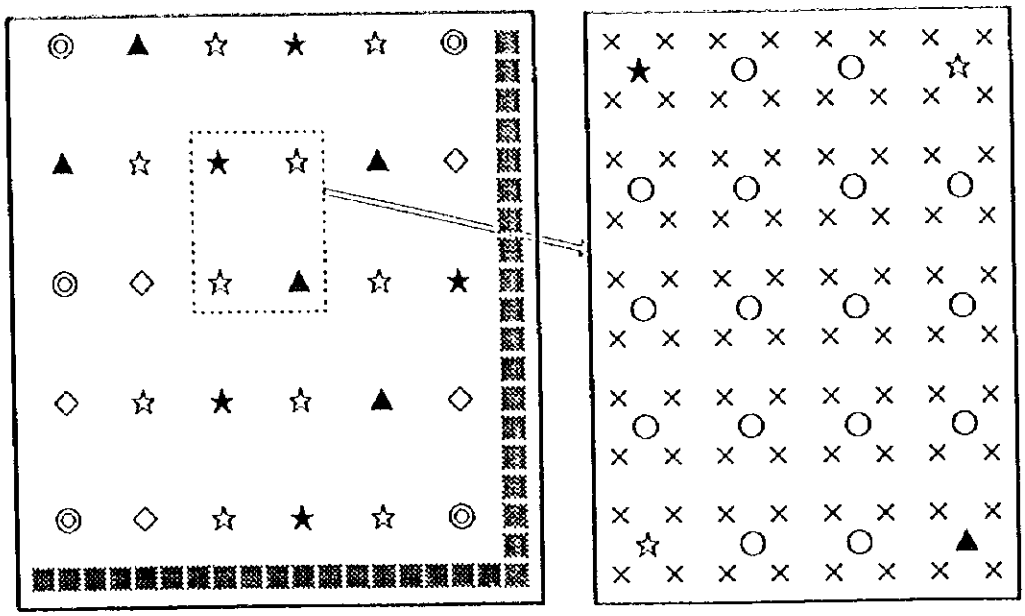
In regard to the planting method, the planting of alternating rows of kayu res (1 tree/1 m) and kayu manis 1 tree/2 m) on the upper side of the wood-fencing work will be effective. In the case of kayu res, rooted cuttings will be used for direct planting.

Tending of the planted trees will be conducted at appropriate times. Kayu manis will undergo harvesting and sprout regeneration in the fifth year after planting.

The area of land for the above-described agroforestry complex development (existing) and the planting pattern are shown in Table 7-5 and Fig. 7-4 respectively. Standard sectional drawings of the wood-fencing work and combination of wood-fencing work and strip planting and the planting pattern for strip planting are shown in Fig. 7-5 and Fig. 7-6 respectively. Moreover, the forecast changes of the tree and crop yields over time following the implementation of the Project are given in Attached Appendix G-3.

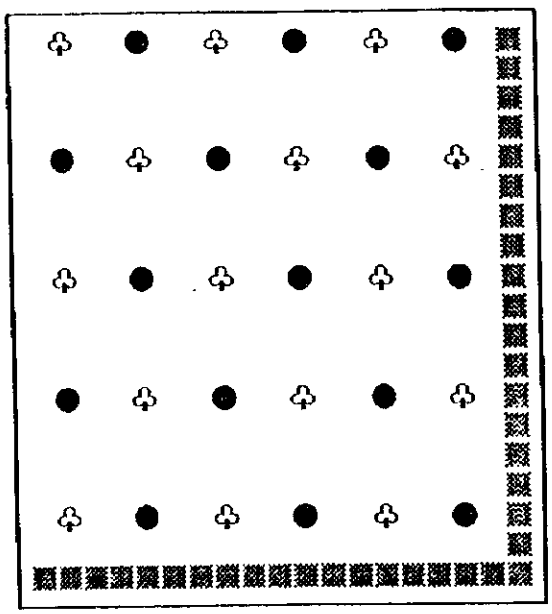
Table 7-5 Planned Area for Agroforestry Complex Development (Existing)

Work		Upper Tree Planting	Soil Conservation Measures	Planned Area
Private land	Agroforestry complex development (existing) (24,809 ha)	Altitude 900 or less (20,542 ha)	No soil conservation measures	15,272 ha
			Wood-fenced conservation work	5,187 ha
			Wood-fenced and strip planting conservation work	83 ha
		Altitude 901-1,500 m (4,267 ha)	No soil conservation measures	3,207 ha
			Wood-fenced conservation work	963 ha
			Wood-fenced and strip planting conservation work	97 ha



(1) Coffee fields of altitude 900 m or less

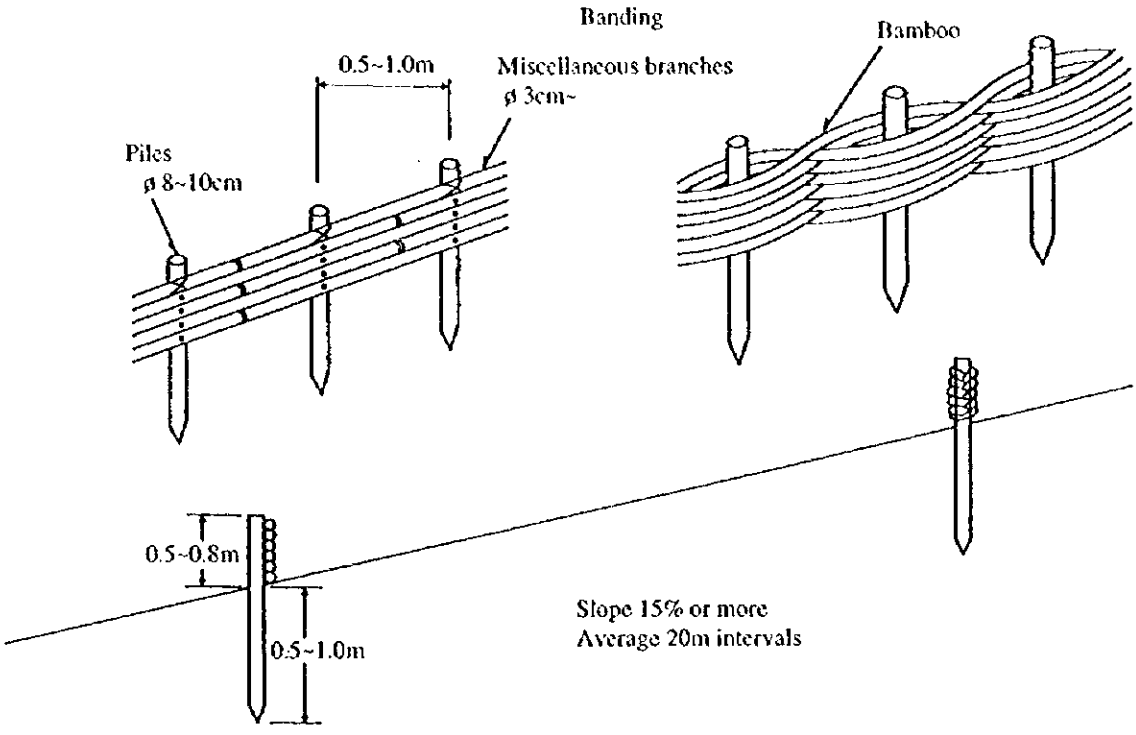
Legend		
★	Durian	(5 trees/ha)
◎	Aren	(5 trees/ha)
▲	Jack fruit	(5 trees/ha)
☆	Petai	(10 trees/ha)
◇	Kayu bawang	(5 trees/ha)
▩	Kayu manis	(70 trees/ha)
○	Shade trees	
×	Coffee	



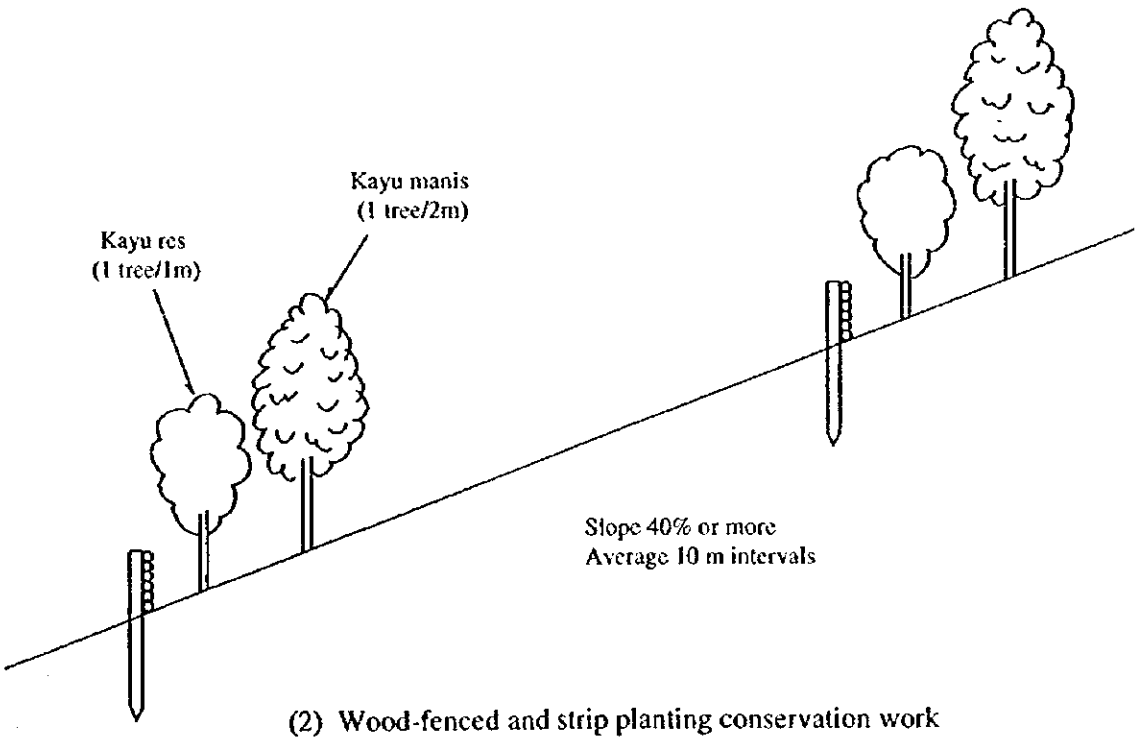
Legend		
♧	Apokat	(15 trees/ha)
●	Melinjo	(15 trees/ha)
▩	Kayu manis	(70 trees/ha)

(2) Coffee fields of altitude 901–1,500 m

Fig. 7-4 Planting Pattern for Agroforestry Complex Development (Existing and New)



(1) Wood-fenced conservation work



(2) Wood-fenced and strip planting conservation work

Fig. 7-5 Wood-Fencing and Strip Planting Conservation Work

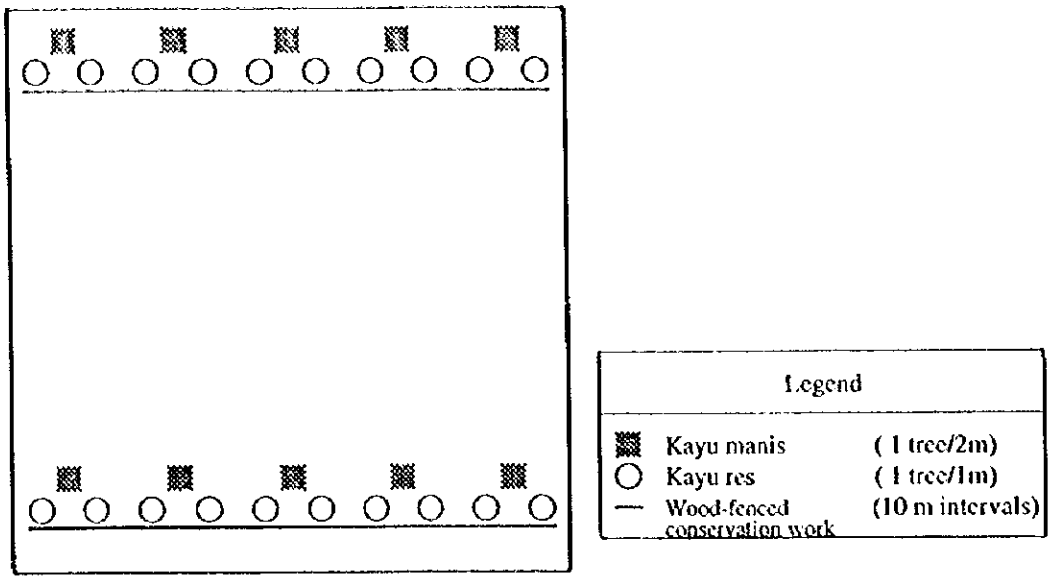


Fig. 7-6 Planting Pattern for Strip Planting

(2) Agroforestry Complex Development (New)

Agroforestry complex development (new) is planned for land, excluding shrub land, with LPR soil. Based on the field survey findings, etc., the agroforestry complex development (new) plan assumes that approximately 60% of the existing shrub land can be utilised within 10 years.

1) Tree Planting

① Coffee Planting

1,600 trees will be planted per hectare (2.5 m × 2.5 m). Lines of coffee trees will be planted along the contour lines.

The beginning of the rainy season (October) is the most desirable period for coffee planting. In the case of deficient stock and poor growth stock, supplementary planting should be conducted as quickly as possible.

In regard to the selection of coffee varieties, it is necessary to examine the requirements regarding the natural conditions and marketability, etc. Robusta coffee is said to be appropriate for an elevation of 800 m or less while arabica coffee is said to be appropriate for an elevation of more than 800 m. Robusta coffee which is highly resistant to pests is cultivated in the Project Area. However, the cultivation of arabica coffee is also possible in the future provided that markets can be secured.

② Upper Tree Planting

The tree species, number of trees and planting method for the upper trees are the same as those described for agroforestry complex improvement (existing).

In the case of shade tree planting, starting at bare land, permanent shade trees and fast growing temporary shade plants will be planted in order to facilitate initial coffee tree growth. Desirable species for use as permanent shade trees are those which are deep rooted, pose little competition for water and nutrients with coffee, are the spreading type, have no thorns on the trunks, can be easily pruned to establish proper shade and are resistant to diseases and pest damage.

③ Tending Method

See section 2) - ① for tending of the planted trees.

④ Harvesting

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

2) Coffee Field Management and Cultivation Technology Improvement

① Upper Tree Management

Shade trees will be pruned approximately once a year at the start of the rainy season (October) in order to maintain a relative light intensity of 75%. In regard to useful trees with a low relative light intensity below the crown, pruning will be conducted to raise the crown height and to increase the relative light intensity below the crown. The pruned leaves and branches of upper trees will be used as green manure and fodder for livestock.

When conducting the replanting of coffee trees, upper trees will be retained to avoid coffee fields from becoming bare land.

② Coffee Training Method

The traditional training method will be changed to a more pertinent method. The coffee training method is described in 5.3-(1)-1)-②-e.

③ Fertiliser Application

The standards for coffee fertiliser application are shown in Table 7-6. Fertiliser will be applied twice a year at the start and end of the rainy season.

Cut weeds, hedge crops and cover crops, pruned branches and leaves from the upper trees and the remains of intercrops, etc. will be placed around the coffee stock and in holes between the coffee stock to achieve a fertilising effect. The supply of organic materials to the soil will improve the soil structure and increase the water infiltration and water retention capacity.

Table 7-6 Coffee Fertilizer Application Standards

(Unit: g/tree)

Planting Years	Start of Rainy Season				End of Rainy Season			
	Urea	TSP	KC ℓ	MgO	Urea	TSP	KC ℓ	MgO
1	20	20	15	10	20	20	15	10
2	50	30	40	15	50	30	40	15
3	75	40	50	25	75	40	50	25
4	100	40	70	35	100	40	70	35
5 ~ 10	150	60	100	50	150	60	100	50
11 ~	200	80	125	70	200	80	125	70

Notes: Urea: urea, TSP; phosphorous tribromide limestone, Kcl; potassium chloride
MgO; magnesium oxide
Source: Pusat Penelitian Kopi dan Kakao, Jember

④ Weeding

Weeds are a particular problem for coffee cultivation where there is much weed infiltration at the sapling stage or in the case of sparse planting. In particular, as the roots of true grass weeds spread close to the top soil and have a strong nutrient and water absorption capacity, they pose stiff competition for the feeder roots of coffee trees in the top soil. The traditional method of clean culture where the soil surface is exposed runs the risk of soil erosion, leading to a reduction of the soil humus content. More effective means of removing weeds are intercropping, mulching, cover crop cultivation and the use of herbicides, etc.

a. Intercropping

Weeding can be reduced by means of the cultivation and management of intercrops for two years after the planting of coffee trees.

b. Mulching

Following the end of intercropping, the weeds should be roughly cut three times a year and used as mulching materials. Mulching increases the water

retaining capacity of the soil, reduces water loss due to evaporation during the dry season and prevents the growth of weeds during the rainy season. Moreover, mulching reduces the ground temperature, contributes to the supply of humus and also prevents the runoff of soil on slopes.

c. Cover Crops

Sod culture which utilises leguminous green manure crops has a positive effect in terms of both weed prevention and the replenishment of organic materials. As coffee feeder roots are widely spread in the top soil, the appropriate selection and management of cover crops are necessary.

d. Herbicides

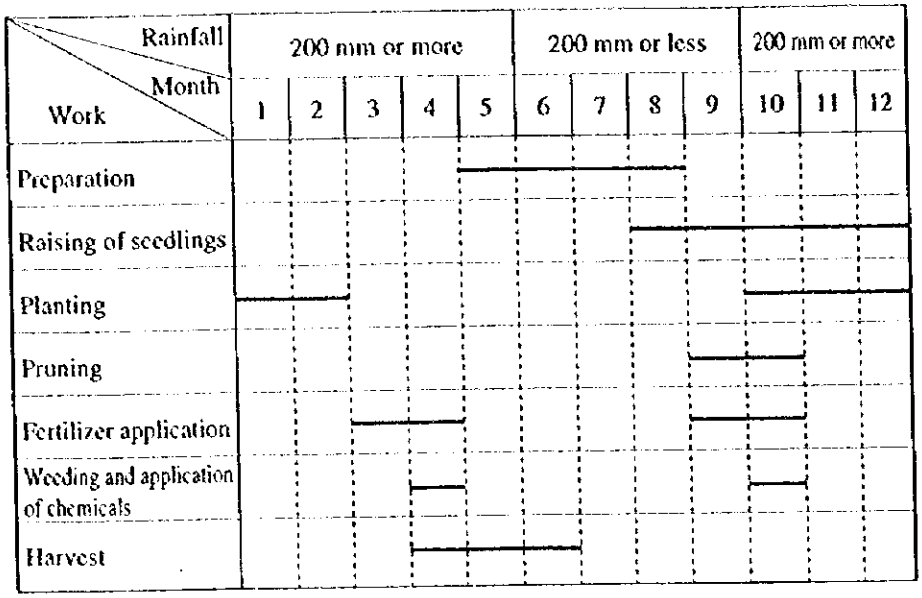
When using herbicides, it is necessary to avoid those types with a high residual toxicity (paraquat, etc.) and to select those with a low residual toxicity to protect the environment. Care is also required in respect to the concentration of the herbicide to be sprayed.

⑤ Pest Damage Prevention

In regard to the prevention of pest damage, it is necessary to avoid pesticides with a high residual toxicity (organo-chloric pesticides, etc.) and to select those with a low residual toxicity to protect the environment. If possible, efforts should be made to introduce biological and ecological methods in order to achieve all-round prevention. Care is also required in respect to the concentration of the pesticide to be sprayed.

The main work schedule for coffee cultivation is shown in Table 7-7.

Table 7-7 Work Schedule for Coffee Cultivation



3) Intercropping

Intercropping is possible in the two years before harvesting commences. Intercropping can be expected to provide food for domestic consumption and cash income. Moreover, weeds can be prevented through cultivation management and the remains of intercrops can be used as mulching materials. The selection and combination of intercrops and the introduction of new varieties, etc. is planned below.

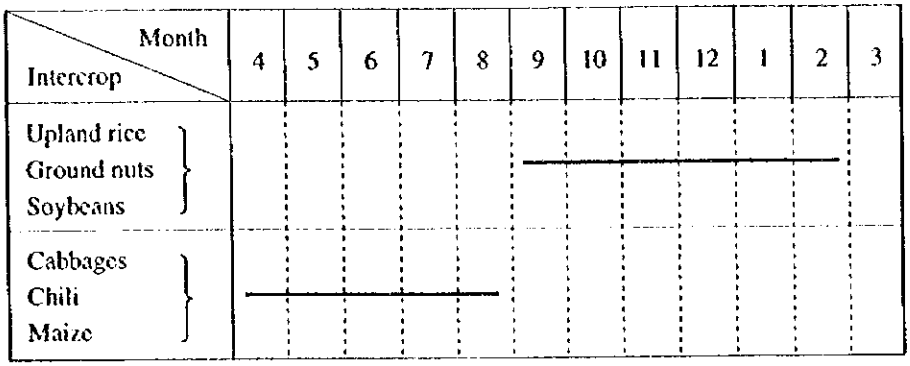
a. In regard to the types of intercrops, such crops as upland rice which are used for domestic consumption and such crops as groundnuts, cabbages and chili which offer high economy and a good cash return will be selected. Leguminous crops are particularly good to maintain the soil fertility. Crops such as cassava which have a high nutrient absorption level are unsuitable for use as intercrops for coffee fields. Such root tuber crops as cassava should be avoided for soil conservation purposes at sloping land.

b. In selecting the types of intercrops and their combination, care will be taken to level the amount of labour and return for each month.

c. In introducing new varieties, those with a high yield and good quality and which are highly resistant to pest damage will be selected.

The suitability of the main intercrops and their cultivation periods are shown in Table 7-1 and Table 7-8 respectively.

Table 7-8 Cropping Seasons for Main Intercrops



(Legend: ——— cultivation period)

4) Soil Conservation Measures

The soil conservation measures described in the section on agroforestry complex development (existing) will be conducted.

The planned land area for agroforestry complex development (new) in the manner described above is shown in Table 7-9. The forecast changes of the tree and crop yields over time following implementation of the Project are shown in Attached Appendix G-3.

Table 7-9 Planned Area for Agroforestry Complex Development (New)

Work		Tree Planting	Soil Conservation Measures	Planned Area
Private land	Agroforestry complex development (new) (2,145 ha)	Altitude 900 or less (1,775 ha)	No soil conservation measures	1,323 ha
			Wood-fenced conservation work	446 ha
			Wood-fenced and strip planting conservation work	6 ha
		Altitude 901 ~ 1,500 m (370 ha)	No soil conservation measures	277 ha
			Wood-fenced conservation work	84 ha
			Wood-fenced and strip planting conservation work	9 ha

(3) Conservation Planting Development

Conservation planting is planned in areas of coffee fields and fields consisting of clayey LPR soil.

1) Species for Planting

Species which are effective in terms of soil conservation (kayu res, bamboo and kapok) will be planted. Betung, which is suitable for bamboo shoot production, is selected as the bamboo variety.

2) Planting Method

The planting of kayu res at intervals of approximately 3 m × 2 m (1,600 trees/ha) and then the planting of alternating rows of bamboo (100 trees/ha) and kapok (100 trees/ha) between the kayu res along contour lines should prove effective.

3) Tending Method

The planted trees will be tended at appropriate times.

4) Harvesting

The harvesting ages of useful species are shown in Table 7-2.

The planned land area for conservation planting and the planting pattern are shown in Table 7-10 and Fig. 7-7 respectively.

Table 7-10 Planned Area of Conservation Plantation Development

Work		Planned Area
Private Land	Conservation plantation development	418 ha

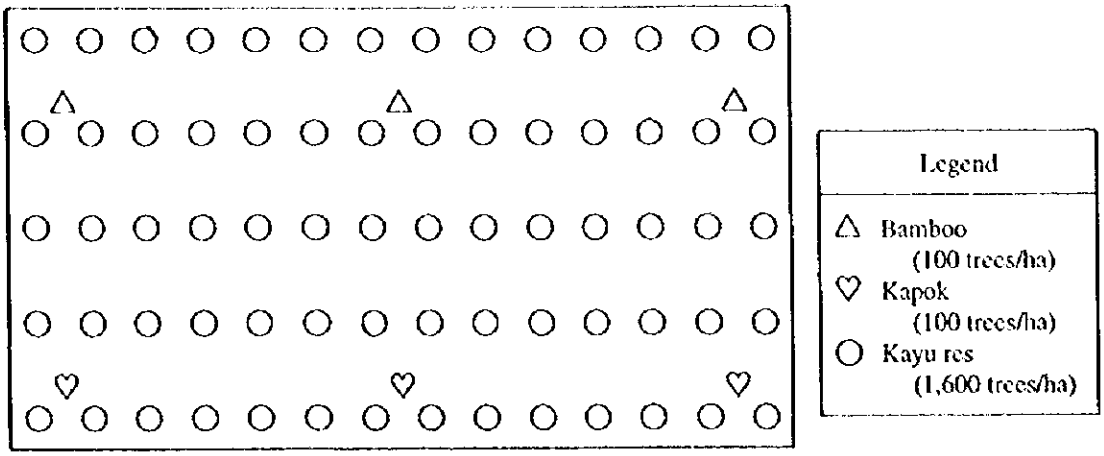


Fig. 7-7 Planting Pattern for Conservation Plantation Development

(4) Dry Crop Field Improvement

Unlike coffee fields, dry crop fields are vulnerable to soil erosion. In order to prevent soil erosion at dry crop fields, bench terraces will be created in accordance with the soil characteristics and slope degree.

1) Bench Terrace (Teras Bangku) Construction

In areas of Andosols and Acrisols soil group with a slope of 15% or more and areas of Cambisols soil group with a slope of 40% or more, bench terraces (Teras Bangku) will be constructed. Moreover, drainage channels for surface water will be constructed together with the bench terraces.

2) Planting of Terrace Hedge Crops (Crops to Cover and Strengthen Terraces)

Hedge crops will be planted in rows in order to strengthen the terraces. In regard to the types of hedge crops, trees and crops that can be used for shading, fodder and green manure purposes will be used. As the feeder roots of coffee trees widely spread throughout the top soil, edge crops which develop axial roots (not lateral roots) are the most appropriate.

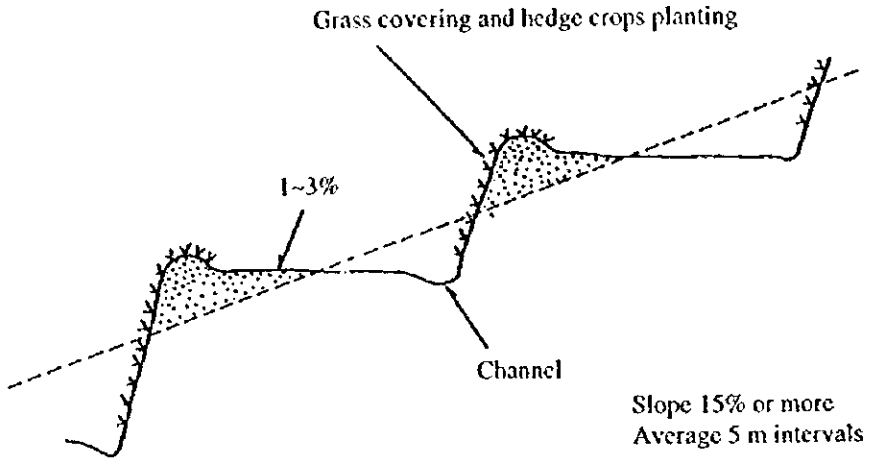
3) Cultivation Technology Improvement

The planned selection and combination of crops and the introduction of new varieties, etc. is as described in 7.4.1-(2)-3).

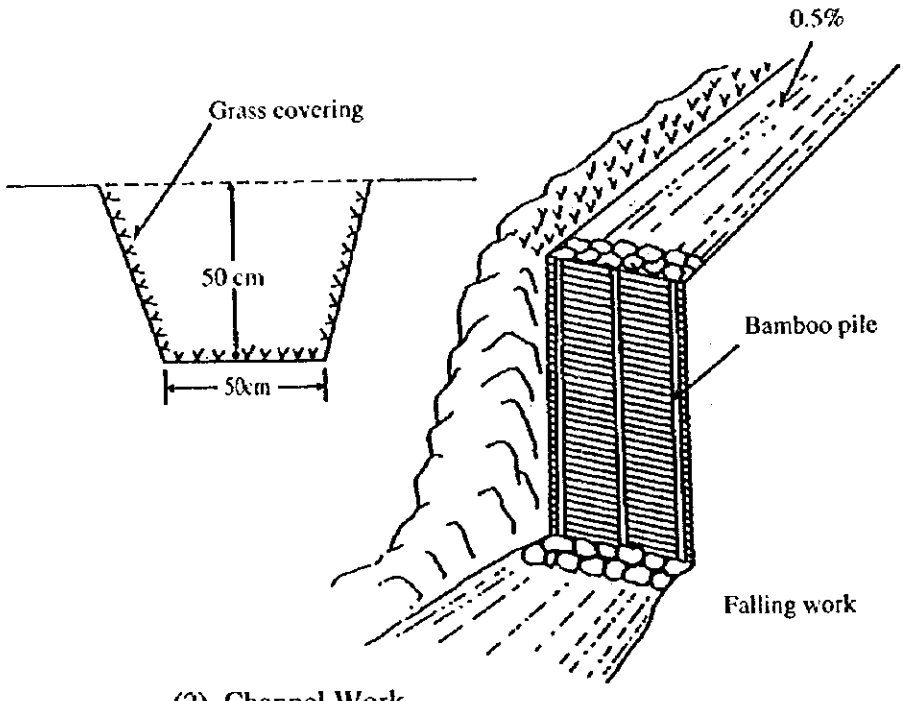
The planned land area for dry crop field improvement and standard section drawings of bench terraces and channels are shown in Table 7-11 and Fig. 7-8 respectively. The forecast changes of the tree and crop yields over time following implementation of the Project are shown in Attached Appendix G-3.

Table 7-11 Planned Area for Dry Crops Field Improvement

Work		Planned Area
Private Land	Dry crops field improvement: bench terrace formation	1,442 ha



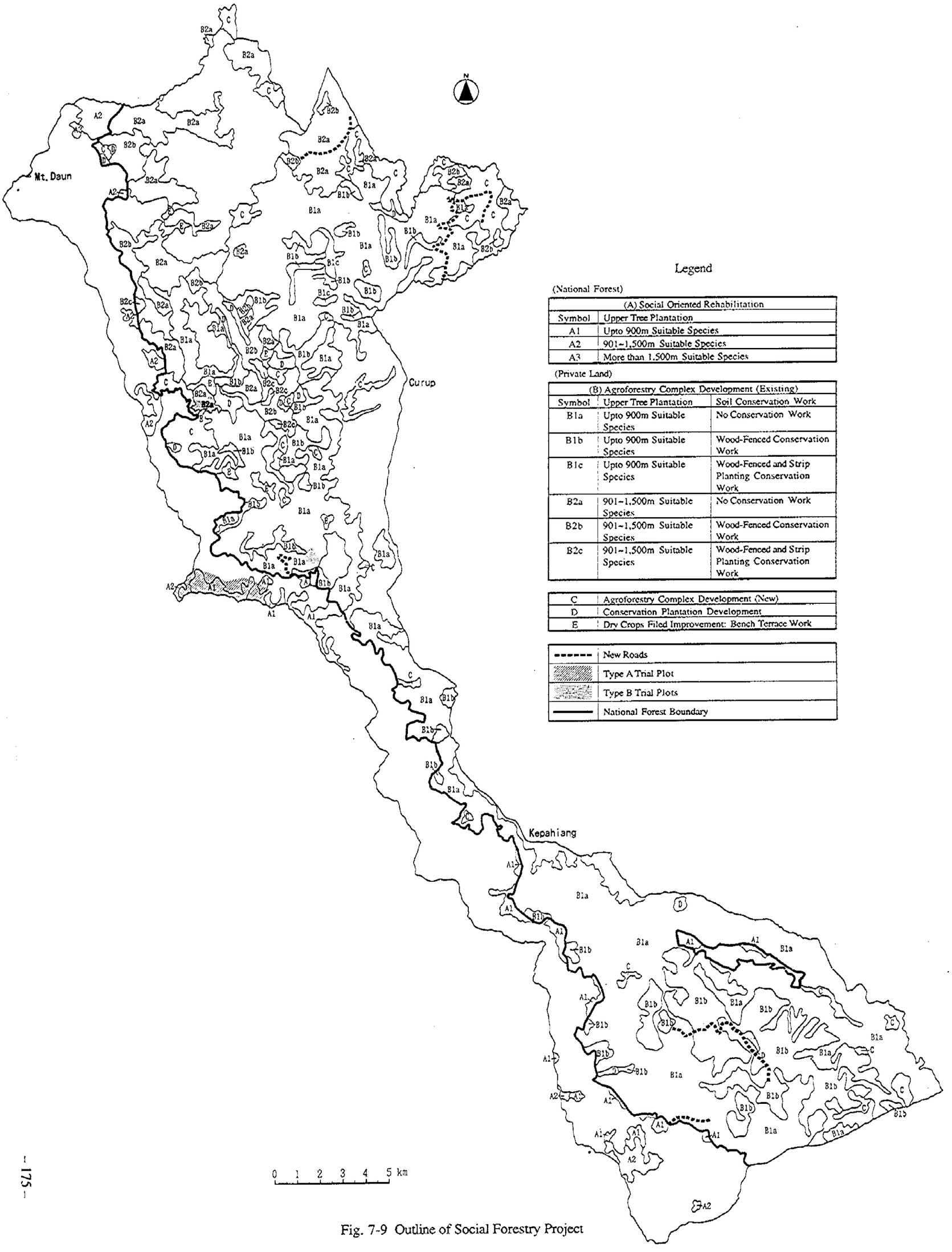
(1) Bench Terraces



(2) Channel Work

Fig. 7-8 Bench Terraces and Channel Work

The components of the Social Forestry Project described so far are graphically outlined in Fig. 7-9.



Legend

(National Forest)

(A) Social Oriented Rehabilitation	
Symbol	Upper Tree Plantation
A1	Upto 900m Suitable Species
A2	901~1,500m Suitable Species
A3	More than 1,500m Suitable Species

(Private Land)

(B) Agroforestry Complex Development (Existing)		
Symbol	Upper Tree Plantation	Soil Conservation Work
B1a	Upto 900m Suitable Species	No Conservation Work
B1b	Upto 900m Suitable Species	Wood-Fenced Conservation Work
B1c	Upto 900m Suitable Species	Wood-Fenced and Strip Planting Conservation Work
B2a	901~1,500m Suitable Species	No Conservation Work
B2b	901~1,500m Suitable Species	Wood-Fenced Conservation Work
B2c	901~1,500m Suitable Species	Wood-Fenced and Strip Planting Conservation Work

C	Agroforestry Complex Development (New)
D	Conservation Plantation Development
E	Dry Crops Filed Improvement: Bench Terrace Work

-------	New Roads
▨	Type A Trial Plot
▨	Type B Trial Plots
———	National Forest Boundary

Fig. 7-9 Outline of Social Forestry Project

7.4.2 Check Dams and Riparian Afforestation

(1) Construction of Check Dams

The construction of check dams is planned for small watersheds in the Project Area where the soil erosion level is believed to be high in order to control sediment runoff. The subject watersheds are Watershed Division No. 2 (Air Pikat Kering), No. 1 (Air Lanang) and No. 6 (Air Dendan) where the annual soil loss is estimated to be 20 tons/ha or more and No. 5 (Air Mundu) where the estimated annual soil loss of 18.7 tons/ha is also large (see 6.2). In the case of Watershed Division No. 7 (Air Musi), although the estimated annual soil loss of 14.3 tons/ha is not particularly large, the amount of soil loss in areas around Bukit Basa is assumed to be high because of the existence of dry crop fields in a mosaic manner with a slope of some 30% or steeper. Accordingly, these areas around Bukit Basa have been added to the subject areas for check dam construction. As the Indonesian Ministry of Forestry sets forth the subject watershed area for check dam (earth dam) construction at 100 – 250 ha, 56 sub-watersheds of 100 – 250 ha each in the subject area were identified to estimate the amount of annual soil erosion in each sub-watershed. In estimating the said soil erosion, each sub-watershed was divided into square plots with 1 cm each side on the topographical map (scale: 1/25,000) and the amount of soil erosion was estimated for each square contained in each sub-watershed using the method described in 6.2.

In the US, 5 tons/acre/year (12.4 tons/ha/year) is used as the tolerable limit for soil erosion. The speed of soil formation varies from one type of soil to another. As the speed of soil formation of the types of soils found in the Project Area is not clearly known, it is impossible to determine the tolerable soil erosion rate. For the present purposes, therefore, 25 tons/ha/year which is approximately double the tolerable erosion rate used in the US is adopted as the minimum annual soil loss necessitating the planning of check dam construction. In Indonesia, a tolerable soil erosion rate is suggested for each type of soil as shown in Table 7-12. According to this table, the tolerable soil erosion rate in the Project Area is inferred to be approximately 1.2 – 2 mm/year (14.4 – 24 tons/ha/year), indicating the appropriateness of the above minimum annual soil loss for check dam construction under the Project. The planned 16 sites for check dam construction, selected from the above 56 sub-watersheds, are listed in Table 7-13. The standard specifications for these check (earth) dams are a height of 8 m, a length of 50 m and a sediment storage volume of 17,000 tons. The dam sites have been selected so that the catchment area of each dam is roughly 100 – 150 ha (see Fig. 7-10).

Table 7-12 Tolerable Soil Erosion Rates in Indonesia

No.	Soil Properties	Tolerable Erosion (At) (mm/year)
1	Soil on bedrock, low depth	0.0
2	Soil above unconsolidated materials, low depth (unconsolidated materials)	0.4
3	Soil above degraded parent materials, low depth	0.8
4	Soil above degraded parent materials, average depth	1.2
5	Soil with water resistant layer under in, above degraded substratum, high depth	1.6
6	Soil with low permeability layer under in, above degraded substratum, high depth	2.0
7	Soil with high permeability layer under in, above degraded substratum	2.5

Notes
1) Volume weight x 10 x At (mm/year) = At (tons/ha/year)
2) Average volume weight for soil in Indonesia: 1.2 g/cc
Source: Ministry of Forestry, Directorate General of Reforestation and Land Rehabilitation: Critical Land Evaluation at End of Fifth Five Year Development (Including System), Book I, Main Report, 1993, page 10

Table 7-13 Check Dam Construction Plan

No.	Kecamatan	Site Location	Watershed Area (ha)	Soil Erosion Rate (ton/ha/year)
C1	Curup	Air Pikat	250	32.6
C2	Curup	Tebat Pulau	260	26.2
C3	Curup	Pungguk Lalang	190	29.7
C4	Curup	Dusun Sawah	120	27.0
C5	Curup	Dusun Sawah	130	42.4
C6	Curup	Lubuk Kembang	160	29.9
C7	Curup	Sukarami	320	26.1
C8	Curup	Sukarami	160	28.5
C9	Curup	Sukarami	210	27.4
C10	Curup	Talang Baru	380	26.9
C11	Curup	Baru Manis	150	37.1
C12	Curup	Baru Manis	190	25.2
C13	Curup	Air Mundu	240	52.6
C14	Curup	Kampung Sajad	170	37.1
C15	Curup	Sentral Baru	150	56.7
C16	Curup	Sumber Rejo	240	39.8

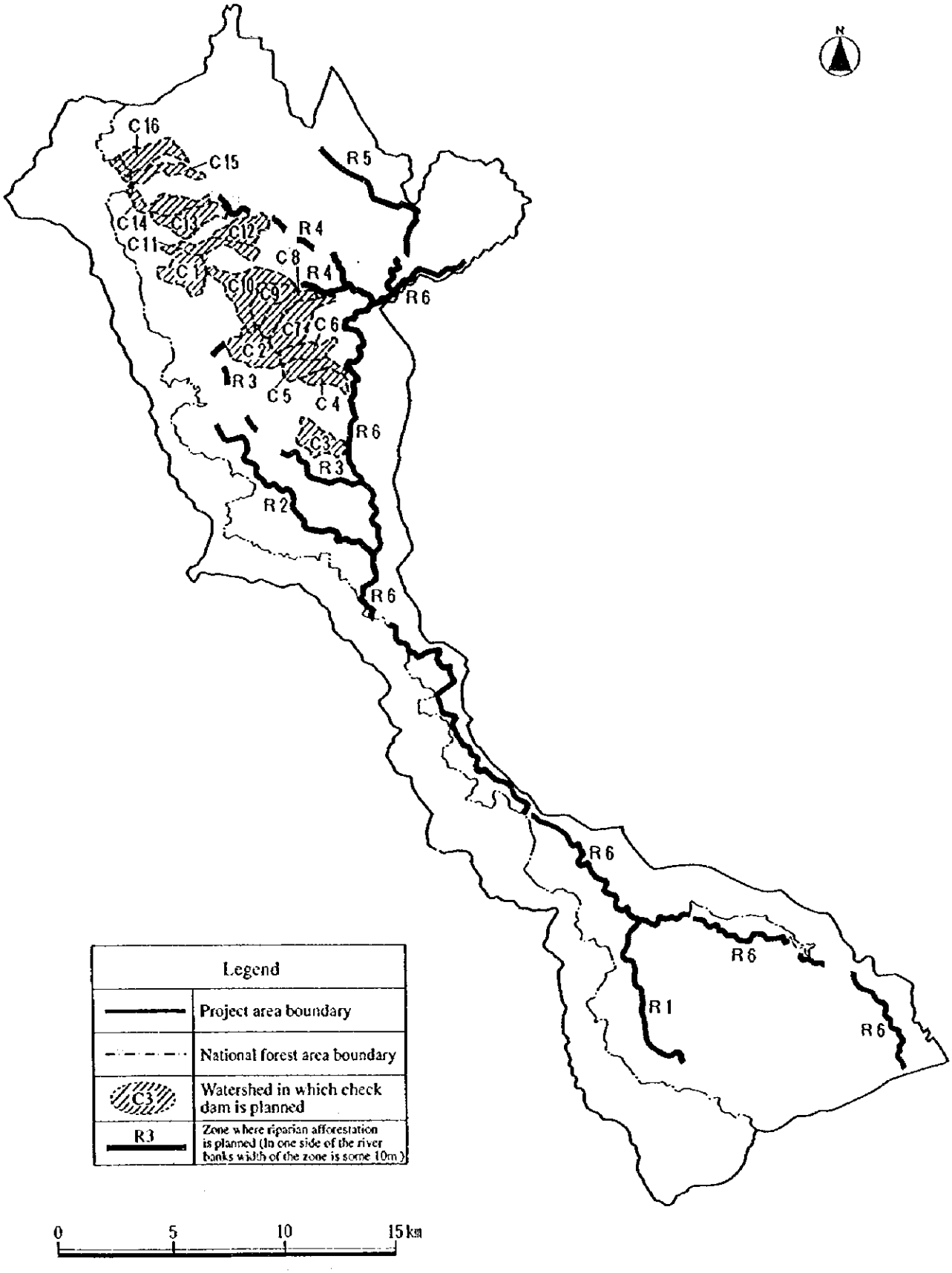


Fig. 7-10 Check Dams and Riparian Afforestation Plan Map

(2) Riparian Afforestation

Riparian afforestation for the prevention of soil erosion is planned on the riversides of the major rivers in the Project Area. With consideration given to raising the effect in terms of soil erosion prevention, the target sites are riparian of insufficient vegetation covering on rivers that possess four valleys or more on the topographical map (reduced scale 1:25,000) that was prepared in the Study. Riparian forests will have a width of 10 m and, as a rule, will be planted on both banks of target rivers. The afforestation area is 205 ha and 41,000 bamboo stocks will be planted (see Table 7-14). The species of bamboo to be planted are *Dendrocalmus asper* (local name, Betung), *Gigantochloa robusta* (local name, Manyan) and Serik (local name), the planting interval will be 10 m, and 2 rows separated by 5 m will be planted on each river bank.

Moreover, regarding the total area of 10 ha centering around the 2 sites near Tabarenah where rafflesia growth has been confirmed, this will be made a conserved area.

Table 7-14 Riparian Afforestation Plan

No.	River	Afforestation Area (ha)
R1	Air Tertik	19.4
R2	Air Lanang	24.9
R3	Air Pikat Kering	16.8
R4	Air Mundu	23.3
R5	Air Dendan	19.9
R6	Air Musi	100.7
Total		205.0

The target land areas, total number of trees to be planted and breakdown of trees to be planted under each work item under the Project are respectively indicated in Appendix G-5.

7.5 Change of Soil Erosion and Sediment Runoff by Project Implementation

The effect in terms of reduction in sediment runoff as a result of the national forest and private land plan was estimated using the technique described in section 5.2.1. The estimated C value and P value with respect to the land use and soil conservation measures implemented under the Project are indicated in Table 7-15 and Table 7-16 respectively.

Incidentally, the major changes in land use resulting from the Project are indicated in Appendix G-6.

Table 7-15 Land Use and C value Resulting from the Project

No.	National Forest/ Private Land	Planned Land Use under the Project	Vegetation Factor C Value
1	National forest	Social oriented rehabilitation: planting of useful species	0.001
2	Private land	Agroforestry complex development (existing): upper tree planting	0.009
3	Private land	Agroforestry complex development (new)	0.009
4	Private land	Conservation plantation development	0.001

Notes:

1) The C value for social oriented rehabilitation and conservation planting development is that used by the Ministry of Forestry for non-devastated forests.
2) The C value for agroforestry complex development (both existing and new) was calculated based on the results of soil erosion tests conducted by the Indonesian Coffee and Cocoa Research Institute (Pusat Penelitian Kopi dan Kakao, Jember) to which factors (excluding the C value) obtained during the Study using the USLE method were applied.

Table 7-16 Soil Conservation Measures and P Value Resulting from the Project

No.	Soil Conservation Measures	Conservation Factor P Value
1	Wood-fenced conservation work (20 m intervals)	0.35
2	Wood-fenced and strip planting conservation work (10 m intervals)	0.25
3	Bench terraces	0.07

Notes:

1) The P value for wood-fenced conservation work is that used by the Ministry of Forestry for poor bench terraces.
2) The P value for wood-fenced and strip planting conservation work is the intermediate value between the values for normal and poor bench terraces used by the Ministry of Forestry.
3) The P value for bench terraces is that calculated based on the results of soil erosion tests carried out by the Indonesian Coffee and Cocoa Research Institute (Pusat Penelitian Kopi dan Kakao, Jember).

The Project Area indicated on the Social Forestry Project Map (scale: 1/25,000) prepared under the Study was divided into square plots with 1 cm each side and, for those square plots with identical locations to those of the samples referred to in 6.2.1, the soil erosion rate following the implementation of the Project when the positive effects of the national forest plan and tree planting and soil conservation measures for private land would have fully materialised was estimated using the technique described in 6.2.1. The estimated annual amount of soil erosion following the implementation of the Project is 641,000 tons/year and the amount of sediment flowing out of the watershed is 54,000 tons/year. As the amount of sediment flowing out of the

watershed is currently estimated to be 74,000 tons/year (see results given in 6.2.1 and 6.3.3), it can be inferred that the implementation of the Project will reduce the sediment runoff out of the watershed by 20,000 tons/year, representing a 27% decrease of the current sediment runoff (the effect of check dams is not considered) (see Table 7-17).

Table 7-17 Change of Soil Erosion and Sediment Runoff by the Project Implementation

Watershed Division No.	Watershed Area (ha)	Now		After Project Implementation			SDR
		Soil erosion in watershed (tons/year)	Sediment runoff from watershed (tons/year)	Soil erosion in watershed (tons/year)	Sediment runoff from watershed (tons/year)	Reduction in sediment runoff (tons/year)	
1	5,709	138,158	10,279	79,926	5,946	4,333	0.0744
2	4,916	120,442	5,408	71,282	3,201	2,207	0.0449
3	1,450	17,980	2,900	16,530	2,666	234	0.1613
4	5,289	67,699	8,990	49,717	6,602	2,388	0.1328
5	8,174	152,854	13,084	129,967	11,125	1,959	0.0856
6	3,850	77,770	6,354	66,220	5,410	944	0.0817
7	18,267	261,218	21,342	175,363	14,327	7,015	0.0817
8	3,746	50,946	4,162	44,952	3,673	489	0.0817
9	1,432	12,458	1,018	6,874	562	456	0.0817
Total	52,833	899,525	73,537	640,831	53,512	20,025	

Notes:
1) The above figures are estimates at the time when the positive effects of the national forest plan and the tree planting and soil conservation measures for private land will have fully materialised.
2) The watershed division Nos. are equivalent to those given in Table 6-5 and Fig. 6-2.
3) The SDR given for watershed division Nos. 1-5 are those used for watershed division Nos. 1-5 in Table 6-8 because each watershed is more or less the same.
4) The overall SDR for watershed division Nos. 1-5 has been applied as the SDR for watershed division Nos. 6-9.

The level of the sediment runoff reduction effect of the implementation of the Project will be low at the beginning but will gradually increase with the progress of the Project. Table 7-18 shows the estimated sediment runoff reduction for a period of 30 years from the commencement of the Project. It is indicated that the overall sediment runoff will be reduced by 25% with the implementation of the Project (including the positive effect of check dams).

Table 7-18 Estimated Annual Changes of Soil Erosion and Sediment Runoff after Project Implementation

Year	Soil Erosion in Watershed (tons/year)	Sediment Runoff From Watershed (tons/year)	Reduction of Soil Erosion (tons/year)	Reduction of Sediment Runoff (tons/year)	Percentage of Sediment Runoff Reduction * (%)
1	899,525	73,537	0	0	0.0
2	880,806	70,417	18,719	3,120	4.2
3	861,557	67,290	37,968	6,247	8.5
4	842,307	63,864	57,218	9,673	13.2
5	823,058	62,485	76,467	11,052	15.0
6	779,052	59,233	120,473	14,304	19.5
7	752,892	57,375	146,633	16,162	22.0
8	725,993	55,485	173,532	18,052	24.5
9	698,355	53,499	201,170	20,038	27.2
10	669,977	51,460	229,548	22,077	30.0
11	648,224	49,926	251,301	23,611	32.1
12	645,267	49,802	254,258	23,735	32.3
13	643,049	49,688	256,476	23,849	32.4
14	641,570	49,585	257,955	23,952	32.6
15	640,831	49,537	258,694	24,000	32.6
16	640,831	50,700	258,694	22,837	31.1
17	640,831	51,942	258,694	21,595	29.4
18	640,831	53,414	258,694	20,123	27.4
19	640,831	53,512	258,694	20,025	27.2
20	640,831	53,512	258,694	20,025	27.2
21	640,831	53,512	258,694	20,025	27.2
22	640,831	53,512	258,694	20,025	27.2
23	640,831	53,512	258,694	20,025	27.2
24	640,831	53,512	258,694	20,025	27.2
25	640,831	53,512	258,694	20,025	27.2
26	640,831	53,512	258,694	20,025	27.2
27	640,831	53,512	258,694	20,025	27.2
29	640,831	53,512	258,694	20,025	27.2
29	640,831	53,512	258,694	20,025	27.2
30	640,831	53,512	258,694	20,025	27.2
Total	20,764,928	1,661,383	6,220,822	544,727	24.7

* Percentage of sediment runoff after implementation of the Project vis-a-vis the annual sediment runoff from the watershed of 73,537 tons/year prior to implementation of the Project.
(See Attached Appendix G-7)

7.6 Infrastructure Development Plan

An infrastructure development plan will be formulated for the development of roads, nurseries and water supply facilities required for the implementation of the Social Forestry Project.

7.6.1 New Road Construction

(1) Construction Sites and Lengths

According to the survey on the opinions of local residents, local residents strongly hope for the construction of roads necessary for the daily transportation of goods, etc. In consideration of the need to vitalise local communities and for the smooth progress of the Project, the construction of new roads under the Project is planned in mountain areas with a low road density (see Table 7-19).

Table 7-19 New Road Construction

Construction Site	Length (km)
Pal Tujuh village	3.0
Tanjung Alam village	1.8
Air Selimang village	2.0
Air Ramon village	6.0
Seguring village	14.0
Total	26.8

(2) Selection of Routes

When selecting new road routes, as well as making use of field survey findings, topographical maps and aerial photographs, etc., consideration will be given to the following points:

① Avoidance of steep slopes,

② Avoidance of rocky areas,

③ Placement along contour lines and adaptation with terrain.

(3) Road Standards and Structure

The standards and structures of roads will be as follows.

①	Road width:	4.0 m
②	Shoulder:	50 cm on both sides
③	Longitudinal gradient:	maximum 9% for a design speed of 20 km/h, but maximum 14% in unavoidable cases
④	Drainage facilities:	side ditches and lateral drainage works
⑤	Curve radius:	minimum 15 m for a design speed of 20 km/h, but minimum 10 m in unavoidable cases
⑥	Surface:	simple paving

(4) Standard Sectional Drawing

The standard sectional drawing of new roads is indicated in Fig. 7-11.

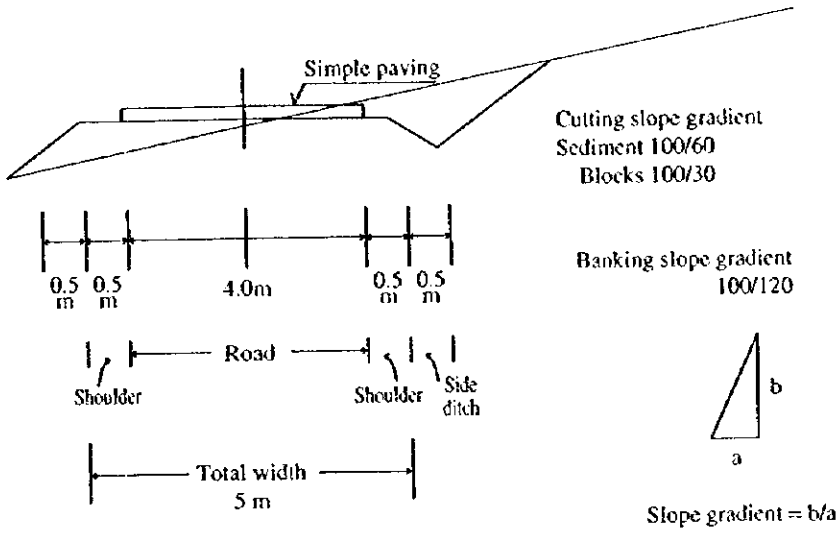


Fig. 7-11 Standard Sectional Drawing of Road

The locations of the planned new roads are given in Fig. 7-9.

7.6.2 Construction of New Semi-Temporary Central Nursery

As many of the seedlings required for the Project are those of fruit trees, etc. which are difficult to produce, the establishment of a semi-temporary central nursery is deemed necessary for the centralised management of seedling production. This nursery will be basically only used during the project implementation period.

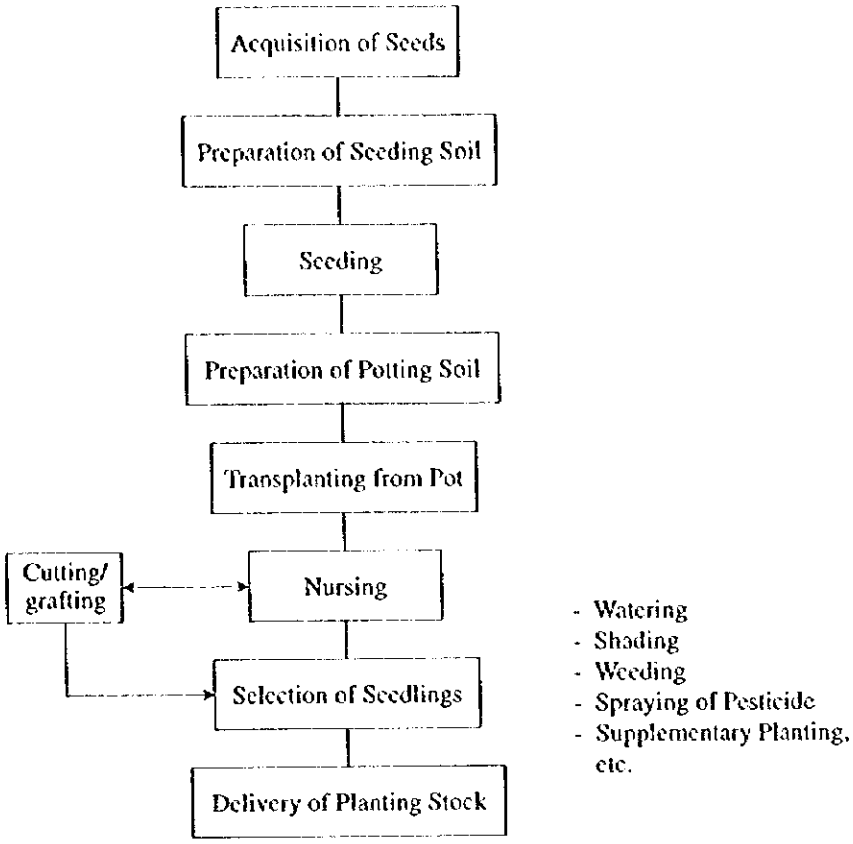
(1) Scale and Location of Nursery

The planned scale of the semi-temporary central nursery in consideration of the required seedling production capacity and auxiliary facilities is described below. The nursery will be located in Kec. Curup and the land will be leased from a private owner (see Table 7-26 for the seedling types and quantities).

①	Maximum annual nursery stock production	336,100 trees
②	Nursery bed area	3,000 m^2
③	Incidental facilities	
	Office	100 m^2
	Warehouse	100 m^2
	Rest area	100 m^2
	Garage	50 m^2
	Display forest, etc.	6,650 m^2
④	Incidental facilities and equipment	
	Water supply pump	1 pump
	Water conveyance pipes	300 m
	Storage tank	1 tank
	Manual sprayers	2 sprayers

(2) Seedling Raising Method

① The procedure for raising seedlings is as indicated below.



② Points for Nursing

a. Seeding

The soil used for the seeding beds should be sterilised and mixed with sand. After germination, particular care should be given to watering and the prevention of damage by diseases and harmful insects.

b. Potting

Top soil should be used as the potting soil. Fertiliser and sand, etc. should be mixed and agitated with the top soil to prepare the potting soil. Vinyl pots should be used for transplanting the germinated seeds. While the actual nursing period varies from one species to another, approximately one year is usually required during which weeding, watering, shading, the spraying of pesticide and supplementary planting, etc. are conducted. In particular, watering should be conducted once or twice a day during the dry season and on fine days although careful attention must be paid not to be over-wet.

c. Selection of Seedlings and Delivery

Those seedlings damaged by diseases and harmful insects and seedlings showing signs of epinasty should be removed from the stock and the remaining seedlings designated as planting stock. The planting stock yield rate is set at 80%.

7.6.3 Water Supply System

A water supply system is planned for Desa Air Lanang where the villagers show strong expectations for the introduction of such a system. The scale of and required equipment for this system are listed below.

① Number of benefitting households	:	200
② Supply volume/household/day	:	60 ℓ
③ Required volume of drinking water supply/day	:	12 kℓ
④ Required equipment		
– Water pumps	:	2
– Water tanks (5 m^3)	:	3
– Supply pipes (5.5 m long)	:	55
– Pipe joints	:	55
– Valves	:	2

A water management cooperative will be established to be responsible for the construction, operation and maintenance, etc. of the water supply system. Similar strong interest is also shown by Desa Lubuk Saung and Desa Air Salimang. As both villages are included in the water supply plan of the Bengkulu Development Project of the World Bank, however, they are eliminated from the scope of this Social Forestry Project.

7.7 Promotion of Businesses Not Largely Dependent on Land

As described earlier, efforts will be made to promote those businesses which do not require a large land area because of the local farmland shortage. Such businesses are planned for 30 villages near national forests and 16 check dams and are described below.

(1) Raising of Beef Cattle

As illustrated by the monoculture of coffee in hilly areas, only 94 ha (0.2%) of the Project Area's total land area of some 53,000 ha is used as grassland. Accordingly, while the development of large-scale stock raising, which presupposes the existence of huge grazing land, is impossible, the raising of beef cattle is time efficient and the high unit price obtainable makes it popular among local people. The raising of beef cattle requires a continuous supply of forage at a rate of 25 kg/day to achieve an effective weight increase. Therefore, it is necessary to secure land to grow high yield king grass and others and to build sheds. In view of these requirements, the loan of a six month old cow (at a rate of one cow per 10 bulls) for five years to each household belonging to a group of local people who have only dry crops field or coffee field of less than 0.5 ha is planned. The loaned cow is expected to give birth in 18 months time and to produce four calves (of which one will be returned to the government in exchange for the originally loaned cow) during the next five years. Rice straw, maize, soy beans and the branches and leaves of Kayu res, Kaliandra and Lamtoro will be used as feed.

① Cultivation of King Grass

Stump seedlings (four) will be planted at 70 cm intervals. Each hole will be sprayed with some 100 g of three element fertiliser after approximately two weeks when germination and growth commence. As king grass is a fast growing species, requiring plenty of water, watering should be conducted whenever the ground is dry. After approximately four weeks, the grass grows to more than 1 m in height and the quantity of grass per hole exceeds 5 – 6 kg. The required number of king grass plants required for the feeding of cattle (usually five plants/day) should then be cut.

Considering the safety factor, quantity of grass per hole exceeds 3 kg within 4 weeks.

As the remaining roots regenerate, replanting is only required after cutting has been conducted several times. Fertiliser should be re-used when sprouting is observed.

② Yardstick for Fodder Cultivation Areas

Although the required area for fodder cultivation varies depending on the site conditions and soil fertility, etc, a total area of 300 m^2, consisting of 150 m^2 in actual use and 150 m^2 for preparation for use the following month, is required based on the assumption that five king grass plants (25 – 30 kg or more) are required for each cow per day.

(2) Raising of Goats

Goats feeding near roads and farmland require a relatively small quantity of forage. Goats are robust and easy to raise by people with little experience. Accordingly, three four month old goats (at a rate of one female goat per 10 male goats) will be given free of charge to those households which have no or little land.

As a four month old female goat will give birth four times in five years, producing an average of one and a half goats each time and an average of six goats in total, the three female goats will become 21 goats in five years time, likely producing a total income of more than one million Rp.

(3) Apiculture

Apiculture in areas other than the Project Area in Kab. Curup is conducted in areas with many vegetable fields without many flowering trees. Consequently, the average honey production volume per household based on interviews with some 20 households is 4.5 litres which is 60 – 70% of the domestic average in Indonesia.

Under the Social Forestry Project, five units of beehives will be given free of charge to each of 30 villages (each with a group of 10 participants) near natural forests which have relatively many honey source trees, such as coffee, kemiri, kayu manis and kaliandra, etc. As in the case of goat raising, the subject households will be those with no or little land or their own. The expected total income in five years is more than one million Rp.

(4) Culture of Freshwater Fish

Under the soil and water conservation project, the construction of 16 check dams (with an average reservoir of some 2,000 m^2) is planned at 13 villages. Given the fact the villages will be responsible for the maintenance of these check dams, their use must be authorised by either the village group or the village head.

Freshwater fish, specifically Ikan mas, can be cultured by feeding one and a half month old fry for three months with bought feed and the fish are ready for shipping on reaching a certain size (1 kg per some seven fish).

The yardsticks for fish culture are the stocking of some 6,000 fry in a reservoir area of 2,000 m^2. Bought feed should be given every day after making the reservoir fertile using chemical fertiliser and organic matters. Some 90% of the fry become adults after three months which can then be harvested. A net income of two million Rp is hoped for by each culture cycle of three months.

7.8 Organizations and Extension Plan

7.8.1 Social Forestry Implementation Organizations

(1) Organizational Structure

The Cabang Dinas Kehutanan has administrative jurisdiction over social forestry in the case of national forests while the Dinas PKT has administrative jurisdiction over social forestry in the case of private land (both are kabupaten-level organizations). Fig. 7-12 shows the entire structure of organizations involved in social forestry and each component of the figure is briefly explained below.

At the village level, the existing LKMD or farmers' group is used as much as possible. In addition, an information centre is established under the supervision of the provincial Forestry Service to assist all organizations involved in social forestry while advisory committees are established at the national, provincial and kabupaten levels.

(2) Organizations at Village Levels

1) Existing Organizations

The existing LKMD is an organization established in each village for village development with the participation of leading village members. If this LKMD is active and capable of functioning as a body to promote social forestry, the establishment of a new organization is unnecessary. Therefore, the need to establish a new organization in villages should be examined in view of the objectives and expected activities of such a new organization. If a social forestry village group is to be established, this group must be legally approved by means of applying for approval by the kabupaten governor via the competent organization.

2) Establishment of Village Groups

① Objectives

The objectives of the establishment of village groups are as follows.

a. Promotion of a proper understanding and awareness of the concept and operational details of social forestry among local people

b. Promotion of people's participation in social forestry

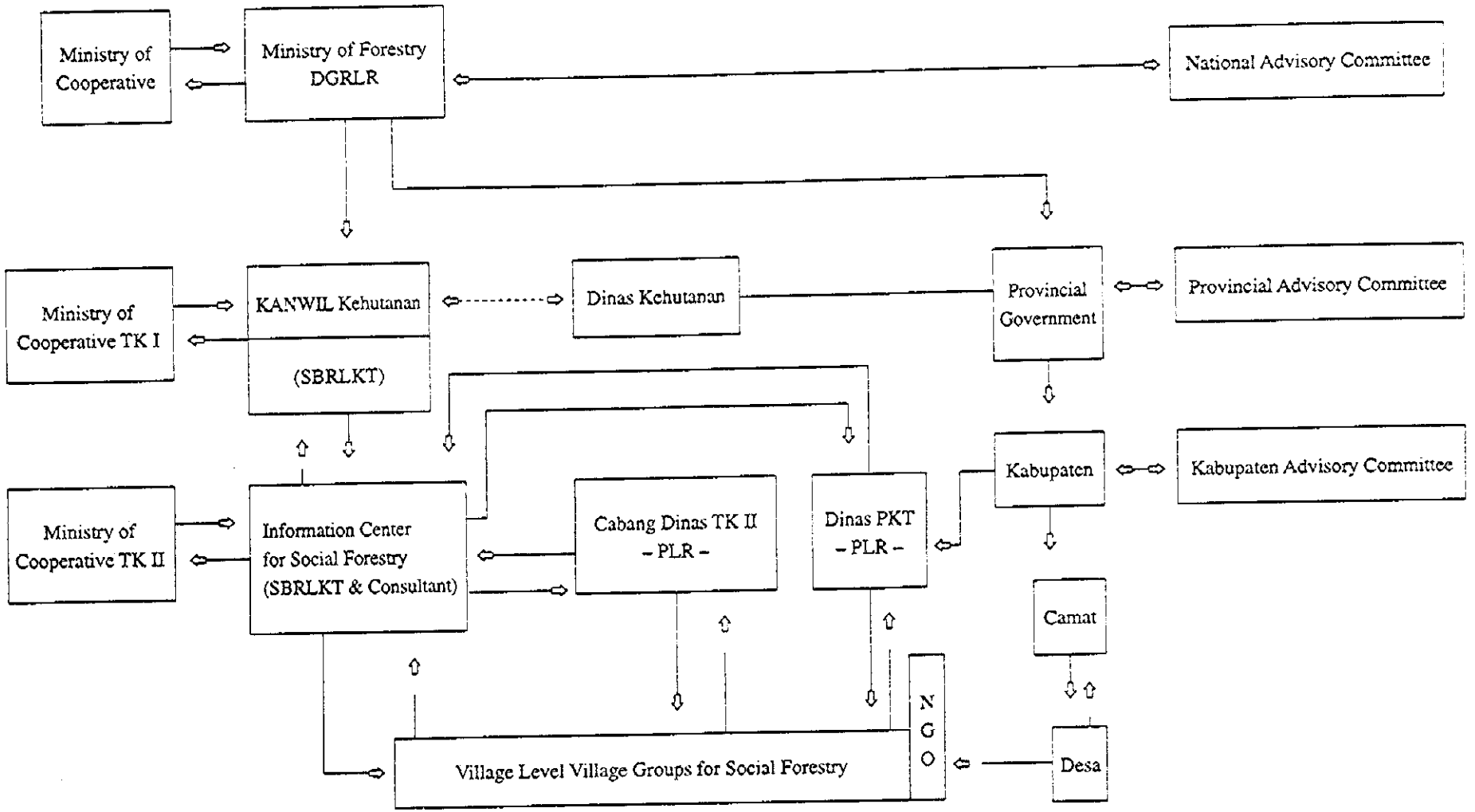


Fig. 7-12 Organizations for Upper Musi Social Forestry Project

c. Planning and implementation of effective social forestry designed to improve the welfare of local people as well as village communities

d. Promotion of forest conservation through the appropriate use of national forests

② Activities

The activities of village groups are as follows.

a. Strict promotion of social forestry with local people

b. Preparation of rules regarding the operation of the village group, including eligibility for participation

c. Invitation of prospective participants and grouping of actual participants

d. Formulation of village level social forestry projects (master plan for people's groups, preparation and examination of annual plan and budget, guidance and assistance)

e. Progress control of social forestry activities and coordination, guidance and advice during project implementation

f. Compilation and reporting of project implementation results and monitoring

g. Work cooperation with KUDs

③ Structure of Village Groups for Social Forestry

The scope of the activities of a village group significantly vary depending on either national forest-based social forestry for an area where national forests exist in the neighbouring area of a village or private land-based social forestry. In the case of the former (national forest-based social forestry), as the right to use the planted trees is usually retained for a long time as the planted trees are continually tended and protected, the relevant village group is essential required to be active for more than 10 years. In comparison, planting under private land-based social forestry is often conducted using the funds and labour of private land-owners with the role of the village group being restricted to the distribution of seedlings and fertiliser except at those trial plots where activities take place along the lines of

national forest-based social forestry. Accordingly, there are, in fact, two types of village groups as shown in Fig. 7-13 based on the structure discussed in the Workshop.

(3) Establishment of Social Forestry Information Centre

1) Objectives

A social forestry information centre will be established as an organization to liaise and coordinate with the village implementation organizations and administrative organizations responsible for the implementation of social forestry and also as an organization to obtain and provide relevant information and data from and to the relevant government organizations and universities, etc.

2) Planned Activities

① Provision of a place for the exchange of information by extension officers and NGO staff

② Organization of study tours

③ Provision of a training venue for extension officers and KUD members (a separate large venue will be required for the training of village group members)

④ Preparation and distribution of newsletters and other public relations materials

⑤ Production and showing of social forestry videos

⑥ Commendation of model cultivation by excellent participants

⑦ Selection and commendation of excellent villages

⑧ Cooperation with KUDs and joint marketing of local products

3) Staffing

The information centre will be manned by several staff members of the Sub-Balai RLKT under the supervision of the provincial Forestry Service. In addition, members of NGOs and universities, etc. will also work when necessary on a contract basis.

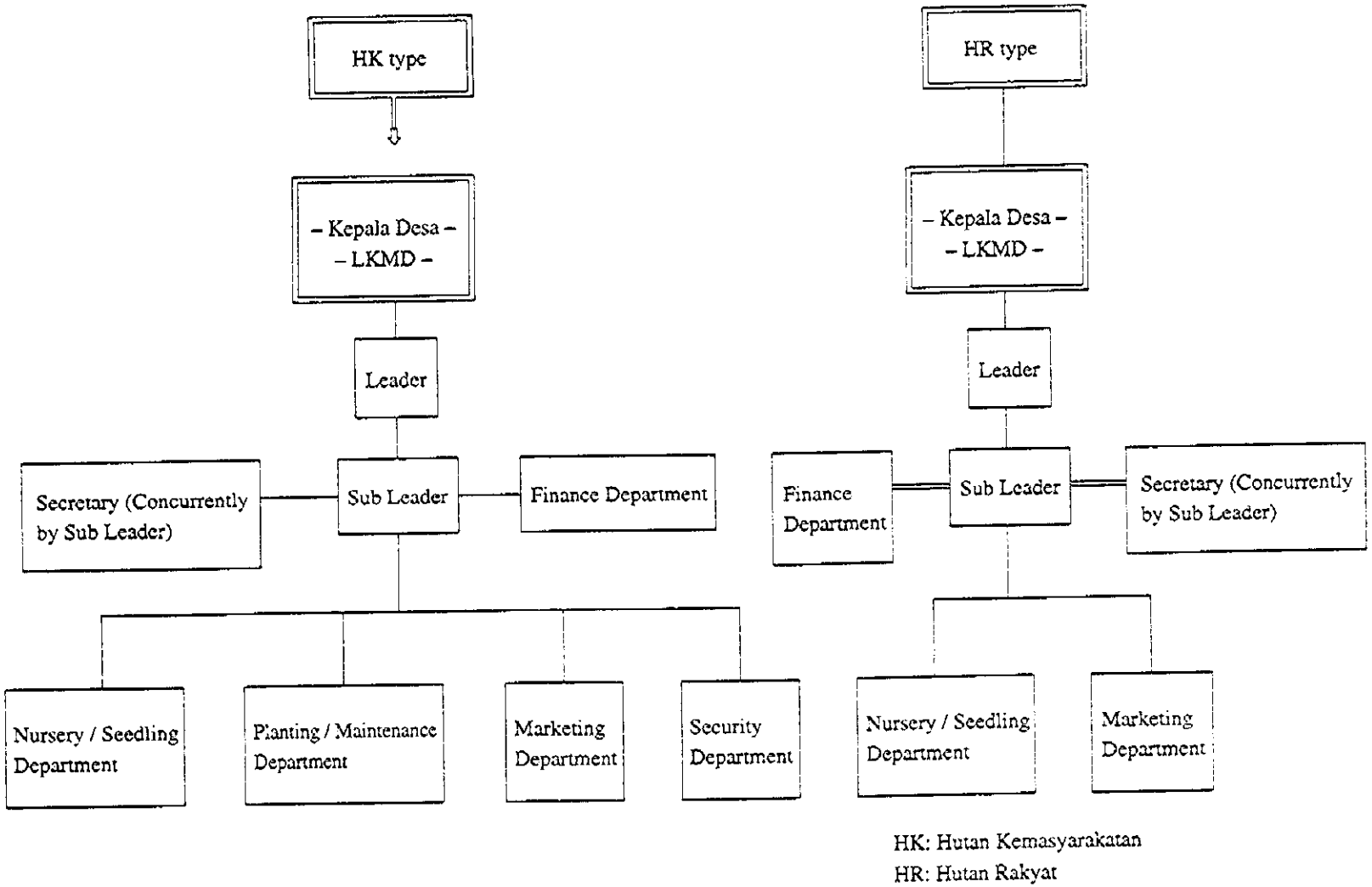


Fig. 7-13 Composition of Social Forestry Village Groups

(4) Establishment of Advisory Committees

1) Objectives and Activities

An advisory committee will be established at each administrative level to ensure that social forestry activities are conducted with the proper guidance and assistance of the many government ministries and agencies involved in social forestry. These committees will meet once or twice a year to assess the progress and problems, etc. of social forestry with a view to obtaining appropriate guidance and assistance from the related government ministries and agencies.

2) Composition of Advisory Committees

The advisory committee members will consist of the head of the administrative organization (at the provincial or kabupaten level) and representatives of such ministries involved in local development planning and coordination as the BAPPEDA (including the BAPPENAS), Ministry of the Interior, Ministry of Cooperatives, Ministry of Commerce, Ministry of Public Works, Ministry of Agriculture (the responsibilities of which include fruit trees, estates and stock raising), Ministry of Settlement and Ministry of Forestry.

7.8.2 Participation of Local People and Roles of NGOs

Good communication with local people is essential to obtain their full consent to what they should and should not do in regard to planting and the long-term use of planted trees in protection forests. Consequently, efforts will be made to smoothly obtain such consent through discussions on the participation of local people by making NGO staff and extension officers, etc. participate in such discussions.

(1) People's Participation System

1) Decision-Making Process

It is believed that the participation of local people at the actual implementation stage of a social forestry project after participating in the initial decision-making process regarding the contents of the social forestry project in question will bear more fruit than in the case of local people simply implementing a project prepared by someone else although the actual achievements may vary depending on the degree of participation in the implementation process and also on the character of the process to obtain their consent.

Firstly, the incorporation of the opinions of local people results in a more effective project in tune with the reality of the local living conditions and requirements. Secondly, local people can provide wisdom and know-how regarding daily life and resources to improve the efficiency of a project. Thirdly, the experience of participating in planning and management on the part of local people improves the awareness of their responsibilities and also increases their confidence, thus improving their management capability to conduct continuous development as actual implementors.

One thing to be noted in the decision-making process is that local people do not necessarily comprise a single class and their opinions are likely to reflect their different classes. At actual meetings, it is fairly common for wealthy leaders to put forward their opinions more openly than the poor. It is, therefore, important to allow a long time for the decision-making process to ensure that a plan reflects a wide range of opinions.

2) System and Process of People's Participation

When a social forestry project is implemented with people's participation and the assistance of various supporting organizations, various positive effects which differ from those resulting from the simple implementation of a project given to local people from above are achieved. Firstly, the formulation of a project based on people's opinions means a well-structured project which is appropriate vis-a-vis the specific local conditions. Secondly, the inclusion of people's wisdom and know-how gives a project a favourable character for local people. Thirdly, people's participation in project implementation means the gradual building up of people's awareness and confidence through actual experience, giving local people the ability to conduct project management. These favourable effects are repeated at the implementation stage of social forestry, securing project sustainability, improving the local standard of living and improving the quality of forests. Although it is desirable for all villagers to participate in social forestry, restrictions on participation may be necessary depending on the size of the subject area. The process to decide the participants in social forestry, covering all aspects, is shown in Table 7-20.

Table 7-20 Process to Decide Participants

No.	Process Description	Implementor
1	Meeting to explain the concept of social forestry to all local people	NGOs and extension officers
2	Workshop to examine a land use plan for all local people	NGOs and extension officers
3	Second meeting to explain social forestry to all local people	NGOs and extension officers
4	Preparation of and application for the establishment of a village level village group	LKMD and other organizations
5	Approval of the establishment of a village level village group	Kabupaten governor
6	Study tours (to areas of advanced social forestry activities)	NGOs, extension officers and village group
7	Training to improve the capability of village level village group	NGOs, extension officers and experts
8	Explanatory meeting to recruit participants	Village group, NGOs and extension officers
9	Examination of applications and notification of decision	Village group, NGOs and extension officers
10	Grouping of participants	Village group, NGOs and extension officers
11	Examination of social forestry components by groups and allocation of plots to households	Groups
12	Examination and submission of social forestry components by village level village group	Village group
13	Commencement of examination of social forestry project	Forestry-related organizations

3) Incentives for Participation of Local People

The incentives for the participation of local people are listed in Table 7-21. Working serving public interests, such as work in national forests, etc., is funded by the government and the ownership rights belong to the government. The labour cost for planting, etc. at trial plots is also funded by the government as these plots constitute model project sites. In the case of agroforestry complex development at private land, seedlings and fertiliser are provided by the government but the labour cost for planting, etc. is borne by the private landowners. In the case of goat raising and apiculture, the government bears the initial cost of distributing goats and beehives, etc.

Table 7-21 Incentives for People's Participation

No.	Objective	Methods
1	Work Not Involving Land-Ownership Such as That in National Forests	- Social oriented rehabilitation (labour cost; fruits) - Free distribution of goats and bees; leasing of beef cattle (returned in the form of one calf five years later) - Improved marketing by KUDs - Fish culture using check dam reservoirs (loan)
2	Planting Work	- Free distribution of high quality seedlings and fertiliser for all planting work (once only at the time of planting) - Agroforestry complex development work (fruit trees) - Construction of access roads
3	Technical Improvement and Upgrading	- Commendation of excellent farmers/villages (seven times) - Study tours to areas of advanced social forestry activities - Training scheme expansion - Increased yield through preservation of soil fertility
4	Improvement of Living Environment	- Installation of domestic water supply system (cost to be borne by subject village)
5	Assistance for Village Level Activities	- Construction of village group office (in villages near national forests) - Provision of remuneration/work expenses for village groups - Provision of office equipment

(2) NGO Staff

1) Roles of NGO Staff

In essence, NGO staff play a catalytic role of developing participatory planning and community-based forest conservation and management and institutionalising various approaches to implement social forestry between target villages and local governments in the project area.

① Facilitator: NGO staff act as a bridge between various parties related to the Social Forestry Project (government organizations, extension officials, village organizations, community leaders and farmers' groups, etc.) NGO staff find the problems faced in the implementation of a social forestry project and their solutions. NGO staff also cooperate with all participants to gradually achieve the main objectives of the Social Forestry Project by means of participatory planning.

② Motivator: NGO staff are innovators which develop a participatory spirit to achieve the project objectives in accordance with the capabilities and responsibilities of existing groups at all levels, from local governments to target groups in villages.

2) Duties and Responsibilities of NGO Staff

① In collaboration with local government officials, including extension officials, NGO staff assist the development of a participatory approach on the part of farmers, communities and target groups to the design, planning, implementation, analysis and evaluation of village-based social forestry. NGO staff particularly guide marginal people to become involved in the Project.

② NGO staff facilitate communication with local governments and collaborate with villagers in the Project Area.

③ In collaboration with communities and with the assistance of local governments, extension workers and steering committees, NGO staff help to define the selection criteria for target villagers and detailed project activities.

④ NGO staff collaborate with field extension officials as counterparts, assist the formation of a village and group level project implementation system and encourage the formation of a system for the active participation of people.

⑤ NGO staff assist target villages in the development of village level and participant group level action plans for project implementation.

⑥ NGO staff assist local governments in the integration of village level action plans into a project implementation plan for the entire Project Area.

⑦ NGO staff facilitate consultations with farmers and communities to enhance the incentives required to commence activities for the Social Forestry Project both on and off the project site and to establish a system for the continued contribution of farmers and progress of the Project.

⑧ NGO staff help to ensure that on and off site benefits are extended to all participants, including poorer farmers, and that the roles to be played by marginal villagers, including women, are recognised in all project activities.

⑨ NGO staff organize and conduct training to teach participatory planning to local government officials, including extension officials, and also organize study tours, workshops and seminars for local community organizations and farmers' groups to promote their participation.

⑨ NGO staff ensure that the participatory planning, monitoring and evaluation approaches are institutionalised at the latter stages of the Project with progressive phasing out of the role of NGO staff in these activities in favour of local government institutions and local NGOs.

3) Qualifications and Criteria for Selection of NGO Staff

The Project will be conducted based on the active participation of local people and local government officials. Therefore, NGO staff should have experience in Indonesia of facilitating interaction between local governments and communities in the development of a participatory planning approach.

Furthermore, NGO staff should have previous experience and ability in regard to participatory rural planning, training extension methodologies, institutional coordination, capacity building at governmental and non-governmental levels, integration of top-down and bottom-up planning, use of audio-visual and media communication technologies, use of participatory rural appraisal and consultation methodologies and gender-related issues.

NGO staff should be capable of facilitating the organization of workshops, meetings and seminars involving project staff, key government officials at the national, provincial, district and sub-district levels, community leaders and villagers to discuss and design participatory planning procedures for project implementation.

4) Composition of NGO Team

The NGO team should coordinate project activities and participants in an integral manner from various aspects, including organizational management and technical aspects, between local people, extension workers and related government agencies. The team leader will be an NGO staff member with at least five years experience in Java while the other team members will be recruited from NGO staff with at least three years experience.

① Team Leader: Community development specialist with thorough experience of community development in Indonesia. The candidate should understand all issues regarding social forestry, forest conservation and management.

② Participatory Planning Project Officers: These must have experience of planning and implementing participatory surveys and the training of local community organizations and NGOs. They should work for the development of appropriate

training programmes for local government staff, local community organizations and NGOs. Knowledge of social forestry, agriculture and the local conditions is essential. They should be selected from candidates with proven ability of encouraging bottom-up development programmes at the village and sub-district levels. They will assist the field officers and local government officials in all operational aspects related to participatory planning. In particular, they will coordinate the day-to-day activities of the field officers and liaise with the village, sub-district and district governments in regard to the integration of village level action plans into operational annual plans for project activities.

5) Contract With NGO

There are many ways of making a contract with an NGO. For the present purposes, a type of temporary staff contract between district level organizations (Cabang Dinas Kehutanan and Dinas PKT) and an NGO appears appropriate in view of the actual load conditions.

As it is considered inefficient to commence the Social Forestry Project in all 93 villages in the Project Area at the same time in view of the need to establish an implementation guidance system, the project period of seven years is divided into three phases. The first phase (first year to third year) will cover 30 villages where project implementation is a priority due to the involvement of both national forests and private land. The second phase (fourth year to fifth year) will cover 33 villages which are adjacent to those villages subject to the first phase. The third phase (sixth year to seventh year) will cover the remaining 30 villages. Taking this project implementation schedule and the roles and duties of NGO staff into consideration, six field officers will be assigned and one officer will be responsible for approximately five villages in each phase. The team leader will make field visits to provide the field officers with guidance/instruction and support in view of effective field activities. The Project will, therefore, require one NGO Team consisting of seven members as follows.

① Team Leader : one

② Participatory Planning Project Officers : six

6) Roles of Extension Officers

Jointly with NGO staff, extension officers will use various discussion techniques to establish a common understanding and consensus among local people regarding their daily needs, types of land use and details of village level social forestry projects,

acting as advisors on behalf of the forestry administration. The number of extension officers engaged in social forestry at the village level will be approximately seven, assuming an assignment policy similar to that adopted by the NGO (see 7.8.3 for extension activities).

7.8.3 Extension and Training

(1) Extension Activities

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

1) Training of Capable Extension Officers for Implementation of Social Forestry

Although many components and techniques of social forestry are related to conventional greening work, etc., some of the planned multi-purpose species for planting are relatively unknown, making it essential that all extension officers have basic knowledge of the cultivation techniques of these species.

Because of the huge difference between the simple implementation of standard processes and the participatory implementation process in which the opinions and desires of local people must be confirmed, it is desirable for the extension officers responsible for social forestry activities to properly understand the principles of social forestry and also to understand participatory discussion techniques.

2) Current Situation and Activities of Extension Officers

The fifteen forestry-related extension officers currently operating in the Project Area consist of those responsible for national forest-based reforestation (belonging to the Cabang Dinas Kehutanan) and those responsible for the extension of greening projects for private land (belonging to the Dinas PKT).

① The main activities of the extension officers responsible for national forest-based reforestation are the training of farmers in assigned villages (4 - 5 villages/officer) on reforestation techniques, coordination with village chiefs and reporting of the reforestation progress. In comparison, the main activities of those responsible for the extension of greening projects are project implementation, extension of techniques, preparation and distribution of extension materials on greening work and meetings with farmers (twice a month for two days). The extension officers

in various fields meet twice a month at the extension station of the Ministry of Agriculture.

② As described in ① above, the extension officers attend at least four meetings each month and appear too busy to do anything other than wide-ranging regular activities when the list of their work assignments is reviewed. However, the results of interviews with villagers indicate that the visits by extension officers are not particularly frequent. This situation is not unbelievable given the lack of mobility (motorcycle, etc.) of the extension officers.

③ Assuming that extension officers gain mobility under the Social Forestry Project and that each officer is responsible for 4 – 5 villages, 6 – 7 officers will be required every year to supervise 93 villages in three phases, totalling seven years (some 30 villages will be supervised in each phase of 2 – 3 years). These officers will be selected from among the present 15 officers.

④ Each extension officer will discuss problems with the members of the village groups, provide guidance in the field, examine questions relating to farming techniques at the extension station of the Ministry of Agriculture and exchange opinions with other extension officers at the information centre (and will also conduct examinations and guidance in the field).

3) Extension Facilities and Equipment

At present, extension officers are not provided with a motorcycle which is, in fact, essential for the efficient posting and use of capable and well-experienced extension officers.

Such equipment and tools as office fixtures, VCR and OHP, etc., all of which are necessary for extension work, will be provided for the village groups and information centre and newsletters and social forestry videos will be produced.

(2) Training

In addition to the training of extension officers described earlier, technical training will be provided twice a year for about three years for members of the village groups and KUDs. The contents of this training will be reviewed and modified if necessary thereafter.

The candidate instructors for this training include training instructors for forestry/agricultural extension officers, university academics, staff members of various

research institutes for forestry/farming products and representatives of estates, exporters and NGOs.

1) Training of Extension Officers

① Cultivation methods of multi-purpose species

② Nursing method for seedlings based on asexual reproduction process

③ Soil conservation techniques

④ Apiculture and goat raising techniques

⑤ Discussion techniques, such as PRA technique (listening to and analysing the opinions of participants and examination of improvement measures)

2) Training of Village Group Members

① Cultivation methods of multi-purpose species

② Apiculture and goat raising techniques

③ Nursing techniques

④ Reforestation techniques

⑤ Application methods for fertilisers and agrochemicals

3) Training of KUD Members

① Managerial control

② Trading

③ Financing and accounting

7.9 Improved Trading Status Through Cooperative Activities

(1) Current Situation and Problems

1) Individual Trading of Coffee (Main Local Product)

The Project Area is a monoculture area of coffee where many local people are totally dependent on the income from coffee beans and, therefore, the price of coffee has serious implications vis-a-vis local life. In general, coffee is an international commodity of which the price is significantly affected by the weather conditions in Brazil and which shows noticeable price fluctuations. As a result, the buyers determine their offer prices taking the price fluctuation risk into consideration and the offer prices tend to be unsatisfactory for the producers. In addition, the predominance of small-scale producers rather than large estates in the Project Area means that the degree of dryness and quality of the coffee beans are unstable, making it necessary for small middlemen operating at the village level to check the condition of the beans. The offer prices of buyers tend to be low partly because of the extra cost involved in the buying process. There are also cases of people who have borrowed to finance their living expenses during the off-season facing hard bargaining when they try to settle their accounts with coffee beans after the harvest.

As these cases show, producers generally find it difficult to enjoy equal trading status vis-a-vis buyers because of the large trade information gap between themselves and buyers.

2) Cooperative Trading

Indonesia has a KUD (village cooperative) system and the central government provides low interest loans, tax exemption for members' profits and other measures to make KUDs as village level organizations promote cooperative activities. If a KUD is established and properly managed, it can compensate for the weaknesses of personal trading to contribute to the improved welfare of its members.

Although 40 KUDs (each composed of 2 – 5 villages) are in operation in Kab. Rejang Lebong, they are not particularly active and have a low level of cooperative trading. However, there is a case of one cooperative marketing half of its total coffee production under the name of the KUD, suggesting that it is possible to expand cooperative marketing.

(2) Improvement Measures

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

1) Establishment and Consolidation of KUDs

① Establishment of a new KUD for each village or for several combined villages for those villages where no KUD is currently in operation.

② Recruitment of capable staff and further qualitative improvement of KUD staff: as it is highly desirable for anyone involved in the marketing of local products to fully understand the production/processing techniques, major marketing channels, price fluctuations and main materials/equipment required, etc., the appointment priority for KUD managers should be given to someone with experience in the relevant fields.

In addition, training sessions should be held approximately twice a year for staff members of the existing KUDs to upgrade their knowledge in the relevant fields (see 7.8.3 for training details).

2) Uniform Product Quality and Quality Improvement

Uniform product quality and quality improvement are essential when the unit trade volume is increased. In the case of coffee for example, uniformatisation and quality improvement through process control, cooperatisation of the final selection process and application of the same quality standards to all cooperative members will alleviate worry on the part of buyers in regard to the coffee quality, creating an advantageous situation for producers.

7.10 Monitoring and Evaluation

(1) Monitoring

Monitoring will be conducted by the village group prior to the end of each project year and a monitoring report will be submitted to the organization in charge of social forestry activities (either the Cabang Dinas Kehutanan or the Dinas PKT) together with the

assessment results and opinions of the NGO staff and extension officers responsible for social forestry activities in the field.

Monitoring is designed to assess the implemented work in order to identify problems and to examine possible solutions with a view to using the results for modification of the project contents and for the improved planning of subsequent new projects. It will be conducted in the following manner for rehabilitation and other subjects.

1) Rehabilitation

Monitoring will be conducted on items which are deemed necessary among such items as work site locations, year of commencement, area, soil, inclination, planting method, planted species, tree height and diameter by species, stand density, ground vegetation, soil depth, supplementary planting rate, areas of poor performance, causes of poor performance and improvement measures, types of fertilisers and quantities used and fruit production volume, etc.

2) Farmland Improvement

Monitoring will be conducted on items which are deemed necessary among such items as work site locations, year of commencement, area, soil, inclination, planting method, planted species/farming products, tree height and diameter by species, stand density, ground vegetation, soil depth, supplementary planting rate, areas of poor performance, causes of poor performance and improvement measures, types of fertilisers and quantities used and fruit and farming product production volumes, etc.

3) Soil and Water Conservation

The monitoring items in regard to soil and water conservation work will be as follows.

① Conditions of dam body and sluiceway, volume of deposited sediment at each check dam and volume of fish culture in the case of silvofishery activities

② Conditions of terraces on steep slopes and wood-fencing conservation work/strip planting, state of cultivation and fruit and farming product production volumes and state of soil loss at work sites

③ Progress of bamboo planting and growth of bamboo trees (including the presence of bamboo shoots) in riparian forests

4) Production of Seedlings

The monitoring items in regard to the production of seedlings will include the work commencement year, work area, seed supply, nursing of seeded trees and hardening of the planting stock prior to delivery, nursing results of grafts and cuttings, timing of seedling delivery and delivery rate, etc.

5) Environmental Conservation

At the actual implementation stage of the Social Forestry Project, monitoring will be necessary to check the state of implementation of environmental conservation measures and to prevent negative changes of environmental factors which may be affected by the implementation of the Social Forestry Project.

① Environmental Factors Subject to Monitoring

The main environmental factors considered in the Social Forestry Project are the soil and water conservation function which should be improved by better forest conditions, water quality, rare fauna and flora and the living environment of local communities. Among these factors, river water quality and rare fauna and flora are important environmental indices which cannot be fully addressed by the activities of the social forestry information centre and environmental monitoring measures (see Chapter 9).

② Implementation Method

a. Contamination of River Water

Many local people directly drink river water. The recent rapid increase of the use of herbicides and insecticides at coffee fields, however, poses a threat of their accumulation in river deposits and/or concentration in the aquatic ecosystem. It is, therefore, highly desirable to continuously conduct follow-up surveys to check changes of the upperstream water quality in order to establish a clear picture of river water contamination.

b. Rare Fauna/Flora and Ecosystem

As described in Chapter 3, the habitation of rare fauna and flora is either confirmed or expected in areas other than natural reserves. In the case of national forests, a preliminary investigation and other work prior to the implementation of social forestry activities will be conducted.

c. Monitoring Implementation System

As environmental conservation monitoring deals with wide ranging subjects, the social forestry information centre will play a central role while enlisting the assistance of scholars and engineers in the subject fields as well as local people for its implementation.

(2) Evaluation

While monitoring is designed to assess the project progress at the end of each year of the project period with a view to modifying the project contents based on the identified problems, the evaluation will be conducted by a third party to check the project achievements and impacts, etc. at both the intermediate and final stages of project implementation.

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

Under the Social Forestry Project, the 93 subject villages will be divided into three groups for phased project implementation, i.e. 30 villages near national forests in the first phase, 33 villages adjacent to the first phase villages in the second phase and the remaining 30 villages in the third phase. Given this implementation schedule, the evaluation will be conducted at the end of the first and second phases so that the evaluation results can be used to improve the social forestry activities in the subsequent phases.

7.11 Implementation Schedule

(1) Implementation Schedule and Preparatory Work

The Social Forestry Project has various work components and will be implemented by people's groups and advisory committees at all administrative levels, etc. as described earlier.

Table 7-22 outlines the project components and their objectives, those responsible for work implementation, availability of financial assistance and points to note for work implementation in view of the possible impacts on people's lives, etc.

Particularly important for the smooth implementation of various types of work are for key persons of the many organizations related to the Project to properly understand the actual living conditions of people in the subject areas and the establishment of a common perception and understanding of social forestry as a means to improve local living conditions. The implementation schedule should then be decided following a thorough analysis of the current conditions of the Project Area and the various implications and priorities of the Project.

(2) Annual Plan

Based on a comprehensive assessment of the total work volume, project implementation system and availability/activities of farmers' groups, etc., the work volume for each component in each project year should be planned to be as equal as possible with the final completion of the Project in seven years.

Meanwhile, the wood-fencing conservation work at the trial plots should be planned in the first year, followed by planting in the second year.

The work implementation schedule and work volume for each project year are shown in Tables 7-23 and 7-24 respectively while the number of trees to be planted and the seedling production volume for each project year are given in Tables 7-25 and 7-26 respectively.

(3) Annual Schedule

Farming activities in the subject areas are dominated by coffee cultivation. As the period from April to June is the busy coffee harvesting season, it will be difficult to secure the labour required for the Project during this period. The planned utilisation of local labour must avoid this busy season and land preparation should be conducted in the dry season with planting in the rainy season in accordance with the natural cycle.

Table 7-22 Outline of Social Forestry Project Components

Project Component		Planned Work/ Work Volume	Implementation Body	Funding	Work Description	Preparatory Work and Others
National Forests	Social-Oriented Rehabilitation	Planting of useful species: 1,597 ha	MOF (participation of local people)	MOF	The participation of landless farmers and small-scale farmers is a priority; the coffee bean collection cost will be borne by	The responsibility for tending and maintenance work will be transferred to the participants when the fruit trees are sufficiently grown
	Social-Oriented Border Tree Planting	Planting of border trees: 30 km	MOF (participation of local people)	MOF	the participants	to produce income.
Private Land	Agroforestry (existing and new)	Planting of upper story trees: 26,954 ha	Local people (MOF)	Loan by MOF	Seedlings and fertiliser will be provided free of charge for the first	The cost at trial plots will be paid by the MOF until such time that
		Soil conservation: 6,875 ha	Local people (MOF)	Loan by MOF	planting work only; priority implementation at trial plots; an application for a low interest loan may be made if a land owner lacks sufficient funds	the planted trees bear fruit to provide income for the participants.
	Conservation Plantation Development (planting of such conservation trees as bamboo): 418 ha		Local people (MOF)	Loan by MOF	Creation of new plantations at devastated land at coffee fields or dry crop fields	–
	Dry Crop Field Improvement (construction of bench terraces, etc.): 1,442 ha		Local people (MOF)	Loan by MOF	Construction of bench terraces at steep dry crop fields	–
	Riparian Afforestation (planting of bamboo along main river courses): 205 ha		MOF (cooperation of local people)	MOF	Introduction of riparian afforestation along major river courses	The management responsibility will be transferred to local people once bamboo shoots can be collected.
	Check Dams (8 m high, 50 m long): 16		MOF (cooperation of local people)	MOF	After completion, fresh water fish culture by local people will be possible	No financial assistance will be provided by the MOF for fish culture.
	Access Roads: 26.8 km		MOF (cooperation of local people)	MOF	Work priority is given to access roads to trial plots	The road maintenance cost will be borne by the users.
	Semi-Temporary Central Nursery (some 1 ha in size with an information centre on the premises): 1		MOF	MOF	The supply of seedlings by this nursery affects all the planned work	An information centre will be established on the premises.
	Water Supply (equipment and materials for construction of intake facilities): 1 set		MOF (cooperation of local people)	MOF	Provision of equipment and materials for water intake facilities	The construction and maintenance costs will be borne by the village concerned.
	Promotion of Businesses Not Dependent on Land: 300 households		MOF (participation of local people)	MOF	Gift of goats and honey bees to 300 landless households; loan of beef cattle to 300 small-scale farming households	Following the delivery of goats, bees and beef cattle, the responsibility for their care will fall on the subject households.
Common	Joining of KUD and Employment of Experts (three years): 2 KUDs		MOF	MOF	Model management; training of other staff in charge of KUD operation	–
	① Implementation Bodies: 2 ② Advisory Committees: 3 levels ③ Information Centre: 1 ④ Village Promotion Offices (at 30 villages involved in national forest-related work): 30 ⑤ Staff Contracts (consultants and NGOs)		MOF MOF MOF MOF (participation of local people) MOF	MOF MOF MOF MOF MOF	① The information centre will act as the central base for all related people and will be provided with equipment, vehicles and necessary fixtures to perform its functions ② Building construction and provision of the necessary equipment and fixtures, etc. for all new village development offices ③ Selection of consultants and NGOs ④ Preparation of various programmes and guidelines ⑤ Awards for excellent villages and farming houses	① Prior assignment of leading personnel for social forestry ② Selection of site for the information centre ③ Selection of village promotion office sites ④ Prior agreement on the selection of basic issues with consultants and NGOs ⑤ Prior consultations with villages implementing trial plots ⑥ Preparatory work for the establishment of advisory committees

Notes:

(1) Implementation body means the body responsible for the implementation of the Social Forestry Project and is classified into three categories: ① "MOF (participation of local people)" where the work is conducted by the MOF with the participation of local people, ② "MOF (cooperation of local people)" where the work is conducted by the MOF with the cooperation of private land owners and ③ "Local People (MOF)" where the work is conducted on private land by owners agreeing to the objectives of the Project.

(2) The funding sources differ at different implementation stages of the Project as there are various funds in addition to a possible grant from the Presidential Special Budget. Therefore, the implementation categories in this table of "MOF (participation of local people)" and "MOF (cooperation of local people)" where the MOF is the main implementation body are classified as "MOF", i.e. paid by the MOF, while the category of "Local People (MOF)" where private land owners conduct the work in agreement with the objectives of the Project and where there is a possibility of a MOF loan for those lacking sufficient funds is classified as "Loan by MOF".

(3) In the case of the promotion of businesses not dependent on land, three female goats and/or five beekeeping hives will be provided for each of 300 landless farming households (of 30 villages adjacent to national forests). The goats will be four month old females. Assuming that each goat gives birth to 1 - 2 kids each year for four years, there will be five young goats for sale in addition to succeeding goats, bringing in some 1.5 million Rp in five years. In short, each year will produce 0.3 million Rp and one succeeding goat. Coupled with the income from apiculture, additional income of 0.5 million Rp/year can be anticipated.

(4) One female calf will be loaned to each of 300 small farming households (in 30 villages near national forests) for breeding purposes for five years and, at the end of this period, one calf will be returned to the government. As beef cattle require a large quantity of fodder, land is required to grow highly productive grass. This requirement restricts the scope of the subject households to those which can provide a shed and fodder producing site. The raising of beef cattle is expected to produce additional income of 0.5 million Rp/year provided that the labour is supplied by the subject household.

(5) Fish culture at a check dam reservoir will mainly be managed by the village. The culture of freshwater fish at a check dam reservoir (of 1,000 m^2) is expected to produce an income of some one million Rp in three months. As the operation can be repeated twice a year without substantial expenditure except for the cost of fish feed and fry, fish culture is expected to produce a high level of income. Therefore, no special grant will be provided and the operation is expected to be conducted by the village community or group of villagers.

(6) In the case of social-oriented rehabilitation, etc., the participation priority is given to landless farmers or small-scale farmers. The participants will be paid for their planting and tending work and will also be permitted to collect coffee beans from the coffee fields. The coffee fields in national forests tend to lack proper care and, therefore, the yield is estimated to be less than half of the standard yield. However, they can still produce an income of some one million Rp/year which should help the participants until the planted fruit trees, etc. start to produce fruit. Thirty years after the initial planting, it will become possible to extract resin from damar mata kucing, providing a semi-permanent source of income because of the long resin producing period. If the land subject to participation by landless farmers or small-scale farmers is less than 1 ha, the possibility of raising goats/honey bees, conducting freshwater fish culture or raising beef cattle will be examined as an alternative. Through the selection of appropriate work, it is hoped that the income of all households will reach the middle level income established by the household survey at Desa Tebat Pulau.

Table 7-23 Social Forestry Project Implementation Schedule

Work				Second year	1			2			3			4			5			6			7		
				Three months	4	8	12	4	8	12	4	8	12	4	8	12	4	8	12	4	8	12	4	8	12
Various Procedures, Surveys, Coordination and Detailed Design, etc.																									
Monitoring/Evaluation																									
National Forests	Social oriented rehabilitation	Planting of Useful Species	Elevation: upto 900 m																						
			Elevation: 901 - 1,500 m																						
			Elevation: 1,501 m or higher																						
	Social oriented planting of boundary trees																								
Private Land	Agroforestry complex development (existing)	Planting of Upper Trees	Elevation: upto 900 m																						
			Elevation: 901 - 1,500 m																						
		Soil Conservation Measure	Wood-fenced conservation work																						
			Wood-fenced and strip planting conservation work																						
	Agroforestry complex development (new)	Planting of Trees	Elevation: upto 900 m																						
			Elevation: 901 - 1,500 m																						
		Soil Conservation Measure	Wood-fenced conservation work																						
			Wood-fenced and strip planting conservation work																						
	Conservation Plantation Development																								
	Improvement of Dry Crops Field (Construction of Bench Terraces)																								
	Check Dam																								
	Riparian Afforestation																								
	Construction of New Road																								
	Nursing (Establishment of Central Nurseries)																								
	Construction of Domestic Water Supply Facilities																								
	Provision of Beef Cattle																								
	Provision of Goats																								
	Provision of Apiculture Facilities																								
	Provision of Freshwater Fish																								
	Extension and Training Activities																								
	KUD Activities																								

Notes:
—: planned work for Project Area
- - : planned work for trial plots

Table 7-24 Annual Work Plan

Work				Unit	Year							Total
					1	2	3	4	5	6	7	
National Forests	Social oriented rehabilitation	Planting of Useful Species	Elevation: upto 900 m	ha		170 (128)	190	190	190	190		930
			Elevation: 901 - 1,500 m	ha		117 (12)	130	130	130	130		637
			Elevation: 1,501 m or higher	ha		6	6	6	6	6		30
	Social oriented planting of boundary trees			km		6	6	6	6	6		30
Private Land	Agroforestry complex development (existing)	Planting of Upper Trees	Elevation: upto 900 m	ha		3,417 (50)	3,425	3,425	3,425	3,425	3,425	20,542
			Elevation: 901 - 1,500 m	ha		692 (50)	715	715	715	715	715	4,267
		Soil Conservation Measure	Wood-fenced conservation work	ha	870 (31)	880	880	880	880	880	880	6,150
			Wood-fenced and strip planting conservation work	ha		20	40	40	40	40		180
	Agroforestry complex development (new)	Planting of Trees	Elevation: upto 900 m	ha		355	355	355	355	355		1,775
			Elevation: 901 - 1,500 m	ha		70	75	75	75	75		370
		Soil Conservation Measure	Wood-fenced conservation work	ha	90	110	110	110	110			530
			Wood-fenced and strip planting conservation work	ha		3	3	3	3	3		15
	Conservation Plantation Development			ha		78	85	85	85	85		418
	Improvement of Dry Crops Field (Construction of Bench Terraces)			ha	282	290	290	290	290			1,442
	Check Dam			ha	5	5	6					16
	Riparian Afforestation			No(s).		30	35	35	35	35	35	205
	Construction of New Road			ha	2.8	6.0	6.0	6.0				26.8
	Nursing (Establishment of Central Nurseries)			Set(s)	1							1
	Domestic Water			Set(s)	1							1
	Beef Cattle Raising			Village(s)		10	10	10				30
	Goats Raising			Village(s)		10	10	10				30
	Apiculture Facilities			Village(s)		10	10	10				30
	Freshwater Fish			Sites	5	5	6					16
Extension and Training				Occasion	1	1	1	1	1	1	1	7
Expansion of KUDs				Occasion	1	1	1	1	1			5

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

Table 7-25 Breakdown of Trees to be Planted by Year

(Unit: trees)

Tree Species	Project Year							Total
	1	2	3	4	5	6	7	
Aren	0	22,380	22,820	22,820	22,820	22,820	17,125	130,785
Salak	0	600	600	600	600	600	0	3,000
Pinang	0	600	600	600	600	600	0	3,000
Durian	0	22,260	22,700	22,700	22,700	22,700	17,125	130,185
Jengkol	0	3,400	3,800	3,800	3,800	3,800	0	18,600
Kemiri	0	8,080	9,000	9,000	9,000	9,000	0	44,080
Melinjo	0	14,940	15,750	15,750	15,750	15,750	10,725	88,665
Jack fruit	0	18,860	18,900	18,900	18,900	18,900	17,125	111,585
Apokat	0	14,940	15,750	15,750	15,750	15,750	10,725	88,665
Petai	0	41,120	41,600	41,600	41,600	41,600	34,250	241,770
Kapok	0	7,800	8,500	8,500	8,500	8,500	0	41,800
Merkusi pine	0	33,360	35,960	35,960	35,960	35,960	0	177,200
Bamboo	0	13,800	15,500	15,500	15,500	15,500	7,000	82,800
Mahogany	0	34,000	38,000	38,000	38,000	38,000	0	186,000
Kayu bawang	0	18,860	18,900	18,900	18,900	18,900	17,125	111,585
Subtotal	0	255,000	268,380	268,380	268,380	268,380	131,200	1,459,720
Damar mata kucing	0	57,400	64,000	64,000	64,000	64,000	0	313,400
Kayu res	0	147,800	179,000	179,000	179,000	179,000	0	863,800
Kayu manis	0	328,880	341,400	341,400	341,400	341,400	289,800	1,984,280
Lamtoro	0	263,097	265,620	265,620	265,620	265,620	136,620	1,462,197
Subtotal	0	797,177	850,020	850,020	850,020	850,020	426,420	4,623,677
Coffee (robusta)	0	680,000	688,000	688,000	688,000	688,000	0	3,432,000
Total	0	1,732,177	1,806,400	1,806,400	1,806,400	1,806,400	557,620	9,515,397

Note: Regarding nursery stock, wildings will be purchased for damar mata kucing, kayu res will be directly cut, village nurseries will be consigned for kayu manis, lamtoro and coffee (robusta), and other nursery stock will be produced in semi-temporary central nursery (newly established).

Table 7-26 Seedling Production Number by Project Year

(Unit: trees)

Tree Species	Project Year							Total
	1	2	3	4	5	6	7	
Aren	0	28,000	28,600	28,600	28,600	28,600	21,500	163,900
Salak	0	800	800	800	800	800	0	4,000
Pinang	0	800	800	800	800	800	0	4,000
Durian	0	27,900	28,400	28,400	28,400	28,400	21,500	163,000
Jengkol	0	4,300	4,800	4,800	4,800	4,800	0	23,500
Kemiri	0	10,100	11,300	11,300	11,300	11,300	0	55,300
Melinjo	0	18,700	19,700	19,700	19,700	19,700	13,500	111,000
Jack Fruit	0	23,600	23,700	23,700	23,700	23,700	21,500	139,900
Apokat	0	18,700	19,700	19,700	19,700	19,700	13,500	111,000
Petai	0	51,400	52,000	52,000	52,000	52,000	42,900	302,300
Kapok	0	9,800	10,700	10,700	10,700	10,700	0	52,600
Merkusi Pine	0	41,700	45,000	45,000	45,000	45,000	0	221,700
Bamboo	0	17,300	19,400	19,400	19,400	19,400	8,800	103,700
Mahogany	0	42,500	47,500	47,500	47,500	47,500	0	232,500
Kayu bawang	0	23,600	23,700	23,700	23,700	23,700	21,500	139,900
Total	0	319,200	336,100	336,100	336,100	336,100	164,700	1,828,300

Note: In the case of Damar mata kucing, the planting stock will be purchased while cuttings of kayu res will be directly planted in the ground. The production of kayu manis, lamtoro and coffee (robusta variety), all of which are easy to nurse, will be entrusted to village nurseries.

7.12 Project Implementation System

(1) Foreign Consultants

As the planned Social Forestry Project is designed so as to allow its implementation with technologies/techniques which can be easily adopted and widely used by those involved, it is believed that field staff led by those of the Ministry of Forestry will be able to meet all the necessary requirements. It will, however, be necessary to strengthen the guidance and training regarding the management of the comprehensive procurement of the equipment and materials required for the social forestry work and also of financial matters.

In addition, it is believed that there is a local shortage of manpower with sufficient experience in such fields as civil engineering/construction, environment, soil loss prevention and preservation of land productivity and preservation of water quality, etc. where the work volume under the Social Forestry Project is particularly high. Accordingly, the assignment of foreign consultants with rich experience in these fields is planned (see Table 7-27).

(2) Local Consultants

In addition to the seven NGO staff operating at the village level to facilitate people's participation in social forestry, the appointment of local consultants to assist the foreign consultants in terms of the management of project implementation and guidance on the management of financial matters is planned in connection with such work as civil engineering/construction work, environment, soil loss prevention and preservation of land productivity and preservation of water quality, etc. (see Table 7-27).

Table 7-27 Required Consultant Manpower

(Unit: man-months)

Consultant \ Project Year	1	2	3	4	5	6	7	Total
1. Foreign Consultants	16	14	12	12	4	6	9	73
① General/Finance-Procurement	8	6	6	6	2	2	3	33
② Civil Engineering	2	2	2	2				8
③ Construction (Building)	2	2	2	2				8
④ Water Quality	2	2	2	2				8
⑤ Soil	2	2				2	3	9
⑥ Environment					2	2	3	7
2. Local Consultants	50	50	50	36	36	26	28	276
① General Affairs	12	12	12	12	12	12	12	84
② Finance-Procurement	12	12	12	12	12	12	12	84
③ Civil Engineering	12	12	12	12				48
④ Construction (Building)	12	12	12		12			48
⑤ Soil	2	2	2				2	8
⑥ Environment						2	2	4
Total	66	64	62	48	40	32	37	349

7.13 Project Cost

(1) Precondition for Cost Estimate

1) The project implementation period is 7 years.

2) The year of project commencement is 1998.

3) The annual inflation rate is estimated at 7 % based on the statistical data as shown below:

1992/93	8.30%
1993/94	5.29%
1994/95	4.84%
1995/96	7.11%
Average	6.39%

(Source) Statistik Indonesia, 1995

4) The base year for costing is 1997.

5) The foreign exchange rate is 21.48 Indonesian Rupiah (Rp) per Japanese Yen (the exchange rate at the end of June, 1997).

6) The physical contingency is set at 8 % of each project cost item.

7) The project cost includes farmers' labor costs such as labor costs for farming.

8) Tax

The project is regarded as a joint undertaking by the Ministry of Forestry and farmers, and the total project cost is calculated after including all taxes to be paid by both parties. Two types of taxes have been considered as part of the project cost : one is a sales tax to be borne by both the government and farmers, and the other is an income tax to be paid by farmers. The current sales tax rate is 10% on the amount of goods and services purchased while the income tax rate ranges from 15 % to 35 % of the yearly taxable income. When the amount of taxes is calculated for the project, 10% of a sales tax is considered when

goods and services are purchased through market channels and 20 % of an income tax is considered on the net income from the agriculture related revenue. The net income is estimated at 3 % of the total agriculture related revenue.

It is considered that the following items are subject to sales taxes:

Chemical fertilizers, pesticide, etc. which will be purchased through KUD or at other retail stores; materials, equipment, and construction work which will be procured for construction and maintenance of roads; materials to be purchased for establishment of nurseries in the first year; equipment and materials for water supply facilities; construction of offices and equipment for information centers and supporting services; medicines and feeds for cattle, goats, etc.; equipment and materials required for construction of check dams. These items are to be procured mainly from the outside of the project area.

(2) Cost Estimate

The project cost has been estimated based on the work plan. As Tables 7-28 to 7-29 show, the total project cost for the project period of 7 years is 286,569 million Rp (equivalent to 13,341 million Yen) in 1997 constant price. This amount includes taxes (both sales and income taxes). With the price and physical contingencies being added (7% and 8.0%, respectively), the total project cost in nominal terms is 438,633 million Rp (equivalent to 20,420 million yen). The total project cost will be borne by both the Ministry of Forestry and farmers. The project cost to be borne by the Ministry of Forestry amounts to 71,435 million Rp (equivalent to 3,326 million yen) while the project cost to be borne by farmers amounts to 367,198 million Rp (equivalent to 17,095 million yen). The project cost includes farmers' labor costs such as labor costs for farming. Out of the total project cost, the amount of sales taxes is 10,424 million Rp (equivalent to 485 million yen).

Table 7-28 Project Cost Estimate
(Total of 7 Year Project Implementation Period)

(Unit : Million Rp)

Project Component	Base Cost (Constant)	Total Cost (Nominal)
Agroforestry Complex Develop. etc.	265,202	379,361
Riparian	200	276
Check Dam	815	945
Road Construction	5,485	6,894
Nursery Central	322	409
W.S.Air Lanang	131	140
Cattle, Goat, Bee	1,678	2,198
Information Centers, etc.	3,153	3,890
KUD	137	157
Income Tax (Farmers)	2,742	3,925
Project Management (Consultants)	6,704	7,947
Sub-Total of Project Cost	286,569	406,141
Physical Contingency	0	32,491
Grand Total of Project Cost	286,569	438,633

Table 7-30 shows the proportions of respective project components to be borne by either the Ministry of Forestry or farmers. The basic concept of classifying project costs into these two categories is described as follows:

1) Costs for project components (such as agroforestry complex development) whose benefits will be mainly received by farmers will be basically paid by farmers. For the purpose of improving agricultural productivity, the Ministry of Forestry will assist farmers with seedlings and fertilizers on a temporal basis. Plantation of fruit trees is an example of this type.

2) As described in 1), costs for project components whose benefits will be directly enjoyed by farmers will be basically borne by farmers: however, there are cases where farmers may find it difficult to bear costs required for the project. For example, farmers may not be well-informed of benefits of newly introduced project components due to imperfect information networks. Another example is a case where the Ministry of Forestry may have to take an initiative to supply goods and services when a project component has a characteristics of quasi-public goods. There is also a case where the Ministry of Forestry has to take risks at the initial stage which farmers may not be able to bear. Project components in this type will be such as establishment of nurseries,

bench terraces and water supply facilities, construction of roads, establishment of information centers, etc.

3) Even categorized into the above 2), some project components which are gradually adopted by farmers and/or whose maintenance work needs to be relied on farmers will be done by the Ministry of Forestry at the initial stage of the project implementation. Responsibilities will be shifted from the Ministry of Forestry to farmers at later stages. For example, the Ministry of Forestry will bear the initial purchase cost of a goat under the project component "cattle, goat, and bee" but a farmer will take care of it once it is given to him/her.

Table 7-29 Details of Project Cost

(1)

Project Cost (Implementation Period: 7 Years)

(Unit: Million Rp unless otherwise specified)

	Project Component			Code	Work Plan	Base Cost (1997 Price)	Total Project Cost(Nominal)	Project Component/ Total Project Cost (%)	Breakdown of Total Project Cost		Share bet. MOF and Farmers		MOF's Project Component /MOF's Total Project Cost (%)
									MOF	Farmers	MOF(%)	Farmers(%)	
Natural Forest	Agroforestry Complex Development, etc.					265,202	379,361	86%	44,225	335,136	12%	88%	62%
Natural Forest	Social Oriented Rehabilitation	Planting of Useful Species	Elevation: up to 900m	Ichi-4	930ha	4,180	5,909	1%	1,002	4,907	17%	83%	1%
Natural Forest	Social Oriented Rehabilitation	Planting of Useful Species	901—1500m	Ichi-5	637ha	2,923	4,170	1%	455	3,715	11%	89%	1%
Natural Forest	Social Oriented Rehabilitation	Planting of Useful Species	1500m –	Ichi-6	30ha	134	188	0%	35	152	19%	81%	0%
Natural Forest	Social Oriented Border Tree Planting			Ichi-18	30km	694	954	0%	528	425	55%	45%	1%
Private Land	Agroforestry Complex Development (Existing)	Planting of Upper Trees	Elevation: up to 900m	Ichi-8	20,542ha	165,882	238,782	54%	23,814	214,968	10%	90%	33%
Private Land	Agroforestry Complex Development (Existing)	Planting of Upper Trees	901—1500m	Ichi-9	4,267ha	33,374	48,145	11%	3,579	44,565	7%	93%	5%
Private Land	Agroforestry Complex Development (Existing)	Soil Conservation Measure	Wood+Fenced Conser. Work	Ichi-10a	6,150ha	2,117	2,910	1%	2,910	0	100%	0%	4%
Private Land	Agroforestry Complex Development (Existing)	Soil Conservation Measure	Wood+Fenced & Strip Planting	Ichi-11a	180ha	418	584	0%	308	276	53%	47%	0%
Private Land	Agroforestry Complex Development (New)	Planting of Trees	Elevation: up to 900m	Ichi-12	1,775ha	26,078	36,721	8%	6,656	30,065	18%	82%	9%
Private Land	Agroforestry Complex Development (New)	Planting of Trees	901—1500m	Ichi-13	370ha	5,327	7,518	2%	1,275	6,243	17%	83%	2%
Private Land	Agroforestry Complex Development (New)	Soil Conservation Measure	Wood+Fenced Conser. Work	Ichi-10b	530ha	196	259	0%	259	0	100%	0%	0%
Private Land	Agroforestry Complex Development (New)	Soil Conservation Measure	Wood+Fenced & Strip Planting	Ichi-11b	15ha	36	49	0%	26	23	54%	46%	0%
Private Land	Conservation Plantation Development			Ichi-14	418ha	1,042	1,492	0%	484	1,007	32%	68%	1%
Private Land	Dry Crop Field Improvement: Dry Crops Field			Ichi-16	1,442ha	22,134	30,844	7%	2,054	28,789	7%	93%	3%
Private Land	Dry Crop Field Improvement: Bench Terrace			Ichi-17	1,442ha	668	838	0%	838	0	100%	0%	1%
	Riparian Afforestation					200	276	0%	266	10	97%	3%	0%
	Building of Check Dam					815	945	0%	919	26	97%	3%	1%
	Road Construction					5,485	6,894	2%	6,894	0	100%	0%	10%
	Semi-Temporary Central Nursery					322	409	0%	409	0	100%	0%	1%
	W.S.Air Lanang					131	140	0%	140	0	100%	0%	0%
	Cattle+Goat+Bee+Ikanmas					1,678	2,198	1%	1,296	902	59%	41%	2%
	Information Center, etc.					3,153	3,890	1%	3,890	0	100%	0%	5%
	KUD					137	157	0%	157	0	100%	0%	0%
	Income Tax					2,742	3,925	1%	0	3,925	0%	100%	0%
	Project Management					6,704	7,947	2%	7,947	0	100%	0%	11%
	Project Cost Sub-Total					286,569	406,141	93%	66,143	339,998	16%	84%	93%
	Physical Contingency					0	32,491	7%	5,291	27,200	16%	84%	7%
	Project Cost Grand Total					286,569	438,633	100%	71,435	367,198	16%	84%	100%

(Note1) The farmers' account includes farmers' labor costs and costs of agricultural inputs.

(Note2) The project component "Information Center, etc." includes costs of mobilizing NGOs while the component "Project Management" includes costs of employing consultants.

(2)

Total Project Cost of the Ministry of Forestry and Farmers (Nominal Price) (Unit Rp 1000000)

	Project Component			Code	Work Plan	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Total
						1998	1999	2000	2001	2002	2003	2004	
	Agroforestry Complex Development, etc.					1,333	17,567	33,679	51,161	70,934	92,810	111,875	379,361
Natural Forest	Social Oriented Rehabilitation	Planting of Useful Species	Elevation: up to 900m	Ichi-4	930ha	0	338	596	875	1,202	1,582	1,316	5,909
			901—1500m	Ichi-5	637ha	0	196	364	584	836	1,131	1,059	4,170
			1500m –	Ichi-6	30ha	0	12	20	29	38	49	39	188
	Social Oriented Border Tree Planting			Ichi-18	30km	0	100	126	158	195	235	140	954
Private Land	Agroforestry Complex Development (Existing)	Planting of Upper Trees	Elevation: up to 900m	Ichi-8	20,542ha	0	9,863	19,804	31,086	43,849	58,760	75,419	238,782
			901—1500m	Ichi-9	4,267ha	0	1,811	3,871	6,207	8,852	11,940	15,463	48,145
		Soil Conservation Measure	Wood-Fenced Conser. Work	Ichi-10a	6,150ha	249	270	289	309	331	704	757	2,910
			Wood-Fenced & Strip Planting	Ichi-11a	180ha	0	34	79	98	119	149	105	584
	Agroforestry Complex Development (New)	Planting of Trees	Elevation: up to 900m	Ichi-12	1,775ha	0	2,245	4,137	5,619	7,288	9,216	8,217	36,721
			901—1500m	Ichi-13	370ha	0	424	828	1,147	1,497	1,901	1,722	7,518
		Soil Conservation Measure	Wood-Fenced Conser. Work	Ichi-10b	530ha	26	34	36	39	41	36	47	259
			Wood-Fenced & Strip Planting	Ichi-11b	15ha	0	5	6	8	9	12	10	49
	Conservation Plantation Development			Ichi-14	418ha	0	78	122	195	280	400	417	1,492
	Dry Crop Field Improvement: Dry Crops Field			Ichi-16	1,442ha	928	2,015	3,249	4,646	6,223	6,658	7,124	30,844
	Dry Crop Field Improvement: Bench Terrace			Ichi-17	1,442ha	129	142	152	163	174	37	41	838
	Riparian Afforestation					0	33	41	43	48	53	58	276
	Building of Check Dam					267	286	367	0	4	8	14	945
	Road Construction					592	1,363	1,472	1,590	1,718	76	82	6,894
	Semi-Temporary Central Nursery					91	47	53	57	61	65	34	409
	W.S.Air Lanang					140	0	0	0	0	0	0	140
	Cattle+Goat+Bee+Ikanmas					471	172	203	217	233	660	242	2,198
	Information Center, etc.					1,416	387	417	392	413	435	430	3,890
	KUD					49	52	56	0	0	0	0	157
	Income Tax					32	189	338	506	698	943	1,219	3,925
	Project Management					1,420	1,370	1,323	1,220	753	790	1,070	7,947
	Project Cost Sub-Total					5,810	21,467	37,949	55,188	74,861	95,841	115,025	406,141
	Physical Contingency					465	1,717	3,036	4,415	5,989	7,667	9,202	32,491
	Project Cost Grand Total					6,275	23,184	40,985	59,603	80,850	103,508	124,227	438,633

(Note1) The farmers' account includes farmers' labor costs and costs of agricultural inputs.
(Note2) The project component "Information Center, etc." includes costs of mobilizing NGOs while the component "Project Management" includes costs of employing consultants.

Table 7-30 Proportion of the Ministry of Forestry's Account and Farmers' Accounts for Respective Project Components

(Unit:%)

Project Component	MOF's Account	Farmers' Account (Note)
Agroforestry Complex Develop. Etc.	12	88
Riparian	97	3
Check Dam	97	3
Road Construction	100	0
Nursery Central	100	0
W.S. Air Lanang	100	0
Cattle, Goat, Bee	59	41
Information Centers	100	0
KUD	100	0
Income Tax (Farmers)	0	100
Project Mgt. (Consultants)	100	0
Total Project Cost	16	84

Note: The farmers' account includes farmers' labor costs.