MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT
THE SOCIALIST REPUBLIC OF VIET NAM

No.

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR AFFORESTATION
ON
THE COASTAL SANDY AREA
IN
SOUTHERN CENTRAL VIET NAM
IN
THE SOCIALIST REPUBLIC OF VIET NAM

February 2000

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

JAPAN FOREST CIVIL ENGINEERING CONSULTANTS FOUNDATION

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PREFACE

In response to a request from the Government of the Socialist Republic of Viet Nam, the Government of Japan decided to conduct a basic design study on the Project for Afforestation on the Coastal Sandy Area in Southern Central Viet Nam and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Viet Nam a study team from July 18 to August 24, 1999.

The team held discussions with the officials concerned of the Government of Viet Nam, 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 Viet Nam in order to discuss a draft basic design, and as this result, the present report was finalized.

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Socialist Republic of Viet Nam for their close cooperation extended to the teams.

February, 2000

Kimio Fujita
President
Japan International Cooperation Agency

February, 2000

Letter of Transmittal

We are pleased to submit you the basic design study report on the Project for Afforestation on the Coastal Sandy Area in Southern Central Viet Nam in the Socialist Republic of Viet Nam.

This study was conducted by Japan Forest Civil Engineering Consultants Foundation, under a contract to JICA, during the period from July 12, 1999 to February 22, 2000. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Viet Nam and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

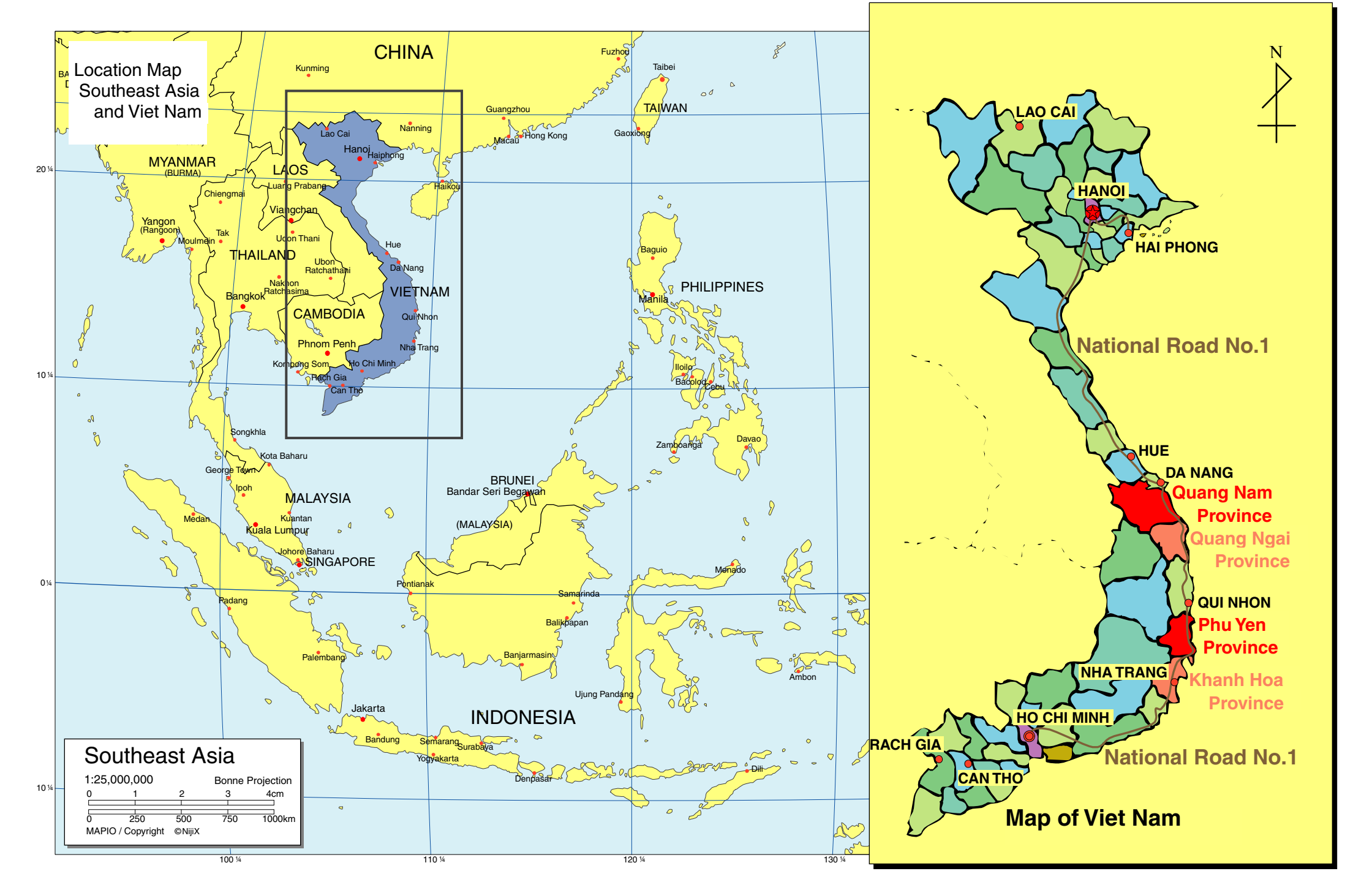
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Senshi Namba

Project Manager,
Basic Design Study Team on
the Project for Afforestation on the Coastal Sandy Area in Southern Central Viet Nam

Japan Forest Civil Engineering Consultants Foundation


Location Map
Southeast Asia
and Viet Nam
CHINA
Kunming
Fuzhou
Taibei
Guangzhou
TAIWAN
Nanning
Lao Cai
Hanoi
Haiphong
Macau
Hong Kong
Gaoxiong
MYANMAR
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LAOS
Luang Prabang
Haikou
Chiengmai
Viangchan
Yangon
(Rangoon)
Moulmein
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VIETNAM
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Baguio
Manila
CAMBODIA
Qui Nhon
Phnom Penh
Nha Trang
Kompong Som
Ho Chi Minh
Rach Gia
Can Tho
Iloilo
Bacolod
Cebu
Songkhla
Zamboanga
Davao
Kota Baharu
George Town
Ipoh
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Bandar Seri Begawan
MALAYSIA
Medan
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Johore Baharu
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Pontianak
Samarinda
Padang
Balikpapan
Palembang
Banjarmasin
Ambon
Ujung Pandang
Jakarta
INDONESIA
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Yogyakarta
Denpasar
Dili
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100 ¼
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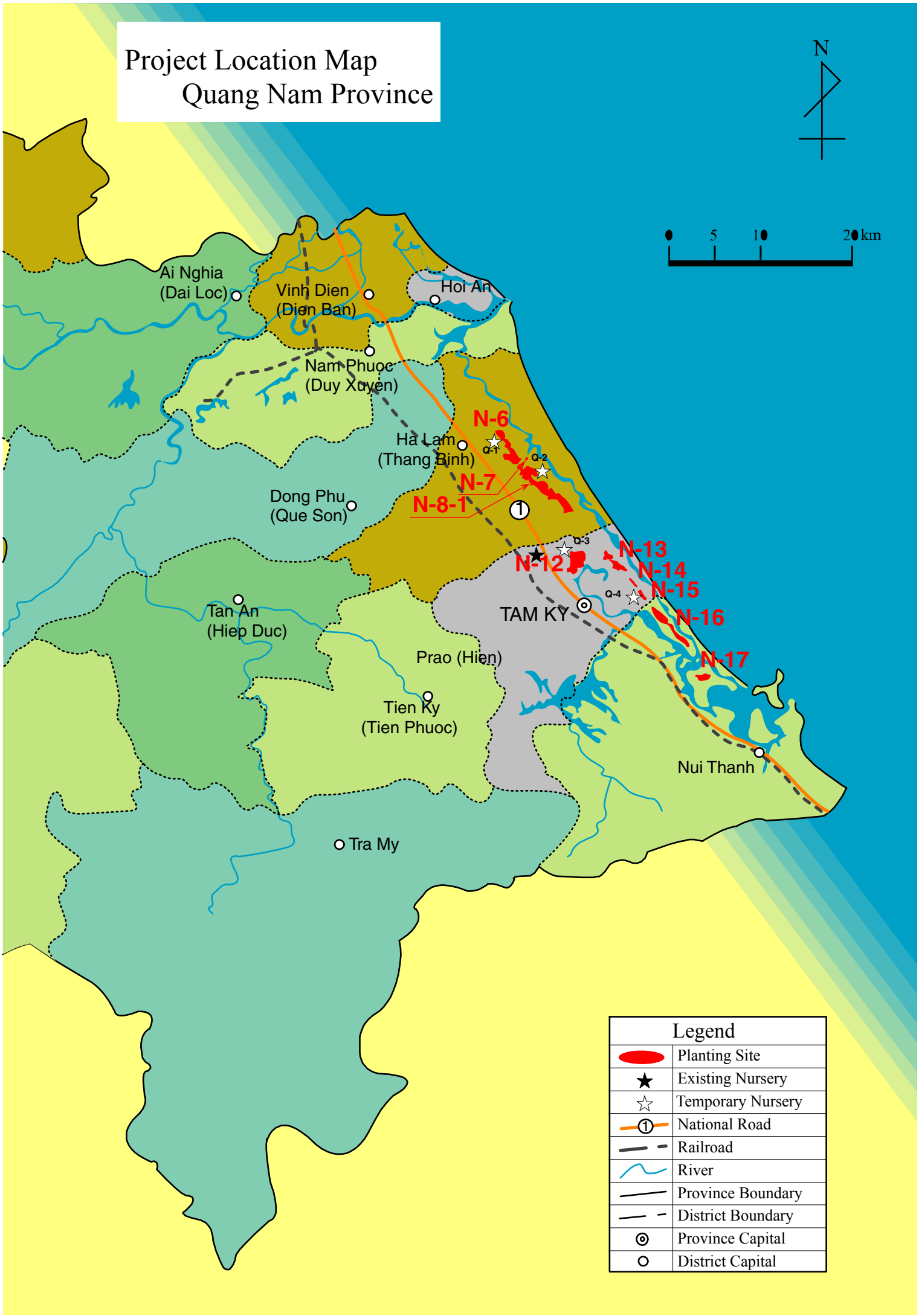
130 ¼
Southeast Asia
1:25,000,000
Bonne Projection
0 1 2 3 4cm
0 250 500 750 1000km
MAPIO / Copyright ©NijiX
N
LAO CAI
HANOI
HAI PHONG
National Road No.1
HUE
DA NANG
Quang Nam
Province
Quang Ngai
Province
QUI NHON
Phu Yen
Province
NHA TRANG
Khanh Hoa
Province
HO CHI MINH
RACH GIA
National Road No.1
CAN THO
Map of Viet Nam


Project Location Map
Quang Nam Province
N
5
10
20 km
Ai Nghia
(Dai Loc)
Vinh Dien
(Dien Ban)
Hoi An
Nam Phuoc
(Duy Xuyen)
Ha Lam
(Thang Binh)
Dong Phu
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Tan An
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Q-1
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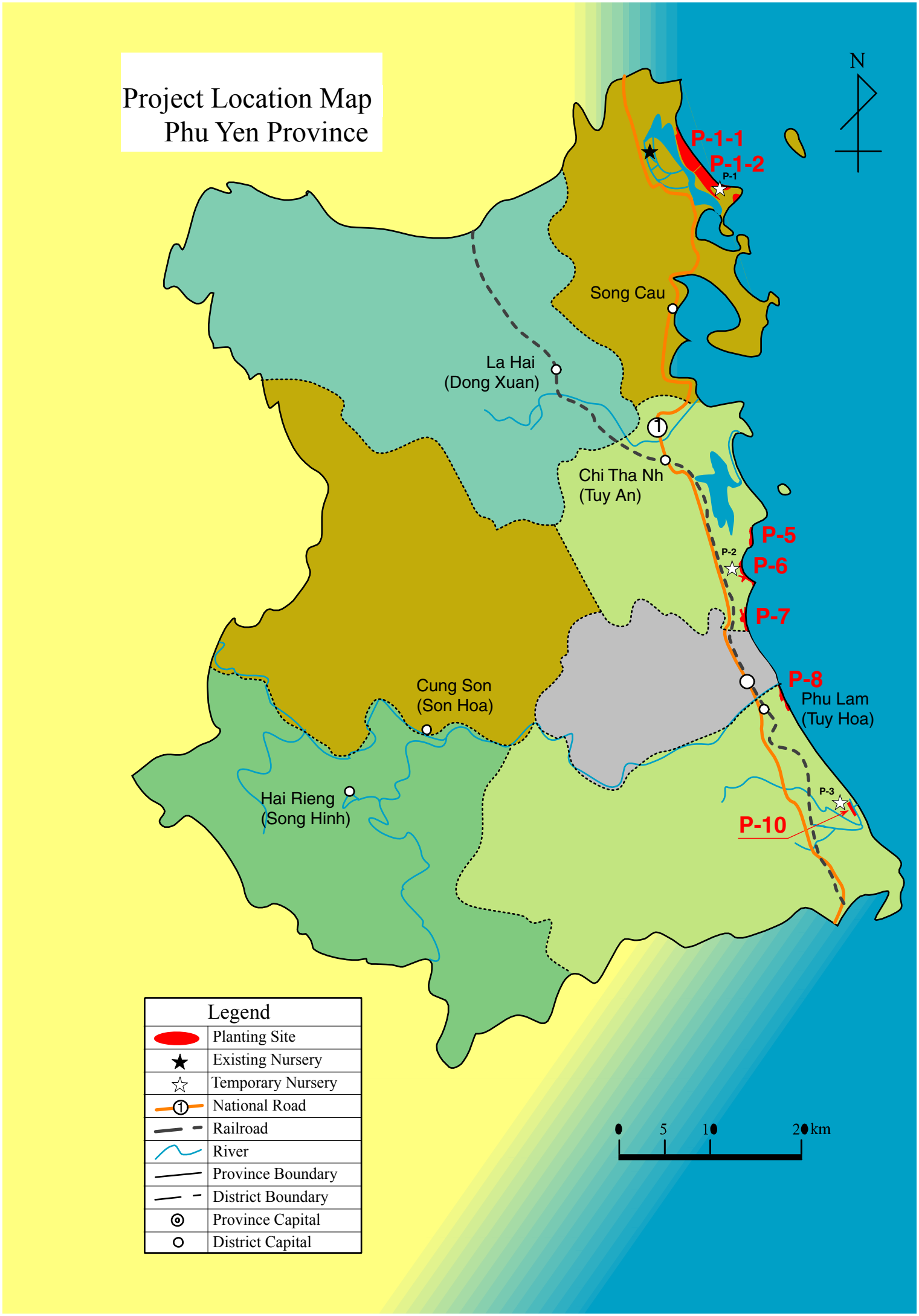
Q-3
Q-4
1
Legend
Planting Site
Existing Nursery
Temporary Nursery
National Road
Railroad
River
Province Boundary
District Boundary
Province Capital
District Capital


Project Location Map
Phu Yen Province
N
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P-1-2
P-1
Song Cau
La Hai
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Chi Tha Nh
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Province Boundary
District Boundary
Province Capital
District Capital
5
10
20 km

List of Abbreviations

DARD	Department of Agriculture and Rural Development
FC	Forest Company
FE	Forest Enterprise
MARD	Ministry of Agriculture and Rural Development
MBFFAP	Management Board for Forestry Foreign Aid Projects
MPI	Ministry of Planning and Investment
NSC	National Steering Committee
PFMB	Protection Forest Management Board
PMB	Project Management Board
Project	Project for Afforestation on the Coastal Sandy Area in Southern Central Viet Nam
Reforestation Grant Aid	Japanese Grand Aid aimed for Afforestation/Reforestation

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Chapter 1　Background of the Project

Chapter 1 Background of the Project

The Socialist Republic of Viet Nam (hereinafter referred to as "Viet Nam") is located in the east of the Indochina. The area is 331,689 km^2 with a population of 76,710,000 (1997), which consists mostly of rural population. As some two-thirds of the total land area is covered by mountains and hilly land and meteorological and geographical conditions are favorable. Viet Nam has long enjoyed its rich forest resources.

The forest area in Viet Nam decreased from 14 million ha, approximately 42% of the national land area, in 1945 to 9.3 million ha, approximately 28% of the national land area, in 1995. Until 1975, the war was the major cause of forest decline. Thereafter, the increase of the population has caused a strong demand for fuelwood and forest products, which resulted in over-exploitation of forest resources throughout the country. This declining trend still continues today, in terms of forest area and its quality.

This massive decline of forests has not only damaged the function of forests as wood producing source but has also deteriorated the environmental conservation function. The environmental conservation function includes the control of mountain disasters such as abnormal water flow and sediment discharge as well as the prevention of shifting sand in coastal sandy areas. The adverse effects of such deterioration can be recognized in many places across the country today.

In order to improve the situation, the Government of Viet Nam commenced the implementation of major afforestation/reforestation projects after 1975. However, it has found itself in the difficult situation of being unable to implement truly effective measures because of inappropriate management, inefficient planting technology, limited financial resources and the fact that people living in and around forestland are living in poverty.

In Viet Nam, nationwide afforestation/reforestation projects widely began in the 1990's based on the experience and achievements of afforestation/reforestation activities mainly assisted by foreign countries from the late 1970's onward; progresses in plantation technology and improvement of management observed after "Doi Moi" which was carried into effect in 1986.

In September 1992, Program 327 was launched under the Decision of Government 327/CT for the purpose of "utilizing bare land, devastated land, forest land, coastal land and watershed". Initially, the main focus was placed on development in mountain regions. However, the Decision of Prime Minister 556/TTg issued in 1995 shifted the main purpose of Program 327 to creating and maintaining protection forests and special use forests, including watershed forests, coastal protection forests and national parks.

The contents of Program 327 was integrated into the so-called "5 Million ha Forest Establishment Program" for which a resolution was passed by the National Assembly in December 1997. The program aims at creating 3 million ha of production forests and 2 million ha of protection forests in the period from 1998 to 2010. In response to this resolution, the Decision of Prime Minister 661 was issued in July 1998, detailing the concrete objectives, tasks, principles and implementation system for the establishment of 5 million ha forests.

According to the Decision of Prime Minister 661, the establishment of 2 million ha protection forests is to be executed through new planting for 1 million ha and assisted natural regeneration for 1 million ha by improving existing degraded natural forests. In the protection forests establishment plan, the afforestation/reforestation of 60,000 ha in coastal sandy areas aimed for fixing the shifting sand is included. The extremely important coastal sandy areas cover 30,000 ha and scheduled to be afforested between 1998 and 2000.

Sandy coast is spreading in the southern central Viet Nam provinces and local residents are frequently affected by natural disasters when the typhoons strike and winds shift the sand. Such disasters damage farmlands, agricultural crops and living conditions of local residents. Sand-laden winds also damage the major infrastructures, such as the national road No.1 and the national railroad. Coastal areas located between the coastline and the national road No.1 are covered by white sand without any forests or with poorly growing scattered trees.

Therefore, to reduce damages from sand, establishment and improvement of coastal protection forests is an urgent necessity. This region is ranked as one of the top priority areas in the forest establishment program of Viet Nam. However, afforestation in coastal sandy areas requires appropriate technology and much cost, which makes it difficult for Viet Nam to proceed with the project.

Against this background, the Government of Viet Nam made a request for Grant Aid for the Project for Afforestation on the Coastal Sandy Area in Southern Central Viet Nam.

The followings are the contents of the request from Viet Nam:

(1) **Project Areas**

Project areas are located in coastal districts of four provinces:

Quang Nam	(3 districts):	Thang Binh, Tam Ky, Nui Thanh
Quang Ngai	(2 districts):	Binh Son, Duc Pho
Phu Yen	(3 districts):	Song Cau, Tuy An, Tuy Hoa
Khanh Hoa	(1 district):	Van Ninh

(2) **Afforestation**

Establishment of 11,015ha protection forest in four provinces.

Quang Nam:	4,043 ha
Quang Ngai:	1,959 ha
Phu Yen:	2,810 ha
Khanh Hoa:	2,203 ha

(3) **Equipment**

Equipment provision for forest protection activities.

4WD Vehicle (wagon):	5
Pickup truck:	4
Motorbike:	16

Chapter 2　Contents of the Project

Chapter 2 Contents of the Project

2-1 Objectives of the Project

The Project sites (hereinafter referred to as "Sites") designated in the request to Japan from Viet Nam are located in four provinces, i.e. Quang Nam, Quang Ngai, Phu Yen and Khanh Hoa, of southern central Viet Nam, and consist of 55 batches. Each Site varies from 2 ha to more than 1,200 ha in terms of area. The total requested area was 11,015 ha.

The majority of forest establishment cases had been conducted in mountainous regions of four provinces where a large planting area is available and high productivity in wood production is expected. However, forest establishment in coastal sandy areas with high population density and high land utilization rate has recently been emphasized.

Coastal sandy areas in southern central Viet Nam are located between the coastline and the national road No. 1 and filled with farmlands, houses and various public facilities.

Forest establishment and planting activities have been widely practiced around farmlands and public facilities in the coastal sandy areas. Nevertheless, there are still large areas that need further afforestation/reforestation, for most of the previous planting activities were conducted on scattered sites and relatively small in size. Therefore, damages by strong wind and shifting sand can be observed and effective land use is hindered.

The direct objective of the request is to protect farmland and houses near the Sites and also to alleviate damages to the national road and the national railway line which play a vital transport role in Viet Nam and other infrastructure components by establishing coastal protection forests.

The medium and long-term objectives of the Project are described below. They can be achieved by sustained forest maintenance which enables sustainable function as protection forest.

(1) Improvement of the productivity of farmland lying behind established forests and the resulting environmental improvement would enable the use of hitherto unused waste as farmland or fuelwood production sites in some areas.
(2) Appropriate tending work (pruning, improvement cutting and thinning) to maintain healthy forest stands will enable the supply of fuelwood and organic products for local residents.
(3) The continuous implementation of forest maintenance and management will increase employment opportunities and improve the standard of living for local residents.
(4) The sustaining of stable forests will contribute to the creation and maintenance of biological diversity and environmental conservation over wide coastal areas.

2-2 Basic Concept of the Project

Based on the result of the Basic Design Study, it was decided to adopt a total planting area of 3,670 ha at 16 Sites in Quang Nam and Phu Yen Provinces. The Sites will prove to be a good model for establishment of 60,000ha coastal protection forests in coastal sandy areas of Viet Nam.

The basic concept of the Project is described below.
Details on the selection and validity considerations of the Site are described in section 2-3.

(1) Planting Area

The field survey on the requested Sites (55 Sites with a total area of 11,015ha) found that almost all the Sites meet "Criteria for the Site Survey and Evaluation of Site Selection" indicated in the Minutes agreed and signed in July 28, 1999.

However some sites/locations included conditions described below.

① Steeply sloping sites/locations where successful afforestation cannot be expected without major civil engineering work.
② Sites/locations requiring drainage channels and/or the transport of planting stock and materials by boat because of flooding during the rainy season.
③ Sites/locations with sand spit topography, showing wave marks and which, therefore, require the construction of a coast embankment.
④ Sites/locations where the construction of an access road by the Vietnamese sides is difficult due to adverse topography.

It was decided to exclude these sites/locations from the prospective Sites on the grounds that the high cost of forest establishment in such sites/locations. The total excluded area sums up to 2,714 ha (for details see table 2-4).

On the other hand, some requested Sites have areas in their vicinity where planting will be easier than above mentioned sites/locations. On these Sites, in

consideration of the excluded planting areas, enlargement of their boundaries to increase planting areas was decided after discussion with Vietnamese side. As a result, the planned total planting area in four provinces comes up to 10,080 ha, which is the total target area of the Basic Design Study.

When considering present afforestation situations in the coastal sandy areas in Viet Nam, its silvicultural techniques and activities are recognized to be on an above-average level. However, in order to complete 10,080ha planting in three to four year period, the following concerns arise.

① The pace of annual planting will reach between 3,000-4,000 ha in peak periods. This pace exceeds that of the past actual planting activities for the method introduced in the Project. Thus there is likely to be apprehensions regarding management of planting itself. Moreover, upgrading of present setups will be necessary for forest management after planting.

② During peak periods of planting (100ha per day), a total of approximately 15,000 laborers (about 150 laborers per hectare) will be required in four provinces to carry out such an unprecedented amount of work. Even granted that it is possible to secure that number of laborers, there will be a fear that employing so many laborers for a period of just three or four years might create social instability.

In consideration of the above concerns, it is reasonable to conclude that implementing all 10,080 ha afforestation at one time under the reforestation Grant Aid is too risky.

Therefore, from the viewpoint of judging the "easiness of project implementation" in each of the 42 Sites covering 10,080 ha in four provinces, each Site was classified and ranked mainly according to Site access, length of necessary operation roads at the Sites, and prospects for project completion within the given period (see section 2-3).

Thus, a ranking (A, B, and C) by the easiness of project implementation was determined (see table 2-6). Of the total planting area, 5,220ha, 3,260ha and 1,600ha was placed in the A rank, B rank and C rank, respectively.

Sites classified as A rank spread over four provinces, but in view of the fact that this is one of the first reforestation Grant Aid undertakings to be conducted by the Government of Japan, it was deemed appropriate to further narrow down Sites according to the certainty of project implementation and degree of cost-effectiveness.

In view of the fact that supervision of intensive works is easy and indirect costs for afforestation can be reduced in provinces with relatively concentrated distribution of Sites (for details see table 2-7), it is clear that Quang Nam Province and Phu Yen Province are advantageous. Therefore, planting of A rank Sites covering 2,040 ha in Quang Nam Province and 1,630 ha in Phu Yen Province, making a total of 3,670 ha, has been planned.

Of the six southern central coastal provinces, Quang Nam Province, located in the center of the upper part, and Phu Yen Province, in the center of the lower part, will prove to be a good model for future afforestation of coastal protection forest in other provinces of the southern central Viet Nam.

(2) Implementation Period for the Project

It is necessary to raise healthy planting stocks before carrying out afforestation under the Project, and the nursing period ranges from five to seven months depending on whether the stock is raised by cutting or by nursing seedlings.

In regions such as the Project areas, that have a dry season and a rainy season, the planting period is limited to the rainy season between September and December. Moreover, in cases where the planting area of single sites is expansive, it is necessary to construct operation roads within the Sites in advance to maximize the efficiency of planting stock transport and labor efficiency.

Moreover, since it is judged that by purchasing quality planting stocks for the Project solely from existing nurseries, belonging to the Department of Agricultural and Rural Development (DARD) and Forest Enterprise and Forest Company (FE/FC) in each province, it will be physically impossible to provide sufficient stocks, thus temporary nurseries capable of producing the required

quantity of planting stocks must also be constructed prior to the planting work.

Accordingly, in order to carry out a first cycle of afforestation, the first year should be devoted to securing seeds, establishing temporary nurseries near/within the scheduled Sites, nursing the planting stocks and constructing operation roads within the Sites, and actual planting should be commenced in and after the second year.

Since afforestation under the Project will be carried out under severe climate and soil conditions, it is vitally important to carry out tending works twice after planting. The first tending work, in a year after planting, includes additional fertilization, replanting to replace dead trees, and sand digging work to restore seedlings which are buried due to shifting sand and to mediate desiccation of soil moisture content during dry seasons. The second tending work, in two years after planting, consists of additional fertilization and sand digging work.

Thus afforestation activity will be finished in four years (preparation, planting, tending x 2), however, concerning the 3,670 ha targeted under the Project, it is desirable to carry out the planting over two cycles to facilitate work supervision and temporary nursery utilization. Therefore the overall Project period will be approximately five years.

(3) Planting Method

Afforestation in coastal sandy areas in Viet Nam has a fairly long history. However, there are few projects currently in progress that involve the large-scale and concentrated afforestation. Conventionally, *Casuarina equisetifolia* (hereinafter referred to as "Casuarina") has been the major planting species.

As there are many places where relatively good growth is observed despite the adverse soil and climate conditions in coastal sandy areas, Casuarina is selected as the major planting species for the Project.

Local residents have requested the planting of acacia, eucalyptus and cashew nut trees. In view of the need to facilitate the participation of local residents in forest management and to make easy confirmation of Site boundaries, the

planting of these species and boundary trees (flowering trees) at suitable Sites will be introduced.

Concerning the planting of Casuarina in Viet Nam until today, it has often been the case that planting stocks are raised from seeds to be planted as bare-rooted seedlings. However, due to severe conditions of coastal sandy land and the fact that not enough care has been taken to select and plant healthy planting stocks, there has been a high percentage of seedling mortality. For this reason, the use of pot seedlings has recently been encouraged because this offers a higher chance of raising healthy planting stocks and enables a soil dressing effect to be achieved at the time of planting. Nursery practice based on taking cuttings from superior mother trees is being carried out in DARD nurseries, albeit on a small scale.

In the Project, assuming that the canopy closure of the Sites will occur after 8-10 years, when the current annual growth increment of Casuarina is at its highest, it is estimated that density will be at least 2,000 trees per hectare (tree height =approximately 10 m); therefore, the basic density at the time of planting shall be made 2,500 trees per hectare.

Concerning planting stocks, healthy stocks raised from seeds or cuttings in existing nurseries will be purchased, however, since production capacities of the nurseries are limited, it will be necessary to raise a large proportion of the necessary planting stocks in temporary nurseries basically established in the Sites.

Regarding seeds raised in temporary nurseries, seeds possessing a clearly defined provenance will be used for the first planting. For the second year's planting, since it will be possible to compare stocks raised in the first year and select the Casuarina best suited for seed collection, good quality seeds which was taken from Casuarina stocks raised under similar conditions to those seen in the Project areas will be purchased from local seed companies.

As for the size of pots, major pot size in Viet Nam, that is to say pots with the diameter of 10 cm and the height of 20 cm, will be used with a view to achieving high yield root taking in the coastal sandy areas.

The weight of each potted planting stock will be around 2 kg. Manual labor will be relied on in transporting planting stocks into Sites and planting them. However, since a large number of laborers will be needed to manually carry out all the work, planting systems that is based on good consideration of the most cost-effective density of operation roads and number of transporting carriers shall be established according to the scale of each Site.

(4) Equipment and Materials

A minimum number of vehicles that are essential for patrolling, the progress control of the planting work and the maintenance of forests by provincial DARD will be provided by Japan.

(5) Forest Maintenance

For the successful afforestation of 3,670ha in coastal sandy areas, both MARD in the central government and the forestry division of DARD in each province where the Sites are located must properly act as the responsible agencies as well as implementing agencies. Furthermore, concerning the operation and maintenance of forests after planting, involvement of both these agencies will be decisive.

These organizations have acquired certain experience of the planting and forest maintenance of Casuarina and other species. A contracting system under which local residents in the designated forest areas are assigned the management of certain areas in exchange for an allowance, has been executed as one of major methods for forest maintenance in Viet Nam. However, the management of protection forests in Viet Nam has been weaker than that of wood production forests. The main reason for this lies in the fact that the payment of allowances was delayed and protection forests provide less advantages than production forests because restrictions on utilization of non-timber forest products are imposed.

Maintenance of forests established under the Project will be the charge of Vietnamese side. In consideration of above mentioned problems concerning the

forest management, the following points are expected to be improved about operation and maintenance of the forest established under the Project.

① Stronger Regulations for Protection Forest

As the Project areas are located in the most crucial places among the designated protection forest areas, therefore, fairly strict regulations on their use will be enforced even after the established forests are completely handed over to Vietnamese side.

② Compilation of Forest Management Plan

In the coastal sandy areas of southern central Viet Nam, Casuarina reaches the canopy closure around 10 years after planting and has a continuous growth increment for approximately 25 years. Therefore, a creation of forest management plan (including regeneration plan) which has a cycle of 25 years will be essential. In the creation of the plan, consideration must be given to encouragement of local participation in addition to technical issues of forest management such as the stand density control and the regeneration method.

③ Improvement of Forest Management Contracting System

The system will be strengthened by appropriate payment of allowance to local residents involved in forest management.

④ Other Governmental Measures

The protection forest management guidelines and government policies specify that an officer will also be appointed as responsible person for forest management at district level. Accordingly, in surrounding areas of which the environment is improved by the Project, it is believed that the government will provide assistance to facilitate the use of these improved areas as farmland or coppice forests. It is strongly hoped that the above system and government policy will be strictly enforced in view of the proper maintenance of the planted trees following the completion of the Project.

In order to enhance effectiveness of operation and maintenance of the forests established, following items shall be considered for the Project

planning by Vietnamese side.

① Information and technical support shall be provided to ensure that the full understanding of local residents is obtained concerning the significance of coastal protection forests and the importance of forest tending and maintenance.
② Trees that are felled in the process of the stand density control shall be orderly set aside for local residents' use. Raising the local residents' awareness for their vigorous participation in forest management activity is an important, basic point of the Project.

As indicated above, the Project aims to promote the participation of local residents, thus contributing to create an atmosphere for a self-reliant forest establishment by the local residents.

Based on the basic concept described above, the major activities of the Project are summarized in table 2-1.

Table 2-1 Summary of Project Activities

Item	Requested Content	Basic Plan
Project Area	Quang Nam Province Quang Ngai Province Phu Yen Province Khanh Hoa Province	Quang Nam Province Phu Yen Province
Afforestation	Number of Sites: 55 Total Planting Area: 11,015ha Target Species: *Casuarina equisetifolia* Complementary Species: ・Acacia ・Eucalyptus	Number of Sites: 16 Total Planting Area: 3,670ha Target Species: *Casuarina equisetifolia* Complementary Species: ・Acacia ・Eucalyptus ・Cashew ・Boundary Tree (Flowering Tree)
Temporary Work for Afforestation		Operation Road: 9,300m Temporary Nursery: 7 Temporary Building: 7
Supply of Equipment	4WD Vehicle: 5 Pickup: 4 Motorbike: 16	4WD Vehicle: 3 Pickup: 2 Motorbike: 6

Note: Total planting areas indicated above are areas which planting will be actually carried out. Therefore, firebreaks and non-planting places within the Sites are not included in the planting area.

2-3 Examination of Selection and Validity of Sites

(1) Selection of Sites

The number of Sites contained in the request had been 55 (a total of 11,015ha) before the Study Team departed to conduct the field survey in Viet Nam. However, following the review made by DARD in each province at the start of the Site survey, the number of Sites was narrowed down to 44 (a total of 10,525ha) in a process which also involved renew of the Site locations (item① below). In this Study, these 44 Sites were checked against the following selection criteria (items ② through ⑰) which are narrowed down from the criteria described in the Minutes (July 28, 1999) to determine whether or not they should be targeted by the reforestation Grant Aid (for details see table 2-2) .

① Sites survived the screening by DARD.
② No overlap with other afforestation projects being performed by other donors or Viet Nam.
③ No overlap with other projects not related to afforestation.
④ Necessity for the establishment of coastal protection forests (shifting sand protection and wind protection).
⑤ Either government owned land or public land.
⑥ Confirmation of the forest maintenance and management setup of the Vietnamese side.
⑦ No Overlap with areas for agroforestry or other purposes.
⑧ Compatibility with the grant aid scheme.
⑨ Positive socioeconomic effect on the local community through forest establishment.
⑩ Likelihood of environmental improvement effect by forest establishment.
⑪ Site located in objective districts.
⑫ No serious difficulties in establishing access roads.
⑬ Suitability of geological and soil conditions for planting.
⑭ Site not in danger of being inundated by waves (sand pit and etc.) and where car access is possible without using any boat.
⑮ Topographical conditions which does not hinder afforestation (in particular,

no sloping land with a gradient of 10° or more).

⑯ No need for wind protection works.

⑰ No long term flooding and stagnation of water during the rainy season.

⑱ Possibility of expansion of the planting area around the Site.

Of the above items, concerning ① through ⑩, screening was carried out on site-to-site basis. Moreover, concerning ⑪ through ⑰, because conditions are not the same all over a Site, omission of area within each Site has been introduced. As for the item ⑱, land where planting is possible around the Sites and where the items ② through ⑰ were complied with shall be included in Sites.

Concerning the item ⑬, the local soil shows slight disparity in pH. However, since no significant variation is recognized in the composition of soil nutrients and other soil properties, it was concluded that the composition is almost uniform, thus, selection criteria based on soil conditions (the item ⑬) were not applied.

A total of 42 Sites covering a total area of 10,080 ha cleared these criteria and was selected as the study target Sites (see table 2-3).

Practically, from the requested 44 Sites (10,525ha), the following kinds of sites were excluded from the planting area, based on the field survey. The quantity, locations and areas of excluded sites are listed in table 2-4.

① Sites where the surface gradient is 10° or more.

② Sites of sand spit terrain where afforestation cannot be carried out without using boats.

③ Sites where sand fixation walls are required.

④ Sites where there is evidence of wave inundation.

⑤ Sites where wind protection works are required.

⑥ Sites which are flooded and stagnated for a long time during the rainy season.

⑦ Sites where construction of access roads to the Site are difficult.

Table 2-2 Site Selection Criteria

	Item	Commentary and Definition
①	Screening by DARD A Sites requested by DARD B Sites which, although requested, had already been incorporated into other sites by DARD C Sites which had already been excluded when the Study Team was given an explanation at the DARD	The originally requested 55 sites had already undergone review and had been revised by the time the Study Team arrived in Viet Nam. Concerning the revised sites, survey and analysis were carried out based on items ② through ⑱ of Table 3-1 and ① through ⑦ of Table 3-3).
②	Overlapping with other projects (reforestation/afforestation projects by Viet Nam or other donors) A None B Yes	
③	Overlapping with other projects not related to reforestation/afforestation A None B Yes	Specifically speaking, one site involved a construction of commune group cemetery.
④	Need for coastal protection forest A None B Yes	Inhabited buildings or farmland lie next to all the requested sites, and damages caused by shifting sand and wind have been confirmed. This is the basis for assuming that coastal protectionl forests are necessary.
⑤	Government owned land/public land or not A Government owned or public land B Other land	All the land is government owned and it has been confirmed that the land use rights belong to the DARD or local communes.
⑥	Confirmation of the post-Project forest maintenance setup A Sufficient B Insufficient	A forest maintenance setup was confirmed whereby a Protection Forest Management Board (PFMB) is placed under each DARD, and Forest Protection Stations and Forest Inspectorate Sub-Departments remain in close communication on the commune level.
⑦	Overlapping with agroforestry areas A No overlapping B Overlapping exists	
⑧	Compatibility with the grant aid scheme A Compatibility exists B Incompatible	Since the Project aims to establish forests not for producing timber but for contributing to land protection and environmental conservation through the control of shifting sand, it was confirmed that all sites comply with the guidelines for reforestation Grant Aid.
⑨	Socioeconomic effect on the local community through protection forest establishment A High B Low	There are many people living in poverty in the four target provinces, especially in areas around the requested sites. Apart from the direct increase in income resulting from the additional employment for afforestation, since the adverse effects of shifting sand on agriculture and other economic activity will be mitigated, the economic impact on the local community is high.
⑩	Environmental improvement effect A High B Low	Together with the socioeconomic effect, improvement in the natural environment can be expected from the planting of forests in devastated sandy areas.
Area related ⑪	Sites located in objective districts	In cases where the requested site extends beyond the target district indicated in the minutes, the protruding portion has been excluded from the area
⑫	Sites where access road establishment is difficult	Sites where access road establishment is difficult have been excluded.
⑬	Suitability of geological and soil conditions for planting	Parts where it is judged that afforestation is difficult based on the geological/soil conditions have been excluded from the area. (However, geologically difficult areas were found not to exist).
⑭	Sites not in danger of being inundated by waves (sand spit area)	Parts of sand spit area where access is by boat or where there is a high risk of wave inundation have been excluded from the area.
⑮	Topographical conditions which does not hinder afforestation (surface gradient)	Parts where the gradient is 10 degrees or more and it is deemed that a sand fence is required have been excluded from the area.
⑯	No need for wind protection works	Places where it is deemed that afforestation cannot succeed unless wind protection works are established have been excluded from the area.
⑰	No long term flooding and stagnation of water during the rainy season	Places where it is deemed that afforestation will not succeed unless leveling of flooded land (sand bed establishment) is carried out have been excluded from the area.
⑱	Possibility of expansion of planting area around the site	Concerning sites where land was excluded for any of the reasons given in items 11-17, places considered to be suitable for planting around those sites have been added.

Table 2-3 Selection of Sites

Item:				①	②		③	④	⑤	⑥	⑦	⑧	⑨	⑩		⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	
Province	District	Old site number (before the field survey)	Requested area 1	Screening by DARD	Overlapping with other projects	Overlapping with other projects besides reforestation/afforestation	Need for coastal protection forest	Public land or not	Confirmation of the post-Project forest maintenance setup	Overlapping with agroforestry areas	Compatibility with the grant aid scheme	Socioeconomic effect on the local community	Environmental improvement effect	New site number	Requested area 2	Excluded area 1 (outside targeted districts)	Excluded area 2 (access road establishment is difficult)	Excluded area 3 (geological conditions)	Excluded area 4 (sand drift area with wave inundation and boat access)	Excluded area 5 (steep slope, need sand force work)	Excluded area 6 (need wind protection work)	Excluded area 7 (flooded area)	Excluded area (Total)	Possible expansion area around the site	Total Area (ha)	Remarks
Quang Nam	Thang Binh	1	52.8	A	A	A	A	A	A	A	A	A	A	N-1	67							14	14	17	70	
		2	378.2	A	A	A	A	A	A	A	A	A	A	N-2	450							153	153	153	450	
		3	37.1	C		B								-									0		0	
		4	166.3	A	A	A	A	A	A	A	A	A	A	N-3	158							16	16	18	160	
		5	4.9	C		B								-									0		0	
		6	9.6	B	A	A								(N-2)									0		0	
		-	-	A	A	A	A	A	A	A	A	A	A	N-4	37							7	7	10	40	
		7	296.1	A	A	A	A	A	A	A	A	A	A	N-5	428							43	43	45	430	
		8	343.8	A	A	A	A	A	A	A	A	A	A	N-6	300							45	45	45	300	
		-	-	A	A	A	A	A	A	A	A	A	A	N-7	10							5	5	5	10	
		9	516.5	A	A	A	A	A	A	A	A	A	A	N-8	1,240							140	140	140	1,240	
		10	448.6	B	A	A								(N-8)									0		0	
		11	194.4	B	A	A								(N-8)									0		0	
		12	12.3	B	A	A								(N-5)									0		0	
		13	2.7	A	A	A	A	A	A	A	A	A	A	N-9	7								0	3	10	
		14	2.2	A	A	A	A	A	A	A	A	A	A	N-10	7								0	3	10	
		15	142.0	A	A	A	A	A	A	A	A	A	A	N-11	130							13	13	13	130	
	Tam Ky	16	211.3	A	A	A	A	A	A	A	A	A	A	N-12	355							35	35	40	360	
		17	161.9	B	A	A								(N-12)									0		0	
		18	13.9	C										-									0		0	
		19	51.0	A	A	A	A	A	A	A	A	A	A	N-13	249							62	62	63	250	
		20	109.6	B	A	A								(N-13)									0		0	
		21	41.7	A	A	A	A	A	A	A	A	A	A	N-14	68							14	14	16	70	
		22	53.1	A	A	A	A	A	A	A	A	A	A	N-15	50							15	15	15	50	
	Nui Thanh	23	344.5	A	A	A	A	A	A	A	A	A	A	N-16	231							23	23	22	230	
		24	138.9	A	A	A	A	A	A	A	A	A	A	N-17	189							15	15	16	190	
Quang Ngai	Binh Son	-	-	A	A	A	A	A	A	A	A	A	A	G-1	175							43	43	38	170	
		-	-	A	A	A	A	A	A	A	A	A	A	G-2	72							18	18	16	70	
		25	16.0	C										-									0		0	
		26	18.2	C										-									0		0	
		27	35.6	A	A	A	A	A	A	A	A	A	A	G-3	57							8	8	11	60	
		28	55.3	A	A	A	A	A	A	A	A	A	A	G-4	59							8	8	9	60	
		29	203.7	A	A	A	A	A	A	A	A	A	A	G-5	37		37						37	0	0	
		-	-	A	A	A	A	A	A	A	A	A	A	G-6	58							12	12	14	60	
		30	73.9	C										-									0		0	
		31	174.6	C										-									0		0	
		32	89.1	C										-									0		0	
		33	469.0	A	A	A	A	A	A	A	A	A	A	G-7	469				27	42		56	125	56	400	
	Duc Pho	34	419.7	A	A	A	A	A	A	A	A	A	A	G-8	486	82						24	106	60	440	
		-	-	A	A	A	A	A	A	A	A	A	A	G-9	96								0	44	140	
		35	436.5	A	A	A	A	A	A	A	A	A	A	G-10	417				99			21	120	63	360	
		36	144.8	C										-									0		0	
		37	11.4	A	A	A	A	A	A	A	A	A	A	G-11	11								0	29	40	
		38	38.7	A	A	A	A	A	A	A	A	A	A	G-12	44							4	4	50	90	
		39	61.7	A	A	A	A	A	A	A	A	A	A	G-13	50					31		6	37	47	60	
Phu Yen	Song Cau	40	1,157.0	A	A	A	A	A	A	A	A	A	A	P-1	983					89	80	47	216	153	920	
		41	153.0	A	A	A	A	A	A	A	A	A	A	P-2	67						10	5	15	58	110	
		42	384.8	A	A	A	A	A	A	A	A	A	A	P-3	421					187	75	20	282	131	270	
		43	123.4	C										-									0		0	
	Tuy An	44	27.3	C										-									0		0	
		45	27.7	C										-									0		0	
		46	298.0	A	A	A	A	A	A	A	A	A	A	P-4	238				154		10	13	177	109	170	
		47	60.0	A	A	A	A	A	A	A	A	A	A	P-5	40						5		5	95	130	
		48	50.1	A	A	A	A	A	A	A	A	A	A	P-6	89					15	10		25	96	160	
		-	-	A	A	A	A	A	A	A	A	A	A	P-7	93						10		10	107	190	
	Tuy Hoa	49	16.5	C										-									0		0	
		50	67.6	A	A	A	A	A	A	A	A	A	A	P-8	57								0	43	100	
		51	127.9	A	A	A	A	A	A	A	A	A	A	P-9	99	5			94				99	0	0	
		52	85.4	A	A	A	A	A	A	A	A	A	A	P-10	77							5	5	58	130	
		53	76.2	C										-									0		0	
		-	-	A	A	A	A	A	A	A	A	A	A	P-11	72							10	10	58	120	
Khanh Hoa	Van Ninh	54	1,031.7	A	A	A	A	A	A	A	A	A	A	K-1	578					53	55	85	193	25	410	
		55	1,272.9	A	A	A	A	A	A	A	A	A	A	K-2	1,704					182	145	232	559	75	1,220	
	Ninh Hoa	-	-	A	A	A	A	A	A	A	A	A	A	K-3	0								0	200	200	
			10,941.1	(11,015ha)											10,525										10,080	
	Number of Sites		55	44										44											42	

Table 2-4 List of Excluded Sites

Province	District	Site Number	Total Area (ha)	Excluded Area (ha)	Remarks
Quang Nam	Thang Binh	N-1	67	14	Flooded Area
		N-2	450	153	Flooded Area
		N-3	158	16	Flooded Area
		N-4	37	7	Flooded Area
		N-5	428	43	Flooded Area
		N-6	300	45	Flooded Area
		N-7	10	5	Flooded Area
		N-8	1240	140	Flooded Area
		N-11	130	13	Flooded Area
	Tam Ky	N-12	355	35	Flooded Area
		N-13	249	62	Flooded Area
		N-14	68	14	Flooded Area
		N-15	50	15	Flooded Area
	Nui Thanh	N-16	231	23	Flooded Area
		N-17	189	15	Flooded Area
Quang Ngai	Binh Son	G-1	175	43	Flooded Area
		G-2	72	18	Flooded Area
		G-3	57	8	Flooded Area
		G-4	59	8	Flooded Area
		G-5	37	37	No Access Road
		G-6	58	12	Flooded Area
		G-7	469	125	Steep Slope, Sand Spit, Accessible by boat only, Flooded Area
	Mo Duc	G-8	486	106	Outside of the 2 Districts in Quang Ngai, Flooded Area
	Duc Pho	G-10	417	120	Sand Spit, Washed by Waves Accessible by boat only Flooded Area
		G-12	44	4	Flooded Area
		G-13	50	37	Steep Slope, Flooded Area
Phu Yen	Song Cau	P-1	983	216	Steep Slope, Moving Sand Area, Flooded Area
		P-2	67	15	Moving Sand Area, Flooded Area
		P-3	421	282	Steep Slope, Moving Sand Area, Flooded Area
	Tuy An	P-4	238	177	Sand Spit, Washed by Waves Accessible by boat only Moving Sand Area, Flooded Area
		P-5	40	5	Moving Sand Area
		P-6	89	25	Steep Slope, Moving Sand Area
		P-7	93	10	Moving Sand Area
	Tuy Hoa	P-9	99	99	Sand Spit, Washed by Waves Accessible by boat only
		P-10	77	5	Flooded Area
		P-11	72	10	Flooded Area
Khanh Hoa	Vanh Ninh	K-1	578	193	Steep Slope, Moving Sand Area, Flooded Area
		K-2	1,704	559	Steep Slope, Moving Sand Area, Flooded Area
				2,714	

(2) **Validity of Sites.**

The selected Sites (42 Sites; a total planting area of 10,080 ha) were ranked according to ease of implementation and the validity of each was examined. Evaluation factors are as indicated below (for details see table 2-5).

① Ease of improvement works required to establish access roads
② Length of preparatory period required until planting
③ Low level of operation road density (examination of whether operation roads can be kept short according to the shape of Sites)
④ Length of new access roads
⑤ Ease of planting stock supply (distance from existing nurseries)
⑥ Ability to secure sufficient laborers
⑦ Ease of commuting for laborers (distance from each district capital)

The evaluation results are as indicated in table 2-6. The numbers and areas of Sites are as shown below:

A rank	25 Sites	5,220 ha
B rank	16 Sites	3,260 ha
C rank	5 Sites	1,600 ha

For reasons described in 2-2 (1), of the A rank, afforestation of 3,670 ha at 16 Sites in Quang Nam Province and Phu Yen Province shall be selected (see table 2-7 and table 2-8).

Table 2-5 Site Evaluation Criteria

Item	Commentary and Definition
① Ease of improvement works (bridges, width, river beds) required to establish access roads A No need for improvement works B Section where width is less than 2.5 m has a length of less than 1.0 km, or cases where a river bed exists along the shortest route C Section where width is less than 2.5 m has a length of 1.0 km or more, or bridge or river bed improvement works are necessary in one location D Section where width is less than 2.5 m has a length of 1.0 km or more, or bridge or river bed improvement works are necessary in multiple locations	On access road leading to the requested sites, there were bridges, river beds, or narrow sections which require improvement works. Since there is small likelihood that the Viet Nam side will start improvements immediately following the start of the Project, sites requiring works in more places have been set at a later implementation.
② Length of preparatory period required until planting A The necessary preparatory period is less than 1.0 year B The necessary preparatory period is less than 1.5 years C The necessary preparatory period is less than 2.0 years D The necessary preparatory period is 2.0 years or more	Sites where construction of an access road will be time consuming and there is little likelihood that works can be finished within the originally planned Project period (3 years) have been set at a later implementation.
③ Level of operation roads density in the requested sites (grasping of the shape of sites which potentially require numerous work roads) A Less than 10 m/ha B 10-15 m/ha C 15-20 m/ha D 20 m/ha or more	In order to avoid collective civil engineering works, sites shaped in such a way that density of the operation roads is high have been set at a later implementation.
④ Length of access road establishment A 0km B 0-1.5 km C 0.5-1.0 km D 1.0 km or more	Sites where the distance of access roads to be constructed by the Viet Nam side is long have been set at a later stage.
⑤ Ease of the planting stock supply (distance from major existing nurseries) A 10 km radius B 20 km radius C 30 km radius D Greater than 30km radius	In order to reduce the number of temporary nurseries that need to be established, sites situated close to existing nurseries have been set at an early implementation.
⑥ Number of laborers (number of unemployed in the province) A Assuming the peak daily number of employed laborers to be 6,000, at least 20 times that number of unemployed exist in the province B Assuming the peak daily number of employed laborers to be 6,000, at least 10 times that number of unemployed exist in the province C Assuming the peak daily number of employed laborers to be 6,000, at least 5 times that number of unemployed exist in the province D Assuming the peak daily number of employed laborers to be 6,000, less than 5 times that number of unemployed exist in the province	By assuming the peak daily number of employed laborers required for all work areas to be 6,000 and estimating the number of unemployed people in each province as a multiple of this, then indicators for securing labor were obtained. Source: Status of Labor - Employment in Vietnam 1998 Edited: Ministry of Labor - Invalids and Social Affairs Center for Information - Statistics on Labor and Social Affairs Published: Statistical Publishing House
⑦ Commuting distance (distance from District Capital) A 5 km radius B 10 km radius C 15 km radius D Greater than 15 km radius	In order to reduce the number of temporary laborer dormitories, sites which can be commuted to from district capitals have been set at an early implementation.

Table 2-6 Validity of Sites

Item: ① ② ③ ④ ⑤ ⑥ ⑦

Province	District	New site number	Planting area (ha)	Ease of access road improvement works	Length of preparatory period required until planting	Level of operation roads density	Length of access road establishment	Ease of planting stock supply (distance from major existing nurseries)	Number of laborers	Commuting distance (distance from District Capital)	Conclusion	A (ha)	B (ha)	C (ha)	Remarks
Quang Nam	Thang Binh	N-1	70	C	A	B	C	C	A	D	B	0	70	0	
		N-2	450	C	A	B	A	C	A	C	B	0	450	0	
		N-3	160	C	A	C	A	C	A	C	B	0	160	0	
		N-4	40	C	A	B	C	C	A	C	B	0	40	0	
		N-5	430	C	A	B	B	C	A	B	B	0	430	0	
		N-6	300	A	A	C	A	B	A	A	A	300	0	0	
		N-7	10	A	A	B	B	C	A	C	A	10	0	0	
		N-8 - 1	580	A	A	B	A	C	A	C	A	580	0	0	
		N-8 - 2	440	D	A	B	A	A	A	D	B	0	440	0	
		N-8 - 3	220	C	A	B	A	A	A	D	B	0	220	0	
		N-9	10	C	A	B	B	C	A	D	B	0	10	0	
		N-10	10	C	A	B	C	C	A	D	B	0	10	0	
		N-11	130	C	A	B	A	C	A	D	B	0	130	0	
	Tam Ky	N-12	360	A	A	B	B	A	A	B	A	360	0	0	
		N-13	250	A	A	B	A	B	A	C	A	250	0	0	
		N-14	70	A	A	D	A	B	A	B	A	70	0	0	
		N-15	50	A	A	D	A	B	A	C	A	50	0	0	
	Nui Thanh	N-16	230	A	A	D	A	C	A	D	A	230	0	0	
		N-17	190	A	A	B	A	D	A	D	A	190	0	0	
Quang Ngai	Binh Son	G-1	170	A	A	B	A	B	A	C	A	170	0	0	
		G-2	70	A	A	B	A	B	A	C	A	70	0	0	
		G-3	60	A	A	B	B	C	A	D	A	60	0	0	
		G-4	60	A	A	D	A	C	A	D	A	60	0	0	
		G-6	60	A	A	D	A	C	A	D	A	60	0	0	
		G-7	400	B	A	D	A	C	A	D	B	0	400	0	
	Duc Pho	G-8	440	A	A	C	C	D	A	D	A	440	0	0	
		G-9	140	C	A	B	A	D	A	C	B	0	140	0	
		G-10	360	C	A	D	C	D	A	B	C	0	0	360	
		G-11	40	A	A	B	B	D	A	C	A	40	0	0	
		G-12	90	D	A	B	B	D	A	D	C	0	0	90	
		G-13	60	D	A	B	B	D	A	D	C	0	0	60	
Phu Yen	Song Cau	P-1 - 1	490	A	A	B	A	D	A	D	A	490	0	0	
		P-1 - 2	430	A	A	A	A	D	A	D	A	430	0	0	
		P-2	110	C	A	D	B	C	A	C	C	0	0	110	
		P-3	270	C	A	C	A	C	A	C	B	0	270	0	
	Tuy An	P-4	170	C	A	B	B	C	A	C	B	0	170	0	
		P-5	130	A	A	B	C	B	A	D	A	130	0	0	
		P-6	160	A	A	C	C	B	A	D	A	160	0	0	
		P-7	190	A	A	A	A	A	A	D	A	190	0	0	
	Tuy Hoa	P-8	100	A	A	D	A	B	A	A	A	100	0	0	
		P-10	130	A	A	B	A	C	A	D	A	130	0	0	
		P-11	120	C	A	B	B	D	A	D	B	0	120	0	
Khanh Hoa	Van Ninh	K-1	410	A	A	C	A	D	A	D	A	410	0	0	
		K-2 - 1	240	A	A	B	A	D	A	D	A	240	0	0	
		K-2 - 2	980	A	D	C	A	D	A	D	C	0	0	980	
	Ninh Hoa	K-3	200	C	A	A	A	D	A	D	B	0	200	0	
			10,080									5,220	3,260	1,600	
												25	16	5	

Number of Sites 46

Province		A	B	C		
Quang Nam		2,040	1,960	0	4,000	1,845
Quang Ngai		900	540	510	1,950	900
Phu Yen		1,630	560	110	2,300	1,061
Khanh Hoa		650	200	980	1,830	844
Total		5,220	3,260	1,600	10,080	4,650

Table 2-7 Considerations on Validity of the Sites

	A Rank area /Requested Area (%)	Distribution of A rank sites within Province
Quang Nam	51%	Dense
Quang Ngai	46%	Intermediate
Phu Yen	71%	Dense
Khanh Hoa	36%	Sparse

Table 2-8 List of Sites in Quang Nam Province and Phu Yen Province

Province	District	New site number	A (ha)	Remarks
Quang Nam	Thang Binh	N-6	300	
		N-7	10	
		N-8 - 1	580	
	Tam Ky	N-12	360	
		N-13	250	
		N-14	70	
		N-15	50	
	Nui Thanh	N-16	230	
		N-17	190	
Phu Yen	Song Cau	P-1 - 1	490	
		P-1 - 2	430	
	Tuy An	P-5	130	
		P-6	160	
		P-7	190	
	Tuy Hoa	P-8	100	
		P-10	130	
		area	3,670	
		number of sites	16	

Quang Nam	2,040	2,040
Phu Yen	1,630	1,630
Total	3,670	3,670

2-4 Basic Design

The following Basic Design was made on the total area of 3,670 ha consisting of 16 Sites of which validity was confirmed.

2-4-1 Design Concept

The Project, targeting the two provinces of Quang Nam and Phu Yen on the coast of southern central Viet Nam, involves the planning of cooperation in the establishment of coastal protection forests for mitigating damages caused by strong winds and shifting sand, improving the living environment of local residents, and protecting surrounding infrastructures.

In making the Project design, the following concepts shall be adhered to in consideration of the results of discussions with related agencies within the Government of Viet Nam and the results of field surveys.

Table 2-9 Basic Statistics in Two Provinces (1997)

	Population (x1,000)	Area (1,000ha)	Farm Land (1,000ha)	Forest Land (1,000ha)
Quang Nam	1,379.4	937.3	104.7	439.7
Phu Yen	769.6	516.1	69.1	162.9
Nation	76,714.5	33,167.0	7,843.1	10,169.6

Source：Statistical Data of Agriculture, Forestry and Fishery 1990-1998 and Forecast in the Year 2000, 1999

Source：Socio-economic Statistical Data of 61 Provinces and Cities in Vietnam,

2-4-1-1 Natural Conditions

Viet Nam, being extremely prone to the influence of the South China Sea, is situated in a tropical monsoon/subtropical monsoon climate zone. Precipitation, typhoons and other seasonal changes of climate are influenced by the southwest and northeast monsoons, and regional differences in climate in Viet Nam itself are extreme. Annual mean temperature is approximately 24˚C in northern regions and approximately 27˚C in southern regions.

precipitation at observation points varies widely between 1,200 mm and 4,800 mm, and the mean value is 1,740 mm. The central coastal belt in the southern

region is the driest area in the country, and annual precipitation here sometimes drops below 1,000 mm.

(1) Precipitation and Precipitation Patterns

Although a slight difference is found between the two provinces, generally speaking, the dry season lasts from January to August and the rainy season from September to December. Moreover, during the dry season itself, there is a period between May and June known as the intermediate rainy season when there is quite a lot of precipitation.

There is a characteristic in terms of the annual precipitation that the upper in the north, the more becomes the annual precipitation. This is due to the disparity in precipitation during the rainy season, though there is little disparity in precipitation between the two provinces in the driest period of the year from February to April.

In view of the above precipitation conditions, attention will be given to the following points.

① It is important that planting is completed in the first two months of the rainy season, and that the remainder of the rainy season will be devoted to the growth of planted trees.
② Regarding nursing, since this is practiced throughout both the dry season and rainy season, sunlight management and water management will be appropriately conducted according to manuals.
③ In carrying out the construction of temporary facilities (operation roads, temporary nurseries, and temporary buildings), construction sites will be laid away from areas of flooding and strong winds. The construction will be carried out in the dry season.
④ Dies on due to rain will not be designed for any of the work activities.

Table 2-10 Monthly Mean Precipitation (mm)

Province	Town	Month												Total	from Jan	from Sep
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		to Aug	to Dec
Quang Nam	Tam Ky	84	49	42	46	116	111	61	92	287	746	579	295	2,508	601	1,907
Phu Yen	Song Cau	26	9	4	19	70	134	80	96	171	422	472	124	1,627	438	1,189
	Tuy Hoa	48	17	30	35	70	61	45	49	242	518	488	143	1,746	355	1,391

Table 2-11 Mean Number of Rainy Days per Month (days)

Province	Town	Month												Total	from Jan	from Sep
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		to Aug	to Dec
Quang Nam	Hoi An	10.1	6.0	4.8	5.4	8.5	8.7	7.7	10.0	15.1	19.5	21.1	17.6	134.5	61.2	73.3
	Tam Ky	15.9	9.2	7.6	7.3	11.0	9.3	8.9	11.9	16.3	21.7	22.9	21.8	163.8	81.1	82.7
Phu Yen	Song Cau	6.0	3.0	2.0	2.0	7.0	5.0	4.0	5.0	12.0	15.0	15.0	11.0	87.0	34.0	53.0
	Tuy Hoa	11.0	5.0	4.0	4.0	7.0	8.0	5.0	9.0	15.0	19.0	20.0	16.0	123.0	53.0	70.0

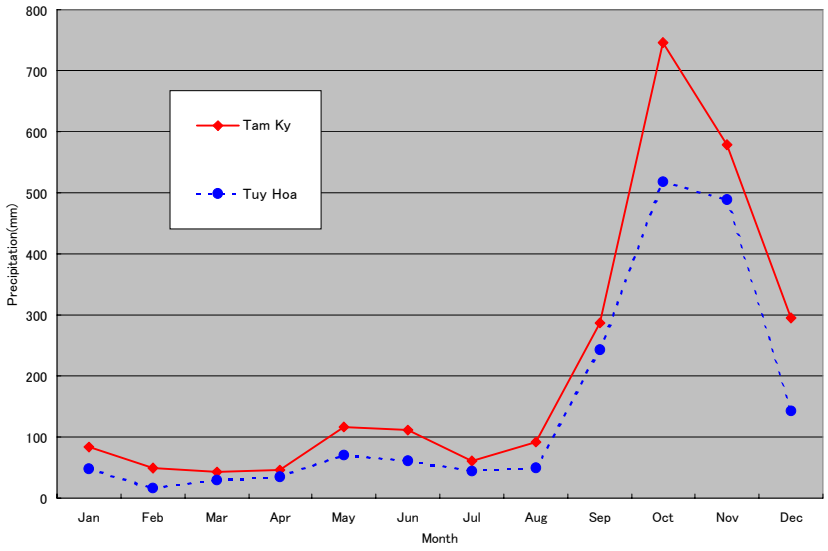


Figure 2-1 Changes in Monthly Mean Precipitation

(2) **Temperature**

① Monthly mean temperatures in each province are as indicated in table 2-12. Temperature remains at between 20-30˚C throughout the year and annual fluctuations are small, thus providing a good environment for the growth of vegetation. The annual mean temperature in each province ranges between 25-26˚C and regional disparities between the provinces are small; therefore, the impact of temperature on the Project is small.

② The Project work will be carried out by a large number of laborers in the scorching sun in coastal sandy areas. Accordingly, a measure to secure the safety and health of laborers will be essential.

Table 2-12 Monthly Mean Temperature

Province	Town	category	Month												Average	from Jan	from Sep
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		to Aug	to Dec
Quang Nam	Tam Ky	Average	21.3	22.4	24.2	26.5	28.0	28.7	28.8	28.5	27.1	25.4	23.7	21.5	25.5	26.1	24.4
		Max	24.6	26.3	28.8	31.4	33.0	33.7	34.1	33.7	31.5	28.6	26.5	24.3	29.7	30.7	27.7
		Min	19.1	20.2	21.4	23.6	24.8	25.4	25.1	25.1	24.3	23.1	21.7	19.7	22.8	23.1	22.2
Phu Yen	Tuy Hoa	Average	23.0	23.6	25.2	27.1	28.7	29.0	28.9	28.6	27.4	26.3	25.1	23.5	26.4	26.8	25.6
		Max	26.4	27.6	29.7	31.8	33.7	33.8	34.3	33.8	32.2	29.7	27.7	26.3	30.6	31.4	29.0
		Min	20.8	21.1	22.2	23.8	25.3	25.8	25.6	25.4	24.4	23.9	23.1	21.5	23.6	23.8	23.2

(3) Abnormal Weather

Typhoons often strike the region. Damages due to wind and flooding are likely to occur every year. Of those damages, the Project design shall include measures against predictable damages which may normally occur. However, the plan shall not cover with respect to unpredictable severe disasters such as a great flooding in November 1999.

(4) Topography, Geology, and Soil Conditions

① The topography is generally flat, however, small areas on a steep gradient were observed in regions of continuing sand dunes. Afforestation will not be carried out on slopes where the gradient is 10° or more.

② Sandy soil is composed more than 90% of inorganic materials and a little of organic materials, making conditions very poor and infertile for the growth of plant. For this reason, based on past local planting activities, experiences of coastal forest establishment in Japan and cost-benefit, the design will include pot nursing in order to obtain a soil dressing effect and the application of manure and compound fertilizer to planting holes.

③ Since the ground surface is composed of deposited sandy soil, the soil bearing capacity is weak. Therefore, when designing operation roads, works of roadbed with load-bearing capacity of 8-ton load will be included. Furthermore, since there are many areas where an impermeable layer exists just below the surface thus leading to poor drainage and flooding in the rainy season, ample attention will need to be paid to the layout of facilities.

(5) **Vegetation**

Some parts of the Sites have been already covered by shrubs and grasses, and this natural vegetation fixes the shifting surface sand. For this reason, existing vegetation will be retained as much as possible.

2-4-1-2 Social Conditions

① Since the Sites are government-owned land and rights of land use have not been allocated to local residents, no significant problem is recognized concerning ownership or land use rights. However, in places where the Sites are neighbored by residential land, farmland, or cemeteries, appropriate buffer zones will be created.

② In order to ensure the smooth and effective promotion of the Project, which will be realized by a large number of laborers, development of a commuting system and provision of technical and safety training will be carried out by DARD of each province and subcontractors.

③ Since few infrastructures exist in coastal sandy areas, facilities such as temporary nurseries, operation road and temporary buildings which are necessary for the Project implementation will be constructed. Such facilities will be all temporary works for the afforestation.

2-4-1-3 Use of Local Contractors, Equipment and Materials

A number of forest enterprises and forest companies (FE/FC), which are the state-owned forestry operation units, can be found in each province. FE/FC are well versed and have experience in planting activities and forest management. Accordingly, design for the Project will be advanced based on the assumption that the FE/FC will bear the responsibility for works ranging from production of planting stock through to planting and tending as subcontractors for a Japanese contractor.

Concerning the establishment of operation roads and construction of temporary nurseries, too, it has been confirmed that numerous experienced contractors exist locally.

Concerning the construction equipment and materials required for afforestation of coastal protection forests, although wide ranges of items are required, majority of items will be available by local procurement. In carrying out local procurement, it is important to establish a detailed procurement setup based upon confirming the capacity of local suppliers and distributors.

2-4-1-4 Operation and Maintenance Capacity of Implementing Agencies

MARD and DARD, the responsible and implementing agencies for the Project, have actively been promoting afforestation activities since the beginning of the 1990s.

In view of this fact, it is deemed that these agencies possess sufficient afforestation experience and forest management capacity.

In particular, since the Project will entail the recruitment of a large number of laborers in coastal sandy areas where few infrastructure exists, responsibility for labor health and safety measures should rest with MARD and DARD because they have a full knowledge of local labor legislation, labor customs, and labor conditions.

Furthermore, since it is important to obtain the understanding and cooperation of local residents when carrying out forest protection, MARD and DARD will also be responsible for conducting public relations.

Concerning the vehicles that will be required to promote the above labor health and safety measures and local participation, some of the vehicles will be supplied under the Project.

2-4-1-5 Scope and Grading of Equipment

(1) The scope of equipment to be supplied to DARD is as follows:

① Some of the vehicles required for the management of areas which are reforested under the Project.

② The above items are also to be used in “the 5 Million ha Forest Establishment Program”.

(2) Concerning equipment grades, equipment will be maintenance-free and will adhere to the following line.

① Since vehicles will need to run over bumpy and very poor road conditions, vehicle types that can withstand such conditions will be selected.

2-4-1-6 Implementation Period

The Project implementation schedule will be decided by giving consideration to the following factors.

① Period of work should not exceed that provided in the construction permission.

② Appropriate planting periods for planting and replanting shall be between the beginning and the middle of the rainy season to facilitate the growth of plating stocks receiving plenty of water during the remainder of the rainy season.

③ Of tending works, fertilizer application and sand digging work periods shall be two months between April and June during the intermediate rain season, and replanting period shall be two months between September and November.

④ Construction period for temporary facilities (temporary nurseries and operation roads) will be set not to hinder nursing, planting and tending activities.

2-4-2 Basic Design

2-4-2-1 Afforestation

The following, table 2-13 shows the planting areas to be afforested according by Site and period. Moreover, table 2-14 shows the planting areas to be afforested by province, working period and tree species. Details of necessary basic design in order to achieve establishment of 3,670ha forest are described below.

Table 2-13 Planting Areas by Site and Period

Province	District	Site Number	Planting Area (ha)	1/2	2/2	
					term 1	term 2
Quang Nam	Thang Binh	N-6	300	0	300	0
		N-7	10	0	10	0
		N-8 - 1	580	0	0	580
	Tam Ky	N-12	360	0	360	0
		N-13	250	0	250	0
		N-14	70	0	0	70
		N-15	50	0	0	50
	Nui Thanh	N-16	230	0	0	230
		N-17	190	0	0	190
Phu Yen	Song Cau	P-1 - 1	490	0	0	490
		P-1 - 2	430	0	430	0
	Tuy An	P-5	130	0	130	0
		P-6	160	0	0	160
		P-7	190	0	190	0
	Tuy Hoa	P-8	100	0	0	100
		P-10	130	0	0	130
		Area (ha)	3,670	0	1,670	2,000
		Number of Sites	16		7	9

Table 2-14 Planting Areas by Province, Period and Tree Species

Province	Species	Planting Area (ha)	1/2	2/2	
				term 1	term 2
Quang Nam	**SUBTOTAL**	**2,040**	**0**	**920**	**1,120**
	Casuarina	1,826	0	822	1,004
	Acacia	102	0	47	55
	Eucalyptus	102	0	47	55
	Cashew	10	0	4	6
	Flowering Tree	-	-	-	-
Phu Yen	**SUBTOTAL**	**1,630**	**0**	**750**	**880**
	Casuarina	1,458	0	672	786
	Acacia	82	0	37	45
	Eucalyptus	82	0	37	45
	Cashew	8	0	4	4
	Flowering Tree	-	-	-	-
TOTAL	**TOTAL**	**3,670**	**0**	**1,670**	**2,000**
	Casuarina	3,284	0	1494	1790
	Acacia	184	0	84	100
	Eucalyptus	184	0	84	100
	Cashew	18	0	8	10
	Flowering Tree	-	-	-	-

(1) **Planting**

① Design Concept

a. In the design, a prime consideration will be given to wind protection and prevention of shifting sand, while an emphasis will be laid on improvement of the natural environment and socio-economic condition.

b. Shifting sand dunes, flooding areas, wind-prone areas and steep slopes will be excluded from the design planting areas to avoid waste of planting in areas with impediments to establish forests as much as possible. Therefore, special attention shall be given to demarcation of Site boundaries and excluded areas.

c. Planting activities will mainly involve manual labor. However, concerning transport of heavy items (planting stocks, manure, fertilizer, etc.), use of

small crawler type carriers will be considered.

d. Special attentions to the local climate as typified by the rainy season and the dry season shall be given. Moreover, equalization of laborer recruitment through all seasons and regions shall be considered.
e. Existing vegetation shall be retained in Sites as much as possible, in order to contribute to the growth of planting species as an ameliorator of the site conditions.
f. Boundary of each Site shall be demarcated by concrete stakes.
g. Planting shall be intensively implemented during the first two months of the rainy season.
h. Planting must be completed over a wide area on scattered Sites during the short planting period. Therefore, schedules of construction of temporary facilities and nursing of planting stocks must be carefully adjusted not to interfere the planting schedule.
i. The target tree species is Casuarina, which is most suited to coastal sandy lands of the region. Acacia, eucalyptus, cashew and flowering trees will be used as complementary species.
j. In consideration of the ease of planting and maintenance following planting, each planting compartment will be around 50 ha in size, flowering trees will be planted in corners of compartments as boundary trees, and fire breaks of 30 m in width shall be secured as a measure against forest fires.

② Design Criteria

a. Target Species (Casuarina planting)

Planting density will be 2,500 trees per hectare.

Judging from the growth and canopy closure rate of existing Casuarina forests of different stand age, it was deemed that this planting density is not excessive and enables a sufficient wind and shifting sand protection effect to be obtained. Spacing in this case is 2.0 m x 2.0 m. Moreover, since it was confirmed as a result of soil analysis, that the soil composition of all the Sites is the same irrespective of color and particle size, the planting density shall be the same for each Site.

Each tree will be given 50 g of compound fertilizer and 375 g (0.5 litter) of manure. Since the compound fertilizer will be used on sandy soil in which

nutrients can be easily dissolved by rain, longer lasting block form shall be used rather than grains. Objective of applying manure is to improve the soil water holding capacity and other physical/chemical properties of soil, in addition to providing nutrients.

Concerning the provenance of Casuarina, Vietnamese Casuarina as well as Chinese 601 and 701 shall be used. Also other Casuarina with a clear provenance (ex. Australia) shall be used.

b. Complementary species

Acacia, eucalyptus, cashew and flowering trees, will be planted on boundaries and in areas easily accessible to local residents for leaf litters and other secondary products, and the planting density and spacing are shown in table 2-15. Moreover, concerning boundary trees (flowering trees), a total of 12 trees will be planted every 50 ha square (compartment unit of Casuarina afforestation). Compound fertilizer and manure will be applied according to the same guidelines given above concerning Casuarina.

In view of necessary quantity and local production capacity, planting stocks of complementary species will be purchased from existing nurseries.

Table 2-15 Planting Areas and Planting Density by Tree Species

Species	Area (ha)	Density (trees/ha)	Spacing	Remarks
Casuarina	3,284	2,500	2.0m×2.0m	
Acacia	184	2,000	2.0m×2.5m	
Eucalyptus	184	2,000	2.0m×2.5m	
Cashew	18	500	4.0m×5.0m	
Boundary Trees (Flowering trees)	—	0.24		12trees/50ha

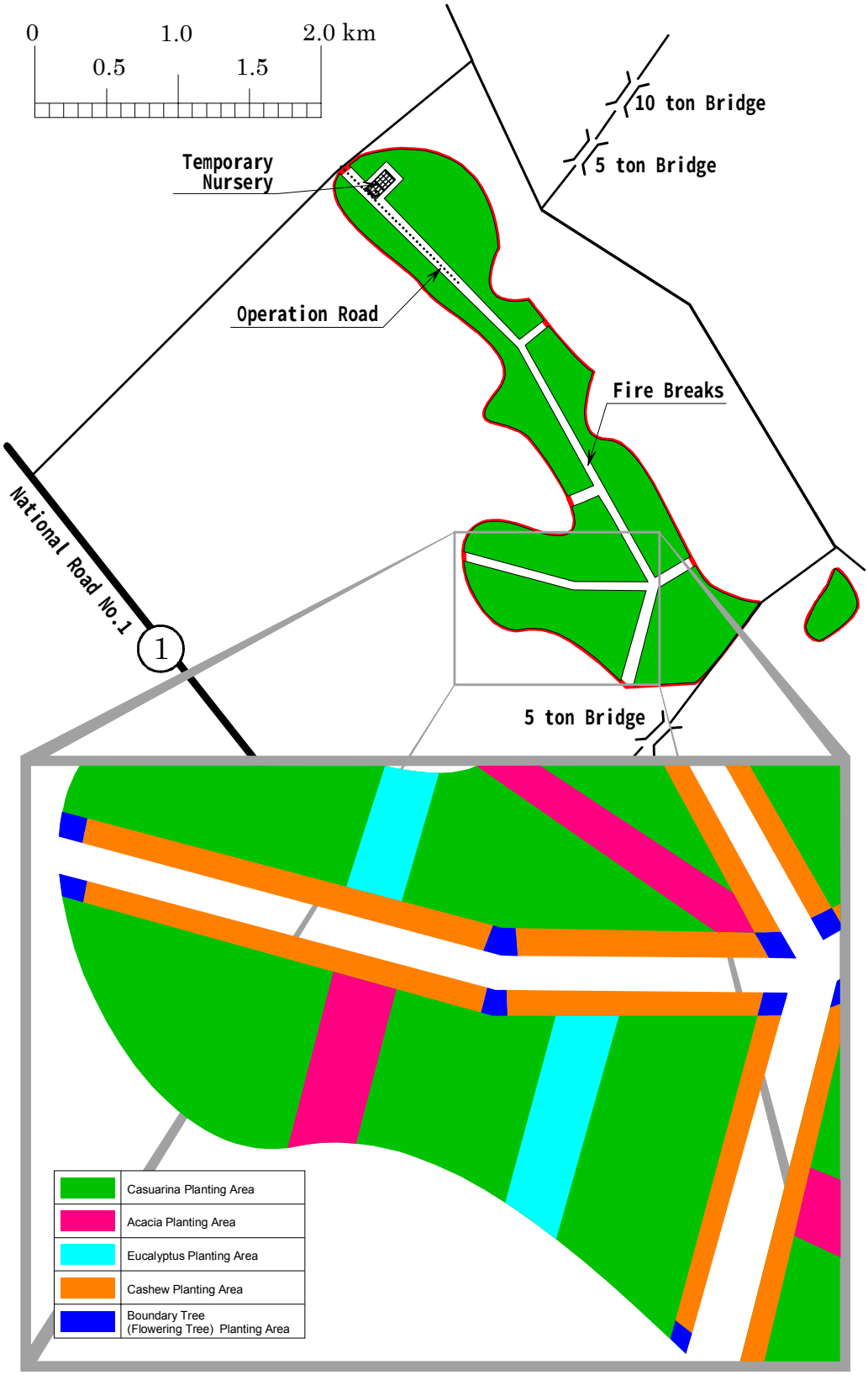


Figure 2-2 Image of Site

(2) Nursing

① Design Concept

a. Necessary amount of planting stocks will be supplied based on the planting plan.
b. In consideration of local nursing activities, nursing plan aims to procure and produce planting stocks whose quality is adaptable in coastal sandy areas.
c. The nursing plan will be designed based on the special characteristics of the planting period, the rainy season, and the dry season, etc.
d. The temporary nurseries are intended for only using during the Project implementation period and thus durability will be designed for it.
e. The temporary nurseries are indispensable for the production of planting stocks, but these are temporary facilities for achievement of afforestation which is the main Project objective.

② Production and Purchase of Planting Stock

In order to execute afforestation over 3,670 ha, it is necessary to prepare a total of approximately 8,960,000 planting stocks. These planting stocks will be supplied from both newly constructed temporary nurseries and existing nurseries. Assuming replanting of 15% of the total planting trees, extra 1,340,000 planting stocks will be necessary. Thus, a total of approximately 10,300,000 planting stocks will be required for the Project.

With respect to Casuarina afforestation activities, the two provinces targeted under the Project have experience in production mainly of bare-rooted seedlings at DARD, FE, and household nursery levels. It is estimated that production of Casuarina planting stocks in existing nurseries in two provinces amounts to a million seedlings per year. Judging from the results of the field survey, the current production capacity in the two provinces is not sufficient to provide the whole amount required for the Project.

In consideration of this, about 66% of the Casuarina planting stocks will be produced in the temporary nurseries, while the remaining 34% and other tree species will be purchased from existing nurseries.

The number of planting stocks required for the Project based on the planting plan is approximately 8,960,000. Table 2-16 and table 2-17 give breakdowns of this number according to province, period, and tree species.
Table 2-18 and table 2-19 give the number of planting stocks required for the replanting by province, period, and tree species.

Table 2-16 Number of Required Planting Stocks for Planting by Province and Period

Province	Total	1/2	2/2	
			term 1	term 2
Quang Nam	4,978,470	0	2,245,210	2,733,260
Phu Yen	3,977,370	0	1,832,170	2,145,200
TOTAL	8,955,840	0	4,077,380	4,878,460

Table 2-17 Number of Required Planting Stocks for Planting by Tree Species

Province / Species	Total	Quang Nam	Phu Yen
Casuarina	8,210,000	4,565,000	3,645,000
Acacia	368,000	204,000	164,000
Eucalyptus	368,000	204,000	164,000
Cashew	9,000	5,000	4,000
Boundary Tree	840	470	370
Total	8,955,840	4,978,470	3,977,370

Table 2-18 Number of Required Planting Stocks for Replanting by Province and Period

Province	Total	1/2	2/2		
			term 1	term 2	term 3
Quang Nam	747,200	0	0	337,000	410,200
Phu Yen	597,050	0	0	274,925	322,125
TOTAL	1,344,250	0	0	611,925	732,325

Table 2-19 Number of Required Planting Stocks for Replanting by Tree Species

Province / Species	Total	Quang Nam	Phu Yen
Casuarina	1,232,500	685,250	547,250
Acacia	55,200	30,600	24,600
Eucalyptus	55,200	30,600	24,600
Cashew	1,350	750	600
Boundary Tree	0	0	0
Total	1,344,250	747,200	597,050

a. Purchasing from Existing Nurseries

Planting stocks produced in existing nurseries shall be purchased at a price inclusive of cost for transport to Sites. Of the total planting stocks, about 34% of the required Casuarina and other tree species will be produced in existing nurseries. For the last replanting, all of the planting stocks will be purchased.

Moreover, it has been confirmed that planting stocks of acacia, eucalyptus, cashew and flowering trees (ex. bougainvillea) for boundary trees are available in two provinces. Under the Project, planting stocks of these species shall be purchased from existing nurseries.

Table 2-20 and table 2-21 show the numbers of total planting stocks that can be purchased from existing nurseries in each province by period and by species, respectively.

Table 2-20 Planting Stock Purchase in Existing Nurseries

Province	Total	1/2	2/2		
			term 1	term 2	term 3
Quang Nam	2,229,550	0	774,281	1,024,556	430,713
Phu Yen	2,036,038	0	747,674	950,126	338,238
Total	4,265,588	0	1,521,955	1,974,682	768,951

including replanting and losses in transit

Table 2-21 Number of Required Planting Stocks in Existing Nurseries by Tree Species

Province / Species	Total	Quang Nam	Phu Yen
Casuarina	3,365,096	1,730,350	1,634,746
Acacia	444,375	246,335	198,040
Eucalyptus	444,360	246,330	198,030
Cashew	10,872	6,040	4,832
Boundary Tree	885	495	390
Total	4,265,588	2,229,550	2,036,038

including losses in transit (5%)

b. Production at Temporary Nurseries

Assuming a production yield of 80% (including losses in transit), the number of nursing stocks (number of total planting stocks) is approximately 7,797,000. Table 2-22 gives a breakdown of this number by province and period.

Table 2-22 Number of Total Planting (Nursing) Stocks from Temporary Nurseries

Province	Total	1/2	2/2
Quang Nam	4,502,876	1,884,750	2,618,126
Phu Yen	3,294,188	1,400,125	1,894,063
Total	7,797,064	3,284,875	4,512,189

including replanting

c. Number of Total Planting Stocks

Summary of the numbers of total planting stocks (including losses in transit and other losses) necessary for the Project is indicated in table 2-23.

Table 2-23 Number of Total Planting Stocks for the Project

unit: thousand seedlings

Species	Total ①+②	Purchased ①	Temporary Nursery ②
Casuarina	11,162	3,365	7,797
Acacia	444	444	-
Eucalyputus	444	444	-
Cashew	11	11	-
Boundary Tree	0.89	0.89	-
Total	12,061.89	4,265	7,797

③ Seed and Nursing Standard

a. Seeds required for temporary nurseries

As a rule, only seeds for which the provenance and examined germination rate are clearly known will be purchased.

In view of the fact that the collection period, screening and storage methods of local seeds are unknown, and in consideration of the Project starting time, the nursing period, and the timing of planting, it will be difficult to locally secure the whole seeds required to produce the planting stocks necessary for the first planting.

Accordingly, concerning the seeds required for planting in the first year of the Project, seeds which possess a clear provenance, good quality and also with necessary quantity shall be purchased.

Concerning the seeds for second planting and replanting, since a setup for the seed supply can be prepared in Viet Nam, suitable seeds for the Project shall be purchased from the National Forest Seed Company.

The National Forest Seed Company produces and takes care of 25 provenance strains of Casuarina mainly based on vegetative propagation, and 11 of these are considered to be suited to coastal sandy land like that of the Project areas. Incidentally, details concerning the provenance suited to the Project shall be determined in the detailed design stage.

The amount of required seeds by province and period is shown in table 2-24.

Table 2-24 Amount of Seeds Required in the Temporary Nurseries

unit: kg

Province	1/2	2/2	Total
Quang Nam	12	50	62
Phu Yen	9	36	45
Total	21	86	107

The period of Casuarina seed fruition and collection in Viet Nam is generally

between August and December, although there is a slight disparity according to regions. The seed collection period and sowing period differ, and it is essential to maintain seed quality in the period up until germination. Moreover, because Casuarina seeds contain a high water content at the time of collection and will ferment and rot if left unattended, drying must quickly be carried out. If wings remain on the seeds, they tend to absorb moisture and reduce seed vitality; therefore, it is necessary to separate seeds from wings. For this reason, seeds already separated from wings will be procured for the Project.

b. Scions

Propagation by cutting is currently implemented in part of existing nurseries, thus purchased planting stocks shall be partially used for the Project. Regarding Casuarina, Chinese 601 and 701 scions with a clear provenance shall mainly be used.

c. Planting Stock Standards

- Sowing Pot Nursing

  In view of the actual situation described below, nursing of sowing pot seedlings shall mainly be carried out in the temporary nurseries. However, in regard to availability of good quality seeds and possible starting time for the nursing, nursing of pot seedlings by cutting propagation shall be carried out as a complementary nursing method.

  Planting of bare-rooted seedlings is the most commonly adopted method in the Project area, however, the survival rate of bare-rooted seedlings in coastal sandy areas is extremely poor at roughly 50%.

  Planting by the sowing pot seedlings has been on the increase in recent years. Since this planting method enables a good survival rate to be achieved and leads to good growth, the target provinces are promoting the full-scale adoption of this method. Apart from good survival rate and growth, there are some other reasons given below why this method is becoming popular:

  ・The good survival rate and early stage growth are the result of the

good soil dressing effect that is obtained by using medium-sized pots (roughly 10 cm x 20 cm).

- Water and sunshine management can be carried out more appropriately in the case of pot nursing.
- Using medium-sized pots makes it possible to secure good root system growth and T/R (top/root) ratio.
- Carrying out appropriate mixing of pot soil makes it possible to carry out nursing in controlled soil.
- Transport of seedlings in pots makes it easier to prevent drying and reduces damages and other losses in transit.

With respect to propagation by cutting, it has been mentioned that nursing of superior provenance strains is possible and that the nursing period can be reduced more in the case of propagation by cutting than sowing. However, propagation by cutting is only a method to come into practice within a year or at the stage of planning in both provinces, and realistic production level lies somewhere between 20,000-50,000 stocks per year in each province. It is likely that the scale of production of cuttings will grow in the future, but when considering the present capacity, the method will be complementarily applied in the Project.

- Pot Size

A large pot size is desirable for developing root systems, however, in a large-scale afforestation, even a small increase in pot size will lead to a huge increase in the amount of required pot material. Moreover, larger pot diameter leads to greater nursery area and increase of the weight of each nursery stock will have an impact on nursery stock transport, no matter whether it be done by manual labor or by machinery. In order to make the most efficient and the most economical design concerning the amount of pot materials and transport as well as the size of nursery area, it is necessary to reduce pot size to a level that does not hinder root systems to grow to be capable of fully surviving in the Sites. Nevertheless, because Casuarina is characterized by deep axial roots, use of deep pots is desirable, while keeping the pot size minimal.

The size of pots being locally used or considered to be used under the Project

for Casuarina is relatively large; in Phu Yen Province, pots measured 15 cm in diameter and 22 cm in height and had a dry soil weight alone of more than 2.2 kg on average. The pot size regarded as able to ensure both economy and the growth of axial roots is that of which weighs approximately 1.7 kg on average including soil and measures 10 cm (diameter) by 20 cm (height), and this size shall be adopted for Casuarina nursing under the Project.

- Planting Stock Height

  In most of the coastal provinces in Southern Central Viet Nam excluding Quang Nam Province, a planting stock height of at least 1-m is adopted. The reason given for this was that small stocks don't take root or survive on coastal sandy ground. However, in the Site survey, a trend was observed whereby the first and the second year Casuarina have a higher likelihood of suffering from withering or other damages when the height exceeds 1 m. It is thought that such a phenomenon is caused by desiccation stress since the T/R (top/root) ratio and the transpiration ratio increase in the case of larger stocks compared to smaller stocks in pots of the same size. Accordingly, it is necessary to decide the height of planting stock to avoid drying damage as much as possible and secure growth in sandy areas.

  Planting stocks need to be of a certain size to maintain drying resistance and growth further after recovery from desiccation stresses. When controls of pot size, nursing period and water and sunshine management are taken into account, and judging from local nursing conditions, it is deemed that a planting stock height of around 60 cm and a nursing period of 5-7 months are appropriate.

  The Casuarina planting stocks to be used in the Project shall be produced to the following standards in temporary nurseries and existing nurseries.

Seeds and scions:	Seeds and scions with clear provenance will be used.
Nursing methods:	Pot nursing will be applied. Pots size will be 10 cm in diameter and 20 cm in height.
Nursing period:	5-7 months (from sowing)
Seedling height for planting:	60 cm ±10 cm
Diameter	>5 mm

Local standards will be adopted for acacia, eucalyptus, cashew nut and flowering trees.

d. Sunlight Management

The nursing period of Casuarina is largely in the dry season. In order to prevent drying damage and to produce planting stocks that are healthy and of high quality, it is vital that water management and thorough sunlight management be carried out. Therefore, shading facilities with shade nets will be installed in the nurseries. Shades will be provided throughout the period of sowing bed nursing of seedlings just after germination. After transplanting to pots, the seedlings will, as a rule, be nursed under the shade for the following two months.

e. Mycorrhiza Inoculation

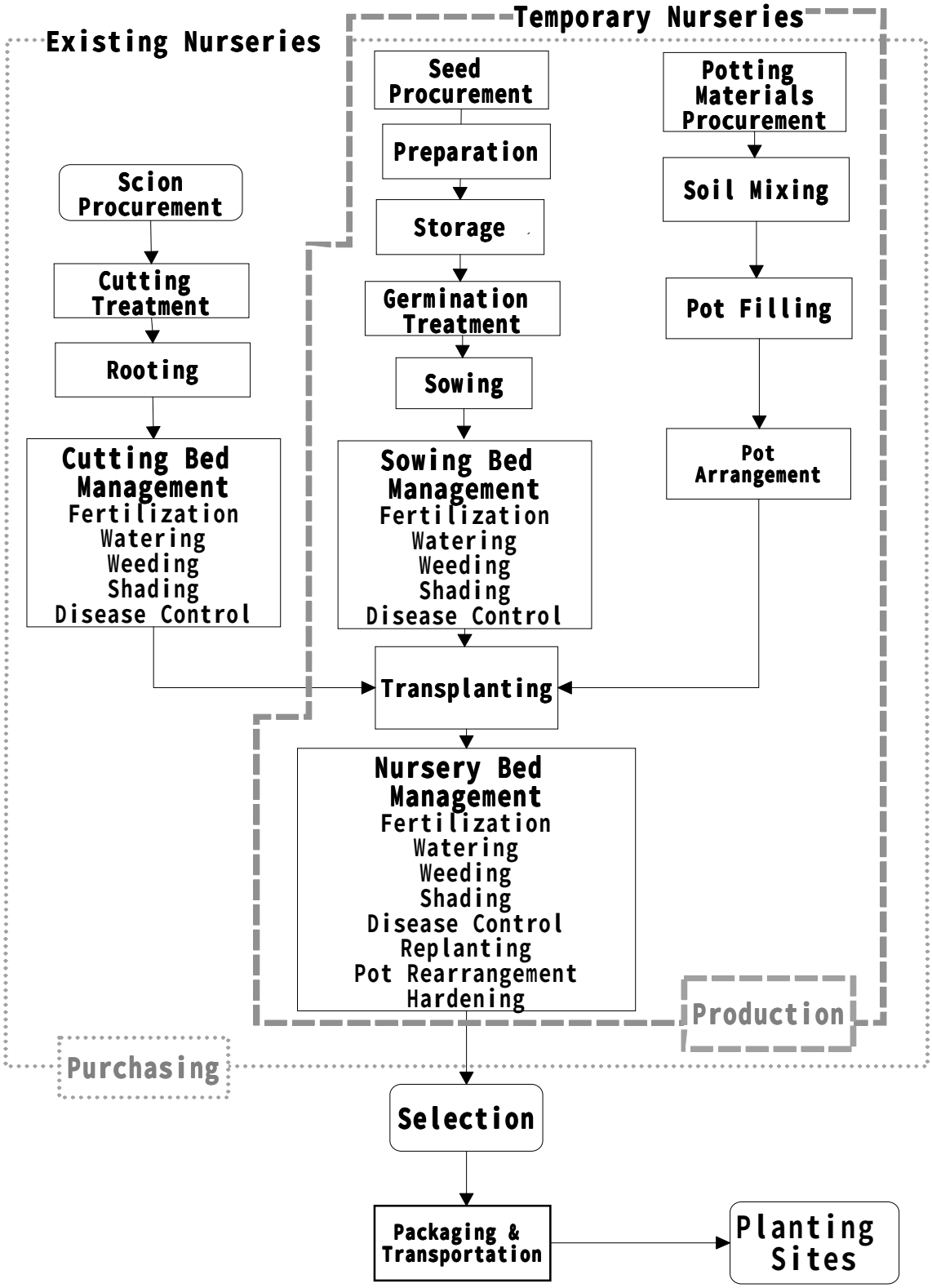
Casuarina is known for symbiosis with the actinomycetes Frankia, which carries out nitrogen fixation, and Casuarina that have been inoculated with Frankia are characterized by the formation of root nodules. Since the stocks will be planted in coastal sandy land where almost no nitrogen fertilizer exists, it is necessary to consider carrying out Frankia inoculation that will result in reducing of the fertilization quantity. In order to carry out effective nitrogen fixation, it is effective to carry out inoculation with VA and exogenous Mycorrhiza, in addition to Frankia.

Laboratory culture of Frankia and other strains is effective, but inoculation can also be given well by mixing of soil taken from an existing Casuarina forest, where Casuarina possessing root nodules grow, into pots. A consideration shall be given to which inoculation methods suited to local technical levels. For this reason, survey of Mycorrhiza in existing Casuarina

forests and study of feasible methods of inoculation shall be carried out in the detailed design stage.

④ Planting Stock Production Flow

A flowchart of planting stock production under the nursing plan is shown in figure 2-3.



Note: Propagation by cutting will also be implemented in temporary nurseries if necessary

Figure 2-3 Flowchart of Planting Stock Production

(3) Tending

As a result of the field survey, it was clarified that there is a high necessity for implementation of three kinds of tending works, i.e. replanting, sand digging, and fertilization under the responsibility of Japanese side.

① Design Concept

a. Considering the results of the field survey, there are three kinds of tending works which particularly need to be carried out under the Project; these are replanting, sand digging, and fertilization.
b. Tending work, carried out in unison with planting, aims at reducing the mortality rate and raising the growth rate of planted trees and will be conducted during the two years after planting.
c. Simultaneous implementation with planting will be avoided as much as possible and work schedule will be divided up.

② Replanting Design Criteria

According to the technical guidelines for Casuarina planting in each province, when so much withering occurs that the planting density falls below 80% within three years of planting, replanting is carried out to maintain the tree density.

However, in ordinary dry season conditions, withering of trees actually occurs in the first dry season after planting, and the mortality rate thereafter is roughly 15%. In view of this, replanting work under the Project will be carried out in the first year after planting. Replanting will be set at 15% of the original planting density.

Replanting will only be implemented in forests with a mass occurring of withering over a wide area.

Fertilization and planting stock standards for replanting will be in accordance with the principles of planting methodology for each tree species, and the replanting period will be the same as the planting period, i.e. the first two months of the rainy season.

③ Sand Digging Work Design Criteria

The field survey found sand digging work to be performed for two reasons. Sand digging in the rainy season is designed to dig up trees which have been blown down by the sea winds or have been buried, while sand digging in the dry season is intended to build circular banks of sand around tree bases and thus preserve the moisture content of soil.

Under the Project, since wind-prone Sites were excluded in the Site selection process, rather than trees blown down by the sea winds there is deemed to be a greater risk of desiccation in the dry season. Therefore, sand digging work will be carried out between April and June. This work will be performed two times after planting.

Moreover, if there is any possibility of temporary flooding during the rainy season, sand banking work will be implemented as part of sand digging work to avoid risk of withering. The sand banking work shall be implemented whenever the risk of temporary flooding is detected.

④ Fertilization Design Criteria

Fertilizer will be applied in a block form, because this hinders nutrients to easily leach away even in sandy soil during the rainy season. It also ensures that the fertilization effect is maintained over the medium to long term. The same compound fertilizer as used at the time of planting will be used.

Fertilizer will be applied during the growing season of trees. Specifically speaking, fertilizer will be applied just before the intermediate rainy season (April to June), which is the second growing period for trees. Since this fertilizer generally remains effective for approximately six months, another fertilization will be carried out during the intermediate rainy season in the next year.

⑤ Tending Area

Tables 2-25 and table 2-26 indicate areas of tending works by province and period of planting.

Table 2-25 Areas of Replanting by Province and Period

Unit : ha

Province	TOTAL	1／2	2/2	
			#1	#2
Quang Nam	306	0	138	168
Phu Yen	245	0	113	132
TOTAL	551	0	167	300

Table 2-26 Areas of Sand Digging Work and Fertilization by Province and Period

Unit : ha

Province			Total	1／2	2/2	
					#1	#2
Quang Nam	1st planting	920	1,840	0	920	920
	2nd planting	1,120	2,240	0	1,120	1,120
Phu Yen	1st planting	750	1,500	0	750	750
	2nd planting	880	1,760	0	880	880
Total		3,670	7,340	0		

(4) **Forest Maintenance**

Forest maintenance under the Project will be implemented under the responsibility of Vietnamese side while keeping a close and flexible relation with the other Project work activities. Operation and maintenance scheme is shown in figure 2-4.

① Design Concept

a. Forest operation and maintenance under the Project is intended to achieve sustainable forest management. The design period of operation and maintenance will be 25 years, after which current annual increment of Casuarina forests is expected to dramatically decrease. Therefore, a cycle of forest management plan will be set at 25 years, assuming forest regeneration in the 25th year.

b. The Project implementation period will be the first stage of the forest management, and the second stage will be the period of 20 years starting

from the sixth year up to the 25th year.

c. The forest management plan shall be prepared by each DARD. In preparing these plans, a local participation system shall be introduced with respect to forest protection and forest development. Management plans shall be revised every five years through incorporating changes in socio-economic conditions.
d. The Protection Forest Management Board (PFMB) organized within DARD will be the implementing agency and responsible agency of forest operation and maintenance.
e. The forest management works in the first stage will consist of ①forest monitoring, ②countermeasures against drought, forest fires, typhoons, and disease and pest damages. These works will be the responsibility of the Vietnamese side.
f. The forest management works in the second stage will consist of thinning and regeneration in addition to the same works as the first stage. These works will be the responsibility of the Vietnamese side.
g. In promoting the forest operation and maintenance activities, participation by local residents will be encouraged based on an appropriate merit system.

② Forest Monitoring

PFMB and local residents will be in charge of forest monitoring at a unit of 50 ha.

③ Countermeasures against Drought, Forest Fires, Typhoons, and Disease and Pest Damages.

In case of damages caused by unpredictable disasters, detailed problem analysis will be conducted and early preventive measures will be executed under maintenance of communication setup.

④ Thinning and Regeneration

Concerning local participation and the sustainable forest management, the Vietnamese side will be responsible for a specific design.

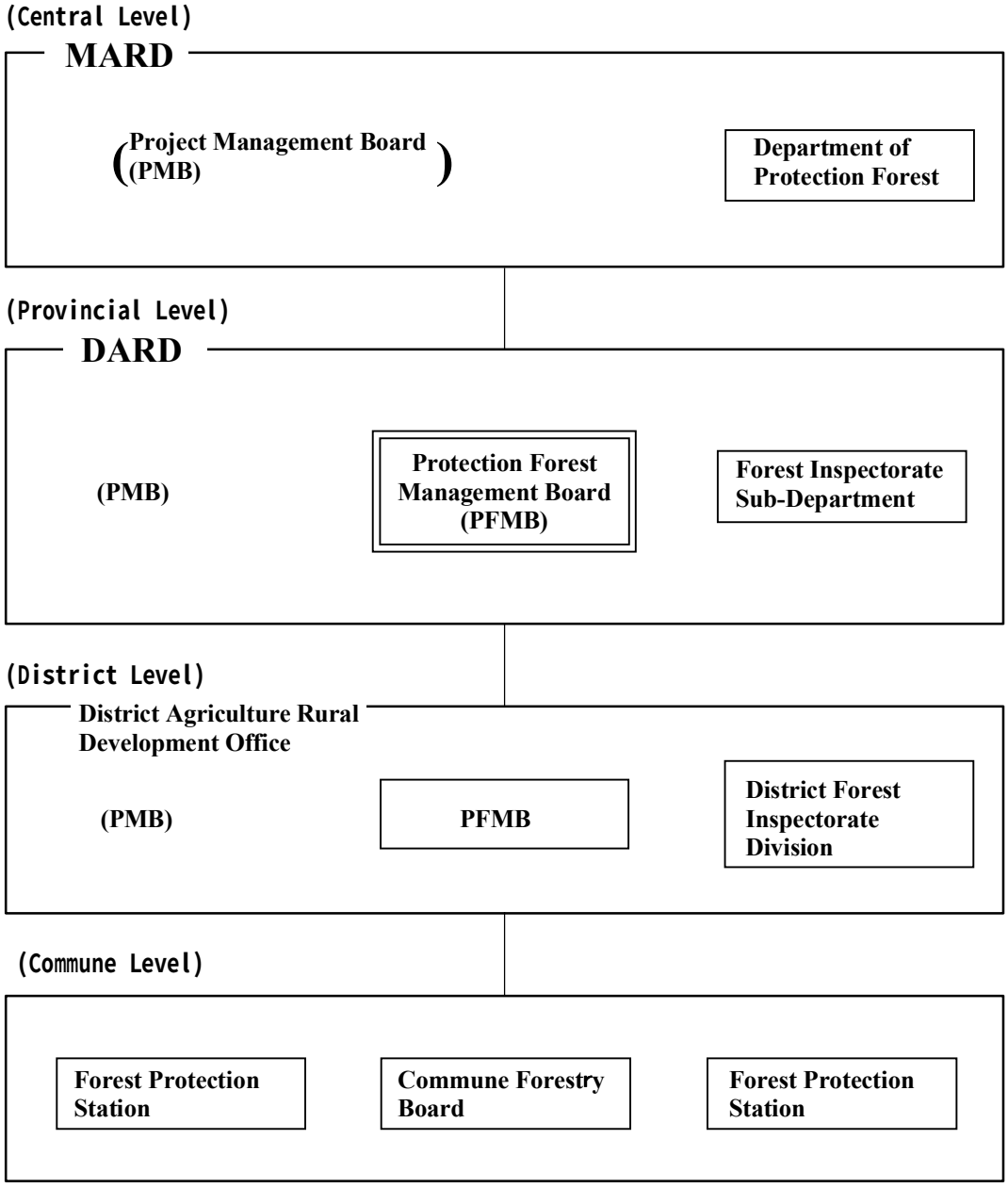


Figure 2-4 Operation and Maintenance Setup

2-4-2-2 Temporary Work

The objective of the Project is establishment of coastal protection forests, and the established forests will be provided to Viet Nam. Accordingly, the temporary nurseries, temporary buildings and operation roads described below are temporary works for establishment of the said forests. However, since the quality of these temporary works could influence the success of each activity of afforestation works, design concept and criteria of the temporary works will be presented.

(1) Construction of Temporary Nurseries

① Basic Concept

The temporary nurseries will only be used during the Project implementation period. The temporary nurseries will be as a rule established within the Sites. And, since, they will not be permanent facilities by nature, they will be designed with just enough capability to function during the Project implementation period.

a. Period for establishment of nurseries will be scheduled not to hinder nursing activities.
b. Water and sunlight management will mainly be conducted by manual labor, thus expensive automated sunshade system and sprinkler system will be not introduced. Furthermore nursery facilities will be simple as much as possible.

The construction of temporary nurseries within Sites offers the following advantages, so design will be such that these items can efficiently and effectively be realized.

c. No compensation is required concerning land used for nursery purposes.
d. The scale of nurseries can be adjusted regardless of surrounding environmental conditions and constraints.
e. Intensive planting stocks production and production management are possible.
f. Plating stocks can be assimilated to the same environment as the afforestation environment.

g. Planting stocks transport costs can be reduced.

② Well Construction and Water Management

Since rivers and other water sources are not available in the vicinity of almost all the Sites, it is necessary to secure water from wells.

As a result of surveying existing wells near candidate nursery sites and Sites, it was confirmed that ample water supply could be secured for nurseries even during the dry season. They are shallow wells which are rather subsurface water wells (pumping rate 0.75 m^3/hour, average depth 10 m) not deep groundwater wells. A boring success rate of 80% has been assumed. The number of wells required per nursery will be set based on the daily required irrigation flow (for the nursery bed 10mm/day per square meter).

However, for the purpose of securing the necessary irrigation flow even under abnormal weather conditions (droughts, etc.) and during the dry seasons, it is essential to construct water reservoirs; therefore, ponds capable of storing irrigation water stock for three days shall be provided in each nursery.

③ Electricity and Generator

Being located in remote areas, the Sites by and large have poor access to electricity.

Equipment and facilities are required for operating nurseries of a few hectares in size, and generators or electricity supply are essential to run such equipment and facilities. For this reason, in the temporary nurseries, the necessary equipment will be selected from among products that come with attached generators/engines as much as possible.

④ Production Quantity

Judging from the present state of the existing nurseries, approximately 66% of Casuarina planting stocks will be produced in the temporary nurseries. The table 2-22 shows the required number of total planting stocks by period and province.

⑤ Structure of Nurseries

Major facilities in each temporary nursery are nursery beds, sowing beds, shading facilities, wells, reservoirs and protection fences. In order to realize a full function of planting stocks production, the structure of these facilities are as follows in principle:

1) Nursery Beds

One nursery bed will measure 1.2 m x 30 m (inner dimensions); the bed will be surrounded by enclosure and placed on top of a vinyl sheet with a view to protect pots from being scattered out of the bed. In addition, a workspace of 0.8 m will be placed between nursery beds. Within one nursery bed, 3,600 pots can be arranged.

2) Sowing Beds

One sowing bed will measure 1.2 m x 10 m (inner dimensions); and the bed will be enclosed by a wooden frame to prevent soil from being scattered out of the bed. Simple vinyl houses will be provided for sowing beds.

3) Shading Facilities

Shading facilities will consist of shading nets and supporting pillars, which will be erected over the sowing beds and nursery beds.

4) Reservoirs

Reservoirs capable of holding an irrigation water stock for three days will be constructed for each nursery.

In order to construct a reservoir, waterproof sheets will be placed over excavated ground. Concerning the scale of each pond, in consideration of ease of maintenance and balance with the sizes of other facilities, the capacity will be limited to approximately 55 m^3 and surface area to approximately 70 m^2. Incidentally, irrigation pumps will mainly be used to supply water from reservoirs to the nursery beds and sowing beds.

5) Wells

Wells will be located within or near nurseries based on the well construction

point survey. Concrete pipes with the inside diameter of 1 m will be installed for each well, and submerged pumps will pump up the required quantity of water into reservoirs.

6) Nursery Protection Fences

Protection fences will be installed around each nursery to prevent cattle and other animals. For the supporting pillars, metal and wooden materials shall be used to simplify the building work.

⑥ Size of Nurseries

The required areas of nursery beds and sowing beds in the temporary nurseries, determined based on the required number of planting stocks, are as indicated in table 2-27 and table 2-28, respectively.

Table 2-27 Required Total Area of Nursery Beds

unit: m^2

Province	1/2	2/2	Total
Quang Nam	18,864	26,316	45,180
Phu Yen	14,040	19,008	33,048
TOTAL	32,904	45,324	78,228

Table 2-28 Required Total Area of Sowing Beds

unit : m^2

Province	1/2	2/2	Total
Quang Nam	314	437	751
Phu Yen	234	318	552
TOTAL	548	755	1,303

The necessary nursery bed area (45,324 m^2) and sowing bed area (755 m^2) in the second year of planting, when the planting rate reaches a peak, represent the minimum scale required to carry out production of planting stocks in the temporary nurseries. This is the case where one temporary nursery is planned in each province, and then the peak annual production will be 2.62 million stocks in Quang Nam Province and 1.89 million stocks in Phu Yen Province. The area of each nursery, when taking incidental

facilities into account, is approximately 6 ha and 5 ha, respectively.

It is surely possible to construct nurseries of this size, but they may be too large from the viewpoint of production management and there is concern that nursery operation and management functions may not be fully realized.

Therefore, the scale of each developed nursery shall be kept from appropriate, i.e. not too large to maintain. In view of actual conditions of nurseries in tropical countries, the maximum size of a single nursery under the Project shall be limited to an annual nursery stocks production capacity of 1,000,000. For reference, the following table shows the size and structure of temporary nurseries which produce 1,000,000 seedlings per year.

Table 2-29 Size and Structure of a Nursery (1,000,000 seedlings/year)

Nursery Bed	Area	Bed	m^2	12,528
		Corridor	m^2	8,328
		Total	m^2	20,856
	# of Beds		beds	348
Sowing Bed	Area		m^2	167
	# of Beds		beds	14
Soil Yard			m^2	1,128
Mixed Soil Yard			m^2	564
Reservoir Surface Area			m^2	635
Other Facilities			m^2	12,000
Total Area			m^2	35,350
			ha	3.54

However, details regarding the size and position of each temporary nursery shall be determined in consideration of conditions of access to each Site and the existence of suitable land within the Sites. A total of four temporary nurseries are planned in Quang Nam Province and three temporary nurseries in Phu Yen Province (table 2-30). If a well construction survey indicates that sufficient amount of water is not available, the size and position of nurseries shall be altered to match the reality.

Table 2-30 Locations of Temporary Nurseries

Province	Nursery #	Site #	Maximum Production (thousand seedlings/yr.)	Construction Period
Quang Nam	Q-1	N-6	548	1/2～
	Q-2	N-8-1	548	2/2
	Q-3	N-12	500	1/2
	Q-4	N-15	500	1/2
Phu Yen	P-1	P-1-2	843	1/2～
	P-2	P-6	539	1/2
	P-3	P-10	135	2/2

note: Nurseries Q-1 and P-1 are planned to be expanded during period 2/2

⑦ Permanently Stationed Personnel in the Temporary Nurseries

General laborers in the nurseries can commute, however, management and operation personnel will need to be stationed. For a nursery of up to roughly 3 ha and with a production capacity of 1 million seedlings per year, two guards shall be permanently stationed (one of these will also act as nursery manager) and they shall reside in temporary buildings constructed within the nurseries.

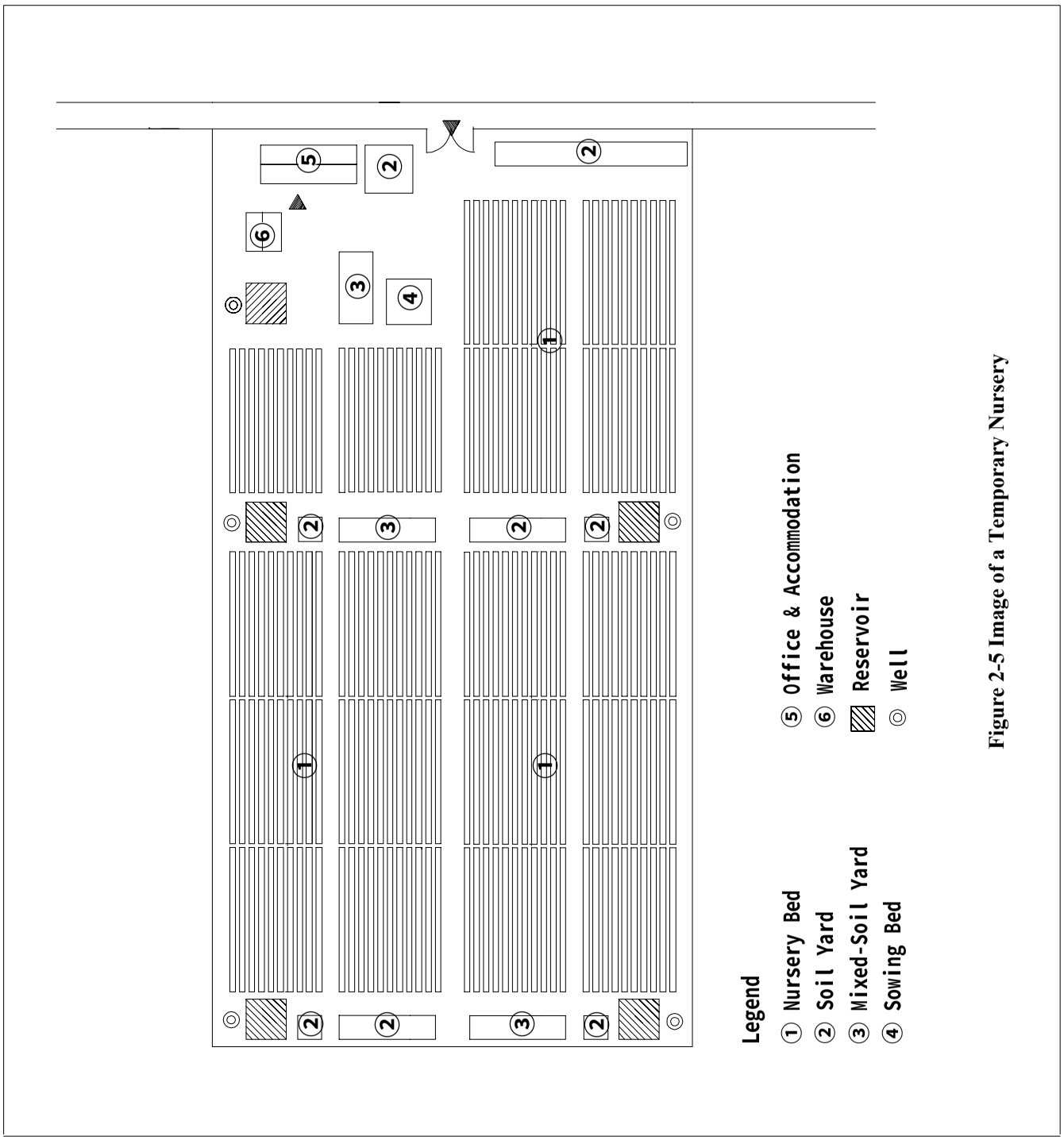


Figure 2-5 Image of a Temporary Nursery

(2) Temporary Buildings

In order to smoothly and efficiently promote the work required for afforestation, i.e. nursing, planting, tending, and construction of operation roads, temporary buildings will be constructed.

① Design Concept

Temporary buildings will be constructed within temporary nurseries. In order to provide the minimum required functions for Project implementation, the following three types of buildings will be needed.

a. Office

- Space for performing office procedures required for Project implementation
- Space for holding discussion meetings, etc. about Project implementation

b. Accommodation

- Facilities for accommodating permanently stationed personnel in the temporary nurseries

c. Warehouse

- Space for fertilizers and chemicals, etc.
- Space for hand tools, etc.
- Space for oil and other hazardous material

② Scale of Buildings

The components and capacity of temporary buildings are summarized in table 2-31.

Table 2-31 Component and Capacity of Temporary Buildings

Temporary Building		Numbers by Province	Target	Area
a. Office		Quang Nam 4 Phu Yen 3 Total 7	Instructor 1 Supervisor 10 Total 11 persons	82.5m^2/ office
b. Accommodation		Quang Nam 4 Phu Yen 3 Total 7	Total 2 persons	10.0m^2/building
c. Warehouse	Fertilizer storage	Quang Nam 4 Phu Yen 3 Total 7	Fertilizer, chemicals, and pots, etc.	16.0m^2
	Tool Storage		Tools for nursing and planting	20.0m^2
	Hazardous material storage		Roughly 10 drum cans	10.0m^2
	Total			46.0m^2

③ Numbers of Temporary Buildings

Table 2-32 Numbers of Temporary Buildings by Province

Province	Building	Area (㎡)	Numbers	Total Area (㎡)	1/2	2/2
Quang Nam	Office/accommodation	92.5	4	370.0	3	1
	Warehouse	46.0	4	184.0	3	1
Phu Yen	Office/accommodation	92.5	3	277.5	2	1
	Warehouse	46.0	3	138.0	2	1
Total	Office/accommodation	-	7	647.5	5	2
	Warehouse	-	7	322.0	5	2

(3) Operation Roads

① Design Concept

a. Operation roads will be established in the Sites to enable efficient planting work to be carried out. These operation roads are not permanent structures, but will be temporary facilities necessary for afforestation. The structure of operation roads will not be built in accordance with road standards in Japan nor Viet Nam, but to the minimum standard required to allow vehicles to run.

b. The length of operation roads has been determined by calculating the density that minimizes planting, tending and fertilizing costs.

Table 2-33 Length of Operation Roads

unit: m

Province	1/2	2/2	Total
Quang Nam	2,950	5,070	8,020
Phu Yen	530	750	1,280
TOTAL	3,480	5,820	9,300

c. All operation roads will be established on firebreaks (total width 30 m). However, there are exceptions to this rule at points where roads join access roads and on some other sections.

d. Maintenance and repair activity of operation roads will consist of leveling and repair (gravel refilling and leveling). Leveling will be carried out during planting and tending work period when the roads are most frequently used. Leveling will be repeated twice during the Project implementation period and covering the total length of 18,600m. Repair will cover all the length (9,300m) established under the Project and carried out once during the Project implementation period. Incidentally, the amount of gravel refill (upper roadbed material) shall be 15% of the amount originally laid. Operation road patrols, and maintenance and repairs of access road to Sites shall be the responsibility of the Vietnamese side.

② Design Criteria

a. Operation Roads

- Design vehicles shall be normal trucks (maximum load 4 tons).
- Design velocity shall be 30 km/h.
- The width of operation roads shall be 3.6 m consisting of 3.0 for the roadway and 0.3 m for each shoulder.
- The surface of roads shall consist of gravel, and roadbed shall be composed of upper subbase (10 cm) and lower subbase (30 cm).
- Roads shall be given a cross gradient so that they would be well drained.
- Turnouts shall be established at basic intervals of less than 500 m and shall be large enough to enable vehicles to turn.

b. Stack yards

Stack yards shall be established as temporary storage areas for planting stocks transported from nurseries, manure and fertilizer required for planting, etc., and they shall be temporary facilities like the operation roads.

Stack yards shall be established near turnouts (figure 2-6 Standard section drawing of operation roads, figure 2-7 Standard drawing of turnouts).

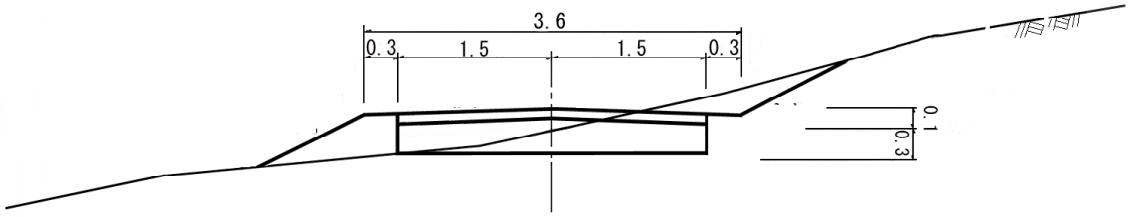


Figure 2-6 Standard Drawing of Operation Road (unit: m)

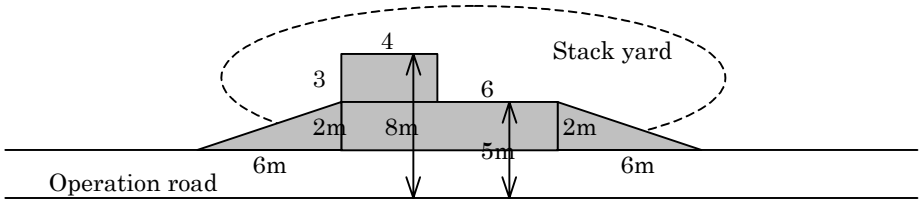


Figure 2-7 Standard Drawing of Turnout

③ Flow of Operation Roads Establishment

It is necessary to construct operation roads ahead of planting, tending, and construction of temporary nurseries and temporary buildings. Roads must be finished safely within the designated works periods. Accordingly, the construction plan will be compiled in consideration of site conditions, weather conditions, and construction machinery conditions to ensure that construction is the most efficiently and precisely achieved.

The establishment of operation roads will mainly be carried out by mechanical earth works with a view to securing efficiency. This is because operation roads must be constructed within a limited period (during the dry season). Civil engineering machines introduced in the establishment of operation roads will be 6-ton bulldozers for excavation works and 3 to 4-ton vibratory rollers for compaction works.

Feasibility and efficiency of operation road construction are largely dependent on the water content of soil which is determined by the climate. The rainy season in the Project area is generally between September and December and the works shall not be carried out during October and November when rainfall is particularly heavy.

When establishing operation roads, ample compaction of the roadbed shall be carried out firmly, and upper subbase materials shall be equivalent to crusher-run stone for roads (C-40: stone size of 0-40 mm), while lower subbase shall consist of high quality soil with the gravel of 0-150 mm in diameter in order to obtain a sufficient compaction effect.

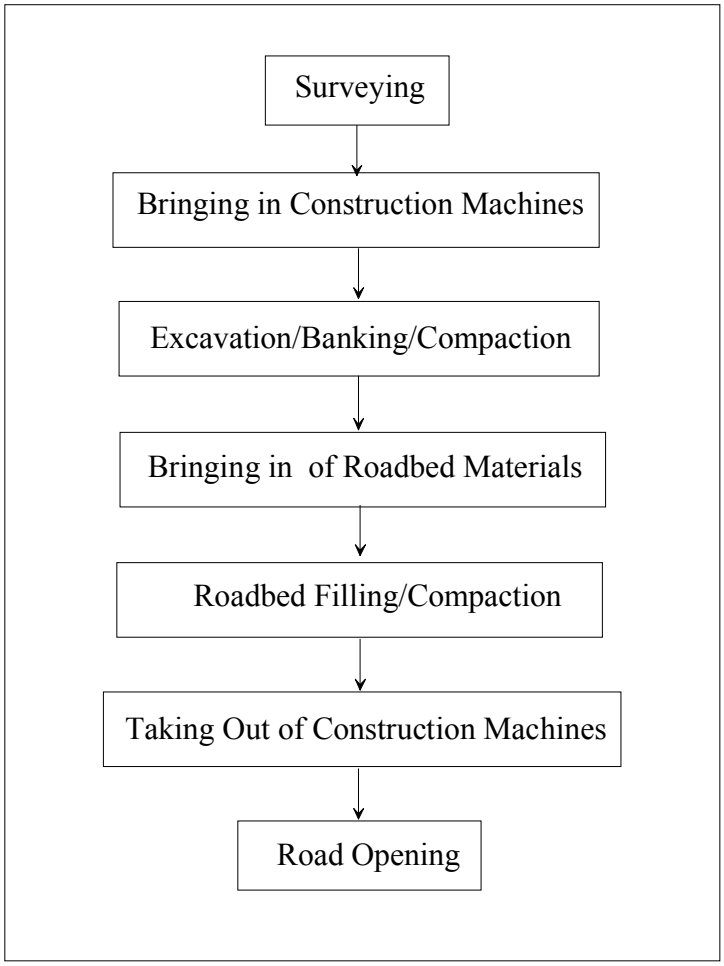


Figure 2-8 Flowchart of Operation Road Establishment

2-4-2-3 Equipment Procurement Plan

Items, numbers, objective and utilization plan of equipment supplied to MARD and DARD are as described below.

(1) Items and Numbers of Equipment

Table 2-34 List of Equipment to be Procured

No	Equipment	Country of Procurement	Country of Production	Main Specifications/ Composition	Equipment Standard	Installation Site	Quantity
1.	4WD Vehicle (Wagon Type)	Japan	Japan	Diesel Engine: 2,500 - 3,000 cc, 4WD, Left Handle, >6 Passengers, 5-MT	Standard Model	MARD 2 DARD	3
2.	Pickup Truck	Japan	Japan	Diesel Engine: 2,500 - 3,000 cc, 4WD, Left Handle, Double cabin, 5-MT	Standard Model	2 DARD	2
3.	Motorbike	Viet Nam	Viet Nam	100 cc, On-road Type	Standard Model	2 DARD	6

(2) Purpose of Use of Equipment

As the purposes of equipment usage differ between MARD in Hanoi and DARD in the Project provinces, they will be separately discussed below.

1) MARD

Staff members of the Forestry Division of MARD, particularly those among the Management Board for Forestry Foreign Aid Projects (MBFFAP) which is responsible for the management of the Project, will mainly use the equipment for the following works.

① Four Wheel-Drive Vehicles (Wagon Type)

a. Witnessing and inspection of the works to be conducted under the Project
b. Progress control of the Project
c. Supply of cuttings to existing nurseries in the two provinces
d. On-site guidance and supervision to ensure the health and safety of laborers working for the Project
e. Field survey for forest monitoring
f. Forestry extension services and PR activities
g. Guiding and escorting visiting guests to the Project areas and other places
h. Coordination to obtain various permits and approval processes pursuant to laws and regulations
i. Communication with other ministries and related organizations

2) DARD

Staff members of the Forestry Division of DARD will use different types of vehicles to conduct the various types of works listed below.

Four wheel-drive vehicles (Wagon Type) will be normally stationed at DARD and will be dispatched to Sites when necessary, whereas, pickups will be mainly used at on-site basis. Compared to the two types of vehicles, motorbikes are unsuitable for long distance travelling. Therefore, motorbikes will be used in such geographically limited administrative units as districts and towns.

① Four Wheel-Drive Vehicles (Wagon Type)

a. Witnessing and inspection of the works to be conducted under the Project
b. Progress control of the Project
c. On-site guidance and supervision to ensure the health and safety of laborers working for the Project
d. Guidance and forestry extension activities to local residents
e. Field survey for forest monitoring
f. Guiding and escorting visiting guests to the Sites and other places
g. Communication with related organizations/agencies within province

② Pickups

a. Survey on well construction sites
b. Witnessing of demarcation survey of Sites and witnessing of survey at the start of planting, tending, nursing and temporary works
c. Patrol for protection of perimeter signs
d. Forest monitoring/patrolling
e. Maintenance and repair of access roads
f. Patrol on operation roads
g. Transport of equipment and materials necessary for the execution of works to be borne by the Vietnamese side

③ Motorbikes

a. Guidance and supervision to local residents
b. Supervision and inspection works
c. Forest monitoring
d. Communications works

(3) **Plan of Use of Equipment**

① Current Equipment Possession

As MARD has so far received similar vehicles in the past through such Grant Aid projects as "The Project for the Strengthening of Reforestation Program through Agroforestry Practice in Dac Lac Province" and "The Project for Improvement of Equipment for Reforestation Program in North-west Viet Nam" and technical cooperation projects, including "The Afforestation Technology Development Project on Acid Sulphate Soil in the Mekong Delta", it should firstly try to utilize these vehicles to the full extent. However, the present project areas are far from Hanoi and are dispersed with poor access. MBFFAP which is involved in the maintenance and operation of the Project, is not located on MARD premises but is isolated in urban Hanoi. It will, therefore, be unrealistic for personnel to move to MARD whenever they need vehicles. As the existing vehicles at MBFFAP were supplied to assist other projects, it will be practically impossible to divert them to the Project because of the overlapping season of their heavy use for afforestation work. In short, there are currently no vehicles which can exclusively be used for the work listed in (2) above.

DARD in each province owns vehicles shown in table 2-35. Normally, these vehicles are managed by the Administration Division. If the existing vehicles are inadequate to conduct a specific type of work, the vehicles owned by subordinate organizations such as FE/FC are temporarily hired.

Table 2-35 Existing Vehicle of DARD

Province	Vehicle Type	Quantity	Main User	Purpose
Quang Nam DARD	4 WD Vehicle (Wagon Type)	3	DARD Staff	* Patrolling * Forest Monitoring * Supervision & Inspection
	Pickup Truck	1	DARD Staff	* Goods Transportation * Patrolling & Monitoring
	Sedan	1	DARD Official	* Transportation to Related Organizations within Province
Phu Yen DARD	Pickup Truck	1	Forestry Sector Staff	* Personnel Transportation * Forest Monitoring * Supervision & Inspection
	Sedan	1	DARD Official	* Transportation to Related Organizations within Province * Supervision & Inspection

While the existing vehicles would be capable of serving the purposes of the Project, there is an absolute shortage of vehicles to conduct the existing works and actually vehicles are frequently hired. Particularly during the busy season, it is difficult to secure vehicles to be hired. In short, it will be practically impossible to rely on the existing fleet to fully supply the demand of vehicles under the Project which would have an added burden on the existing fleet.

Motorbikes are used for forest management and forestry extension activities, etc. Neither DARD nor its subordinate organizations currently have any motorbikes and those which are personally owned by staff members are used for official duties.

② Operation Plan

MARD uses four-wheel drive vehicles in Hanoi and at Project areas. In Hanoi, they will mainly be used for communication and coordination purposes. At Project areas, they will mainly be used for witnessing, inspection, progress control, and the investigation of emerging problems. They are also planned to be used for the transport of cuttings from a research institute near Hanoi to the existing nurseries in the two provinces involved in the Project.

Table 2-36 shows the annual operating days and operating rate of the four-wheel drive vehicles (wagon type) of MBFFAB.

The annual operating rate is calculated based on 246 working days a year, taking public holidays and other holidays in Viet Nam into consideration.

Table 2-36 Operation Plan for Vehicles Provided for MARD

Type	Division/Department Responsible for Operation	Main User	Purpose	Annual use (days)	Total Use (days)	Annual Operation Rate (%)
				(days x frequency)		
4 WD Vehicle (Wagon Type)	Management Board for Forestry Foreign Aid Projects	MARD Forestry Related Staff	・Witnesing & Inspection ・Progress Control ・Cuttings Transporation ・Guidance & Supervision ・Field Survey ・Extension & PR ・Escorting ・Coordination & Communication	5 x 6 = 30 5 x 6 = 30 5 x 6 = 30 5 x 6 = 30 5 x 2 = 10 5 x 6 = 30 5 x 6 = 30 2 x 52 = 104	294	294/246＝ **120%**

Operation plans for vehicles at DARD are shown in table 2-37 and table 2-38. It will be necessary for the four-wheel drive vehicles (wagon type) and pick-up trucks to cover the entire Project area in each province, and their operation plan will be strongly influenced by seasonal timing and types of works such as nursing and planting. The maximum travelling distance per day will be approximately 80 km one way. Travelling to a location more than 50 km away will require a full day because of the poor road conditions. Works using motorbikes will be conducted on a daily basis as they will mainly be used within a district (approximately 20-km radius).

Table 2-37 Operation Plan for Vehicles to be Provided for DARD in Quang Nam Province

Type	Division/Department Responsible for Operation	Main User	Purpose	Annual use (days)	Total Use (days)	Annual Operation Rate (%)
				(days x frequency)		
4 WD Vehicle (Wagon Type)	・Protection Management Board (PFMB)	DARD Forestry Sector Staff	・Witnesing & Inspection ・Progress Control ・Guidance & Supervision ・Extension ・Field Survey ・Escorting ・Coordination & Communication	3 x 24 = 72 3 x 12 = 36 3 x 6 = 18 3 x 24 = 72 5 x 10 = 50 3 x 6 = 18 1 x 52 = 52	318	318/246＝ **129%**
Pick Up Truck	・Forestry Techinical Center	DARD Staff Technical Center Staff	・Well Survey ・Witnessing of Surveying ・Patrol Work & Forest Monitoring ・Maintenance & Repair of Access Roads ・Patrol of Operation Roads ・Transportation Work	3 x 3 = 9 5 x 12 = 60 5 x 12 = 60 5 x 6 = 30 5 x 12 = 60 5 x 24 = 120	339	339/246＝ **138%**
Motor Bike	・Thanh Binh District PMB	PMB Staff	・Guidance & Extension ・Supervision & Inspection ・Forest Monitoring ・Communication	1 x 120 = 120 1 x 60 = 60 1 x 90 = 90 1 x 60 = 60	330	330/246＝ **134%**
Motor Bike	・Tam Ky District PMB	PMB Staff	・Guidance & Extension ・Supervision & Inspection ・Forest Monitoring ・Communication	1 x 120 = 120 1 x 60 = 60 1 x 90 = 90 1 x 60 = 60	330	330/246＝ **134%**
Motor Bike	・Nui Thanh District PMB	PMB Staff	・Guidance & Extension ・Supervision & Inspection ・Forest Monitoring ・Communication	1 x 120 = 120 1 x 60 = 60 1 x 90 = 90 1 x 60 = 60	330	330/246＝ **134%**

Table 2-38 Operation Plan for Vehicles to be Provided for DARD in Phu Yen Province

Type	Division/Department Responsible for Operation	Main User	Purpose	Annual use (days)	Total Use (days)	Annual Operation Rate (%)
				(days x frequency)		
4 WD Vehicle (Wagon Type)	・Protection Management Board (PFMB) ・Administration Division	DARD Forestry Sector Staff	・Witnesing & Inspection ・Progress Control ・Guidance & Supervision ・Extension ・Field Survey ・Escorting ・Coordination & Communication	3 x 24 = 72 3 x 12 = 36 3 x 6 = 18 3 x 24 = 72 5 x 10 = 50 3 x 6 = 18 1 x 52 = 52	318	318/246＝ **129%**
Pick Up Truck	・PFMB ・Administration Division	DARD Staff Technical Center Staff	・Well Survey ・Witnessing of Surveying ・Patrol Work & Forest Monitoring ・Maintenance & Repair of Access Roads ・Patrol of Operation Roads ・Transportation Work	5 x 3 = 15 5 x 10 = 50 5 x 12 = 60 5 x 6 = 30 5 x 12 = 60 5 x 24 = 120	335	335/246＝ **136%**
Motor Bike	・Tuy An District PMB	PMB Staff	・Guidance & Extension ・Supervision & Inspection ・Forest Monitoring ・Communication	1 x 120 = 120 1 x 60 = 60 1 x 90 = 90 1 x 60 = 60	330	330/246＝ **134%**
Motor Bike	・Tuy Hoa District PMB	PMB Staff	・Guidance & Extension ・Supervision & Inspection ・Forest Monitoring ・Communication	1 x 120 = 120 1 x 60 = 60 1 x 90 = 90 1 x 60 = 60	330	330/246＝ **134%**
Motor Bike	・Song Cau District PMB	PMB Staff	・Guidance & Extension ・Supervision & Inspection ・Forest Monitoring ・Communication	1 x 120 = 120 1 x 60 = 60 1 x 90 = 90 1 x 60 = 60	330	330/246＝ **134%**

(4) Equipment Operation and Maintenance setup

In the two DARD and MARD, it is possible to employ operating drivers capable of carrying out daily maintenance inspections of vehicles.

The planned vehicle types locally used commonly, thus repair services can be carried out by local repair shops. Operation and maintenance costs can be borne by the two DARD and MARD.

Chapter 3 Implementation Plan

Chapter 3 Implementation Plan

3-1 Implementation Plan

The implementation plan is intended to secure the specified level of project quality and safely carry out the plan and procurement within the designated works period in order to attain the Project objectives of afforestation and equipment procurement. Implementation planning involves grasping the overall Project scale and quantities of afforestation, nursing and temporary construction works, examining various methods of execution and procurement, and compiling a schedule so that the Project is completed within a limited period.

In compiling the implementation plan, important points to be considered are that the Project must be in accordance with actual conditions and that the Project is smoothly carried out in line with designed methods. Accordingly, in particular, with respect to afforestation implementation planning, it is necessary to compile plans so that efficient and accurate implementation shall be ensured, giving full consideration to current site conditions, meteorological conditions and construction machinery conditions.

3-1-1 Implementation Concept

(1) Overview

Following discussions of the Project among related agencies of the Government of Japan, the Project will be approved by Cabinet Council and will eventually be transferred to the implementation stage after the Exchange of Notes (E/N) between the Government of Japan and the Government of Viet Nam. The Project Implementation will be carried out based on the contracts signed by the implementing agencies in Viet Nam, the Japanese consultant, and the afforestation contractor. Each contract signed between the implementing agencies in Viet Nam, the consultant and the afforestation contractor require verification by the Government of Japan.

(2) Implementing Agencies

The following diagram shows the relationship between each implementing organization in the case where the Project is implemented as a Grant Aid

operation by the Government of Japan (see figure 3-1).

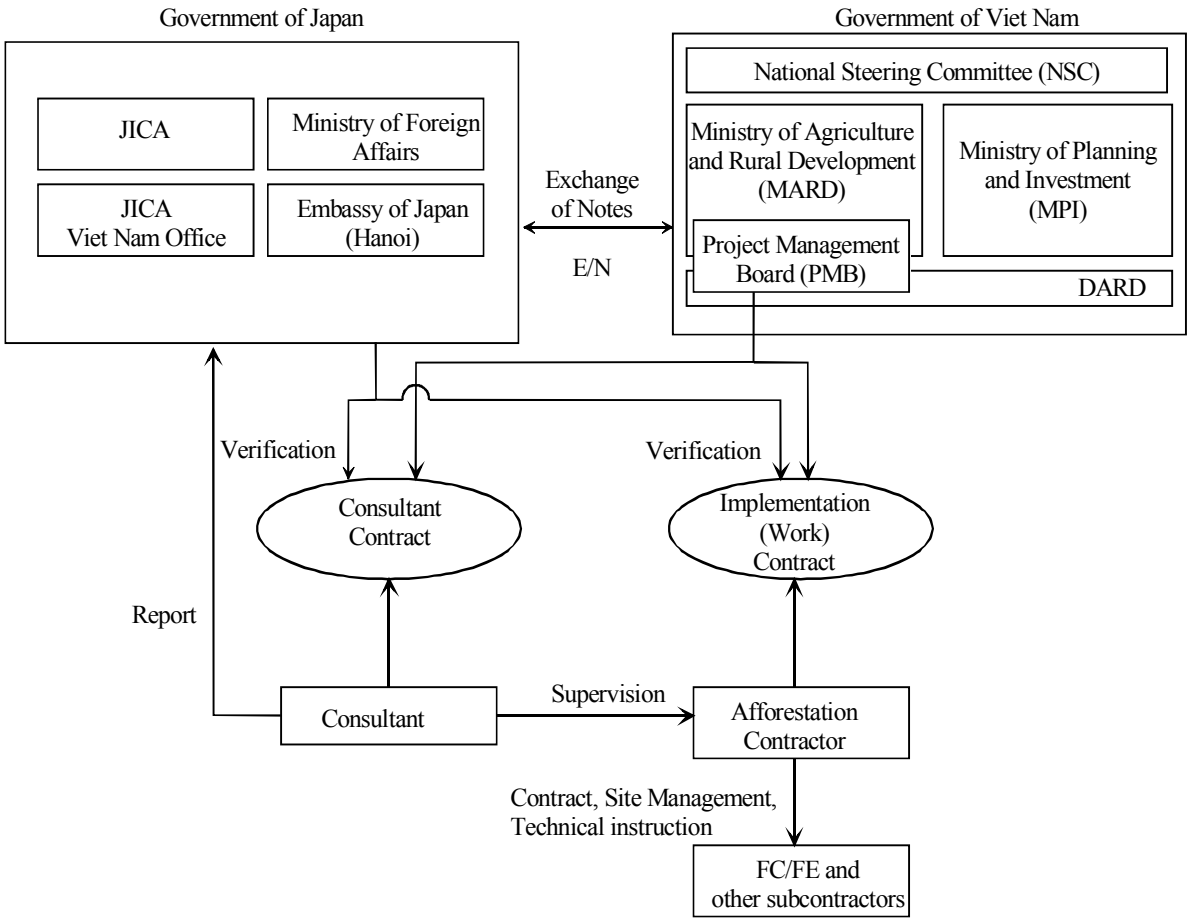


Figure 3-1 Related Organizations and Agencies in Project Implementation

The main implementing agency and also main responsible agency for the Project is MARD, which will make contracts with the Japanese consultant and the afforestation contractor, implement the scope of works of the Vietnamese side described later, and encourage the smooth progress of the Project. The liaison agency for the Project will be the Project Management Board (PMB) which will be established within MARD and mainly composed of MBFFAP and representatives of relevant DARD. Moreover, the NSC, composed of representatives from major ministries and agencies, holds the right to make approval and decision of the Project within the Government of Viet Nam.

The Japanese consultant will carry out the detailed design, assist in tender procedures, and carry out supervision of works. Afforestation and equipment procurement will be carried out by a Japanese contractor (afforestation contractor) chosen by tender. Actual afforestation work will be implemented by FE/FC belonging to each DARD and construction companies in Viet Nam under the guidance of engineers dispatched by the said Japanese contractor.

The implementation setup of afforestation contractor will be composed of three stationed Japanese engineers and 19 Vietnamese personnel (at the peak period). Of the Japanese engineers, a chief and another engineer will operate in one province each and be responsible for various activities in the province. Moreover, the chief will be in charge of the progress control of the Project as a whole. Another engineer who will be stationed in Quang Nam will serve as a coordinator. The coordinator will mainly be responsible for contracting and progress control of various activities, and negotiations with MARD and other related organizations and agencies. Also the coordinator will support the chief engineer.

Of the Vietnamese personnel, each of two managers responsible for facilitation of project implementation will operate in one province each. There will also be 14 instructors - eight stationed in Quang Nam Province and six stationed in Phu Yen Province - and they will be responsible for instructing the massive number of local laborers and supervisors, and carrying out nursing, planting, tending and temporary works (figure 3-2 Local Organization Setup).

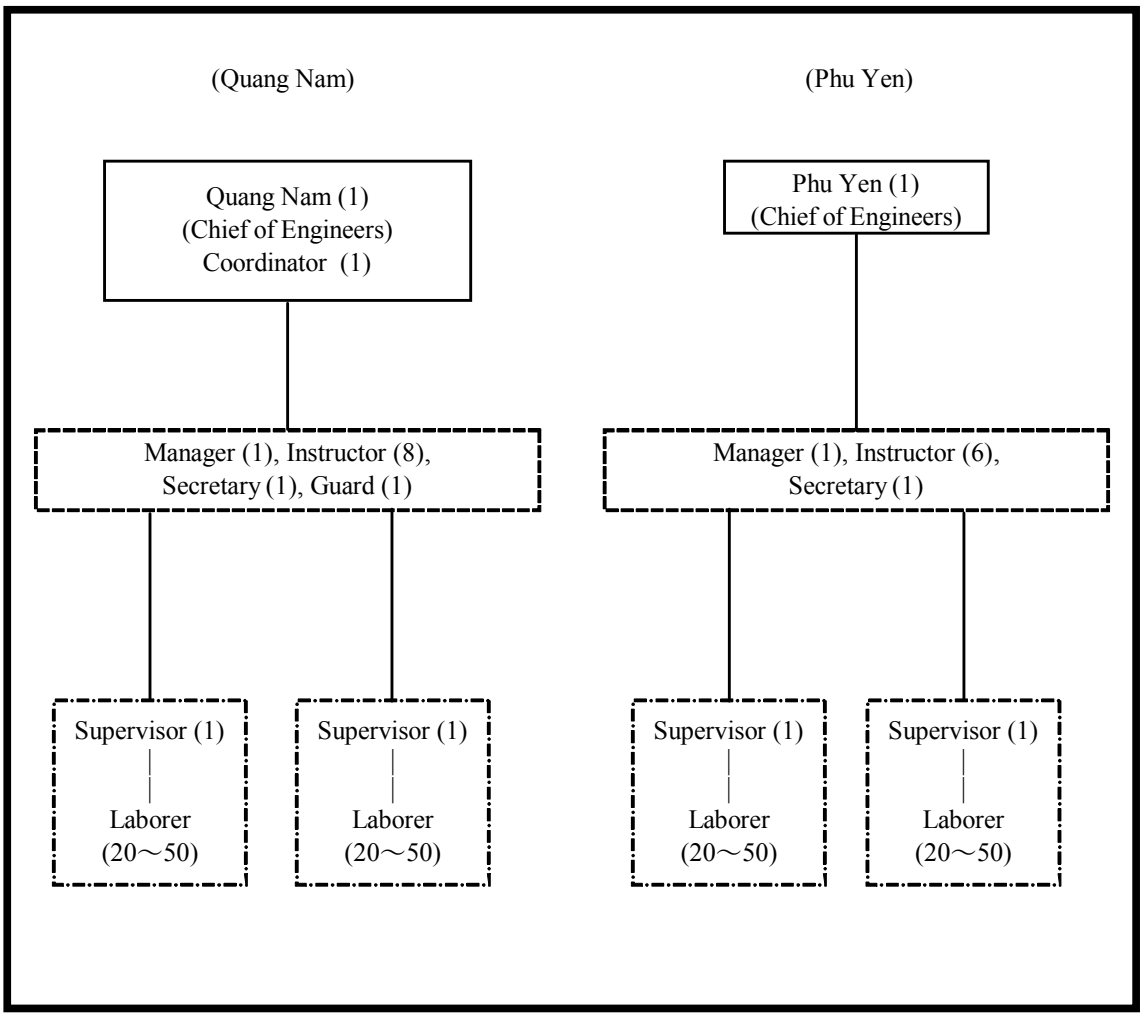


Figure 3-2 Local Organization Setup

(3) Flow of Work

The major procedure of Casuarina forest establishment under the Project is shown in figure 3-3 “Implementation Flow of Major Activities”.

Figure 3-3 Implementation Flow of Major Activities

3-1-2 Implementation Conditions

3-1-2-1 Afforestation

It is necessary to pay attention to the following points concerning afforestation in general:

① The Project aims to simultaneously implement afforestation in Sites scattered in a wide range of areas. Therefore, it is necessary to appropriately and promptly implement it in consideration of the conditions of each Site. In particular, formation of the local organization setup is important during the early stage of implementation.

② A large number of laborers will be employed during the Project period. In addition to paying attention to securing necessary laborers for each work and work period, it is necessary to adopt a work schedule management that adheres to the local labor law.

In particular, during the planting period and nursing period, since works will be carried out in coastal sandy areas where there is no living infrastructure and it will be difficult to execute the works using locally recruited laborers only, consideration must be given to securing laborers from afar (10 km or more).

③ In order to achieve the Project goal, the following activities should seriously be done from the technical points of view.

a. Implementation of each work in appropriate work period
b. Fertilization in poor nutrient coastal sandy areas
c. Supply of healthy planting stocks and appropriate handling of them

④ The target of the Project is development and maintenance of forests. Development and maintenance of such biological resources are greatly affected by uncertain factors such as climate and harmful pests. Under the Project, measures against unpredictable events such as drought, typhoon, forest fires, diseases and pests will be responsibility of the Vietnamese side.

(1) **Planting**

It is necessary to pay attention to the following points when compiling the planting plan:

① Since the planting works need to be completed in two months beginning from the start of the rainy season, it will be necessary to carefully work out the detailed schedule plan in advance. Moreover, since the start of the rainy season varies by year, decision of the actual start of works will need to be made with a great care.

② The planting works will largely be carried out by manual labor. Concerning the implementation flow, most works are manual and will require a large number of laborers, recruitment and technical training of laborers and safety management will be important. Full consideration also needs to be given to deployment of laborers. Since the largest numbers of laborers need to be employed for a very short period, it is necessary to carefully prepare detailed work schedules to ensure smooth progress of the works.

③ The transport plan will carefully be made so that manure, compound fertilizer and planting stocks are not left for a long period in the stack yards during the rainy season.

④ It is necessary to take every care during the transport of planting stocks when the stem is most prone to breakage.

(2) **Nursing**

It is necessary to pay attention to the following points when compiling the nursing plan:

① Since the nursing and planting periods are limited, strict schedule control and product control will be enforced so that these time constraints can be cleared.

② In addition to the actual nursing period assumed to be 5-7 months for Casuarina, since pot filling work and other activities will be necessary in the nurseries, continual nursing works will arise throughout the year. In this way, because nursing works will be needed almost throughout the year, it will be necessary to carefully compile the implementation plan in consideration of employment of laborers, particularly during the busy

farming season, and local climatical conditions, etc.

③ Prevention of harmful pests and diseases, and timely countermeasures when pests and diseases do appear

④ Reduction of planting stock losses and maintenance of quality in transit

⑤ Securing of good quality of materials for planting stock production

(3) **Tending**

It is necessary to pay attention to the following points when compiling the tending plan:

① Replanting and fertilization will be the same as described in the section on planting.

② Since the timing of starting sand digging and fertilization works is not so easily dictated by the weather as in the case of planting, a detailed work schedule will be compiled considering equalization of labor recruitment.

(4) **Others**

In addition to the above, careful thought needs to be given to the following points with respect to afforestation:

① In defect inspections of the Project, since it is necessary to correctly distinguish withering of planted trees according to work defects and subsequent disease and insect damage and natural disasters, etc., diagnosis of withering from the plant pathology viewpoint shall be carried out either at the time of the completion inspection or in the work implementation stage.

② Within the Sites, there are sporadic areas where local residents have already planted trees. However, mycorrhiza has hardly inoculated to these and growth of trees is extremely poor due to the poor state of soil nutrition. Under the Project, to make sure that forest growth takes place, from the professional viewpoint concerning forest soil and soil microorganisms, etc., the mycorrhiza inoculation rate shall be raised considerably.

3-1-2-2 Temporary Works

It is necessary to pay attention to the following points when compiling the plan

for temporary works in general:

① Construction of access roads to each Site (works to be borne by the Vietnamese side) will be completed prior to the start of works to be implemented by the Japanese side.
② Foundation and civil engineering works will be avoided during the rainy season.
③ Concerning local implementation, schedules will be prepared so that works requiring special techniques are minimized. Concerning tools also, since special tools are not widely available, works that can be implemented using simple operations will be adopted.
④ Major construction materials can locally be procured, but some items entail quality problems. Accordingly, standard materials for general purposes will be procured rather than specific items. However, since quantities of some materials are large, the order will be established well in advance with a view to securing quality control.
⑤ Much construction equipment can locally be available, however, some items are unreliable superannuated. Accordingly, when using locally procured machines, it will be necessary to pay due attention to operational safety management. Concerning surveying instruments, since local technology and calibration levels are sometimes insufficient, it will be necessary to carry out precise adjustment.
⑥ Existing bridges with the maximum load of 8 tons limit the size of vehicles to be used in most of the Sites. Therefore it is not appropriate to introduce heavy construction machinery which exceeds 8 tons. In the time of implementation, construction machinery should be selected in consideration of the maximum load of bridges and weight of the machinery.

(1) Temporary Nurseries

It is necessary to pay attention to the following points when constructing temporary nurseries:

① When constructing nurseries, an effective work schedule will be compiled in consideration of plans of planting, operation roads, etc. In particular, the work schedule should be effective enough to correspond with nursing period and timing of carrying out planting stocks.

② Securing personnel for development and operation of the temporary nurseries in sandy areas

③ Measures against natural disasters such as flooding and shifting sand in the temporary nurseries

④ Establishment of an execution setup for managing and operating the temporary nurseries

⑤ Securing of water supply, electricity and basic infrastructure for the temporary nurseries

⑥ The scope of works to be borne by the Vietnamese side (survey of well construction points) will be necessary to be finished before the start of works to be conducted by the Japanese side.

(2) Temporary Buildings

It is necessary to pay attention to the following points when constructing temporary buildings:

① Construction of temporary buildings will be carried out in unison with the construction of temporary nursery.

(3) Operation Roads

It is necessary to pay attention to the following points when constructing operation roads:

① Construction of operation roads must safely be carried out and finished prior to planting, tending, and construction of the temporary nurseries. Therefore, implementation plan shall be effective and appropriate enough to correspond with local site conditions, climatic conditions and capacity of construction machinery.

② In some Sites, there are areas where flooding occurs during the rainy season. It is necessary to avoid establishing operation roads in such areas.

③ When the moisture content of sand increases as a result of rainfall, work will be suspended and only resumed after the sand dries out to a reasonable level.

④ Cemeteries currently exist inside or near Sites where operation roads are to be constructed. In such cases, a minimum distance of 20 m will be secured between the cemeteries and the shoulders of the operation roads or

stack yards.

⑤ Operation roads and stack yards are all planned on state owned land, however, there are some sections where the roads will pass through areas where the land use rights of citizens are set. In such cases, the authority will coordinate with local residents concerning their land use rights in order to allow operation roads and stack yards to be established.

3-1-3 Scope of Works

3-1-3-1 Afforestation

(1) **Planting**

① Since the planting plan forms the main component of the Project, it will mostly be implemented by the Japanese side.

② Witnessing of demarcation survey of Sites will be in the scope of works to be borne by the Vietnamese side.

(2) **Nursing**

① The Japanese side will perform the production of planting stocks in the temporary nurseries.

② Management of planting stock production in existing nurseries will be in the scope of works to be borne by the Vietnamese side.

(3) **Tending**

① The Japanese side will perform replanting, sand digging, and fertilization under the Project.

② According to the technical guidelines for Casuarina afforestation in each province, the tending period is given as three years after planting and during this period the following activities are performed: weeding, replanting, sand digging, fertilization, fire prevention measures, disease and pest control, prohibition of livestock grazing, prohibition of felling, irrigation (Phu Yen Province only), and washing of salt from leaves (Phu Yen Province only). Accordingly, above tending works except that performed by the Japanese side in the scheme of ①above will need to be performed by the Vietnamese side when they become necessary.

Table 3-1 Tending Work

Tending Work	Work Contents	Necessity	Responsibility
Weeding	Removal of weeds, vines, ivy, and shrubs	Invasion by weed is rare	Viet Nam
Replanting	Replanting in order to maintain tree density	Necessary	Japan
Sand digging	1) Raising of trees that have fallen under the weight of sand 2) Mounding of sand around tree bases in order to retain moisture in soil	Necessary	Japan
Fertilization	Application of chemical fertilizer NPK	Necessary	Japan
Fire protection measures	Weeding of fire breaks	Invasion by weed is rare	Viet Nam
Disease and pest countermeasures	Patrols	No particular disease and pest damage is targeted	Viet Nam
Prohibition of livestock grazing in forests	Local residents will be encouraged to stop grazing in forests until tree crowns become closed	Necessary	Viet Nam
Prohibition of felling	Local residents will be informed of the ban on tree felling.	Necessary	Viet Nam
Irrigation	Manual irrigation in the dry season	Sites requiring irrigation are not selected	
Washing of salt from leaves	Washing (by pure water) of salt which has attached to leaves in sea winds during the rainy season	Trees which die as a result of salt damage are very rare	Viet Nam

(4) **Training and Extension (Information) Services**

Training can largely be divided into Laborers Safety and Health Management Training carried out by DARD for afforestation subcontractors (FE/FC), and work training concerning labor safety and forest establishment techniques

carried out by the Japanese contractor for laborers recruited by afforestation subcontractors.

The objectives of extension service are to record the importance and technical system of coastal protection forest establishment, to spread the contents of such records among local residents, and thus make a contribution to the promotion of coastal protection forest establishment. DARD will implement the activities involving extension service.

① Training

Table 3-2 Training Courses

Training Course	Training Objective	Targets and Frequency	Lecturers	Responsibility
Labor safety and health management training	To secure the safety and health of laborers	・Managers (2), Instructors (14) Four times per year x 16 trainees ・ Operators and drivers Two times per year x 47 trainees	DARD employees	Viet Nam
Work training (Nursing) (Planting/ Tending)	Improvement of technical capability of workers in each field	・ Laborers ・ Four times per year x 120 trainees ・ Laborers ・ Two times per year x 1,800 trainees	Japanese engineers	Japan

② Extension (Information) Services

Table 3-3 Extension Activities

Item	Implementing Agency	Participants, etc.	Responsibility
Compiling of Record	DARD	1 person in each DARD Total of 2	Viet Nam

3-1-3-2 Temporary Works

(1) Temporary Nurseries

① Most of the works involved in the construction of temporary nurseries will be the responsibility of the Japanese side.

② The works to be borne by the Vietnamese side with respect to the construction of temporary nurseries is the survey of well construction points in the candidate nursery sites.

(2) Operation Roads

The works to be borne by the Vietnamese side with respect to the establishment of operation roads are as follows:

① Establishment of access roads leading to the Sites

② Maintenance and repair of the access roads

③ Patrol of operation roads

3-1-3-3 List of Scope of Works

The scope of works to be borne by the Japanese side and the Vietnamese side under the Project are as shown in table 3-4 and table 3-5.

Table 3-4 List of Scope of Works (1)

Works	Items to be Borne by The Japanese Side	Items to be Borne by The Vietnamese Side
(1) Planting	①Decision of planting positions and digging work of planting holes ②Application of manure and chemical fertilizer ③Planting stock transport and planting	①Witnessing of demarcation survey of Sites
(2) Nursing	①Procurement of seeds ②Nursing and packaging and transport of planting stocks ③Planting stocks purchase	①Management of planting stock production in existing nurseries
(3) Tending	①Replanting ②Fertilization ③Sand digging	
(4) Forest Maintenance		①Compilation of forest management plan ②Forest monitoring ③Thinning ④Regeneration ⑤Forest management with local participation ⑥Countermeasures against unpredictable disasters ⑦Weeding ⑧Disease and Pest Control ⑨Prohibition of livestock grazing in forests ⑩Prohibition of felling ⑪Washing of salt from leaves （note：⑦ to ⑪ will be done during tending period if necessary）
(5) Training and Extension Services	①Work training (nursing) ②Work training (planting /tending)	①Labor safety and health management training (managers and instructors) ②Labor safety and health management training (operators and drivers) ③Compilation of record of the Project

Table 3-5 List of Scope of Works (2)

Works	Items to be Borne by The Japanese Side	Items to be Borne by The Vietnamese Side
(6) Temporary Nursery	①Construction of temporary nurseries	①Survey of well construction points
(7) Temporary Building	①Construction of site offices ②Construction of accommodation facilities ③Construction of warehouses	
(8) Operation Road	①Establishment of operation roads ②Maintenance of operation roads	①Preparation of access roads ②Maintenance of access roads ③Patrol of operation roads
(9) Equipment Procurement	①4WD vehicles ②Pickup trucks ③Motorbikes	①Tax exemption and implementation of customs clearance measures concerning procurement
(10) General service		①Issue of permits and licenses necessary for Project implementation ②Exemption of taxes and other charges on experts and other persons from Japan concerned with Project implementation that may otherwise be levied on visitors from Japan ③Exemption of any other taxes and charges related to the Project ④Banking arrangement and procedures of authority to pay concerning implementation of the Grant Aid
(11) Consultants supervision	①Inspection and approval of work drawings, etc. ②Guidance of afforestation and equipment procurement ③Reporting on afforestation and equipment procurement conditions ④Cooperation with payment approval procedure ⑤Inspections	①Witnessing of inspections in each stage and issue of inspection certificates and completion certificates ②Assignment of assistants for consultant supervision, and recruitment of drivers

3-1-4 Consultant Supervision

(1) Basic Concept

The consultant responsible for carrying out Project design will be a Japanese consultant recommended by JICA and approved by MARD. The consultant should possess ample experience in afforestation design and planning and be capable of performing the works of the Project. Based on the main purport of this basic design and holding discussions with the Government of Viet Nam, the consultant will carry out detailed design for nursing, planting and tending, the temporary works (establishment of work roads and construction of temporary nurseries and buildings), and equipment procurement, and they will also prepare the necessary tender documents.

Concerning supervision of planting and other works, a supervisor shall be dispatched to carry out project progress control and quality control for the Project, give guidance to contractors, and conduct communications and secure coordination with the related ministries and agencies.

The specific contents of consultant work are as indicated below.

Works	Contents
Detailed design	Prepare tender documents (specifications, detailed drawings) for afforestation and equipment supply.
Promotion of tender contract	Decide the contract policy, prepare a draft contract, and select contractors (including tender announcement, prequalification, tendering, evaluation, and contract).
Inspection and approval of working drawings, etc.	Inspect and give approval to the work drawings, working plan, materials and equipment presented by the contractor.
Guidance of afforestation and equipment procurement	Examine the afforestation and equipment plans and work schedule and give guidance to the afforestation contractors.
Reporting on afforestation and equipment procurement conditions	Report on the state of Project progress to the contract parties and related agencies and manage the monthly meetings
Cooperation in payment approval procedure	Cooperate in examining the contents of invoices and carrying out procedures concerning payment of fees during and after the works.
Inspections	Carry out midterm inspections on completed works and quality inspections from the start through to the completion of all the works.

(2) Consultant Supervision Setup

In addition to carrying out planting stock quality control, schedule and safety management and equipment procurement control over extensive Sites, it is necessary to conduct quality control, schedule control and safety control, etc. over the temporary works (temporary nurseries, operation roads, temporary buildings). In order to provide appropriate guidance on these matters, coordinate with related agencies in the two provinces, and promote smooth implementation of works based on the design documents, one Japanese engineer shall be assigned to Viet Nam as resident supervisor. Moreover, a spot supervisor will be dispatched during the planting period when effective supervision over the two provinces is not feasible only by the resident supervisor alone.

3-1-5 Equipment Procurement Plan

(1) Procurement of Construction Equipment and Materials

Most of the equipment and materials required for the Project can be procured in Viet Nam and shall locally be procured as a rule. However, crawler type carriers, which will be necessary for planting and tending works, are not locally available and shall be procured in Japan.

(2) Procurement of Project Equipment

① Procurement in Viet Nam

a. Motorbikes

Motorbikes can be procured in Viet Nam, maintenance and repairs can locally be carried out and no problems exist regarding quality. Therefore local procurement shall be planned concerning motorbikes.

② Procurement in Japan

a. Vehicles

Japanese vehicles shall be procured because they undergo strict quality control and are only rarely to experience breakdown and because repair and maintenance services for them are available in Viet Nam.

b. Equipment

Four-wheel drive vehicles and pickup trucks

③ Supply Routes

a. Products Procured in Japan

Products for Hanoi and Quang Nam shall be landed and passed through customs in Hai Phong. Products for Phu Yen shall be landed and passed through customs in Ho Chi Minh. Final handing over will take place in Hanoi and capitals of the two target provinces.

b. Products Procured in Viet Nam

Products procured in Viet Nam shall directly be supplied to each Project area.

3-1-6 Implementation Schedule

In the event where the Project is implemented under the Grant Aid scheme of the Government of Japan, the consultant contract will be signed between the Government of Viet Nam and the consultant following the Exchange of Notes (E/N) between the two countries. The Project will be implemented over the three stages of detailed design, tender and contracts, and afforestation and equipment procurement.

(1) Detailed Design Work

The consultant shall prepare the detailed design and tender documents based on the contents of the basic design. These documents will consist of detailed design drawings, specifications, and calculation sheets. Close discussions shall be held with related agencies on the Vietnamese side during the initial, intermediate and final stages of the detailed design respectively, and the tender work will be commenced after approval is given to the final detailed design output.

(2) Tender-related Work

Following completion of the detailed design, the consultant, acting on behalf of the implementing agency MARD, will carry out a preliminary qualification survey (P/Q) in Japan by means of advertisement.

Competitive tender will be conducted among the companies which have been selected based on the P/Q results; this will take place in Japan in the presence of the parties concerned. The company that offers the lowest price will be selected as the successful bidder, providing that the contents of its bid are deemed to be appropriate, and this company will then make a work contract with MARD in Viet Nam. The contract will become effective upon receiving the authorization of the Government of Japan. The time required for the signing of the consultant contract through to the detailed design work, tender and the work contract is roughly six to seven months.

(3) Implementation

Following the signing of the work contract, works for the Project will be started by the afforestation contractor after receiving authorization of the Government of Japan. Implementation schedule is shown in figure 3-4 to figure 3-5.

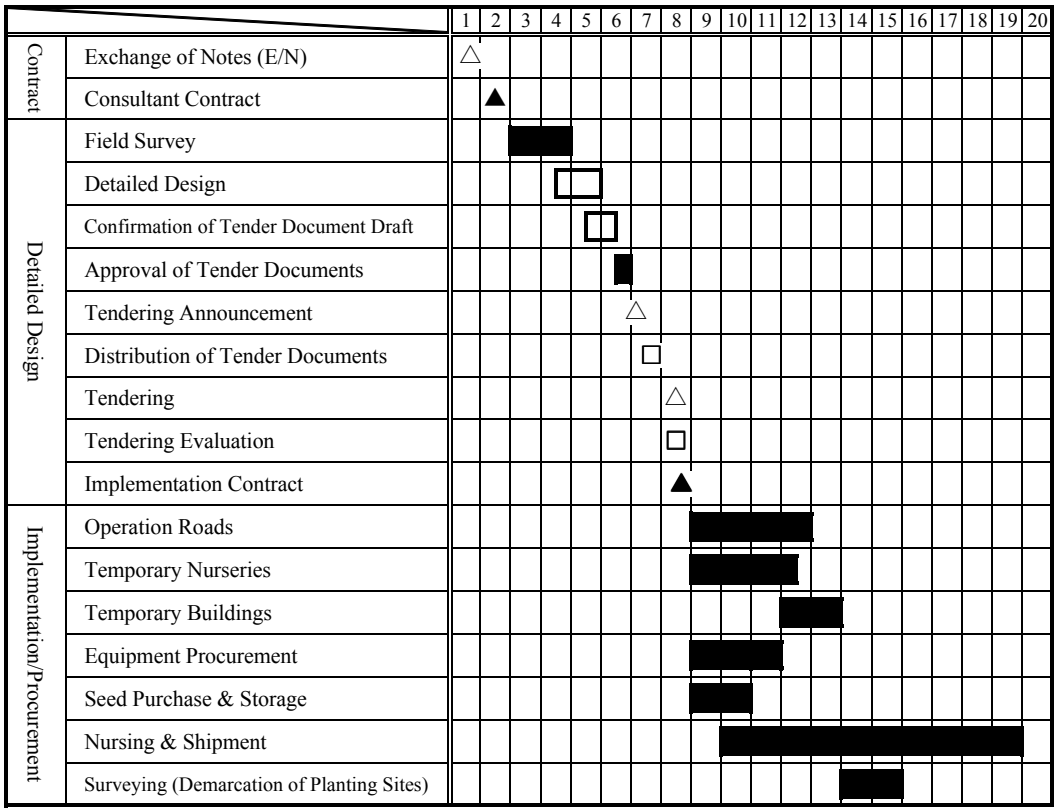


Figure 3-4 Flowchart of Implementation Schedule (period 1/2)

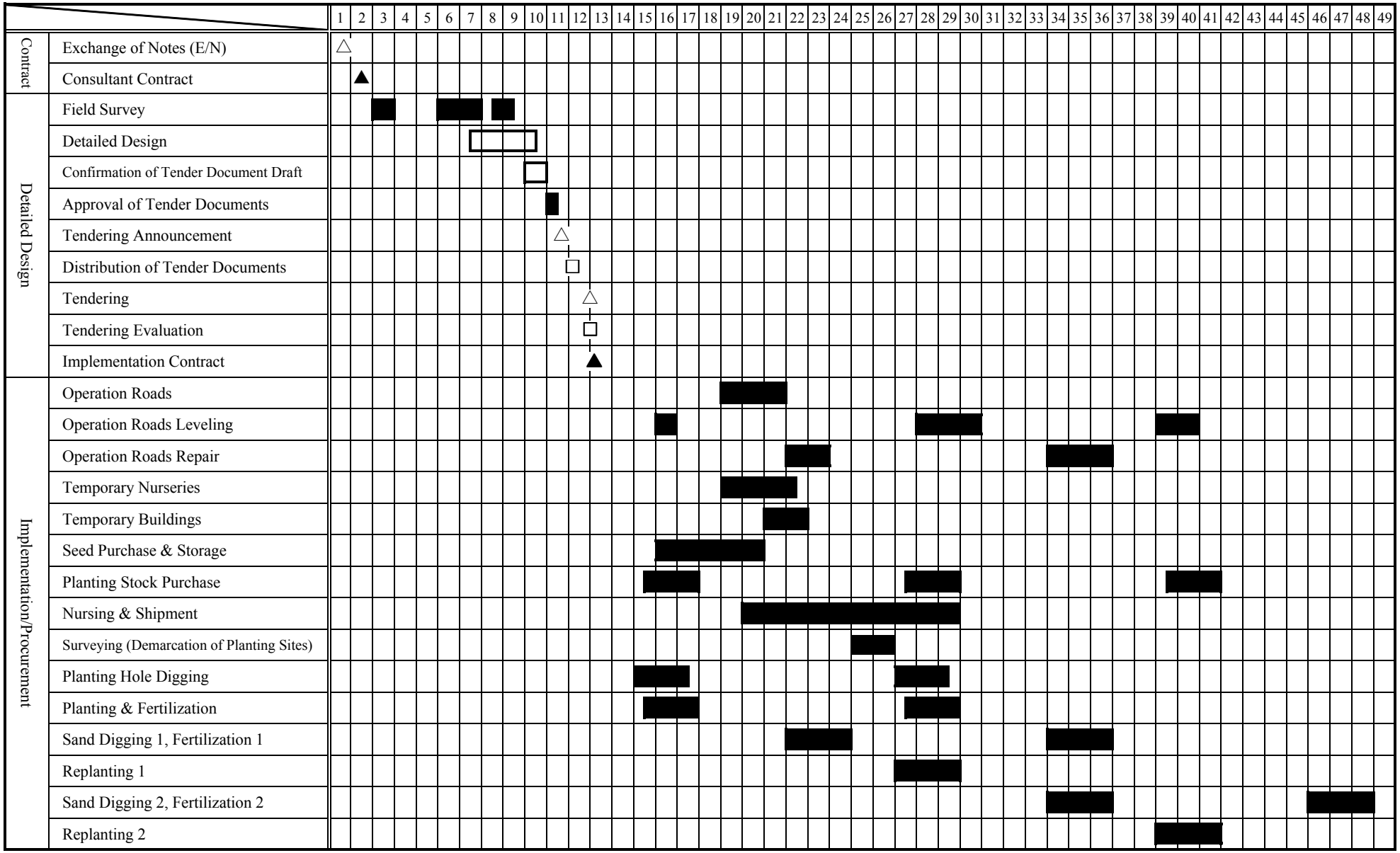


Figure 3-5 Flowchart of Implementation Schedule (period 2/2)

3-1-7 Obligations of Viet Nam

While the Project-related undertakings by the Vietnamese side are wide-ranging, they are classified into three categories: (1) items to be conducted prior to the commencement of the Project; (2) items to be conducted during the Project implementation period; (3) items related to the maintenance of the newly established forests in the post-Project period. The Vietnamese undertakings in these three periods are described in more detail below.

(1) **Prior to Commencement of the Project**

① Demarcation of Site Boundaries

Although the location and extent of the Sites are roughly determined by the present study, their boundaries are not necessarily precisely demarcated. Moreover, the area of each Site is not very accurate because measurement was based only on the topographical map (scale: 1/25,000) prepared by the relevant DARD. Furthermore, the Sites and their adjoining areas have farmlands, cemeteries and planted areas which are used by local residents. Abrupt implementation of planting in these places has a high risk of conflict with local residents. Therefore, while the detailed design will plan implementation of surveying at the Sites, the Site boundaries must firstly be confirmed in the presence of the representatives from local residents and/or People's Committee members of each commune. These people are also expected to witness the surveying for the detailed design and that carried out at the time of commencement of various types of works, playing a supporting role in the determination of an accurate planting area at each Site.

② Determination of Well Construction Points at Candidate Temporary Nursery Sites

The planned construction sites for temporary nurseries have roughly been decided in the present study. As securing of an abundant supply of water during the nursing period is essential, construction of several wells at each temporary nursery site is planned. The participation of experienced Vietnamese engineers will be essential in the construction of the well

drilling points. If there is no prospect of securing the necessary supply of water, it may be necessary to alter the location and/or size of the temporary nursery.

③ Construction of Access Roads

It will be necessary to construct an access road of several hundred of meters in length at most of the Sites, and the selected Sites does not include those where the construction of an access road is judged to be difficult. These access roads must be constructed prior to the commencement of the Project so that the construction of the operation roads can immediately commence at the start of the Project. Particular attention should be paid to the access road specifications so that they at least qualify the design specifications for the operation roads. It is essential that these access roads allow smooth traffic of 8-ton vehicles even during the rainy season.

④ Issue of Permits and Licenses Required for Project Implementation

The relevant procedures for a permit or a license required for the construction of temporary facilities and implementation of planting works, etc. must be completed by the Vietnamese side prior to the commencement of the work in question.

(2) During Project Period

① Production of Planting Stocks at Existing Nurseries

Approximately 33% of the Casuarina and all of other species planting stocks to be used for the Project will be purchased. Accordingly, the Vietnamese side must effectively produce planting stocks, which meets the relevant planting stock standards set under the Project, at existing nurseries. All the works relating to the production of these planting stocks must be undertaken by the Vietnamese side.

② Formulation of Forest Management Plan

The canopy closure of planted Casuarina will occur about 5 – 10 years after the Project period. From this time onwards, appropriate thinning must be conducted to ensure the sound growth of the planted trees. It is, therefore, essential that the Vietnamese side formulates a long-term forest

management plan which incorporates the intentions of local residents and a system of making available of the wood produced by thinning for use by local residents in an orderly manner.

Under the Project, such a forest management plan with a long-term perspective will be formulated by DARD.

③ Training for Labor Safety and Health Management

During the implementation period of the Project, a large number of laborers and machine operators will be recruited for the construction of the operation roads, nursing at the temporary nurseries and extensive planting. Provision of intensive safety and health training for supervisors, instructors, operators and drivers will, therefore, be necessary to ensure safe and efficient work. This training will be provided by the Vietnamese side in accordance with the relevant laws in Viet Nam.

④ Compilation of Record

A document on the technical setup introduced in the Project will be prepared based on the compiled records of the Project operations. Even though the Project scale has been reduced to approximately one-third of the original request, the planting mainly of Casuarina over an area of 3,670 ha will constitute a valuable example of afforestation work. Under the Project, a fixed sample plot (some 20 m x 20 m) shall be designated every 50 - 100 ha of planting area at the time of completion of the planting work for continuous compilation of record by the Vietnamese side.

⑤ Monitoring and Patrolling

The Vietnamese side will conduct (i) forest monitoring and damage control measures and (ii) road patrolling and the maintenance of access roads. Regular monitoring of the planted Sites will be conducted so that a prompt response can be made when damages to the planted trees are discovered. Similarly, the operation roads and access roads will be regularly patrolled and the quick implementation of maintenance/repair work will be conducted, if necessary.

⑥ Various Procedures

The Vietnamese side will be responsible for (i) the customs clearance procedures and tax exemption procedures in regard to the procured equipment and (ii) the exemption from taxes and levies as required in regard to Project-related Japanese personnel and equipment, etc. so that the Japanese side can smoothly conduct their work.

(3) Post-Project Period

As the planned cooperation period is approximately five years, the Vietnamese side will thereafter entirely be responsible for the maintenance and operation. Given that the estimated period for the growth cycle of Casuarina under the site conditions is approximately 25 years, the post-Project period for management work by the Vietnamese side is expected to be approximately 20 years. The management work during this post-Project period will mainly focus on the following three points.

① Formulation of Operation and Maintenance Plan

A comprehensive design will be conducted for (i) review and announcement of the forest management plan, (ii) damage prevention and control measures for the planted trees, (iii) thinning and regeneration with the participation of local residents and (iv) operation and maintenance of the provided vehicles. This operation and maintenance plan will be evaluated, examined and reviewed every five years.

② Extension (Information) Service

In order to improve the awareness of local residents of the importance of creating protection forests, (i) Project forest observation tour by local residents, (ii) distribution of planting stocks to public bodies, (iii) opportunities for practice of planting by local residents (afforestation workshops) and (iv) various regreening events (green festivals) shall be actively held and/or afforded.

③ Survey Records

As a part of the record compilation during the Project period, conditions of forests will continuously be recorded for the long-term analysis of the

planting techniques employed and the subsequent state of growth of the planted trees. These records will certainly make a significant contribution to the improvement of techniques for coastal forest development in Southern Central Viet Nam. In addition, they should constitute valuable records for forestry sector in other countries, as growth records for Casuarina are still rare.

The above-described operation and maintenance plan will be formulated by each DARD. The plan will be reviewed every five years, in consideration of changes of the socioeconomic conditions and the state of growth of the planted trees. In regard to the utilization of wood produced by thinning and the regeneration of thinned Sites which will take place after some 10 years from the initial planting, it will be important that operations be conducted in a manner which encourages full cooperation of local residents.

3-2 Project Cost Estimation

3-2-1 Expenses Covered by the Government of Viet Nam

For implementation of the Project, the following works should be done by the Vietnamese side, and all the expenses for these works should be covered also by the Vietnamese side. The annual average of such cost is estimated to be 5,350 thousand yen.

Table 3-6 Expenses Covered by the Government of Viet Nam (period 1/2)

(Unit: 1,000 Yen)

Item	Total	1/2	2/2
1. Compilation of operation and maintenance plan	320	320	0
2. Promotion of local participation	455	45	410
3. Improvement and maintenance of access roads	17,980	13,492	4,488
4. Survey of well construction points	860	860	0
5. Forest monitoring and work road patrols	3,179	1,397	1,782
6. Surveying witnessing and inspection works	834	434	400
7. Health and safety management training	495	273	222
8. Survey records	762	381	381
9. Vehicle running costs	1,866	840	1,026
Total	**26,751**	**18,042**	**8,709**

Annual average: 5,350 thousand yen

Besides items mentioned in table 3-6, promotion of extension (information) services to enhance local participation concerning forest establishment is highly desirable.

3-2-2 Operation and Maintenance Costs

(1) Basic Concept of Operation and Maintenance

The basic concept for operation and maintenance after completion of the Project implementation period is as given below.

① The responsible agency and the implementing agencies for the Project are MARD and DARD.

② The target period for operation and maintenance will be 20 years from the sixth year to the 25th year after the project implementation. The end of operation and maintenance period corresponds to the period for forest management plan.

a. Operation and maintenance plans shall be prepared by each DARD. In compiling these plans, revised plans shall be prepared every five years through incorporating changes in socioeconomic conditions.

b. The main items of the operation and maintenance plans to be prepared every five years shall be as follows:

- Evaluation of the performance of the operations in the previous phase (five years)
- Personnel from implementing agencies to be needed and necessary expenses
- Local participation system (including extension service and technical training)
- Revision of forest management plans
- Methods of utilizing wood produced by thinning and regeneration
- Operation plans of supplied equipment

c. The implementing agency for the operation and maintenance plan shall be MARD and DARD.

③ Since emphasis will be placed on encouraging local residents to autonomously develop protection forests in coastal sandy areas, the following activities shall vigorously be implemented: observation tours for Project forests, distribution of planting stocks to public bodies, afforestation workshops, and green festivals.

④ In addition to the compilation of the records concerning technical issues of Project operations as a part of the extension (information) service activities, continual record compilation and analysis concerning the forest conditions will be carried out for the purpose of contributing to raising the level of techniques for sound growth of forests and forest establishment.

(2) Operation and Maintenance Setup

The organizations concerned with Project operation and maintenance are the NSC, MARD, DARD and PFMB.

(3) Operation and Maintenance Costs

The operation and maintenance costs on the Vietnamese side are as indicated in table 3-7. The annual average of such cost is estimated to be 1,078 thousand yen.

Table 3-7 Operation and Maintenance Costs

(Unit: 1000 yen)

		Years 6-10	Years 11-15	Years 16-20	Years 21-25	Total
1	Compilation of operation and maintenance plans	320	320	320	320	1,280
2	Promotion of local participation	1,452	1,452	1,452	1,452	5,808
3	Survey records	762	762	762	762	3,048
4	Disaster countermeasures					
5	Thinning					
6	Regeneration					
7	Vehicle running costs	2,855	2,855	2,855	2,855	11,420
	Total	5,389	5,389	5,389	5,389	21,556

Annual average: 1,078 thousand yen

Chapter 4 Project Evaluation and Recommendation

Chapter 4 Project Evaluation and Recommendations

In Viet Nam, there are strong expectations in regard to the beneficial effects of the Project among those involved in the forestry sector. The fact that the Vietnamese side has requested the afforestation of more than 10,000 ha of coastal sandy area in four provinces in Southern Central Viet Nam reflects such strong expectations.

Given the fact that the Project is one of the first afforestation projects under the Grant Aid scheme of the Government of Japan, a successful implementation is necessary. Having analyzed the original request from various angles, it has been decided to conduct the afforestation of a total area of 3,670 ha in 16 Sites of two provinces over a period of some five years (including approximately two years of tending after planting).

The suitability, effects and recommendations of the Project are discussed next.

4-1 Project Effect

(1) Verification of Project Propriety and Project Effects

Implementation of the Project under the Grant Aid scheme of the Government of Japan (Reforestation Grant Aid) is deemed to be proper for the following reasons.

1) Validity of Effects

① Clear Priority Given to The Project

The Decision of the Prime Minister 661 (August 1998) plans the afforestation of 30,000 ha in coastal sandy areas of high priority in the period from 1998 to 2000. The Project forms a part of this afforestation plan for 30,000 ha.

Moreover, many donors and international organizations have already expressed their support for the Five Million ha Forest Establishment Program (see appendix 4-1).

② Urgent Demand for Expected Project Effects

In adjacent areas of the Sites lie the national road No. 1 (the most important trunk road in Viet Nam), farmland (mainly paddy fields), and some 30,000 houses which are suffering from damages due to wind and/or shifting sand in the tropical monsoon climate.

The establishment of coastal protection forests is, therefore, an important and urgent task to mitigate or prevent such damage.

③ High Expectations of Local Residents

A questionnaire survey (see appendix 4-2) on residents in the Project areas indicated that majority of the respondents expect alleviation of sand damages to houses, farmlands and roads from the coastal protection forests. Moreover, 50 % of respondents are willing to participate in establishment and maintenance activities of the coastal protection forests.

The survey also indicated that approximately 90% of respondents expect supply of fuelwood from the coastal protection forests and approximately 70% of respondents expect job opportunity from the forest establishment. The project enables job opportunity for the residents during the Project implementation period and supply of fuelwood through thinning upon the forest maintenance after the Project implementation period.

④ Strong Prospect for Acting as Model Project for Coastal Forest Establishment Programs of Government of Vietnam

The six provinces in the Southern Central Region of Viet Nam are Da Nang, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen and Khanh Hoa from the north to the south. The implementation of the Project in Quang Nam and Phu Yen Provinces will provide an excellent model for similar projects in neighboring provinces given their geographical proximity.

In addition, nursing at temporary nurseries, planting of a certain size of land, technical and safety training for laborers, and other project-related works will contribute to improving forest establishment works in Viet Nam. Moreover, the participation of local residents in the Project as front-line workers is expected to improve their awareness and commitment to forest

establishment.

2) Validity of Implementation

① Past Achievements of Establishment of Coastal Protection Forests

DARD in both Quang Nam Province and Phu Yen Province have experience in planning and establishing coastal protection forests of Casuarina using the national budget over some 10 years. The actual planting and relevant works has been conducted by such state enterprises as FE /FC.

DARD in each province has also been conducting the extension of techniques/skills and providing guidance for and the supervision of afforestation/reforestation works by local residents (mainly farmers), acting as the implementation body for the PAM 4304 of the World Food Program (WFP).

② Availability of Necessary and Suitable Forest Land

Viet Nam has a long coastline of some 3,200km, of which approximately 1,500 km is said to require the forest establishment. Planting along the coast of the Southern Central Region which is exposed to a tropical monsoon climate is particularly urgent.

The 16 Sites in two provinces where the cost-benefit performance is considered to be high are selected based on such criteria as (i) the construction of new access road(s) will be in time for the Project implementation, (ii) the construction of new bridge(s) is not necessary, (iii) no steep slopes are involved and (iv) new erosion control structures, such as windbreak fences and sand fixation fences, are unnecessary.

③ Availability of Necessary Laborers

Among the various types of works associated with afforestation, planting requires the largest volume of manpower.

Especially, in two months during the second planting period concurrent with replanting, the largest number of laborers will be required. The maximum number of laborer per day during the period would sum up to approximately 6,500.

Having studied the labor statistics, interviews with DARD staff members, distribution of local housing areas and past data on laborers employed by FE/ FC on a daily basis, it is judged that the required number of workers for the Project can be secured.

④ Local Availability of Required Construction Equipment and Materials

The construction of operation roads, temporary nurseries and temporary buildings will require a wide range of equipment and materials, most of which can locally be procured. Most of the equipment, materials and tools required for producing planting stocks, planting and tending could also locally be procured.

⑤ Readiness of Vietnamese Side to Fulfil Its Obligations

Based on the Decision of the Prime Minister 661, the Secretariat for the Five Million ha Forest Establishment Program has been established at MARD. The Project Management Board (PMB) composed of related divisions of MARD/DARD have also been established to be responsible for the necessary budgetary appropriation and organizational development for the Project. Moreover, the Provincial PMB will be set up in due course.

⑥ Feasible Development of Forest Maintenance Setup

As described in ⑤ above, it appears certain that the necessary budgetary appropriation and organizational development will be conducted. Also FE/FC have sufficient experience of forest management.

Meanwhile, the Decision of the Prime Minister 661 sets forth the manner of participation by local residents and NGOs in the forest management.

(2) Beneficial Effects

The establishment of new forests under the Project is expected to have the following beneficial effects.

1) Direct Beneficial Effects

① Establishment of new coastal protection forests over a total area of 3,670

ha

② Protection and effective utilization of some 4,000 ha of hinterland because the newly established forests will function as both windbreaks and sandbreaks

③ Mitigation of shifting sand damages and wind damages on farmland, residential areas, roads, railway lines, etc. and environmental improvement of areas located further inland as a consequence of the windbreak and sandbreak functions performed by the newly established forests in addition to the above mentioned direct effect on the immediate hinterland

④ Contribution to improvement of techniques for planting and forest maintenance in regard to Casuarina

2) Indirect Beneficial Effects

① Contribution to increased supply of fuel wood and organic matters as a result of the production of wood by thinning, leaf litters, etc. through the proper management of the newly established forests

② Provision of employment opportunities for people in rural communities through continuous forest management work

The size of the population, which will directly benefit from the above effects, will be 413,400 in Quang Nam Province and 380,400 in Phu Yen Province (i.e. total population of districts where the Sites are located), with a benefiting area of 129,600 ha for Quang Nam Province and 187,700 ha for Phu Yen Province. The size of the population and area, which will indirectly benefit from the Project, will be the entire population and area of both provinces (a total of 2,149,000 people and 1,453,000 ha) as well as neighboring coastal provinces where the knock-on effects of the Project will be expected and where the establishment of coastal forests is strongly hoped for.

4-2 Recommendations

The implementation of the Project is expected to have considerable beneficial effects as described in 4.1-(2), together with its contribution to improving the living environment for local residents and its excellent functioning as a model coastal forest establishment plan for Viet Nam. Given these positive effects and the status of the Project as a part of the Five Million Hectares Forest Establishment Program which is a high priority policy of the Government of Viet Nam, the implementation of the Project under the Grant Aid scheme of the Government of Japan is judged to be highly significant.

However, the following pending issues still need to be addressed for implementation of the Project and the following suggestions will be presented in order to promote smooth and effective implementation of the Project.

(1) Smooth Implementation of Undertakings by the Vietnamese Side

Under the Project, schedules for nursing and planting are highly restricted by temporal factors. For smooth implementation of the Project, some of the works undertaken by the Vietnamese side shall be completed prior to the commencement of the detailed design and implementation of works to be conducted by the Japanese side.

Works such as demarcation of Site boundaries, well construction point survey, and construction of access roads are particularly important and will seriously influence the progress of Project implementation. Therefore, a budget and organizational setup shall be established so that prompt implementation of such works will be secured in accordance with implementation schedule.

(2) Establishment of Operation and Maintenance Setup

The budget and organizational setup necessary for operation and maintenance after the Project implementation is likely to be secured by the Vietnamese side. However, since Sites are widely distributed, strong organizational setups will be required not only at provincial level but also at district/commune levels as well. Especially, the responsibilities of the various organizations involved in

the Project shall be clearly defined, while seriously considering encouragement of the participation by local residents.

For appropriate forest maintenance, in particular, the involved DARD shall play a central role in formulation of an operation and maintenance plan which should incorporate the following issues.

- Preparation of a forest management plan from the long-term perspective and periodical review of the plan
- Forest monitoring and damage prevention/control measures
- Access road maintenance
- Operation and maintenance of the vehicles provided under the Project

The review of this operation and maintenance plan for updating approximately every five years is desirable so that the plan continues to reflect the actual situation.

Appendices

1. Member List of the Survey Team
2. Survey Schedule
3. List of Party Concerned in Viet Nam
4. Minutes of Discussion
5. Maps and Relevant Data
6. References

Appendices

1. Member List of the Survey Team

Basic Design Study on the Project for Afforestation on the Coastal Sandy Area in Southern Central Viet Nam in the Socialist Republic of Viet Nam

（1）Field Survey

Leader:	Hiroshi MASUKO	Development Specialist Japan International Cooperation Agency (JICA)	18/07-29/07/1999
Technical Adviser:	Yasushi OMASA	Senior Officer Forest Conservation Div. Forest Agency	18/07-29/07/1999
Coordinator:	Hisatoshi OKUBO	Deputy Director First Project Mgmt. Div. Grant Aid Project Mgmt. Dept. JICA	18/07-29/07/1999
Chief Consultant/ Management Planner:	Senshi NAMBA	Japan Forest Civil Engineering Consultants Foundation (JFEC)	18/07-06/08/1999
Afforestation Planner 1:	Takeshi YAMAZAKI	JFEC	18/07-24/08/1999
Afforestation Planner 2:	Mitsunori KOGURE	JFEC	18/07-24/08/1999
Facility Planner 1:	Tatsuru OGAWA	JFEC	18/07-24/08/1999
Facility Planner 2:	Tomohiro SHIBAYAMA	JFEC	18/07-24/08/1999
Cost Estimation/ Construction Planner:	Katsuyuki OMI	JFEC	25/07-24/08/1999
Interpreter:	Ryu MIZUKOSHI	JFEC	18/07-16/08/1999

（２）Explanation of Draft Report

Leader:	Hisatoshi OKUBO	Deputy Director First Project Mgmt. Div. Grant Aid Project Mgmt. Dept. JICA	23/01- 29/01/2000
Technical Adviser:	Takashi TOMINAGA	Senior Officer Research and Extension Div. Forest Agency	23/01- 29/01/2000
Chief Consultant/ Management Planner:	Senshi NAMBA	Japan Forest Civil Engineering Consultants Foundation (JFEC)	23/01- 03/02/2000
Afforestation Planner 1:	Takeshi YAMAZAKI	JFEC	23/01- 03/02/2000
Afforestation Planner 2:	Mitsunori KOGURE	JFEC	23/01- 03/02/2000
Facility Planner 2:	Tomohiro SHIBAYAMA	JFEC	23/01- 03/02/2000
Interpreter:	Yoshiko FUSE	JFEC	23/01- 03/02/2000
Cost Estimation/ Construction Planner:	Haruo IKEGAWA	JFEC (self funded consultant member)	27/01- 03/02/2000

	Date		Details of Survey Schedule			
			Mr. Masuko Mr. Omasa Mr. Okubo	Dr. Namba Mr. Mizukoshi Mr. Kogure	Mr. Yamazaki	Mr. Ogawa Mr. Shibayama
1	18-Jul	Sun	・10:00 Tokyo – 13:40 Hong Kong (CX509) ・14:55 Hong Kong – 15:45 Hanoi (CX791) (Hanoi)			
2	19-Jul	Mon	■Courtesy visit to Embassy of Japan & JICA office ■Courtesy visit to Ministry of Planning & Investment (MPI) ■Courtesy visit to Ministry of Agriculture & Rural Development (MARD) – Submission of Inception Report, Consultation (Hanoi)			
3	20-Jul	Tue	・08:15 Hanoi – 10:15 Nha Trang(VN267) ■Courtesy visit to Khanh Hoa Province People' Committee (PC) ■Courtesy visit to Khanh Hoa Province Department of Agriculture & Rural Development (DARD) (Nha Trang)		・07:50 Hanoi –09:00 Da Nang (VN311) ・Da Nang – Tam Ky (by car) ■Discussion with Quang Nam Province DARD (Tam Ky)	
4	21-Jul	Wed	■Reforestation Site Survey in Khanh Hoa (Nha Trang)		■Reforestation Site Survey (Tam Ky)	
5	22-Jul	Thu	■Reforestation Site Survey in Khanh Hoa ・Nah Trang – Tuy Hoa (by car) (Tuy Hoa)		■Reforestation Site Survey (Tam Ky)	
6	23-Jul	Fri	■Courtesy visit to Phu Yen Province PC ■Courtesy visit to Phu Yen Province DARD ■Reforestation Site Survey in Phu Yen (Tuy Hoa)		■Negotiations for a Survey Contract (Tam Ky)	
7	24-Jul	Sat	■Reforestation Site Survey in Phu Yen (Tuy Hoa)		■Negotiations for a Survey Contract (Tam Ky)	
8	25-Jul	Sun	・16:10 Nha Trang –18:10 Hanoi (VN266) (Mr. Yamazaki) ・10:10 Da Nang – 11:20 Hanoi (VN310) (Mr. Ogawa, Mr. Shibayama) ・ 10:00 Tokyo – 13:40 Hong Kong (CX509) (Mr. Ogawa, Mr. Shibayama) ・ 14:55 Hong Kong –15:45 Hanoi (CX79 (Hanoi)			
9	26-Jul	Mon	■Discussion with MARD (Hanoi)			
10	27-Jul	Tue	■Draft of Minutes Discussions (Hanoi)			
11	28-Jul	Wed	■Signing of Minutes ■Report to Embassy of Japan & JICA office (Hanoi)			
12	29-Jul	Thu	(Mr. Masuko, Mr. Omasa, Mr. Okubo) ・09:50 Hanoi – 12:45 Hong Kong (CX790) (Mr. Masuko, Mr. Omasa, Mr. Okubo) ・14:45 Hong Kong – 19:45 Tokyo (JL732) (Dr. Namba, Mr. Mizukoshi, Mr. Kogure) ・07:50 Hanoi – 09:00 Da Nang (VN311) (Mr. Yamazaki, ,Mr. Ogawa, Mr. Shibayama) ・13:20 Hanoi –16:05 Nha Trang (VN267)]			

Date			Dr. Namba Mr. Mizukoshi	Mr. Kogure	Mr. Yamazaki	Mr. Ogawa Mr. Shibayama	Mr. Omi
12	29-Jul	Thu	・07:50 Hanoi – 09:00 Da Nang (VN311) ■Review of Information (Da Nang)		・13:20 Hanoi –16:05 Nha Trang (VN 267) ■Review of Information (Nha Trang)		
13	30-Jul	Fri	・Da Nang – Tam Ky (by car) ■Signing of surveying contract (Tam Ky)		■Discussion with Khanh Hoa Province DARD ■Nursery Facility Survey (Nha Trang)		
14	31-Jul	Sat	・ Tam Ky – Quang Ngai (by car) ■Courtesy visit to Quang Ngai Province PC ■Courtesy visit to Quang Ngai Province DARD – Submission of Inception Report, Questionnaire, Consultation Consultation (Quang Ngai)		■Reforestation Site Survey (Nha Trang)		
15	1-Aug	Sun	■Review of Information (Quang Ngai)		■Reforestation Site Survey (Nha Trang)	■Nursery Facility Survey (Nha Trang)	
16	2-Aug	Mon	■Reforestation Site Survey ■Visit FE/FC (Quang Ngai)		■Reforestation Site Survey (Nha Trang)	・ Nha Trang – Tuy Hoa (by car) ■Discussion with Phu Yen Province DARI (Tuy Hoa)	
17	3-Aug	Tue	・ Quang Ngai – Tam Ky (by car) ■Courtesy visit to Quang Nam Province PC ■Courtesy visit to Quang Nam Province DARD – Submission of Inception Report, Questionnaire, Consultation (Tam Ky)		■Visit to Cam Ranh Peninsula (Nha Trang)	■Nursery Facility Survey (Tuy Hoa)	・10:00 Tokyo – 13:40 Hong Kong (CX509) ・14:55 Hong Kong – 15:45 Hanoi (CX791)
18	4-Aug	Wed	・18:45 Da Nang – 20:10Hanoi (VN314) (Hanoi)	■Reforestation Site Survey (Tam Ky)	■Reforestation Site Survey (Nha Trang)	■Nursery Facility Survey (Tuy Hoa)	■Discussion with MARD ■Team Meeting (Hanoi)
19	5-Aug	Thu	■Review of Information ■Team Meeting (Hanoi)	■Reforestation Site Survey (Tam Ky)	■Reforestation Site Survey (Nha Trang)	■Nursery Facility Survey (Tuy Hoa)	■Discussion with MARD ■Team Meeting (Hanoi)
20	6-Aug	Fri	(Dr. Namba) ・ 9:50 Hanoi –12:45 Hong Kong (VN790) ・14:45 Hong Kong – 19:45 Tokyo (JL732) (Mr. Mizukoshi) ・08:15 Hanoi –10:15 Nha Trang (VN267)	・ Tam Ky – Nha Trang (by car) (Nha Trang)	・ Nha Trang – Tuy Hoa (by car) ■Discussion with Phu Yen Province DARD (Tuy Hoa)	■Nursery Facility Survey ■Discussion with Phu Yen Province DARD (Tuy Hoa)	・08:15 Hanoi –10:15 Nha Trang (VN267) ■Discussion with Khanh Hoa Province DARD (Nha Trang)

Date			Details of Survey Schedule			
			Mr. Omi Mr. Mizukoshi	Mr. Kogure	Mr. Yamazaki	Mr. Ogawa Mr. Shibayama
20	6-Aug	Fri	・08:15 Hanoi -10:15 Nha Trang (VN 267) ■Discussion with Khanh Hoa Province DARD (Nha Trang)	・ Tam Ky – Nha Trang (by car) (Nha Trang)	・ Nha Trang – Tuy Hoa (by car) ■Discussion with Phu Yen Province DARD (Tuy Hoa)	■Nursery Facility Survey ■Discussion with Phu Yen Province DARD (Tuy Hoa)
21	7-Aug	Sat	■Implementation Planning / Technical Training & Extension Planning Survey (Nha Trang)	■Reforestation Site Survey (Nha Trang)	■Discussion with Phu Yen Province DARD ■Reforestation Site Survey (Tuy Hoa)	・ Tuy Hoa – Qui Nhon (by car) ■Visit National Seed Company in Bin Dinh Province (Qui Nhon)
22	8-Aug	Sun	■Implementation Planning / Technical Training & Extension Planning Survey ・ Nha Trang – Tuy Hoa (by car) (Tuy Hoa)	・ Nha Trang – Tam Ky(by car) (Tam Ky)	■Reforestation Site Survey (Tuy Hoa)	・ Qui Nhon– Quang Ngai (by car) (Quang Ngai)
23	9-Aug	Mon	■Discussion with Phu Yen Province DARD (Tuy Hoa)	■Reforestation Site Survey (Tam Ky)	■Reforestation Site Survey (Tuy Hoa)	■Discussion withQuang Ngai (Quang Ngai)
24	10-Aug	Tue	■Implementation Planning / Technical Training & Extension Planning Survey (Tuy Hoa)	■Reforestation Site Survey (Tam Ky)	■Reforestation Site Survey (Tuy Hoa)	■Nursery Facility Survey (Quang Ngai)
25	11-Aug	Wed	・ Tuy Hoa – Tam Ky (by car) ■Discussion with Quang Nam Province DARD (Tam Ky)	■Reforestation Site Survey (Tam Ky)	■Reforestation Site Survey (Tuy Hoa)	■Nursery Facility Survey (Quang Ngai)
26	12-Aug	Thu	■Implementation Planning / Technical Training & Extension Planning Survey ・18:45 Da Nang – 19:55 Hanoi (VN314) (Hanoi)	■Reforestation Site Survey and (Tam Ky)	■Reforestation Site Survey (Tuy Hoa)	■Nursery Facility Survey (Quang Ngai)
27	13-Aug	Fri	■Implementation Planning / Technical Training & Extension Planning Survey ■Discussion with MARD (Hanoi)	■Reforestation Site Survey (Tam Ky)	■Reforestation Site Survey (Tuy Hoa)	■Nursery Facility Survey (Quang Ngai)
28	14-Aug	Sat	■Implementation Planning / Technical Training & Extension Planning Survey ■Discussion with JICA office (Hanoi)	■Reforestation Site Survey (Tam Ky)	■Reforestation Site Survey (Tuy Hoa)	■Nursery Facility Survey (Quang Ngai)
29	15-Aug	Sun	■Implementation Planning / Technical Training & Extension Planning Survey (Hanoi)	■Reforestation Site Survey (Tam Ky)	■Reforestation Site Survey (Tuy Hoa)	・ Quang Ngai – Tam Ky (by ■Nursery Facility Survey (Tam Ky)
30	16-Aug	Mon	・07:50 Hanoi – 09:00 Da Nang (VN311) ・Da Nang – Quang Ngai (by car) ■Discussion with Quang Ngai Province DARD (Quang Ngai) (Mr. Mizukoshi) ・09:50 Hanoi – 12:45 Hong Kong (CX790) ・14:45 Hong Kong – 19:45 Tokyo (JL732)	・ Tam Ky – Quang Ngai (by car) ■Discussion with Quang Ngai Province DARD (Quang Ngai)	■Discussion with Quang Ngai Province DARD ・ Tuy Hoa – Quang Ngai (by car) (Quang Ngai)	■Discussion with Quang Nam Province DARD (Tam Ky)

Date			Details of Survey Schedule			
			Mr. Omi	Mr. Kogure	Mr. Yamazaki	Mr. Ogawa Mr. Shibayama
30	16-Aug	Mon	・07:50 Hanoi – 09:00 Da Nang (VN311) ・Da Nang – Quang Ngai (by car) ■Discussion with Quang Ngai Province DARD (Quang Ngai)	(Quang Ngai)	・ Tuy Hoa – Quang Ngai (by car) (Quang Ngai)	■Discussion with Quang Nam Province DARD ■Nursery Facility Survey (Tam Ky)
31	17-Aug	Tue	■Implementation Planning/ Technical Training & Extension Planning Survey ■ Team meeting (Quang Ngai)	■Reforestation Site Survey ■ Team meeting (Quang Ngai)	■Discussion withQuang Ngai Province DARD ■ Team meeting (Quang Ngai)	・Tam Ky – Quang Ngai (by car) ■ Team meeting ・Quang Ngai – Tam Ky (by car) (Tam Ky)
32	18-Aug	Wed	■Implementation Planning/ Technical Training & Extension Planning Survey ・Quang Ngai – Da Nang (by car) ・18:45 Da Nang – 19:55 Hanoi (VN314)	■Reforestation Site Survey (Quang Ngai)	■Reforestation Site Survey (Quang Ngai)	■Nursery Facility Survey (Tam Ky)
33	19-Aug	Thu	■Implementation Planning/ Technical Training & Extension Planning Survey (Hanoi)	■Reforestation Site Survey (Quang Ngai)	■Reforestation Site Survey (Quang Ngai)	■Nursery Facility Survey (Tam Ky) Mr. Ogawa ・Quang Ngai – Da Nang (by car) ・18:45 Da Nang – 19:55 Hanoi (VN314) (Hanoi)
34	20-Aug	Fri	■Implementation Planning/ Technical Training & Extension Planning Survey (Hanoi)	■Reforestation Site Survey ・Quang Ngai – Da Nang (by car) ・18:45 Da Nang – 19:55 Hanoi (VN314) (Hanoi)	■Reforestation Site Survey ・Quang Ngai – Da Nang (by car) ・18:45 Da Nang – 19:55 Hanoi (VN314) (Hanoi)	■Nursery Facility Survey ・Quang Ngai – Da Nang (by car) ・18:45 Da Nang – 19:55 Hanoi (VN314) Mr. Ogawa ■Nursery Facility Survey (Hanoi)
35	21-Aug	Sat	■Review of Information (Hanoi)			
36	22-Aug	Sun	■Review of Information (Hanoi)			
37	23-Aug	Mon	Mr. Omi, Mr Ogawa ■Discussion with MARD, Report to Embassy of Japan and JICA office Mr. Yamazaki, Mr. Shibayama ■Discussion with MARD, Visit MARD Library, etc. Mr. Kogure ■Review of Information, Survey coordination (Hanoi)			
38	24-Aug	Tue	・09:50 Hanoi – 12:45 Hong Kong (CX790) ・14:45 Hong Kong – 19:45 Tokyo (JL732)			

No	Date		Details of Survey Schedule			
			Mr. Okubo Mr. Tominaga	Dr. Namba, Mr. Shibayama, Ms. Fuse	Mr. Yamazaki, Mr. Kogure	Mr. Ikegawa
1	1/23	Sun	・9:40 Tokyo-13:50 Hong Kong(CX509)	・14:55 Hong Kong-15:55 Hanoi(VN79 (Hanoi)		
2	1/24	Mon	■Courtesy visit to Embassy of Japan, JICA office, Ministry of Planning & Investment (MPI) and Ministry of Agriculture & Rural Development (Hanoi)			
3	1/25	Tue	■Discussion with MARD (Hanoi)			
4	1/26	Wed	■Discussion with MARD (Hanoi)			
5	1/27	Thu	■Discussion with MARD (Hanoi)			・9:40 Tokyo-13:50 Hong Kong(CX509) ・14:55 Hong Kong-15:55 Hanoi (VN791)
6	1/28	Fri	■Signing of Minutes, Report to Embassy of Japan & JICA office (Hanoi)			
7	1/29	Sat	・11:00 Hanoi-13:45 Hong Kong(CX790) ・15:15 Hong Kong-20:00 Tokyo(CX500)	・Team meeting (Hanoi)		
8	1/30	Sun		~~・13:15 Hanoi-15:55 Nha Trang (VN267)~~	・7:50 Hanoi-9:00 Da Nang(VN311) ・9:30 Da Nang-10:30 Tam Ky (by car) (Tam Ky)	
9	1/31	Mon		・7:00 Hanoi-8:40 Nha Trang(VN267) ・9:00 Nha Trang-12:00 Tuy Hoa (by car) ■ Discussion with DARD	■ Discussion with DARD (Tam Ky)	
10	2/1	Tue		■Site Survey in Phu Yen 15:00 Tuy Hoa-18:00 Nha Trang (by car) (Nha Trang)	■Site Survey in Quang Nam (Tam Ky)	
11	2/2	Wed		・9:45Nha Trang-11:45 Hanoi(VN266)	・8:00 Tam Ky-9:00 Da Nang(by car) ・ 10:10 Da Nang-11:20 Hanoi (VN310) (Hanoi)	
12	2/3	Thu		・11:00 Hanoi-13:45 Hong Kong(CX790) ・15:15 Hong Kong-20:00 Tokyo(CX500)		

3. List of Party Concerned in Viet Nam

(1) Field Survey

○Hanoi

-Ministry of Agriculture and Rural Development

Department of Forestry Development	
Director General	NGUYEN NGOC LUNG
Head of Silviculture Division	PHAM QUANG MINH
JICA Expert	SUZUKI AKIRA
Department of International Cooperation	
Deputy Director	NGUYEN DINH HUONG
Senior Expert	NGO SY HOAI
Forest Inventory and Planning Institute	
Deputy Director	NGUYEN HUY PHON
Chief of International Cooperation Division	HOANG SY DONG
Head of Remote Sensing Division	NGUYEN MANH CUONG

-Ministry of Planning and Investment)

Department of Agriculture and Rural Development	
Vice Director	NGU YEN VANH
Forestry Expert	HYU THACH

Embassy of Japan

Counselor	MIYAHARA NOBUTAKA
Second Secretary	IMURA HISAYUKI

JICA Viet Nam Office

Resident Representative	JIBIKI TAKANORI
Deputy Resident Representative	HATAKEYAMA TAKASHI
Assistant Resident Representative	WATANABE KOZO

○ Quang Nam Province

-People's Committee

Chairman	LE TRI TAP
Foreign Department	PHAN VAN TRUONG

-Department of Agriculture and Rural Development

Vice Director	PHAN VAN HAU
Forestry Technical Division	
Division Manager	HUYNH PHONG BA
Specialist	VO DINH DUONG
Planning & Investment Division	
Division Manager	NGUYEN LOC

Specialist	LE MINH HUNG
Technical Consulting Center for Agriculture and Rural Development	
Director	NGUYEN NHAT

○ Quang Ngai Province

-People's Committee

Chairman	TRAN LE TRUNG

-Department of Agriculture and Rural Development

Vice Director	TRUONG QUANG VIET
Account – Finance Office	
Manager	LE VAN SON
Specialist	BUI PHU PHONG
Forestry Development Department (Division)	
Director	DAO VAN KHOI
Vice Director	TRAN DUNG
Specialist	TRAN KIM NGOC

○ Phu Yen Province

-People's Committee

Chairman	LE VAN HUU
Deputy Director General	NGUYEN HUE
Foreign Department	BUI TIEN LOI

-Department of Agriculture and Rural Development

Vice Director	HUYNH VAN TUYEN
Technical Division	
Manager	DINH VAN TAN
Specialist	MAI TIEN LEN
Finance and Accounting Division	
Deputy Manager	NGUYEN TRONG KHOUNG
Planning and Investment Division	
Manager	PHAM VAN YEN
Forestry Technical Center	
Director	NGUYEN THANH MEN
Vice Director	PHAN PHIEN

○ Khanh Hoa Province

-People's Committee

Vice Chairman	NGUYEN MINH SON

-Department of Agriculture and Rural Development

Director	HOANG VAN TRUONG
Deputy Director	BUI CONG KHANH
Forestry Technical Division	
Manager	VU HUY TU
Specialist	LA CAT HANG
Specialist	TRAN VAN TROAN

-People's Committee of Van Ninh District

Vice Chairman	VU DINH LUAN

(2) Explanation of Draft Report

○Hanoi

-Ministry of Agriculture and Rural Development

Department of Forestry Development	
Director General	NGUYEN NGOC LUNG
Deputy Director	NGUYEN HONG QUAN
Head of Silviculture Division	PHAM QUANG MINH
Chief of Silviculture Division	PHAM HOAI DUC
Officer	PHAM MINH THOA
JICA Expert	Suzuki Akira
Department of International Cooperation	
Deputy Director	BUI THI LAN
Senior Expert	NGO SY HOAI
Officer	DAO THI LOC
Management Board for Forestry Foreign Aid Projects	
Director	DOAN DIEM
Officer of Silviculture	NGO THI DON

-Ministry of Planning and Investment

Department of Agriculture and Rural Development	
Deputy Director General	LE THI THONG
Forestry Expert	HUYNH THACH
Department of Foreign Economic Relations	
Officer	NGUYEN THI THANH HAI

Embassy of Japan

Counselor	MIYAHARA NOBUTAKA
First Secretary	IDA MITSUNORI

JICA Viet Nam Office

Resident Representative	JIBIKI TAKANORI
Assistant Resident Representative	WATANABE KOZO

○ Quang Nam Province

-Department of Agriculture and Rural Development

Vice Director	PHAN VAN HAU
Forestry Technical Division	
Division Manager	HUYNH PHONG BA
Planning & Investment Division	
Specialist	LE MINH HUNG

○ Phu Yen Province

-Department of Agriculture and Rural Development

Vice Director	HUYNH VAN TUYEN
Forestry Technical Division	
Manager	DINH VAN TAN
Specialist	MAI TIEN LEN
Finance and Accounting Division	
Deputy Manager	NGUYEN TRONG KHOUNG
Planning and Investment Division	
Manager	PHAM VAN YEN
Forestry Technical Center	
Director	NGUYEN THANH MEN
Specialist	NGUYEN DINH TU

4. Minutes of Discussion

(1) Field Survey

MINUTES OF DISCUSSIONS
ON
BASIC DESIGN STUDY ON THE PROJECT
FOR
REFORESTATION ON THE COASTAL SANDY AREA
IN SOUTHERN CENTRAL VIET NAM
IN
THE SOCIALIST REPUBLIC OF VIET NAM

Based on the results of the Preparatory Study, the Government of Japan decided to conduct a Basic Design Study on the Project for Reforestation on the Coastal Sandy Area in Southern Central Viet Nam (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Socialist Republic of Viet Nam (hereinafter referred to as "the Viet Nam") 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 July 18 to August 24, 1999.

The Team held discussions with the officials concerned of the Government of Viet Nam and conducted field surveys at the study area.

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.

Hanoi, July 28, 1999

Mr. Hiroshi Masuko
Leader
Basic Design Study Team
JICA

Mr. Nguyen Van Dang
First Vice Minister
Ministry of Agriculture and Rural Development
The Socialist Republic of Viet Nam

ATTACHMENT

1. Objective

The objective of the Project is to protect living conditions and social and economic facilities from moving sand and wind from the sea through the establishment of the protection forests in the coastal sandy areas in the southern central part of Viet Nam.

2. Project Sites

The Project sites are located in the following four provinces:

(1) Quang Nam Province
(2) Quang Ngai Province
(3) Phu Yen Province
(4) Khanh Hoa Province

The details of the Project sites are listed in Annex-1 (see also Map in Annex-2).

3. Responsible and Implementing Organizations

The responsible and implementing organizations are Ministry of Agriculture and Rural Development (MARD) and Provincial Departments of Agriculture and Rural Development (DARD) of the four Provinces.

4. Major Project components requested by the Government of Viet Nam

After discussions with the Team, the items described below were finally requested by the Vietnamese side.

JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

(1) Reforestation of protection forest areas along the southern central coast.
(Details of requested areas are listed in Annex-1)
(2) Equipment and facilities
Items are listed in Annex-3.

In connection with the above-mentioned components, the Team explained that the necessity of such equipment and facilities would be carefully judged after detailed analyses of findings and results of the Study in Japan, together with other equipment and facilities which might be required for the implementation of the Project and maintenance of forests established under the Project.

The Vietnamese side will submit an official letter to the Japanese side concerning the above.

5. Criteria for the site survey and evaluation of site selection

Both sides have agreed on a list of the criteria in Annex-4 for evaluating the priority and adequacy of each site during the study. The results of the study and the recommended planting sites will be presented as a part of the draft report to the Vietnamese side by the Draft Report Explanation Team.

6. Japan's Grant Aid System

(1) The Vietnamese side has understood the system of Japan's Grant Aid explained by the Team. (See Annex-5)

(2) The Vietnamese side will take necessary measures described in Annex-6 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 Viet Nam until August 24, 1999.

(2) JICA will prepare a draft report in English and dispatch a mission in order to explain its contents around October 1999.

(3) In the case that the contents of the report is accepted in principle by the Government of Viet Nam, JICA will complete the final report and send it to the Government of Viet Nam by the end of March 2000.

8. Other Relevant Issues

8-1. Targeted species

Both sides have agreed that the targeted species is in principle *Casuarina equisetifolia*. In case of necessity, introduction of other species such as *Acacia* and *Eucalyptus* might be considered.

8-2. Location of the Planting sites

The final location of the planting sites will be finalized by both sides by the middle of August 1999.

8-3. Finalization of the Planting area

The total planting area will be decided in Japan as the result of the analysis based on the criteria mentioned in article 5. Concerning this, the Vietnamese side noted that the total planting area should be maintained around 11,000 ha but not less.

8-4. Maintenance of the forests

The Vietnamese side understood that it has the responsibility for maintenance of the forests established under the Project mainly by means of people's participation.

8-5. Necessary Approval Procedures

The Vietnamese side will secure the prompt and timely clearance of any governmental procedures required for the official approval of implementation of the Project by the middle of November 1999.

8-6. Contribution to mitigation of climate change

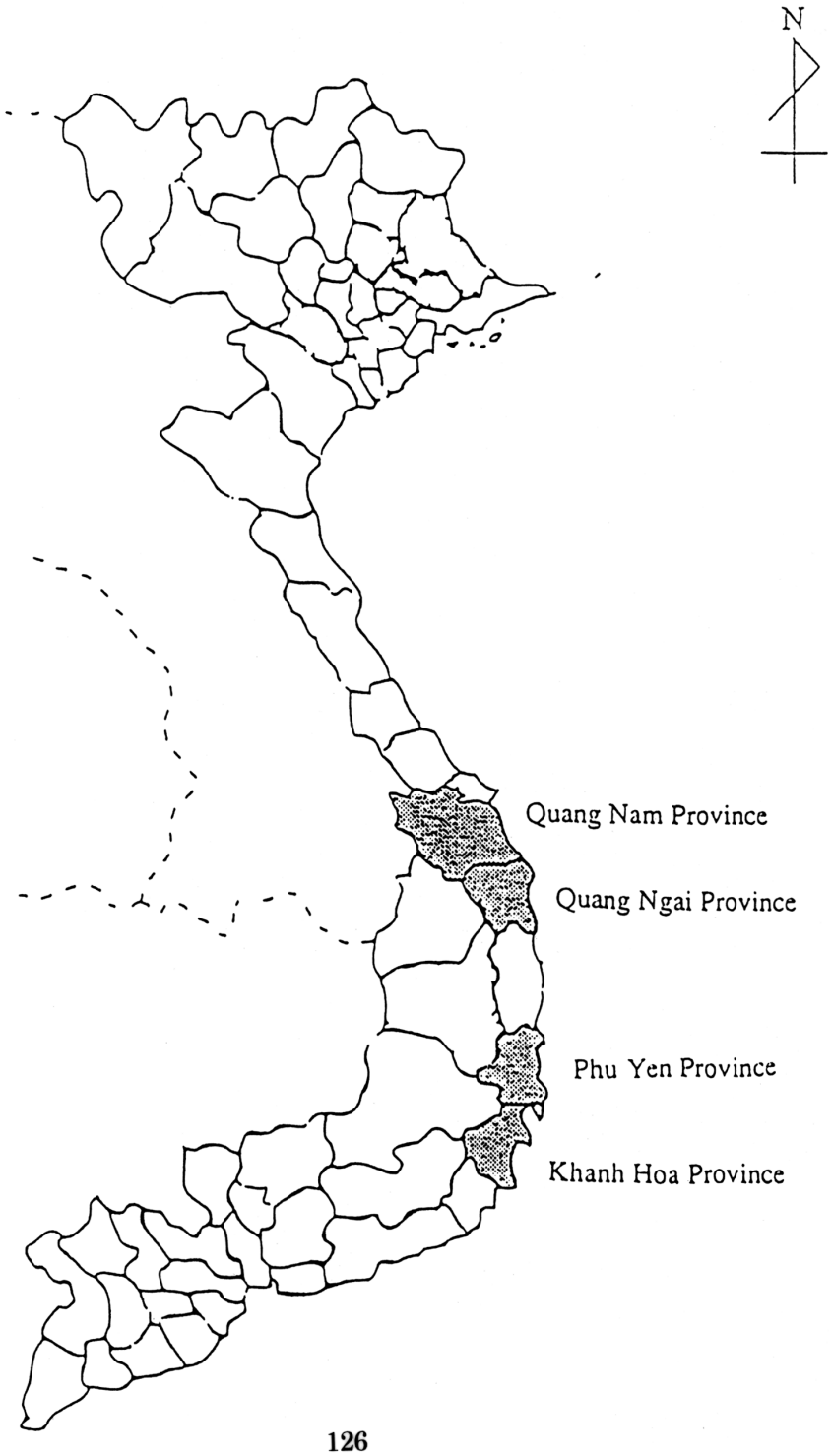
The Vietnamese and the Japanese sides recognized that forests are contributing to mitigation of global climate change and that they are recognized as greenhouse gas sinks and reservoirs.

Annex-1

List of the Area for Reforestation Requested by the Government of Viet Nam

Province	District
Quang Nam	Thang Binh
	Tam Ky
	Nui Thanh
Quang Ngai	Binh Son
	Duc Pho
Phu Yen	Son Cau
	Tuy An
	Tuy Hoa
Khanh Hoa	Van Ninh

Project site location map



Annex-3

Major Items requested by the Vietnamese Side

1. Equipment

(1) Vehicles for the transportation of laborers and seedlings
(2) Vehicles for the management
(3) Motorcycles for the management
(4) Heavy machines for the construction

2. Facilities

(1) Operation roads
(2) Nursery facilities
(3) Simple site offices and warehouses
(4) Water supply facilities

Criteria for the site survey and evaluation of site selection

(1) Economic and social effectiveness of the protection forests in the areas
(2) Improvement of the environmental situation
(3) Geological, geographical and meteological conditions
(4) Capacity of seedling production
(5) Accesibility to the tree planting sites
(6) Availability of necessary labor
(7) Existence of duplication with other reforestation projects executed by the Vietnamese side or by other donors
(8) Maintenance system of the planted areas by the Vietnamese side
(9) Cost of the implementation
(10) Situation of land ownership and utilization
(11) Other conditions to be considered under the Japanese Grant Aid scheme

Note: The order of presenting the above items does not represent the priority of importance.

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) Exchangeof 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.

(3)

(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 Grand 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, temporary 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		●

(3)

(2) Explanation of Draft Report

MINUTES OF DISCUSSIONS
ON
BASIC DESIGN STUDY ON THE PROJECT FOR
REFORESTATION ON THE COASTAL SANDY AREA
IN SOUTHERN CENTRAL VIET NAM
IN
THE SOCIALIST REPUBLIC OF VIET NAM
(Explanation on Draft Report)

In July 1999, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team on the Project for Reforestation on the Coastal Sandy Area in Southern Central Viet Nam (hereinafter referred to as "the Project") to the Socialist Republic of Viet Nam (hereinafter referred to as "the Viet Nam"), 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 the Viet Nam on the components of the draft report, JICA sent to the Viet Nam the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Hisatoshi Okubo, Deputy Director, First Project Management Division, Grant Aid Management Department , JICA, from January 23 to February 3, 2000.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

Hanoi, January 28, 2000

Mr. Hisatoshi Okubo Leader Draft Report Explanation Team Japan International Cooperation Agency	Dr. Nguyen Hong Quan Deputy Director Department of Forestry Development Ministry of Agriculture and Rural Development The Socialist Republic of Viet Nam	Mr. Le Hong Thai Deputy Director Department of Agriculture and Rural Development Ministry of Planning and Investment The Socialist Republic of Viet Nam

Witness:

Mr. Phan Van Hau Vice Director Department of Agriculture and Rural Development Quang Nam Province The Socialist Republic of Viet Nam	Mr. Huynh Van Tuyen Vice Director Department of Agriculture and Rural Development Phu Yen Province The Socialist Republic of Viet Nam

ATTACHMENT

1. Components of the Draft Report

The Vietnamese side agreed and accepted in principle the components of the draft report explained by the Team.

2. Japan's Grant Aid scheme

The Vietnamese side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of the Viet Nam as explained by the Team and described in Annex-5 and Annex-6 of the Minutes of Discussions signed by both parties on July 28, 1999.

3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed item and send it to the Government of the Viet Nam by the end of March 2000.

4. Other Relevant Issues

4-1. The Project sites are 16 Planting areas in Quang Nam and Phu Yen Provinces, totaling around 3,670 ha as shown in Annex 1.

4-2. Target species are shown in Annex 2.

4-3. The Vietnamese side strongly has requested that a second afforestation project which will include planting areas in Quang Ngai and Khanh Hoa provinces start as soon as possible after the Project is put into implementation. The Vietnamese side also explained that in order to alleviate natural and economic aftermath of the disastrous flood in November 1999 in the Central Region of Viet Nam, particularly Quang Ngai and Khanh Hoa provinces, afforestation in the 2 provinces have now become the urgent and national concern.

The Team has understood importance and urgency of the request made by the Vietnamese side and promised to report and appeal to the relevant authorities in Japan.

4-4. The Vietnamese side will secure the prompt and timely clearance of any government procedures required for the official approval of implementation of the Project by the end of February 2000.

4-5. The List of Vehicles to be procured by the Project has been modified as Annex 3 upon requested by the Vietnamese side. Final approval for this matter must be made in Tokyo.

4-6. The Vietnamese side has agreed upon the contents of the following measures to be taken and has promised to implement them promptly:

(1) Major undertakings described in Annex 6 of the Minutes of Discussions signed on July 28, 1999.
(2) Forest management plan and actions described in the Draft Report.
(3) Scope of works to be borne by the Vietnamese side as explained in the Draft Report.
(4) Operation and maintenance plan of vehicles to be supplied by the Project and obligation to secure them proper use as proposed in the Draft Report.

4-7. Both sides have agreed that the term "reforestation" should more appropriately be changed to "afforestation" in the Project title.

4-8. Both sides have agreed that one long term JICA expert specializing in forestry to be stationed in the Central Region may facilitate the implementation of the Project. The Vietnamese side will make a separate official request for the expert if necessary.

4-9. Both sides recognized that forests are contributing to mitigation of global climate change and that they are considered as greenhouse gas sinks and reservoirs.

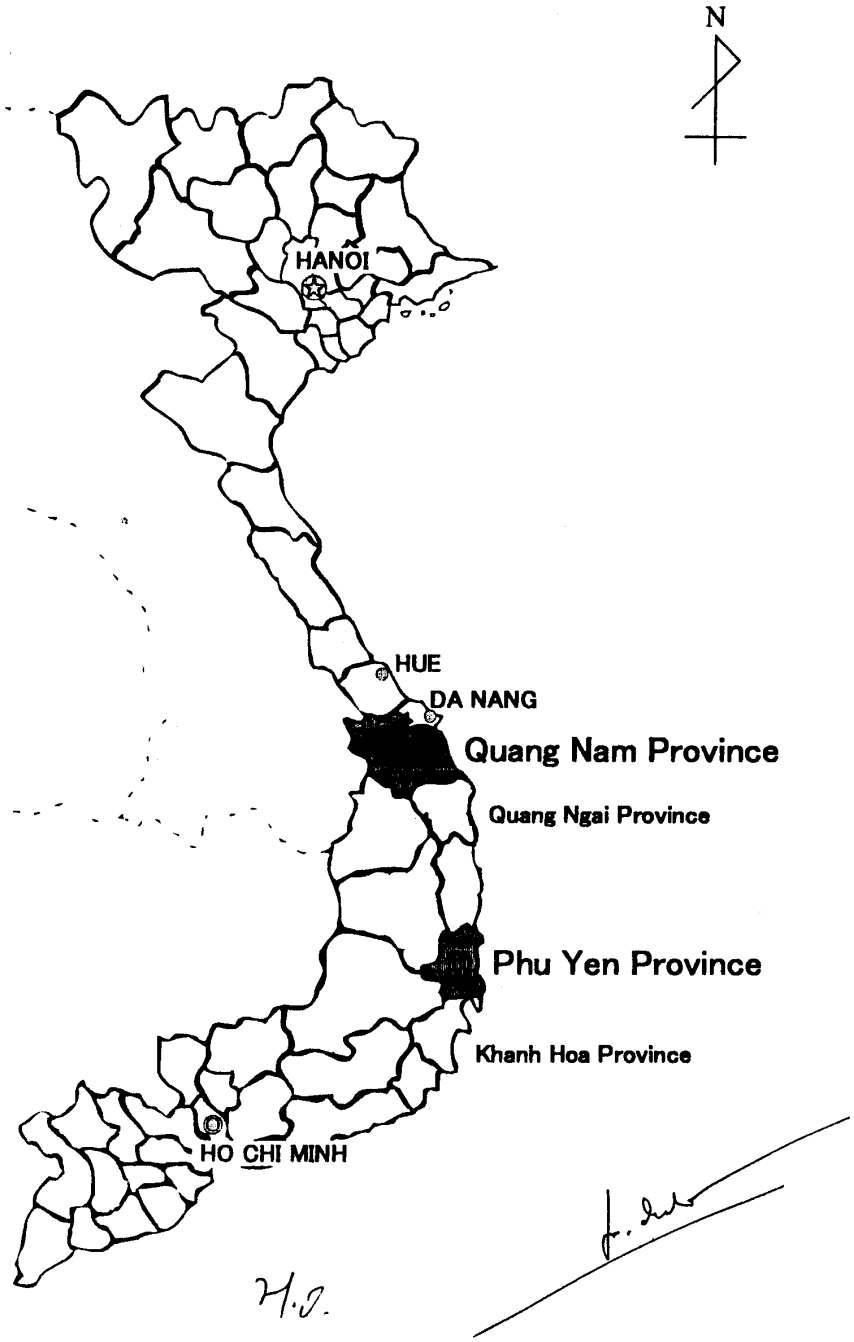
H.O.

Project Sites

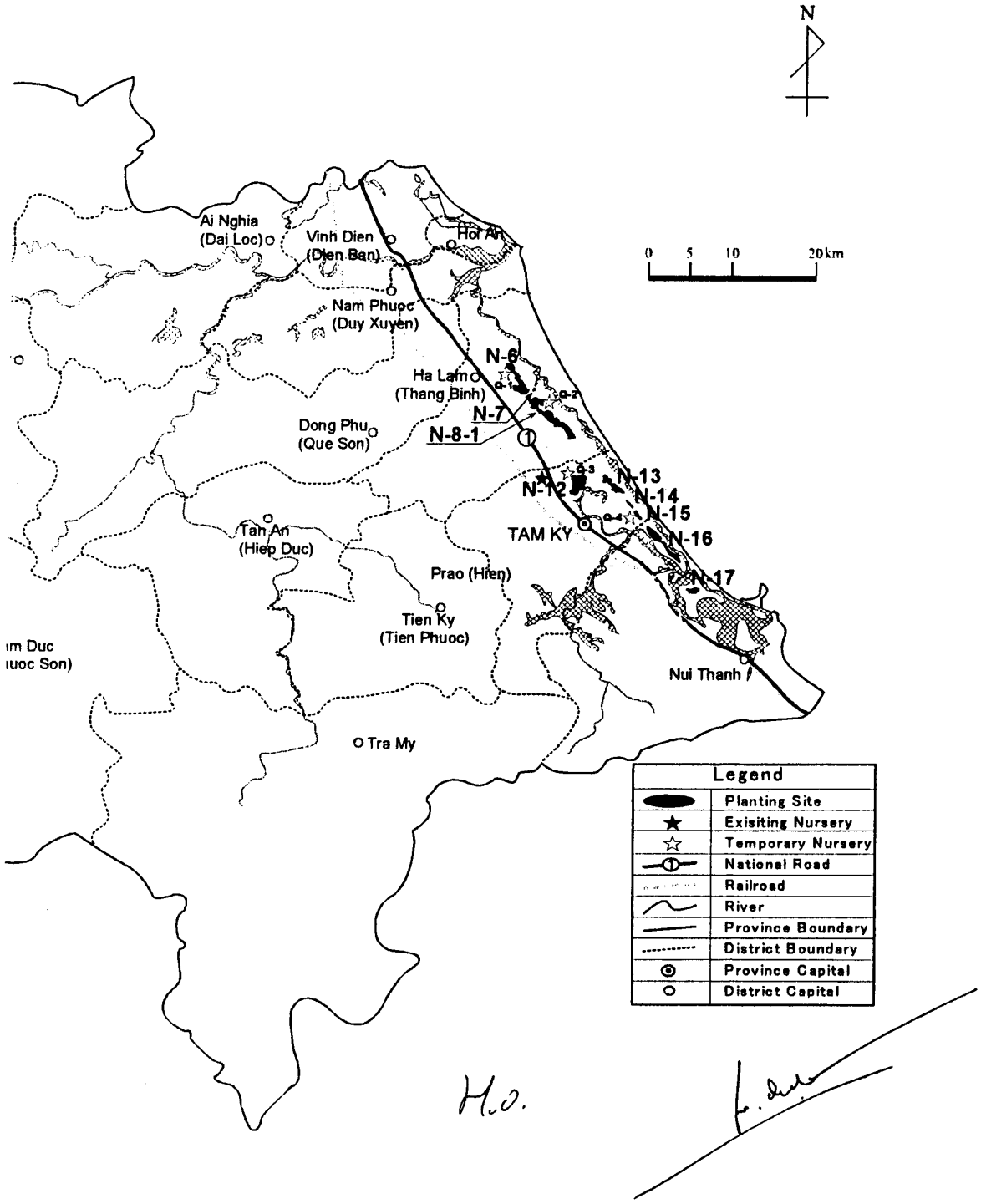
Province	District	New site number	A (ha)	Remarks
Quang Nam	Thang Binh	N-6	300	
		N-7	10	
		N-8 - 1	580	
	Tam Ky	N-12	360	
		N-13	250	
		N-14	70	
		N-15	50	
	Nui Thanh	N-16	230	
		N-17	190	
Phu Yen	Song Cau	P-1 - 1	490	
		P-1 - 2	430	
	Tuy An	P-5	130	
		P-6	160	
		P-7	190	
	Tuy Hoa	P-8	100	
		P-10	130	
		area	3,670	
		number of sites	16	

Quang Nam	2,040	9 sites
Phu Yen	1,630	7 sites
Total	3,670	16 sites

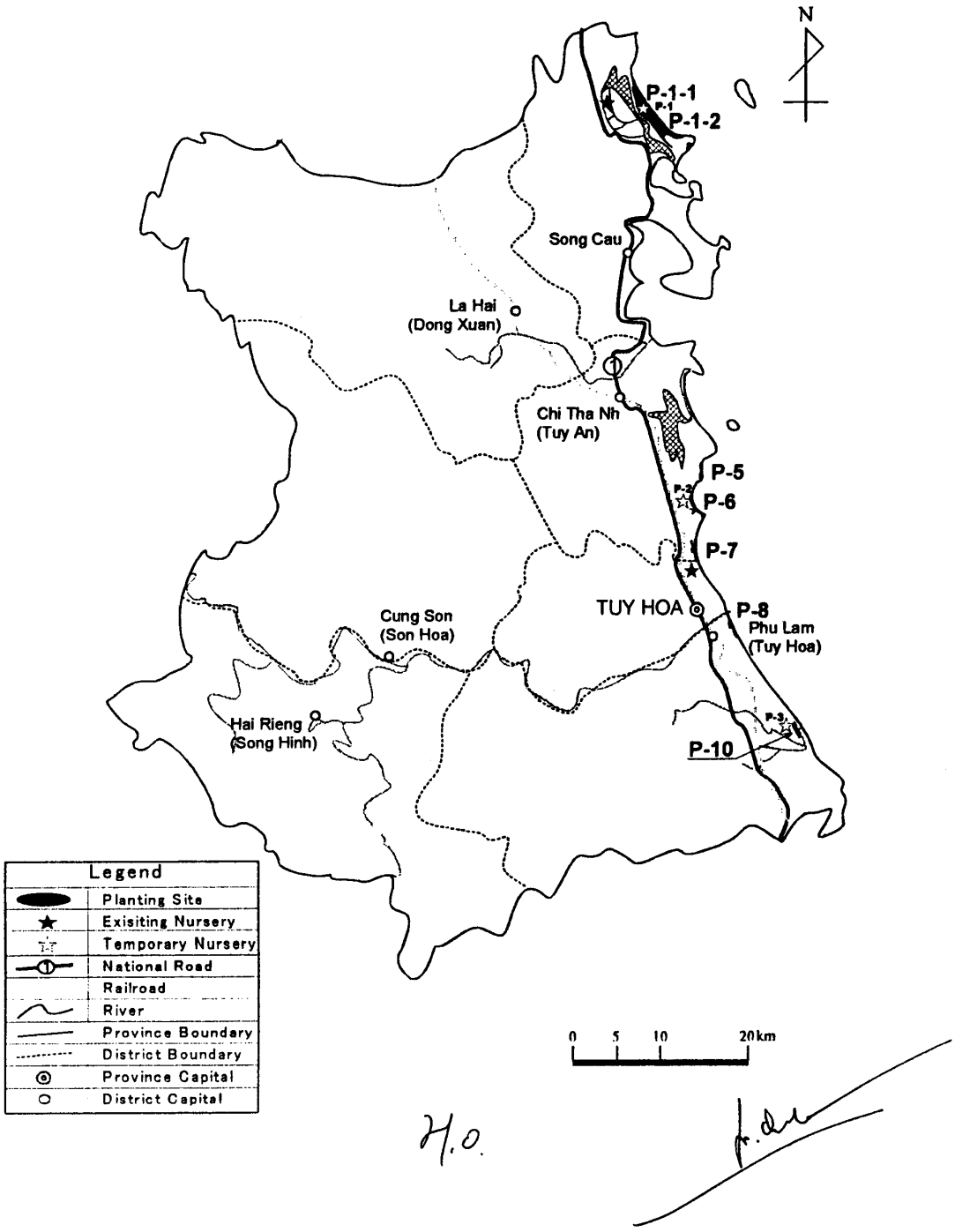
Map of Viet Nam



Location of Planting Sites (Quang Nam Province)



Location of Planting Sites (Phu Yen Province)



Annex 2

Target Species

Province	Species	Planting Area (ha)
Quang Nam	**SUBTOTAL**	**2,040**
	Casuarina	1,826
	Acacia	102
	Eucalyptus	102
	Cashew	10
	Flowering Tree (boundary tree)	-
Phu Yen	**SUBTOTAL**	**1,630**
	Casuarina	1,458
	Acacia	82
	Eucalyptus	82
	Cashew	8
	Flowering Tree (boundary tree)	-
TOTAL	**TOTAL**	**3,670**
	Casuarina	3,284
	Acacia	184
	Eucalyptus	184
	Cashew	18
	Flowering Tree (boundary tree)	-

M.O.

Annex 3

List of Vehicles

No	Equipment	Installation Site	Quantity
1	4WD vehicle	MARD 2DARD	3
2	Pickup truck	2DARD	2
3	Motorbike	2DARD	8

5. Maps and Relevant Data

Appendix 4-1 Memorandum of Agreement on the Preparation of a Partnership Support Program for Vietnam's Five Million Hectare Reforestation Program

Appendix 4-2 Results of Questionnaire Survey on Residents in the Project Areas

Appendix figure 1 Study Target Planting Sites and Access Road Network （Quang Nam）

Appendix figure 2 Study Target Planting Sites and Access Road Network （Quang Ngai）

Appendix figure 3 Study Target Planting Sites and Access Road Network（Phu Yen）

Appendix figure 4 Study Target Planting Sites and Access Road Network （Khanh Hoa）

Appendix 4-1 Memorandum of Agreement on the Preparation of a Partnership Support Program for Vietnam's Five Million Hectare Reforestation Program

MEMORANDUM OF AGREEMENT

ON

THE PREPARATION

OF

A PARTNERSHIP SUPPORT PROGRAM

FOR

VIETNAM'S FIVE MILLION HECTARE REFORESTATION PROGRAM

(5MHRP)

BACKGROUND

The Tenth National Assembly of the Socialist Republic of Vietnam approved in July 1998 a new Forestry Program, which seeks to reforest and rehabilitate 5 million hectares of forest land, such that by 2010 the total forest area of the country will reach 14,3 million hectares (equivalent to 43% of forest coverage). The 5MHRP is a challenging program on environmental protection as well as rural development and poverty alleviation. It also shows the commitment and the priority given by the Government to the forestry sector for the coming years and responds to the "Rio Declaration" (UNCED) and Agenda 21.

The Ministry of Agriculture and Rural Development (MARD) and the provinces are challenged to proceed as soon as possible with large scale implementation of the Program. The Program will require considerable investments in technology development, capacity building and institutional development. It should create a favorable environment for people's participation. Although details remain to be worked out, it is clear that the Program will draw heavily on the State Budget as well as external donor grants and loans.

During the Consultative Group Meeting in Paris in December 1998 it was agreed between the Donor Community and the Representative of the Vietnamese Government that a Partnership would be established to support the 5MHRP.

OBJECTIVE OF THE MEMORANDUM OF AGREEMENT

The objective of the Memorandum of Agreement is to reach agreement on a formal Partnership between the Government of Vietnam and interested Donors, including NGOs, which will lead the Government and Donors to a shared sector support program for effective and efficient implementation of the 5MHRP on the basis of agreed policies, strategies, priorities and principles of implementation.

STRUCTURE OF THE MEMORANDUM OF AGREEMENT

This Memorandum of Agreement is not a legally binding document, rather a sign of commitment to develop a formal Partnership. MARD will lead the implementation of the Memorandum of Agreement under direction of a Vice Minister, through a Joint Partnership Steering Committee, co-chared by the Donors on a rotational basis. The Partnership Steering Committee will be supported by a Partnership Secretariat attached to the International Cooperation Department of MARD and operated in collaboration with the Office of the 5MHRP within the Forestry Development Department. The Partnership Steering Committee of the Memorandum of Agreement will include, but not be limited to, representatives of Ministry of Agriculture and Rural Development, the Office of the Government, Ministry of Planning and Investments, Ministry of Finance and the signing Donors and NGOs. The majority of the national partners of the Partnership's Steering Committee are members of the Executing Committee of the 5MHRP.

The Partnership Steering Committee is responsible for achieving the objective of the Memorandum of Agreement. The Partnership Steering Committee provides guidance to Task Forces under the Memorandum of Agreement and is responsible for the coherence among Task Forces and the ultimate synthesis into the Partnership. The Steering Committee is also responsible for liaison with national programs and fora. The Steering Committee liaises with the national level Steering Committee and the Executing Committee of the 5 MHRP. The Partnership Steering Committee will meet quarterly or more often as required.

PRINCIPLES OF THE MEMORANDUM OF AGREEMENT

The process of developing the Partnership, embarked on with the Memorandum of Agreement, will be entirely transparent for all participants and stakeholders. An appropriate mechanism will be established for adequate information sharing.

The Government of Vietnam will seek to convince Donors and international organisations to place their support to the forestry sector development in the framework of the Memorandum of Agreement and the resulting Partnership, especially when relevant to the 5MHRP.

Signed Donors and international organisations, in consultation with the Government and the Partnership Steering Committee, will aim to put their investments and support to the forestry development in the framework of and supportive to the Memorandum of Agreement and the resulting Partnership.

PARTICIPATION AND DURATION OF THE MEMORANDUM OF AGREEMENT

Participation under the Memorandum of Agreement is flexible. In consultation with the Partnership Steering Committee other national organisations and interested Donors can become party of the Memorandum of Agreement. Any party can withdraw from the Memorandum of Agreement by notifying the Partnership Steering Committee in writing.

The memorandum is initially established until December 2000. The term will be extended, if the signatories agree.

TASK FORCES

In order to achieve a Partnership on a Forestry Sector Support Program underpinning the 5MHRP, joint Government/Donor Task Forces will be established by the Partnership Steering Committee to prepare the various elements of such a Partnership. Each Task Force should include key stakeholders and work on the following objectives:

TASK FORCE I : *CLARIFICATION OF THE 5MHRP*

Objective: Review and assess the current preparation and implementation status of the 5MHRP and present in detail the objectives and outputs to be achieved and the proposed means and implementation structure. Define the core activities of the Program, its relations with other national programs as well as its limits.

TASK FORCE II : *FOREST POLICY, STRATEGY AND INSTITUTIONS*

Objective: Review and assess the strengths and weaknesses of current forest policy, strategy and institutions in Vietnam and recommend how they should be changed in order to create the right framework conditions to achieve the objectives of the 5MHRP.

TASK FORCE III: *FOREST SECTOR INVESTMENT AND ASSISTANCE NEEDS AND PARTNERSHIP SUPPORT STRUCTURE*

Objective: Review and assess the future investment needs of forestry in Vietnam over the short and medium term (including the immediate needs) and the current contributions and the role of the ongoing projects and programs. Recommend financing strategy for sustainable forestry sector development in Vietnam and the implementation of the 5MHRP. In particular, consider a) the demand for public investments; b) the range of the Government/Donor Partnership options to support the forestry sector in Vietnam; c) identify the costs and benefits of a program approach to forestry investments and d) define the necessary preconditions for successful investments in forestry activities at all levels.

Planned and ongoing donor supported technical assistance in the sector will be made supportive to the Task Forces, where relevant.

The Task Forces are composed of Vietnamese and Donor representatives and will be limited in size. They get guidance from and report to the Partnership Steering Committee. The Steering Committee will set their term in relation to the process of the Memorandum of Agreement and the need to synthesize their results into a Partnership. The Task Forces will define their specific outputs, activities and operating modalities in the first three months. They will report on a regular basis in a workshop (the Task Forces could report on the same day). They can draw on Donor support and external consultants for specific studies.

This Memorandum of Agreement is signed on behalf of:

THE GOVERNMENT
OF S.R. VIETNAM

H.E. Le Huy Ngo
Minister, Vice Chairman, National
Steering Committee, 5MHRP

WORLD BANK (WB)

Mr. Andrew Steer
Country Director

FINLAND

H.E. Mr. Juha Puromies
Ambassador

ASIAN DEVELOPMENT BANK
(ADB)

Mr. Jean-Pierre A. Verbiest
Resident Representative

GERMANY

Worfgang Erck
Ambassador

UNITED NATIONS DEVELOPMENT
PROGRAM (UNDP)

H.E. Mr. Edouard A. Wattez
UN Resident Coordinator

JAPAN

Mr. Hirota Koki
Chief Representative,
Japan Bank for International
Cooperation (JBIC)

FOOD AND AGRICULTURE
ORGANISATION OF THE UN (FAO)

Mrs. Guerrieri Fernanda
Representative

Mr. Hatakeyama Takashi
Deputy Representative
Japan International Cooperation
Agency (JICA)

NETHERLANDS

H.E. Mrs. Monique P.A. Frank
Ambassador

SWEDEN

H.E. Mr. Gus Edgren
Ambassador

SWITZERLAND

Mr. Urs Herren
First Secretary,
Development Cooperation

WORLD CONSERVATION
UNION (IUCN)

Mr. Nguyen Minh Thong
Representative

WORLD FOOD PROGRAM (WFP)

Mr. Julian Lefevre
Representative

EUROPEAN UNION (EU)

H.E. Mr. Frederic Baron
Ambassador, Head of Delegation

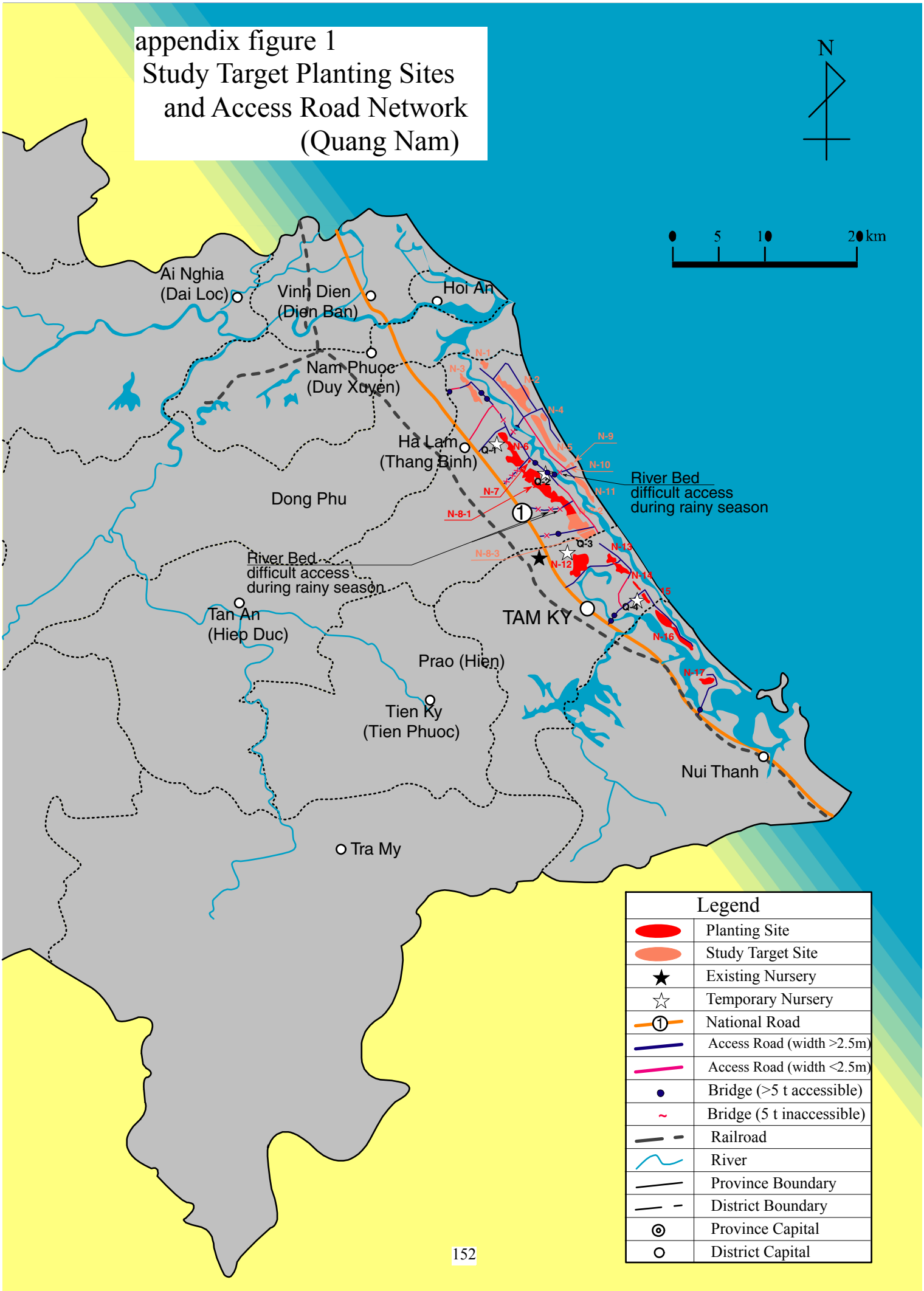
WORLD WIDE FUND FOR
NATURE (WWF)

Mr. Eric Coull
Representative

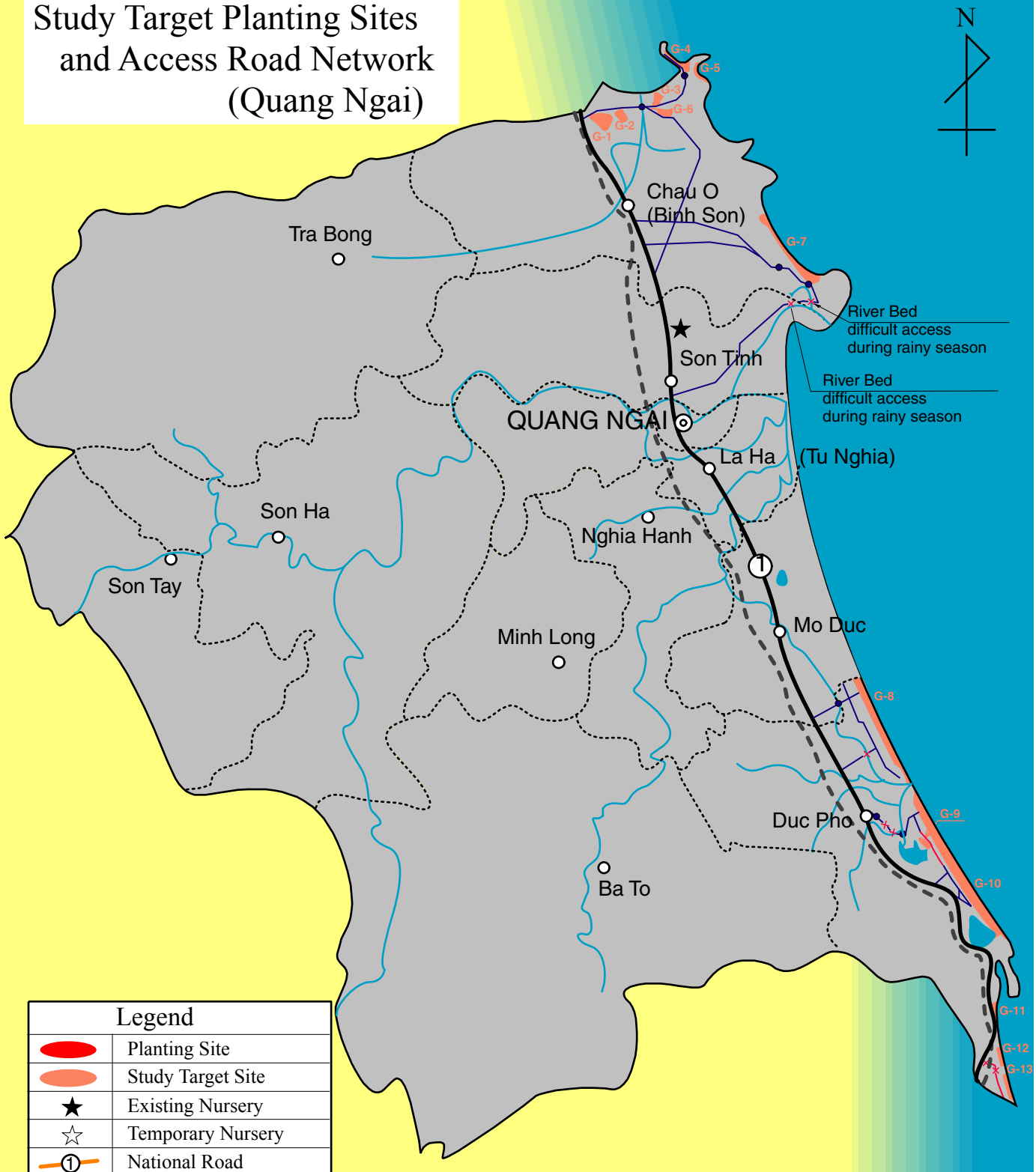
Appendix 4-2 Results of Questionnaire Survey on Residents in the Project Areas

Question	Quang Nam (62 persons)		Phu Yen (51 Persons)		Total (113)	
1. Do you understand the role of coastal protection forests?	62	(100)	51	(100)	113	(100)
2. What do you expect of coastal protection forests? (multiple choice)						
(1) Prevention of sand invasion to homes	25	(40)	40	(78)	65	(58)
(2) Prevention of sand sedimentation on roads	41	(66)	36	(71)	77	(68)
(3) Prevention of sand sedimentation on farmland	25	(40)	38	(75)	63	(56)
3. Are you willing to participate in the establishment of coastal protection forests?	26	(42)	28	(55)	54	(48)
4. Others (Other Expectations)						
(1) Supply of fuelwood	55	(89)	43	(84)	98	(87)
(2) Supply of small logs	23	(37)	28	(55)	51	(45)
(3) Provision of employment opportunities	45	(73)	32	(63)	77	(68)
(4) Sale of seedlings	8	(13)	12	(24)	20	(18)

Respondents of the questionnaire survey reside within 10 km from the Sites

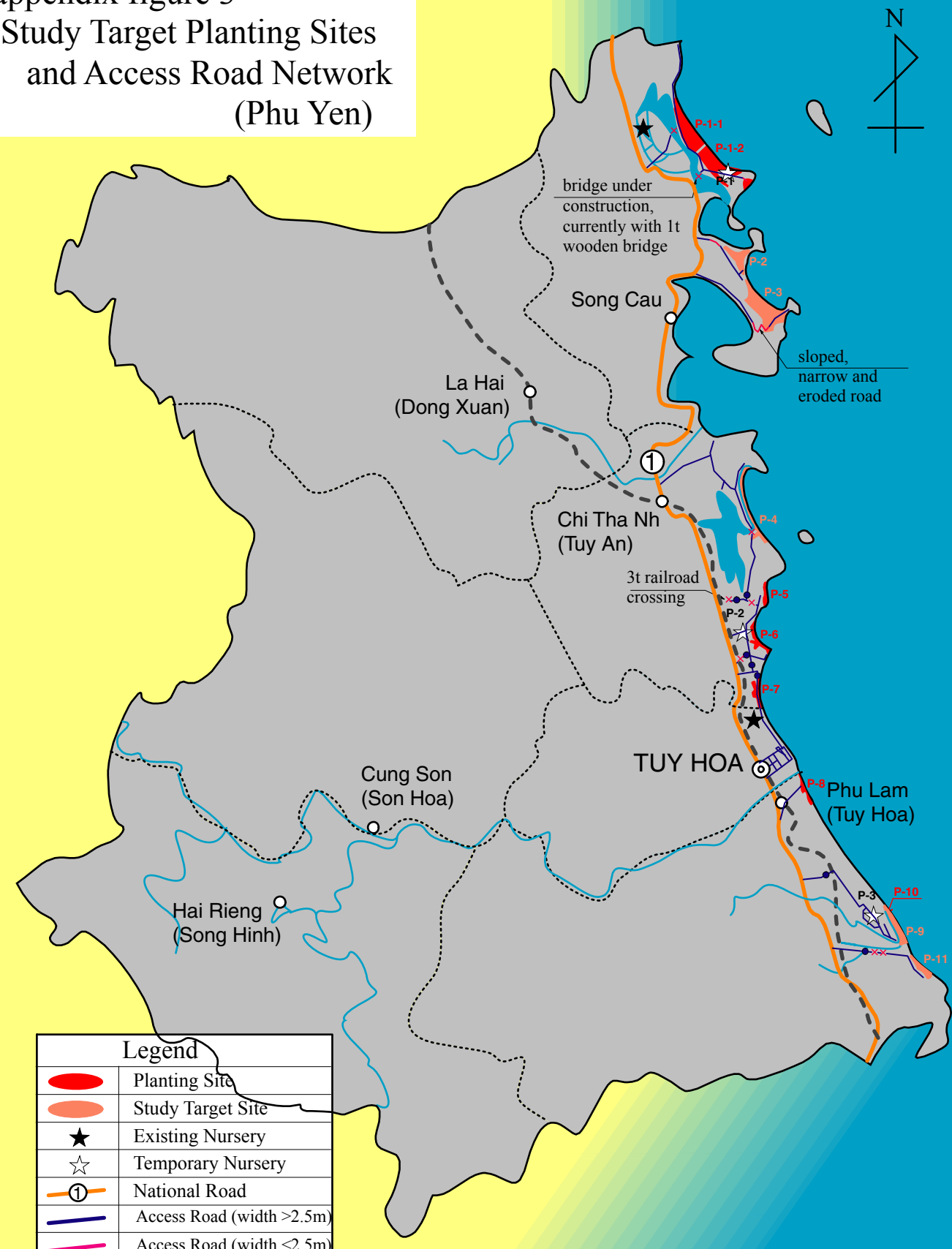

appendix figure 1
Study Target Planting Sites
and Access Road Network
(Quang Nam)
N
0 5 10 20 km
Ai Nghia
(Dai Loc)
Vinh Dien
(Dien Ban)
Hoi An
Nam Phuoc
(Duy Xuyen)
Ha Lam
(Thang Binh)
Dong Phu
River Bed
difficult access
during rainy season
River Bed
difficult access
during rainy season
Tan An
(Hiep Duc)
TAM KY
Prao (Hien)
Tien Ky
(Tien Phuoc)
Nui Thanh
Tra My
N-1
N-2
N-3
N-4
N-5
N-6
N-7
N-8-1
N-8-3
N-9
N-10
N-11
N-12
N-13
N-14
N-15
N-16
N-17
Q-1
Q-2
Q-3
Q-4
1
Legend
Planting Site
Study Target Site
Existing Nursery
Temporary Nursery
National Road
Access Road (width >2.5m)
Access Road (width <2.5m)
Bridge (>5 t accessible)
Bridge (5 t inaccessible)
Railroad
River
Province Boundary
District Boundary
Province Capital
District Capital

appendix figure 2
Study Target Planting Sites
and Access Road Network
(Quang Ngai)

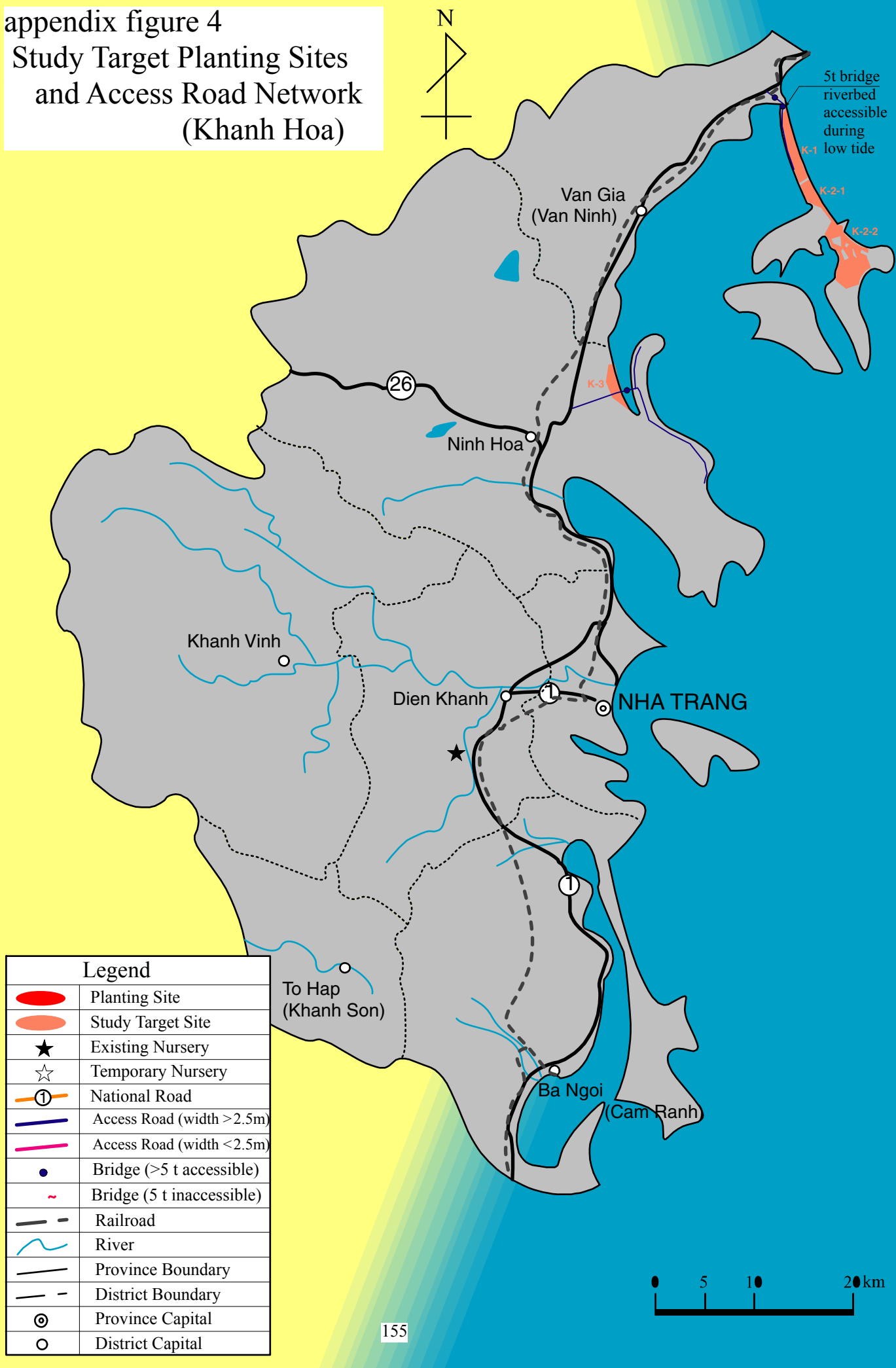


Legend	
	Planting Site
	Study Target Site
★	Existing Nursery
☆	Temporary Nursery
①	National Road
	Access Road (width >2.5m)
	Access Road (width <2.5m)
•	Bridge (>5 t accessible)
~	Bridge (5 t inaccessible)
	Railroad
	River
	Province Boundary
	District Boundary
◎	Province Capital
○	District Capital

appendix figure 3
Study Target Planting Sites and Access Road Network (Phu Yen)



appendix figure 4
Study Target Planting Sites and Access Road Network (Khanh Hoa)



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