

JAPAN INTERNATIONAL  
COOPERATION AGENCY

DIRECTORATE GENERAL OF  
FOOD CROPS AND HORTICULTURE  
MINISTRY OF AGRICULTURE  
GOVERNMENT OF THE REPUBLIC OF INDONESIA

THE STUDY  
ON  
THE IMPROVEMENT  
IN  
QUALITY OF THE TROPICAL FRUITS

VOLUME I  
MAIN REPORT

1

JUNE 1998

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## CURRENCY EQUIVALENTS

(February 1998)

US\$ 1.00 = Rp. 9,000  
(average of buying and selling rates)

US\$ 1.0 = ¥ 125

## PREFACE

In response to the request from the Government of the Republic of Indonesia, the Government of Japan decided to conduct a master plan study on the improvement in quality of the tropical fruits and entrusted the study to Japan International Cooperation Agency (JICA).

JICA sent to Indonesia a study team headed by Mr. Yutaka Matsumoto, Nippon Koei Co., Ltd., three times between July 1997 and May 1998.

The team held discussions with the officials concerned of the Government of Indonesia, and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report 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 Republic of Indonesia for their close cooperation extended to the team.

June, 1998



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Kimio Fujita  
President  
Japan International Cooperation Agency

June, 1998

Mr. Kimio Fujita  
President  
Japan International Cooperation Agency (JICA)  
Tokyo, Japan

Letter of Transmittal

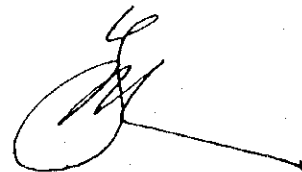
We are pleased to submit to you the Final Report of the Study on the Improvement in Quality of the Tropical Fruits in the Republic of Indonesia. This report presents the results of all works performed in both Indonesia and Japan during a total period of 11 months from July 1997 to May 1998, with cooperative efforts of the Directorate General of Food Crops and Horticulture (DGFCH, MOA) and other Indonesian authorities concerned.

The Master Plan (MP) was prepared based on the Indonesian fruit production development policy and strategies, and basic development plans formulated for each of the four Provinces through scrutinizing the present conditions, potentials and constraints in this sub-sector and Study Area. The MP embraces a wide scope of development objectives in both upstream and downstream areas : seedling propagation and distribution, farm management, post-harvest and processing, marketing as well as institutional measures and supporting services. In this MP, 21 programs are proposed in total at three administrative levels : central (national), provincial, and district. Among the 21 programs, the "Orchard Development Program" for 37 orchard development potential areas is the "core" program and the other 20 programs could be considered as the supporting ones to promote the fruit production development through fruit quality improvement in Indonesia.

As addressed in the national development plans and consistently expressed by the Government of Indonesia (GOI) in the meetings held between JICA and GOI, it is a pressing need to alleviate regional disparities of the country by creating new job opportunities in rural areas and to increase farmers' income, especially small landholding ones. We believe that the programs proposed in this MP will promote the fruit production through fruit quality improvement in the development areas, and consequently to improve the participating farmers' living standards. We would like therefore to recommend to implement the programs as early as possible and in an integrated manner.

We wish to express our deep appreciation and gratitude to the personnel concerned of your Agency, Jakarta Office, the Embassy of Japan in Indonesia, the Ministry of Agriculture, BAPPENAS and the authorities concerned of the GOI for the courtesies and cooperation extended to us during our field survey and study.

Very truly yours,

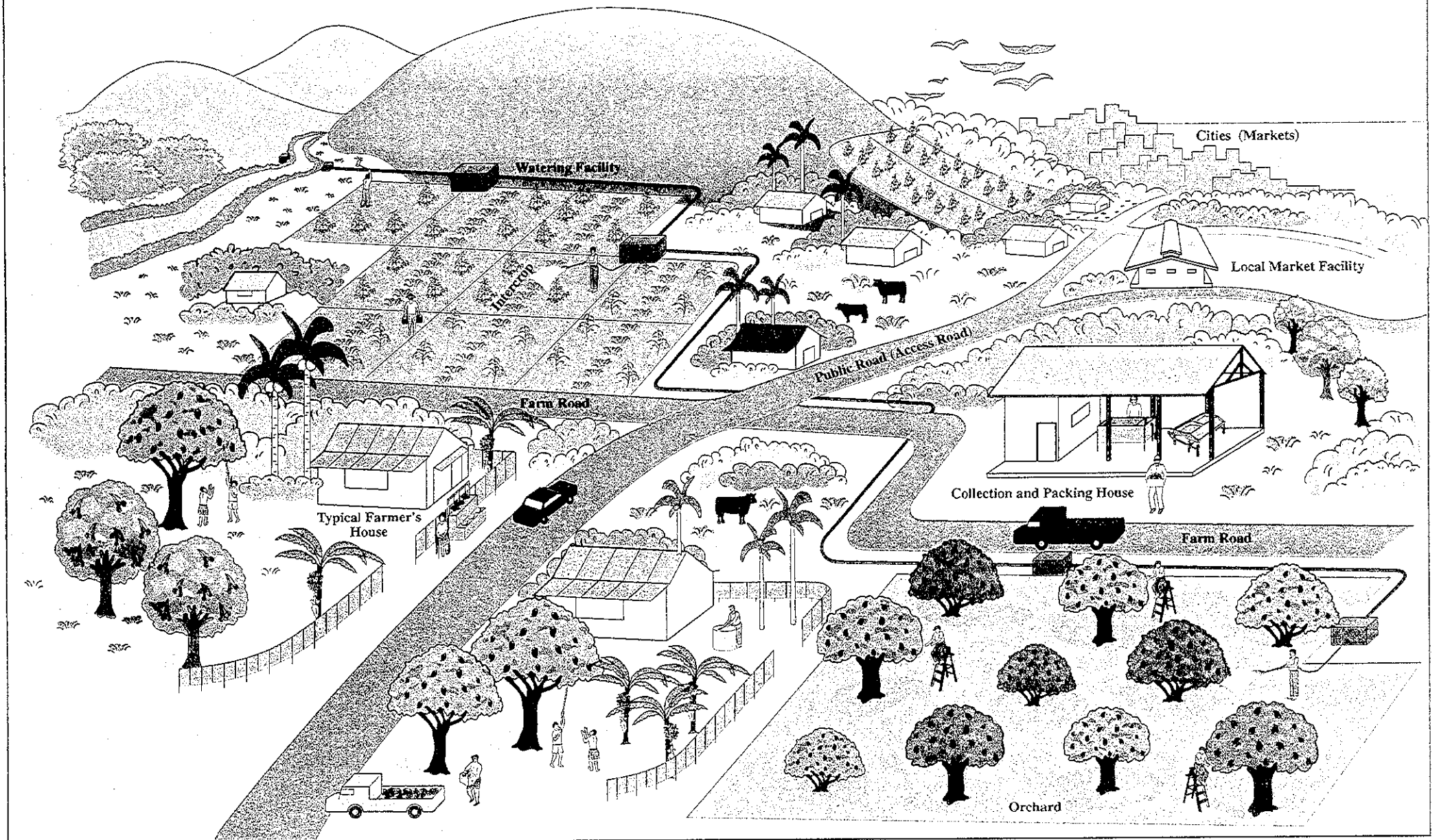


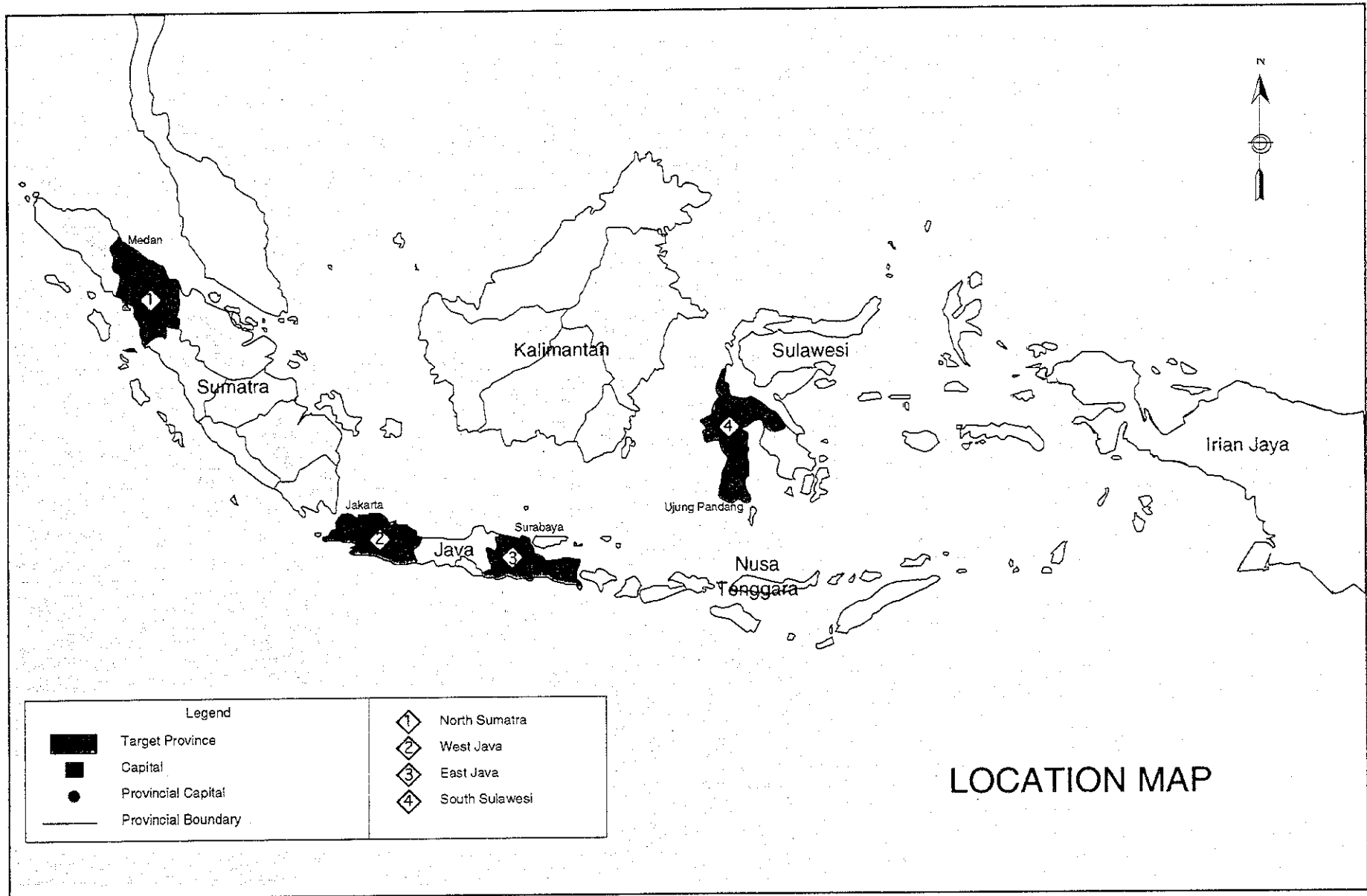
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Yutaka Matsumoto  
Team Leader for the Study on the  
Improvement of the Tropical Fruits

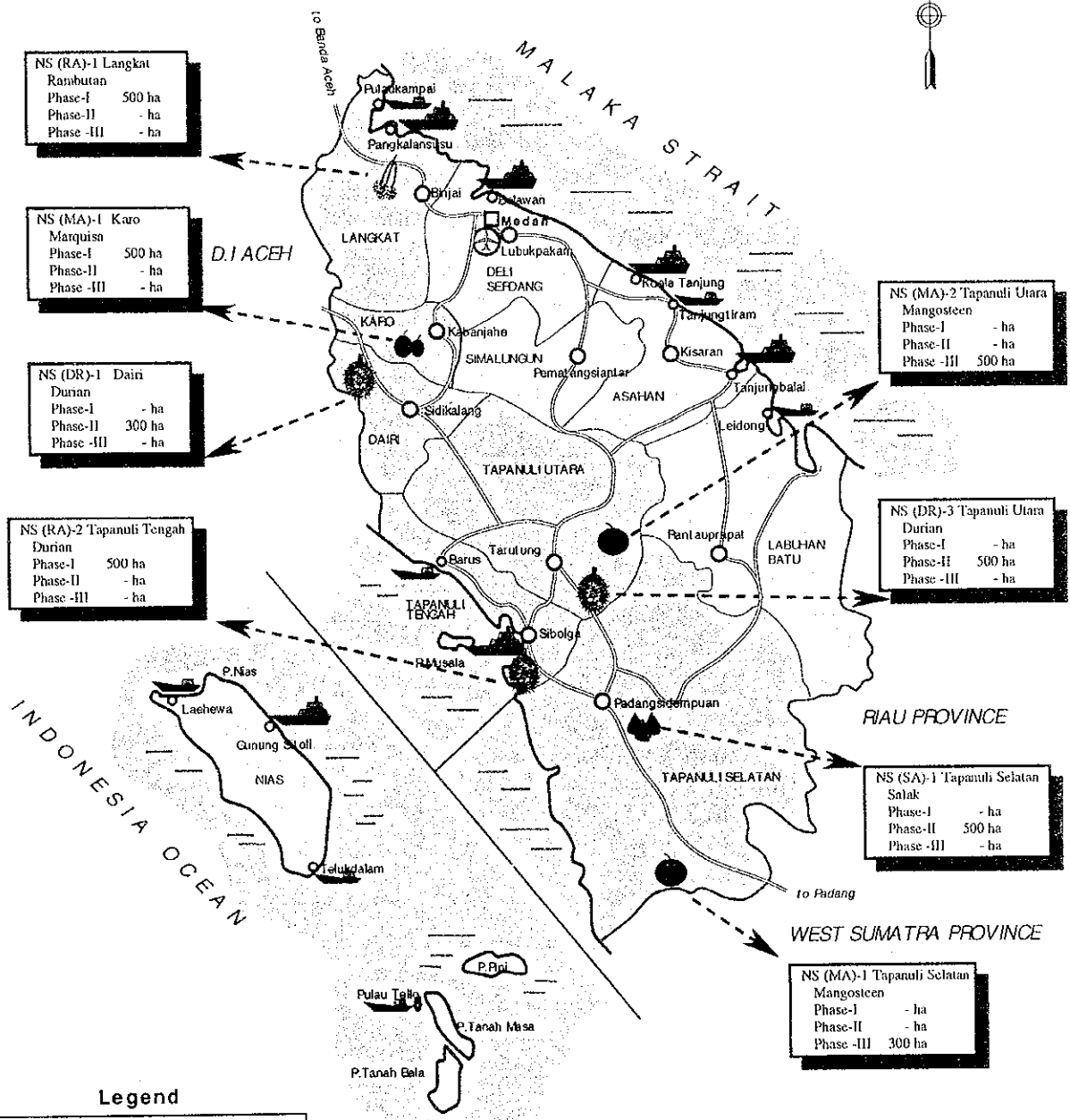


# LAYOUT VIEW OF A FRUIT PRODUCTION DEVELOPMENT AREA





# LOCATION MAP ( NORTH SUMATRA PROVINCE )

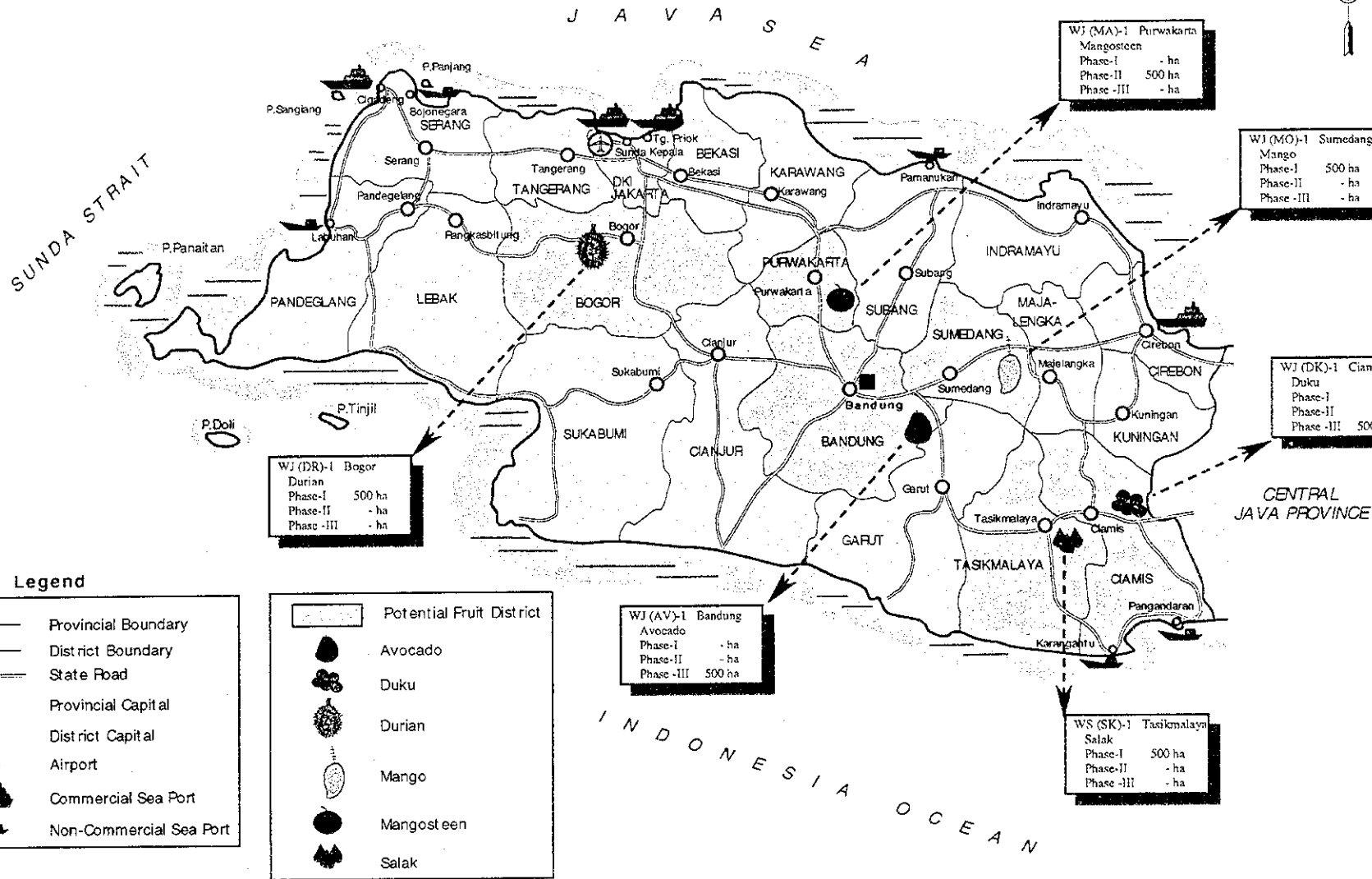


## Legend

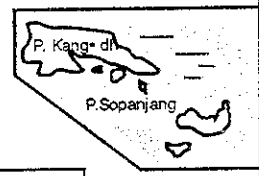
	Provincial Boundary
	District Boundary
	State Road
	Provincial Capital
	District Capital
	Airport
	Commercial Sea Port
	Non-Commercial Sea Port

	Potential Fruit District
	Durian
	Mangosteen
	Marquise
	Rambutan
	Salak

# LOCATION MAP ( WEST JAVA PROVINCE )



# LOCATION MAP ( EAST JAVA PROVINCE )



**Potential Fruit District**

- Avocado
- Banana
- Duku
- Durian
- Mango

CENTRAL JAVA PROVINCE

**EJ (DR)-2 Trenggalek**

Durian	- ha
Phase-I	500 ha
Phase-II	- ha
Phase-III	- ha

**EJ (BA)-1 Jombang**

Banana	500 ha
Phase-I	- ha
Phase-II	- ha
Phase-III	- ha

**EJ (MO)-1 Pasuruan**

Mango	- ha
Phase-I	500 ha
Phase-II	- ha
Phase-III	- ha

**EJ (AV)-1 Lumajang**

Avocado	- ha
Phase-I	500 ha
Phase-II	500 ha
Phase-III	- ha

**EJ (DK)-1 Tulungagung**

Duku	- ha
Phase-I	500 ha
Phase-II	- ha
Phase-III	- ha

**EJ (DR)-1 Jombang**

Durian	500 ha
Phase-I	- ha
Phase-II	- ha
Phase-III	- ha

**EJ (SK)-1 Malang**

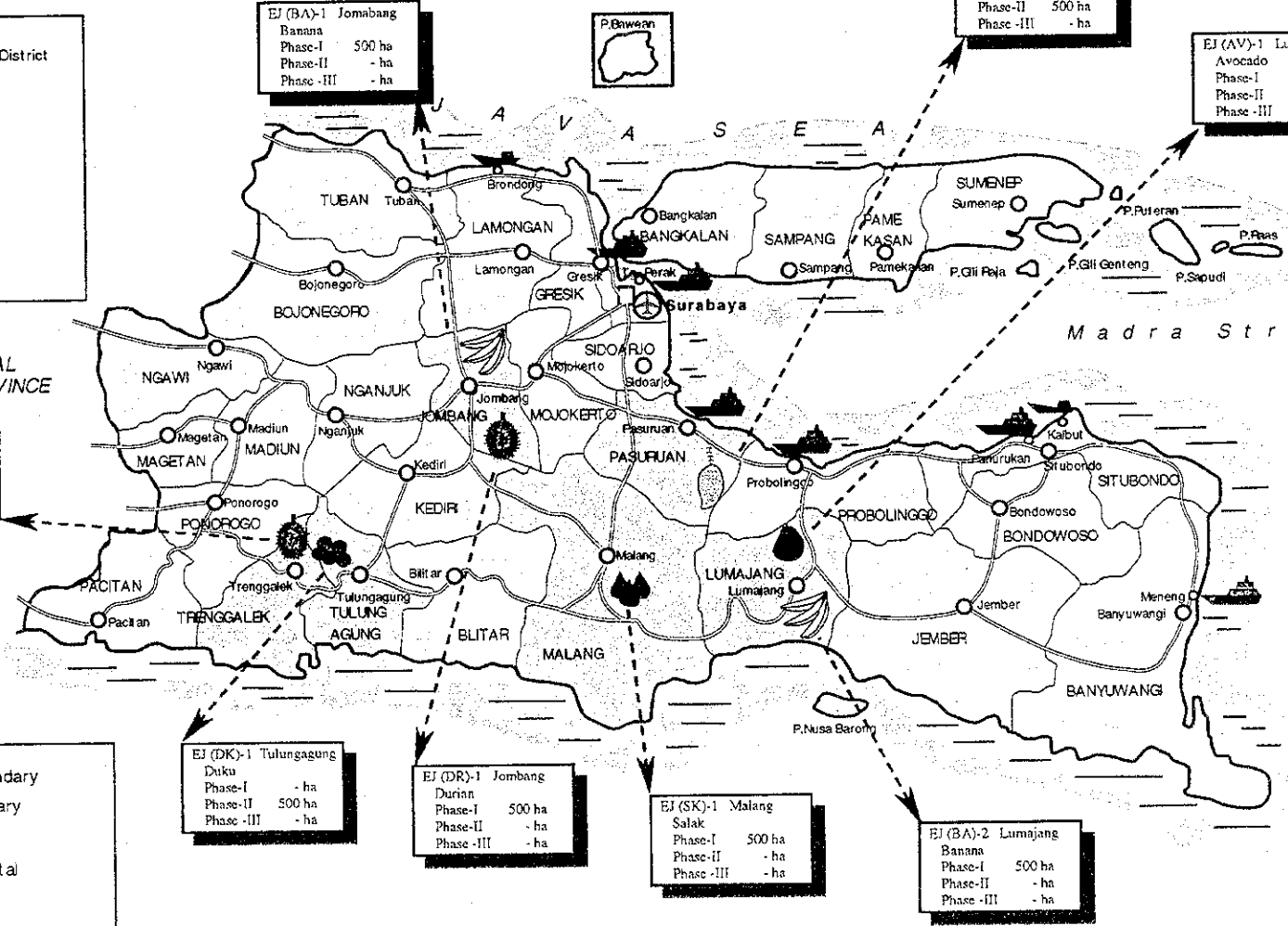
Salak	500 ha
Phase-I	- ha
Phase-II	- ha
Phase-III	- ha

**EJ (BA)-2 Lumajang**

Banana	500 ha
Phase-I	- ha
Phase-II	- ha
Phase-III	- ha

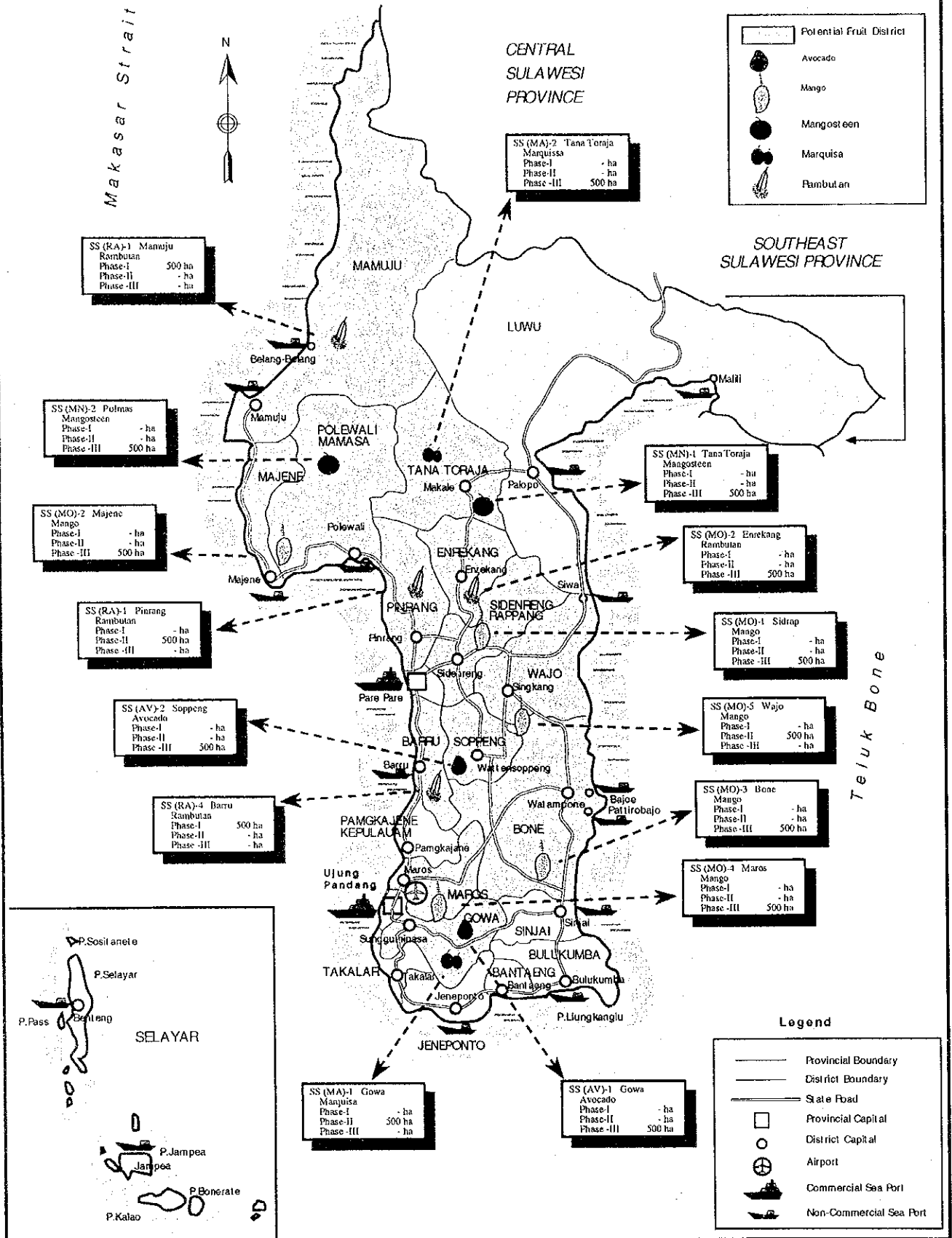
**Legend**

- Provincial Boundary
- District Boundary
- State Road
- Provincial Capital
- District Capital
- Airport
- Commercial Sea Port
- Non-Commercial Sea Port



INDONESIA OCEAN

# LOCATION MAP ( SOUTH SULAWESI PROVINCE )



## SUMMARY

### CHAPTER 1 INTRODUCTION

#### 1. Background

In response to a request from the Government of Indonesia (GOI), the Government of Japan (GOJ) agreed to conduct the *Study on the Improvement in Quality of the Tropical Fruits* (the "Master Plan" Study) through the Japan International Cooperation Agency (JICA) and agreed on the Scope of Works (S/W) with the Directorate General of Food Crops and Horticulture (DGFCH), Ministry of Agriculture (MOA). The Study was carried out over a period of nine months from July 1997 in collaboration with DGFCH as the counterpart agency and completed with the submission of this Final Report.

The Final Report has incorporated all of the findings, survey and study results obtained through the field and home work during the Phase I (July 1997 to November 1997), Phase II (November 1997 to February 1998), and Phase III (February to May 1998).

#### 2. Objectives of the Study

The objectives of the Study are: 1) to prepare a Master Plan for each of the four Provinces aiming at increasing small-scale farmers' income through the improvement in quality of the target tropical fruits corresponding to the need for supply to domestic and international markets; and 2) to carry out technology transfer to the Indonesian counterpart personnel concerned in the course of the Study.

The Study Area consists of four Provinces: North Sumatra, West Java, East Java, and South Sulawesi. These four Provinces were selected considering the fact that they are all endowed with high potential for growing tropical fruits. In particular, two Provinces: West Java and South Sulawesi are model areas under the Third Umbrella Cooperation. The experiences and lessons learnt in this Study Area are considered to be instrumental to other Provinces in implementing fruit quality improvement and orchard development projects. In total nine tropical fruits are targeted in this Study and their presence in the respective Provinces is as shown below.

- |                  |   |   |
|------------------|---|---|
| - North Sumatra  | : | Durian, mangosteen, marquisa, rambutan, and salak   |
| - West Java      | : | Avocado, duku, durian, mango, mangosteen, and salak |
| - East Java      | : | Avocado, banana, duku, durian, mango, and salak     |
| - South Sulawesi | : | Avocado, mango, mangosteen, marquisa, and rambutan  |

### **3. Study Organization**

To facilitate the Study's implementation, two committees were organized, one on the Indonesian side and the other on the Japanese side. The Steering Committee, on the Indonesian side, consisted of MOA, BAPPENAS and the Ministry of Industry and Trade, and is chaired by DGFCH. The Advisory Committee was set up by JICA to provide the Team with advice on the Study implementation.

### **4. Transfer of Technology**

In accordance with the Technology Transfer Plan prepared based on the results of discussion with the Indonesian counterparts, the transfer of technology started in close cooperation and joint-work with the counterpart personnel, both the officers of DGFCH and four Provincial Agricultural Services Offices. This transfer was facilitated by Weekly Meetings on the progress in the week, and through discussions with the authorities concerned and interview survey to the interested farmers.

## **CHAPTER 2 BACKGROUND OF HORTICULTURAL DEVELOPMENT IN INDONESIA**

### **5. Agricultural Development Policy and Prospect**

Agriculture plays an important role in Indonesian economy, accounting for 17% of Gross Domestic Product (GDP), and absorbing approximately 44% of the working population. However, the share of agriculture is expected to continue to decline from 20% in 1990 to 15% by 2000 and further to 11% by 2010. It is to be noted that the manufacturing sector which is closely related to agro-industry and agribusiness shows a remarkable growth from 15% in 1990 to 33% in 2010.

### **6. Horticultural Development Policy and Target**

More emphasis is placed on horticultural development in Repelita VI, because horticultural products, particularly fruit, have a big opportunity as one of the sources for major growth in the food crops sub-sector. Development of food crops and horticulture is directed toward income increase of community, augmentation of farmers' welfare, generation of job opportunities, and increase of foreign exchange.

Based on past achievements, GOI set GDP targets for the food crops and horticulture sub-sector in Repelita VI as shown in Table 1.



**Table 1 GDP Targets and Position of Horticultural Production under Repelita VI**

Description	1993	1994	1995	1996	1997	1998
<b>- GDP of Food and Horticultural Crops (Rp. billion)</b>						
• <i>Constant Price 1989</i>	26,573	27,237	27,918	28,644	29,360	30,094
<b>- Share of Crops</b>						
1) <i>Rice</i>	54.67	54.35	54.02	53.68	53.33	52.95
2) <i>Palawija</i>	25.78	25.75	25.73	25.71	25.71	25.74
3) <b>Horticulture</b>	<b>19.55</b>	<b>19.90</b>	<b>20.25</b>	<b>20.61</b>	<b>20.96</b>	<b>21.31</b>
• <i>Vegetables</i>	6.69	6.68	7.02	7.19	7.36	7.53
• <b>Fruits</b>	<b>12.86</b>	<b>13.04</b>	<b>13.23</b>	<b>13.42</b>	<b>13.60</b>	<b>13.78</b>
<b>Total</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Source: Policy and Development Pattern of Food and Horticultural Crops, DGFCH, MOA.

## 7. Horticultural Development Administration

At the national level, DGFCH under MOA is primarily responsible for orchard development and implements a series of technical services to cover planning and programming of food crops and horticultural development. To assume these tasks, DGFCH is composed of seven technical Directorates including Programming, Seed Development, Horticultural Production, Farm Business and Processing Development, Plant Protection, etc. At the Provincial level, the Provincial Agricultural Services (PRAS) Office is in charge of planning and monitoring of horticultural development programs and projects. At the District level, the District Agricultural Services (DAS) Office under the control of Bupati (District Chief) is responsible for implementation and management of orchard development programs and projects.

In Indonesia, there are two kinds of fund sources in the development budget. One is the "National Budget of Receipts and Expenditure (APBN)" which is disbursed to development projects based on the national development plan. The other is the fund source (APBD-I and APBD-II) which is raised by the respective Provincial and District governments themselves. This fund is mainly allocated to the local development projects planned and designed by the local governments. For implementation of these local projects, the national budget is often appropriated as an additional finance.

## 8. Horticultural Development Achievements

In the Repelita V, GOI placed stress on promotion of fruit production as a means to diversify food and horticultural crops. In line with this policy and strategy, DGFCH started implementing the following horticultural development programs.

- a. Fruit Crops Production Center (Sentra Produksi Buah-Buahan);
- b. Farm Operation in Special Area (Usahatani di Wilayah Khusus);
- c. Integrated Farm Operation in Marginal Area (Usahatani Terpadu di Lahan Marginal); and
- d. Integrated Rural Agricultural Project (Proyek Pertanian Rakyat Terpadu).

As to the "Fruit Crops Production Center", a part of the program was realized with financial support of the Sector Program Loans (SPL) provided by the Overseas Economic Cooperation Fund of Japan (OECF). Under the above horticultural development programs, 19 kinds of fruits including citrus, durian, mango, rambutan and others were planted throughout the country.

The total orchards developed in the last seven years (1991/92-1997/98) amounted to 239,530 ha. At first, the majority of these projects had no more than 50 ha in development scale. Considering the high forecast demand and marketability of fruit products, the development area tends to be expanded up to 500 ha in some projects. In addition to the above developed programs, several studies on horticultural development are being carried out by DGFCH with both GOI's budget and foreign technical assistance provided by JICA and the Asian Development Bank (ADB).

### **CHAPTER 3    PRESENT CONDITION OF FRUIT PRODUCTION SUB-SECTOR IN INDONESIA**

#### **9.    Socio-economic and Agro-ecological Conditions**

Horticulture consists of four main crops: fruit, vegetables, ornamental plants, and medicinal plants, each including many kinds of crops. In the past, horticultural development has been constrained by GOI's policy of concentration on rice self sufficiency. However, this sub-sector is nowadays considered the most effective tool to generate employment opportunities and is strongly supported by the Government. The supporting services provided by the Government are centered on the agribusiness especially related to fruit processing and trading, covering not only its production but also research, extension, training, and rural credit.

Most of the regions of Indonesia which extends over about 2,000 km north to south and 5,000 km east to west, enjoy a moist tropical climate, with abundant rain and high temperature. With the exception of rainfall, climatic conditions at a particular place vary little in the year. From December to March (wet season), heavy rainfall covers most of Indonesia, and from June to September (dry season), heavy rainfall covers only the northern parts. Mean monthly relative humidity is uniformly high and exceeds 70% to 90% in most months. There

are however significant regional variations of sunshine and wind as well as rainfall, and a marked change of temperature with elevation.

## **10. Fruit Seedling Propagation and Control**

Due to the wide agro-ecological variations, a large number of fruit species are grown in Indonesia. Most of these are well known as indigenous or local species. For fruit quality improvement, proper selection of fruit varieties is of paramount importance.

The Agency for Agricultural Research and Development (AARD) is responsible for seedling development by varietal crossing of crops and establishment of raising method of seedlings. The organizations involved in fruit seedling production and propagation are central and local government agencies like PRAS, BBI, BBU, BBP, and the private sector. As to the seedling certification and control in the country, there exist 15 Seed Certification and Control Centers (BPSB) which undertake acknowledgment of cultivars, examination/certification of seeds and seedlings and control of their markets. As far as the research on and development of fruit seedlings are concerned, most of the above institutions have started their activities recently.

## **11. Fruit Growing and Production**

The fruit production in Indonesia depends mostly on a large number of smallholders who practice a type of "mixed gardening" in their home yards, and with traditional fruit growing techniques or without any special farming care after planting. Most of farmers cultivate for self consumption and not yet for commercial purpose, resulting in negligence in fruit tree maintenance such as pruning and thinning treatment. Even though the outbreak of pest and diseases occur, no special countermeasures are taken.

In the tropical region where the temperature and humidity are always high, there exist many kinds of pests and diseases throughout the year. Presently, the countermeasures to control the pests and diseases are taken up only in relatively large-scale orchards and their experimental farms by using the corresponding insecticides and fungicides. In the remote mountainous areas of outer island, fruit crops are often damaged by the predators such as wild boars, monkeys, squirrels and others.

The actual production, harvested area and yield per hectare of fruit from 1993 to 1996 are as shown in Table 2.

**Table 2 Fruit Production, Harvested Area and Yield**

Item	1993	1994	1995	1996	Average Annual Growth Rate (%)
- Production (1,000 tons)	5,629	6,403	10,922	11,468	19.47
- Harvested Area (1,000 ha)	460	505	673	667	9.73
- Yield (ton/ ha)	12.23	12.68	16.22	17.21	8.92

Note : \* Preliminary figures

Source : Directorate of Horticulture Production, DGFCH

## **12. Post-harvest Handling and Processing**

In general, post-harvest handling of fruit crops is not practiced in a systematic way. Storage and packaging are mostly done using the traditional methods. Lack of proper post-harvest cares causes deterioration of the quality of fruit during storage and transportation under high temperature and decrease in shelf life. Accordingly, post-harvest loss of fruit is estimated at about 20 to 25% of the total production.

Processing industry can be classified into two categories: "traditional home industry" and "modern food processing industry". Raw materials used for the home industry are avocado, banana, durian, mango and rambutan, while those for the food processing industry are marquisa and pineapple. The total value of processed fruit commodities amounted to Rp.140 billion in 1995. Fruit processing is regarded as one of the most important industries to utilize excess fruit, absorb labors in rural areas, and acquire foreign exchange.

## **13. Marketing of Fruits**

In Indonesia, several trading and marketing systems peculiar to specific localities can be observed. These include "Pajak", "Ijon", "Tebasan", "Kontrak Pilih" and so on. The per capita fruit consumption is estimated at 24.5 kg in 1996. Considering the fact that the per capita fruit consumption recommended by the Food and Agriculture Organization (FAO) to keep nutritious balance and healthy life is 60 kg, there is much room for market promotion of Indonesian tropical fruits.

Fresh banana including plantain was exported most largely in 1996 with a total volume of 101,494 tons, followed by 1,981 tons of mangosteen (fresh or chilled), 566 tons of mango (fresh or chilled), and 307 tons of durian (fresh). These fruits were exported by air cargo. As to the import of fruits, about 5,000 tons of tropical fruits were imported in 1996. In addition, it

should be noted that in the same year, more than 100,000 tons of temperate fruits such as apple, mandarin, pear and orange, were imported at a cost of about US\$70 million.

#### **14. Supporting Institutions and Services**

##### *Extension Services and Training*

Institutionally, the Ministry of Home Affairs has jurisdiction over provision of agricultural extension services to farmers and each District Agricultural Service (DAS) is responsible for management of extension activities at the field level. MOA functions as a supporting agency for provision of technical assistance services to extension workers, through the Center for Agricultural Extension (CAE), Agency for Agricultural Education and Training (AAET), and their subordinate institutions.

In 1995, a total of 32,771 Agricultural Field Extension Workers (PPL) attached to 1,718 Rural Agricultural Extension Centers (BPP) and 247 District Government Offices were engaging in general extension activities throughout the country. Agricultural Extension Specialists (PPS) belonging to CAE are assigned to the Regional Offices and BPTP of MOA, Provincial and District Government Offices, and Rural Agricultural Information and Extension Centers (BIPP).

##### *Credit Services*

Two types of farm credit facilities handled by KUD are available. One is "small traders credit program (KCK)" extended to low income groups and petty traders with a repayment period of one year. The other is "farm credit (KUT)" extended to farmers with a repayment period of seven months and an interest rate of 14% per annum. However, the lack of longer term credit corresponding to the periods between planting and harvesting of perennial tree crops represents a real constraint for orchard development.

##### *Farmers' Organization*

Farmers' groups specializing in fruit production and trading are not yet organized in Indonesia. Most farmers are members of farmers' groups (Kelompok Tani) at Desa level, which are commune-based non-administrative units, engaging mainly in paddy and palawija production. Besides, nearly 8,000 units of KUD have been established so far as central government-sponsored institutions by the Ministry of Cooperatives and Small Enterprises. This figure is far below the Ministry's target of some 18,200 units, accounting for only 42.3% of it.

## CHAPTER 4 ORCHARD DEVELOPMENT SITUATION IN THE STUDY AREA

### 15. Position of the Study Area

Although the total area of the Study Area occupies only 12.4% of Indonesia's total area, most of its socio-economic indicators like population, GRDP and others share from 40% to 50% of the country's totals. The Study Area consisting of four Provinces includes almost all types of socio-economic and agro-ecological features and is endowed with a relatively wide range of natural resources.

Indonesia's economy, reflecting its physical geography, climate and political history, is significantly different in each region, ecological zone and even in respective areas. There exists a distinct contrast between Java and outer-Java in terms of socio-economic features and their endowments and potentials as well. However, this is not simply a Java vs. off-Java issue. Even in Java, there are regional disparities: some areas suffer from much greater concentration of poverty than others.

### 16. Socio-economy

The area and number of administrative units in the Study Area as of 1996 are shown in Table 3. In 1996, the population in the Study Area is estimated at 93.2 million, accounting for about 47% of the country's population. The population growth rate has declined drastically from 3.35% in 1983 to 2.73% in 1990 and 1.7% in 1990-1996. The highest population density is 866 persons per km<sup>2</sup> in West Java, followed by 712 persons per km<sup>2</sup> in East Java, while the density is only 106 persons per km<sup>2</sup> in South Sulawesi and 160 persons per km<sup>2</sup> in North Sumatra.

**Table 3 Area and Number of Administrative Units by Study Province, 1996**

Province (Propinsi)	Area (km <sup>2</sup> )	% to Total Area	No. of Districts (Kabupaten)	No. of Municipalities (Kotamadya)	No. of Sub-districts (Kecamatan)	No. of Villages (Desa)
North Sumatra	70,787	3.69	11	6	252	5,242
West Java	46,300	2.41	20	5	529	7,166
East Java	47,921	2.50	29	8	615	8,426
South Sulawesi	72,781	3.79	21	2	185	2,878
<b>Study Area (% to Total)</b>	<b>237,789 (12.4)</b>	<b>12.39 -</b>	<b>81 (32.8)</b>	<b>21 (33.3)</b>	<b>1,581 (39.3)</b>	<b>23,712 (35.8)</b>
Indonesia	1,919,317	100.00	247	63	4,022	66,158

Source: Statistical Year Book of Indonesia, 1996 and Environmental Statistics of Indonesia 1996, BPS.

The contribution of the agriculture sector to rural household income was 43.5% in North Sumatra, 35.7% in West Java, 45.3% in East Java, and 51.6% in South Sulawesi. The contribution of both South Sulawesi and East Java exceeded the national average of 45.1%. During 1987-1990, South Sulawesi recorded the highest per capita income growth rate per annum (4.6%), followed by West Java (3.2%), and East Java (0.9%) while the rate in North Sumatra was minus (-1.2%). In the same period, the national average growth rate was 1% per annum.

In Indonesia, poverty is measured in a comprehensive way, taking account of the basic needs such as health, life expectancy, primary education, access to clean drinking water, and public services. In the Study Area, East Java has the biggest number of rural poor of over 2.5 million or 16.5% of the country's total, followed by 2.1 million (13.6%) in West Java, 0.78 million (5.1%) in North Sumatra, and 0.38 million (2.5%) in South Sulawesi.

### **17. Agro-ecological and Agro-climatic Conditions**

The four Study Provinces (North Sumatra, West Java, East Java, and South Sulawesi) located in Sumatra, Java and Sulawesi islands respectively, include the following physiographic regions:

- North Sumatra: Western foothills and plains, Barisan mountains, eastern plains and hills, and eastern coastal swamplands
- West and East Java: Northern alluvial plains, northern foothills and plains, central volcanic mountains, and southern dissected plateaus and plains
- South Sulawesi: Central mountains, eastern mountains and karst, southwestern plains and mountains, and southeastern mountains and plains

In Java, most areas receive rainfall of 2,000 to 4,000 mm annually. The driest areas with rainfall of less than 1,500 mm are located along the north coast, with some places having less than 1,000 mm. In Sumatra, rainfall distribution is strongly influenced by the Barisan Mountains and ranges from 1,000 to 3,000 mm. These mountains lie very close to the west coast. In Sulawesi, rainfall distribution reflects the complex topography. Most areas receive 1,000 to 3,000 mm of rain per year.

The estate type of agricultural production (e.g. rubber, palm oil, etc.) is the mainstay in North Sumatra and estate crops are developed mainly in the eastern part of the Province. Fruit growing by small landholding farmers is therefore schemed in the western mountains and foothills. In West and East Java, the main crop is irrigated paddy and horticultural crops are

mostly cultivated in the northern foothills near the major cities and towns. South Sulawesi is able to produce surplus agricultural products and deemed as "food basket", especially for in the eastern islands.

### **18. Fruit Seedling Supply**

Most farmers engaging in fruit growing usually buy fruit seedlings in local markets or private nurseries when they intend to plant new fruit trees in their home yards. But such demand is too small to sustain financial status of the private nurseries, resulting in less opportunity for their technological improvement and entailing their over-dependence on the horticultural development programs being implemented with public investment (MOA). As to the operation and management of private nurseries, much is needed for their improvement.

### **19. Fruit Production and Harvesting**

In the Study Area, the total number of farm-households engaging in horticulture amounted to about 2 million in 1993, accounting for 22.6% of the total landholding farm-households. In number, East Java (42.4%) ranks first in the Study Area, followed by West Java (38.4%) and North Sumatra and South Sulawesi (both 9.6%).

The statistical data in 1993 also indicate that the average land size is 0.96 ha in North Sumatra, 0.48 ha in both West Java and East Java, and 1.10 ha in South Sulawesi. Thus, the area for fruit production per household is quite limited and usually used for mixed planting for subsistence rather than for full commercial production. The crops are cultivated or planted in between various plants, so it is sometimes difficult to recognize which is the main crop for the farmers' livelihood. The farming methods applied in the Study Area remain at the traditional to semi-commercial level. This is, in part, due to the reason that the general level of education of farmers is still low and this makes rapid adoption of new production and harvesting technology difficult.

### **20. Post-harvest and Processing**

Even in the Study Area where fruit production is considered to be relatively active and occupies a large share in the country's total, there are quite few farmers who are taking proper post-harvest handling measures and care for the harvested crops, such as cleaning, sorting, grading, and packaging. Because of the buying system widely practiced in Indonesia like "Ijon" and "Tebasan", most of post-harvest operations are entrusted to collectors/traders. This implies that for most small landholding farmers, fruit growing is a side business or an alternative for diversification of their crops. The agro-industry and agribusiness development should be



further promoted so as to make the most use of the excess fruit products or produce value-added products, and create job opportunities, especially for the people in rural areas.

## **21. Marketing**

The marketing system can be broadly classified into three categories for the respective target destinations: 1) local markets, 2) regional and urban markets, and 3) export and agribusiness. In the Study Area, the harvested excess fruits are usually brought to and transacted in the nearest local market by collectors/traders. Some quality fruits salable at higher prices are conveyed to the regional and/or urban markets such as Medan (North Sumatra), Bandung (West Java), Surabaya (East Java), Jakarta and others.

The major target fruits exported from the Study Area are durian, mango, mangosteen, and rambutan. Most of them are exported in "fresh" condition by air cargo. As to marquisa, it is mostly processed as "juice" and widely commercialized in urban centers of the country as well as exported to Singapore, Australia, and EC.

## **22. Extension Services**

As institutions assuming extension services in the Study Area, there are 696 BBPs and 81 BIPPs. 648 PPS and 10,234 PPL are posted in these institutions to deal with farmers' consultation. However, very few of them are specialized in horticulture, much less in fruit cultivation and production. Extension services for fruit growing are at the present covered by food crops PPL.

The number of farm households per PPL is 1,330 in East Java, 1,033 in West Java, 670 in North Sumatra, and 475 in South Sulawesi. Considering the national average of 687 farm households per PPL, the smaller figures of South Sulawesi and North Sumatra indicate the relatively better extension service situations than those in the two Provinces in Java.

## **23. Rural Community, Poverty and Gender**

In the Study Area consisting of the four Provinces, most of the target farmers or fruit growers belong to the following three types of communities: 1) Rainfed agriculture community, 2) Garden and plantation community, and 3) Irrigated cultivation community. No small impediments to orchard development are derived from the socio-cultural ("adat" or "traditional") backgrounds of the above communities.

In the fruit production, women play an important role, participating in the planting, weeding and harvesting. Their tasks consist mostly of sorting, packaging, plant watering and manuring.

Since women are always disadvantaged especially in rural areas, the fruit production planning should be designed to open up opportunities for them so as to address their critical needs and improve their quality of life.

#### **24. Infrastructure**

The physical infrastructure on which the economy depends is still weak in the Study Area, especially in the remote/isolated areas. Due to the latest financial constraints, proper maintenance is becoming more difficult. Weakness in the transport system often impedes domestic circulation of goods and supplies, as well as import and export activities.

Many areas, especially outside Java where new orchard development is promising, do not have adequate infrastructure to support the proposed development. Such infrastructure as access road to market, facilities for irrigation, storage, processing, etc., is an essential prerequisite for successful implementation of any project. Shortage of electric power is a serious constraint for agribusiness and agro-industry development.

#### **25. Environment**

Generally, the orchard development sites are located in upland areas, i.e. mountain slopes or foothills. Land development by clearing trees, shrubs or bushes will lead to soil erosions if protection measures are not properly taken.

Presently, no negative impact of fruit cultivation and production is reported or observed in the Study Area. This is mostly because of its small scale or insignificant development size and share. Due to its negligible farming scale and production, small landholding farmers seldom use agro-chemicals for their fruit trees.

### **CHAPTER 5    CONSTRAINTS TO FRUIT PRODUCTION DEVELOPMENT IN THE STUDY AREA**

#### **26. Identified Fruit Production Development Problems**

To improve the quality of fruit, it is essential to tackle the following two major issues: 1) selection of high quality planting materials and varieties, and 2) proper post-harvest treatment of the crops. The former belongs to the "upstream" measures, while the latter falls under the "downstream" measures. In principle, both issues are to be solved in conformity with the market needs or consumers' demand.

The key factors for orchard development concern such issues as supply of certified or good quality fruit seedlings, selection of the sites suitable for fruit growing as well as marketability and profitability of the fruits to be cultivated. To promote orchard development, it is also important to educate the participating farmers so that they realize the importance of adopting new farming technology for commerce-oriented fruit production.

As constraints to fruit production promotion through fruit quality improvement, there is a need to consider the level of technologies, especially in provision of planting materials, farming management, post-harvest handling, processing as well as marketing. Major constraints are: 1) insufficient technical knowledge on seed and seedling production and propagation, 2) lack of experiences in preparing/introducing new varieties, 3) less knowledge about advanced technology, 4) lack of effective and disease-free maintenance system, 5) poor facilities and equipment in BBI and BBU, 6) lack of information service system on new and qualified seedlings, 7) limited capability of BPSB in service, control and guidance to seedling producers, and 8) limited methods and facilities in certification system of fruit seedlings.

As to the development and introduction of new varieties, the lack of feedback system in compliance with the market demands is a major constraint for propagation and supply of new and qualified seedlings.

In addition to procurement of the required seedlings both in quality and quantity, there still exist several difficulties to be solved, especially in technical levels of the officials/staff in charge and farmers. Major constraints to orchard development include poor knowledge or experience on fruit tree maintenance such as manuring, pruning and thinning, and lack of proper post-harvest and processing treatment. These cause not only alternate fruit bearing leading to fluctuation of market prices and imbalance of fruit supply and demand, but also considerable post-harvest losses.

The issues facing agro-processing industry are: 1) unreliable provision of raw materials both in quantity and quality, 2) limited facilities or equipment for fruit processing, and 3) non-availability of long term credit. To strengthen the fresh fruit market system, it is urgently needed to improve the marketing and trading system of fresh fruit, and clarify the demarcation of roles between producers (fruit growers) and collectors/traders.

Constraints mentioned above to fruit production development through fruit quality improvement are categorized into three aspects such as i) institutions and finance, ii) human resource development and training, and iii) basic infrastructure and facilities as shown in Table 4.

**Table 4 Major Constraints and Issues for the Fruit Production Development**

Major Constraints	Major Issues	Organizations
<b>1. Institutions and Finance</b>		
- Lack of cooperation among the agencies concerned, especially between DGFCH and other related ministries and agencies due to their vertical administrative structure	Formation and strengthening of the cooperation system among the agencies concerned for promotion of the fruit production development projects	MOA, BAPPENAS, Ministry of Industry, Ministry of Migration, MPW, MOCSED
- Shortage of the public institutions which take charge of fruit production development from the central-level through farm-level	Establishment and consolidation of the implementing agencies (including project management offices, coordination committees, etc.) for smooth implementation of the fruit production development projects	DGFCH
- Limited development funds and difficulties to secure and allocate them throughout the project implementation	Continued allocation of the government's development funds (APBD) to complete the project implementation	DGFCH
- Lack of communication and partnership linkage between public institutions and private sector in regard to fruit production development	Formation of the cooperation and partnership linkage with the private sector	DGFCH, Agency for Agribusiness, PRAS
- Difficulty in introducing a low-interest financing system in Indonesia where the higher-interest lending is prevailing	Foundation of the rural credit system including a long-term credit service to farmers engaging in the perennial crops farming	Agency for Agribusiness
- Poor recognition of the importance to strengthen the R&D activities for introduction of new varieties and assess the adaptability of new technologies to be introduced	Strengthening of the new technology adaptability trial operation system in AARD and BPTP	AARD
- Underdeveloped information system to provide the accurate and timely information to those who are interested and/or engaged in fruit production and its agribusiness	Upgrading of the two-way information system which enables the producers to send information to the markets and consumers	PRAS, Agency for Agribusiness
- Non organization of fruit growers' groups and their credibility in KUD	Institutional arrangements for formation of the fruit growers' groups and provision of the supporting services to assist them in organizational, financial and operational aspects	Agency for Agribusiness, DGFCH, PRAS, DAS
- Weak position of fruit producers in the markets and marketing system, and lack of supporting services to them	Institutional development of the established fruit growers' groups and strengthening by uniting them into associations and federation	Agency for Agribusiness, PRAS
<b>2. Human Resource Development and Training</b>		
- Lack of the planning staff at provincial level, especially in PRAS	Capability building of the Provincial staff in charge of the project planning	PRAS, BAPPEDA
- Shortage of the staff in the local governments (both at provincial and district levels) well versed in the orchard development and management	Capability building of the Provincial staff in charge of the project implementation and management	PRAS
- Limited number of the staff specialized in introducing and propagating the new fruit varieties at BBIs and BBUs	Upgrading of the staff capacity to strengthen the research and development activities for introduction and breeding of the new high quality fruit varieties	AARD, PRAS, BBI, BBU
- Non existence of the extension workers who have highly specialized knowledge and technology in fruit cultivation and its farm management, and poor training facilities and materials	Preparation of the farm management manuals for fruit production subsequent to introduction of the new fruit growing technologies, and upgrading of the extension workers' capabilities	AARD(BPTP)
- Lack of the staff in charge of seedling inspection and their practical training	Upgrading of the staff capability to strengthen the fruit seedling inspection system in BPSB	DGFCH (BPSB)
- Poor knowledge of the staff in charge of plant quarantine and pest control in CAQ, and limited number of the expert in this field	Capability building of the staff in charge of the plant quarantine, and insect and pest control to strengthen the plant quarantine system in CAQ	CAQ
- Insufficient knowledge and technical level of the staff in charge of introduction and propagation of the high quality seedlings at BBIs and BBUs	Upgrading of the staff's knowledge and technical level to improve the high quality seedling propagation and distribution system	PRAS, BBI, BBU
- Weak capability of the private nurseries in producing and supplying the high quality seedlings	Capability building of the private nurseries to upgrade their propagation capacity of quality seedlings	PRAS, DAS, BBI, BBU
- Lack of training and reeducation opportunities to the staff in charge of extension services to fruit growers	Upgrading of the extension workers' capacities and knowledge about farm management, post-harvest handling and marketing for promotion of the market-oriented fruit production development	PRAS, DAS
- Insufficient knowledge and experience of farmers about fruit production and post-harvest handling technologies	Dissemination of the knowledge and technology about the market-oriented farm management, post-harvest handling and marketing to the participating farmers	PRAS
- Poor experience of farmers in group operations and activities, and lack of management capabilities	Provision of the guidance services to the established fruit growers' groups to strengthen their operations and management	PRAS
<b>3. Basic Infrastructure and Facilities</b>		
- Increase of the small landholding farmers and impoverishment of rural areas	Establishment of the orchards with properly prepared fruit farms	PRAS
- Deficiency of the basic infrastructure in rural areas due to the limited development funds	Construction and/or improvement of the basic infrastructure such as access roads, watering and drainage facilities, etc.	PRAS
- Lack of the facilities and equipment to undertake the R&D activities for introduction and propagation of new high quality fruit varieties in BBIs & BBUs and others	Installation and/or rehabilitation of the facilities and equipment required for research and development activities in introducing and breeding the new high quality fruit varieties	PRAS
- Insufficient facilities and equipment to carry out the new technology adaptability tests in AARD and BPTP	Construction and/or rehabilitation of the facilities and equipment in AARD and BPTP necessary for strengthening the new technology adaptability trial operation system	AARD(BPTP)
- Overage and poor facilities and equipment for seedling inspection in BPSB	Improvement of the facilities and equipment in the BPSB necessary for physical, chemical and botanical examinations of the fruit seedlings	DGFCH (BPSB)
- Lack of the facilities and equipment for plant quarantine activities and pest control in CAQ	Improvement of the facilities and equipment for strengthening of the plant quarantine system	CAQ
- Insufficient and overage facilities and equipment for propagation and distribution of the high quality seedlings at BBIs and BBUs	Rehabilitation of the facilities and equipment in BBIs and BBUs to improve and strengthen the high quality seedling propagation and distribution system	PRAS, BBI, BBU
- Deficiency of the facilities for post-harvest handling and processing which are indispensable for the market-oriented fruit production development	Installation of the post-harvest handling facilities for collecting, cleaning, sorting, packaging, processing, etc. with a view to producing the high quality value-added fruit products	PRAS
- Poor marketing and processing system and facilities for dealing with the harvested fruits	Installation and/or rehabilitation of the facilities required for improvement of the fresh fruit collection, storage and distribution system in the local markets	PRAS

Note : For abbreviations, refer to "ABBREVIATIONS AND GLOSSARY."

Source : JICA Study Team

## **27. Problem Structure Analysis**

Compared to other regions in the country, the Study Area has much potentials and advantages, but it is true that this area faces a variety of problems which might work as constraints to further development of regional economy. Main factors constituting the problem structure can be classified into two categories: external (macro-economic) and internal (regional socio-economic) factors. The external factor is more fundamental, and concerns to a large extent the financial and national policy/institutional issues, while the regional socio-economic factor mainly concerns the natural/physical factors. As external factors, there exist such issues as wage pressure, slow deregulation, rupiah devaluation, natural resource depletion, increase of public investment, and so on. On the other hand, the regional factors include the impacts of global climate changes, forest denudation due to traditional slash and burning farming, conversion of agricultural lands to industrial and residential uses, and others.

## **28. Socio-economic and Cultural Constraints**

The impediments to orchard development seem to derive mostly from the socio-cultural backgrounds of the respective communities and growers themselves. However, major socio-economic problems and constraints identified in the respective Study Provinces are basically identical to the general ones observed in Indonesia. They are mostly rooted in policy background, institutional and financial issues of this sub-sector. Concretely, they concern the traditional land use and tenure customs, partnership relation between producers (small holders) and collectors/traders, importance or position of the fruit growing in farmers' livelihood, state of supporting system, etc.

The issues to be strongly addressed are, among others, poverty or disparity in wealth, employment creation and gender issue. As to Women in Development (WID), women are expected to play an important role in farming practices and contribute to the increase of family income through active participation in fruit growing and production.

## **CHAPTER 6 BASIC DEVELOPMENT PLAN FOR FRUIT PRODUCTION THROUGH FRUIT IMPROVEMENT IN THE STUDY AREA**

### **29. Basic Development Plan and Strategies**

#### *Objectives of the Fruit Production Development Plan*

The objectives of fruit quality improvement and orchard development in the Study Area are: 1) to increase farmers' income and welfare, especially for small landholding farmers, 2) to

produce sufficient fruit to meet the people's need or market demands, both in regional/urban areas and overseas, 3) to improve the people's nutrition and health through promotion of fruit consumption, 4) to create and provide more job opportunities by developing agro-processing industries in rural areas, 5) to establish a dynamic agribusiness system through developing the linkage of its strong sub-systems and active participation of the private sector, 6) to strengthen the activities of farmers' groups in order to empower them to have better market competition with tough bargaining power, and 7) to broaden the market share, domestic as well as abroad, and increase foreign exchange.

### *Strategies for Fruit Production Development*

To overcome the constraints clarified in Chapter 5 and realize the objectives mentioned above, the following eleven basic strategies are to be pursued: 1) selection of the fruit varieties, 2) development scale, 3) preparatory works for economic farming, 4) supporting services for orchard development and its management, 5) marketing system, and 6) human resources development.

Since the objectives of this Master Plan Study are to "increase small landholding farmers' income through the improvement of quality of the target tropical fruits", a "balanced development" would be the most desirable and realistic development scenario in this Study. Thus, this balanced development scenario should be made up, especially keeping in mind the following four factors or principles: 1) nationwide orchard development (including those in other 23 provinces), 2) increase of the small landholding farmers' income, 3) acceptability and capability of participating farmers in the proposed orchard development areas, and 4) budget to be allotted to horticultural development.

### **30. Basic Development Plans for the Four Study Provinces**

Based on the development objectives, direction, concept and strategies described above, the basic development plans the four Provinces were formulated as summarized in Table 5.

**Table 5 Gist of the Basic Development Plans in Each of the Four Study Provinces**

<p><b>1. North Sumatra Province</b></p> <p>1-1 Major Characteristics</p> <ul style="list-style-type: none"> <li>- Estate type of agricultural production is developed</li> <li>- Relatively higher per capita GRDP</li> <li>- Undeveloped road network</li> <li>- Potential sites for fruit growing are located in remote and marginal areas (plateaus and foothills) in the western part of the Province</li> <li>- Gateway to Indochinese countries (Singapore, Malaysia, etc.)</li> </ul> <p>1-2 Key Theme for Agricultural Development</p> <ul style="list-style-type: none"> <li>- Intensification / Diversification</li> </ul> <p>1-3 Development Targets</p> <ul style="list-style-type: none"> <li>- Development of the western and central Districts of the Province, especially located in the marginal remote plateaus and foothills</li> <li>- Upgrading of fruit seedling production system to supply high-quality plantlets</li> <li>- Promotion of high value-added production or small scale agro-processing industry</li> <li>- Construction of access roads and related facilities to fruit growing areas</li> <li>- Establishment of distribution network linking with high potential markets in major cities and abroad</li> <li>- Development of human resources and fruit growers' organizations</li> <li>- Strengthening and enhancement of agricultural support services</li> </ul> <p>1-4 Proposed Orchard Development Sites by Target Fruit</p> <ol style="list-style-type: none"> <li>1) Durian : Dairi, Tapanuli Tengah, and Tapanuli Utara (1,550 ha)</li> <li>2) Mangosteen : Tapanuli Selatan, and Tapanuli Utara (1,300 ha)</li> <li>3) Marquisa : Karo (1,000 ha)</li> <li>4) Rambutan : Langkat (500 ha)</li> <li>5) Salak : Tapanuli Selatan (1,500 ha)</li> </ol> <p>1-5 Proposed Development Programs [refer to 35.]</p>
<p><b>2. West Java Province</b></p> <p>1-1 Major Characteristics</p> <ul style="list-style-type: none"> <li>- Large population (over 40 million) and high urbanization ratio (42.7%)</li> <li>- Higher population growth (2.1%) and density (866 persons/ km<sup>2</sup>)</li> <li>- Relatively developed irrigation systems</li> <li>- Higher urban poverty incidence</li> <li>- Big potentials for agro-industry development</li> <li>- Deforestation and watershed degradation</li> </ul> <p>1-2 Key Theme for Agricultural Development</p> <ul style="list-style-type: none"> <li>- Intensification / Conservation</li> </ul> <p>1-3 Development Targets</p> <ul style="list-style-type: none"> <li>- Improvement in livelihood of small land-holding farmers living in central mountainous and southern foothill areas</li> <li>- Promotion of agro-processing industry to generate employment opportunities</li> <li>- Establishment of a systematic marketing system to cope with the increasing inflow of food crops</li> </ul> <p>1-4 Proposed Orchard Development Sites by Target Fruit</p> <ol style="list-style-type: none"> <li>1) Avocado : Bandung (500 ha)</li> <li>2) Duku : Ciamis (500 ha)</li> <li>3) Durian : Bogor (500 ha)</li> <li>4) Mango : Sumedang (1,000 ha)</li> <li>5) Mangosteen : Purwakarta (500 ha)</li> <li>6) Salak : Tasikmalaya (1,000 ha)</li> </ol> <p>1-5 Proposed Development Programs [refer to 35.]</p>

### 3. East Java Province

#### 1-1 Major Characteristics

- Very low population growth rate (annual average 0.82%)
- Agro-based society with large share of working population in the primary sector
- Fertile soils for crop production
- Relatively higher yields of food crops
- Existence of a large population (over 4 million) below the poverty line

#### 1-2 Key Theme for Agricultural Development

- Intensification / Diversification

#### 1-3 Development Targets

- Increase of small landholding farmers' income through orchard development, especially in central mountainous and southern dissected plateaus and foothills
- Promotion of small scale (or home) agro-industry to produce value-added products
- Strengthening of farmers' organizations

#### 1-4 Proposed Orchard Development Sites by Target Fruit

- 1) Avocado : Lumajang (1,000 ha)
- 2) Banana : Jombang and Lumajang (1,000 ha)
- 3) Duku : Tulungagung (1,000 ha)
- 4) Durian : Jombang and Trenggalek (2,150 ha)
- 5) Mango : Pasuruan (750 ha)
- 6) Salak : Malang (1,700 ha)

#### 1-5 Proposed Development Programs [refer to 35.]

### 4. South Sulawesi Province

#### 1-1 Major Characteristics

- Large land area (72,781 km<sup>2</sup>) with low population density of 106 persons/km<sup>2</sup>
- "Food basket" for the eastern part of Indonesia with surplus of agricultural products (e.g. paddy, vegetables, etc.)
- Less urbanized society with 71.7% rural population
- Low incidence of poverty and high per capita calorie consumption

#### 1-2 Key Theme for Agricultural Development

- Diversification / Extensification

#### 1-3 Development Targets

- Improvement in the living standard of small landholding farmers living in the marginal upland areas
- Enhancement of processing capabilities to treat surplus products
- Promotion of inter-islands trade and transportation system
- Strengthening of extension system

#### 1-4 Proposed Orchard Development Sites by Target Fruit

- 1) Avocado : Gowa and Soppeng (1,000 ha)
- 2) Mango : Sidereng Rappang, Majene, Bone, Maros, and Wajo (2,500 ha)
- 3) Mangosteen : Tana Toraja and Polewali Mamasa (1,000 ha)
- 4) Marquisa : Gowa and Tana Toraja (4,000 ha)
- 5) Rambutan : Mamuju, Enrekang, Pinrang, and Barru (4,050 ha)

#### 1-5 Proposed Development Programs [refer to 35.]

Source: JICA Study Team

## 31. Definition of the Development Strategy Alternatives

To plan long-term orchard development in the Study Area, it is prerequisite to determine the development strategy by phase, considering the maturity of projects as well as in line with the marketing strategy in each development area and by target fruit. In this Master Plan Study, the



following development strategy alternatives were conceived forecasting the future “market” prospects:

- Alternative I : Local market-based development
- Alternative II : Regional and urban market-oriented development
- Alternative III : Export and agro-industry-driven development

The basic direction and typical activities of the respective three development strategy alternatives are compared as summarized in Table 6.

**Table 6 Comparison of Three Alternative Development Scenarios**

Characteristic	Alternative I (A-I) Local Market-Based Development	Alternative II (A-II) Regional & Urban Market-Oriented Development	Alternative III (A-III) Export & Agro-industry- Driven Development
Basic Direction	To utilize local or indigenous resources for establishment of the development core area	To make stronger linkage with other regions and major cities to activate the intra- and inter-regional trades	To introduce external resources to promote mainly export and agribusiness as a driving force for regional development
Typical Activities	* Business-oriented farming * Simple agro-processing * Simple post-harvest handling and local market-related services	* Market networking * Post-harvest handling * Linkage with industries dev. * Intra- and inter-regional trades	* Commercial production of fruit crops * Footloose and port/airport-oriented industries * Agribusiness-related services

Source: JICA Study Team

The above development scenarios are drawn up for 37 orchard development sites or projects, considering the development needs of each locality, production scale, marketability prospects of the respective target fruits, and so on.

### **32. Assessment of Orchard Development Potential**

#### *Agro-ecological and Agro-climatic Suitability*

To identify the areas suitable for fruit growing and production in the Study Area, the agro-ecological suitability by target fruit was firstly examined in a macroscopic way all over the Study Provinces. As far as the agro-ecological and agro-climatic conditions are concerned, all the potential development sites are in general suitable for cultivation of the respective target fruits designated for each of the four Provinces

#### *Criteria for Assessment of Development Potential and Priority*

The assessment factors to be used as evaluation criteria are classified broadly into two categories: 1) agro-ecological indicators, and 2) socio-economic and cultural indicators. In the

criteria established to screen out the priority development projects among the potential ones, 7 key assessment factors and 29 evaluation indicators are set out.

In the selection of the potential areas for orchard development, the agro-ecological indicators should be weighted. However, in the second step, much importance is to be attached to the socio-economic and cultural factors. To ensure more impartial and substantial evaluation, the scores accumulated at each key assessment factor level were weighted by allocating the following ratios to the respective 7 factors: natural condition 20%, development needs 18%, crop marketability 17%, social acceptability 15%, crop profitability 15%, institutional capability 10%, and seedling production 5%.

### 32. Supply and Demand Analyses of the Target Fruits

#### *Supply and Demand Analyses of Fruits*

The supply and demand analyses of fruits were carried out. The supply volume was estimated by statistical data of production from 1984 to 1993, projection of production of the fruit trees planted by the public investment from early 1990 as well as on-going projects and the new ones proposed in this Study. The demand was estimated by making the most of the statistical data and projecting the trend of population and income. According to the results of the supply and demand analyses as shown in Table 7, the demand exceeds from the first the supply as to such crops as banana and rambutan. As regards the supply and demand of durian and salak, they are at first balanced, but their demand will exceed the supply until the year of 2005. On the other hand, the supplies of the other crops like avocado, duku and mango will exceed at the beginning their respective demands, but their relations will be reversed until the year 2010.

**Table 7 Supply-Demand Balance by Fruit Crops**

Fruit Crops	1996	1998	2003	2008	2013	2018
Avocado	+	+	+	-	-	-
Banana	-	-	-	-	-	-
Duku	+	+	+	-	-	-
Durian	+	-	-	-	-	-
Mango	+	+	+	+	-	-
Mangosteen	-	-	-	-	-	-
Salak	-	-	+	-	-	-

Note : (+) = surplus (-) = deficit

Source : JICA Study Team

### *Price Prospects in the Markets*

According to the analysis for examining the correlation of annual fruit productions with annual average market prices, the market prices of all the target fruits in North Sumatra are supposed not to fluctuate even though fruit supply volume is increased. Similar tendency is observed for avocado and banana in West Java, mango and rambutan in South Sulawesi. Market of salak in West Java is saturated, but it may be possible to keep the market price through opening up new markets. As for other fruits in respective Provinces, development of new market is required so as to keep the increasing trend of their market prices.

### **34. Marketing**

The demand and supply analysis of the target fruits by Province was carried out based on the average annual fruit consumption volume, population by urban and rural areas, fruit production, and losses of fruit products during the post-harvest and marketing processes. The results indicate both the surplus and shortage in supply of the target fruits in the respective Provinces.

For the orchard development of banana in East Java and rambutan in North Sumatra and South Sulawesi which are in short supply in the market, it is advised to start from the first stage with a strategy aiming at regional and urban market. Similarly, the durian and mango orchards development in West Java and the durian and salak orchards development in East Java have to be promoted aiming to open up markets in Jakarta and Surabaya respectively. The orchard development of durian in North Sumatra, mango in East Java and South Sulawesi, and salak in North Sumatra and West Java, which are already saturated in the regional and urban markets, are required to produce and market more higher quality products which are much competitive in both quality and price. For the orchard development of avocado, duku and mangosteen in West Java, East Java and South Sulawesi, it is firstly proposed to establish the certified seedling production system, to produce high quality seedlings, and then to commence orchard and their market development. As to the marquisa orchard development in North Sumatra and South Sulawesi, it is required to adopt the agro-industry driven development strategy by establishing a closer cooperation with the agro-processing industries.

## **CHAPTER 7 MASTER PLAN FOR FRUIT PRODUCTION DEVELOPMENT THROUGH FRUIT QUALITY IMPROVEMENT**

### **35. Proposed Programs**

Impediments to the fruit production development include a variety of problems and constraints

to be solved at each administrative level. Some need to be dealt with at the national level, because the scope of issues is not limited to the four Study Provinces, while the others should be tackled individually by local authorities. Therefore, the countermeasures or development strategies are worked out at each level: Central (national), Provincial, and District.

The “programs” formed at each level are described below.

At Central (National) Level

- NP-1 Formation of Institutional Linkage for Agribusiness Development
- NP-2 Strengthening of Intra-ministerial Coordination System for Orchard Development
- NP-3 Rationalization of Supporting Services for Credit Facilities and Marketing Promotion
- NP-4 Strengthening of Research and Development Activities for Introduction and Breeding of New High Quality Fruit Varieties
- NP-5 Strengthening of New Technology Adaptability Trial Operation System
- NP-6 Rationalization of Fruit Seedling Inspection System
- NP-7 Strengthening of Plant Quarantine System

At Provincial Level

- PP-1 Strengthening of Project Planning Capacity at Provincial Level
- PP-2 Strengthening of Management Capability Building of Provincial Staff
- PP-3 Improvement of High Quality Seedling Propagation and Distribution System
- PP-4 Institutional and Technical Capability Building of Private Nurseries
- PP-5 Enhancement of Extension Staff's Knowledge on Agribusiness Development
- PP-6 Upgrading of Market Information System
- PP-7 Institutional Development for Association of Fruit Grower's Groups

At District Level

- DP-1 Establishment of Orchard as Core of Target Fruit Growing Area (Orchard Development Projects)
- DP-2 Introduction and Practice of Market-oriented Quality Fruit Growing Techniques
- DP-3 Establishment of On-farm Level Extension Service System
- DP-4 Development of Post-harvest Handling System
- DP-5 Improvement of Access Facilities to Markets
- DP-6 Improvement of Local Market Facilities
- DP-7 Institutional Strengthening of Small Landholding Fruit Growers

### 36. Scope and Features of the Programs

- The program for “establishment of orchard as core of target fruit growing area” (DP-1) sets the development area at no more than 500 ha for the initial stage. If it is over 500 ha, the first 500 ha will be developed with the public investment and the remainder will be developed independently by the fruit growers’ group when the revolving capital from the first public investment is pooled as collateral fund for the next expansion works. The total orchard development area proposed in this Master Plan amounts to 18,300 ha broken down as follows:
  - North Sumatra : 1,300 ha for durian (3 sites); 1,000 ha for mangosteen (2 sites); (3,800 ha in 8 sites) 500 ha for marquisa (1 site); 500 ha for rambutan (1 site); and 500 ha for salak (1 site)
  - West Java : 500 ha for avocado (1 site); 500 ha for duku (1 site); 500 ha for (3,000 ha in 6 sites) durian (1 site); 500 ha for mango (1 site); 500 ha for mangosteen (1 site); and 500 ha for salak (1 site)
  - East Java : 500 ha for avocado (1 site); 1,000 ha for banana (2 sites); 500 ha for (4,000 ha in 8 sites) duku (1 site); 1,000 ha for durian (2 sites); 500 ha for mango (1 site); and 500 ha for salak (1 site)
  - South Sulawesi : 1,000 ha for avocado (2 sites); 2,500 ha for mango (5 sites); (7,500 ha in 15 sites) 1,000 ha for mangosteen (2 sites); 1,000 ha for marquisa (2 sites); and 2,000 ha for rambutan (4 sites)
- The program for “development of post-harvest handling system” (DP-4) is designed to make the fruit growers’ groups engage in post-harvest handling to market higher quality or value-added commodities in tie-ups with collectors/traders.
- The program for “improvement of access facilities to markets” (DP-5) is designed to link the newly opened orchards with local markets. An inventory or investigation will be made on the public road sections needed to be rehabilitated and their repair works. To implement such rehabilitation works, it is necessary to submit a request letter to the Provincial Road Services Office.
- The program for “improvement of local market facilities” (DP-6) aims to reduce handling losses in local markets through improving the fresh fruit collection, storage and distribution system. In the case that harvested fruits are forwarded from the orchards to the regional and/or mega-cities like Jakarta, Surabaya, Medan, etc. by the way of local markets, it is required to establish/improve properly the marketing system

- by installing a trading center for transshipment, collection and distribution, and storage in each of the major regional cities concerned in addition to the post-harvest handling facilities to be provided in the orchards.
- The program for “enhancement of extension staff’s knowledge on agribusiness development” (PP-5) aims to provide a series of training opportunities to PPS and PPL, while the programs for “establishment of on-farm level extension service system” (DP-3) and “introduction and practice of market-oriented quality fruit growing techniques” (DP-2) are designed to provide fruit growers’ groups with intensive extension services including recruitment and capability building of special extension staff attached to each orchard and to train the participating farmers to produce and market quality fruits through provision of a series of training courses, respectively by entrusting to a third party specializing in this field.
  - The programs for “institutional strengthening of small landholding fruit growers” (DP-7) and for “institutional development for association of fruit growers’ groups” (PP-7) aim to establish a fruit growers’ group in each orchard development area and then to strengthen them by regrouping into a larger profit-oriented organization or association through guidance services and several training programs provided from the authority concerned. An association of fruit growers’ groups will be formed at the provincial level and such association is expected to function so as to acquire the better bargaining position through recognition of the brand name of fruit in the markets. Likewise, the well managed association will undertake step by step joint operation and maintenance of the facilities and/or equipment, and engage in agribusiness making use of the reserve funds collected from its members.
  - The programs for “formation of institutional linkage for agribusiness development” (NP-1) and “strengthening of intra-ministerial coordination system for orchard development” (NP-2) are aiming at smooth and parallel implementation of packages of various sectors for achievement of the objective of the Master Plan, by establishing a “Coordination Committee” and a “Project Management Unit” under DGFCH. The Committee is to consult the Director General of DGFCH on final decision concerning coordination and arrangement with other ministries and agencies as well as intra-ministerial offices, technical and administrative matters for the programs implementation, and so on. Based on the decision of the Committee, the Management Unit is to control progress and budget of the programs, and to coordinate with the Province and District offices concerned.

- The program for “strengthening of project planning capacity at provincial level” (PP-1) and “strengthening of management capacity building of provincial staff” (PP-2) aim to improve and strengthen the capability of staff of Provincial Agricultural Services Office and other agencies concerned through execution of periodical staff training managed by the Project Management Office in order to promote the new agribusiness sector.
- The program for “realization of supporting services for credit service facilities and marketing promotion” (NP-3) and “upgrading of market information system” (PP-6) are required in the medium and long terms. Practical plans are to be formulated under the initiatives of the Agency for Agribusiness coordinating with the agencies concerned.
- The program for “strengthening of research and development activities for introduction and breeding of new high quality fruit varieties” (NP-4) aims to improve/upgrade the R&D activities of the Fruit Research Institute in Solok (West Sumatra).
- The program for “strengthening of new technology adaptability trial operation system” (NP-5) is designed to conduct a study with a view to establishing in future a nationwide technology adaptability trial operation system for the recommended varieties among the Assessment Institute for Agricultural Technology at Sukarami (West Sumatra) as well as BPTPs to be established in every province under the supervision of AARD. As to the standard manual of farm management and post-harvest handling for each target fruit, it will be prepared by the Assessment Institute for Agricultural Technology in Sukarami.
- The program for “improvement of high quality seedling propagation and distribution system” (PP-3) is designed to rehabilitate and/or renew the facilities and equipment of BBI and BBU concerned and to establish a database system on the existing mother plants in each Province. The five BBI targeted in this program are located in Karo and Tapanuli Selatan (both in North Sumatra), Sumedang (West Java), Pasuruan (East Java) and Gowa (South Sulawesi), while the number of targeted BBU amounts to twelve in total: 2 in North Sumatra, 2 in West Java, 4 in East Java, and 4 in South Sulawesi. The rehabilitation and/or construction works will be carried out focusing on the Foundation Block in BBI and the Scion Multiplication Block in BBI and/or BBU.
- The program for “institutional and technical capability building of private nurseries” (PP-4) will be promoted and managed by the Provincial Agricultural Services Office in closer cooperation with BBI in each Province. As to the technical capability

building of the private nurseries, it will be entrusted to a third party specializing in human resource development. To enable the private nurseries to upgrade their propagation capacity of quality fruit seedlings and improve their facilities, a supporting measure would be taken by the authority concerned.

- The program for “rationalization of fruit seedling inspection system” (NP-6) is to upgrade the seedling certification and control services given by BPSB in Medan (North Sumatra), Bandung (West Java), Wonocolo (East Java), and Maros (South Sulawesi).
- The program for “strengthening of plant quarantine system” (NP-7) aims to strengthen the plant quarantine system with a view to supporting export promotion of Indonesian tropical fruits. The issues to be urgently solved for export promotion are the determination of admissible maximal limits of chemical residues on fresh fruits and identification of the insects and pests causing their infestations.

### **37. Implementation Organization**

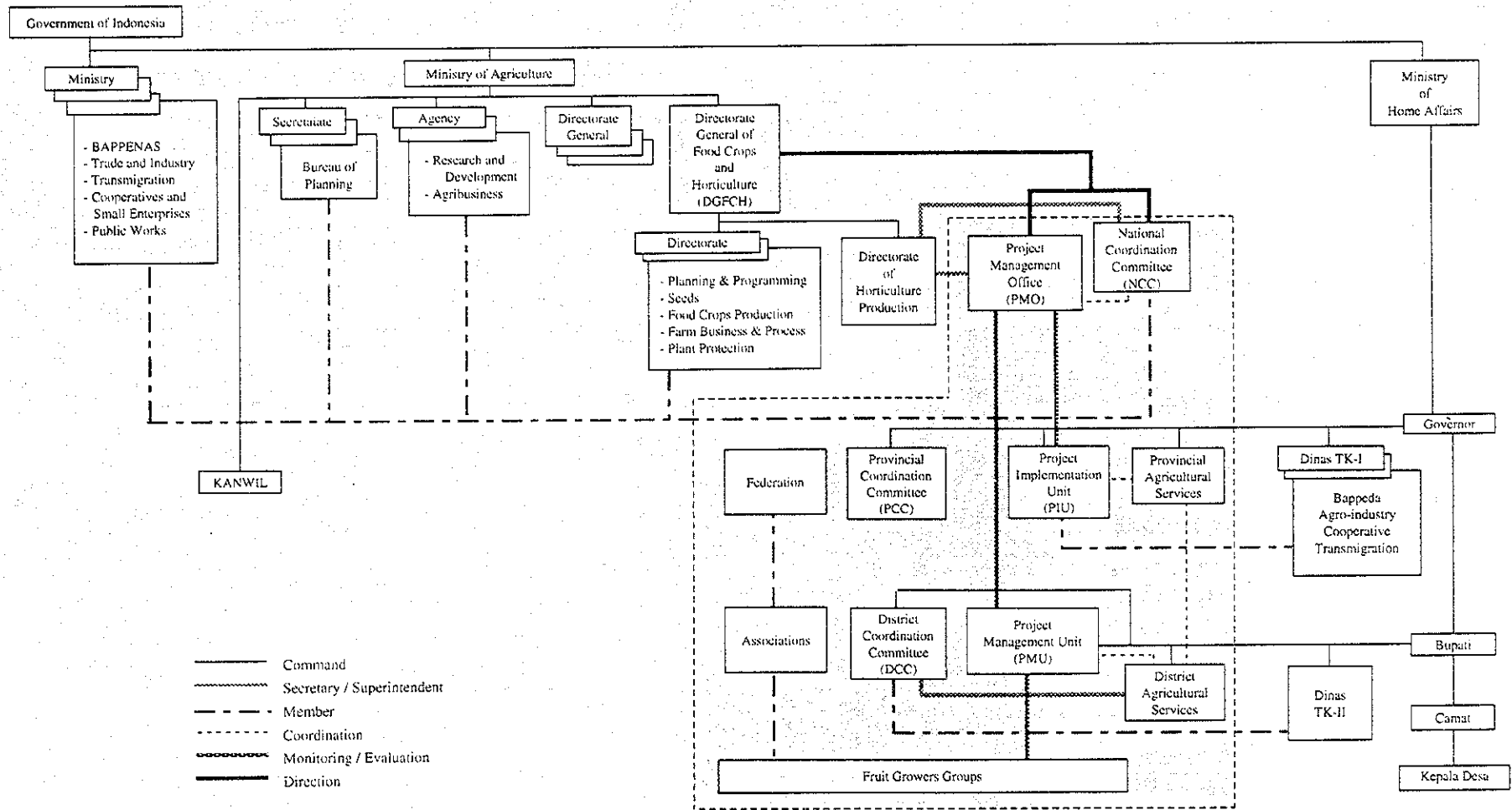
As shown in Figure 1, DGFCH is the executing agency at the central level, responsible for implementation of the programs relating to the inter-sectoral and inter-provincial issues. For overall supervision of the programs implementation, it is recommended to establish two organizations: “Coordination Committee (CC)” and “Project Management Office (PMO)” under the control of the Director General of DGFCH. The former will advise the Director General of DGFCH on technical and managerial issues for implementation of the programs and keep contact with the agencies at the Provincial and District levels. The latter will coordinate with the agencies and authorities concerned in charge of programs implementation, control of the program performance, application and allocation of the annual budgets, and so on.

At Provincial and District levels, a “Coordination Committee” will be established for coordinating the program and project management, which are under the control of the head of the Provincial Agricultural Services Office and Bupati, respectively. Besides, under the direction of the Project Management Office, a “Project Implementation Unit” will be created at the Provincial level, while a “Project Management Unit” will be established for each development area at the District level.

In parallel with the restructuring and implementing arrangements at both the central and local government levels, the establishment and strengthening of fruit growers’ organizations are a key issue for successful implementation of the orchard development programs. At the preparatory stage prior to the commencement of implementation, the social design or social



**Figure 1 IMPLEMENTATION ORGANIZATION**



Source: JICA Study Team

preparation study will be carried out, together with a cadastral survey, so as to identify the farmers' participation and make preparations for grouping the fruit growing farmers. Activities of the established fruit growers' groups will be institutionally and financially consolidated by regrouping them into "Associations" and/or "Federations" and through their engagement in agribusiness and agro-processing industry.

### **38. Program Implementation Schedule**

As shown in Figure 2, the planning period up to the target year 2018 is divided into three phases covering the coming four Five-Year Development Plans: Phase I up to 2003 (Repelita VII), Phase II for 2004 - 2008 (Repelita VIII), and Phase III for 2009 - 2018 (Repelita IX & X).

The programs relating to the upstream enterprises like fruit quality improvement and institutional strengthening will be commenced from the very early stage of Phase I, because these programs contain the introduction and development of the new varieties which are used to extend over a long period of time, and the institutional arrangements indispensable to ensure sound implementation of the programs proposed in the Master Plan. As to implementation of 37 orchard development projects (DP-1) and other eight related programs like DP-2, DP-3, DR-4, DP-5, DP-6, PP-7, PP-5, and PP-7, they will be executed in three Phases as per the prioritized order, and development scale. The development areas for each of the 37 orchards were fixed taking into consideration the annual budget available for the horticulture sub-sector and regional and provincial balance in the nationwide orchard development. The total development areas by phase are as follows:

- Phase I (Repelita VII) : 6,000 ha in 12 sites
- Phase II (Repelita VIII) : 5,800 ha in 12 sites
- Phase III (Repelita IX&X) : 6,500 ha in 13 sites




### **39. Tentative Cost**

The total investment cost for implementation of the programs proposed in this Master Plan is estimated based on the following basic assumptions:

- 1) All prices expressed in 1998 price level
- 2) Exchange rate (as of February 1998): US\$1.00 = Rp.9,000 = ¥125
- 3) Price contingency: 10% per annum
- 4) Physical contingency: 10% of the infrastructure cost
- 5) Value Added Tax (VAT): 10% of the total investment cost

Figure 2 IMPLEMENTATION SCHEDULE

Code No.	Description	Phase-I					Phase-II					Phase-III								
		Up to 2003 (Repelita VII)					2004 to 2008 (Repelita VIII)					2009 to 2013 (Repelita VIX)			2014 to 2018 (Repelita XX)					
		'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17
<b>Programs at Central Level</b>																				
NP-1	Formation of Institutional Linkage for Horticulture Agribusiness Development																			
NP-2	Strengthening of Inter-ministerial Coordination System for Orchard Development																			
NP-3	Rationalization of Supporting Services for Credit Facilities and Marketing Promotion																			
NP-4	Strengthening of Research and Development Activities for Introduction and Breeding of High Quality New Fruit Varieties		////	////	////	////														
NP-5	Strengthening of New Technology Adaptability Trial Operation System				////	////	////	////	////	////	////	////	////	////	////	////	////	////	////	////
NP-6	Rationalization of Fruit Seedling Inspection System		////	////																
NP-7	Strengthening of Plant Quarantine System		////	////																
<b>Programs at Provincial Level</b>																				
PP-1	Strengthening of Project Planning Capacity at Provincial Level																			
PP-2	Strengthening of Management Capability Building of Provincial Staff																			
PP-3	Improvement of High Quality Seedling Propagation and Distribution System																			
PP-4	Institutional and Technical Capability Building of Private Nurseries		////	////	////	////														
PP-5	Enhancement of Extension Staff's Knowledge on Horticulture Agribusiness Development	■						■												
PP-6	Upgrading of Market Information System		////	////	////	////														
PP-7	Institutional Development for Association of Fruit Growers' Group				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
<b>Programs at District Level</b>																				
DP-1	Establishment of Orchard as Core of Target Fruit Growing Area	////	////	////	////	////	////	////	////	////	////	////	////	////	////	////	////	////	////	////
DP-2	Introduction and Practice of Market-oriented Quality Fruit Growing Techniques		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
DP-3	Establishment of On-farm Level Extension Service System	■						■												
DP-4	Development of Post-harvest Handling System				////	////				////	////				////	////				
DP-5	Improvement of Access Facilities to Markets		////	////	////	////														
DP-6	Improvement of Local Market Facilities				////	////	////	////	////	////	////	////	////	////	////	////	////	////	////	////
DP-7	Institutional Strengthening of Smallholding Fruit Growers	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Note:  : Feasibility Study & Detailed Design or Preparation of Program  
 : Provision of Facilities and Equipment  
 : Project Activity

Source: JICA Study Team

The total amount of investments (public and private) necessary to attain the development objectives of this Master Plan Study is estimated at US\$119.14 million.

(Unit: million US\$)

Description	Phase I	Phase II	Phase III	Total
1 Programs at National Level	12.40	2.33	3.75	18.48
2 Programs at Provincial and District Levels	23.49	27.87	49.30	100.66
- North Sumatra	5.50	7.47	7.51	20.48
- West Java	5.67	2.37	6.19	14.23
- East Java	7.50	7.69	0.36	15.55
- South Sulawesi	4.82	10.34	35.24	50.40
Total Investment Cost	35.89	30.20	53.05	119.14

#### 40. Project Sustainability Assessment

##### *Farm Economy*

With a view to assessing the implementation effects of the orchard development projects proposed in this Study, a farm budget analysis was conducted assuming that the participating fruit growing farmers hold 1.0 ha of land on an average for cultivation of fruit trees. In the analysis, a comparison of cash flow is done for the two cases of "with" and "without" fruit growing conditions. The orchard development projects and their supporting program package proposed in this Master Plan will largely improve the farm income. The gross income of farms of an average farm size (for each target fruit cultivation) is expected to increase 10.1 times in the case of banana, 7.1 times for salak, 5.5 times for marquisa, 5.1 times for mango, 4.2 times for durian, 3.4 times for rambutan, 2.7 times for avocado, 2.2 times for mangosteen, and 1.8 times for duku. The average land size of 1 ha for fruit growing will produce enough income to pay O&M cost and provide for the family's living costs, and enable even adequate savings.

The fruit growers can not expect any income from fruit growing during the non-fruit bearing years which vary with the respective target fruits. When the farmers participate in the fruit production project proposed in this Study, it is estimated that their invested amount by target fruit will be recovered after 2 years to 9 years. In case the orchard is used for inter-cropping with a view to supplementing their income during the on-fruit bearing period, the invested amount in a single year balance will be recovered after 1 year for banana, durian, mango, mangosteen and rambutan, 2 years for duku, 3 years for marquisa and salak, and 4 years for avocado. With financial supporting services at the initial stage by providing the loans of

agricultural inputs in kind, the bases for farm management of fruit growers could be strengthened.

### *Environmental Impacts*

In addition to the above-mentioned direct benefits derived from incremental fruit production, the following indirect effects and socio-economic and cultural impacts would be induced by the implementation of the projects and programs envisaged in the Master Plan .

### *Physical impacts*

The orchard development projects proposed in this Master Plan will generally have a positive impact on the environment. The rehabilitation and construction works of rural roads, watering facilities, and village infrastructure are mostly designed to improve environmental conditions in the project area. The improvement of such basic village infrastructure will reduce soil erosion, water losses, waterlogging, and so on.

### Socio-economic and Cultural Impacts

Subsequent to the implementation of the orchard development projects, the following socio-economic and cultural impacts will be brought about:

- Improvement of farmers' living standards
- Increase in employment opportunities
- Expansion of business chances
- Promotion of WID
- Other socio-economic (multiplier) effects
  - Contribution to national food security and public health
  - Promotion of regional development by activating the local market system including farm inputs and outputs
  - Acceleration of agribusiness development in rural areas
  - Alleviation of regional disparities and poverty

As to the increase in employment opportunities, which is becoming the most imminent socio-economic issue to be addressed and conducive to improvement of farmers' living standards, it is expected to generate about 18,500 man-days of job opportunities per day on the average for farm management under the proposed 37 orchard development projects up to the target year of 2018.

## CHAPTER 8 ACTION PLAN AND RECOMMENDATIONS

### 41. Action Plan

In consideration of the administrative procedures and formalities to be followed in GOI and MOA for the formulation and adoption of new development projects, allocation of development budget, establishment of project organization, and set-up of project monitoring and management system, the Master Plan was formulated so as to implement abreast the twenty one programs for fruit production development. The programs recommended to be immediately executed in Phase I are packaged as the "Action Plan".

The Action Plan consists of the following programs:

1) Establishment of Orchard as Core of Target Fruit Growing Area (DP-1):

Under this orchard development program, 12 potential sites were selected as the Phase I priority projects from the four Study Provinces. These sites were judged to be the most suitable areas for growing of the target fruits. The total orchard development area amounts to 6,000 ha for cultivation of the six target fruits of banana, durian, mango, marquisa, rambutan, and salak;

2) Human Resource Development of On-farm Level Extension Workers and Farmers (DP-2 & DP-3);

3) Development of Post-harvest Handling System (DP-4);

4) Improvement of Access Facilities to Markets and Local Market Facilities (DP-5 & DP-6);

5) Institutional Development of Small Landholding Fruit Growers and Association of Fruit Growers' Groups (DP-7 & PP-7);

6) Strengthening of Institutional Linkage among Ministries and Agencies, Intra-ministerial Coordination System in MOA (NP-1 & NP-2);

7) Capability Building of Provincial Staff (PP-1 & PP-2);

8) Rationalization of Supporting Services for Credit Facilities and Upgrading of Market Information System (NP-3 & PP-6);

9) Strengthening of Research and Development Activities for Introduction and Breeding of New High Quality Fruit Varieties (NP-4);

- 10) Strengthening of Regional Adaptability Trial Operation System (NP-5);
- 11) Improvement of High Quality Seedling Propagation and Distribution System (PP-3);
- 12) Institutional and Technical Capability Building of Private Nurseries (PP-4);
- 13) Rationalization of Fruit Seedling Inspection System (NP-6); and
- 14) Strengthening of Plant Quarantine System (NP-7).

## **42. Recommendations**

Due to the latest climatic anomalies like the prolonged drought and financial crisis caused by currency turmoil, the country and its people are placed in serious socio-economic situations. It is reported that more than two million workers have lost their jobs. To create job opportunities for these workers, it is necessary to make the best use of the non-irrigated lands, especially in rural areas.

In view of such circumstances, it is pertinent to take countermeasures for increasing production of food crops in wetland areas, and promote orchard development in upland areas, which is conducive to increase of small landholding farmers' income, creation of job opportunities, food security, and so on. It is therefore recommended that the programs selected in the Action Plan be implemented as early as possible.

At the preparatory stage prior to the implementation of the Action Plan, it is recommended to carry out the following works:

- For preparation of the Implementation Program, DGFCH should take practical measures and actions in consulting with BAPPENAS;
- The Implementation Program will be prepared so as to assure the smooth implementation of the programs and realization of their respective objectives. Especially for successful implementation of the orchard development programs, DGFCH should attach importance not only to implement extension and training programs to participant farmers concerning farm management and fruit growing technique, to assure quality improvement programs, but also to establish proper marketing strategies.
- Since the programs related to fruit quality improvement are to be implemented by the relevant government agencies, DGFCH will formulate the detailed and substantial coordination program with these agencies;

- At the initial stage of implementation of the orchard development, it is necessary to identify the participating farmers as well as development areas through “socialization meetings” and then explain to them about the project objectives, advantages, required activities and obligations, and so on. Afterwards, the Final Definite Development Program will be prepared in cooperation with the participating farmers;
- DGFCH will establish an implementation organization so as to assure institutional linkage with other relevant ministries and agencies, intra-ministerial coordination system in MOA as well as administrative coordination with the Provincial and District authorities;
- The programs related to the institutional and human resources development programs (DP-2, DP-3, DP-7, PP-1, PP-2 and PP-7) are also very important for successful implementation of the Action Plan. Hence these programs should be put into practice immediately after preparation of the Final Definite Development Plan; and
- Before accomplishing this Action Plan or Phase I programs/projects, the Implementation Program of the next Phase II programs/projects will be duly formulated to ensure smooth continuation of the Master Plan, and the same is to be done for the final Phase III to realize its ultimate objectives up to the target year 2018.