

**BASIC DESIGN STUDY REPORT  
ON  
THE PROJECT  
FOR  
REHABILITATION OF THE DEGRADED  
NATIONAL PARKS  
BY FOREST FIRE  
IN  
THE REPUBLIC OF INDONESIA**

**MARCH, 2000**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
JAPAN FOREST TECHNICAL ASSOCIATION**

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## **PREFACE**

In response to a request from the Government of the Republic of Indonesia, the Government of Japan decided to conduct a basic design study on the Project for Rehabilitation of Degraded National Parks by Forest Fire in the Republic of Indonesia and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent Indonesia a study team from 4th August to 25th September, 1999.

This team held discussions with the officials concerned of the Government of Indonesia, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then a mission was sent to Indonesia from 6th February to 12th February, 2000 in order to discuss a draft basic design, and as this result, the present report was finalized.

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

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the teams.

March, 2000

Kimio Fujita  
President

Japan International Cooperation Agency

March, 2000

## LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for Rehabilitation of Degraded National Parks in the Republic of Indonesia.

This study was conducted by the Japan Forest Technical Association (JAFTA), under a contract to JICA, during the period from 19th July, 1999 to 27th March, 2000.

In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Indonesia and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

Yasuyuki Suzuki

Chief Consultant,

Basic Design Study Team on the Project for  
Rehabilitation of the Degraded National Parks by  
Forest Fire in the Republic of Indonesia

Japan Forest Technical Association





Fig. 1 Project Sites in Indonesia





Fig. 2 Location of Project Site (East Kalimantan Province)





Fig. 3 Location of Project Site (Lampung Province)



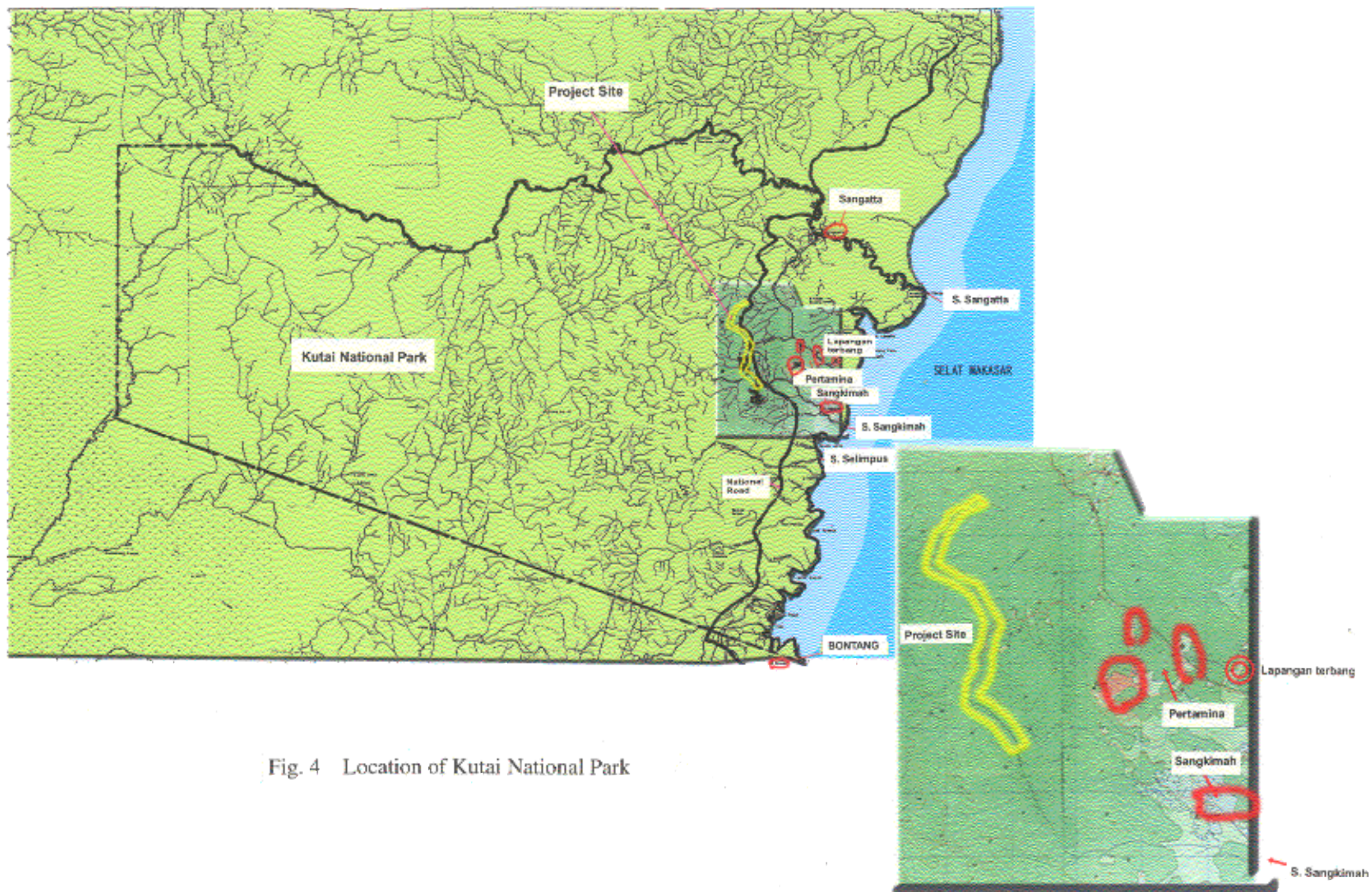


Fig. 4 Location of Kutai National Park



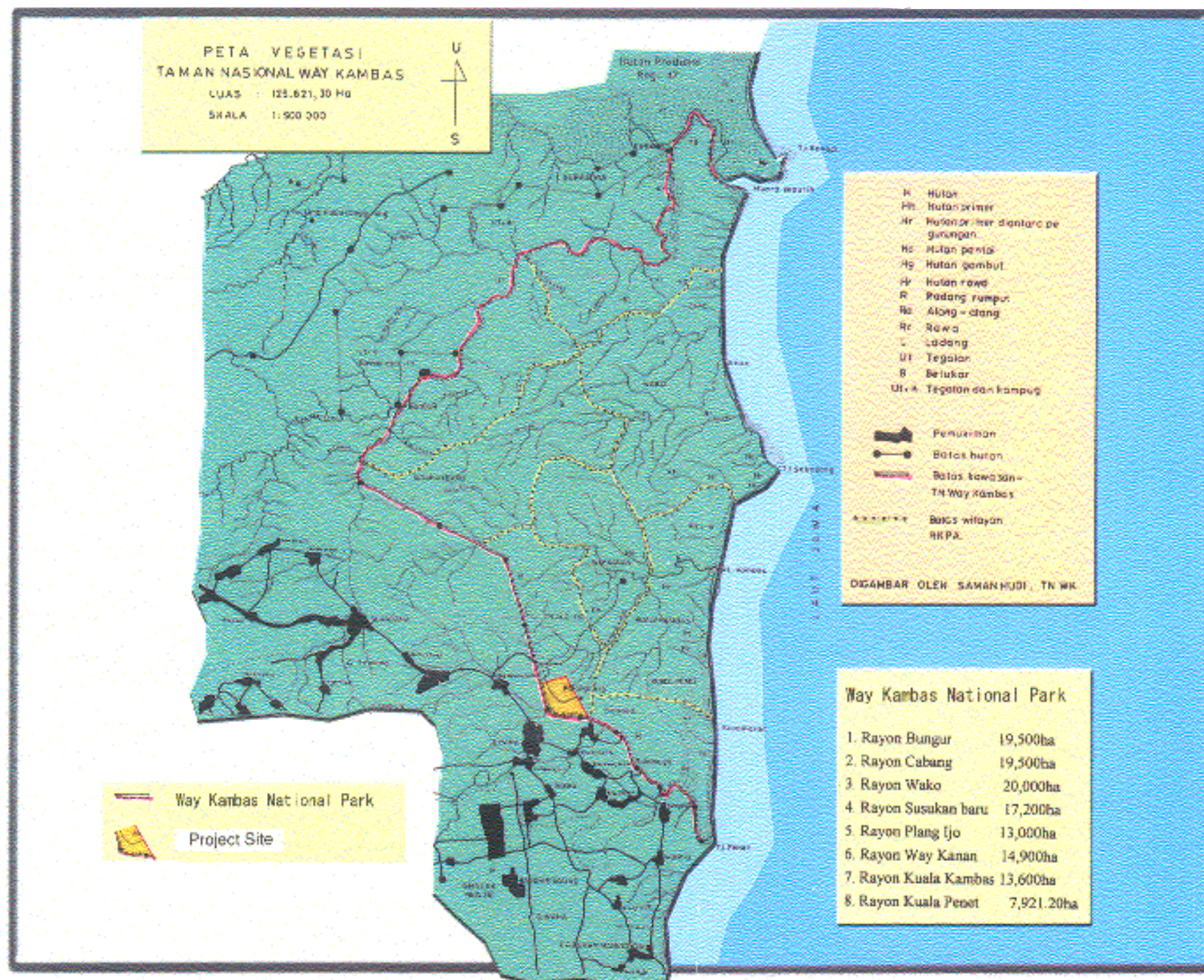


Fig. 5 Location of Way Kambas National Park

## SUMMARY

In the Republic of Indonesia (hereinafter referred to as “Indonesia”), large-scale fires occur during years of extraordinary drought, sweeping across forests and farmland, etc. and also causing smoke and haze damage to not only areas around burned areas but also neighboring countries as well. In addition, the loss of forests due to fire has serious impacts on precious flora and fauna. The severity of these forest fires has been reported worldwide and has attracted much attention from the international community from the viewpoint of not only regional damage but also global implications in terms of conservation of the natural environment and global warming, etc.

The Government of Japan has sent an emergency aid team twice in 1997 to Indonesia to provide assistance for forest fire control activities, health care and environmental measurement, etc. while also providing fire-fighting equipment, dust masks and other items. Moreover, forest fire information has been regularly gathered and exchanged through the Forest Fire Prevention Management Project which commenced in 1996 and other cooperation projects in progress and the International Cross-Sectoral Forum of Forest Fire Management in Southeast Asia was jointly held by the Japan International Cooperation Agency (JICA), the International Tropical Timber Organization (ITTO) and National Development Planning Agency (BAPPENAS) in December, 1998. This forum called for the urgent implementation of various measures for national parks, including the rehabilitation of forests lost due to fire to protect the rare ecosystem, the urgent development of a fire-fighting system and a strong appeal to general visitors to be aware of the importance of fire prevention.

In regard to the rehabilitation of national parks, the National Park Management Plan (25 year plan from 1994 to 2019) formulated by the Directorate General of Nature Protection and Conservation of the Ministry of Forestry and Estate Crops in 1994 spells out the necessity for the implementation of forest fire prevention and control measures, including the creation of firebreaks. While forest rehabilitation using only indigenous species is required to conserve the primeval ecosystem at national parks, technical guidelines for such work have not yet been established because of the technical difficulty of dealing with these species, making the implementation of active rehabilitation work less likely. Under these circumstances, the Government of Indonesia made a request for grant aid for forest rehabilitation of degraded sites by forest fire in both the Kutai National Park in East Kalimantan Province on Kalimantan Island and the Way Kambas National Park in Lampung Province on Sumatera Island to the Government of Japan which had conducted a series of ODA projects in the forestry sector in Indonesia. The necessity to provide the requested cooperation was confirmed in the report for JICA’s project formulation study regarding forest fire control measures which was conducted in September and October, 1998.



In response to this request, the Government of Japan decided to conduct the Basic Design Study and JICA sent the Basic Design Study Team to Indonesia for 53 days from 4th August to 25th September, 1999. The Study Team conducted a field survey and, upon its return to Japan, analysed the field survey findings and compiled the basic design, equipment plan and maintenance plan, etc. for the required planting and facilities. The Study Team to explain the contents of the Basic Design Outline was then sent to Indonesia for seven days from 6th February to 12th February, 2000.

The Project aims at contributing to the promotion of forest rehabilitation of seriously degraded national parks by forest fire by means of conducting model reforestation using indigenous species in the national parks. It also aims at contributing to the strengthening of the national park management system by means of developing a forest fire control system. The Project has been formulated based on the following principles.

- (1) Subject sites : sites with good access from the relevant National Park Office and a good prospect of providing a demonstration effect for the public
- (2) Planting species : combination of several species using only indigenous species
- (3) Facilities : minimum facilities required for forest rehabilitation among the requested facilities to be constructed with nurseries and other facilities being constructed as temporary facilities
- (4) Equipment procurement : minimum equipment to be procured, taking the purpose of use, frequency of use and ease of maintenance into consideration

Examination of the actual conditions of the project sites and other relevant matters based on the above principles has found that the following contents of cooperation will be the most appropriate in contrast to the requested contents.



### Comparison Between Original Request and Proposed Project Contents

Original Request	Proposed Project Contents	Reason for Modification
Subject sites and area: Kutai National Park (400 ha); Way Kambas National Park (360ha)	Kutai National Park (400ha); Way Kambas National Park (360ha)	As originally requested
Planting of indigenous species	Planting of indigenous species	As originally requested
Construction of nurseries to produce required planting stock	Construction of temporary nurseries to produce planting stock to be used during project period	The nurseries will be temporary as planting is not part of the regular work of the National Park Offices.
Construction of reservoirs and dams for water storage	Construction of reservoirs	The reservoirs will be large enough to store the required amount of water.
Construction of firebreaks and patrolling roads	Construction of firebreak tree belts instead of firebreaks and patrolling roads	Patrolling roads of the necessary scale will be constructed. Firebreak tree belts will be created instead of firebreaks which will require constant maintenance work, including weeding.
Construction of reforestation-related facilities	Construction of temporary facilities to be used during the project period	These facilities will be temporary as planting is not part of the regular work of the National Park Offices.
Construction of facilities to protect project sites	Construction of temporary protective fencing for nurseries; construction of a wild elephant incursion prevention ditch (at Way Kambas National Park)	The protective fencing will be temporary in view of the temporary nature of the nurseries.
Provision of equipment, fire-fighting facilities and initial fire-fighting equipment required for rehabilitative reforestation	Provision of necessary fire-fighting facilities and initial fire-fighting equipment	Equipment for rehabilitative reforestation will not be provided as their use in the post-project period is uncertain.
Provision of vehicles required for rehabilitative reforestation	Vehicles for rehabilitative reforestation will not be provided.	There is no specific rehabilitative reforestation plan after the completion of the Project.

Based on the above cooperation principles, the following project components have been decided.

### Major Components of the Project

Components/Contents		Kutai National Park	Way Kambas National Park
Location		Sangata District, East Kalimantan Province	Way Jepara District, Lampung Province
Area		400ha	360ha
Planting Species (Indigenous Species)		Meranti, Kapur, Ulin, Beringin, Sungkai, Tebe Hitam, Ketapang, Jambu-jambuan, Sempur and others	Meranti, Sungkai, Sempur, Gelam, Rengas, Bungur, Puspa and others
Planting Method		Under-planting; nest planting (group planting); line planting; belt planting	As left
Facilities	Reservoir (with Intake Pump)	1	1
	Patrolling Roads	Footpath: 2m wide = 21.6km	Vehicle road: 10m wide = 3km 5m wide = 1.4km
	Fire Look-Outs	3	2
	Fire Cisterns	5	5
	Wild Elephant Incursion Prevention Ditches	none	5,130m in length
Temporary Structures	<ul style="list-style-type: none"> <li>• Nursery</li> <li>- Nursing Bed Area</li> <li>- Area of Premises</li> <li>• Protection Facilities (barbed wire fencing)</li> </ul>	Annual production volume of planting stock: 400,000 2,760m <sup>2</sup> 8,117m <sup>2</sup> 408m	Annual production volume of planting stock: 400,000 2,760m <sup>2</sup> 8,757m <sup>2</sup> 417m
Equipment Provided	<ul style="list-style-type: none"> <li>• Motorcycles</li> <li>• Hose Transporters</li> <li>• Water Tank Lorries</li> <li>• Portable Pumps</li> <li>• Discharge Hoses (20m)</li> <li>• Supply Hoses (6m)</li> <li>• Discharge Nozzles</li> <li>• Station-Type Radio Equipment</li> <li>• Vehicle Mounted-Type Radio Equipment</li> <li>• Portable Radio Equipment</li> <li>• Jet Shooters</li> </ul>	3 1 1 3 50 reels 2 2 1 2 6 30	3 1 1 3 50 reels 2 2 1 2 5 30

While the planting species in national parks are restricted to indigenous species, it is often difficult to obtain the necessary planting stock of these species. The planned planting species under the Project, therefore, include those indigenous species which are naturally distributed in national parks in addition to those listed earlier. Unlike ordinary uniform reforestation over a large area, four different

planting methods, i.e. under-planting, nest planting, line planting and belt planting, will be employed in correspondence with the actual site situation using a relatively small area as the planting unit area. As the planting stock in question are not generally produced, it is impossible to obtain them from outside sources. The required planting stock, including nursed seedlings originally obtained from nearby natural forests, will instead be produced and supplied by purpose-built nurseries under the Project. As reforestation is not part of the regular business of the National Park Offices, the nurseries will be built as temporary facilities to produce some 400,000 planting stock a year. In all, the facilities to be provided under the Project will be reservoirs to supply water to the temporary nurseries and water cisterns for initial fire-fighting, roads required for the patrolling of the project sites, fire look-outs for the early detection of forest fire and fire cisterns to constantly store fire water, etc. In the case of the Way Kambas National park, many wild elephants inhabiting the park may damage the planted sites. A ditch to prevent their invasion will be constructed along the perimeter of the project site. Meanwhile, the equipment to be provided under the Project will include vehicles, fire pumps and radio equipment, etc., all of which are required for initial fire-fighting.

If the Project is implemented under the grant aid scheme of the Government of Japan, it is estimated that approximately 40 months will be required for its completion, including the time required to prepare the detailed design. The total project cost borne by the Government of Indonesia is estimated to be ¥8.3 million (Kutai National Park: ¥4.7 million, Way Kambas National Park: ¥3.6 million).

The protection of the planted sites from forest fire can be provided by the forest patrol system as such protection is part of the regular business of the National Park Offices. As the project sites have been damaged by forest fire in the past, they are extremely prone to the occurrence of new forest fires. Appropriate measures to protect these rehabilitated sites under the Project from forest fire should, therefore, be formulated and continuously implemented to ensure the proper management of these sites.

The following measures are envisaged under the Project to protect the rehabilitated sites.

#### (1) Forest Patrols and Fire Watch

##### 1) Forest Patrols

As such initial fire-fighting measures as early detection and initial fire-fighting are important to control forest fires, the intensive patrolling of the project sites will be conducted by staff members (mainly forest rangers) of the National Park Office during the hazardous season for forest fires (i.e. dry season).



## 2) Fire Watching from Fire Look-Outs

During the hazardous season for forest fires, i.e. dry season, constant watch from fire look-outs (particularly at night) will be maintained. The location of a fire will be accurately determined by measuring its direction from at least two fire look-outs to initiate initial fire-fighting activities.

## (2) Initial Fire-Fighting

An initial fire-fighting regime to cover the entire project sites will be established. Under this regime, a fire pump will be connected to the nearest fire cistern which will be provided at 2km intervals under the Project to supply water for fire-fighting purposes.

The implementation of the Project is expected to have the following positive effects.

## (1) Direct Effects

- 1) Forests in the Kutai National Park and Way Kambas National Park will be rehabilitated.
- 2) The experience of forest rehabilitation using indigenous species under the Project will be accumulated in Indonesia where such experience is scarce, providing a model for forest rehabilitation using indigenous species.
- 3) The forest patrol, fire watch and initial forest fire-fighting regimes in the national parks will be improved.

It is believed that the demonstration effect of the Project will be particularly strong in the Way Kambas National Park as many people visit the local training centre for Sumatera elephants because of its proximity to Bandar Lampung, the capital of Lampung Province. Meanwhile, the project site in the Kutai National Park is situated on both sides of a national road and, therefore, should enjoy a similar demonstration effect vis-a-vis passers-by, including bus passengers.

## (2) Indirect Effects

In addition to the above direct effects, the following indirect effects are expected to result from the implementation of the Project.

- 1) The habitat for wild animals living inside as well as outside the project area will be restored.

- 2) The Project will contribute to the development of guidelines for nursery, planting, tending and maintenance techniques, all of which are necessary for the urgent rehabilitation of the remaining degraded national parks by forest fire.

The following points must be noted to ensure the smooth implementation and continuous effects of the Project.

- (1) Regular follow-up surveys to check the state of tree growth at the planted sites must be conducted so that the Indonesian side can properly identify the positive effects of the Project. At the same time, the Directorate General of Nature Protection and Conservation will have to continuously secure the necessary budget for forest rehabilitation and to consolidate its organization to ensure the full performance of the Project's effects. It is essential for the Government of Indonesia to widely extend the achievements of the Project, which will be implemented as a model project, and to continue to implement rehabilitation projects at degraded national parks by forest fire.
- (2) Even though the maintenance of the planted sites during the project period is planned, further maintenance will be required after the handing-over of the planted sites to the Indonesian side at the end of the project period. While tending work after planting will be conducted for two years under the Project, the tending work for the planted sites established at the end of the project period such as weeding and climber cutting will still be required for another year following the end of the project period. This work should be conducted by the Indonesian side.
- (3) As reforestation work, including tending, is not part of the regular business of the National Park Offices, the implementation of appropriate measures, including the assistance of reforestation-related departments (forest offices and land rehabilitation and soil conservation centres, etc.) and the use of reforestation companies as subcontractors, will be necessary. Forest patrolling and other activities to protect the planted sites from forest fire will continuously be conducted by the Indonesian side in the post-project period.
- (4) The progress of the Project will be regularly monitored by the National Park Office to evaluate whether or not the rehabilitation of national parks under the Project is on course to achieve the objectives of the Project.



### 1) Forest Rehabilitation Survey

The DBH, tree height, number of surviving trees, state of growth and undergrowth, etc. will be regularly checked at fixed points to establish the state of growth of the planted trees.

### 2) Animal Population Survey

The changes of the population of animals (mammals, birds and insects, etc.) will be regularly surveyed to analyse the impacts of forest rehabilitation.

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## **ABBREVIATIONS**

APBN	Anggaran Pendapatan dan Belanja
BAPPENAS	Badan Perencanaan Pembangunan Nasional
BLN	Bantuan Luar Negeri
CIDA	Canada International Development Agency
D/D	Detail Design
DITJEN PKA	Direktorat Jenderal Perlindungan dan Konservasi Alam
DR	Dana Reboisasi
E/N	Exchange of Note
FAO	Food and Agriculture Organization of United Nations
GPS	Global Positioning System
HTI	Hutan Tanaman Industri
IHH	Iuran Hasil Hutan
HPH	Hak Pengusahaan Hutan
IMF	International Monetary Fund
ITTO	International Tropical Timber Organization
JICA	Japan International Cooperation Agency
KPC	PT. Kaltim Prima Coal
PDAM	Perusahaan Daerah Air Minum
PERTAMINA	PT. Perusahaan Pertambangan Minyak dan Gas Bumi Nasional
PLN	PT. Perusahaan Listrik Negara
POLHUT	Polisi Hutan
PT	Perseroan Terbatas
REPELITA	Rencana Pembangunan Lima Tahun
TN	Taman Nasional
T/R	Terms of Reference
UNDP	United Nations Development Programme
UNESCO	United Nations Educational Scientific and Cultural Organization
WWF	World Wildlife Fund



# **1. BACKGROUND OF THE PROJECT**

## **1.1 Outline of the Republic of Indonesia**

The Republic of Indonesia (hereinafter referred to as Indonesia) is situated between 6°N and 11°S and between 95°E and 141°E and consists of numerous islands (some 17,000 islands stretching in the east-west direction for approximately 5,100km). The total national land area of 1.93 million km<sup>2</sup> is some 5.5 times larger than that of Japan. Its population of more than 200 million is ranked fourth in the world.

From the administrative point of view, Indonesia is divided into 24 provinces, two special areas and metropolitan Jakarta although East Timor Province has opted for independence from Indonesia in the referendum held in 1999.

Following the declaration of independence in 1945, Indonesia's economy recorded an average annual growth rate of 6 to 7% under the Sukarno (the first president) regime and the Suharto (the second president) regime. However, the Asian currency crisis which started with the sudden fall of the Thai baht in July, 1997 then spread to Indonesia. In December, 1997, the value of the rupiah, Indonesia's currency, experienced a sharp decline due to political and social instability, severely damaging Indonesia's economy. The seventh Suharto cabinet was formed in March, 1998 amidst the ensuing confusion but, in the face of growing public dissatisfaction, President Suharto resigned from office in May and the then Vice-President Habibie was inaugurated as the third president of Indonesia. The general election held in June, 1999 saw the entry of as many as 48 political parties unless the previous general election which was fought by three parties. Following the declaration of the election results, Abdurrahman Wahid (popularly called Gus Dur) and Megawati Sukarnoputri were elected as the fourth president and the vice-president respectively by the MPR. The first Wahid cabinet was formed on 26th October and is in place today.

After the inauguration of the first Suharto administration, a series of Five Year Economic Development Plans (REPELITA) were formulated and implemented in Indonesia. The 25 year period from the First to the Fifth REPELITA, i.e. the subject period of the First 25 Year Long-Term Plan (PJP-1), was considered to be a period of building up the infrastructure for socioeconomic development and development plans were promoted based on the three fundamental principles of economic development, i.e. (i) fair distribution of the achievements of development, (ii) maintenance of sustainable growth and (iii) establishment of social stability. During these years, Indonesia's economy recorded favourable growth despite experiencing major changes of its environment, including considerable fluctuations of the oil price and foreign exchange rate, etc. In the last 10 years, the annual economic growth rate was approximately 7 - 8% until the commencement of the

currency crisis in 1997 which put Indonesia's economy into a crisis situation. As a result, structural problems which had been hidden during the period of steady growth have suddenly surfaced. Today, Indonesia is facing a number of problems as listed below.

- (1) Fall of the rupiah in the foreign exchange market
- (2) High rate of inflation
- (3) Withdrawal of foreign investors and creditors and a decline of investment
- (4) Decreased foreign currency earnings due to the price fall of natural resources
- (5) Vulnerability of the financial sector
- (6) Increase of the poor

Under these circumstances, various measures, including the short-term measures listed below, are planned to reconstruct the national economy.

- (1) Establishment of a stable and long-lasting government under the leadership of the President newly elected in 1999
- (2) Establishment of a healthy financial system based on loans and guidance by the IMF and the World Bank
- (3) Containment of inflation by a high interest rate policy
- (4) Eradication of the sense of instability among Chinese residents who play a central role in the economy so that they can revitalise economic activities

## **1.2 Current Situation of Forests and Forestry in Indonesia**

### **(1) Total Area of Forests**

Indonesia is said to possess the third largest area of tropical forests in the world after Brazil and Zaire. However, because of the absence of any clear criteria for land classification, it is difficult to accurately estimate the total area of forests. The Ministry of Forestry announced the estimated area of forests in 1994 based on the analysis of satellite imageries. According to this data, more than 70% of the total national land area of 1.9 million km<sup>2</sup> is classified as forests in terms of the designated land use. Of the estimated forest land of 1.49 million km<sup>2</sup>, 1.14 million km<sup>2</sup> is said to be actually covered by forests. This forest area is further classified as the forests to be conserved (protection forests and conservation forests) of 410,000km<sup>2</sup>, the forests for timber production (production forests) of 520,000km<sup>2</sup> and planned development sites (conversion forests) of 210,000km<sup>2</sup>.

The Ministry of Forestry and the Directorate General of Estate Crops in the Ministry of Agriculture were integrated into the Ministry of Forestry and Estate Crops as of March 1998.

While the destruction of tropical forests is a worldwide problem, it is inferred that Indonesia is also experiencing the deforestation of 10,000km<sup>2</sup> a year due to forest fire, slash and burn agriculture and conversion to farmland under settlement programmes, etc.

According to the statistic data compiled by FAO, approximately 1m<sup>3</sup> is the per capita wood consumption of Indonesia accounting for almost half for fuelwoods and charcoal making. Reduction of forest resources in Indonesia is becoming a critical problem for the national.

## (2) Forest Stock

While forest stock in Indonesia is not yet fully established, an average timber output of 63m<sup>3</sup>/ha is expected based on the permitted cutting volume at those forests (production forests) where forestry concessions (HPH) are given. However, the forest conditions appear to be degrading each year.

## (3) Industrial Plantation

Tree plantation establishment for timber production (HTI: industrial plantation including reforestation) is conducted by HPH owners, the PERHUTANI (state forestry corporation) and INHUTANI (state forestry enterprises), etc.

It is planned to complete the creation of 6.2 million ha of industrial plantations by 2003 (the final year of the Seventh Five Year Plan). While the annual forestation of 300,000 ha is necessary to achieve this target, the actual planted area of 300,000 ha in FY 1994, 330,000 ha in FY 1995, 390,000 ha in FY 1996 and 270,000 ha in FY 1997 appears to suggest that the plan has been slightly behind the schedule lately because of the economic crisis.

## (4) Social Forestry

Social forestry (community forestry) is being promoted in Indonesia with the intention of strengthening the link between local people and forests. Participatory planting at production forests is conducted together with the production activities of timber companies while protected forests are managed by forest rangers and others. In the case of protection forests, however,



both production activities and protection activities are not conducted very well and many forests are deteriorating due to illegal cutting and slash and burn agriculture, etc. The social forestry concept which aims at conserving forests through the participation of local people in forest management is being implemented to combat this situation. Under this social forestry concept, cooperatives formed by local people conduct wide-ranging work, from planting to the harvesting of forest products, to share the profits with the central government. Using the budget based on the presidential instruction, social forestry was introduced over a total area of 620,000 ha in the period from FY 1993 to FY 1997. Model projects have been in progress in 10 provinces since FY 1999 with Japanese yen loans.

#### (5) Reforestation for Rehabilitation

While reforestation for rehabilitation was conducted over a total area of 200,000 ha from FY 1973 to FY 1997 with the budget based on the presidential instruction, the actual achievement fell far short of the planned volume (3.7 million ha at the commencement of the Sixth Five Year Plan). In FY 1994, this type of reforestation was conducted over a total area of 12,000 ha with a Japanese yen loan.

#### (6) Timber Production and Exports

The harvesting of forest products and reforestation are usually conducted by enterprises which have a HPH. In the past, such rights were called “cutting rights”. HPH stipulates compulsory reforestation work together with cutting. At the beginning of the Sixth Five Year Plan (1994 - 1998), there were 575 HPH units. While the conduct of HPH owners has gradually improved, many HPHs have recently been cancelled on the grounds of negligent forest management, failing to meet the obligations of a HPH as in the case of the frequent occurrence of forest fire and other incidents. This signifies the government’s move to review the suitability of enterprises awarded a HPH.

The timber production volume in the Fifth Five Year Plan (1989 - 1993) was 127 million m<sup>3</sup> with an annual average of 25.4 million m<sup>3</sup> (target: 31.4 million m<sup>3</sup>). While the Sixth Five Year Plan (1994 - 1998) adopted a target volume of 188 million m<sup>3</sup> (annual average of 37.7 million m<sup>3</sup>), it is now believed to be unlikely that this target was met. While the Seventh Five Year Plan starting in 1999 adopts a total production volume of 241 million m<sup>3</sup> (annual average of 57.1 million m<sup>3</sup>), this figure is currently being reviewed following the birth of a development reform cabinet.

While a total export ban on raw wood has been in force since 1985 under a presidential order to foster and strengthen the domestic forest products industry, this ban has been practically lifted under an agreement with the IMF to aim at the establishment of sustainable forest

management through industrial plantation, prompted by the economic crisis which commenced in 1997.

### **1.3 Background of the Project**

#### **1.3.1 Current State of Forest Fires**

In Indonesia, large-scale fires occur during years of extraordinary drought, sweeping across forests and farmland, etc. and also causing smoke and haze damage to not only areas around burned areas but also neighboring countries as well. In addition, the loss of forests due to fire has serious impacts on precious flora and fauna.

The fire which started around June, 1997 was particularly large and the smoke and haze reached not only various parts of Indonesia but also such neighbouring countries as Malaysia and Singapore over a period of several months, severely affecting the health of the public, transportation by aircraft and ships, tourism activities. It is said that the damage of this massive fire spread to 1.7 million ha, including 0.6 million ha of forests. This serious incident was reported worldwide and attracted much attention from the international community from the viewpoint of not only regional damage but also global implications in terms of conservation of the natural environment and global warming, etc.

The locations as well as sources of fire causing smoke and haze are diverse. The causes of fire range from intentional burning to prepare sites for agricultural plantations, industrial plantation sites, resettlement sites, new farmland development sites and slash and burn agriculture sites, etc. and from the spread of fire and/or leaping flames at forests, including protection forests and conservation forests (those in national parks and others), fire due to carelessness and arson. In addition, fires can restart from ground fires at peat deposits where the complete extinguishing of fire is difficult. The extraordinary drought and delayed commencement of the rainy season resulting from El Niño are believed to have been the main causes of the extensive fire in 1997. El Niño is also said to have been responsible for forest fires and the ensuing problem of smoke and haze in 1982, 1987, 1991 and 1994, suggesting that it has had a cycle of 3 - 5 years in recent years.

#### **1.3.2 Forest Fire Control Measures**

In the face of the catastrophic situation in 1997, the Government of Indonesia intensified its fire-fighting activities and its control of burning practices for site preparation but the smoke and haze damage did not appear to be arrested, resulting in an appeal for help to the international community. In response, the Government of Japan sent an emergency aid team to Indonesia on two occasions to provide assistance for forest fire control activities, health care and environmental measurement, etc.

while also providing fire-fighting equipment, dust masks and other items. Moreover, forest fire information was regularly gathered and exchanged through the Forest Fire Prevention Project which commenced in 1996 and other cooperation projects in progress. In December, 1998, the JICA, ITTO and BAPPENAS jointly held International Cross-Sectoral Forum of Forest Fire Management in Southeast Asia to examine measures to deal with various problems arising from large forest fires which periodically take place in Southeast Asia.

More than some 70,000ha (some 35% of the total area of 200,000ha) and some 8,500ha (some 6.5% of the total area of 130,000ha) respectively of the Kutai National Park in East Kalimantan and the Way Kambas National Park in Lampung, the subject sites of the Project, suffered damage due to forest fire in 1998. While the Kutai National Park boasts rich biological diversity with many rare flora and fauna, reduction of the forest area by forest fire has had a significant adverse impact on such diversity. In the Way Kambas National Park, forest land has become grassland due to a series of forest fires, including that in 1998, making the natural restoration of forests virtually impossible.



## **2. CONTENTS OF THE PROJECT**

### **2.1 Objectives of the Project**

The Government of Indonesia made a request for grant aid for forest rehabilitation in both the Kutai National Park and the Way Kambas National Park to the Government of Japan which had conducted a series of ODA projects in the forestry sector in Indonesia.

The original contents of the Indonesian request consisted of the following items.

- Planting of indigenous species which are naturally found inside national parks and their neighbouring areas
- Nurseries to produce planting stock
- Reservoirs and dams to secure water supply
- Firebreaks and patrolling roads
- Facilities to assist planting work (rehabilitation centre)
- Facilities to protect the Project Areas
- Equipment, fire-fighting facilities and initial fire-fighting equipment required for reforestation for forest rehabilitation
- Vehicles required for reforestation for forest rehabilitation

As the necessity to assist this Project was confirmed in the report for JICA's project formulation study regarding forest fire control measures which was conducted in September and October, 1998, it was decided to conduct the Basic Design Study for the Project.

The Project aims at contributing to the promotion of forest rehabilitation of seriously degraded national parks by forest fire by means of conducting model reforestation using indigenous species in the national parks. It also aims at contributing to the strengthening of the national park maintenance system by means of developing a forest fire control system.

### **2.2 Basic Concept of the Project**

The Basic Design Study was conducted to clarify the forest management system, budget system and other relevant issues in addition to the local natural and social conditions in response to the Indonesian request. The basic concept of the Project subsequently established is described below.

## 2.2.1 Reforestation

### 2.2.1.1 Selection of Subject Sites for Cooperation

#### (1) Selection Criteria for Subject Sites for Planting

- The planting sites for rehabilitation must be near the National Parks Office or the ranger station which is responsible for its management.
- The site must have good access in view of the smooth implementation of planting, tending, protection and other activities.
- The site should be observable by the general public using an adjacent vehicle road and footpath, etc. to ensure its demonstration effects.

#### (2) Locations of Subject Sites for Planting

The locations of the planting sites and the nursery sites have been finalised based on the field investigation, GPS survey and surveying (with pocket compass) results.

##### 1) Kutai National Park

The subject site for planting is an area of 400ha, consisting of 200m wide zones on both sides of the 11km long section (from the 31km point to the 42km point) of the national road running from Bontang City to Sangata Town (some 8% of the area consists of the existing building sites, the existing nursery sites and ponds as well as the wetland resulting from national road improvement work) (Fig. 4 and Fig. 2-2-1).

The subject site enjoys rich topographical features, ranging from flat land to undulating land. The propagation of *Macaranga* spp. and climbers which are pioneer plants following a forest fire is observed. These plants cover 30% of the area while forest land with scattered to open forests and residual forests which have survived fire account for some 40% and 30% of the area respectively.

##### 2) Way Kambas National Park

The subject site for planting is 360ha on the west side of the 6m wide road (from the 2.5km point to the 8km point) leading to the entrance of the Way Kambas National Park, i.e. some 7km from the park entrance on Way Kambas Street in Way Jepara Town, towards the Elephant Training Centre. There are several rivers (some of which dry up in the dry season) in this area (Fig. 2-2-2).

Topographically, the site is flat and Alang-Alang (height: 50 - 150 cm) grassland accounts for 50% of the area. Forests with scattered trees and open forests account for 40% of the area while residual forests account for the remaining 10%. The land on the west side of the road is privately owned and maize and other crops are cultivated.

Originally, the area on the east side of the road heading towards the Elephant Training Centre was also considered as a subject site for cooperation but the subsequent survey found that a project (called Padat Karya) designed to increase employment opportunities for local people by making them plant trees in a some 100m wide zone was in progress. In view of this finding, this area has been omitted from the subject sites. *Dalbergia latifolia* which was planted prior to national park designation still survives in this area. While most of it has been lost due to forest fire, some of the survivors form colonies. While fruit trees were planted under or between the trees planted under Padat Karya, most of them have been damaged by wild elephants.

A patrolling road will be constructed in the Project Area across the Padat Karya area and the relevant consent of the National Parks Office has already been obtained.

No boundary structures will be introduced along the boundary between the project site and the Padat Karya area because these will be clearly distinguished from each other by the different planting species and also because they are located within the same national park.



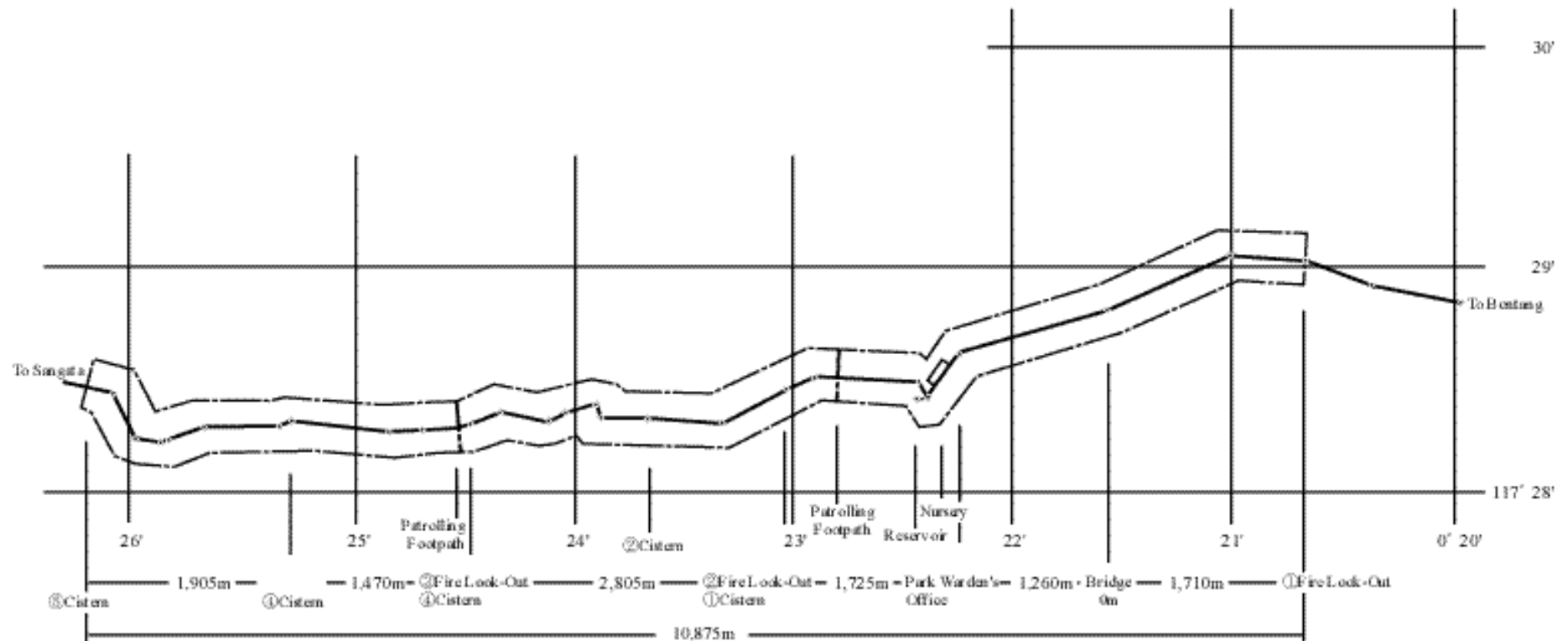


Fig. 2-2-1 Kutai National Park Rehabilitation Plan

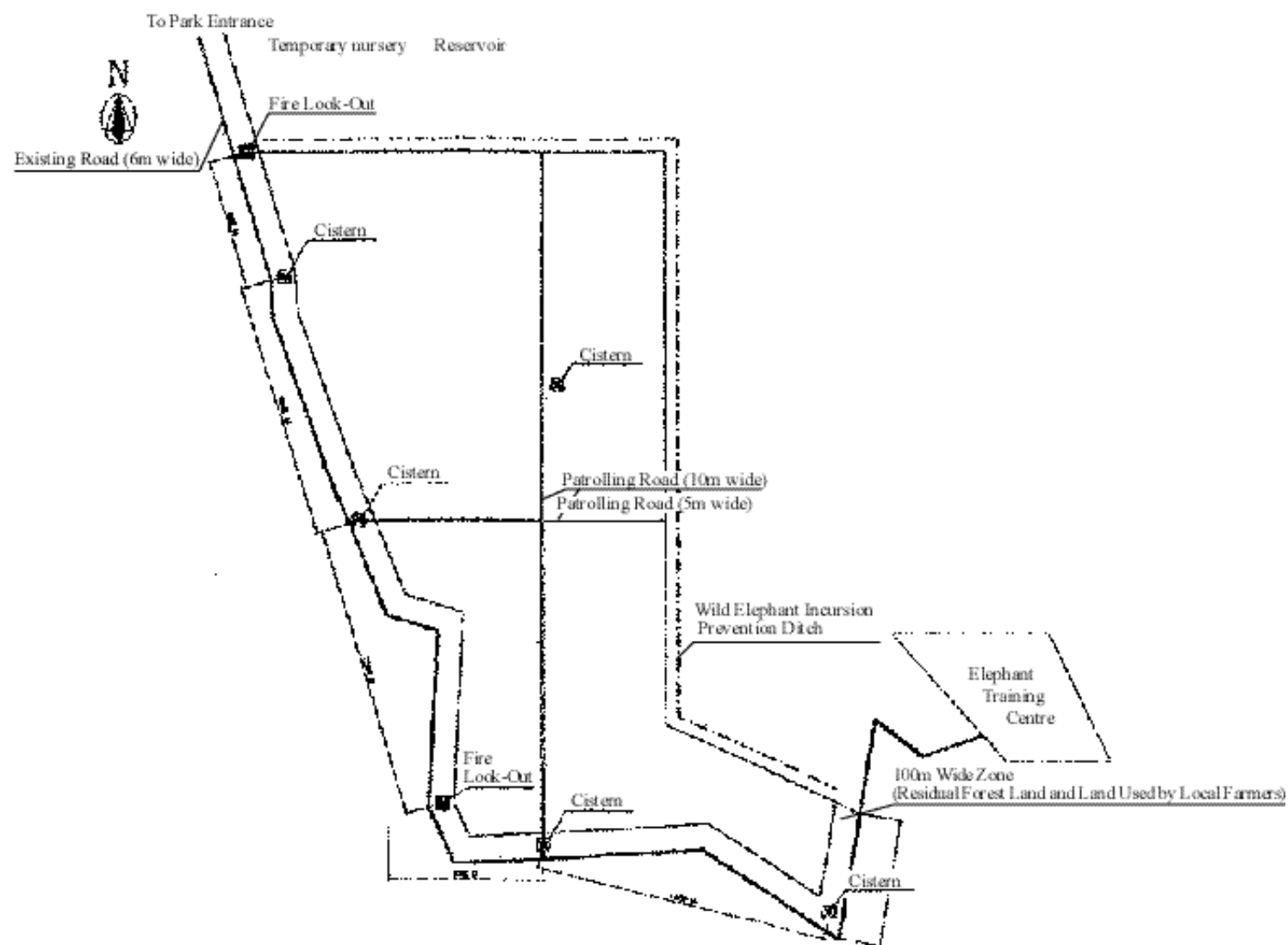


Fig. 2-2-2 Way Kambas National Park Rehabilitation Plan

### 2.2.1.2 Selection of Planting Species

The species to be planted in national parks are restricted to indigenous species which can be found in the national parks in question or in their neighbouring areas by the Government Ordinance Regarding Wildlife Sanctuaries and Natural Reserves (Government Ordinance No. 68 of 1998). The species shown in Table 2-2-1 are selected as candidate species in terms of the reliable supply of planting stock using seeds or seedlings, established nursing methods to produce good quality planting stock, ease of planting and tending work to ensure high survival and relatively easy maintenance, etc.

Table 2-2-1 List of Main Candidate Species for Planting

Local Name	Scientific Name	Kutai National Park	Way Kambas National Park
Meranti	<i>Shorea</i> spp.		
Kapur	<i>Dryobalanops</i> spp.		
Ulin	<i>Eusideroxylon zwageri</i>		
Beringin	<i>Ficus benjamina</i>		
Sungkai	<i>Peronema canescens</i>		
Tebe Hitam	<i>Sloanea sigun</i>		
Ketapang	<i>Terminalia catappa</i>		
Jambu-jambuan	<i>Syzygium</i> spp.		
Sempur	<i>Dillenia excelsa</i>		
Gelam	<i>Melaleuca leucadendron</i>		
Rengas	<i>Gluta reinghas</i>		
Bungur	<i>Lagerstroemia</i> spp.		
Puspa	<i>Schima wallichii</i> var. <i>bancana</i>		

Other indigenous species found in the national parks in question or their neighbouring areas may also be planted if the production of planting stock of these species is found to be feasible.

### 2.2.2 Facilities

#### (1) Reservoirs

Reservoirs are planned as water supply sources for nursery operations under the Project and for initial fire-fighting. Gabions will be constructed in curves like a reservoir to keep enough water level. An intake will be installed near the gabions to intake water by pumps.

These intake facilities are applied taking into considerations of lack of ponds and lakes and the size of rivers in and around the project sites. As they will be used as water supply sources for the fire cisterns for initial fire-fighting in the post-Project period, they will be constructed at the

project sites or along nearby rivers as permanent facilities. For both of the national parks in question, it is judged that the required water volume in these reservoirs will be secured even in the dry season because running water was found during the site visit days in the dry season.

## (2) Firebreak Tree Belts and Patrolling Roads

There is strong concern in regard to the outbreak of fire at newly planted forest land because of the high forest fire hazard. A fire-resistant species will be planted as firebreak tree belts to protect the rehabilitated forests from fire. Patrolling roads will be constructed to detect the fire outbreaks by intensive patrolling and to take initial fire-fighting action.

### 1) Kutai National Park

The perimeter of the project site will be encircled by a patrolling road (footpath) and a 10m wide firebreak tree belt with a fire-resistant species (Sungkai) will be created to act as a firebreak inside this perimeter road. In addition, two patrolling roads (footpaths) each will be created in both directions from this national road.

### 2) Way Kambas National Park

Two criss-crossing patrolling roads which are wide enough to permit vehicle traffic in the dry season will be constructed at the project site and a 10m wide firebreak tree belt using a fire-resistant species (Sungkai) will be created in the inner side of the ditch located to the east side of the site to prevent the invasion of wild elephants (Fig. 2-2-2).

## (3) Protection Facilities

It is estimated that some 300 wild elephants live in the Way Kambas National Park which cause damage to nearby farmland and private houses. In addition, the seedlings of fruit trees planted under Padat Karya have also been damaged. Since elephants are considered to be the endangered species, this project will consider to assist in conserving the species. A ditch will, therefore, be dug around the planting site to protect it from the invasion of wild elephants. A firebreak tree belt using Sungkai will also be created along the inner side of the ditch.

## (4) Fire-Fighting Facilities

The fire-fighting facilities described below will be constructed for effective initial fire-fighting.

### 1) Fire Look-Outs

Fire look-outs will be erected at suitable locations with a high elevation for the early detection of forest fire and the implementation of initial fire-fighting measures during the

hazardous season. To accurately determine a fire site based on directional findings, at least two fire look-outs are necessary.

For the monitoring of the entire project site, three fire look-outs will be erected in the Kutai National Park in view of the narrow but long shape and very undulating land of the project site while two fire look-outs will be erected in the Way Kambas National Park in view of the flat topography and coherent shape of the project site.

## 2) Fire Cisterns

Fire cisterns which constantly store water for early fire-fighting purposes will be provided at 2km intervals along roads at the project sites.

## (5) Temporary Facilities

The nursery facilities (nursing beds, temporary beds and workshop building) required for the production of planting stock to be used during the project period, administrative facilities (office and accommodation building and warehouse, garage and power house buildings), water supply facilities, septic tank, roads at the nursery sites and protective fencing for the nursery facilities will be constructed as temporary facilities.

### **2.2.3 Equipment to be Provided**

The minimum range of initial fire-fighting equipment will be provided to create an initial fire-fighting system for the project areas in order to protect the rehabilitated (planting) sites from forest fire.

Facilities which are essential for reforestation under the Project but which will only be required during the project period, i.e. facilities for which a permanent need is not recognised, will be constructed as temporary facilities. While temporary facilities are not usually subject to the detailed design, it has been decided to conduct their design work in view of the importance of the nursery facilities for the Project to ensure their quality. The main components of the Project are shown in the table below.



Table 2-2-2 Main Components of the Project

Components/Contents		Kutai National Park	Way Kambas National Park
Location		Sangata District, East Kalimantan Province	Way Jepara District, Lampung Province
Area		400ha	360ha
Planting Species (Indigenous Species)		Meranti, Kapur, Ulin, Beringin, Sungkai, Tebe Hitam, Ketapang, Jambu-jambuan, Sempur and others	Meranti, Sungkai, Sempur, Gelam, Rengas, Bungur, Puspa and others
Planting Method		Under-planting; nest planting (group planting); line planting; belt planting	As left
Facilities	Reservoir (with Intake Pump)	1	1
	Patrolling Roads	Footpath: 2m wide = 21.6km	Vehicle road: 10m wide = 3km 5m wide = 1.4km
	Fire Look-Outs	3	2
	Fire Cisterns	5	5
	Wild Elephant Incursion Prevention Ditches	none	5,130m in length
Temporary Structures	<ul style="list-style-type: none"> <li>Nursery</li> <li>- Nursing Bed Area</li> <li>- Area of Premises</li> <li>Protection Facilities (barbed wire fencing)</li> </ul>	Annual production volume of planting stock: 400,000 2,760m <sup>2</sup> 8,117m <sup>2</sup> 408m	Annual production volume of planting stock: 400,000 2,760m <sup>2</sup> 8,757m <sup>2</sup> 417m
Equipment Provided	<ul style="list-style-type: none"> <li>Motorcycles</li> <li>Hose Transporters</li> <li>Water Tank Lorries</li> <li>Portable Pumps</li> <li>Discharge Hoses (20m)</li> <li>Supply Hoses (6m)</li> <li>Discharge Nozzles</li> <li>Station-Type Radio Equipment</li> <li>Vehicle Mounted-Type Radio Equipment</li> <li>Portable Radio Equipment</li> <li>Jet Shooters</li> </ul>	3 1 1 3 50 reels 2 2 1 2 6 30	3 1 1 3 50 reels 2 2 1 2 5 30

## **2.3 Basic Design**

### **2.3.1 Design Concept**

#### **2.3.1.1 Design Concept for Reforestation**

##### **(1) Principles Regarding Natural Conditions**

Reforestation requires a series of work, ranging from the procurement of planting stock, land preparation at planting sites, planting and such tending as weeding, climber cutting and watering to supplementary planting. The appropriate timing for each type of work must be taken into proper consideration in the overall reforestation design so that all types of work are smoothly conducted throughout the year.

In principle, planting work will be conducted in the rainy season and the timing of producing planting stock and land preparation will be designed to accommodate the planting schedule with a view to improving the survival rate of the planted trees.

Although the growth prospects after planting differ depending on the species and planting density, etc., it is assumed that the number of planted trees will be approximately half by the time of crown closure. The species, planting density and planting method for the Project are decided to ensure the early restoration of forests based on this assumption. The important points to note after planting are described below.

- 1) As a forest is usually reestablished as before with a survival rate of some 50%, tending must be conducted without fail to prevent further damage to the surviving trees by weeds and climbers, etc. while confirming the uniform state of survival.
- 2) Additional planting in view of the poor survival state of the planted trees (supplementary planting) will be conducted if the state of tree survival is particularly poor in localised areas. When the state of survival is uniform, the newly planted trees may well be suppressed by the surviving trees. In this case, supplementary planting is not usually conducted and careful observation of the subsequent growth of the surviving trees is conducted instead.

There is a minor dry season from June to September at the Kutai National park. However, no serious impediment to planting is posed by the difference between the dry and rainy seasons and, therefore, reforestation work can be conducted almost throughout the year.

In contrast, there is a distinctive dry season from May to October and a distinctive rainy season from November to April at the Way Kambas National Park. Accordingly, appropriate timing will be arranged with nursery practices and land preparation work being conducted in the dry season and planting and supplementary planting being conducted in the rainy season.

## (2) Principles Regarding Social Conditions

While in theory there should be no dwellers in national parks, the reality is that some national parks have dwellers who were there prior to designation as a national park or illegal dwellers who have moved into parks in more recent years.

The findings of the socioeconomic survey indicate that most local people are willing to cooperate with national park management. The employment of local people is planned for the implementation of the Project in order to foster and maintain a good relationship between local people and national park management.

### 1) Kutai National Park

An area stretching some 40km from north to south along the coast to the east of the national road is designated as a rehabilitation zone by the Kutai National Park Management Plan. In reality, however, there are still many people living inside this national park. Moreover, the transfer of national forests to local governments following the recent decentralisation drive poses problems for the central government to deal with such dwellers and the illegal use of and dwelling in national parks have actually become more serious than was previously the case. Although no signs of such deterioration have yet been observed in the 10 km section towards Sangate to the north of the planned project site, there is concern in regard to illegal land use inside the national park zone in the form of the illegal declaration of occupation using notice boards, tree cutting and burning of the ground. The Government of Indonesia and local governments are requested to introduce appropriate measures to deal with these illegalities.

For the implementation of the Project, the employment of local people for such work as seed collection, nursery practices, planting and tending is planned.

### 2) Way Kambas National Park

As the relocation of dwellers in this national park to alternative sites has been smoothly conducted, no-one currently lives inside the national park. Local people around the project site usually engage in farming hard. They have expressed their willingness to cooperate with the implementation of the Project as they understand the objectives of the Project.

For the implementation of the Project, the employment of local people for such work as seed collection, nursery practices, planting and tending is planned.

(3) Principles Regarding Use of Local Companies

Local companies will be used as subcontractors to ensure the smooth implementation of the Project as these companies have workers who are well experienced in reforestation work. Although hardly any companies or organizations except the Friends of Kutai in the Kutai National Park area have past experience of forest rehabilitation work in a national park, many have experience of industrial plantation, general reforestation and greening work. In East Kalimantan where the Kutai National Park is located, the INHUTANI (a national forestry corporation) and other large timber companies have been actively engaged in industrial plantation in recent years. While there are not many planting project in progress near the Way Kambas National Park, the area is characterised by active operation at rubber plantations where the production of planting stock of rubber as well as the planting of such stock are conducted by state and other enterprises.

(4) Principles Regarding Management Capability of Project Implementation Body

The National Parks Office of the Directorate General of Nature Protection and Conservation, Ministry of Forestry and Estate Crops, which is the implementation body of the Project, is mainly engaged in national park management, including patrolling, and is less experienced in reforestation work. There is also concern that its reforestation work expenditure has been less than adequate. In view of these facts, the National Parks Office will be requested to develop a system for the proper management of the planted sites and to cover the necessary cost through close liaisoning with other bodies involved in reforestation. While the planting programme will be formulated so that the tending work is completed within the project period as much as possible, some tending work will still be necessary following the end of the project period and the Indonesian side will be required to conduct this work.

Protection of the planted sites from forest fires is part of the regular work of the National Parks Office and, therefore, a carefully planned forest patrolling regime should be introduced.

(5) Principles Regarding Work Schedule

Reforestation work will be conducted in a total of 40 months in three phases as shown in the table below, taking the required work volume and work processes into consideration.

- Construction of temporary nursery facilities : to commence in Phase 1; construction of mainly nursery beds in Phase 1 in view of its short time, followed by the construction of most temporary facilities in Phase 2
- Procurement of equipment : to be conducted in Phase 1
- Construction of facilities : to commence in Phase 1; construction of reservoirs and patrolling roads in Phase 1 in view of its short time, followed by the constructed of other facilities in Phase 2
- Planting : to be conducted in Phase 2 and Phase 3, involving land preparation at the beginning of the year (dry season) and planting at the end of each year (rainy season) in each phase
- Tending : to be conducted in the first two years; tending at planted sites in Phase 2 to be conducted in Term 1 of Phase 3 and tending work at planted sites in Term 1 of Phase 3 to be conducted in Term 2 of Phase 3
- Tending at planted sites in Term 3 of Phase 3 : to be conducted by the Indonesian side for one year



Table 2-3-1 Reforestation Work Schedule

Phase \ Year		Year 1	Year 2	Year 3	Year 4
Phase 1		Nurseries Facilities			
		Equipment			
Phase 2		Facilities Nursery Practices			
		Planting	Tending		
Phase 3	Term 1		Nursery Practices Planting		
	Term 2			Nursery Practices Tending	
				Planting	Tending

### 2.3.1.2 Design Concept for Facilities

The facilities to be provided under the Project are fire management facilities required for the maintenance and management of the planted sites and facilities to protect the planted sites from wild animals, etc. Nurseries, water supply facilities for nurseries facilities to assist reforestation work and facilities to protect nurseries will be constructed as temporary facilities. Ease of maintenance and a low running cost will be the two main features of the basic design of facilities.

#### (1) Principles Regarding Natural Conditions

- Considering the existence of dry and rainy seasons, the overall planning should ensure the smooth implementation of the Project in terms of the work plan and work schedule.
- The facilities will be both safe and solid, taking the weather and other conditions of the project sites into consideration.

#### (2) Principles Regarding Use of National Park Land

The facilities will be in harmony with nature and will be simple and practical without any unnecessary features, taking the national park environment and the characteristics of the surrounding area into consideration.

### (3) Principles Regarding Operation and Maintenance and Construction Conditions

- The construction standards currently employed in Indonesia will be employed to ensure technical standards which allow the Indonesian side to conduct the necessary repair work by itself.
- In principle, the construction materials will be procured locally and should be both inexpensive and easy to repair.
- The scale and contents of the facilities will be based on the economic as well as technical level of the Indonesian side in view of the ease of management.

### (4) Principles Regarding Construction Schedule

The early construction of the facilities is desirable to ensure the smooth progress of the reforestation work plan. The facilities will be constructed over two phases, i.e. Phase 1 and Phase 2, in view of the relatively long construction periods required.

## **2.3.2 Basic Design**

### **2.3.2.1 Basic Design for Reforestation**

#### (1) Nursery Practices

##### 1) Procurement Principles for Planting Stock

###### Procurement of Planting Stock

The planting species for the rehabilitation of the degraded national parks by fire are restricted to indigenous species of the national park in question. As these species differ from those used for industrial plantation and reforestation for rehabilitation, etc., planting stock of these indigenous species is not generally produced. This means that it will be impossible to externally procure the required planting stock for the Project from local companies, etc. Therefore, the planting stock for the Project, including nursing the wildling originating from nearby natural forests, will be self-supplied from the temporary nurseries constructed under the Project.

###### Status of Nurseries and Production of Planting Stock

The planned nurseries to produce the planting stock to be used during the project period will be constructed as temporary facilities and contractors (reforestation companies, etc.) will produce the required quantity of the planting stock for the required species. Appropriate work supervision will be provided to ensure the production of high quality planting stock.

## 2) Nursing Method

The planting species to be used under the Project are already described in 2.2.1.2 and the planting stock will be produced in the following forms depending on the characteristics of each species.

### Cuttings

Small branches will be directly inserted into nursery beds for rooting. This method will be used for Sungkai because of the easy rooting of its branches (sticks) while its seed germination rate is low.

### Seedlings

Seeds will be sown in nursery seed beds. Soon after germination, the germinated seeds will be transplanted to pots (black vinyl chloride pots) for nursing (the timing of transplanting will vary from one species to another).

### Wildlings

Young seedlings growing in forests under natural conditions will be collected and transplanted in the nursery for acclimatisation and nursing. The mother trees of species of *Diptrocarpaceae* (Meranti and Kapur, etc.) are very tall and their flowering and fruiting seasons are unstable. In addition, their seeds have only a short life. The nursery practices involving planting stock of these species will use wildlings due to the difficulty of collecting and storing seeds, in turn caused by the fact that many seeds are eaten by animals, and the difficulty of ensuring germination by means of sowing. Wildlings will also be used in the case of Rengas as many young seedlings are available through natural regeneration.

## 3) Types of Planting Stock

The species to be planted for the project are classified into the following types of planting stock based on the nursery practices, taking the unguaranteed collection of seeds of all of the species to be used under the Project into consideration.

Table 2-3-2 Types of Planting Stock

Type of Planting Stock	Local Name	Scientific Name
Cuttings	- Sungkai	- <i>Peronema canescens</i>
Seedlings	- Ulin - Beringin - Tebe Hitam - Ketapang - Sempur - Gelam - Jambu-jambuan - Bungur - Puspa	- <i>Eusideroxylon zwageri</i> - <i>Ficus benjamina</i> - <i>Soanea sigun</i> - <i>Terminalia catappa</i> - <i>Dillenia excelsa</i> - <i>Melaleuca leucadendron</i> - <i>Syzygium</i> spp. - <i>Lagerstroemia</i> spp. - <i>Schima wallichii</i>
Wildlings	- Meranti - Kapur - Rengas	- <i>Shorea</i> spp. - <i>Dryobalanops</i> spp. - <i>Gluta reinghas</i>

Other local species which naturally grow in the national parks in question and in their neighbouring areas will also be planted if necessary.

#### 4) Standards of Nursery Practices

The collection of appropriate seeds and the formulation of nursery practices and planting plan are essential to secure the high quality planting stock of the species to be planted under the Project. The relevant nursery practice standards are shown in Table 2-3-3. The survival rate in this table means the ratio of germinated seeds, cuttings or wildlings which successfully grow into planting stock. While the actual survival rate varies depending on the species and properties of the seeds, etc., it is essential to achieve a high survival rate through appropriate nursery practices. For the main planting species, the standard rate is some 72% (85% at the transplanting stage □ 85% at the out-planting stage) for Sugi (Japanese cedar) and 62% (85% at the transplanting stage □ 68% at out-planting stage) for Hinoki (Japanese cypress).

As far as the planned species for the Project are concerned, pots will be used for individual nursing to achieve a high survival rate unlike in Japan where direct sowing in nursing beds is the common method. Hence, a survival rate of 75% is adopted as the standard rate for the basic design.

Table 2-3-3 Standards of Nursery Practices

Local Name	Collection of Seeds/Seedlings	Storage of Seeds	Method of Nursery Practices	Germination Rate	Period of Nursery Practices	Planting Stock Height During Out-Planting	Survival Rate
Meranti	The seeds, which are born at an interval of 2 - 6 years, are collected just before they fall. Skilled workers are required for collection because of the very high tree height. In general, wildlings are used.	Difficult; must be sown within a few days of collection.	1. Sowing of seeds 2. Cuttings 3. Wildlings The use of natural seedlings is common when seed supply is not secured.	Some 90% in the case of good quality seeds which are collected just before they fall.	Nursing for 8 - 10 months followed by hardening for 1 - 2 months	30 - 50 cm	Seedlings: approx. 80% Wildlings: approx. 55% (JICA Multi-Storied Forest Management Project in Malaysia)
Kapur	As seed bearing is relatively frequent, seeds which have fallen onto the forest floor are collected.	Long-term storage is difficult; can be stored for two weeks at around 15°C; at 5 - 10°C, the storage period is only one week because of low temperature damage.	Sown immediately after collection; wildlings are used if it is difficult to obtain seeds as it is easy to find young seedlings.	(No previous experience)	Approx. six months after sowing	30 - 50 cm	75%
Ulin	Flowering and seed bearing take place irregularly but often occur in the middle to the end of the dry season; in Kalimantan, flowering often takes place in September to October with seed bearing in January to February; seeds which have fallen onto the forest floor are collected.	Can withstand long-term storage.	Sown in germination beds; several months are required for germination.	Good seeds enjoy a high germination rate; 50% in Sumatera (JICA Benakat Project; ATA-186)	The first branches appear when a seedling reaches a height of 30 - 70 cm some three months after germination. Out-planting will be conducted with leaves 6-12 months after germination.	50 - 100 cm	90%
Beringin	Bears seeds every year, making seed collection easy.	(No previous experience)	- To be sown - Quick growth	(No previous experience)	Three months	40 - 60 cm	75%



Local Name	Collection of Seeds/Seedlings	Storage of Seeds	Method of Nursery Practices	Germination Rate	Period of Nursery Practices	Planting Stock Height During Out-Planting	Survival Rate
Sungkai	The germination of collected seeds is poor; the seeds are very small and light with 1,000 seeds weighing only 3.5 - 4 g; cuttings are usually used for propagation as they easily produce roots.	No collection or storage of seeds.	Use of cuttings	The rooting ratio (16-18cm long cuttings) is 90 - 95% for cuttings of 1.5 cm in diameter and 76% for cuttings of 0.5 cm in diameter (JICA Benakat Project; ATA-186).	Nursing for 3 - 4 months after rooting prior to out-planting.	40 - 70 cm	75%
Tebe Hitam	The seeds are collected.	(No previous experience)	To be sown	(No previous experience)	5 - 6 months	30 - 50 cm	75%
Ketapang	Seed bearing is irregular, resulting in poor seed bearing years from time to time.	Storage at room temperature is possible after drying by air.	To be sown; germination takes place 30 - 40 days after sowing.	30 - 40% (PNG)	2 - 5 months	30 - 50 cm	75%
Jambu-jambuan	The seeds from fruit which mature 3 - 4 months after flowering are collected.	Cannot withstand dry conditions; vitality is lost after one month at room temperature and in non-sealed conditions; vitality lasts for three months for half of the seeds if they are stored in sealed conditions and kept at a low temperature (2 - 4°C).	- Usually to be sown - Layers and cuttings may be used	100% germination of fresh seeds	10 - 12 months	30 - 50 cm	75%
Sempur	The seeds are collected.	(No previous experience)	To be sown	(No previous experience)	5 - 6 months	30 - 50 cm	75%

Local Name	Collection of Seeds/Seedlings	Storage of Seeds	Method of Nursery Practices	Germination Rate	Period of Nursery Practices	Planting Stock Height During Out-Planting	Survival Rate
Gelam (kayu putih)	Flowering and seed bearing take place throughout the year; the seeds are collected at the appropriate time.	Storage is unnecessary because the seeds can be collected throughout the year.	To be sown; to be transplanted in vinyl pots when the seedlings reach some 2.5 cm in two months after sowing.	70% (JICA Benakat Project; ATA-186)	Three months	50 - 80 cm	75%
Rengas	Wildlings are collected as many naturally regenerated young seedlings are available.	(No previous experience)	Nursing of wildlings	(No previous experience)	6 - 12 months	30 - 50 cm	75%
Bungur	The seeds are collected.	(No previous experience)	To be sown	(No previous experience)	5 - 6 months	30 - 50 cm	75%
Puspa	Flowering in May through September and seed bearing in July through November; coppice shoots of scattered remaining trees are also used because of the feasibility of sprouting.	Low humidity and constant temperature	To be sown	(No previous experience)	3 - 4 months	50 - 80 cm	90% 93.2% (JICA Benakat Project; ATA-186)
Remarks	<p>&lt; Obtaining of Seeds &gt;</p> <ol style="list-style-type: none"> <li>1. The seeds of specific species and freshness will be procured at fixed prices from, in principle, farmers, etc. in the neighbouring area.</li> <li>2. Seed production often takes place around the end of the dry season.</li> <li>3. In the case of small seeds which are usually born at high branches, the seeds will be collected by means of pruning or other methods after obtaining the relevant permission.</li> </ol>	<ul style="list-style-type: none"> <li>- Fresh seeds, immediately after collection, should be used as much as possible.</li> <li>- Nursing and planting programmes should be formulated so that seeds of the previous year are not used.</li> </ul>	A nursing method which is appropriate vis-a-vis the characteristics of each species should be employed.	The germination rate should be kept as high as possible by means of the use of good quality seeds.	The nursing period should be determined so that an appropriate quantity of planting stock is produced at the time of planting.	While planting stock of 30 - 50 cm in height is usually used for planting, slightly larger planting stock will be used for the project sites in view of the restricted area and early restoration of these sites.	<p>75%</p> <p>In Japan the standard rate is some 72% (85% at the transplanting stage □ 85% at out-planting stage) for Sugi and 62% (85% at the transplanting stage □ 68% at the out-planting stage) for Hinoki. In the Project, pots will be used which increase the survival rate of seedlings and, therefore, a standard survival rate of 75% will be adopted.</p>

## (2) Planting Work

### 1) Planting Method

Given the fact that the subject sites for planting under the Project are national parks, a relatively small planting unit will be necessary instead of the commonly practiced uniform planting (mainly in the form of line planting) over a large area. Accordingly, four planting methods, i.e. under-planting, nest planting (group planting), line planting and belt planting, will be employed to suit the specific local conditions. The mixed planting of different species will not be conducted as the faster growth of some species could suppress the growth of others, negating the positive effects of mixed planting. Instead, planting involving the same species will be conducted in groups in small areas.

#### Under-Planting

The planting stock will be planted in shaded places, such as under large diameter trees which have been killed by fire and under live standing trees around which the number of seedlings and saplings is small due to ground fire. The standard planting distance will be 3m  $\square$  3m (1,111 seedlings per ha).

#### Nest Planting (Group Planting)

The planting stock will be planted in groups (in a circular fashion) at treeless sites. Four trees will be planted in a unit area of 5m  $\square$  5m, resulting in a planting density of 1,600 trees/ha.

#### Line Planting

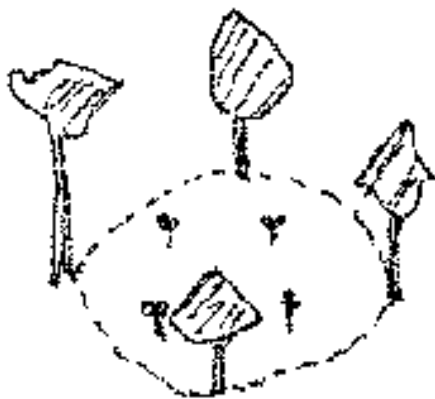
The planting stock will be planted in lines with a certain distance between them at regular intervals. The planting density will be 833 trees/ha based on a distance of 3m between the planted trees and 4m between the lines.

#### Belt Planting

In order to create a firebreak tree belt, 3,000 planting stock will be planted per hectare with a planting distance of 2m  $\square$  2m for a 10m wide belt.



(1) Under-Planting



(2) Nest Planting (Group Planting)



(3) Line Planting



(4) Belt Planting  
(Creation of Firebreak Tree Belts)

Fig. 2-3-1 Planting Methods

Table 2-3-4 Planting Method and Planting Density by Type of Planting Stock

Planting Method	trees/ha (spacing)		
	Cuttings	Seedlings	Wildlings
Under-Planting	1,111 (3m □ 3m)	1,111 (3m □ 3m)	1,111 (3m □ 3m)
Nest Planting (group planting)	1,600 (four per nest) (nest: 5m □ 5m)	1,600 (four per nest) (nest: 5m □ 5m)	1,600 (four per nest) (nest: 5m □ 5m)
Line Planting	833 (3m □ 4m)	833 (3m □ 4m)	833 (3m □ 4m)
Belt Planting (Firebreak tree Belt)	3,000 (2m □ 2m) (six lines)	-	-

## 2) Planting Work

Planting work will involve land preparation, planting and supplementary planting.

### Land Preparation

Mainly land preparation will be manually conducted in the form of clear weeding. Ploughing by a bulldozer will be conducted at Alang-Alang grassland in the Way Kambas National Park because of the strongly imbedded root system of Alang-Alang. *Macaranga tanarius*, a pioneer species, which grows densely at degraded sites by fire in the Kutai National Park will be removed by land preparation work, leaving a suitable number of *Macaranga*, to provide a favourable environment for *Meranti* and other species which require shading at the initial growth stage. As planting will be mainly conducted in the rainy season, land preparation should be scheduled prior to the rainy season, i.e. in the dry season.

Table 2-3-5 Land Preparation Method by Planting Method

Kutai National Park	Way Kambas National Park
- Under-planting: clear weeding (manual weeding)	- Under-planting: clear weeding (manual weeding)
- Nest planting: clear weeding (manual weeding)	- Nest planting: ploughing by bulldozer
- Line planting: belt weeding (manual weeding)	- Line planting: belt weeding (manual weeding and ploughing by bulldozer)
- Belt planting: clear weeding (manual weeding)	- Belt planting: clear weeding (manual weeding and ploughing by bulldozer)



## Planting

Holes of a sufficient size will be dug for planting purposes to avoid damage to the root system of planting stock prior to planting. A suitable planting method will be selected from among under-planting, nest planting, line planting and belt planting based on the planting standards shown in Table 2-3-6 in accordance with the conditions of the planned planting sites.

Table 2-3-6 Selection of Planting Sites to Suit Each Planting Method

Kutai National Park	Way Kambas National Park
<ul style="list-style-type: none"><li>- Under-planting: forest land of a certain size where the upper-story trees, including dead trees, are relatively sparse</li><li>- Nest planting (group planting): relatively gentle slopes</li><li>- Line planting: relatively steep slopes and places with dense <i>Macaranga</i> growth</li><li>- Belt planting: designated firebreak tree belts</li></ul>	<ul style="list-style-type: none"><li>- Under-planting: forest land of a certain size here the upper-story trees, including dead trees, are relatively sparse</li><li>- Nest planting (group planting): Alang-Alang grassland</li><li>- Line planting: sparse to open forest land</li><li>- Belt planting: designated firebreak tree belts</li></ul>

## Supplementary Planting

Supplementary planting involves the additional planting of planting stock where the ratio of dead trees in the originally planted trees, i.e. dead tree ratio, is high due to the poor survival of the planted trees, threatening the successful reestablishment of a forest as before.

Even if the dead tree ratio is above a certain level (15% is used as the yardstick for the Project), supplementary planting will not be conducted at those sites where the surviving trees are evenly distributed and the prospect of successful forest reestablishment as before through the proper implementation of tending work is expected.

The necessity to conduct supplementary planting will be determined by conducting a survey on the state of survival of planted trees within 2 - 3 months of initial planting. If it is already the dry season, supplementary planting will be conducted in the next rainy season.

As there are no reliable standards for supplementary planting in tropical forests, a supplementary planting rate of 15%, which is the national average for reforestation

work in Japan, will be used as the standard supplementary planting rate (usually similar to the dead tree ratio) for the Project.

### 3) Share and Area by Planting Method

Based on the field investigation results, the state of forest fire damage, the state of surviving trees and the topography, etc., the share and area by planting method is decided for each national park.

Table 2-3-7 Share and Area by Planting Method

(Unit: ha)

National Park	Under-Planting	Nest Planting	Line Planting	Belt Planting	Total
Kutai	113 (28%)	113 (28%)	152 (38%)	22 (6%)	400 (100%)
Way Kambas	34 (9%)	172 (48%)	138 (38%)	16 (5%)	360 (100%)
Total	147	285	290	38	760

### (3) Tending Work

After initial planting, such work as watering, weeding and climber cutting must be conducted for a certain period of time to ensure the healthy growth of the planted trees.

As climbers, weeds and pioneer species vigorously grow in the Kutai National Park, various types of tending work will be required in a single growth period, i.e. one year. Given the extraordinary growth of climbers, the implementation of climber cutting separately from weeding will be very important. Watering of the planted trees immediately after planting will be essential during the dry season.

A large part of the Way Kambas National Park is covered by Alang-Alang grassland. The placing of weeded plants tidily along the planting lines will be important as, left unattended, such plants will constitute a contributory factor to forest fire, especially the spread of fire.

In principle, tending work under the Project will be conducted for a period of two years after planting.

The tending standards are outlined in the table below.

Table 2-3-8 Tending Standards

Item	Kutai National Park	Way Kambas National Park
Installation of Shading	None	Number of planted trees $\geq$ 20%
Weeding	One year old planted sites: four times/year Two year old planted sites: four times/year	One year old planted sites: twice/year Two year old planted sites: twice/year
Girdling	At growing sites of <i>Macaranga tanarius</i> ; to be conducted 3 - 6 months after planting	None
Climber Cutting	One year old planted sites: twice/year Two year old planted sites: twice/year	None
Fertiliser Application	Application of guano at a rate of 100 g/tree at one year old planted sites	Application of NPK at a rate of 70 g/tree at one year old planted sites
Watering of Planted Trees	None	Weekly watering at a rate of 300 cc/tree for two months in the dry season of all trees planted in the previous year

### 2.3.2.2 Basic Design for Facilities

The formulation of the basic design for the construction of facilities and the procurement of equipment should take the following issues and conditions into consideration.

#### (1) Construction Method, Equipment and Materials

Building and civil engineering standards employed in Indonesia will be used to ensure proper repair work by the Indonesian side.

#### (2) Basic Plan for Facilities

The facilities to be provided under the Project are described below.

##### 1) Reservoirs

A reservoir will be created using gabions at a river near each project site. The scale should be large enough to supply water for the temporary nurseries and water for initial fire-fighting during the project period and the required amount of water for initial fire-fighting in the post-project period. A water intake will be set up at the reservoir and water will be pumped from the river to the reservoir.

The water intake will be made of concrete, will have a circular shape of 1 m in diameter and 2.5 m in height with an open bottom and will be placed at the riverbed.

Table 2-3-9 Reservoirs

Item	Kutai National Park	Way Kambas National Park
Water Demand of Nursery	24 tons/day	24 tons/day
Water Demand of Temporary Facilities	one ton/day	one ton/day
Water Demand of Fire Cisterns	13.5 tons/cistern □ 5	13.5 tons/cistern □ 5

Water will be freshly supplied to the fire cisterns every 2 - 3 months.

## 2) Patrolling Roads

Patrolling roads will be constructed to patrol the project sites.

Table 2-3-10 Patrolling Roads

Item	Kutai National Park	Way Kambas National Park
Specifications	Footpaths to be created during planting work	Vehicle roads (not gravelled) to allow vehicle traffic during dry season
Quantity	2m wide; 21.6km in total length	10m wide for 3km; 5m wide for 1.4km

## 3) Fire Look-Outs

Fire look-outs will be constructed for the early detection of forest fire at the project sites during the hazardous season for forest fire.

Table 2-3-11 Fire Look-Outs

Item	Kutai National Park	Way Kambas National Park
Specifications	15m high; platform area of 7.3m <sup>3</sup> ; steel-frame structure	15m high; platform area of 7.3m <sup>3</sup> ; steel-frame structure
Quantity	3	2

## 4) Fire Cisterns

Fire cisterns will be installed every 2 km to supply initial fire-fighting water to deal with forest fires at the project sites. Spraying water to everywhere in each project site can be conducted connecting the 3 sets of portable pumps provided with the fire cisterns.

Table 2-3-12 Fire Cisterns

Item	Kutai National Park	Way Kambas National Park
Specifications	3m (L) □ 3m (W) □ 1.5m (H) Capacity: 13.5 tons; RC structure with steel lid	3m (L) □ 3m (W) □ 1.5m (H) Capacity: 13.5 tons; RC structure with steel lid
Quantity	5	5

#### 5) Protection Facilities (Wild Elephant Invasion Prevention Ditch)

A wild elephant invasion prevention ditch will be constructed along three sides of the project site (one side is a paved road from which no elephant invasion takes place) to protect the planted sites.

Table 2-3-13 Protection Facilities (Wild Elephant Incursion Prevention Ditch)

Item	Kutai National Park	Way Kambas National Park
Specifications	None	Manually dug ditch of approximately 2m in depth, 3m in top width and 2.5m in bottom width
Quantity	None	Total length: 5,130m

#### (3) Basic Plan for Temporary Facilities

Facilities which are required for the implementation of the Project and which will be constructed as temporary facilities are listed in Table 2-3-14.

Table 2-3-14 List of Temporary Facilities

Item	Kutai National Park	Way Kambas National Park	Remarks
Temporary Nursery	Annual production volume of planting stock: 400,000 (nursery bed area: 2,760m <sup>2</sup> )	As left	
Water Supply Facilities	To supply water to the temporary nursery	As left	
Temporary Buildings	Temporary office building and warehouse (97.92m <sup>2</sup> ); temporary accommodation building (90.72m <sup>2</sup> ); temporary workshop building (120m <sup>2</sup> )	As left	
Protection Facilities	Barbed wire fencing (1.2m high and 408m long)	Barbed wire fencing (1.2m high and 417m long)	

The planned scale of such temporary facilities as nursery facilities (nursery beds, temporary planting beds and workshop building), administrative facilities (office/accommodation building, warehouse, garage and generator house), power and lighting facilities, water supply facilities (pump and elevated water tank) and septic tanks, etc. is shown in the following tables.

Table 2-3-15- Kutai National Park

(Unit: m<sup>2</sup>)

Item	Calculation of Area	Area
< Nursery Facilities >		
- Nursery Beds	1 block: 12m × 23m (12 beds) = 276	
	10 blocks: 276 × 10 = 2,760	2,760
- Nursery Work Roads	5m wide × (54m + 77m) = 655	
	4m wide × 54m × 2 = 432	
	4m wide × 77m = 308	
	2m wide × 12m × 4 × 2 = 192	
	9m wide × 35m = 315	
	2m wide × 23m = 46	1,948
- Temporary Planting Beds	5m wide × 15m × 2 = 150	150
- Workshop Building	8m wide × 15m = 120	120
< Administrative Facilities >		
- Office/Accommodation Building	7.2m wide × 26.2m = 188.6	188
- Warehouse, Garage and Generator House	6m wide × 25m = 150	150
< Water Supply Facilities >		
- Elevated Water Tank	3m wide × 3m = 9	9
< Septic Tanks >	1m wide × 2.5m × 2	5
< Service Roads >	4m wide × (32 + 52 + 36)m = 480	480
< Others >		2,307
< Total Area of Premises >	70m × 110m long - 9 × 35 ÷ 2 + 23m × 25m = 8,117.5	8,117
Protection Facilities	Barbed wire fencing: 1.2m high × 408m long	

Table 2-3-15- Way Kambas National Park

(Unit: m<sup>2</sup>)

Item	Calculation of Area	Area
< Nursery Facilities >		
- Nursery Beds	1 block: 12m × 23m (12 beds) = 276	
	10 blocks: 276 × 10 = 2,760	2,760
- Nursery Work Roads	5m wide × (54m + 77m) × 2 = 1,310	
	4m wide × 131m = 524	
	2m wide × 12m × 8 = 192	2,026
- Temporary Planting Beds	5m wide × 15m × 2 = 150	150
- Workshop Building	8m wide × 15m = 120	120
< Administrative Facilities >		
- Office/Accommodation Building	7.2m wide × 26.2m = 188.6	188
- Warehouse, Garage and Generator House	6m wide × 25m = 150	150
< Water Supply Facilities >		
- Elevated Water Tank	3m wide × 3m = 9	9
< Septic Tanks >	1m wide × 2.5m × 2 = 5	5
< Service Roads >	4m wide × 17 = 68	68
< Others >		3,281
< Total Area of Premises >	58.5m wide × 149.7m = 8,757.5	8,757
Protection Facilities	Barbed wire fencing: 1.2m high × 417m long	

### 2.3.2.3 Equipment Plan

#### (1) Types and Purpose of Use of Equipment to be Procured

The types and purpose of use of the equipment to be procured are shown in Table 2-3-16.

Table 2-3-16 List of Equipment to be Procured

Type of Equipment	Purpose of Use
Motorcycles	Forest fire patrol
Discharge Hoses and Nozzles	Initial fire-fighting of forest fires
Hose Transporter	Transportation of water pumps and discharge hoses
Water Tank Lorry	Water transportation to water cisterns
Jet Shooters	Front-line fire-fighting
Radio Equipment	Reporting of the sighting of a fire at fire look-outs
Portable Water Pumps	Fire-fighting



Water Intake Hoses	Fire-fighting
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Water pumps will be used to convey water from the water cisterns located at 2km intervals as illustrated in Fig. 2-3-2.

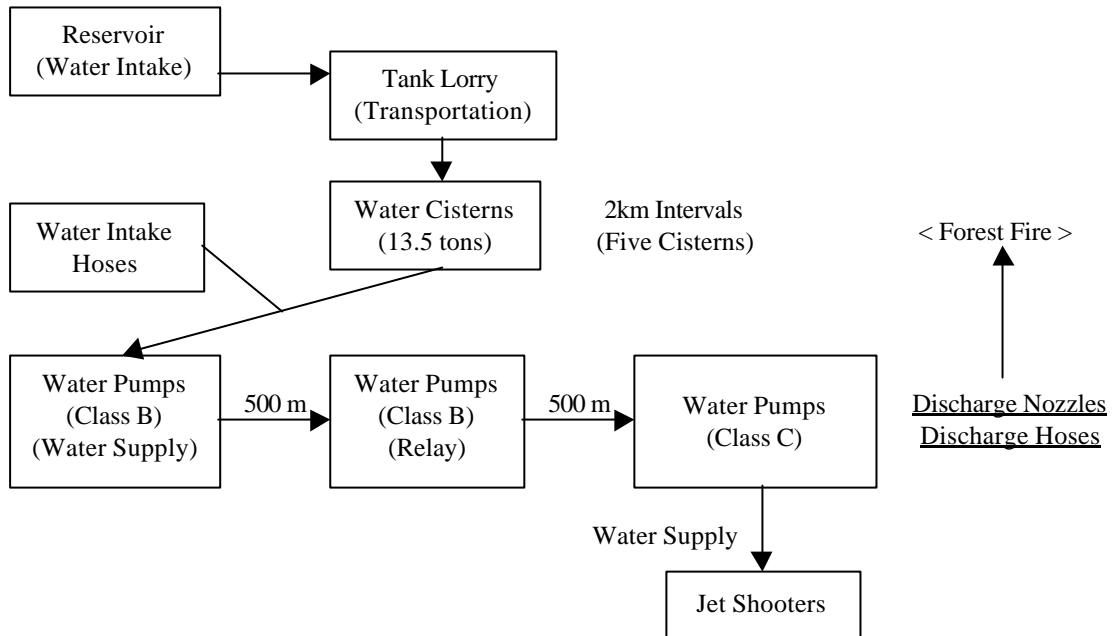


Fig. 2-3-2 Early Fire-Fighting System at National Parks

The dry season with less water availability is the hazardous season for forest fires and, therefore, it is essential for all fire cisterns to be full of water. Water tank lorries will be used to replenish the water in the cisterns. When a fire actually breaks out, water will be directly discharged or supplied to jet shooters using water pumps (capacity: water supply over a distance of 500m; three pumps) and hoses stretching up to 1,000m (20m per reel □ 50 reels), both of which will be transported by a hose transporter. Based on this system, it will be possible to conduct the early fire-fighting of fires within a distance of 1,000m of a nearby water cistern.

## (2) Required Equipment Quantities

The required quantities of the early fire-fighting equipment to be procured under the Project are listed in the table below.

Table 2-3-17 Fire-Fighting Equipment

Item	Specifications	Kutai National Park Office	Way Kambas National Park Office
Motorcycles	125 cc class	3	3
Hose Transporter	4 tons; pump and hose carrying device	1	1
Water Tank Lorry	4 tons with water tank	1	1
Jet Shooters	Backpack water pumps	30	30
Station Radio Equipment	VHF 140 MHZ 40 W	1	1
Vehicle-Mounted Radio Equipment	VHF 140 MHZ 40 W	2	2
Portable Radio Equipment	VHF 140 MHZ 5 W	6	5
Water Pump (Portable)	Engine pump: Class B	1	1
Water Pump (Portable)	- Engine pump (Class B) - Metal gear for water relay	1	1
Water Pump (Portable)	- Engine pump (Class C) - Metal gear for water relay - Hoses (200m □ 10)	1	1
Discharge Hoses	65mm in diameter; 20m in length	50 reels	50 reels
Water Intake Hoses	75mm in diameter; 6m in length	2	2
Discharge Nozzles	65 A insertion type	2	2

### 1) Motorcycles

Each forest ranger office currently has approximately one motorcycle as an official vehicle and this level of provision is insufficient even for regular forest patrols, resulting in patrolling on foot in a limited area or the reliance of forest operation on rented vehicles or rides offered by other vehicle drivers. New motorcycles will be deployed to those bodies in charge of the project sites (forest ranger offices and Rayon offices concerned) to improve the patrolling situation.

Table 2-3-18 Motorcycle Operation Plan

Month	Forest Patrol	Fire Watch	Business Communication	Guidance for Local People	Total
1	10	2	5	3	20
2	10	2	5	3	20
3	10	2	5	3	20
4	10	2	5	3	20
5	15	10	3	3	31
6	15	10	3	2	30
7	15	10	3	3	31
8	15	10	3	3	31
9	15	10	3	2	30
10	15	10	3	3	31
11	10	2	5	3	20
12	10	2	5	3	20
Total	150	72	48	34	304
Annual Operating Rate					83%

During the hazardous season for forest fires, i.e. dry season, motorcycle operation will continue without any break.

## 2) Hose Transporters

Hose transporters will always carry the required quantity of hoses and water pumps in preparation for emergency dispatch. Their deployment is considered necessary as the separation of fire-fighting equipment and transporting vehicles has so far caused delays in dispatch.

Table 2-3-19 Hose Transporter Operation Plan

Month	Fire-Fighting	Stand-By	Total
1	2		2
2	2		2
3	2		2
4	2		2
5	2	29	31
6	2	28	30
7	2	29	31
8	2	29	31
9	2	28	30
10	2	29	31
11	2		2
12	2		2
Total	24	172	196
Annual Operating Rate			54%

Note: An all-day stand-by regime will be introduced in the hazardous season for forest fires, i.e. dry season, from May to October.

### 3) Water Tank Lorries

These vehicles will be used to transport water from reservoirs to water cisterns. Up to the present, mobile tanks (capacity: some 2,000 litres) have been transported to the fire sites on each occasion but each tank only lasts approximately 10 minutes with the use of a portable pump. The introduction of water tank lorries should prove effective to provide additional water.

Table 2-3-20 Water Tank Lorry Operation Plan

Month	Water Transport to Fire Cisterns	Fire-Fighting	Stand-By	Total
1	2	2		4
2				0
3	2	2		4
4				0
5	2	2	27	31
6			30	30
7	2	2	27	31
8			31	31
9	2	2	26	30
10			31	31
11	2	2		4
12				0
Total	12	12	172	196
Annual Operating Rate				54%

Note: An all-day stand-by regime will be introduced in the hazardous season for forest fires, i.e. dry season, from May to October.

### 4) Jet Shooters

Jet Shooters are capable of highly effective fire-fighting with a small amount of water. While each national park office currently possesses some jet shooters (approximately 10 units), there is an absolute shortage vis-a-vis the number of fire-fighters to be dispatched. The minimum requirement is 30 as it is planned to mobilise up to 30 front-line fire-fighters at the time of a forest fire.

### 5) Radio Equipment

One unit for the base station will be provided for the national park office headquarters while two units will be mounted to the hose transporter and water tank lorry. Portable radio equipment (six units for the Kutai National Park and five units for the Way Kambas

National Park) will be placed at fire look-outs (three in the Kutai National Park and two in the Way Kambas National Park) and three carried by patrolmen on motorcycles.

Table 2-3-21 Radio Equipment Operation Plan

Month	Station Radio Equipment	Vehicle-Mounted Radio Equipment	Portable Radio Equipment
1	20	2	20
2	20	2	20
3	20	2	20
4	20	2	20
5	31	31	31
6	30	30	30
7	31	31	31
8	31	31	31
9	30	30	30
10	31	31	31
11	20	2	20
12	20	2	20
Total	304	196	304
Operating Rate	83%	54%	83%

Note: An all-day stand-by regime will be introduced in the hazardous season for forest fires, i.e. dry season, from May to October.

6) Water Pumps (Portable Water Pumps)

These pumps are required to convey water up to a distance of 1,000m from the water cisterns as described earlier.

7) Discharge Hoses

The quantity of hoses has been determined in view of extending the water supply line up to 1,000m using three water pumps.

8) Water Intake Hoses

These hoses are required to intake water from the water cisterns, etc.

9) Discharge Nozzles

These nozzles will be used to discharge water from the water pumps. As they can become easily clogged depending on the water quality, one reserve nozzle will be provided for each nozzle for actual use.

### 3. IMPLEMENTATION PLAN

#### 3.1 Implementation Plan

##### 3.1.1 Implementation Concept

The relationship of the organizations related to project implementation when the Project is implemented as a grant aid project of the Government of Japan is shown below. The project implementation body will be the Directorate General of Nature Protection and Conservation, Ministry of Forestry and Estate Crops and the project implementation body will conclude the relevant agreements with a Japanese consultant and construction company and will execute the undertakings on the Indonesian side as described later to ensure the smooth progress of the Project. The Japanese consultant will be responsible for the detailed design, assistance for tender and work supervision. Reforestation work, facility construction and equipment procurement will be conducted by Japanese companies which are given the relevant orders. Reforestation work and facility construction will be conducted by local reforestation companies, etc. under the guidance of engineers dispatched by Japanese companies.

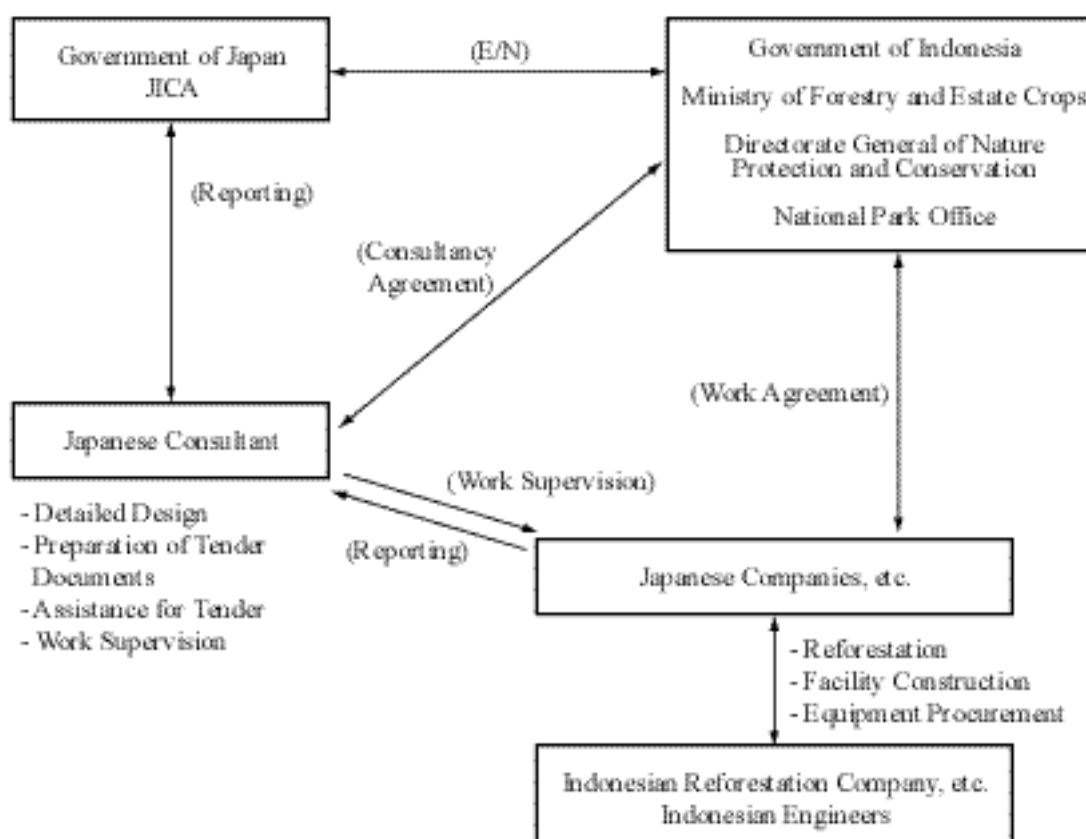


Fig. 3-1-1 Project Implementation Diagramme

Given the fact that there will be two project sites, three Japanese engineers will be assigned to execute the work. Of these three engineers, the senior engineer will be stationed in Jakarta, the capital of Indonesia, to conduct wide-ranging work, from order placement and the procurement of construction equipment and materials to negotiations with the Directorate General of Nature Protection and Conservation, the Consultant and local construction companies. The remaining two engineers will be assigned to the Kutai National Park site and the Way Kambas National Park side to conduct the work at these sites.

### **3.1.2 Implementation Conditions**

The following points must be noted in conducting the actual work.

- For the execution of the work, it will be necessary to recruit skilled workers and engineers from such cities as Jakarta, Samarinda, Balikpapan and Bandar Lampung and non-skilled workers from local areas where the project sites are located. In general, however, local companies lack sufficient capability in terms of technical expertise, finance and organizational structure to satisfy the requirements under the Japanese grant aid scheme. Japanese engineers must, therefore, provide proper technical guidance and work supervision in regard to local construction companies.
- In regard to equipment procurement, careful determination of the procurement timing together with appropriate quality control is essential.
- In the case of the local recruitment of workers, the local community must be fully consulted to ensure a harmonious work relationship with the said community.

### **3.1.3 Scope of Works**

The scope of work between the Japanese side and the Indonesian side for the implementation of the Project under the grant aid scheme of the Government of Japan is shown in Table 3-1-1.



Table 3-1-1- Scope of Work

Type of Work	Japanese Side	Indonesian Side
(1) Nursery Practices	<ol style="list-style-type: none"> <li>1) Procurement of seeds, etc.</li> <li>2) Nursery Practices</li> <li>3) Out planting of planting stock</li> </ol>	<ol style="list-style-type: none"> <li>1) Provision of nursery sites</li> <li>2) Authorisation of procurement of seeds, etc.</li> </ol>
(2) Planting	<ol style="list-style-type: none"> <li>1) Decision on planting sites</li> <li>2) Decision on planting species</li> <li>3) Land Preparation</li> <li>4) Digging of planting holes</li> <li>5) Transportation of planting stock</li> <li>6) Planting</li> <li>7) Supplementary planting</li> </ol>	<ol style="list-style-type: none"> <li>1) Witnessing of planting work</li> <li>2) Prevention of incursion by local people and domestic animals, etc. to the planting sites at the time of planting work</li> </ol>
(3) Tending	<ol style="list-style-type: none"> <li>1) Fertiliser application and watering</li> <li>2) Weeding</li> <li>3) Climber cutting</li> <li>4) Girdling</li> <li>5) Erection of shading</li> </ol>	<ol style="list-style-type: none"> <li>1) Witnessing of tending work</li> <li>2) Tending after the end of the project period (at some planted sites)</li> <li>3) Prevention of incursion by local people and domestic animals, etc. to the planted sites at the time of tending work</li> </ol>
(4) Forest Management		<ol style="list-style-type: none"> <li>1) Preparation of forest management plan</li> <li>2) Forest patrols</li> <li>3) Fire watch</li> <li>4) Initial fire-fighting</li> <li>5) Proper response to damage caused by extraordinary drought or other events beyond control</li> <li>6) Promotion of participatory national park management</li> </ol>
(5) Training and Extension	<ol style="list-style-type: none"> <li>1) Initial fire-fighting training using the equipment provided</li> <li>2) OJT on nursery techniques</li> <li>3) OJT on planting and tending techniques</li> <li>4) Extension through indicating demonstration forest, etc.</li> </ol>	<ol style="list-style-type: none"> <li>1) Promotion of work safety measures among supervisors and extension workers</li> <li>2) Training of equipment operators on work safety</li> <li>3) Extension of reforestation techniques through demonstration forest, etc.</li> </ol>
(6) Construction of Facilities <ol style="list-style-type: none"> <li>1) Fire Look-Outs</li> <li>2) Fire Cisterns</li> <li>3) Reservoirs</li> <li>4) Firebreak Tree Belts</li> <li>5) Patrolling Roads</li> <li>6) Wild Elephant Incursion Prevention Ditches</li> </ol>	<ol style="list-style-type: none"> <li>1) Construction of fire look-outs</li> <li>2) Construction of fire cisterns</li> <li>3) Construction of reservoirs</li> <li>4) Creation of firebreak tree belts</li> <li>5) Construction of patrolling roads</li> <li>6) Construction of wild elephant incursion prevention ditches</li> </ol>	<ol style="list-style-type: none"> <li>1) Maintenance of fire look-outs</li> <li>2) Water supply to fire cisterns and regular changing of the water</li> <li>3) Maintenance of reservoirs by removal of unwanted soil and other means</li> <li>4) Maintenance of firebreak tree belts</li> <li>5) Maintenance of patrolling roads by means of weeding, etc.</li> <li>6) Maintenance of wild elephant incursion prevention ditches by removal of unwanted soil and other means</li> </ol>

Table 3-1-1- Scope of Work

Type of Work	Japanese Side	Indonesian Side
(7) Temporary Structures 1) Temporary Nurseries 2) Water Supply Facilities 3) Temporary Office Building and Warehouse, etc. 4) Temporary Accommodation Building 5) Temporary Workshop Building 6) Protection Facilities	1) Construction of temporary nurseries 2) Construction of water supply facilities 3) Construction of temporary office building and warehouse, etc. 4) Construction of temporary accommodation building 5) Construction of temporary workshop building 6) Construction of barbed wire fencing	
(8) Procurement of Initial Fire-Fighting Equipment	1) Motorcycles 2) Hose transporters 3) Water tank lorries 4) Fire pumps, hoses and nozzles 5) Jet shooters 6) Radio equipment	1) Tax exemption for procured equipment and customs clearance 2) Payment of equipment operating cost 3) Establishment of equipment storage places
(9) General Work	1) Maritime and inland transportation of construction equipment, vehicles and other equipment	1) Provision of project sites 2) Removal of obstructive structures at project sites 3) Application for permission, etc. required for Project-related work; permission for construction of temporary roads to transport construction equipment and materials; permission to obtain soil needed. 4) Customs clearance of construction equipment, vehicles and other equipment and their accessories 5) Exemption of Japanese nationals involved in the Project from taxes and levies 6) Provision of funds, equipment, fixtures and furniture, etc. required for the effective use of facilities and equipment 7) Banking arrangements, including authorisation of payment in connection with the implementation of the Project
(10) Work Supervision	1) Inspection and authorisation of drawings, etc. 2) Guidance on planting and equipment procurement 3) Reporting on the progress of planting and equipment procurement 4) Cooperation for payment authorisation process 5) Completion inspection and quality inspection	1) Witnessing of inspection at various stages and issue of inspection certificate as well as completion certificate

### **3.1.4 Consultant Supervision**

Work supervision will be conducted by the Japanese consultant in accordance with the relevant agreement concluded with the Directorate General of Nature Protection and Conservation, the project implementation body, following the signing of the E/N by the Government of Japan and the Government of Indonesia.

The consultant will maintain close contact with the Indonesian side as required, accurately establish the state of work at each site, control the work processes to ensure the smooth as well as rational progress of the work as planned (process control) and check the precise structure and dimensions as required by the design drawings and specifications (quantity control) as well as the quality and strength of the completed facilities, etc. to meet their requirements (quality control). Moreover, the consultant will enforce strict safety control to prevent accidents during the work implementation period. Supervision of the planting work will be conducted to ensure (i) the production of high quality planting stock, (ii) an excellent state of survival of the planted seedlings based on their planting as planned and (iii) the progress of tending work as planned. The state of survival of the planted trees will be determined by conducting a reconnaissance survey at planted sites to visually observe the following points.

- Uniform state of growth of the planted trees

- Any localised abnormality in tree growth

- Any abnormal growth by species

- Survival of a sufficient number of planted trees to successfully reestablish a forest as before

Given the large variety of the work, each type of which demands professional skills, the work supervision regime will consist of one engineer in the field of reforestation and one engineer in the civil engineering and architecture fields. These engineers will be controlled by a chief consultant. All engineers will conduct spot supervision, particularly during planting work, in view of the scale and contents of the planned work. Completion inspection will be conducted for each type of work and, in the case of reforestation work, the handing over to the Indonesian side will take place when each of the planting, supplementary planting and tending work is completed.

### **3.1.5 Procurement Plan**

The equipment and materials required for the work under the Project will, in principle, be procured in Indonesia as long as their quality and supply of the required quantities are satisfactory. The main equipment and materials to be procured in Indonesia are listed below.

- Primary products produced in Indonesia: sand, gravel and crushed stone, etc.
- Secondary products produced in Indonesia: cement, concrete blocks and roofing slates, etc.
- Processed products of which the raw materials are imported: parts of steel frames and reinforcing bars, sashes (window frames) and wood products, etc.
- Imported products (which are readily available in the domestic market): nursery tools (sieves, high branch shears, atomizer, pot soil mixer, pruning shears, watering cans and transplanting trowels, etc.); planting tools (boundary posts, tape-measures and poles, etc.)

### **3.1.6 Implementation Schedule**

Following the signing of the E/N by the Government of Japan and the Government of Indonesia, the Japanese side will conduct its assigned work, consisting of the detailed design, construction, procurement (facility construction, equipment procurement and reforestation), and will require 40 months in accordance with the implementation schedule shown in the table below.

### 3.1.6.1 Project Implementation Schedule

Table 3-1-2- Work in Phase 1

Type of Work	Kutai National Park	Way Kambas National Park
Construction of Facilities (to be completed in four months)	Construction of a reservoir	Construction of a reservoir, patrolling roads (10m wide road for 3km and 5m wide road for 1.4km)
Temporary Facilities (to be completed in four months)	Construction of a temporary nursery (annual planting stock production volume of 400,000 and a nursery bed area of 2,760m <sup>2</sup> ); ground clearance of the nursery site (8,177m <sup>2</sup> )	Construction of a temporary nursery (the same scale as left); ground clearance of the nursery site (8,757m <sup>2</sup> )
	Construction of water supply facilities (from reservoir to nursery)	Construction of water supply facilities (from reservoir to nursery)
	Construction of barbed wire fencing (408m in length) as protection facilities for the temporary nursery	Construction of barbed wire fencing (417m in length) as protection facilities for the temporary nursery
Equipment Procurement (to be completed in four months)	Procurement of motorcycles (3), hose transporter (1), water tank lorry (1), fire pumps (3), hoses and nozzles (required quantity), radio equipment (one base station unit, two vehicle-mounted units and six portable units) and jet shooters (30)	Procurement of motorcycles (3), hose transporter (1), water tank lorry (1), fire pumps (3), hoses and nozzles (required quantity), radio equipment (one base station unit, two vehicle-mounted units and five portable units) and jet shooters (30)

Table 3-1-2- Work in Phase 2

Type of Work	Kutai National Park	Way Kambas National Park
Construction of Facilities	Construction of fire look-outs (3) and fire cisterns (5) in six months	Construction of fire look-outs (2) and fire cisterns (5), and wild elephant incursion prevention ditches (5,130m) in six months
	Creation of firebreak tree belt (10m wide and 22ha) by planting (two months for land preparation and a further two months for planting)	Creation of firebreak tree belt (10m wide and 16ha) by planting (two months for land preparation and a further two months for planting)
Temporary Structures	Construction of a temporary office building and warehouse, etc. (97.92m <sup>2</sup> ), temporary accommodation building (90.72m <sup>2</sup> ) and temporary workshop building (120m <sup>2</sup> ) in six months	Construction of a temporary office building and warehouse, etc. (97.92m <sup>2</sup> ), temporary accommodation building (90.72m <sup>2</sup> ) and temporary workshop building (120m <sup>2</sup> ) in six months
Reforestation	Production of Planting Stock	Number of out-planting stock: 380,000
	Land Preparation	50ha (22ha for firebreak tree belt)
	Planting	50ha (22ha for firebreak tree belt)
	Supplementary Planting	Subject area: 50ha (22ha for firebreak tree belt)
	Weeding	22ha □ 4 times (firebreak tree belt)
	Climber Cutting	22ha □ twice (firebreak tree belt)
	Work Period	16 months

Table 3-1-2- Work in Phase 3

Type of Work		Kutai National Park	Way Kambas National Park
Reforestation	Production of Planting Stock	Number of out-planting stock: 200,000	Number of out-planting stock: 160,000
	Land Preparation	350ha	310ha
	Planting	350ha	310ha
	Supplementary Planting	Subject area: 350ha	Subject area: 310ha
	Weeding	22ha □ 4 times (firebreak tree belt) 28ha □ 8 times 200ha □ 8 times 150ha □ 4 times	16ha □ twice (firebreak tree belt) 34ha □ 4 times 200ha □ 4 times 110ha □ twice
	Climber Cutting	22ha □ twice (firebreak tree belt) 28ha □ 4 times 200ha □ 4 times 150ha □ twice	None
	Work Period	28 months	28 months

Table 3-1-3- Project Implementation Schedule (Phase 1: Kutai National Park)

Month Sequence	1	2	3	4	5	6	7	8	9	10	11	12	13
Cabinet Meeting													
Signing of E/N													
Consultancy Contract													
Field Survey													
Work in Japan													
Tender and Contract													
Construction Work													
Equipment Procurement													

Table 3-1-3- Project Implementation Schedule (Phase 2: Kutai National Park)

Month Sequence	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Cabinet Meeting																							
Signing of E/N																							
D/D																							
Tender and Contract																							
Production of Planting Stock																							
Land Preparation																							
Planting																							
Supplementary Planting																							
Weeding																							
Climber Cutting																							
Construction of Facilities																							

Note: Weeding: four times/year □ two years = eight times/site; climber cutting: twice/year □ two years = four times/site



Table 3-1-3- Project Implementation Schedule (Phase 3: Kutai National Park)

Month Sequence	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
Cabinet Meeting																																					
Signing of E/N																																					
D/D			<div></div>	<div></div>																																	
Tender and Contract																																					
Production of Planting Stock													<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Land Preparation								<div></div>	<div></div>										<div></div>	<div></div>																	
Planting										<div></div>	<div></div>											<div></div>	<div></div>														
Supplementary Planting																						<div></div>	<div></div>												<div></div>	<div></div>	
Weeding													<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Climber Cutting													<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>

Note: Weeding: 4 times/year □ two years = eight times/site; climber cutting: twice/year □ two years = four times/site

Table 3-1-4- Project Implementation Schedule (Phase 1: Way Kambas National Park)

Month Sequence	1	2	3	4	5	6	7	8	9	10	11	12	13
Cabinet Meeting													
Signing of E/N													
Consultancy Contract													
Field Survey													
Work in Japan													
Tender and Contract													
Construction Work (including temporary structures)													
Equipment Procurement													

Table 3-1-4- Project Implementation Schedule (Phase 2: Way Kambas National Park)

Month Sequence	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Cabinet Meeting																							
Signing of E/N																							
D/D			<div></div>	<div></div>																			
Tender and Contract																							
Production of Planting Stock								<div></div> <b>16ha + 34ha + 200ha (60,000+40,000+290,000 stocks)</b>															
Land Preparation								<div></div> <b>16ha</b>									<div></div> <b>34ha</b>						
Planting										<div></div> <b>16ha</b>									<div></div> <b>34ha</b>				
Supplementary Planting																			<div></div> <b>16ha + 34ha (50ha)</b>				
Weeding													<div></div> <b>16ha (twice)</b>										
Construction of Facilities								<div></div>															

Note: Weeding: twice/year □ two years = four times/site

Table 3-1-4- Project Implementation Schedule (Phase 3: Way Kambas National Park)

Month Sequence	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
Cabinet Meeting																																					
Signing of E/N																																					
D/D			<u><u>          </u></u>																																		
Tender and Contract																																					
Production of Planting Stock													<u><u>110ha (160,000 stocks)</u></u>																								
Land Preparation								<u><u>200ha</u></u>											<u><u>110ha</u></u>																		
Planting										<u><u>200ha</u></u>												<u><u>110ha</u></u>															
Supplementary Planting																						<u><u>200ha</u></u>													<u><u>110ha</u></u>		
Weeding													<u><u>16ha (twice) + 34ha (4 times) + 200ha (4 times) + 110ha (twice)</u></u>																								

Note: Weeding: twice/year □ two years = four times/site

### **3.1.7 Obligation of Recipient Country**

The division of work between the Japanese side and the Indonesian side for the Project is already shown in Table 3-1-1. The authorities concerned in the Indonesian side are required to execute the necessary undertakings in each own responsibilities without delay in each process at the project implementation. The work to be undertaken by the Indonesian side is detailed below.

- Agreement with the Japanese consultant company in accordance with the E/N
- Agreement with the Japanese company to contract out the work in accordance with the E/N
- Banking arrangements with a foreign exchange bank in Japan for payment of contract deposits and issue of payment authorization following the signing of agreements mentioned above
- Payment commissions to a bank of Japan for the banking services based on the banking arrangements of the Indonesian side
- Institutional arrangement for the project implementation including shifting the personnel required for work supervision
- According the entry permits into Indonesia and the long-term stay permits to the Japanese nationals whose services may be required in connection with the agreements with the Japanese consultant and the Japanese contractor for the performance of their work
- Securing of project sites immediately following the signing of agreement with the Japanese contractor
- Application for permissions for construction of the roads required for transporting construction equipment and materials
- Tax exemption of construction equipment and materials and the equipment to be procured
- Prompt customs clearance of the equipment and materials imported from Japan and payment of the fees required for the customs clearance
- Witnessing of inspection at various stages
- Issuing inspection certificates as well as completion certificates

- Exemption of Japanese Nationals from Taxes and Levies

Appropriate measures should be taken by the Indonesian side to exempt Japanese nationals working for the Japanese consultant and other companies with a contract related to the implementation of the Project from taxes and levies which may otherwise be imposed during their stay in Indonesia.

- Provision of Money, Equipment, Fixtures and Furniture, etc. Required for Effective Use of Facilities and Equipment

The necessary budgetary arrangements for the effective use of the facilities constructed and equipment procured under the Project in the post-Project period must be made together with the provision of equipment, fixtures and furniture, etc. which may be required for the same purpose.

### 3.1.8 Volume of Reforestation Work

The volume of reforestation work to be conducted in accordance with the Basic Plan for Reforestation is described in this section.

#### 3.1.8.1 Reforestation Work by Phase

The planned volume of reforestation work by national park and also by planting method is shown in the tables below.

Table 3-1-5- Planned Planting Volume for Kutai National Park

(Unit: ha)

Category	Phase 1	Phase 2	Phase 3	Total
Firebreak tree Belt	0	22.0	0	22.0
Under-Planting	0	8.4	105	113.4
Nest Planting	0	8.4	105	113.4
Line Planting	0	11.2	140	151.2
Total	0	50.0	350	400.0

Table 3-1-5- Planned Planting Volume for Way Kambas National Park

(Unit: ha)

Category	Phase 1	Phase 2	Phase 3	Total
Firebreak tree Belt	0	16.0	0	16.0
Under-Planting	0	3.4	31	34.4
Nest Planting	0	17.0	155	172.0
Line Planting	0	13.6	124	137.6
Total	0	50.0	310	360.0

Table 3-1-5- Total Planned Planting Volume by Phase

(Unit: ha)

Category	Phase 1	Phase 2	Phase 3	Total
Firebreak tree Belt	0	38.0	0	38.0
Under-Planting	0	11.8	136	147.8
Nest Planting	0	25.4	260	285.4
Line Planting	0	24.8	264	288.8
Total	0	100.0	660	760.0

### 3.1.8.2 Planned Production Volume of Planting Stock

The production volume of planting stock required for the planting plan by phase is shown in the tables below based on a survival rate of 75% and a supplementary planting rate of 15%.

Table 3-1-6- Required Volume of Planting Stock for Kutai National Park

(Unit: 1,000 planting stock)

Category	Phase 1	Phase 2	Phase 3	Total
Firebreak tree Belt	0	76	0	76
Under-Planting	0	89	57	144
Nest Planting	0	125	83	208
Line Planting	0	87	58	145
Total	0	375	198	573

Table 3-1-6- Required Volume of Planting Stock for Way Kambas National Park

(Unit: 1,000 planting stock)

Category	Phase 1	Phase 2	Phase 3	Total
Firebreak tree Belt	0	55	0	55
Under-Planting	0	30	14	44
Nest Planting	0	215	101	316
Line Planting	0	90	43	133
Total	0	390	158	548



Table 3-1-6- Total Requirement for Planting Stock by Phase

(Unit: 1,000 planting stock)

Category	Phase 1	Phase 2	Phase 3	Total
Firebreak tree Belt	0	131	0	131
Under-Planting	0	117	71	188
Nest Planting	0	340	184	524
Line Planting	0	177	101	278
Total	0	765	356	1,121

### 3.1.8.3 Planting and Tending Work Volume

The planting work volume by national park, type of work and phase under the Project is shown in the following tables.

Table 3-1-7- Planting and Tending Work Volume for Kutai National Park

(Unit: ha)

Item	Phase 1	Phase 2	Phase 3	Total
< Planting >				
- Land Preparation	0	50	350	400
- Planting	0	50	350	400
- Supplementary Planting (candidate sites)	0	50	350	400
Planting Work Total	0	150	1,050	1,200
< Tending >				
- Weeding				
One year old (four times)	0	88	600	688
Two years old (four times)	0	0	1,912	1,912
- Climber Cutting				
One year old (twice)	0	44	300	344
Two years old (twice)	0	0	956	956
Tending Work Total		132	3,768	3,900
Work Total	0	282	4,818	5,100

Table 3-1-7- Planting and Tending Work Volume for Way Kambas National Park

(Unit: ha)

Item	Phase 1	Phase 2	Phase 3	Total
< Planting >				
- Land Preparation	0	50	310	360
- Planting	0	50	310	360
- Supplementary Planting (candidate sites)	0	50	310	360
Planting Work Total	0	150	930	1,080
< Tending >				
- Weeding				
One year old (twice)	0	32	220	252
Two years old (twice)	0	0	968	968
Tending Work Total	0	32	1,188	1,220
Work Total	0	182	2,118	2,300

## 3.2 Project Cost Estimation

### 3.2.1 Cost to be Borne by Indonesian Side

The required funding by the Indonesian side during the project period is listed below. The cost to be borne by the Indonesian side during the project period will arise from forest patrols, fire watching and initial fire-fighting measures, all of which will be required to protect the planted sites from forest fire. To be more precise, this cost is divided into the personnel cost and the management cost of the equipment to be provided as shown in the following table.

#### (1) Overall Cost

The overall cost to be borne by the Indonesian side is estimated to be Rp 527 million (approximately ¥8.3 million) and the breakdown of this cost is shown in the table below.

Table 3-2-1 Cost to be Borne by Indonesian Side (Overall Cost)

(Unit: Rp 1,000)

Cost Item	1st Year (4 months)	2nd Year (12 months)	3rd Year (12 months)	4th Year (12 months)	Total
Personnel	13,440	135,072	135,072	135,072	418,656
Equipment Management	10,828	32,484	32,484	32,484	108,280
Total	24,268	167,556	167,556	167,556	526,936

(2) Estimated Project Cost to be Borne by Indonesian Side by National Park

The cost to be borne by the Indonesian side by national park during the project period is shown in the following tables.

1) Kutai National Park

The estimated cost is Rp 297 million (approximately ¥4.7 million) and the breakdown of this cost is shown in the table below.

Table 3-2-2 Cost to be Borne by Indonesian Side (Kutai National Park)

(Unit: Rp 1,000)

Cost Item	1st Year (4 months)	2nd Year (12 months)	3rd Year (12 months)	4th Year (12 months)	Total
Personnel	Drivers (2) = 6,720	78,624	78,624	78,624	242,592
Equipment Management	16,242 $\times$ 4/12=5,414	16,242	16,242	16,242	54,140
Total	12,134	94,866	94,866	94,866	296,732

Annual Personnel Cost

The required number of personnel and the annual personnel cost are shown in the following tables.

Table 3-2-3- Required Number of Personnel for Forest Patrols and Fire Watching

Item	Period	Number of Days	Required Unit Manpower	Aggregate Person-Days
Forest Patrols	Dry Season (6 months)	30 $\times$ 6=180	1.5 persons/day	180 $\times$ 1.5=270
	Normal Patrols (12 months)	3 $\times$ 12=36 (every 10 days)	3 persons/day	36 $\times$ 3=108
Fire Watching	High Dry Season (3 months)	30 $\times$ 3=90	1 person/day/tower	90 $\times$ 1 $\times$ 3=270
Total				648

Table 3-2-3- Required Number of Personnel for Initial Fire-Fighting

Type of Personnel		Hose Transporters	Water Tank Lorries	Fire Pumps	Jet Shooters	Total
Required Number of Personnel	Drivers	1	1			2
	Forest Rangers (Fire-Fighters)	Assistants: 2	Assistants: 2	Pumps: 3 Nozzles: 1	30	38
	Total	3	3	4	30	40
Existing Number of Personnel	Drivers	0	0	-	-	0
	Forest Rangers (Fire-Fighters)	0	0	0	30	30
	Total	0	0	0	30	30
Shortage	Drivers	1	1	-	-	2
	Forest Rangers (Fire-Fighters)	2	2	4	0	8
	Total	3	3	4	0	10

The existing manpower level falls short of the required manpower to fully operate the equipment/vehicles to be provided under the Project by 10 field staff members, such as forest rangers (two drivers and eight forest rangers). While new drivers are required all year round, new forest rangers (fire-fighters) will be required during the hazardous season for forest fires, i.e. the dry season of six months.

Table 3-2-4 Calculation of Annual Personnel Cost

(Rp 28,000/day/person)

Cost Item	Required Number of Persons	Period	Person-Days	Estimated Cost (Rp 1,000)
Forest Patrols	2 (Forest Rangers)	6 months	270	7,560
	2 (Forest Rangers)	12 months	108	3,024
Fire Watching	3 (Forest Rangers)	3 months	270	7,560
Initial Fire-Fighting	8 (Fire-Fighters)	6 months	1,440	40,320
	2 (Drivers)	12 months	720	20,160
Total	17		2,808	78,624

### Annual Equipment Management Cost

The annual equipment management cost is shown in the following table.

Table 3-2-5 Calculation of Annual Equipment Management Cost

Item		Motorcycles	Hose Transporters	Water Tank Lorries	Fire Pumps	Cost Rp 1,000
Quantity (Unit)		3	1	1	3	
Fuel and Oil (Petrol, Gas Oil and Lubricant included)	Consumption (litres/month)	30	100	100	10	
	Period (months)	12	12	12	12	
	Unit Cost (Rp/litre)	1,300	650	650	1,300	
	Cost (Rp 1,000)	1,404	780	780	468	3,432
Maintenance	Base Price (Rp 1,000)	3,000	80,000	120,000	6,000	
	Annual Maintenance Cost Percentage (%)	3	6	6	3	
	Cost (Rp 1,000)	$3 \times 90=270$	4,800	7,200	$3 \times 180=540$	12,810
Total (Rp 1,000)		1,674	5,580	7,980	1,008	16,242

### 2) Way Kambas National Park

The estimated cost is Rp 230 million (approximately ¥3.6 million) and the breakdown is cost is shown in the table below.

Table 3-2-6 Cost to be Borne by Indonesian Side (Way Kambas National Park)

(Unit: Rp 1,000)

Cost Item	1st Year (4 months)	2nd Year (12 months)	3rd Year (12 months)	4th Year (12 months)	Total
Personnel	Drivers (2) = 6,720	56,448	56,448	56,448	176,064
Equipment Management	$16,242 \times 4/12=5,414$	16,242	16,242	16,242	54,150
Total	12,134	71,690	71,690	71,690	230,204

### Annual Personnel Cost

The required number of personnel and the annual personnel cost are shown in the following tables.

Table 3-2-7- Required Number of Personnel for Forest Patrols and Fire Watching

Item	Period	Number of Days	Required Unit Manpower	Aggregate Person-Days
Forest Patrols	Dry Season (6 months)	30 × 6=180	1 person/day	180
	Normal Patrols (12 months)	3 × 12=36 (every 10 days)	1 person/day	36
Fire Watching	High Dry Season (6 months)	30 × 6=180	1 person/day/tower	180 × 2=360
Total				576

Table 3-2-7- Required Number of Personnel for Initial Fire-Fighting

Type of Personnel		Hose Transporters	Water Tank Lorries	Fire Pumps	Jet Shooters	Total
Required Number of Personnel	Drivers	1	1			2
	Forest Rangers (Fire-Fighters)	Assistants: 2	Assistants: 2	Pumps: 3 Nozzles: 1	30	38
	Total	3	3	4	30	40
Existing Number of Personnel	Drivers	0	0	-	-	0
	Forest Rangers (Fire-Fighters)	0	0	4	30	34
	Total	0	0	4	30	34
Shortage	Drivers	1	1	-	-	2
	Forest Rangers (Fire-Fighters)	2	2	0	0	4
	Total	3	3	0	0	6

The existing manpower level falls short of the required manpower to fully operate the equipment/vehicles to be provided under the Project by six field staff members, such as forest rangers (two drivers and four forest rangers). While new drivers are required all year round, new forest rangers (fire-fighters) will be required during the hazardous season for forest fires, i.e. the dry season of six months.

Table 3-2-8 Calculation of Annual Personnel Cost

(Rp 28,000/day/person)

Cost Item	Required Number of Persons	Period	Person-Days	Estimated Cost (Rp 1,000)
Forest Patrols	1 (Forest Ranger)	6 months	180	5,040
	1 (Forest Ranger)	12 months	36	1,008
Fire Watching	2 (Forest Rangers)	6 months	360	10,080
Initial Fire-Fighting	4 (Fire-Fighters)	6 months	720	20,160
	2 (Drivers)	12 months	720	20,160
Total	14		2,016	56,448

## Annual Equipment Management Cost

The annual equipment management cost is shown in the following table.

Table 3-2-9 Calculation of Annual Equipment Management Cost

Item		Motorcycles	Hose Transporters	Water Tank Lorries	Fire Pumps	Cost Rp 1,000
Quantity (Unit)		3	1	1	3	
Fuel and Oil (Petrol, Gas Oil and Lubricant included)	Consumption (litres/month)	30	100	100	10	
	Period (months)	12	12	12	12	
	Unit Cost (Rp/litre)	1,300	650	650	1,300	
	Cost (Rp 1,000)	1,404	780	780	468	3,432
Maintenance	Base Price (Rp 1,000)	3,000	80,000	120,000	6,000	
	Annual Maintenance Cost Percentage (%)	3	6	6	3	
	Cost (Rp 1,000)	3 × 90=270	4,800	7,200	3 × 180=540	12,810
Total (Rp 1,000)		1,674	5,580	7,980	1,008	16,242

## 3.2.2 Estimation Conditions

Date of Estimation : January, 2000

Foreign Exchange Rate : US\$ 1 = ¥106.65, Rp 1 = ¥0.0157

Work Period : The work will be conducted in four years and the detailed design and construction work (and equipment procurement) periods are shown in the work schedule.

Others : The Project will be implemented in accordance with the grant aid scheme of the Government of Japan.

### **3.3 Maintenance Plan**

Both of the project sites have been damaged by fire in the past and are still characterised by a high level of forest fire hazard. Appropriate measures to protect the planted sites which rehabilitated under the Project from future forest fires, and proper maintenance and management work will, therefore, be essential and should be done by the Indonesian side. Moreover, monitoring will be conducted to check the state of maintenance work to ensure the rehabilitation of the degraded sites by forest fire through the necessary tending of the planted trees and also to identify the effects of the Project.

#### **3.3.1 Forest Fire Control Measures**

The following measures will be introduced under the Project to control forest fires.

##### **(1) Forest Patrols and Fire Watch**

###### **1) Intensive Patrols**

Such initial fire-fighting measures as early detection and initial fire-fighting are important to control forest fires. During the season of a high forest fire hazard, i.e. dry season, the intensive patrolling of the project sites will be conducted by staff members (mainly forest rangers) of the National Park Office. For this purpose, patrolling footpaths will be introduced in the Kutai National Park while patrol roads allowing vehicle traffic in the dry season will be introduced in the Way Kambas National Park. The proper maintenance of these roads and footpaths will be necessary by means of the constant clearing of shrubs and grass, etc. to keep them in a usable condition.

###### **2) Fire Watching from Fire Look-Outs**

During the hazardous season for forest fires, i.e. dry season, constant watch from fire look-outs (particularly at night) will be maintained. The location of a fire will be quickly and accurately determined by measuring its direction from at least two fire look-outs to initiate initial fire-fighting activities.

The Kutai National Park project site will be provided with three fire look-outs in view of its narrow but long shape with many undulations while the Way Kambas National Park project site will be provided with two fire look-outs in view of its coherent shape and flat topography.



## (2) Initial Fire-Fighting

As described in 1.3.2.3 - Equipment Plan, initial fire-fighting will be initiated using fire cisterns located at 2km intervals. As the water constantly stored in these cisterns is liable to the propagation of green algae which may impair the working of the fire pumps and which may cause clogging of the fire nozzles, replacement of the water every 2 - 3 months by discharging the old water as part of fire-fighting exercises will be important.

### **3.3.2 Forest Fire Control Regime**

At present, forest patrols are generally conducted on foot, partly because of the lack of roads in forests in these national parks and partly because of the inadequate number of vehicles.

At the time of an emergency (at the time of a forest fire or operation), vehicles may be rented from the private sector. In general, the absolute number of vehicles, including motorcycles, possessed by each National Park Office is insufficient and the reality is that private motorcycles and vehicles used by staff members for commuting are also used for work purposes.

The efficient use of the motorcycles and others to be provided under the Project will, therefore, enable intensive as well as effective forest patrols and initial fire-fighting over a wide area.

Vital lessons have been learned from the forest fires in 1997 and 1998 when a sufficient number of people were mobilised but the transport shortage led to a slow and inadequate response to the fires.

## (1) Forest Patrols and Fire Watching

Regular forest patrols in national parks are mainly conducted by forest rangers (called “Jagawana”) who belong to the respective national park office. These forest rangers are mainly deployed at forest ranger offices (called “Resort”) and branch offices (called “Pos”), both of which are located in conservation areas (called “Rayon”) which are in turn set as different management areas inside each national park.

The present deployment situation of the National Park Office personnel is shown below.

1) Kutai National Park Office

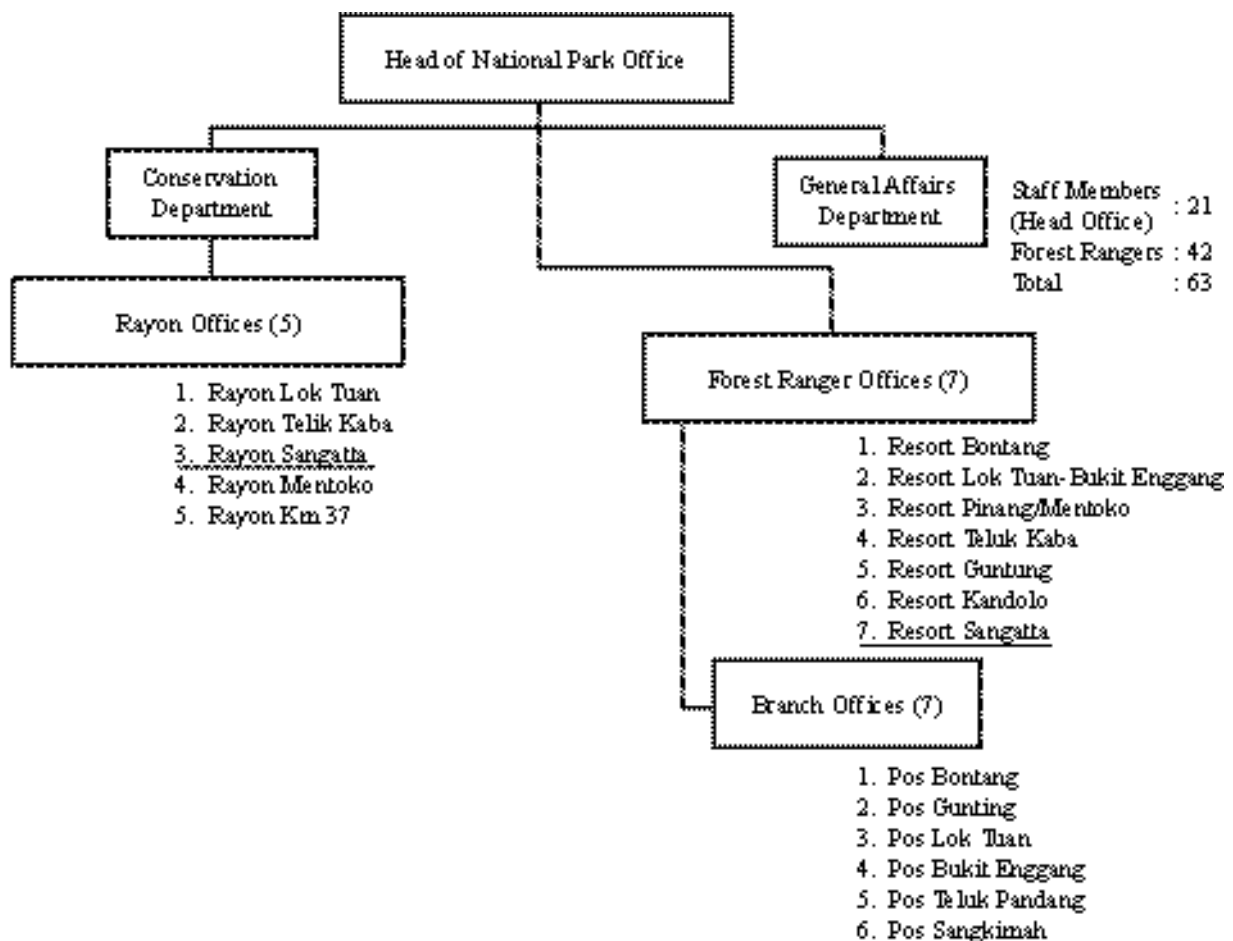


Fig. 3-3-1 Staff Deployment of National Park Office (Kutai National Park)

In general, four forest rangers are deployed at each office. The project site is under the jurisdiction of Resort Sangatta. Eight forest rangers deployed at Resort Sangatta and Pos Sangkimah are engaged in regular forest patrols. New recruitment will be necessary for the proper implementation of the planned forest patrols and forest watch (fire watch) in this area.

#### Forest Patrols

The project site will be encircled by patrolling footpaths and firebreak tree belts as illustrated below. As the east side (sea side) of the national road is a hazardous area for forest fires, patrolling will mainly take place in this area. As there are no inhabitants on the west side (mountain side), forest patrols will be conducted at certain intervals.

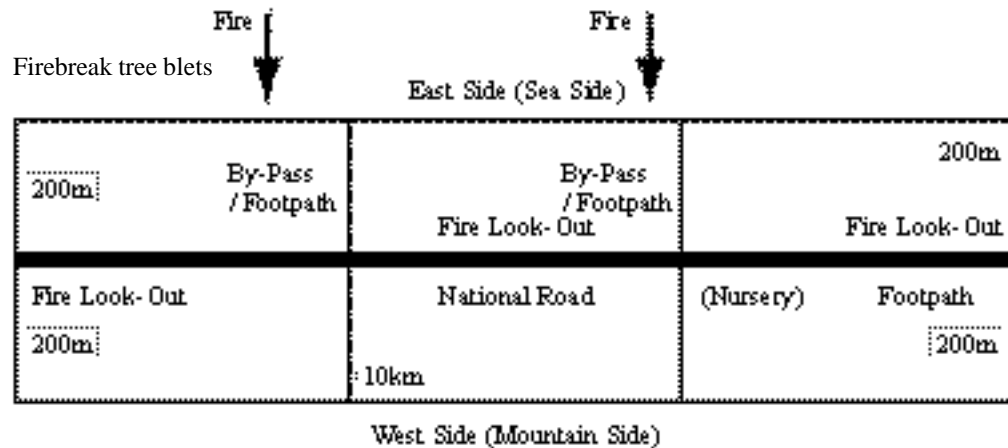


Fig. 3-3-2 Road Layout (Kutai National Park)

The total perimeter length exceeds 20,800m (10,000m + 400m + 10,000m + 400m). Each block divided by a by-pass (and footpath) has a perimeter length of approximately 7km (10,000m footpath ÷ 3 + 200m by-pass + 10,000m national road ÷ 3 + 200m by-pass).

Although motorcycles will be used to reach the project site, patrols inside the site will be conducted entirely on foot. Accordingly, patrolling of the fire hazard area, one side of the project site, will require 1.5 person-days (0.5 person-day in each block × 3) while 3 person-days will be required to patrol the entire site.

#### Forest Watch (Fire Watch)

A constant watch from the five look-outs will be required during the high forest fire hazard season, i.e. particularly the dry season of three months. As regular forest patrolling can meet this requirement during the day, a fire watch by a forest ranger equipped with a radio transmitter will be conducted at each fire look-out at night.

#### Manpower Requirement

The annual manpower requirement to conduct forest patrols and forest watch (fire watch) is shown in Table 3-2-2.

#### Cost

The annual cost of forest patrols and forest watch (fire watch) is shown in the table below.

Table 3-3-1 Required Costs for Forest Patrols and Forest (Fire) Watch  
(Kutai National Park)

Item		Period	Employment Volume (person-days)	Cost (Rp 1,000)
Personnel Cost	Forest Patrols	6 months	270	Rp 28,000 × 270 = 7,560
	Forest Patrols	12 months	108	Rp 28,000 × 108 = 3,024
	Fire Watch	3 months	270	Rp 28,000 × 270 = 7,560
Equipment Management Cost		Motorcycle Fuel		1,404
		Motorcycle Maintenance		270
Total				19,818

2) Way Kambas National Park Office

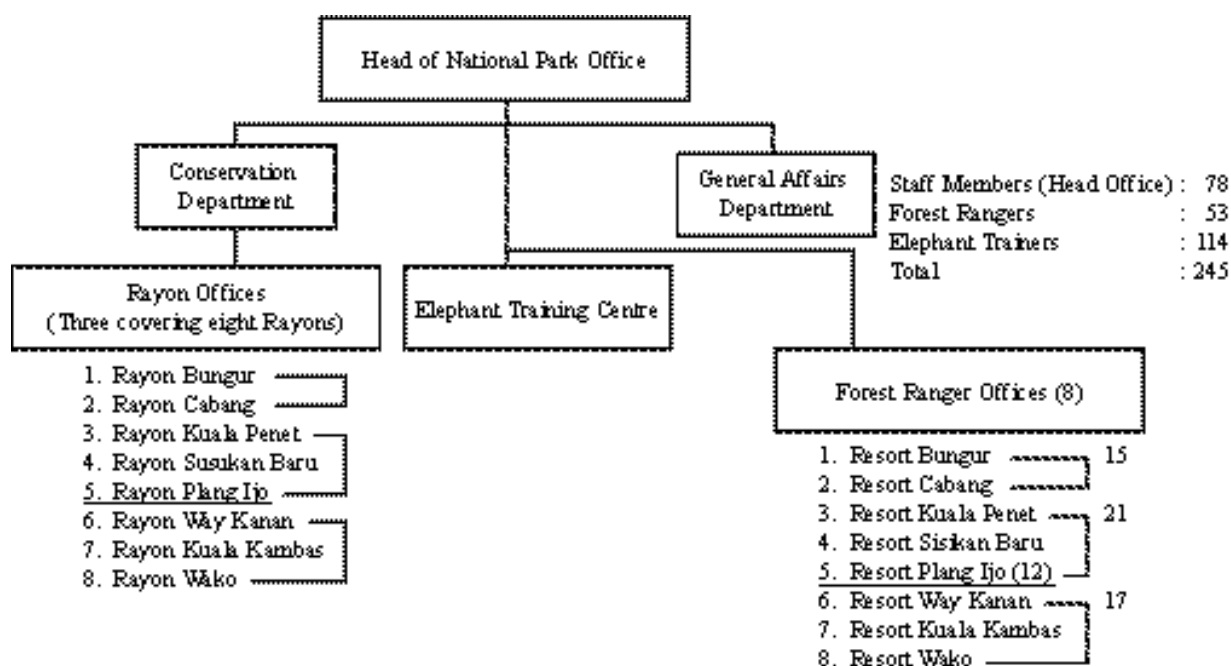


Fig. 3-3-3 Staff Deployment at National Park Office (Way Kambas National Park)

The project site is under the jurisdiction of Rayon Plang Ijo and forest rangers deployed at Resort Plan Ijo are engaged in regular forest patrols. The Elephant Training Centre next to the project site is quite busy with elephant trainers and general visitors. Although 12 forest rangers are deployed in the area, they must conduct their usual work as well as new work, making the recruitment of new staff members necessary.

### Forest Patrols

The forest ranger office in charge of the site is located not far away and is adjacent to the Elephant Training Centre. Patrolling of the entire project site can be conducted by a single forest ranger on a motorcycle using the roads. As the site has distinctive dry and rainy seasons, intensive patrolling will be required during the dry season of six months.

### Forest Watch (Fire Watch)

During the hazardous season for forest fires, i.e. dry season of six months, a fire watch from two fire look-outs will be required at night. During the day, forest fires can be easily detected because there are many people, including visitors to the Elephant Training Centre, in the area. As many fires due to the careless handling of fire start at night, a fire watch from the fire look-outs by watchmen (forest rangers), each equipped with a radio transmitter, will be essential.

### Manpower Requirement

The annual manpower requirement to conduct forest patrols and forest watch (fire watch) is shown in Table 3-2-7- .

### Cost

The annual cost of forest patrols and forest watch (fire watch) is shown in the table below.

Table 3-3-2 Required Costs for Forest Patrols and Forest (Fire) Watch  
(Way Kambas National Park)

Item		Period	Employment Volume (person-days)	Cost (Rp 1,000)
Personnel Cost	Forest Patrols	6 months	180	Rp 28,000 $\times$ 180 = 5,040
	Forest Patrols	12 months	36	Rp 28,000 $\times$ 36 = 1,008
	Fire Watch	6 months	360	Rp 28,000 $\times$ 360 = 10,080
Equipment Management Cost		Motorcycle Fuel		1,404
		Motorcycle Maintenance		270
Total				17,802

## (2) Initial Fire-Fighting Regime

The initial fire-fighting regime at the time of an emergency, i.e. when a fire occurs, involves all staff members of the National Park Office with the chief of the Conservation Department acting as the coordinator with other organizations as shown in Fig.3-3-4 and Fig. 3-3-5. At the initial stage, a fire is mainly dealt with by forest rangers who are engaged in field work among the staff members of the National Park Office responsible for the area in question.

Under the forest fire control regime of the National Park Office, those administrative staff members of the head office are engaged in such work as information gathering, communication and logistics while forest rangers and other field staff are directly engaged in fire-fighting.

### 1) Kutai National Park

#### Forest Fire-Fighting Organization Diagramme

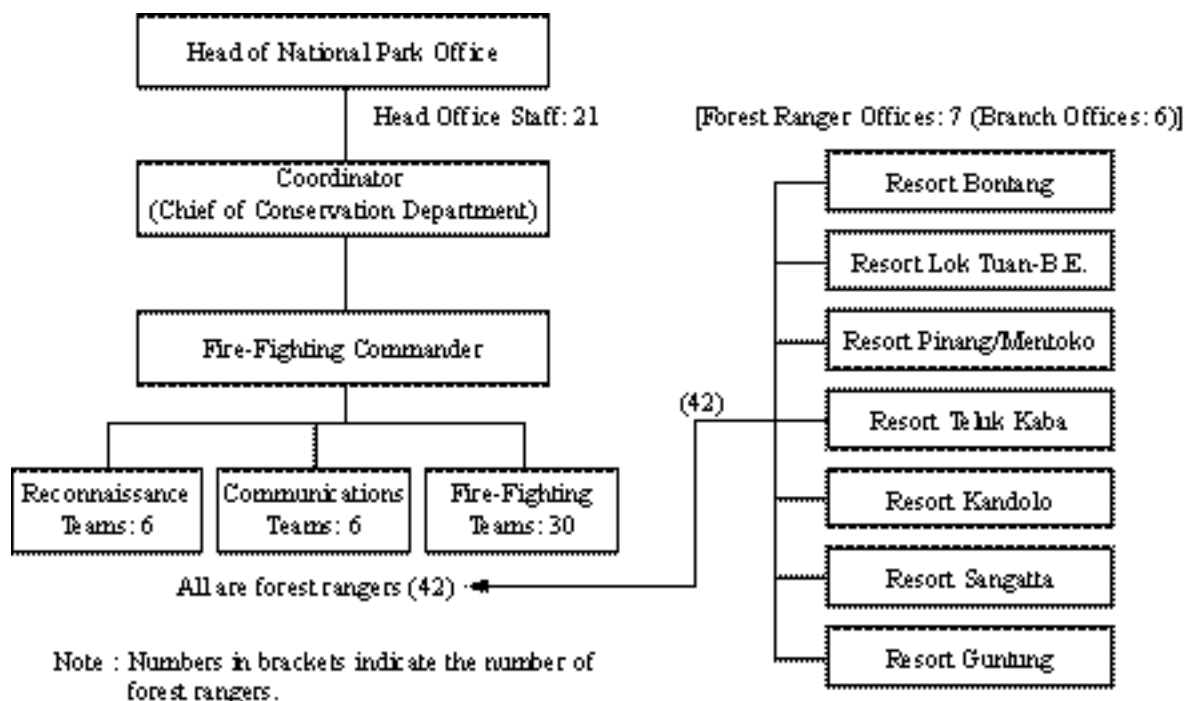


Fig. 3-3-4 Initial Fire-Fighting Regime (Kutai National Park)

#### Manpower

The required manpower to operate the initial fire-fighting equipment to be provided under the Project is shown in Table 3-2-3-. Including existing staff, a total of 10 field staff members, including forest rangers (two drivers and eight forest rangers), will be required to operate the equipment/vehicles to be provided. Drivers will be required all year round to conduct such work as changing the water in the fire cisterns, fire

discharge in fire-fighting exercises and vehicle maintenance in addition to actual driving while forest rangers (fire-fighters) will be required during the hazardous season for forest fires, i.e. the dry season of six months.

#### Cost

The annual initial fire-fighting cost is shown in the table below.

Table 3-3-3 Annual Initial Fire-Fighting Cost

Item		Required Manpower (persons)	Period	Employment Volume (person-days)	Cost (Rp 1,000)
Personnel Cost	Drivers	2	12 months	720	Rp 28,000 × 720 = 20,160
	Forest Rangers (Fire-Fighters)	8	6 months	1,440	Rp 28,000 × 1,440 = 40,320
	Sub-Total	10		2,160	60,480
Equipment Management Cost	Hose Transporter	Fuel & Oil Maintenance	12 months		780 4,800
	Water Tank Lorry	Fuel & Oil Maintenance	12 months		780 7,200
	Fire Pump	Fuel & Oil Maintenance	12 months		468 540
	Sub-Total				14,568
Total		10		2,160	75,048

## 2) Way Kambas National Park

### Forest Fire-Fighting Organization Diagramme

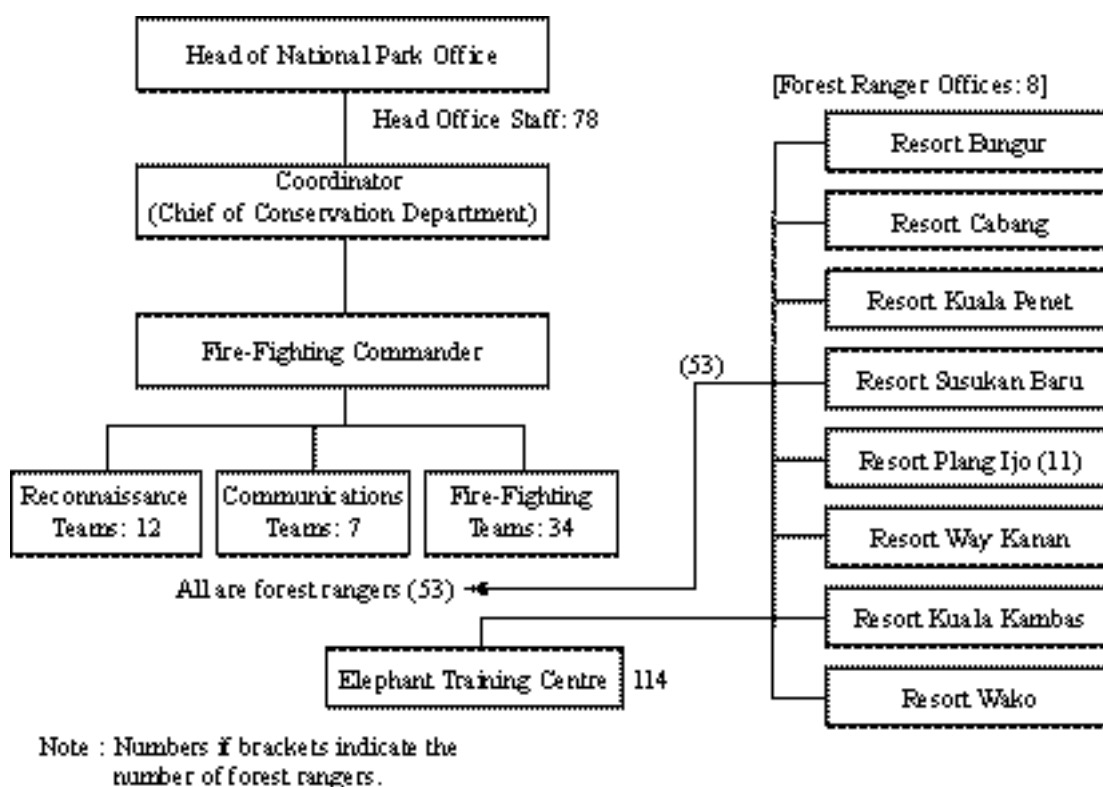


Fig. 3-3-5 Initial Fire-Fighting Regime (Way Kambas National Park)

### Manpower

The required manpower to operate the initial fire-fighting equipment to be provided under the Project is shown in Table 3-2-7-. Including existing staff, a total of six field staff members, including forest rangers (two drivers and four forest rangers), will be required to operate the equipment/vehicles to be provided. Drivers will be required all year round to conduct such work as changing the water in the fire cisterns, fire discharge in fire-fighting exercises and vehicle maintenance in addition to actual driving while forest rangers (fire-fighters) will be required during the hazardous season for forest fires, i.e. the dry season of six months.



### Cost

The annual initial fire-fighting cost is shown in the table below.

Table 3-3-4 Annual Initial Fire-Fighting Cost

Item		Required Manpower (persons)	Period	Employment Volume (person-days)	Cost (Rp 1,000)
Personnel Cost	Drivers	2	12 months	720	Rp 28,000 × 720 = 20,160
	Forest Rangers (Fire-Fighters)	4	6 months	720	Rp 28,000 × 720 = 20,160
	Sub-Total	6		1,440	40,320
Equipment Management Cost	Hose Transporter	Fuel & Oil Maintenance	12 months		780 4,800
	Water Tank Lorry	Fuel & Oil Maintenance	12 months		780 7,200
	Fire Pump	Fuel & Oil Maintenance	12 months		468 540
	Sub-Total				14,568
Total		6		1,440	54,888

### 3) Annual Initial Fire-Fighting Cost

The annual initial fire-fighting cost is totalised in the table below.

Table 3-3-5 Overall Annual Cost of Initial Fire-Fighting

National Park	Employment Volume (person-days)	Personnel Cost (Rp 1,000)	Equipment Management Cost (Rp 1,000)	Total (Rp 1,000)
Kutai	Fire-Fighters (8) : 1,440	40,320	16,242	
	Drivers (2) : 720	20,160	1,674	
	Total : 2,160	60,480	14,568	75,048
Way Kambas	Fire-Fighters (4) : 720	20,160	16,242	
	Drivers (2) : 720	20,160	1,672	
	Total : 1,440	40,320	14,568	54,888
Total	3,600	100,800	29,136 *	129,936

\* The motorcycle cost is included in the forest patrol cost, etc.

### (3) Annual Cost of Forest Fire Control Measures

The annual cost of implementing forest fire control measures for the Kutai National Park and the Way Kambas National Park is shown in the table below.

Table 3-3-6 Overall Annual Cost of Forest Fire Control Measures

(Unit: Rp 1,000)

National Park	Forest Patrols and Forest (Fire) Watch	Initial Fire-Fighting	Total
Kutai	19,818 (approx. ¥310,000)	75,048 (approx. ¥1.18 million)	94,866 (approx. ¥1.49 million)
Way Kambas	17,802 (approx. ¥280,000)	54,888 (approx. ¥0.86 million)	72,690 (approx. ¥1.14 million)
Total	37,620 (approx. ¥590,000)	129,936 (approx. ¥2.04 million)	167,556 (approx. ¥2.63 million)

In short, Rp 95 million (approximately ¥1.5 million) and Rp 73 million (approximately ¥1.14 million) will be required per year for the Kutai National Park and the Way Kambas National Park respectively, totalling Rp 168 million (approximately ¥2.63 million).

### 3.3.3 Maintenance of Planted Sites

The Project will cater for post-planting tending work for two years. Following the end of the project period, however, the various types of tending work shown in the table below will be necessary for one year at the planted sites established during Term 2 in the Phase 3 by the Indonesian side. Tending work in the post-project period will require the assistance of reforestation-related bodies (such as forest offices and the Land Rehabilitation and Soil Conservation Centre, etc.) and/or subcontracting to local reforestation companies.

Meanwhile, the protection of the planted sites from forest fires is part of the regular work of the National Park Office and this task can be achieved by a carefully planned forest patrolling system. It will, however, be necessary to regularly observe the state of tree growth at the rehabilitated sites with a view to evaluating whether or not the rehabilitated national parks under the Project are moving in the intended direction.

(1) Tending Work

1) Work Volume

The volume of tending work to be conducted by the Indonesian side is shown below.

Table 3-3-7 Maintenance of Planted Sites (Tending Work Volume)

National Park	Planted Site	Type of Work	Calculation of Work Volume	Total Work Volume
Kutai	Planted sites of Term 2 in Phase 3 (150ha)	- Weeding - Climber Cutting	150ha □ 4 times 150ha □ 2 times	600ha 300ha
Way Kambas	Planted sites of Term 2 in Phase 3 (110ha)	- Weeding	110ha □ 2 times	220ha
Total		- Weeding - Climber Cutting		820ha 300ha

2) Cost Estimation

The required cost of tending work is estimated in the table below.

Table 3-3-8 Maintenance of Planted Sites (Cost)

National Park	Planted Site	Type of Work	Work Volume (ha)	Labour Cost (Rp/person)	Productivity (person-days per ha)	Cost (Rp 1,000)
Kutai	Planted sites of Term 2 in Phase 3	- Weeding - Climber Cutting	600 300	20,000 20,000	15 9	180,000 54,000
Sub-Total						234,000
Way Kambas	Planted sites of Term 2 in Phase 3	- Weeding	220	20,000	12	52,800
Sub-Total						52,800
Total			1,120			286,800

The estimation results indicate that following the end of the project period, it will be necessary for the Indonesian side to provide some Rp 234 million (approximately ¥3.67 million) for the Kutai National Park and some Rp 53 million (approximately ¥0.83 million) for the Way Kambas National Park, totalling some Rp 287 million (approximately ¥4.5 million) to meet the maintenance cost of the planted sites for at least one year (exchange rate: ¥0.00157 = Rp 1).

## (2) Evaluation of Project Effects and Monitoring Programme

The progress of the Project will be regularly monitored to evaluate whether or not the rehabilitated national parks under the Project is on course to achieve the objectives of the Project. For this purpose, the following surveys will be conducted.

### 1) Forest Rehabilitation Survey

The state of growth of the planted trees will be surveyed at fixed points (plots) in the following manner.

#### Survey Method

- Number of plots : three for each species
- Plot size : 0.05ha (20m × 25m)
- Survey timing : twice a year (dry and rainy seasons)
- Survey items : DBH (cm), tree height (m), number of surviving trees, state of growth (good, fair or bad based on visual observation) and undergrowth (dense, medium or sparse based on visual observation), etc.

#### Survey Sheet (Example)

Name of National Park:

Survey Year:

Plot No.	Survey Date	Name of Surveyor	Tree Species	DBH (cm)	Tree Height (m)	No. of Surviving Trees	State of Growth (Good, Fair or Bad)	Undergrowth (Dense, Medium or Sparse)	Remarks
1									
2									
3									

## Estimation of Annual Cost

Table 3-3-9 Forest Rehabilitation Survey (Outline of Annual Cost)

Item	Quantity	Unit Cost (Rp)	Cost (Rp 1,000)
Surveyor	1 person × 10 days × 2 = 20 person-days	40,000	40 × 20 = 800
Workers	3 persons × 10 days × 2 = 60 person-days	20,000	20 × 60 = 1,200
Transport Cost (1 jeep)	2 return trips × 10 days × 2 = 40 trips	20,000	20 × 40 = 800
Miscellaneous Cost	Twice	50,000	50 × 2 = 100
Total	-	-	2,900

Each national park will require 20 person-days for the surveyor, 60 person-days for workers and a total cost of Rp 2.9 million (approximately ¥50,000) a year to conduct the forest rehabilitation survey.

### 2) Animal Population Survey

Another survey will be conducted to check changes of the population of animals (mammals, birds and insects, etc.) caused by forest rehabilitation.

#### Survey Method

A field reconnaissance survey will be conducted at each project site once a month to visually observe the state of population of animals. In the case of such large animals as oranghutans, the identification of individuals will be important. It is desirable for this survey to be entrusted to a person with academic knowledge. If the survey is to be conducted by staff members of the National Park Office (forest rangers and others), the survey sheet shown below should be used.

## Survey Sheet (Example)

The state of population of animals is recorded in terms of the following categories together with remarks.

: multiple confirmed

: confirmed

□ : habitation inferred (based on droppings and/or traces, etc.)

× : habitation not confirmed

Name of National Park : \_\_\_\_\_

Survey Year : \_\_\_\_\_

Name of Surveyor : \_\_\_\_\_

	Mammals				Birds				Insects				Others		Remarks
Species															
January															
February															
March															
April															
May															
June															
July															
August															
September															
October															
November															
December															

## Estimation of Project Cost

Table 3-3-10 Animal Population Survey (Outline of Annual Survey Cost)

Item	Quantity	Unit Cost (Rp)	Cost (Rp 1,000)
Surveyor	1 person □ 3 days □ 12 months = 36	40,000	40 □ 36 = 1,440
Assistants	2 persons □ 3 days □ 12 months = 72	20,000	20 □ 72 = 1,440
Transport Cost (1 jeep)	2 return trips □ 3 days □ 12 months = 72	20,000	20 □ 72 = 1,440
Miscellaneous Cost	12 times	50,000	50 □ 12 = 600
Total	-	-	4,920

Each national park will require 36 person-days for the surveyor, 72 person-days for assistants and Rp 4.92 million (approximately ¥80,000) a year to complete the survey.

(3) Total Annual Maintenance Cost of Planted Sites

The total annual maintenance cost of the planted sites at the Kutai National Park and the Way Kambas National Park is shown in the table below.

Table 3-3-11 Total Annual Maintenance Cost of Planted Sites

(Unit: Rp 1,000)

National Park	Tending Work (one year only)	Project Evaluation and Monitoring		Total
		Forest Rehabilitation Survey	Animal Population Survey	
Kutai	234,000	2,900	4,920	241,820
Way Kambas	52,800	2,900	4,920	60,620
Total	286,800	5,800	9,840	302,440

## **4. PROJECT EVALUATION AND RECOMMENDATION**

### **4.1 Project Effects**

#### **4.1.1 Beneficial Effects of the Project**

While the Government of Indonesia has been trying to optimise the use of forests by classifying them as production forests, protection forests, and conservation forests and convertible forests, inappropriate cutting, the illegal use of forest land for slash and burn agriculture and the frequent occurrence of forest fires have been causing forest deterioration in terms of both quality and quantity.

In regard to production forests, various measures have been introduced, including the compulsory requirement for those who cut trees to reforest sites to maintain and restore forests, replacing the old practice of cutting and reforestation being conducted by different operators. In regard to protection forests, the prospect of the fostering and utilising these forests for the benefit of local people by means of the introduction of social forestry (community forestry) is under examination. There have been strenuous efforts on the part of the Indonesian government to strengthen the national park offices and natural resources conservation centres/sub-centres for the implementation of positive policies for the maintenance of conservation forests in view of the proper management of national parks and the active preservation of rare wildlife. It was in the second half of the 1970's when the number of conservation forests, including national parks, rapidly increased. The designation of the Kutai National Park and the Way Kambas National Park took place in 1990 and 1989 respectively. At present, there is a total of 32 forest national parks and six oceanic national parks. These are managed by 34 national park offices and natural resources conservation centres. Following such development, the formulation of national park management plans commenced in the 1990's to preserve the biological diversity of forests. However, only a small number of plans have actually been formulated so far, leaving much room for the further improvement of the national park management system.

The recent extraordinary drought caused by the El Niño phenomenon has contributed to the frequent major forest fires, for which burning for ground clearance in preparation for tree planting and also for the development of agricultural plantations and illegal slash and burn agriculture were responsible, inflicting massive damage on forests. Forests damaged by fire include those in national parks which are designated as nature reserves. The forest fire which raged from 1997 to 1998 in particular caused devastating damage to Indonesia's forests.

The natural restoration of forests damaged by artificial causes can no longer be anticipated and there is serious concern in regard to the worsening of the habitat for wildlife.



The Project is designed to rehabilitate the degraded national parks by fires and intends the restoration of the primeval conditions of forests in national parks which has never been attempted before on a project scale. However, the main work of the organization responsible for national park management up to the present has been law enforcement vis-a-vis illegal activities by forest police and has seldom involved activities to maintain forest resources and the forest ecosystem. Meanwhile, forest rehabilitation in national parks demands the use of indigenous species for which there is little experience of reforestation work, from nursery operations to planting and tending, unlike the common species used for general reforestation. As such, the relevant techniques have yet to be firmly established.

For the Project, seedlings and cuttings will be used to produce planting stock. In the case of Dipterocarpaceae of which the collection of seeds is said to be difficult, wildlings will be used to produce the necessary planting stock. Planting in national parks where many regulations exist will be conducted by four methods, i.e. under-planting, group (nest) planting, line planting and belt planting, depending on the situation of the existing trees. The early rehabilitation of vegetation to regain the primeval state is aimed at by combining these planting methods with the nursing planting stock of indigenous species.

The implementation of the Project will, therefore, establish a technical system for such reforestation work as the nursery practice, planting and tending of indigenous species in national parks. While it may be difficult for these rehabilitation techniques to be quickly mastered by the national park offices given their relative inexperience of planting work, the gradual improvement of their technical expertise based on the achievements of the Project is certainly expected to take place.

The Project also aims at developing an initial fire-fighting system for forest fires to strengthen the national park management system. To be more precise, fire look-outs and fire cisterns, etc. will be constructed together with the provision of fire-fighting tools and equipment so that the entire project sites are covered by the initial fire-fighting system.

The Project is expected to have the following beneficial effects.

(1) Direct Effects

- 1) Some parts of the forests in the Kutai National Park and Way Kambas National Park will be rehabilitated.
- 2) The experience of forest rehabilitation using indigenous species under the Project will be accumulated in Indonesia where such experience is scarce, providing a model for forest rehabilitation using indigenous species.

- 3) The forest patrol, fire watch and initial forest fire-fighting regimes in the national parks will be improved.

It is believed that the demonstration effect of the Project will be particularly strong in the Way Kambas National Park as many people visit the local training centre for Sumatera elephants because of its proximity to Bandar Lampung, the capital of Lampung Province. Meanwhile, the project site in the Kutai National Park is situated on both sides of a national road and, therefore, should enjoy a similar demonstration effect vis-a-vis passers-by, including bus passengers.

## (2) Indirect Effects

In addition to the above direct effects, the following indirect effects are expected to result from the implementation of the Project.

- 1) The habitat for wild animals living inside as well as outside the project sites will be restored.
- 2) The Project will contribute to the development of guidelines for nursery practice, planting, tending and plantation maintenance techniques, all of which are necessary for the urgent rehabilitation of the remaining the degraded national parks by fire.

### **4.1.2 Suitability of the Project**

Examination of all aspects, including the anticipated beneficial effects of the Project, has found the Project to be fully suitable for Japanese grant aid because of the following reasons.

- (1) The direct beneficiaries of the Project will be the Kutai National Park and the Way Kambas National Park while the relevant national park offices will master reforestation techniques for the rehabilitation of the degraded national parks by fire and will develop a proper maintenance system for the planted sites, including an initial fire-fighting regime.
- (2) With the implementation of the Project, the primeval state of the forest environment of the subject sites will be quickly restored, contributing to the preservation of wildlife.
- (3) Local people will have the opportunity to participate in the implementation of the Project, raising their awareness of the importance of forests.

- (4) The Indonesian side appears to have sufficient manpower and budget to properly conduct the operation and maintenance of the planted sites in the post-project period. No problems are, therefore, anticipated in this regard.
- (5) The Project is in line with the National Park Management Plans in Indonesia and will form the basis for the maintenance of national parks in the future.

## **4.2 Recommendation**

Given the prospect that the implementation of the Project will have many beneficial effects, resulting in improvement of the forest environment of national parks, the development of a forest fire prevention and control regime and improvement of the lives of local people as described above, the Project's implementation under the grant aid system of the Government of Japan is judged to be highly suitable. However, there are still some pending issues for the smooth as well as effective implementation of the Project as described below and it is strongly hoped that these issues will be noted by the Indonesian side.

- (1) Regular follow-up surveys to check the state of tree growth at the planted sites must be conducted so that the Indonesian side can properly identify the positive effects of the Project. At the same time, the Directorate General of Nature Protection and Conservation will have to continuously secure the necessary budget for forest rehabilitation and to consolidate its organization to ensure the full performance of the Project's effects. It is essential for the Government of Indonesia to widely extend the achievements of the Project, which will be implemented as a model project, and to continue to implement rehabilitation projects at the degraded forest sites by fire.
- (2) Even though the maintenance of the planted sites during the project period is planned as described above, further maintenance will be required after the handing-over of the planted sites to the Indonesian side at the end of the project period. While tending work after planting will be conducted for two years under the Project, such tending work as weeding and climber cutting will still be required for another year following the end of the project period. This work should be conducted by the Indonesian side.
- (3) As reforestation work, including tending, is not part of the regular business of the National Park Offices as described earlier, the implementation of appropriate measures, including the assistance of reforestation-related departments (forest offices and land rehabilitation and soil conservation centres, etc.) and the use of local reforestation companies as subcontractors, will

be necessary. Forest patrolling and other activities to protect the planted sites from forest fire will continuously be conducted by the Indonesian side in the post-project period.

- (4) The progress of the Project will be regularly monitored by National Park Office to evaluate whether or not the rehabilitation of national parks under the Project is on course to achieve the objectives of the Project.

- 1) Forest Rehabilitation Survey

The DBH, tree height, number of surviving trees, state of growth and undergrowth, etc. will be regularly checked at fixed points to establish the state of growth of the planted trees.

- 2) Animal Population Survey

The changes of the population of animals (mammals, birds and insects, etc.) will be regularly surveyed to analyse the impacts of forest rehabilitation.

## **APPENDICES**

## APPENDIX 1 MEMBER LIST OF THE SURVEY TEAM

### (1) Basic Design Study

Name	Assigned Work	Organizational Background
Hiroshi MASUKO	Team Lear	International Cooperation Expert, JICA
Yasunori FUJIHARA	Technical Advisor	Head of Training, Overseas Forestry Cooperation Office, Planning Division, Private Forest Department, Forestry Agency
Ryuichi TABUCHI	Technical Advisor	Head of Afforestation Laboratory, Shikoku Office, Forest Training Institute, Forestry Agency
Hisanao NODA	Project Management	First Project Management Director, Grant Aid Management Department, JICA
Yasuyuki Suzuki	Chief Consultant; Planning of Maintenance	Director of Aerial Survey Department, JAFTA
Seishiro SHOJIGUCHI	Planning of Nursery and Planting	Director Researcher, JAFTA
Fumio ASAKA	Planning of Facilities and Equipment	Chief Researcher, JAFTA
Takahiro TANAKA	Socioeconomic Survey	Consulting Department, IC Net Co., Ltd.
Kazuhiro YAMASE	Wildlife Survey	Executive Director, Natural Environment Research Centre
Keizo KAMIYAMA	Construction Work; Procurement; Estimation	AGS International Architects Engineers Co., Ltd.

### (2) Explanation of and Discussions on Basic Design Outline

Name	Assigned Work	Organizational Background
Emiko IBARAKI	General Management; Project Management	First Project Management Division, Grant Aid Management Department, JICA
Shunsuke MIYAZAWA	Technical Advisor	Regional Forest Plan Coordinator, Management Planning Division, National Forest Management Department, Forestry Agency
Yasuyuki SUZUKI	Chief of Consultant; Planning of Maintenance	Director of Aerial Survey Department, JAFTA
Seishiro SHOJIGUCHI	Planning of Nursery and Planting	Chief Researcher, JAFTA
Fumio ASAKA	Planning of Facilities and Equipment	Chief Researcher, JAFTA

## APPENDIX 2 SURVEY SCHEDULE

### (1) Schedule for Field Survey for Basic Design

Day	Date		Activities	Overnight
1	Aug. 4	Wed.	Narita → Jakarta	Jakarta
2	5	Thurs.	Courtesy visits to Embassy of Japan, JICA Office and Indonesian Ministry, of Forestry and Estate Crops	"
3	6	Fri.	Transfer to Lampung	Lampung
4	7	Sat.	Field survey; joined by Yamase; transfer to Jakarta	Jakarta
5	8	Sun.	Transfer to Bandar Lampung	Bandar Lampung
6	9	Mon.	Transfer to Bontang except two JAFTA members	Bontang
7	10	Tues.	Field survey; transfer to Bandar Lampung	Bandar Lampung and Bontang
8	11	Wed.	"	Bontang
9	12	Thurs.	"	"
10	13	Fri.	"	"
11	14	Sat.	"	"
12	15	Sun.	Sorting of gathered data, etc.	"
13	16	Mon.	Field survey	"
14	17	Tues.	"	"
15	18	Wed.	"	"
16	19	Thurs.	"	"
17	20	Fri.	"	"
18	21	Sat.	"	"
19	22	Sun.	Sorting of gathered data; joined by Kamiyama and Yamada	"
20	23	Mon.	Field survey	"
21	24	Tues.	"	"
22	25	Wed.	"	"
23	26	Thurs.	"	"
24	27	Fri.	"	"
25	28	Sat.	"	"
26	29	Sun.	Sorting of gathered data, etc.; Yamase returns to Japan	"
27	30	Mon.	Field survey	"
28	31	Tues.	"	"
29	Sept. 1	Wed.	"	"
30	2	Thurs.	"	"
31	3	Fri.	"	"
32	4	Sat.	"	"
33	5	Sun.	Transfer from Bontang to Jakarta via Balikpapan	Jakarta
34	6	Mon.	Transfer from Jakarta to Lampung; courtesy visit to National Park Office	Lampung
35	7	Tues.	Field survey	"
36	8	Wed.	"	"
37	9	Thurs.	"	"
38	10	Fri.	"	"
39	11	Sat.	"	"
40	12	Sun.	Sorting of gathered data, etc.	"
41	13	Mon.	Field survey	"
42	14	Tues.	"	"
43	15	Wed.	"	"
44	16	Thurs.	"	"
45	17	Fri.	"	"
46	18	Sat.	"	"
47	19	Sun.	Transfer from Lampung to Jakarta; Kamiyama and Tanaka return to Japan	Jakarta

Day	Date		Activities	Overnight
48	20	Mon.	Data gathering	"
49	21	Tues.	"	"
50	22	Wed.	"	"
51	23	Thurs.	Courtesy visits to Embassy of Japan, JICA Office and Ministry of Forestry and Estate Crops	"
52	24	Fri.	Departure from Jakarta (Suzuki, Shojiguchi and Asaka)	Aircraft
53	25	Sat.	Arrival at Narita	

(2) Schedule for Explanation of and Discussions on Draft Final Report

Day	Date		Activities	Overnight
1	Feb. 6	Sun.	Narita → Jakarta	Jakarta
2	7	Mon.	Meetings at Embassy of Japan and JICA Office, courtesy visit to Ministry of Forestry and Estate Crops	"
3	8	Tues.	Discussions at Ministry of Forestry and Estate Crops	"
4	9	Wed.	Discussions at Ministry of Forestry and Estate Crops; signing of M/D	"
5	10	Thurs.	Reporting to Embassy of Japan and JICA Office	"
6	11	Fri.	Data gathering (Shojiguchi); departure from Jakarta (Suzuki and Asaka)	Aircraft
7	12	Sat.	Sorting of gathered data	Jakarta
8	13	Sun.	Data gathering	"
9	14	Mon.	"	"
10	15	Tues.	"	"
11	16	Wed.	"	"
12	17	Thurs.	"	"
13	18	Fri.	"	"
14	19	Sat.	Departure from Jakarta (Shojiguchi)	Aircraft
15	20	Sun.	Arrival at Narita	



## APPENDIX 3 LIST OF PARTIES CONCERNED IN THE RECIPIENT COUNTRY

### (1) During Field Survey for Basic Design

Organization	Position/Work Assignment	Name
JICA Indonesia Office	Resident Representative Deputy Resident Representative Assistant Resident Representative	Hiroyoshi IHARA Kazuhiro YENEDA Naoaki OHMIYA
Embassy of Japan	Second Secretary	Hideki WAKABAYASHI
JICA Experts (Individual Dispatch)	Project Finding and Coordination Conservation of Land Ecosystem	Yuichi SATO Ginzo AOYAMA
JICA Experts (Forest Fire Prevention Project)	Team Leader Coordinator Assistant Team Leader Participatory Method for Forest Fire Prevention Early Warning and Detection System Forest Fire Prevention and Initial Suppression	Kazuyuki MORITA Hideki HACHINOE Hideaki TAKAI Masahiro OHTSUKA  Hiroki IWAI Masahiro KON
JICA Experts (Tropical Rain Forest Research Project)	Team Leader Forest Ecology and Silviculture Coordinator	Tokunori MORI Tsuyoshi TOMA Kazuhiro MATSUZAWA
Ministry of Forestry and Estate Crops (MoFEC) (Directorate General of Nature Protection and Conservation)	General Director Director of Nature Conservation Areas Director of Biodiversity Conservation Chief, Foreign Cooperation Section	Ir. Abdul Manan Siregar Dr. Sunaryo Ir. Koes Sapardjadi Ms. Ir. Listya
MoFEC (Bureau of International Cooperation and Investment)	Director Head, Foreign Technical Cooperation Division	Dr. Untung Iskandar S. Ir. Bambang Murdiono
MoFEC (Lampung Regional Office of Forestry and Estate Crops)	Head, Natural Resources Conservation Division Head, Planning Division	Ir. Agus Tridoso  Ir. Warsito
MoFEC (East Kalimantan Regional Office of Forestry and Estate Crops)	Head, Natural Resources Conservation Division	Ir. Moch Hiflas
MoFEC (Way Kambas National Park Office)	Director Head, Conservation Section Chief of Area Conservation Chief, Resort Plang Ijo Staff Member Forest Policeman " " "	Ir. Harjanto Wahyu Sukotjo Ir. John Kenedie Ir. Rusman Tarso Raseto Ms. Ir. Dewi Artini Saman Hudi Mukhlisin Sukarman Soedarmadju
MoFEC (Kutai National Park Office)	Director Head, General Affairs Section Head, Conservation Section Chief, Resort Sangatta Chief, Resort Bonang Staff Member	Dr. Tachrir Fathoni Drs. Jansen Siagian Ir. Simon S. Gasong Hery Hendro Sukino Selamat Ryadi B.
Persons Related to Way Kambas National Park	Head, Labuhanratou District Commander, Way Jobera Army Post Policeman, Way Jobera Area Chief, No. 6 Labuhanratou Village Chief, No. 7 Labuhanratou Village Elder in Buranhijou Area	Drs. Sarbini Snjaya Soenarno  Kaijo

Organization	Position/Work Assignment	Name
Persons Related to Kutai National Park	Regional Commander, Army District Commander (LT.-Colonel), Army Deputy Superintendent (Major), Bontang Police Station Kutai Army Post (Sec. Lieutenant) Head, Sangatta District Chief, South Sangatta Village Chief, Sankima Village Elder, South Sangatta Village Chief, Lombok Bay Settlement Representative of Kutai Residents Elder of Local Residents Bontang Municipal Office Bontang Municipal Office	Purwanto Endro Warsito Drs. Andjar Dewanto  Agustinus K. Habulake Amil M. Soewito Hj. Ismail Hj. Augusjah HF Ado T. Untung Suapati S. Joyo Ms. Hj. Sumiaty Ms. S. Nurul H.
Related Persons in Jakarta	UNESCO PT. Badak NGL Co. Hasanuddin University WWF-Indonesia WWF-Indonesia PT. Kaltim Prima Coal PT. Kaltim Prima Coal	Enis Widjanarti Irwan Joezar Prof. Dr. Ngakan Putu Oka Dr. Nengah Wirawan Dr. Bambang H. Saharjo Ms. Rini Djunaedi Ms. Dian Fahna

## (2) Explanation of Draft Final Report

Organization	Position/Work Assignment	Name
JICA Indonesia Office	Resident Representative Assistant Resident Representative	Hiroyoshi IHARA Naoaki OHMIYA
Embassy of Japan	Second Secretary	Hideki WAKABAYASHI
JICA Experts (Individual Dispatch)	Project Finding and Coordination Conservation of Land Ecosystem	Yuichi SATO Ginzo AOYAMA
MoFEC (Directorate General of Nature Protection and Conservation)	Director General Director of Nature Conservation Areas Head, Planning Division Chief, Foreign Cooperation Section Foreign Cooperation Section Head, National Park Conservation Division Chief, Evaluation of National Park Function Section Chief, National Park Management Section Head, Tourism Development Division II Head, Biodiversity Conservation Division	Ir. Harsono Drs. Widodo S. Ramono Ir. Waladi Isnain Ms. Ir. Listya Ms. Ir. Endang Wahyuningsih Ir. Agoes Sriyanto Ir. Agus B. Sutito  Ms. Ir. Siti C. Kaniawati Ms. Ir. Sri. Murniningtyas Ir. Hariyadi
MoFEC (Bureau of Planning and Foreign Cooperation)	Chief, Bilateral Cooperation Section	Ms. Ir. Tri Meinartin

## APPENDIX 4 MINUTES OF DISCUSSIONS FOR BASIC DESIGN STUDY

### MINUTES OF DISCUSSIONS ON BASIC DESIGN STUDY ON THE PROJECT FOR REHABILITATION OF THE DEGRADED NATIONAL PARKS BY FOREST FIRE IN THE REPUBLIC OF INDONESIA

The Government of Japan decided to conduct a Basic Design Study on the Project for Rehabilitation of the Degraded National Parks by Forest Fire (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Republic of Indonesia (hereinafter referred to as "the Indonesia") the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Hiroshi Masuko, Development Specialist, Institute for International Cooperation, JICA, and is scheduled to stay in the country from August 4 to September 24, 1999.

The team has held discussions with the officials concerned of the Government of Indonesia and conducted field surveys at the study areas.

In the course of discussions and field surveys, both parties have confirmed the main items described on the attached sheets. The team will proceed to further work and prepare the Basic Design Study Report.

Jakarta, August 13, 1999



Mr. Hiroshi Masuko

Leader  
Basic Design Study Team  
Japan International Cooperation Agency



Ir. Abdul Manan Siregar

Director General of Nature  
Protection and Conservation  
Ministry of Forestry and Estate Crops

## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to rehabilitate a part of the forests degraded by forest fire in Way Kambas National Park and Kutai National Park.

### 2. Project Sites

The Project sites are located in the following National Parks.

(1) Way Kambas National Park

(2) Kutai National Park

The location maps of the sites to be studied are shown in Annex-1.

### 3. Responsible and Implementing Organization

The responsible and implementing organization is the Directorate General of Nature Protection and Conservation, Ministry of Forestry and Estate Crops.

### 4. Items requested by the Government of Indonesia

After the discussions with the Team, the items described in Annex-2 were finally requested by the Indonesian side.

JICA will assess the appropriateness of the requests and will recommend them to the Government of Japan for approval. However, the Team also explained that the necessity of such facilities and equipment would be judged after detailed analyses of findings and results of the study in Japan.

(1) Rehabilitation of forest areas in Way Kambas and Kutai National Parks.

(Details of the requested areas are listed in Annex-1)

(2) Construction and procurement of the necessary facilities and equipment

(Details of the items are listed in Annex-2)

### 5. The Criteria for site survey and evaluation

Both sides have agreed on the criteria listed in Annex-3 for site survey and evaluation on requested sites. The results of the study will be presented as a part of the draft report to the Indonesian side by the Draft Report Explanation Team.

②

## 6. Japan's Grant Aid System

- (1) The Indonesian side understood the system of Japan's Grant Aid explained by the Team. (See Annex-4)
- (2) The Indonesian side will take necessary measures described in Annex-5 for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

## 7. Schedule of the Study

- (1) The Team will proceed to further studies in Indonesia until September 24, 1999.
- (2) JICA will prepare a draft report in English and dispatch a team in order to explain its contents around November 1999.
- (3) In the case that the contents of the report are accepted in principle by the Government of Indonesia, JICA will complete the final report and send it to the Government of Indonesia by the end of March 2000.

## 8. Other Relevant Issues

### 8-1. Maintenance of the Project Sites

Indonesian side understood that it has the responsibility for the maintenance of the rehabilitation areas established under the Project. Both sides recognized that the dissemination to local people on forest fire prevention is a key issue for the maintenance of the forests.

### 8-2. Contribution to the mitigation of climate change

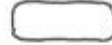
Indonesian and Japanese sides acknowledged that forests are contributing to the mitigation of global climate change, and that forests are recognized as greenhouse gas sinks and reservoirs.

*M.*

③

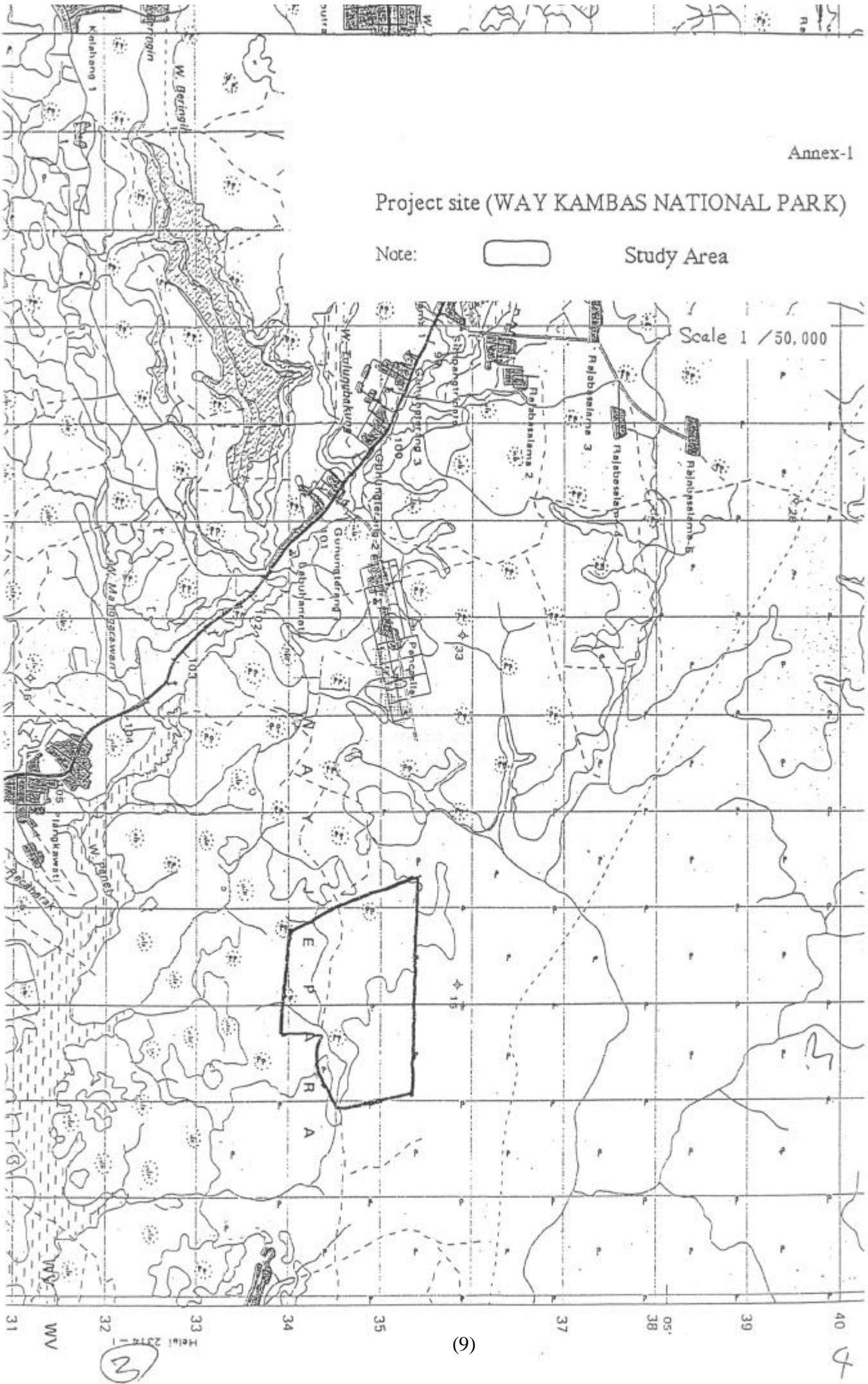
Project site (WAY KAMBAS NATIONAL PARK)

Note:



Study Area

Scale 1 / 50,000





Project Site (KUTAI NATIONAL PARK)

Note:



Study area

Scale 1 / 50,000

Contents of the Request by the Government of Indonesia

1. Target Areas for Rehabilitation of Forest

Way Kambas National Park

Kutai National Park

2. Requested Project Plan

- (1) Rehabilitation by planting of indigenous tree species
- (2) Construction of nursery facilities
- (3) Construction of storage ponds and dams
- (4) Construction of fire breaks and patrol trails
- (5) Construction of rehabilitation facilities
- (6) Construction of guarding facilities
- (7) Procurement of equipment for rehabilitation, fire prevention and initial fire suppression
- (8) Procurement of vehicles for rehabilitation

3



**Criteria for site survey and evaluation on requested sites**

- (1) Assessment of the contents of the Project.
- (2) Relationship between the Project and other relevant projects at national and local levels.
- (3) Current conditions and issues in related sectors.
- (4) Organization structure for management and maintenance.
- (5) Financial capacity of project implementation organization.
- (6) Related assistance programs by other donors.
- (7) Study of natural, social and economic conditions which may cause technical difficulties for rehabilitation in the sites.
- (8) Collection and analysis of necessary data and materials.
- (9) Survey of local conditions for the implementation, e.g. supply of equipment and materials, construction of facilities, access to the sites.
- (10) Any other criteria that affect the implementation of rehabilitation in the sites under the Japanese Grant Aid.

## Japan's Grant Aid Scheme

### *1. Grant Aid Procedures*

- 1) Japan's Grant Aid Program is executed through the following procedures.

Application	(Request made by a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

- 2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the Project to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the Project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

## 2. Basic Design Study

### 1) Contents of the Study

The aim of the Basic Design Study (hereafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

- a) Confirmation of the background, objectives, and benefits of the requested Project and also institutional capacity of agencies concerned of the recipient country necessary for Project's implementation.
- b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
- c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- d) Preparation of a basic design of the Project.
- e) Estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

### 2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The firm(s)

selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA.

The consultant firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchanges of Notes, in order to maintain technical consistency.

### **3. Japan's Grant Aid Scheme**

#### **1) What is Grant Aid?**

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

#### **2) Exchange of Notes (E/N)**

Japan's Grant Aid is extended in accordance with the Notes exchanged by the Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc. are confirmed.

#### **3) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and a final payment to them must be completed.**

However in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

#### **4) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.**

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However the prime contractors, namely, consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of the "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

6) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid project, the recipient country is required to undertake such necessary measures as the following:

- (1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.
- (2) To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.
- (3) To secure buildings prior to the procurement in case the installation of the equipment.
- (4) To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.
- (5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.

*Me*

(6) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(7) Proper Use

The recipient country is required to maintain and use facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

(8) Re-export

The products purchased under the Grant Aid should not be re-exported from the recipient country.

(9) Banking Arrangement (B/A)

- a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the verified contracts.
- b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.

3

## Major Undertakings to be taken by Each Government

NO	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To secure land for reforestation, nursery, etc		●
2	To clear, level and reclaim the site when needed		●
3	To construct access road and drainage canals when needed		●
4	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
5	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	(●)	(●)
6	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
7	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
8	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities		●
9	To educate the importance of maintenance of the forestry and fire prevention to the inhabitants around the Project site		●

4.

## APPENDIX 5 MINUTES OF DISCUSSIONS FOR EXPLANATORY MEETING ON DRAFT FINAL REPORT

### MINUTES OF DISCUSSIONS ON BASIC DESIGN STUDY ON THE PROJECT FOR REHABILITATION OF THE DEGRADED NATIONAL PARKS BY FOREST FIRE IN THE REPUBLIC OF INDONESIA (EXPLANATION ON DRAFT REPORT)

In August 1999, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team on the Project for Rehabilitation of the Degraded National Parks by Forest Fire (hereinafter referred to as "the Project") to the Republic of Indonesia, and through discussion, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the study.

In order to explain and to consult Indonesian side on the components of the draft report, JICA sent to Indonesia the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Ms. Emiko Ibaraki, First Project Management Division, Grant Aid Management Department, JICA, from February 6 to February 20. As a result of discussions, both parties confirmed the main items described on the attached sheets.

Jakarta, February 9, 2000



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Ms. Emiko Ibaraki  
Leader  
Draft Report Explanation Team  
Japan International Cooperation Agency



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Ir. Harsono  
Director General of Nature Protection  
and Conservation  
Ministry of Forestry and Estate Crops



## ATTACHMENT

### 1. Components of the Draft Report

Indonesian side agreed and accepted in principle the components of the Draft Report explained by the Team.

### 2. Japan's Grant Aid Scheme

Indonesian side understood the Japan's Grant Aid Scheme and the necessary measures to be taken by the Indonesian side as explained by the Team and described in Annex-4 and Annex-5 of the Minutes of Discussions signed by both parties on August 13, 1999.

### 3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed items and send it to Indonesian side as soon as possible.

### 4. Other Relevant Issues

#### 4-1. Main components of the Project

Indonesian side agreed the main components of the Project shown in Annex-1.

#### 4-2. Project sites

The Project sites for the Basic Design Study are the Way Kambas National Park and the Kutai National Park. However, considering the social situation around the project site in the Kutai National Park, both sides agreed that the Project will be executed in the Way Kambas National Park for the time being. As for the project site in the Kutai National Park, Indonesian side will inform their intention to launch the Project to Japanese side when the social situation there is confirmed to be secure enough to implement the Project.

#### 4-3. Necessary measures to be taken by Indonesian side

Indonesian side agreed to take prompt actions for following items.

- (1) Major undertakings described in the article 2 above (excluding No. 3 of Annex-5)
- (2) Division of work to be borne by Indonesian side as described in the Draft Report
- (3) Proper operation and maintenance of equipment to be supplied in the Project

#### 4-4. Maintenance of the planted area

Indonesian side understood the importance of forest fire prevention and tending of the planted trees after the Project is handed over to the Indonesian side.

As for the tending (weeding) of planted trees in the Phase 3 (110 hectare) in the Way Kambas National Park, Indonesian side makes efforts to ensure the budget and agreed to designate the responsible section in Ministry of Forestry and Estate Crops to implement tending work properly.

#### 4-5. Monitoring programme to evaluate project effects

Indonesian side understood the importance of monitoring flora and fauna to evaluate project effects after the Project is handed over to Indonesian side.

#### 4-6. Contribution to mitigation of climate change

Both sides recognized that forests are contributing to mitigation of global climate change and that they are considered as greenhouse gas sinks and reservoirs.

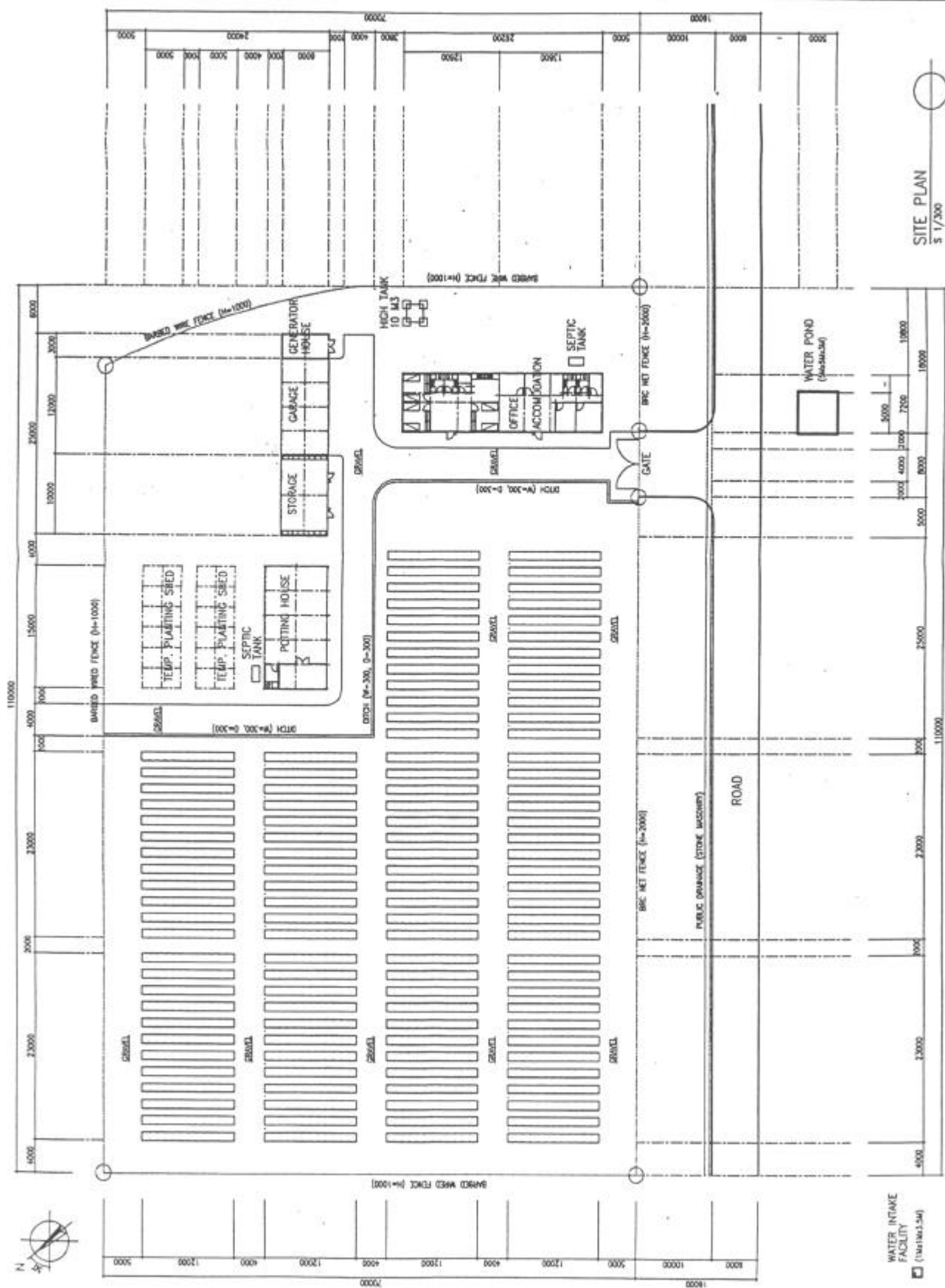
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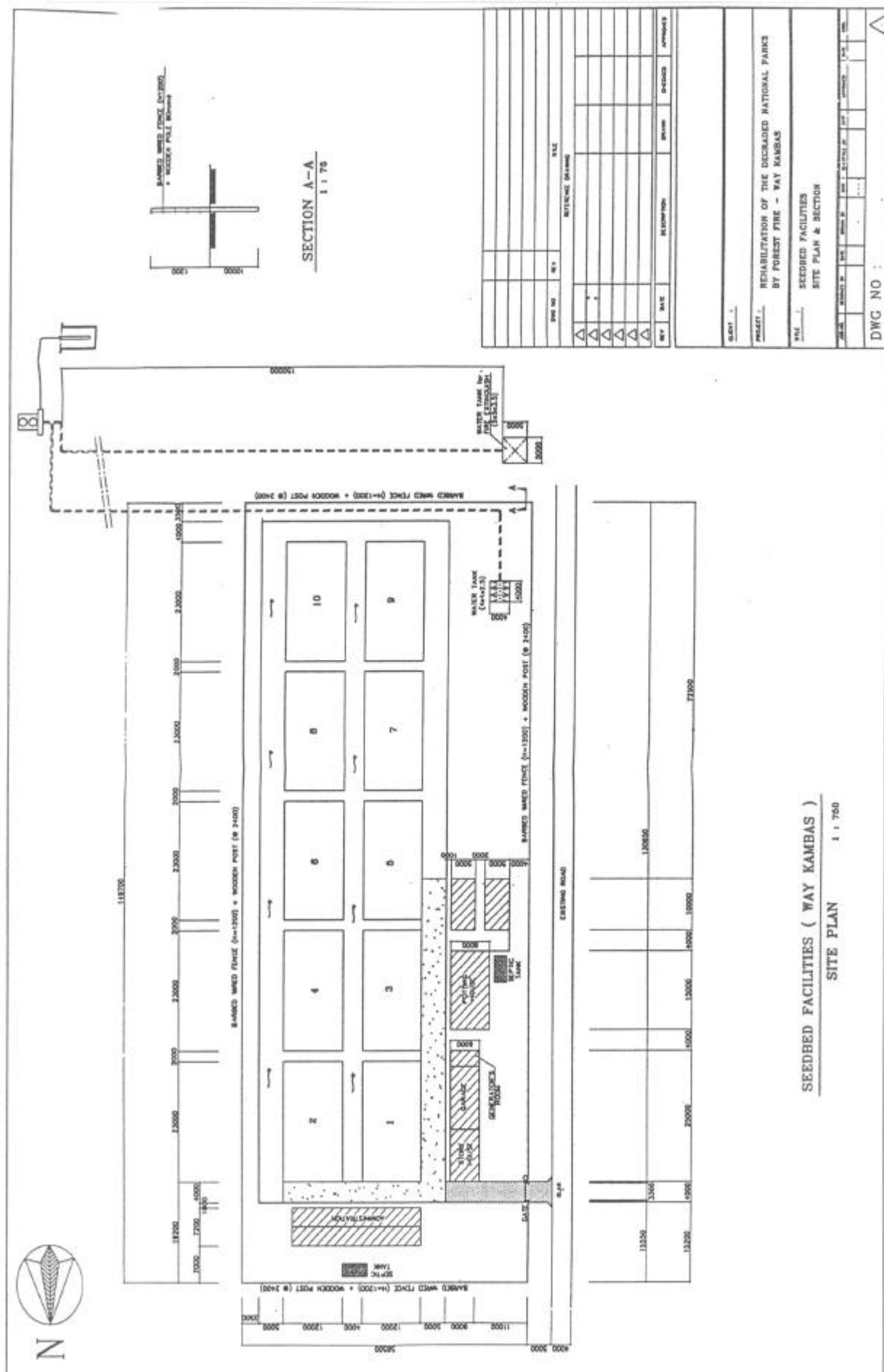
## Main Components of the Project

Components/Contents		Kutai National Park	Way Kambas National Park
Location		Sangata District, East Kalimantan Province	Way Jepara District, Lampung Province
Area		400 ha	360 ha
Planting Species (Local Species)		Meranti, Kapur, Ulin, Beringin, Sungkai, Tebe Hitam, Ketapang, Jambu-jambuan, Sempur and others	Meranti, Sungkai, Sempur, Gelam, Rengas, Bungur, Puspa and others
Planting Method		Under tree planting, Group planting, Line planting, Belt planting	Same as left
Facilities	Reservoir (with Intake Pump)	1	1
	Patrol Roads	Foothpath: 2 m wide = 21.6 km	Vehicle road: 10 m wide = 3 km 5 m wide = 1.4 km
	Fire Look-Outs	3	2
	Water cisterns	5	5
	Wild Elephant Incursion Prevention Ditches	none	5,130 m in length
Temporary Structures	o Temporary Nursery	Annual production volume of seedling: 400,000	Annual production volume of seedling: 400,000
	- Nursing Bed Area	2,760 m <sup>2</sup>	2,760 m <sup>2</sup>
	- Area of Premises	8,117 m <sup>2</sup>	8,757 m <sup>2</sup>
	o Protection Facilities (barbed wire fencing)	480 m	417 m
Equipment Provided	o Motorcycles	3	3
	o Hose Transporters	1	1
	o Water Tank Lorries	1	1
	o Portable Pumps	3	3
	o Discharge Hoses (20 m)	50 reels	50 reels
	o Supply Hoses (6 m)	2	2
	o Discharge Nozzles	2	2
	o Station-Type Radio Equipment	1	1
	o Vehicle Mounted-Type Radio Equipment	2	2
	o Portable Radio Equipment	6	5
	o Jet Shooters	30	30

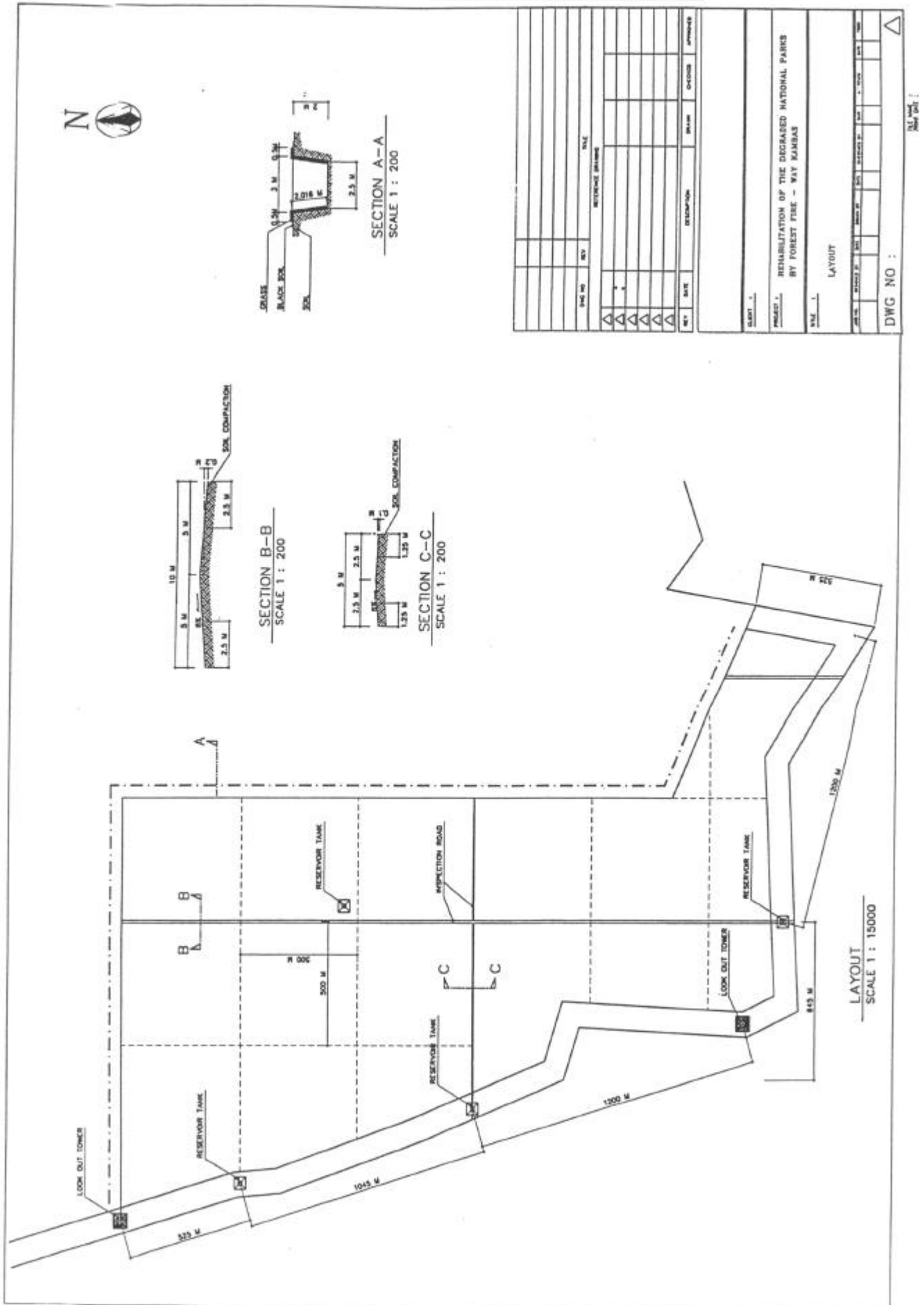
### PLANNED LOCATION OF NURSERIES ①



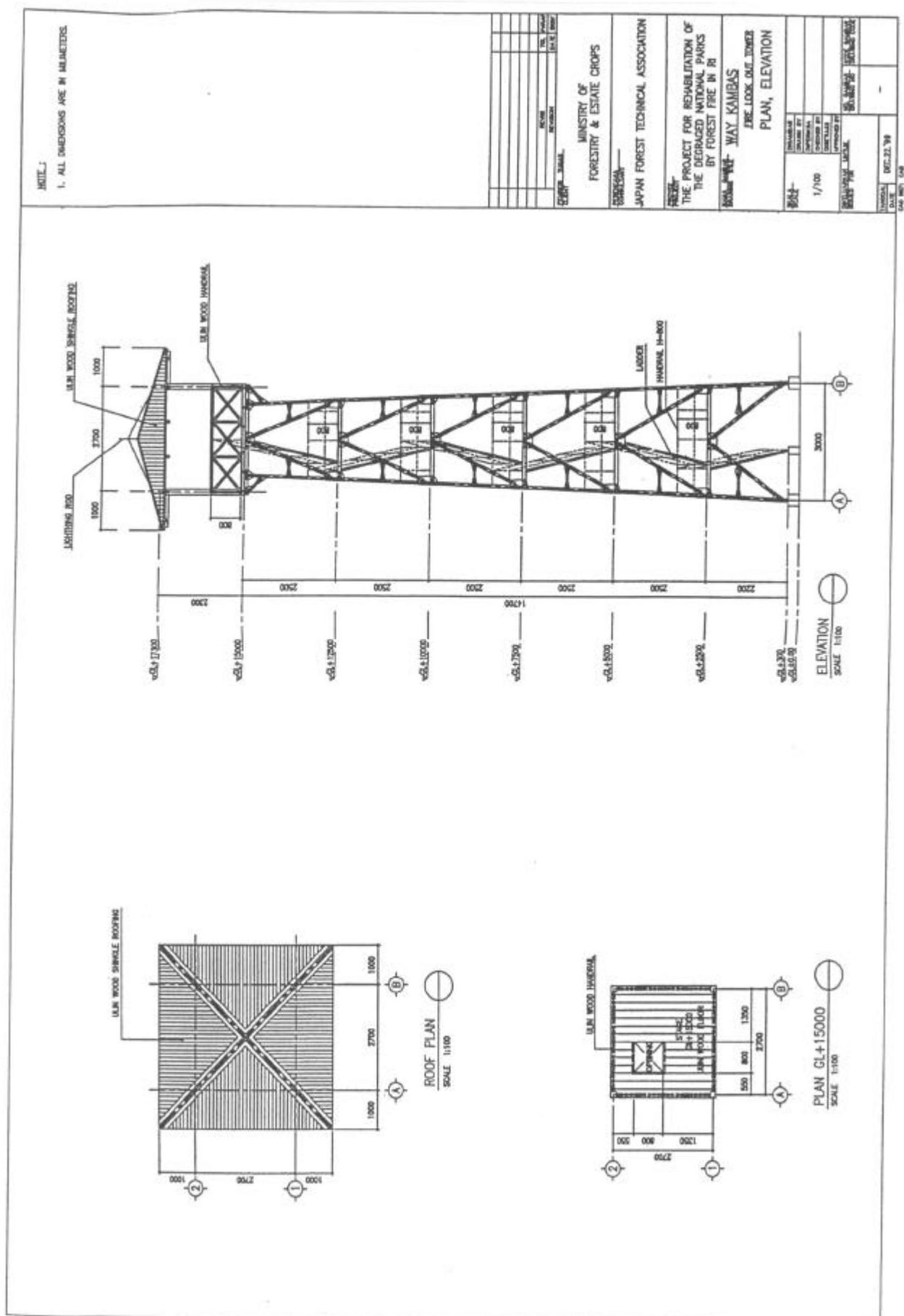
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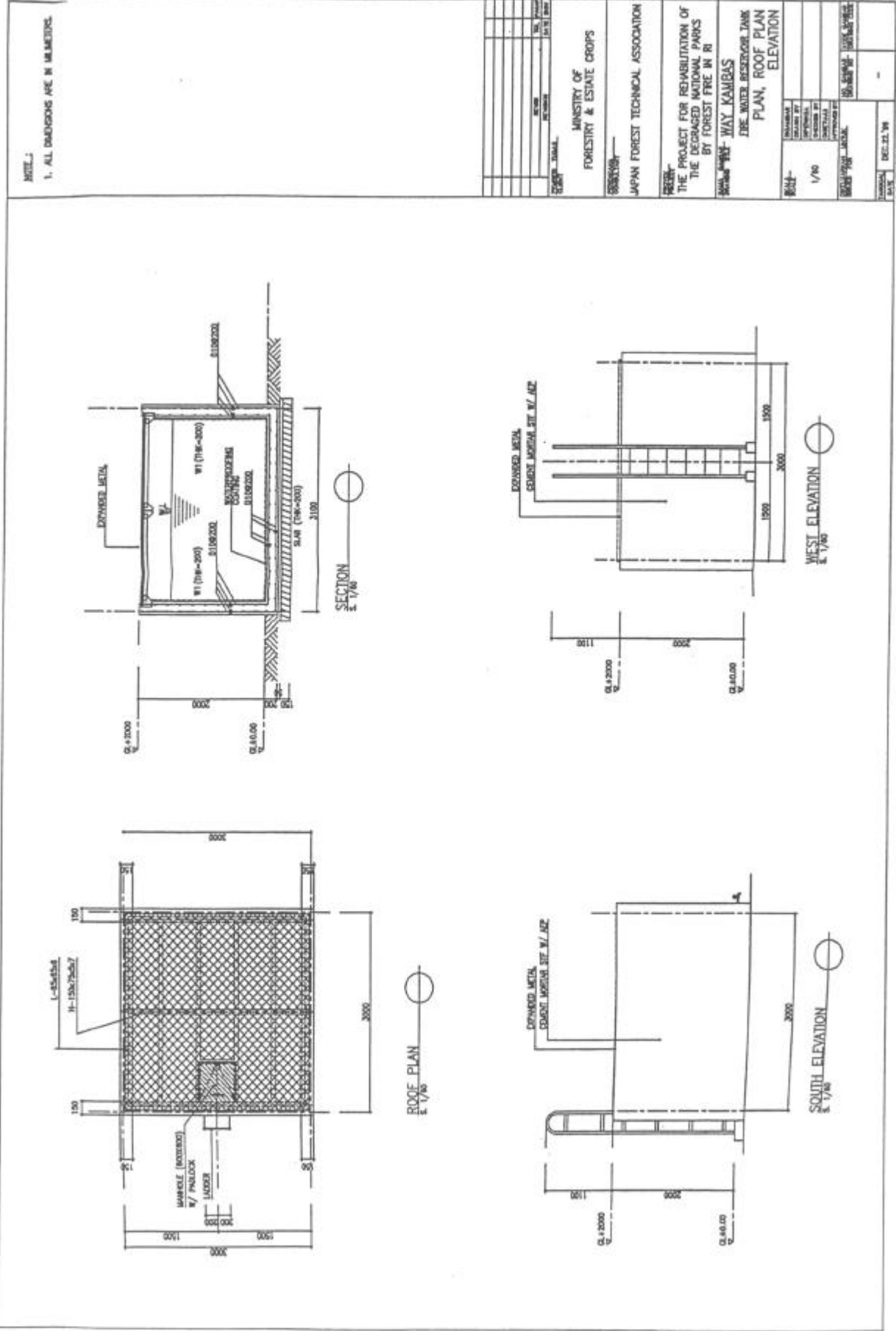
## APPENDIX 7 DESIGN DRAWINGS ①



## APPENDIX 7 DESIGN DRAWINGS ②



APPENDIX 7 DESIGN DRAWINGS ③







## APPENDIX 8 LIST OF GATHERED REFERENCE MATERIALS

- (1) Kalimantan Timur dalam Angka 1997
- (2) Kabupaten Kutai dalam Angka 1997
- (3) Sensus Ekonomi 1996; Statistik Potensi Desa Propinsi Kalimantan Timur
- (4) Statistik Harga-Harga Pedesaan Propinsi Kalimantan Timur 1996
- (5) Lampung Tengah dalam Angka 1997
- (6) Kecamatan Purbolinggo dalam Angka 1997
- (7) Kecamatan Way Jepara dalam Angka 1997
- (8) Monografi Desa/Kelurahan Rajabasalama 1998/1999
- (9) Monografi Desa/Kelurahan Rajabasalama 1996
- (10) Lampung dalam Angka 1997/1998
- (11) Indonesia dalam Angka 1998
- (12) Kecamatan Sangata dalam Angka Tahun 1997
- (13) Monografi Desa Labuhan Ratu VI 1998
- (14) Statistik dan Booklet Kehutanan Propinsi Lampung 1997/1998
- (15) Data dan Informasi Kehutanan Propinsi Lampung 1997/1998
- (16) Jenis-Jenis vegetasi/pohon yang ada Tman Nasional Kutai
- (17) Jenis-Jenis Satwa Liar yang ada di Kawasan Taman Nasional Kutai
- (18) Daftar Nama-Nama satwa yang Lindungi Undang-Undang di Taman Nasional Way Kambas
- (19) Nama-Nama Jenis atau Golongan Jenis dalam Bahasa Indonesia sebagai Perbandingan dengan Nama-Nama Asli (Nama Daerah Lampung) Terpenting di Suaka Margasatwa Way Kambas
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- A-5 : Project Profile Indonesian Forestry Action Programme: Ministry of Forestry, RI
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- A-7 : Report on CGIF Working Group Meeting on Social Forestry and Forest Fire (Sanggau, West Kalimantan, 27-28 July 1998): Bearau of International Cooperation and Investment, Ministry of Forest and Estate Crops
- A-8 : Report on 18th Meeting of CGIF, Special Session on Forest Fire (12 Des.1997): Bureau of International Cooperation and Investment, Ministry of Forestry, RI
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- A-11 : Peta; Propinsi Kalimantan Timur
- A-12 : Pengendalian Kebakaran Hutan Tanaman di Benakat (Palembang , Pebruari 1988): DJRRL; Dephut
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- A-14 : Summary Report on an Informal Meeting on Structural Reform in Indonesian Forestry (2 Jul. 1998)
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- A-19 : Kutai National Park
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- A-37 : Cooperarion Project on Forest Fire Control in Indonesia: Ditjen PHPA; 22 Apr. 1993
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- A-39 : Bagan Orgabisasi Direktorat Jenderal PHPA; Statistik Ditjen PHPA ,1997/1998
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- A-41 : Kemitraan Taman Nasional Kutai (Laporan Pelaksanaan); Sekretariata Kemitraan Taman Nasional Kutai;Bontang Juni 1997)
- A-42 : Laporan Kegiatan Tahun 1996/1997 (Bontang, April 1997)
- A-43 : Rencana Kegiatan Tahun 1997/1998 (Bontang, April 1997)
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