STUDY ON FORESTRY DEVELOPMENT AND FOREST REHABILITATION

Summary Report

January 1993

PROJECT FORMULATION MISSION FOR INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

The views expressed in this report are those of the members of the mission and do not necessarily refrect those of JICA nor Japanese Government.

contents

Report of Project Formulation Mission for Indonesia

(Forestry Development and Forest Rehabilitation)

1. Introduction

1-1 Background

Indonesia is a country possessing the world third largest tropical forests and the foremost in Southeast Asia. The conservation of such tropical forests and their sustainable management have a great significance not only for Indonesia but also for the entire world.

Reviewing the present conditions of forest resources in Indonesia, the government announced in 1984, indicating that the forest areas total 144 million hectares with the forest ratio of 75%. However, the figure apparently includes a considerably large number of forests which have been reduced to grasslands and waste lands by shifting cultivation, forest fires and other factors. According to one estimate, for instance, the total forest areas amount to 109 million hectares with the forest ratio of 56%.

It can be said that the recovery and conservation of forest and its sustainable utilization are the most significant issues for the forest administration of Indonesia.

Under such situations, Indonesia took policies to impose an embargo on the export of logs and increase added value by raising the degree of processing of timber. Besides, efforts are being made at present to recover and conserve the forest, through various methods including the use of Reforestation Fund, by classifying the reforestation in a broad sense into categories of regreening, reforestation in a narrow sense and industrial plantation.

In Indonesia, preparations are now being made for the Second 25-Year Long Term Development Plan and the Sixth National 5-Year Development Plan. The Ministry of Forestry is making efforts to contribute effectively to these plans from the forestry sector.

Though still being in the stage of study, the tentative goals of forestry sector in the Second 25-Year Long Term Development Plan are apparently set at (1) securing forest resources to meet the demand of people and forest industry for raw materials, (2) securing forest resources aiming at the conservation of biodiversity and (3) securing forest resources with various socio-economic functions. The emphasis placed on these matters indicates the strong expectations for forests and forestry.

Facing the reality, on the other hand, there exist a variety of difficult problems, in additions to the tendency of decreasing forest areas as described already, such as:

(1) As regards the reforestation, it has been claimed that the regreening had been completed for 5.81 million hectares, reforestation in a narrow sense for 1.22 million hectares and industrial reforestation for 1.43 million hectares by the end of the fourth 5-year plan. However, there seems to exist many attempts which proved to be unsatisfactory. One estimate points out the necessity of reforestation amounting to 20 million hectares in the future.

(2) There is much room for improvement in timber utilization and processing technology. There are many timber left in forest lands after felling, and the percentage of utilization in timber sawing is low.

(3) There are 6.7 million hectares of national parks. Nevertheless, some local people including shifting cultivators are living there, gradually encroaching upon the parks. And,

(4) As for the social forestry, which is conceptually an effective means of forestry activity inviting participation of local people, truly effective cases of implementation are exceptional so that such an attempt is still in the stage of trial.

Japan's cooperation with Indonesia ranks the first among the bilateral assistances. Cooperation activities have been steadily promoted in the field of forestry cooperation also. In the field of project-type technical

cooperation, five projects have been implemented to date, commenced by Mountain Logging Practice Project in Jawa, from 1977 to 1982. In the field of development study, a total of five studies have been made to date including the forest resources management study in central Jawa from 1976 to 1978. In the field of grant aid cooperation, there have been registered five cases of cooperation to date since the Tropical Rain Forest Center in 1979.

1-2 Purpose of the Survey

The survey was carried out from September 9 to October 8 with participation of a total of seven members, led by the team leader Mr. Y. NISAWA, Managing Director of Forestry and Fishery Development Cooperation Department of JICA.

(1) To make recommendations as to the course of Japan's forestry cooperation for Indonesia through JICA in the future through the consultation and exchange of opinions with the government agencies concerned of Indonesia and international organizations as well as bilateral assistance agencies which are now playing active roles in the country, the collection and analysis of pertinent data and field survey. Visiting the country at this point of time is deemed appropriate as preparations are being made to work out the Second 25-Year Long Term Plan and the Sixth National 5-Year Development Plan, and the Indonesian Tropical Forestry Action Programme has just be prepared.

(2) To conduct field survey on the cases of development study requested officially and unofficially for the current fiscal year, give them priorities and carry out drafting terms of reference for the study if required.

2. Possibility of JICA's Cooperation in Forestry Sector

2-1 Importance of Forestry Cooperation

Japan has been carrying out cooperation actively in various fields responding to the request from the Government of Indonesia. It will be necessary and worthwhile to make the forestry cooperation as one of the main fields in JICA's cooperation due to the following reasons:

(1) The forests are important resource of Indonesia, and timber production will greatly contribute to the economy of the country and the people.

(2) Forests have a variety of functions such as national land conservation, water conservation and so on. Furthermore, the existence of them is of vital significance from the viewpoint of conserving the global environment like the prevention of the warming up of the earth.

(3) Necessity of cooperation will be more pertinent in view of the envisaged role of forestry in the coming Sixth 5-Year Plan of the country.

(4) JICA has provided cooperation for more than ten years heretofore with reforestation at its core so that the groundwork is laid for the cooperation for future.

The field of forest and forestry covers such a wide range as reforestation, felling, breeding, forest conservation, control of pests and diseases, timber processing, nature conservation, etc. JICA is required, therefore, to clarify the priority sector in cooperation while avoiding the duplication with the past cooperation and other agencies' programs.

Having reviewed the forestry policy of Indonesia heretofore and based on the results on hearing on the attitude to tackle with the forthcoming 25-year and 5-year plans, this cooperation mission thinks that the following three items should be the core of JICA's in the forestry sector in Indonesia.

1) Protection: To protect ecosystem, soil and water

2) Production: To preserve a great variety of products and services available from forest for the benefit of the present and future generations.

3) Participation: To give proper consideration to the concept and experience of all people who are influenced by and related with activities concerning forest, and request them to participate in forestry activities.

2-2 Integrated Approach

(1) Necessity of Integrated Approach

The forestry cooperation by JICA in Indonesia has a relatively long history, and it is being actively promoted at present, and its future expansion is desired. It will be appropriate, as the methods to promote cooperation under such situation, to take an integrated approach or so called program approach by setting intermediate goals of cooperation with a term of about ten years, putting various schemes related to JICA such as the technical cooperation project, grant aid cooperation, and development study in a perspective, paying due attention to the cooperation provided by other assistance organizations of Japan.

(2) Goals for the Approach

To adopt all the three items described above as goals will be too diversified for the approach. It will be appropriate, therefore, to narrow them down to the following two items, taking due consideration of Indonesia government's view and the resource available to JICA:

1. Contribution to the reforestation (Reforestation in protection forest) plan of the Indonesian government, and
2. Contribution to the greening (Reforestation to the periphery of housing and farmland) plan of the Indonesian government.

The following are conceptually possible items which can be put under the program with above mentioned goals at this point of time:

1) Promotion of reforestation to rehabilitate devastated land. Such as the deteriorated secondary forests, grasslands, swamps and semi-arid lands.

2) Promotion of watershed management activities.

3) Development of tropical forests rehabilitation techniques such as reforestation using native tree species, production of excellent seeds, breeding technology, tending method, control of pests and diseases, etc.

4) Development of economical large scale forest rehabilitation technology

5) Promotion of environmental conservation activities, such as management of natural parks, enlightenment of consciousness on conservation of tropical forests, prevention of forest fires, etc.

6) Manpower training for foresters/technicians

Incidentally, such type of cooperation as afforestation of bare lands for mountain side protection and etc (so called environmental reatforestation), a search for possibility should be continued for grant aid as no tangible monetary benefit will be derived from them, although this approach is quite different from the conventional grant aid as the major components of costs are wages for planting and tending .

3. Recommendatons on the Development Study Requests

3-1 Various requests examined by the Mission

One of the assignments given to the mission is to make recommendation on JICA's priority on development study requests from the Indonesian government and prepare draft terms of refernce of the study for the high priority request. The requested projects and the findings of the mission thereof are as described below. Based on this observation, the mission has judged the 'Study on Master plan for forestry development in semi-arid zone in NTT Province' as the most desirable one, and has prepared a draft project document for it.

1) F/S on rehabilitation reforestation of degraded land in South Kalimantan: No suitable site for F/S could be identified.

2) F/S on rehabilitation reforestation of degraded land in the Lake Toba area: The content of the request was in effect the preparation of a master plan for a large regional development. However, such a master plan for the said area was prepared by JICA in the past.

3) F/S rehabilitation of degraded land on the upper stream of the Kampar Kiri and on the upper stream of the Lokan Kanan in Riau Province: Priority is low in doing this development study for rehabilitation of degraded land as the necessity of this place is more on actual introduction of social forestry and agro-forestry for shifting cultivation farmers living in the protected forest and nature protection forest.

4) F/S on rehabilitation reforestation of degraded land in East Kalimantan: A site suitable for the F/S was found at a part of the Bukit Seharto Forest. However, in comparison with the request, 'Preparation of master plan for forestry development in semi-arid zone in NTT Province', which is described below, the latter has higher priority.

3-2 Outline of development study request for 'Master Plan for Forestry Development in Semi-arid zone in NTT Province'

(1) Project Site

The NTT Province consists of islands such as the Timor Island (western half), Flores Island and Sumba Island. The province has a total area of approximately 4.7 million hectares and a population of 3.53 millions in 1991. The project site is adjacent to Kupang, the provincial capital. The area is called 'Oesau' watershed with several small rivers. Its basin is the source of water for Kupang. The project site has an area of approximately 146,000 hectares.

(2) Natural Environment of Project Site

1) Climate

The climate of NTT province is clearly separated into two parts, the dry season from April to November an the rainy season from December to March. The annual total rainfall of the 'Amarasi' county, a part of the project site, is approximately 1,400mm.

2) Vegetation

Since the dry season is as long as eight months, a kind of savanna forests are distributed in a wide range in the vicinity of the project site and monsoon forests are sporadically seen. In the monsoon forest, trees such as Santalum album, Pterooarpus indious, Eucalyptus alba and Tamarindus indicas are seen.

3) Soil

The majority of the project site is formed by the upheaval of coral reef. Limestones formed by weathered coral are seen everywhere. The distribution of clayey soil is also seen in a wide range.

(3) Social Environment of Project Site

Many villages are distributed along the roads, mostly on the trunk line connecting Kupang and Soe. The residents of the project site include many

transmigrants from Flores, 'Sabu', etc. besides the local people. They are producing corn and other crops for self consumption by shifting cultivation and are raising cattles for their income. They are also collecting firewood in forest land for fuel. There is an area in the project site, in which agro-forestry called the 'Amarasis' system is being practiced. This is a farming method combining 'Ipil-ipil' and annual crops.

3-3 Present Condition of Forestry Development in the Project Site

The Fifth 5-Year Plan aims at creating afforested land of 5,000 hectares a year and 25,000 hectares in five years. Though reforestation operations are performed every year, the past achievements were not satisfactory as shown in Table 6. This fact is attributable to such causes that the growth of seedlings is not satisfactory due to the severe climatic conditions and that the seedlings suffer from damages by the burning of farmers and the grazing of cattles.

The tree species for which reforestation technology is established around the project site include Santalum album, teak, mahogany, Cassia siamea, and Pterocarpus indicus (Indian rosewood). The seedlings of these tree species are produced and planted every year. Furthermore, experimental reforestation of acacias has been attempted though in a small scale.

Table 6. Results of reforestation in NTT Province

(From 1st to 4th 5-year plans) (Ha)

5-year plan	1st (1969-74)	2nd (1974-79)	3rd (1979-84)	4th (1984-89)
Reforested area	444	3,160	7,065	1,725

Source: Hearing at local bureau of Forestry Ministry.

3-4 Outline of the draft terms of reference of the study

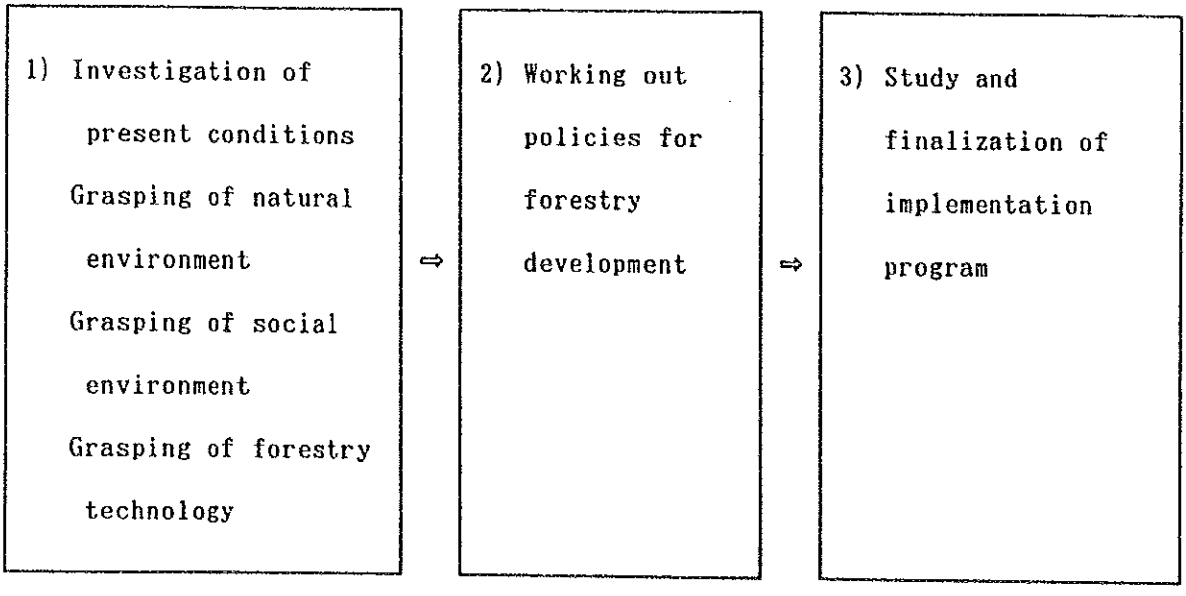
(1) Purpose

To work out a master plan for forestry development aiming at the improvement of living standards of local people and local economy in NTT Province, one of the least developed in Indonesia.

(2) Contents of the terms of reference

It can be said that the project site is an area difficult to implement reforestation operation due to severe natural environments including climate and soil conditions and the prevalent shifting cultivation and grazing of cattles as described previously. Therefore, the development of relevant reforestation techniques will be indispensable for promoting the implementation of the plan.

It is necessary, first of all, to grasp the present conditions of natural environment, social environment and forestry technology. The implementation can only be commenced after the completion of analysis of the present conditions of project site comprehensively, and after preparation of the master plan. The outline of the necessary flow of action is as shown in the following chart.



Specific description of each component of the above chart is as follows:

1) Surveys on Present Conditions

a. Surveys on Natural Environment

With respect to the present conditions of natural environment of the project site, an investigation will be carried out on climate, soil, topography, geology, hydrology, vegetation and ecosystem. The following data will then be prepared:

- Vegetation maps (forest classification map)
- Soil maps
- Topographical and geological maps

b. Survey on Social Environment

As regards the conditions of social environment of the project site, a survey will be conducted on the local economy and actual conditions of living condition to find out the relationship between local people and the foresters. In particular, an effort will be made to grasp the methods of cultivation and livestock raising practiced by the local residents.

c. Survey on Forestry Technology

A survey will be made on the conditions of forestry technology in the vicinity of the project site, and a study made on the possibility of technology development in the future.

2) Working out Policies for Forestry Development

The results of surveys on present conditions will be analyzed and examined, and the policies will be worked out for the future development of forestry in the project site.

3) Study and Finalization of Implementation Plan

The plan to be put into effect in the survey site should be worked out along the policies for forestry development. The followings will require particularly careful examination, as the survey site includes production forests, serving also as the source of water for Kupang and many local people living in the project site:

I. Study on technology development for industrial plantation

II. Study on so called environmental reforestation, and

III. Study on social forestry.

4. Others

The Indonesian side explained to the mission an idea for 'Lumping integrated campus' which intends to transfer the forestry experiment station, forest product experiment station and forestry training school currently located in Bogor, which is under rapid urbanization, to Lumping, and make them into an integrated campus. Lumping locates at midway between Jakarta and Bogor, and intention is to establish the integrated campus to fully meet the increasing demand for research and training. The Ministry of Forestry representatives expressed their view that the Japanese cooperation for the scheme will be very much welcome, adding that the idea will be reviewed farther and will be refined as the scheme is not yet thoroughly finalized.

The mission stated that the scheme is apparently too large in magnitude as far as can be seen from the rough idea at the moment, that the cooperation will be limited to a part even in case JICA could cooperate in the future after due process taken, adding that the attempt itself to create a integrated research and training center seems meaningful.

Appendix

1. Present Conditions of Forestry Development as Grasped by the Mission

1-1 Administrative Organizations

(1) Organization of the Ministry of Forestry

The forestry administration in Indonesia had been performed by one ministry during the period from 1964 to 1967. The forestry administration was changed hand to the Ministry of Agriculture subsequently till 1983. It has been administrated by the Ministry of Forestry since 1984 to date. The seven functions of the Ministry of Forestry are organized by an echelon formation; Ministerial Secretariat, Inspectorate General, four Directorate Generals of Enterprises (Directorate General of Enterprises, Directorate General of Reforestation and Land Rehabilitation, Directorate General of Forest Protection and Nature Conservation and Directorate General of Forest Inventory and Land Use planning) and the Agency for Forestry Research and Development. Under the heads of respective Departments (Chief Secretaries, Directors Generals), Directors, the heads of bureaus, section chiefs, chief clerks and other general staffs are assigned. The total staff of the Ministry of Forestry numbers approximately 2,000. As for local organizations,Regional Forestry Offices (Kanwil Kehutanan) are established in 27 provinces as organizations under direct supervision of the Ministry of Forestry for the planning and implementation of management control. In addition, the provincial Forestry Services (Dinas Kuhutanan) are established in each provincial government under the Ministry of Home Affairs in 24 provinces except for three provinces on Jawa Island for the implementation of actual operation such as the control of felling right and management of national forests. As the national enterprises belonging to theMinistry of Forestry, there are the National Forestry Corporation (Perum Perhutani) in charge of the management of national forests on Jawa Island and the National Forestry Company (P.T. Inhutani I -V) which is undertaking of reforestation.

1-2 General Condition of Forestry Development and Problems

(1) Present Condition of Forests

1) Type of Forests

The climate of Indonesia is tropical. Located close to the equator, there is little seasonal fluctuation in temperature, slightly low around 26℃ in the rainy season (November to March) and 29 ℃ and thereabout in the dry season (April to October), averaging around 28 ℃. There is little regional difference except high-altitude areas.

Consequently, most of the forests excluding alpine zones belong to the category of tropical forests. There is a tendency that the rainy season gets longer in the western region and the dry season becomes longer in the eastern region. According to the amount of annual rainfall, different types of tropical forest emerge as described below:

Namely, the tropical rain forest of high temperature and much rain in the low land forest (distributing in altitude below 1,000m) in Sumatra and Kalimantan, the tropical seasonal forest on Sulawesi featured with and extremely little rainfall in the dry season and with a sharp distinction between the rainy and dry seasons, and the tropical savanna forest on Timul and Maluku islands with severe aridity.

As for the soil, volcanic soil is widely found and the fertility is higher in Jawa, followed by Sulawesi, Sumatra and Kalimantan in descending order.

2) Forest Area

According to the National Forest Land Use Plan (Taga Guna Hutan Kesepakatan : TGHK) decided by the ministries concerned in 1984, the forest are as total 144 million hectares (equivalent to approximately 75% of the entire national land). This, however, does not necessarily mean the actual forest areas. It includes considerably large areas which have been reduced to grassland and waste lands by shifting cultivation, forest fires, and conversion into farmlands as mentioned below.

One estimate gives the area of 109 million hectares with a forest ratio of 56%. The difference of 35 million hectares may represent those reduced to bare lands, grasslands and waste lands of low productivity by shifting cultivation, excessive felling, overgrazing, and forest fires in the past.

3) Decrease of Forest

It is estimated that as much as 1.3 million hectares of forests are disappearing throughout Indonesia every year. A noticeable decrease is seen in the forests in Kalimantan.

The causes of forest decrease are diversified: conceivable causes include the illegal conduct such as illegal felling and shifting cultivation, transformation of forest land into farmland based on the transmigration policy and natural disasters such as forest fires. The areas lost by forest burning and natural forest fire are quite extensive among them. For instance, it is said that approximately 3.6 million hectares of forest area disappeared by a forest fire on kalimantan in 1982 and 1983. The ordinary commercial felling is not counted in the decrease of forest since selective felling operation is adopted. The area lost by commercial felling amounts to approximately 1.3 million annually according to a trial computation using assumptions of the volume in forest felling amounting to 45m^3 /ha, the rate of log produced from a tree 50% and annual log production 30 million cubic meters.

(2) Present Condition of Forestry

1) Felling of Natural Forest

The felling of natural forest is conducted with TPTV technique by the holders of concession (HPH) permitted by the government. In principle, all the forests in Indonesia consist of state-owned forests controlled by the Government. Logging contractors are obligated to buy concession from the

Government (Ministry of Forestry) and do enrichment planting under the remaining trees if required. On such an occasion, the concessioners are granted for concessions from felling to reforestation instead of only felling.

In felling natural forest, trees with the d.b.h. 50cm and over only (60cm in the restricted production forest) are selectively cut within the amount authorized annually. Commercial tree species with the d.b.h in the range from 20 to 49cm are to be left untouched at a rate of over 25/hectare. No felling is allowed for the following 35 years in the same forest. Reforestation is performed according to circumstances and the growth of small diameter tree is awaited.

The land to which the concession was given increased year after year since the adoption of concession system in 1967. As of March 1990, the concession is granted to 574 concessioners for approximately 59 million hectares of production forest and conversion forest, which is about 60% of all production forest and conversion forest. The contract period of a concession lasts 20 years, and the renewal for another 20 years is possible if certain conditions were met.

The production forests have an inventory of 2.7 billion cubic meters which will enable, according to a computation, to maintain the present level of felling (log production in 1989 was approximately 35 million cubic meters) until after 2050.

The plan is so worked out that the quantity of felling manmade forest will exceed the quantity of felling from natural forest in around the year 2,010.

2) Reforestation

a. Category of Reforestation

The artificial reforestation in Indonesia has a long history. It dates back to the reforestation of teakwood in Jawa Island in 1800s. The reforestation is actively promoted nowadays by adopting various methods.

Reforestation under the jurisdiction of the Ministry of Forestry can be broadly classified into regreening, reforestation and industrial plantation

(HTI/timber estate). Besides, there is the reforestation in the course of TPTI implementated by the concession holders (HPH).

It was annouced that the regreening was executed for 5.81 million hectares, the reforestation for 1.22 million hectares and industrial plantation for 1.43 million hectares (of which 69 thousand hectares or thereabout could be truly classified into HTI), totaling 8.46 million hectares by the completion of the Fourth 5-Year Plan (1988). It has been said that the reforestation of 20 million hectares is needed in future due to many failures in the said plan. Of the 20 million hectares, 6 million hectares are to be executed as industrial plantation (HTI) to supply raw materials for industry by private sectors. To describe more in detail;

I. Regreening aims at the restoration of devastated private land.
Since the 'forest' in the classification of land utilization in Indonesia is state-owned, the object of regreening consists of farm land and residential land other than the 'forest'. Since the people are the ones actually planting trees, the government is providing such assistance on social forestry in broad sense such as demonstration reforestation, construction of forest conservation facilities, supply of seedlings and the extension of techniques. The target areas for regreening from 1989 to 1993 amounts to 4.9 million hectares.

II. Reforestation aims at strengthening the functions of forest to conserve soil and foster water source by restoring devastated forest (mainly protection forest) by reforestation operations. With the government, as the principal executing body, operations such as tree planting and natural regeneration management are implemented. Reforestation of a 1.9 million hectares are planned from 1989 to 1993.

Japan's OECF is giving soft-term credit every year since 1989 as part of its sector program loans for the reforestation (support to development policy of priority sectors by using of collateral fund of commodity credits).

The reforestation is done in the protection forests since the purpose of reforestation is strongly inclined to strengthen the functions for conservation of soil and water sources. It is extremely difficult to secure a rate of return commensurating with the credit from the reforestation itself. Therefore, the use of the Sector Program Loans can be said as appropriate in that sense.

Ⅲ. Industrial Plantation aims at creating artificial forests by planting trees in forest with low productivity forest(difficult of natural regeneration with the stock below 20 m³/ha) for timber production. The land selected for the object of industrial plantation is classified as the production forest in land utilization, and the land has to be artificial forest at present or low production forests such as devastated land and the secondary forest.

Private enterprises are the principal executing bodies. However, subsidy is granted from the reforestation fund (described later) for execution by joint ventures with the state-owned forestry company (INHUTANI).

As it has been already described, the concept of industrial plantation has existed since the 1800's. Its development in large scale started from around 1984. The achievement in the Fourth 5-Year Plan was only approximately 72,000 hectares, under the Fifth Plan, however, it expanded to a level of 300,000 hectares a year, amounting to 1.5 million hectares in five years.

b. Reforestation Guarantee Deposit Fund(DJR)

The reforestation compensation money (repayable after the execution of reforestation) at the rate of US$4 per 1m³ had been collected from concessioners since 1980 according to the quantity of timbers cut for the purpose for promoting the restoration of felling sites. The system changed in 1989, and the Reforestation Fund became not refundable. At present, collection is made at the rate of US$10 (US$1 in case of chips) per 1m³. The balance of the fund is said to reach the level of 1.2 trillion Rupiahs (Approximately ¥

86 billion) as of June 1991.

The reforestation fund is to be used for restoration reforestation , industrial plantation and land restoration outside concession areas.
It is said that the fund is also used for the promotion of agroforestry and forest improvement, and to meet the costs of transmigration from protected forests. It is said to be also used as the fund for giving loans to enterprises engaged in the industrial plantation.

c. Forest Industry

The forest industry is contributing to the Indonesian economy through expanding employment and expanding export of non-petroleum products. In 1991, processed timber products such as plywood and sawn wood accounted for 20% of the export of non-petroleum and non-gas products and this was 13% of the total exports.

Ⅰ. Log production

The log production has been at a level of around 25 million m^3 from 1981 to 1987 with small fluctuations. The temporary reduction is considered due to the restriction of log export in 1983 and the total embargo in 1985. The policy to impose embargo on the export of logs was decided under the consultation of the Ministry of Forestry, Ministry of Agriculture and Ministry of Commerce for conserving tropical rain forests and promoting the domestic timber industry,aiming at the increase of added value to the forestry products.

Ⅱ. Plywood

The plywood industry in Indonesia started in 1973. The industry got into full stride after the government promulgated its policy in 1981 not to approve log export for concessioners which do not have plywood factories, and further impetus was given with the promulgation of policy in 1982 to authorize the export by allotting quota for each factory,and ultimately the total embargo of log export in 1985.

The export accounts for approximately 90% of production (7.69 million m^3

1989-90), 27% of which is shipped for Japan (upper half period of 1992). As of March 1990, the number of plywood factories in operation is 114, under construction is 11 and on application is 11.

Ⅲ. Saw milling

The export of sawn wood accounts for approximately 30% of production (10.85 million m^3, 1989-90). As compared with the plywood, the sawn wood is strongly oriented for the domestic market since the growth of the domestic market exceeds that for export, reflecting the expansion of demand for the building boom since 1986.

A high rate of export tax is levied on ordinary sawn wood with low degree of processing with the view to heighten the degree of processing from the viewpoint of increasing employment. At the same time, the tendency has been strengthened recently in the forest industry to place much greater emphasis on the plywood industry having power to create larger employment opportunities.

The integration and merger of medium and small saw mills are now under way.

Ⅳ. Nature Protection

As ten percent of botanical species in the world exist in Indonesia, 1,602 forests are designated as national parks, forest parks, sanctuaries, hunting parks and reserves. These include, for instance, 24 national parks totaling 6.7 million hectares. Measures are taken for the protection of 533 different animal species.

The National Parks include the 'Kulinci Subrato' National Park (central Sumatera, approx. 1.5 million hectares), the largest in Indonesia, the Ujun Koolon National Park (western end of Jawa, approx. 90,000 hectares), habitat of the Jawa rhinoceros, and the Komodo national park (lesser Sunda Islands, approx. 75,000 hectares), habitat of the Komodo dragon. They are playing significant roles for the protection of precious animals and plants.

(3) Problems to be Tackled

1) Felling in Natural Forests

There is an optimistic forecast that the present level of felling can be maintained beyond 2050 with the production forests available for future use estimated to be 36.8 million hectares and the growing stock of available commercial tree species is approximately 2.7 billionm^3. It may be said, on the other hand, that there are not an ample resource, considering the low percentage of utilization in log production (50 to 60%), lower commercial utilization value due to remote felling areas, destruction of forest with the expansion of population and the increase of timber demand accompanying with economic development.

In this connection, the quantity of timber left unused in the forest in 1988 is estimated 23 million m^3, 8 million m^3 out of which is presumed to be usable for sawn wood and plywood. The reduction of such timber in the forest is indispensable for the effective utilization of natural forest resources. The review of concession royalty and specification for log has become a task to tackle on.

Strict operation standards are established for the felling in natural forests, and actions including the suspension and revocation of concessions are taken for those who violate such operation standards. Nevertheless, the illegal felling without obtaining permission apparently amounts to a considerable quantity. Measures are being taken to fight against such practices. However, there proved to have much to be improved due to the shortage of budget and manpower.

2) Reforestation

The quantity planned in the Fifth 5-Year Plan (1989 to 93) for regreening is 4.9 million hectares, reforestation in narrow meaning (tree planting, plus natural regeneration.) 1.9 million hectares, 700,000 hectares of which is for planting, and industrial reforestation 1.5 million hectares. The actual performance in 1991/92 for regreening was 460,000 hectares, reforestation in

narrow meaning(tree planting) 45,000 hectares and industrial reforestation 500,000 hectares respectively.

According to the Ministry of Forestry, 22% of protected forests and nature conservation forests, 39% of production forests and 59% of conversion forest are degraded as of 1989. As for the devastated lands,4.12 million hectares of the state-owned forests and approximately 5.55 million hectares of the private lands outside the forest are required to be restored immediately. Specific description of each category is as follows:

I. Industrial Plantation

The estimated area of industrial plantation amounts to 498,000 hectares by April 1992, which is equivalent to 0.9 to 1 million hectares by the end of the Five Year Plan, leaving the backlog of over 0.5 million hectares. Causes are the shortage of manpower, seeds and seedlings and the suitable land due to theconflict with occupying farmers over lands, etc.

The balance of the reforestation fund is reaching the level of 1.2 trillion Rupiahs (approximately ¥86 billions) as of June 1991 as mentioned already. What had been utilized by September of the same year is a said to be only 6% of the balance because the deliberation for the outlay of fund is strict and much time has been spent for the procedure.

A trial calculation by assuming the cost of industrial plantation to be 2 million Rupiahs/ha and the subsidy rate from the fund to be 46.5% indicates that approximately 1.3 million hectares of industrial plantation will be possible with the fund of 1.2 trillion Rupiahs.

The techniques such as the control of pest and disease, pruning and thinning is not firmly established yet though the reforestation techniques itself is more or less established with successful planting of fast growing tree species in industrial plantation. An earliest establishment of above mentioned techniques will be required for the industrial plantation in future since the reforestation area will become larger. It will be indispensable,at

the same time, to secure seeds and seedlings with excellent hereditary quality with each variety, and good provenance for reforestation in order to produce high quality timbers, therefore the strengthening of tree improvement is necessary for this purpose.

II. Reforestation and Regreening

Although the reforestation has been executed by the allocation of the presidential budget and the sector program loan from the OECF, it delayed much as compared with the progress of industrial plantation. The Reforestation Fund is allocated only for the tending from the fourth year after reforestation.

Regreening has been executed by allocating the presidential budget, and the Reforestation Fund has been used for the supply of seeds and technical guidance for planting Albizzia falcataria.

The degradation of watershed areas are advancing due to excessive farming and grazing on Jawa Island with dense population and in the eastern region with aridity. Proper watershed management and social forestry approach are required for recovering these degraded lands.

3) Timber Industry

Since the embargo of log export in 1985, Indonesia rapidly increased the export of plywood and sawn wood. It appears the policy to enhance the degree of local processing and increase added value has succeeded. However, the timber utilization and processing technology is yet to be improved and many timbers are left unused in the forest after felling and the percentage of utilization in saw milling is as low as 40 to 50%.

Indonesia committed herself to achieve sustainable management of all forests by 2000, to the international community. Considering the development of timber industry based on such commitment, it is urgently needed to enhance added value, improve productivity, improve utilization ratio and fully utilize unused tree resources.

4) Nature Protection

Indonesia has 6.7 million hectares of national parks, world's treasure-house for the precious tropical animals and plants. However, shifting cultivations by the people who have been making living since olden times,are gradually encroaching the parks.

The problems may be the inadequacy of basic control system of the national parks and the unconsciousness of residents on the conservation of tropical forests. Since the population increase is foreseen for the future as well, it will be of a vital importance to take concrete measures not to worsen the situation.

In case of the "Gunung Leusar' National Park visited by some member of the team, for instance, the policy seems to be directed to transmigrate residents to the outside of the Park and plant trees on the land evacuated. the implementation of tree planting with the participation of residents in the vicinity will create employment opportunities and at the same time a great effect can be expected for the spread and enlightenment on the conservation of tropical forest.

It was worthwhile,to consider the possibility of grant aid for future cooperation for the tree planting in national parks such as this park where no practical economic merit is expected and, therefore, is difficult to introduce credit .

2-3 More Details on Present Conditions of Forestry Sector Development and Problems Involved

(1) Industrial Plantation

1) Present Condition of Implementation of Industrial Plantation

Reforestation development goals had been set for respective 5-Year Plans since the First 5-Year Development Plan. In the Fifth 5-Year Development Plan (1989/90 to 1993/94) now under way, the provision of adequate employment opportunities to the rapidly increasing working population is mentioned as the foremost issue. The estimated annual average increase of labor force during the period of the plan amounts to 2.4 millions, and a net economic growth rate of 5% is said to be required to employ and absorb such labor force. The economic growth is to be achieved on the basis of increasing export of non-petroleum/gas products and the general tax revenue.

Much importance is attached to the production of timber as a non-petroleum/gas products and the increase of sawn wood and plywood by about 19% and 38% respectively is planned as compared with the fourth plan period. The increase of timber production through proper control of natural forests as well as the promotion of the industrial plantation for active creation of forest resources are indispensable to meet the demand fully for raw materials of the rapidly increasing timber related industries. An ambitious plan was worked out for the Fifth 5-Year Development Plan as compared with the Fourth Development Plan, as seen in Table. 1 .In the field of industrial reforestation, in particular, the area is planned to be doubled as against theactual performance in the previous plan.

Table 1 - Actual performance and plan for reforestation

Unit: ha

Quantity / Type of reforestation	Actual performance of 4th plan	5th plan Total	(1989)	(1993)
(Reforestation)				
non HTI	...	500,000	100,000	100,000
Supplementary Planting	69,160	580,000	116,880	116,000
Artificial reforestation	1,804,540	250,000	50,000	50,000
Natural regeneration	229,700	500,000	100,880	100,000
(Regreening)	1,464,900			
Creation of model forest	.../4,470	25/2,500	5/500	5/500
Social forestry	243,810	150,000	30,000	34,000
Provision of seedlings	...	2,080,000	500,000	500,000
(Industrial reforestation,HTI)	12,270	1,500,000	100,000	408,900

According to the current investigation, the achievement in the four year period from 1989 to 1992 as against 1.5 million hectares of planned industrial reforestation in the fifth plan according to preliminary operational data, though a period of one more year is still left, is 542,445 hectares as shown

in Table 2. There exist several figures for actual achievement but in any event, the achievement ratio fell short even of the half of the planned quantity, so it may negatively affect the achievement of the Fifth Development Plan as a whole. As the reasons for failing to achieve the plan, the shortage of labor, shortageof seeds as well as seedings and the shortage of suitable land due to the conflict over land with occupying farmers, etc. are quoted often as earlier described.

Reviewing by provinces, overwhelmingly high achievement ratios are held by the three provinces in Jawa Island, which have been developed and reforested mainly teakwood from earlier days. The state-owned forestry corporation, Perhutani, reforested approximately 250,000 hectares of teakwood in the past four years through the three forest management bureaus and local forestry offices in Jawa island.

Other provinces with high achievement in reforestation beside them are three provinces of South and North Sumatra and Riau on Sumatra island and the two provinces of East and South Kalimantan. In constructing paper and pulp factories in Indonesia, the required raw materials are to be procured by themselves in principle. Therefore, industrial reforestation promoted by paper and pulp industry is often found in provinces within the range of collecting raw materials for them. For example, the majority of 83,000 hectares of reforestation in South Sumatra Province is attributable to the Barito Pacific Group (BPG), which is the largest lumber enterprise group in Indonesia. With a factory under construction to manufacture one million tons of pulp, half a million tons of paper and 250,000 tons of rayon a year, a reforestation project is now pushed forward to cover an area of 300,000 hectares in five years. Many reforestation projects are promoted by the International Timber Company in East Kalimantan and by the Indo Rayon Corporation in North Sumatra.

Table 3 - Progress of industrial reforestation by provinces

(Achievement by August 1992)

Quality / Province	Achievement of industrial forestation (ha)				
	1989/1990	1990/1991	1991/1992	1992/1993	Total
Aceh	3,648.61	2,170.60	5,330.70	1,205.30	12,355.21
North Sumatra	11,320.00	13,563.50	8,058.52	1,409.12	34,351.14
Jambi	1,000.00	2,130.00	1,529.00	4,932.95	9,151.00
Riau	8,300.48	16,369.98	19,164.82	3,603.12	46,438.40
West Sumatra	—	0.00	619.50	160.00	779.50
Bengkulu	—	0.00	0.00	0.00	0.00
South Sumatra	500.00	24,342.76	56,967.29	1,297.50	83,107.55
Lampung	475.00	1,806.71	5,641.82	822.11	8,745.64
South Kalimantan	7,241.00	4,432.52	9,897.13	1,556.07	23,273.32
East Kalimantan	8,775.79	6,324.77	28,650.15	6,865.53	50,616.24
West Kalimantan	566.00	42.50	1,172.85	1,432.51	2,713.86
Central Kalimantan	—	0.00	0.00	0.00	0.00
South Sulawesi	1,146.00	1,521.00	667.00	210.00	3,544.00
Central Sulawesi	—	0.00	10.00	640.00	650.00
Southeast Sulawesi	1,200.00	468.30	1,449.22	3,965.48	7,083.00
Maluku	—	883.08	2,286.37	618.67	3,788.12

West Nusa Tenggara	360.00	322.50	1,460.00	317.50	2,460.00
East Nusa Tenggara	1,150.00	2,430.00	4,058.47	1,377.00	9,015.47
Irian Jaya	60.00	0.00	0.00	0.00	60.00
East Timor	98.00	239.20	1,295.80	0.00	1,633.00
West Jawa	28,300.00	21,470.00	24,535.70	24,955.57	99,261.27
East Jawa	23,250.00	17,280.00	10,671.90	13,032.85	64,234.75
Yogyakarta	19,232.00	27,188.00	16,271.30	16,492.20	79,183.50
Bali	—	—	—	—	0.00

Major tree species planted in each province during the period of the Fifth Plan are as shown in Table 3. Generally, Acacia, Eucalyptus and Albizzia are used, which are easy to raise seedlings and are fast in the initial growth.

Table 5 - Major tree species used for reforestation

Province	Major tree species used for reforestation
Aceh	Pinus merkusii
North Sumatra	Anthocephalus chinensis, Albizzia falcataria, Peronema canescens, Hevea spp, Eucalyptus spp, Acacia spp.
Jambi	Dyera constulata, Gonystylas bancanus, Hevea spp., Paraserianthes falcataria, Peronema canescens, Acacia mangium, Eucalyptus spp:
Riau	Calamus spp., Hevea spp., Peronema canescens, Acacia mangium, Eucalyptus spp., Albizzia falcataria
West Sumatra	Hevea spp., Aleurites moleccana, Swietenia macrophylla,

	Peronema canescens
Benkul	Hevea spp., Albizzia falcataria, Acacia mangium
South Sumatra	Paraserianthes falcataria, Acacia mangium, Pinus merkussi., Eucalyptus spp., Sterculia oblongata, Hevea spp., Pernonema canescens
Lampung	Pernonema canescens, Paraserianthes falcataria, Acacia mangium
South Kalimantan	Paraserianthes falcataria, Acacia mangium, Ochroma bicolor, Eucalyptus spp., Anthocephalus chimensis
East Kalimantan	Eucalyptus spp., Pinus merkusii, Paraserianthes falcataria, Hevea spp, Cocos nucifera, Shorea spp, Palaquim spp, Bombax malabaricum, Gmelina arborea
West Kalimantan	Hevea spp., Acacia mangium, Aibizzia falcataria, Aleurites moluccana, Eucalyptus spp., Gmelina arborea
Central Kalimantan	Albizzia falcataria, Peronema canescens, Hevea spp.,
South Sulawesi	Eucalyptus spp., Areurites moluccana, Thebroma cacao, Durio graveolens, Albizzia falcataria, Palaquim spp.
Central Sulawesi	Albizzia falcataria, Hevea spp., Peronema canescens
Southeast Sulawesi	Tectona grandis
Maluku	Acacia mangium, Eucalyptus spp., Albizzia falcataria, Ochroma bicolor, Swietenia macrophylla, Gmelina arborea, Paraserianthe falcataria
West Nusa Tenggara	Paraserianthe falcataria, Eucalyptus spp, Cassia siamea
East Nusa Tengara	Aleurites moluccana, Swietenia maclyophylla, Gmelina arborea, Paraserianthes falcataria
Central Jawa	Tectona grandis

East Jawa	Tectona grandis
Bali	Manilkara kauki

2) Industrial Reforestation and Transmigration Settlement Policy

One of the purposes for the industrial reforestation is to increase income of local people through the provision of employment opportunities. Emphasis has been placed recently on the policy to secure employment for transmigrants and settle migratory farmers by industrial reforestation. For example, industrial reforestation (HTI -Trans) of 610,000 hectares is allocated to 100 plywood companies in expectation of transmigration or settlement of migratory farmers totaling approximately 60,000 families assuming that a family can be allocated ten hectares. BPG mentioned before accepted 1,000families of farmers for its industrial reforestation. The farmers areallowed to cultivate one hectare of paddy field per family in the area while being engaged in the reforestation. This can be called a setup of forestry oriented social policy consideration which includes both policies forindustrial reforestation and transmigration settlement. Much potentiality can be expected from this policy, if carefully managed.

3) Tasks to be tackled in relation to the Industrial Reforestation

a. Countermeasures against disadvantages of large-area single species artificial forests

The tree species used for industrial reforestation consist of several fast-growing species of short felling period except the teakwood on Jawa Island and a few species of long felling period. It is very dangerous since they are vulnerable to the damages by diseases and insects, forest fire and climate to create artificial forests on a vast area ranging from tens of thousands to hundreds of thousands hectares using limited number of species. There have been examples of damages caused by large-area reforestation by a few limited species in many other countries and regions. Since Indonesia has started recently to establish such large-area reforestation, emphasis should be placed on the research and technical development with this regards.

b. Paying attention to public opinion on nature protection

Since the industrial reforestation is limited to production forests, low-productivity forests and degraded lands, there will be little problem in relation to environment conservation when reforestating is done in an area practically devoid of trees like the grassland of alang-alang. However, in case of establishing a plantation by clear cutting for land preparation in a forest having an volume of around 20/m³, the land is turned bare for a certain period even if it is evident that a forest better than the present one will be created in due course. There may exist, in this case, a public opinion denouncing that the ecosystem is disturbed and the so-called forest destruction is done immediately after seeing such conditions. It will be necessary to obtain better understanding of public opinion and take these points fully into consideration in selecting suitable sites for industrial reforestation.

c. Restoration of site after felling in natural forests

The principle with respect to the site after felling natural forest is that

the site must be restored by the concessioner who fell the natural forest in his own responsibility, using TPTI. The validity of concession is 20 years,so a lot of concession permitted from late 1960s to early 1970s will shortly expire although extension of concession is authorized when continuous operation is desired. It is said, however, that the cases of such extension are rare and the concessioners are decreasing in reality. As TPTI is the selective felling with the cycle year 35 years, if a concessioner fell down a forest at the 20th year, and failed to extend his concession, the implementation of TPTI would become imperfect and the standing stock will not recover as planned. It is said that the Ministry of Forestry in such a case put the state-owned forestry corporation, Inhutani, in charge of restoring the forest through industrial reforestation. Such method dealing with the aftermath of TPTI should be carefully handled so that it will not harm the confidence on continued management of natural forest by TPTI.

(2) Social Forestry

The Ministry of Forestry listed up the following eight fields as priority issues starting from the Fourth 5-Year Plan (1984 to 1988) and is pushing them forward with particular emphasis on the participation of local people. Such policy is based on the recognition that their implementation will be difficult without the understanding and participation of local people.

1) Reforestation
2) Regreening
3) Control of shifting cultivation
4) Social forestry
5) Soil conservation
6) Timber estates
7) Extensions
8) Forest farming (Private and community forestry)

Following four items are listed as the objectives of social forestry on the above list:

1) To enhance the capacity of forest land

2) To improve the income of people in vicinity of forests and their social welfare

3) To let the local community have the sense of responsibility for protection of forest resources

4) To protect forest resources and all functions of forest.

It is stated also that the distinction of implementation of social forestry from other operations would be difficult, which may indicate the fact that narrow definition of the word of 'social forestry' is adopted, although the actual operations for social forestry include the sericulture and the introduction of forestry byproducts, such as the bee keeping and cultivation of rattan.

The Ministry of Forestry has prepared two handbooks titled the 'A guideline for social forestry program' and 'Pattern of social forestry development', which are designed for field workers. However, the mission has the impression that they are still not frequently used in the field level.

Forest farming in its present form is a program for local people to grow fast-growing tree species in their private lands. It is apparently practiced in regions with demand from nearby pulp factories. Its actual examples were observed in North Sumatra and West Jawa. In the former, the Indo Rayon Company, owning a pulp factory, encourages the residents on Samosir Island in the Lake Toba to plant eucalyptus and buys them out. At Cirawamekar in the outskirt of Bandung, agro-forestry has been effectively promoted by the combination of regeneration by sprouting of albizzia for timber, pulp, firewood, etc., combined with cassaba cultivation under the guidance of the Forest Conservation Center of the Ministry of Forestry.

Regreening and soil conservation are operations intended for non-forest land (mainly farmland in watershed zones). Social forestry is regarded as an important component in these fields as a means of planting trees in private lands.

The Ministry of Forestry is eager to employ social forestry technique for the control of shifting cultivation. Since the major theme in this field is how to convert the cultivation system into a settled farming, giving thought to the integration with agriculture is very important.

The responsibility for social forestry as mentioned above is spread over a various departments in the Directorate General of Reforestation of the Ministry of Forestry, and its actual implementation is promoted by the forest administration bureaus of each province, forestry services of provincial governments, forest conservation centers, and even by forestry corporation and enterprises possessing concessions. It, therefore, appears there is no single department or bureau controlling social forestry in the central and local governments. Roughly speaking, the policy aspects in each province are covered by the forestry administration bureaus and the watershed management plans (including social forestry programs) worked out and implemented by the Forest Conservation Centers (BRLKT and its sub-center, sub-BRLKT). On outer islands, the forestry services of each provincial government are occasionally involved in the implementation of operations by assigning their staff for dissemination.

Reforestation and timber estates are intended to be done on the areas classified as such forest land as protected forests and production forest respectively. In these categories of operations, social forestry approach is also considered as a means to deal with local people. The Perum Perhutani (forestry corporation) on Jawa Island, and PT Inhutani and companies with concessions in felling and reforestation on outer islands assume the responsibility to deal with local people living in the production forest areas.

The first important thing on policy level may be that the social forestry is to be fully grasped as a generalized concept. Social forestry should go beyond the confines as a technique of watershed management but full recognition of necessity to improve the welfare of local people and improve the difference in

economy and income by regions should be accomplished.

Secondly, its complexity should be sorted out as an organizational problem. In its present form, social forestry operations are allocated to each bureau, making it difficult to understand the boundary of each operation.

Thirdly, strengthening staff engaged in extension in each region is necessary. The staff engaged in extension of forestry are far smaller than those for agriculture. There may, in actuality, little distinction between the two when seen from the side of farmers. It is hoped, therefore, the shortage will be covered through the cooperation between ministries concerned for example, to give technical training on agro-forestry to staffs engaged in dissemination of agriculture.

With respect to agro-forestry as an effective means for the promotion of social forestry, there are numerous agro-forestry systems in Indonesia, which are traditional to each locality or have been introduced in recent years. A considerable amount of study has already been made on them. There are also successful cases of the reforestation of fast growing tree species by people. Therefore, technical problems which may be encountered in the implementation of social forestry will not be very difficult to solve. It will suffice to consider which kind of system is to be used for respective region. The most problematic in this regard will be the incentive and motivation. There are many tenant farmers in Indonesia, especially in heavily populated regions, so there is the possibility that the right and benefit of harvest may not be guaranteed in case of planting trees instead of crops harvested annually. Furthermore, small scale farmers, in particular, may show negative attitude for the introduction of new system unless its advantage is proved in a visible form, different from the present farming method. There were seemingly many cases wherein the farmers went back to the traditional systems just as the support from the Ministry of Forestry was suspended though it seemed successful while the support continued, which, though could not be actually witnessed in the current investigation.

Another point requiring attention in the implementation of social forestry is the presence of transmigrants. In the transmigration, the forest lands are cleared for farmland in many cases. Since the productivity of such soil is not always high, problems occur, such as the intrusion of transmigrants into forest land and the spread of fire to forest land due to the practice of shifting cultivation. Besides the transmigration based on the government policy, there are voluntary transmigrants from Sulawesi and other islands to scarcely populated regions like the East Kalimantan. In many cases, these transmigrants have no cultivation techniques well-adapted to the environment of new land so that they could give much greater impact to forests than the traditional local farmers. What is needed to protect the forests is the technology for continuous farming suited for the region,in addition to systems and counter measure against forest fire. The solution of problem may require integrated approach besides forestry approach.

The transmigration policy aiming at the promotion of forestry is seen in recent years. Such program should be implemented carefully taking due consideration of social forestry factor.

The emphasis has been placed on the reforestation ,while social forestry approach has been taken as a technique to achieve the purposes. It will be important to study carefully the needs of farmers first, and develop and disseminate the technology thereof. In many cases, the interests of people and the government can agree each other in the end. For example,the retention of fertility of farmland by reforestation will result in soil conservation and sound watershed management, and improvement of living environment and educational level will result.

Finally, if appropriate technology practicable by farmers were developed and introduced, there must be demand or distribution mechanism in the region for fast-growing trees raised by farmers. So the economic feasibility should also be taken into account along with the technical feasibility. Therefore, it often becomes important to construct infrastructure and open up the market

for agricultural products, forest products and their processed goods prior to the introduction of social forestry techniques.

2. Inspection report of Gunung Leuser National Park

1) Outline of Gunung Leuser National Park

This national park, designated as the first national park in Indonesia in 1974, has a total area of approximately 900,000 hectares lying astride Aceh Special Province and North Sumatra Province. In the park, several 3,000m-high mountains exist with the Gunung Leuser (altitude approximately 3,400m) at their center. The mountains are covered with tropical rain forests consisting mostly of trees of dipterocarpaceae.

Precious animals such as tigers, elephants, rhinoceros, orangutans and gibbons live in the Park, and rare plants like rafflesiaceae are distributed. The flora and fauna are richly diversified, and their species are very abundant.

The forests in the park are conserved in a very good condition since they have been protected as felling is prohibited and the entry of general tourists has been strictly limited.

Notwithstanding the above, some local people have been living in this area from old time, approximately 2,100 households are located in the park at present and utilizing approximately 7,000 hectares of state-owned land for their living.

The government has a plan to transmigrate these dwellers to the outside of the area and plant trees on the places after they are evacuated.

2) Possibility of Cooperation by JICA

The restoration and rehabilitation inside the national park, aiming at the protection of flora and fauna and to retain natural scenery will not produce much direct economic benefit. Therefore, cooperation for these activities may

require new form of cooperation like, for instance, grant aid.

Unlike the usual case of supply of machines and facilities, being carried out under the existing grant aid scheme, final fruit of this kind of cooperation would be the reforested land. In this sense, existence of a guarantee of technical backstopping to assure the success of reforestation is essential but there are still some doubts exist especially for planting local tree species. Besides, some difficulty may occur in relocating the people outside the National Park smoothly. It may, therefore, be desirable for this case to study farther carefully the best plan for maintaining of improving the Park rather than starting immediate action, although the concept of grant aid reforestation needs to be pursued in general terms as earlier mentioned in this report.

The implementation of the study of the area in the future will be also important for obtaining the basic knowledge for cooperation in National Park Management as JICA has no experience so far in this field in Indonesia.

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(9/20-10/01)

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