

EXECUTIVE SUMMARY

1. Introduction

1.1 Background of the Study

Mekong Delta is located in the southern part of Viet Nam and is a main granary of the country, contributing around 60 % of total agricultural production in the country. The area is adjacent to Ho Chi Minh City, the largest domestic market achieving high economic growth in recent years. However, the rural area where more than 85 % of the population in Mekong Delta reside, has been left behind the development due to constraints in infrastructure, processing and marketing system of agricultural products and such problems as those associated to weak farmers' organizations.

Dong Thap Muoi area is located in the northeastern part of the Mekong Delta. The area is flood prone and includes area of acid sulfate soils. Owing to the successive effort in constructing canals and dyke systems in the area, paddy production increased tremendously in the past 10 years. However, agricultural production is unstable due to inundation, and thus the farm income remains relatively low.

In this context, the Government of Viet Nam requested the Government of Japan a technical cooperation on the formulation of Agricultural Development for Dong Thap Muoi area. In response to the request, the Government of Japan conducted a preliminary study by Japan International Cooperation Agency (JICA) to discuss and define the study with Vietnamese side from October to November 1998, and both sides agreed upon the implementation the study on Integrated Agricultural Development Plan in the Dong Thap Muoi Area. This study is being conducted from March 1999, in accordance with the Scope of Works (S/W) and Minutes of Meeting signed on November 4, 1998.

1.2 Objectives of the Study

As decided in S/W, the objectives of the study are ;

- 1) To formulate a Master Plan for Agricultural Development Plan in the Dong Thap Muoi area, which includes the followings,
 - (1) Inundation mitigation
 - (2) Improvement of storage, processing and marketing system of agricultural products, and
 - (3) Improvement of irrigation and drainage system
- 2) To conduct a feasibility study for the priority project(s)/area(s) selected from the Master Plan
- 3) To carry out technology transfer to the Vietnamese counterpart personnel through on-the-job training in the course of the study

Study Area

The Study Area is located in the northeastern part of the Mekong Delta along the Tien River, with 290,320 ha of land area of which 228,700 ha is in Dong Thap Province and 61,620 ha is in Tien Giang

Province.

Scope of the Study

In order to achieve the objectives mentioned above, the study is being made in two phases, Phase I and Phase II. Each phase includes fieldwork in Viet Nam and Home Work in Japan respectively.

2. Background

2.1 Overview of the development performance of Mekong Delta

Mekong River Delta, which includes the Study Area, consists of 12 provinces with natural area of 39,600 km² and population of 16.0 million in 1998. These account for 12% of the national total area and 22.6% of the total population in the country. While the share of agriculture sector in GDP in 1994 accounted for 28.7% for the whole country, the corresponding figure for the region was 47.6 %. GDP growth of the region in the period 1990-94 achieved 8.3 % on annual average basis. This was higher than that of the Red River Delta and of the whole country. In this period, the sector-wise growth rates were 5.8% for agriculture, 10.5% for industry sector and 12.1% for service sector. Taking into account the higher share of agriculture, the contribution of agriculture to the region's GDP growth is considered significant. Major contributor for this was the increased rice production.. GDP structure is changing with decreasing trend of agriculture sector, with industry and construction sector and service sector in growing trend. However, agriculture remains as an important sector in Viet Nam, as more than 80% of the population resides in the rural area and their income sources depend heavily on agriculture and related activities.

As a long-term development plan of Mekong Delta, "Master Plan on Socio-economic Development in Mekong River Delta to the Year 2010" was prepared in 1996. Target included in the development plan is GDP/capita, which will be raised by 1.50 times from 1994 to 2000 and 2.63 times from 2000 to 2010. Other issues included are ; expansion of trade, especially of export with annual growth rate of 18 %, enhanced investment of around 11.6-15.5 % annual growth rate in the period. Decreased share of agriculture in GDP with increased share of other sectors were expected in the plan. Promotion of agricultural diversification is being emphasized, including the expansion of livestock and horticulture. However, paddy remains as most important crop, producing 18 million tons or 55% of the total production of the country in 2010.

" Flood Control Planning for the Inundation Areas in the Mekong Delta" was prepared by MARD (SIWRP) in 1998 and approved by the Government in June 1999. In planning, the area is divided into 4 regions, one of which is the Plain of Reeds with area of 703,338 ha. The Study Area of around 290,000 ha is included in the region of Plain of Reeds.

Another related plan related to the Study Area to be referred is the "Planning for the High Quality Rice Area and Special Rice Production for Export in the Mekong Delta", prepared by MARD. In order to

strengthen the competitiveness of the major commodity of the region, that is rice, and to increase the export earnings, improvement of rice quality is considered comprehensively from the production to processing and marketing stages in the plan

2.2 General Situation of the Two Provinces

The study area covers one town(Cao Lanh) and 6 districts(Tan Hong, Hong Nhu, Tam Nong, Tanh Binh, Cao Lanh and Thap Muoi) in Dong Thap Province and two districts(Cai Be and Cai Lay) in Tien Giang Province. Total farm household accounts 202 thousand, with 519 thousand engage in agriculture. Around 90% of the total cultivated area of 228 thousand ha, or 200 thousand ha are paddy field. Therefore, paddy is the dominant crop in the region, with varying degree of other important crops for the particular areas. Average size of farm is 1.13 ha, being relatively higher than that of the national average of 0.71 and particularly to that of Red River Delta of 0.25 ha.

The study area will be divided into 3 zones, deep, medium and shallow inundation zones based on the degree of inundation. In deep inundation area located in the northern part and medium inundation zone in the middle part, double cropping of paddy prevails while in shallow inundation zone in southern part triple paddy cropping is dominant. Farm size decreases from the deep(north) to the shallow (south) gradually.

Generally, share of farm income in total income is as high as 91%, among which income from crop production accounts for 93%.

3.2 Natural conditions

Topography: The area is 0.3 - 4.0 m asl., forming gradual decline from northwest to southeast. There exist many canals in the area, flowing basically from west to eastward and from north to southward. The flow is affected by the tide level and also by rainfall.

The water level in canals change in dry season 3.0 m(south) and 0.6 m (north) within a day. However, in rainy season, changes of water level are decreased due to higher level of canal water.

Meteorology and Hydrology : Under the climatic condition of tropical monsoon, the area has distinct rainy and dry seasons. In rainy season of May to October, more than 90% of the annual rainfall concentrates with annual precipitation of 1000mm - 1,600mm. Annual average temperature is 27. and annual evaporation is 1,200mm.

Inundation conditions: Inundation occurs from August to October in the area. Inundation in the area is caused by 3 factors. First one is the flood of Mekong Delta which starts in August from the Cambodian border, second by the changes of tidal level and the third by the intensive rainfall.

Soils: The area is a flood plain and consists of natural levee and back - swamp extending behind the levee, where the drainage condition is relatively good due to its higher elevation. In lower laying area, the soils are formed of heavier textured and impermeable silts and clays and drainage condition is not favorable. Periodic inundation caused by flood provide natural nutrient and contributes to the maintenance of soil fertility in the area. However, the existence of acid sulfate soil in the medium

inundation area poses constraints for development. The acid sulfate soils are broadly classified into two groups, potential acid sulfate soils and actual acid sulfate soils. The former requires careful management of water regime as these contain acidic materials and pose serious oxidation of water by excessive drainage and/or excavation of canals. The serious hazards are presented by the latter causing high acidity of water being used not only for irrigation but also for daily use.

Natural environment: Tram Chim National Park is located in the central part of the study area with around 7,000 ha, where the acid sulfate soils concentrate. To reserve the unique biodiversity of Mekong Delta, this area was designated as National Park in 1994. Eastern Sarus Crane is one of the important rare species in this park.

3.3 Agriculture and rural infrastructure

Irrigation and drainage: Main canals in the area were constructed in the periods of 1970s and 1980s and have been used for boat transportation as well as irrigation and drainage. For irrigation and drainage, pumps are used, mostly of small size covering 10-20 ha each, though there exist a limited number of large scale ones covering more than 1,000 ha. These pumps are usually owned by individuals and managed by farmers groups that also collect irrigation fees from farmers and pay to the pump owners.

Inundation mitigation: Following the construction of main canals, the construction of the small dikes started in the early part of 1980s. At present, around 60% of the area is covered by small dike systems. All these dikes are designed to protect the inundation in August when Summer - Autumn Crop is harvested. These dike systems lack such structures as spillway, water gate, culvert, bridge etc. and farmers cut dikes when irrigation and drainage are required.

Road conditions: Due to inundation occurring periodically, road network in the area is not well developed. The roads paved and passable throughout the years are limited, namely, National road No.1, No.30 and the road connecting My Tho and My An. Most of the others are unpaved and impassable during August and October. Further, after rainfall, these roads often become impassable due to poor surface conditions. Therefore, boat transportation plays an important role in the area.

3.4 Agriculture

Land use: Of the total area of about 290,000 ha, agricultural land occupies as high as 79%, with limited share of forest of 4%. Among 228,000 ha of agricultural land, 2,00,000 ha are paddy, with very limited share of orchard and upland field. Though orchard is gradually increasing in the area, paddy cropping remains dominant.

Crop production: Of the total planted area of 424,000 ha, 388,000 ha are planted paddy. In the past 10 years, paddy production increased 2.1 times to 1.86 million ton by increased planted area and yield. Construction of canals, followed by dike system enabled to increase the double and triple cropping, supported by the introduction of high yield and short period varieties. Other crops include fruits and industrial crops. Fruits production concentrate in the southern area of relatively high elevation along the Tien River. Mango, longan, citrus and banana are major fruits produced in the area. The orchard is in

increasing trend though gradually, shifting from mixed garden to monoculture orchard. Industrial crops include soybean, sugarcane and rush, though limited in scale.

Livestock and fisheries: In the area, livestock sector occupies only 8% of the total agricultural production. Buffaloes and cattle, mostly used as draught animal in the past are rapidly decreasing while pigs and poultry are increasing, reflecting the farm mechanization in case of former and increased market demand in the latter.

Fisheries in the area consist of catching fishery and aquaculture. Around 5,000 fishermen are estimated to be engaging fish catching in the area. In addition substantive number of farmers are engaging fish catch in off farm seasons. Yearly production fluctuates depending on the flood conditions. In 1998, total fish catch amounted to 17,000 tons. Aquaculture is mostly operated in small fishpond and cages and increasing gradually in the area. Total production by aquaculture in 1998 was 26,000 tons, surpassing that of fish catches.

Farming system: Due to natural endowment of the area, paddy farming is predominant. Another farming system included fruits production. Of the paddy farming, about 38% is under triple cropping and 42% under double cropping.

Farm mechanization: In the area, land preparation and threshing are mechanized, while seeding, fertilizer application and harvesting are made by manual labor. In the area, about 5,000 tractors and 3,500 threshers are owned and operated by individuals, who provide services on contract basis.

Farming revenue: The average net income for paddy is estimated as 2,680 thousand VND/ha for single crop, 4,940 thousand VND/ha for double crop and 6,890 thousand VND/ha for triple crop. In case of fruits, net income vary by kinds and that for longan is 5,970 thousand VND/ha and for citrus 23,350 thousand VND/ha.

3.5 Forestry

Forest in the study area as of June 1999 is reported to be 14,850 ha, of which 40% or 5,856 ha are unstocked areas. Therefore, ratio of forest cover of the area is only 3.1% and in a decreasing trend. 65% of the forest is state owned. When classified by function,

Into protection forest(2,287ha), special use forest(2,821 ha) and production forest(3,886 ha). In terms of species, *Melaleuca cajuputi* is dominant (98 %) as this species is most suitable to acid sulfate soils. Others include *Eucalyptus camaldulensis*.

In Vietnam, plantation is classified into two types, the one scattered plantation along the road and dike and another concentrated plantation on the bare land and others.

The figures described above are included in the concentrated plantation. Scattered plantation in Dong Thap Province numbers 40,000 plants, while in two districts, Cai Be and Cai Lay in Tien Giang Province 11,000 plants showing gradual increase in recent years. Fuel wood demand in the area is estimated as 201 thousand m³ in Dong Thap Province and 11.8 thousand m³ in Tien Giang Province in the year 2010. Most of the fuel wood will depend on the scattered plantation. Both provinces have plantation plan up to the year 2010, in which target is set as 19,000 ha for concentrated plantation and 200million

trees for scattered plantation in Dong Thap Province and 19 million trees as scattered plantation in Tien Giang Province. Target of concentrated plantation in Dong Thap Province seems to be rather ambitious.

3.6 Post harvest processing

As paddy is the single most important crop in the area, post harvest processing relates mostly to paddy/ rice sector. In the adjacent towns such as Sadec in Dong Thap or My Tho in Tien Giang, there exist a number of processing industries of fish, fruits and rice flour. In addition, there exist many small scale traditional food processing industries such as sugar extraction, bakery and noodle.

Rice post harvest processing: Farmers harvest paddy manually and then threshed on farm. For threshing, mobile threshers are used. Paddy threshed are dried by sunshine either on farm or nearby the houses. Although there exist dry yards with concrete or tiles, in most cases farmers dry paddy at back yards or road. Therefore, drying is not appropriately done, particularly of Summer - Autumn crop due to inundation. Usually farmers do not store much paddy except their home consumption, as they sell paddy just after harvest. Therefore most of the farmers do not possess the storage facilities for paddy. Milling at farmers level are mostly for their home consumption and using the rice mill nearby or mobile mill on contract basis.

There exist 800-900 rice mills in the area. The capacity of these rice mills vary from hundreds kg/ h to 10 tons/h. These rice mills concentrate at the crossing points of canals or roads, particularly in Hong Ngu, Cai Be, Cai Lay and My An. These rice mills also supply brown rice in addition to milled rice. Quality inspection system is not well developed for daily transaction of rice in Vietnam. Usually for checking the quality of rice in transaction, moisture and length of rice kernel are paid attention. In many cases, paddy include the mixed varieties, red and or colored kernels, in addition to poor drying.

All these factors lead to poor quality and lower recovery rate of milled rice. Large scale rice mills, such as SOEs are equipped with polishing machine to increase market value of milled rice. These mills have warehouse not only to store the material or milled rice, but also used as a place to unify the material and to grade of the milled rice. Most of SOEs procure materials after receiving the orders from clients. Therefore, the storing period of materials or products is relatively short and hence damage and loss during in this period is rather limited.

Other post harvest processing: These include frozen factory for marine product, sugar mills, feed mills and rice bran oil mill. Frozen factory is rather new and expected its future development. Sugar mills are located along Tien River, and most of them are small scale. Due to low productivity of sugar cane, inefficient collection of material canes and unfavorable current market situation, most of the sugar mills are facing difficulties. Feed mills are located outside of the area, My Tho and Sadec. Locally available materials for feed production are rice bran, broken rice and small fish. Major material for feed production such as maize and additives need to be procured from outside. As the new factory for rice bran oil extraction is being established introducing extraction method using organic solvent, there exist potentials to expand feed production with better coordination of the oil mill.

Problems related post harvest processing: Common problems related to post harvest among producers,

traders and millers lack of understanding on the market needs and requirement on the commodity, rice .Other issues include lack of fund, lower technology level, lower management capacity and poor infrastructure. In case of paddy, as the price does not effectively reflect the quality, farmers often do not have the incentive to improve the quality. At the milling stage, in addition to the old fashioned facilities, difficulties to procure uniform quality material, mixture of high moisture paddy and others limit the supply of high quality rice.

3.7 Marketing system

Among major agricultural products in the area, rice and fruits depend mainly on the market outside of the area, while livestock, vegetable and fishery products are consumed mainly within the area. Most of the agricultural products are handled by local collectors and collective marketing by farmers does not exist in the area.

Marketing of rice: Paddy production in the area in 1998 was estimated at 1.86 million tons, of which around 70% or 130 - 135 had been traded. Marketing channel consists of farmers local collectors/private rice millers SOEs. Almost all farmers sell their paddy to local collectors who visit the farm household by boat. Collected paddy by local collectors are milled by rice mills under contract basis and sold to large processing and trading companies including SOEs.

Farm gate price of paddy is directly influenced by the international market price in principle. However, quality of rice produced in the area remain relatively low, mainly due to small scale marketing by individual farmers, inappropriate quality inspection system and lack of the understanding among concerned parties including farmers on market needs and requirement.

Marketing system of fruits: Marketing channel of fruits in the area consists of farmers local collectors local wholesale traders with a variation by kind of fruits. Local collectors usually visit farm households or orchard to buy directly from farmers and sell them to local wholesale traders in An Huu or Cai Be markets in the area. No collective or group marketing by farmers exist in the area. For the marketing of fruits, market information system needs to be strengthened and the wholesale market facilities in the area need to be improved.

3.8 Agricultural support services

Agricultural support services include agricultural extension, crop protection, veterinary services, supply of agricultural input and rural credit.

Agricultural extension: At the provincial level, there exists Agricultural Extension Center (AEC) under the Department of Agriculture and Rural Development (DARD). At district level, Agricultural Extension Station(AES) is responsible for extension work.

AEC is managed by provincial government administratively, but central government, MARD, provides technical support. Budget of AEC are basically borne by province, with a certain subsidy from central government.

Crop protection: In DARD, Crop Protection Division is responsible for crop protection from disease and

pest, plant quarantine, and agricultural chemicals. Integrated Pest Management (IPM) is being emphasized in their activities and various technical information are provided through seminar, radio and printed matters.

Livestock services Livestock Division of DARD is responsible for prevention and treatment of animal disease, animal quarantine and supervision of veterinary medicine

There also exist animal quarantine office at district level.

Supply of agricultural input: AGRISED is the State Operated Enterprise of the Dong Thap Province responsible for supply of input, such as seeds, fertilizer, agricultural chemicals and farm machinery.

Though independent and autonomous body, AGRISED is supervised by DARD and receive subsidy from the province for core staff salary.

Rural credit: Official credit institutions are Vietnam Bank for Agriculture and Rural Development (VBARD) and Vietnam Bank for the Poor (VBARD). As private institutions, there exist People's Credit Fund and Rural Shareholding Company in the area. Among these institutions, VBARD has the biggest share in rural credit. VBARD branch office in Dong Thap Province was established in 1990 and in Tien Giang Province in 1988. Under the branch office at provincial level, there exist sub-branch office at each district to respond the needs of farmers. Almost 70 - 80% of farmers are provided credit by VBARD. Ceilings of credit amount are set at district, province and national level. Therefore, the credit application beyond ceiling should be submitted to higher authority, for example, from district to province or from province to headquarters. Ceilings are also set for individual, private enterprise and state operated enterprise. Credit are classified into three, short-term (less than one year), medium - term (one to less than 5 years) and long - term (more than 5 years) credits. For receiving credit, farmers are required to submit Land Use Certificate. Therefore landless farmers are not eligible for VBARD credit. VBP was established in 1995 for the purpose of eliminating poor in the country. No collateral is required for VBP credit, being an effective fund sources for the poor. Farmers in the area are utilizing VBARD credit actively and they appreciate in general. The problems expressed by farmers regarding VBARD credit are rather cumbersome procedures for application, lower ceiling of the credit amount.

3.9 Rural community and farm household economy

Compared to Dong Thap, Tien Giang Province has relatively long development history. The middle and northern parts of the area have been developed, particularly since the later part of 1970s. Due to the difference of natural conditions and development history of the places in the area, distribution of population is not even in the area. Rural communities have been formed in belt shaped pattern, following the construction of canals and roads. The result of the RRA conducted in the area reveals that farmers strongly wish enhanced social services including the improvement of infrastructure. In infrastructure, they emphasize dike improvement, safe drinking water, bridges and electricity. Other social services emphasized include education and healthcare, particularly of their quality upgrading.

Farm household economy: Though there exist wide variation among farmers, average net income of farm household in the area is 35.9 million VND per year. In the area, the total number of poor farm

household is 35,488 or 14.5 % of the total farm household, of which 23,885 household are in Dong Thap and remaining 11,603 are in Tien Giang Province. There are substantive number of landless farmers and also small scale farmers of less than 0.2 ha. These farm households constitute major part of the poor household in the area.

Farmers organization: There exist many informal farmers groups in the area, mostly formed for a single objective, such as irrigation and credit. Since 1996 when new Cooperative Law was enacted, number of cooperatives in the area is growing in the area. Currently, 24 agricultural cooperatives are operating in the area, of which 14 are in Dong Thap and 10 in Tien Giang Province.

4. Master Plan

4.1 Basic Development Concepts

Development potentials and constraints: The area is located in the upper part of Mekong Delta in Vietnam, the granary of the country. Average size of the farms is comparatively large and paddy yield level is high. Further, double and triple croppings are widely practiced in the area. Therefore, per capita production of paddy/rice is higher than any other region of the country. These are the advantages of paddy production in the area. Rice is not only the staple food of the people but also an important commercial crop in the area and play an important role in the economic development of the area.

Due to natural conditions of the area, paddy is the single dominant crop in the area. However, agricultural diversification is gradually going on, particularly in the southern part and along Tien River, where inundation is not so serious. In these area, growing of fruits is increasing gradually.

On the other hand, as unutilized land is very limited, expansion of agricultural land in the area can not be expected. Therefore, to increase the income of farmers and to improve the living conditions of farmers, intensification/ diversification of agriculture and increasing job opportunities in non-farm sectors are required , particularly in view of the population increase in the area in future.

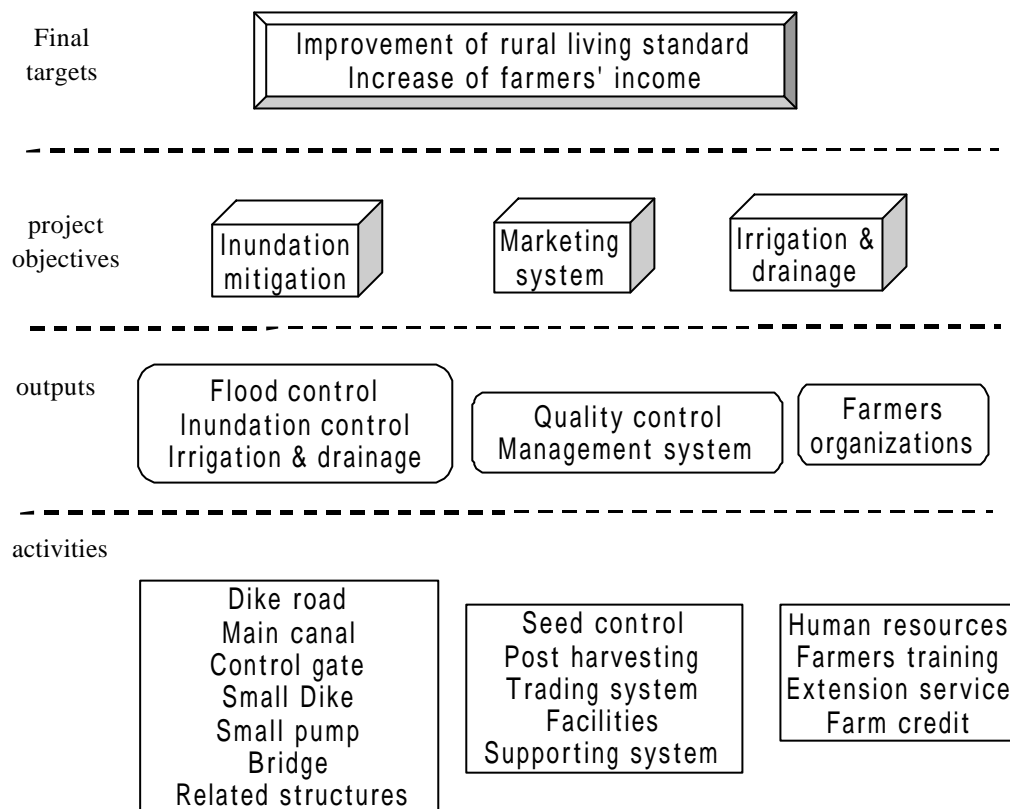
In spite of the advantages in paddy production of the area as above mentioned, there exist constraints such as flood, inundation and undeveloped transportation. Existence of acid sulfate soils is another critical constraint of the area. In agriculture, by periodic flood and inundation, crop production, especially Summer - Autumn paddy production is unstable yearly. Due to inundation, paddy drying is not effectively conducted and this leads to a lower quality, and lower market value of the product. Regarding the low quality of rice in the area, in addition to higher moisture of paddy, there exist various issues to be solved, such as mixture of different varieties, inclusion of foreign matters, lack of appropriate of appropriate quality inspection system and others. Therefore, not only farmers but also traders and processors can not fully enjoy the benefit due to vicious cycle of lower quality and lower price.

Sector wise potentials and constraints are summarized below:

Potentials and Constraints of Each Sector for the Agricultural Development

Sector	Potential	Constraints
Land use	<ul style="list-style-type: none"> • High ratio of agricultural land. • Existence of natural reserve forest. 	<ul style="list-style-type: none"> • No expansion of agricultural land is expected. • Limited forest cover.
Agricultural Production	<ul style="list-style-type: none"> • Paddy is most suitable crop. • Major portion of agricultural land devoted to paddy. • Exist potential to expand 3 crops a year. • Exist possibility to expand fruits and other crops though limited. • Diversification of farming including livestock and fisheries exist. 	<ul style="list-style-type: none"> • Flood / inundation cause unsuitability of products. • Due to flood / inundation extent of orchard, livestock and fish breeding expansion are limited.
Agricultural Infrastructure	<ul style="list-style-type: none"> • Canal network for irrigation / drainage exist. • Transportation by boat is available in the canal system. • Enough irrigation water is available in main canal even in dry season. • Small dyke system enables 2-3 crops a year. 	<ul style="list-style-type: none"> • Situation of infrastructure is not at satisfactory level. • Living conditions against inundation are poor. • Canals obstruct road transportation. • Irrigation / drainage system within the dyke is not well established. • Dyke system lacks such structures as control gate, culverts, and spillways.
Extension & Support System	<ul style="list-style-type: none"> • Such organizations exist. - Extension Center - Plant Protection Division - Animal Health Division - Agriculture Development Service Company 	<ul style="list-style-type: none"> • Budget constraints. • Limited number of extension workers and facilities. • Weak production and supply system for seed and seedlings. • Inadequate seed registration and control system.
Rural Credit	<ul style="list-style-type: none"> • VBARD branch exist at provincial and district level. • VBP extend loan to the poor. • The credit to farmers are increasing. • Other formal institution PCF also exists. • Cooperatives are eligible to borrow from VBARD. 	<ul style="list-style-type: none"> • VBARD's credit does not fully meet the requirement of farmers in; <ul style="list-style-type: none"> - Complicated procedure - Amount is small - Terms is so short - Interest rate is high • The number of other institution is limited. • Credit to cooperatives is limited at the moment.
Post Harvest Processing facilities	<ul style="list-style-type: none"> • Abundant supply of paddy to support paddy processing industry. • Enough capacity to process paddy . • Reliable supply of locally made machinery and spar parts. • Existence of many small scale food processing industry. 	<ul style="list-style-type: none"> • Insufficient rice processing facilities for high quality rice. • Limited number of engineers for technology improvement. • Insufficient business management. • Limited supply of materials other than rice • Most of the small scale food industries are family based ones lacking funds and technologies for improvement.
Marketing System	<ul style="list-style-type: none"> • Better access to major market, HCMC. • Transportation net work improving. • Major commodities are focused on market abroad. 	<ul style="list-style-type: none"> • Marketing channels are diversified and complicated. • Paddy / rice price do not duly reflect the quality. • Insufficient market information for produces and consumers.
Farmer's Organization	<ul style="list-style-type: none"> • Existence of legal facility for cooperatives. • Existence of informal groups and cooperatives. • Strong needs and willingness of farmers on cooperatives. • Emergence of the direct cooperation between companies and cooperatives. 	<ul style="list-style-type: none"> • Experience of failure in the past cooperatives and lack of understanding on new cooperative law on the part of farmers. • Lack of capable leaders. • Limited capital of cooperatives. • Limited opportunities for women in involvement in cooperative activities.
Forest Management	<ul style="list-style-type: none"> • Existence of concentrated forest and scattered forest. • Existence of natural reserve forest. • Substantial demands for fuel wood. 	<ul style="list-style-type: none"> • Decreased forest cover. • Limited unused land for afforestation. • Extension and supporting system is not improved
Environmental Conservation	<ul style="list-style-type: none"> • There is National Park in the study area. 	<ul style="list-style-type: none"> • Acid sulfate soil high water level to inundation. • Water pollution

In formulating Master Plan, based on the potentials and constraints of the Area, following development concepts are prepared.



Basic Development Concepts

Target and Strategy of Agricultural Development: As all of the major long term development plans at national, regional and provincial levels are set 2010 as the Target Year, the master plan adopted 2010 as a target year to keep conformity to these existing plans. However, all of these existing plans were prepared in the period of 1994-95 when the economic growth was very robust. When seen the plans now, after the Asian economic crisis started in 1997, some targets seems to be rather optimistic. Therefore, taking this into consideration, targets are set to be more realistic and feasible ones.

Sector wise targets and strategies are prepared, following the above Basic Development Concepts and based on the sector wise potentials and constraints. External conditions are clarified respective strategies.

Targets and Strategies of Each Sector for Agricultural Development

Sector	Targets	Strategies	External Conditions
Land Use	<ul style="list-style-type: none"> • Appropriate land use aimed at; <ul style="list-style-type: none"> -Diversified agriculture. -Environmental protection. -Support industrialization. -Stabilization of cropping pattern 	<ul style="list-style-type: none"> • Increase of crop intensity. • Crop diversification. • Forestation. 	<ul style="list-style-type: none"> • The agreement of the inhabitants.
Agricultural Production	<ul style="list-style-type: none"> • Paddy production increase in yield and expansion of 2-3 crops a year. • High quality paddy production. • Diversification including; <ul style="list-style-type: none"> -Fruits -Livestock -Fishery • Increased income of farm household. 	<ul style="list-style-type: none"> • Establishment of production system for high quality rice. • Establishment of diversified agricultural production system. • Promotion of agricultural mechanization. • Farming technology improvement. 	<ul style="list-style-type: none"> • Effective support system. • Strengthened farmer organization.
Agricultural Infrastructure	<ul style="list-style-type: none"> • Protection from flood at Zone A. • Improvement of Drainage conditions at Zone C. • Mitigation of inundation conditions at Zone B and C. 	<ul style="list-style-type: none"> • To control flood from Cambodian border • To improve flow capacity of canals. • To improve small dyke system. 	<ul style="list-style-type: none"> • Agreement with Cambodia on the construction of major work. • Farmers consensus on improvement plan.
Extension & Support System	<ul style="list-style-type: none"> • Strengthen extension system. • Production and supply high quality rice seed and fruit seedling. • Provide enough materials with good quality by support services. 	<ul style="list-style-type: none"> • Increase of the staff and extension materials, equipment. • Improvement of other support service. • Improvement of production and supply system rice seeds and seedlings. 	<ul style="list-style-type: none"> • Technical supports from the higher level organization.
Rural Credit	<ul style="list-style-type: none"> • To increase the coverage of farm household of credit by VBARD. • To encourage the investment credit for farmers, both by individuals and collectives. • To support the implementation of the programs/projects by special fund. 	<ul style="list-style-type: none"> • VBARD to improve the conditions for rural credit in favor of farmers. • Special development fund to be established to finance the cost of programs/ project under the plan. • To increase the credit to farmers group/cooperatives for their investment needs. 	<ul style="list-style-type: none"> • Rules and regulation on VBARD loans needs to be amended.
Post Harvest Processing facilities	<ul style="list-style-type: none"> • Reduction of post-harvest losses. • Increase in value added of the products. • Increase in job opportunities. 	<ul style="list-style-type: none"> • Improvement of post-harvest practice, facility and equipment of producers. • Improvement of management system including operation, and renovation of facility. • Support to the introduction of new processing businesses and expansion of activities in a small industry. 	<ul style="list-style-type: none"> • Improvement of quality inspection and control method.
Marketing System	<ul style="list-style-type: none"> • Collective marketing of produce by farmers organization. • Improve the quality of product. • Enlarge the scale of marketing commodity. • Promote the farmers' participation in marketing activity. 	<ul style="list-style-type: none"> • Establishment of appropriate marketing channels for farmers. • Enlarge the scale of commodity by formulating farmers' group. • Promote the farmers' participation in marketing activity by initiating the model farmers' group(s). 	<ul style="list-style-type: none"> • Improvement of the commodity market in core center. • Efficient collection /distribution of fruit in Food Supply System of HCMC. • Efficient loading work at Saigon port, Can Tho port and Sa Dec port. • Thuan bridge and Can Tho bridge.
Farmer's Organization	<ul style="list-style-type: none"> • Development of leadership of key persons among farmers and local officials. 	<ul style="list-style-type: none"> • Training for farmers and government staff to be capable leaders. • Training of understanding farmers' 	<ul style="list-style-type: none"> • Existence of appropriate leaders and key persons. • Farmers' active and

**THE STUDY ON INTEGRATED AGRICULTURAL DEVELOPMENT PLAN
IN THE DONG THAP MUOI AREA VIET NAM FINAL REPORT**

Sector	Targets	Strategies	External Conditions
	<ul style="list-style-type: none"> Detailed contents depend on activities to be raised by other sectors. 	<ul style="list-style-type: none"> organization and its operation. Improvement/development of cooperation between governments and farmers for development. 	<ul style="list-style-type: none"> voluntary participation in the organization with strong motivation.
Forest Management	<ul style="list-style-type: none"> Supply of sufficient firewood to inhabitants. Establishment of appropriate forest management. 	<ul style="list-style-type: none"> Strengthen of extension activities. Increase of forest area as much as possible. 	<ul style="list-style-type: none"> Farmers agreement on forestation plan.
Environmental conservation	<ul style="list-style-type: none"> Establishment of exact countermeasure against acid sulfate problem. 	<ul style="list-style-type: none"> Environmental monitoring works on long-term basic. Further detailed investigation required. 	<ul style="list-style-type: none"> The monitoring covers broad impacted area in the Mekong Delta.

Zoning: Zoning of the study are was made based on the four items, soils, flood, land use and water quality as major factors. In this exercise, "Flood Control Planning for the Inundation Areas in the Mekong Delta" was taken into consideration. Agro-processing and marketing conditions were also given consideration.

Main Factors on Zoning

	Main characteristic			
	Soil Resources with emphasis on ASS*	Flood Condition		Water Quality (pH)
		With dike	Without dike	
Zone A	ASS does not distribute. Low cation exchange capacity and low base saturation with strongly acidic subsoil. Generally thin surface horizon with a low amount of organic matter.	Dike for S-A 70% Depth: 0 to 3m Period: 2 months	Non Dike area 30% Depth: 2 to 3m Period: 4 months	pH of canal water does not likely decline below 4.
Zone B	Saturated with water for long periods during the year. Rather fertile with a finer soil texture and a slower organic matter decomposition, and an influx of ions from adjacent higher lands. But the zone is sparsely covered by potential and actual ASS.	Dike for S-A 60% Depth: 2 to 3 m Period: 2 months	Non Dike area 30% Depth: 2 to 3m Period: 4 months	pH of canal water likely decline below 4 in the area adjacent to ASS particularly at the beginning of rainy season. (June)
Zone C	Saturated with water for long periods during the year. Rather fertile with a finer soil texture and a slower organic matter decomposition, and an influx of ions from adjacent higher lands. The zone is partly covered by Potential ASS.	Dike for S-A 70% Depth: 1 to 2 m Period: 1.5 months	Non Dike area 30% Depth: 1 to 2m Period: 3.5 months	In the past 13 years of the northern part of the zone, pH of canal water declined below 4 once every two years in June.
Zone D	ASS does not distribute. Generally fertile and used for a wide range of crops due to chemically rich properties with a near neutral soil reaction. High hydraulic conductivity because of silty or loamy nature.	Garden dike area 95% Depth: 0 to 0.5 m Influenced by Tide	Non Dike area 5% Depth: 0.5 to 1m Period: 3 months	pH of canal water does not likely decline below 4.
Zone E	No ASS in the zone. Endowed with a relatively fertile alluvial soils,			pH of canal water does not likely decline below 4.

Zone F	Severe Actual ASS covers most part of the zone together with potential acid sulphate soils.	Dike for S-A 30% Depth: 2 to 3 m Period: 2 months	Non Dike area 70% Depth: 2 to 3m Period: 4 months	The zone is very susceptible to acidification of canal water.
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*ASS: Acid Sulphate Soils

4.2 Sector Projects

4.2.1 Land Use and Agricultural Production

Agricultural land area proposed in the land use plan is set as 207,000ha which is nearly equal to the present value and determined considering the fact that the further land exploitation for agricultural production is not anticipated in the study area. Total rice cropping area will increase by 20,800ha altering the single and double rice cropping area to triple cropping area. As for perennial cropland, it is set to increase by 3,900ha.

The target crop of agricultural production will be paddy and fruits. Rice production plan aims at quality improvement as well as yield increase. To this end, it proposes introduction of high quality varieties, unification of varieties and technical improvement of cropping practices.

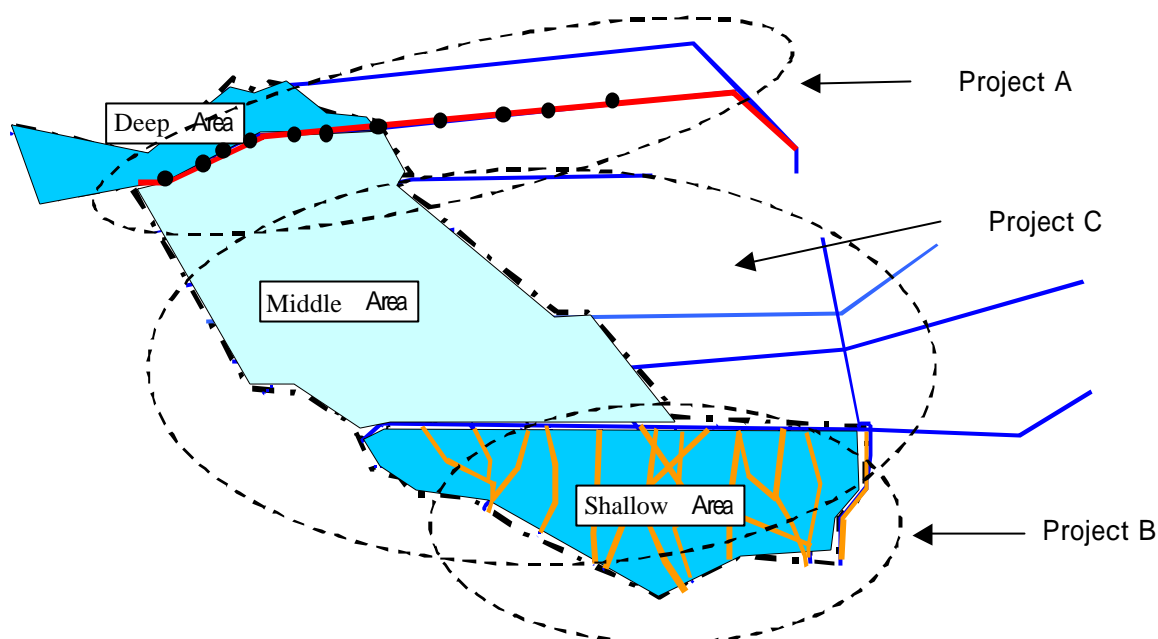
As for rice production, cultivated area is increased by 412,000ha from current area of 392,000ha and yield is set to be as 5.0 t/ha from present value of 4.8t/ha. On perennial crop, land area will be increased by 3,900ha with increases in land area for longan, mango and citrus.

4.2.2 Agricultural and Rural Infrastructure

Development target was set in line with Flood Control Master Plan in the Mekong Delta for respective zone with particular emphases on inundation mitigation and improvement of irrigation and drainage condition.

Output A: Protection from Flood	Output B: Improvement of Drainage Condition	Output C: Mitigation of Inundation Condition
Project A: Flood Control on Boundary Area	Project B: Flood Control in Southern Nguyen Van Tiep	Project C: Small Dyke System Improvement
Objective: To stabilize double rice cropping by controlling flood from June to Aug. Targeted Zone: Zone A	Objective: To stabilize rice production throughout the year by means of improvement of drainage condition Targeted Zone: Zone C, Zone D	Objective: To stabilize rice production through mitigation of inundation condition and networking of rural roads Targeted Zone: Zone B, Zone C

Proposed Project of Infrastructure Sector



Outline of Development Plan

1) Project A: Flood Control on Boundary Area

The project components includes elevation of dike extending from Hong Ngu to Hung Ha with approximate distance of 42 km and installation of ten control gates with 7 to 25m width and 9 to 10 m height at the intersections with main canals aiming at flood control. Anticipated benefit is protection from serious flood damage and stabilization of S-A crop production.

2) Project B: Flood Control in Southern Nguyen Van Tiep

The project deals mainly with dredging and widening of twelve main canals extending in the south of 'Nguyen Van Tiep Canal' to improve drainage condition. The components also include improvement of small dike system aiming at mitigation of inundation conditions and stabilizing triple rice cropping. It is suggested that the project induce increase of water level within the project area while improve drainage conditions at the upstream of the area.

3) Project C: Small Dyke System Improvement

The project aims at stabilisation of double rice production, mitigation of inundation conditions and ensuring road transportation in the period from September to October by means of improvement of small dike system and associated strengthening of farmer's organisation. Dikes are to be raised to the height being able to protect paddy field from inundation in September and October mitigating adverse impacts such as changes in water level to an acceptable level, which is materialized by adopting 'Rotational Inundation Control System'.

4.2.3 Forest Management

The objectives of the Study on forest management is to improve the rural environment, stabilize and

increase the income of farm households and enhance the living standard of farmers through forest conservation and stable supply of fuelwood required by local people.

Concentrated Planting at Government Forestry Areas: The unused land with an area of 103 ha in the government-owned production forest area will be forested. The unused 370ha of land within Tram Chim national Park which have been kept for afforestation will also be forested.

Concentrated Planting outside Government Forestry Areas: 722ha of unused land in Than Hong and Than Binh districts is planned to be forested. Plantation will be managed by the People's Committee of the relevant communes.

Environmental Conservation Forest Zone: Environmental conservation forest zone will be created in the area of approximately 17,000ha lying in the northern part of Thap Muoi District for the purpose of preventing floods, conserving water and ensuring biodiversity. Concentrated planting will be planned for 900 ha of unused land. Scattered planting along roads, canals and ridges between paddy fields is planned. The DARD of the Dong Thap Provincial Government will be responsible for the supervision of planting and the management of new plantation.

Border Protection Forest: A border protection forest will be planned for the border zone with Cambodian territory for national security and flood prevention. This forest will be 46km in length and 100m in width and planted and managed by the DARD of the Dong Thap Provincial Government.

Scattered Planting: Scattered planting along roads, embankments and canals will be planned in areas other than Cai Be and Cai Lay Districts for the purpose of supplying fuelwood for local people and preventing soil erosion, floods and wind damage. Management responsibility lies in the People's Committee of the relevant communes. The project term will be 6 years and project cost is estimated to be 25,769 million VND.

4.2.4 Post-Harvest Processing

The following plans are proposed to reduce post-harvest losses, increase value added of the products, increase producer's income and job opportunity.

Training and extension of P/H technology: The project will deal with post-harvest technology training and extension program for the producers, traders and processors. Training concerning rice's post-harvest processing will be provided to those in Dong Thap Province while that of 'fruit and vegetable' will be considered for Tien Giang Province.

Improvement of Rice Processing Facility and Equipment: To reduce post-harvest losses and

improve quality of rice, the project component will include provision of credit for procurement of post-harvest facilities and equipment to producers and processors.

Model Project for Rice Marketing and Post-Harvest: A model cooperative project is planned to build efficient production and collective marketing system of rice.

4.2.5 Improvement Plan of Marketing System

Sales of major agricultural products of the Study Area, rice and fruits, depends on the foreign and domestic market outside of the Study Area, inferiority in quality is regarded as a major constraint for larger sales. In addition to improved quality control of the products, an expanded distribution volume for efficiency and a further involvement of producers into marketing system are required.

Improvement of Rice Marketing System: The project deals with building a new sales channel from producer to the polishers by means of formation of Model Agricultural Cooperatives. Four farmer's organizations will be chosen to form model cooperatives and they will handle sales of high quality rice and post-harvest processing. The experiences in the project will be applied to other areas. On the other hand, financial support, training and seminar will also be provided to collectors and millers aiming at cost reduction in marketing system.

Improvement of Fruit Marketing System: Farmers should be well informed about short and long term market climate to compete in volatile fruit market, which may enlarge sales volume and thus increase farmer's income. The project proposed here provides information regarding current price and quantity, foreign and domestic market through mass-media and ultimately building information networks which is materialized by assigning the task to a division of DARD under the coordination with Price bureau. Further, facilities and equipment at the Cai Be and An Huu Market will be improved responding to the increased sales volume of fruit at the Markets. The management responsibility will lie in Management Board consisting of members including traders. It will be supported and supervised by Provincial People's Committee.

4.2.6 Environmental Conservation

Acid Sulphate Soil, covering from middle to north of the Study Area, poses considerable constraints to daily water use including drinking water as well as agricultural production. In addition to this given natural environment, effluent of pesticide from paddy field also enhance the degradation of surface water quality of the area. Detailed Surface Water Quality Monitoring was recommended to tackle this problem. Surface Water Quality Monitoring will be reviewed first and parameters, sampling stations and sampling time will be revised.

4.2.7 Extension and Support System

Four plans were formulated dealing with production and supply of high quality rice seeds and fruit seedling, extension and training and farm mechanization which are expected to enhance the projects performance proposed in the marketing sector. These programs are currently being executed by subordinate agencies of Provincial DARD including extension center, crop protection department, livestock department and AGRISEDO.

Production and Supply Plan for High Quality Rice Seeds: Improved rice productivity and quality requires urgent reformation of seed production and supply system. The plan proposes to transfer the authority of seed selection and inspection to DARD. AGRISEDO is proposed to bear responsibility of seed production, multiplication of certified seed by contract basis with farmers and supply seed that is certified by DARD.

Two farms owned by AGRISEDO, the Dong Cat and the An Phong Farms, are to be specialized in production of FS, processing and supply of propagated seed. Annual replacement rate of seed is raised to 10 % by the Year 2010 considering the current modest rate, though, the final target is set as 20%. To materialize this target, it is proposed to improve infrastructure of the seed farm including dike system, canals, pumps and watergates. In addition, facilities such as Dryers, Processing system of seed and farm machinery will be purchased. To strengthen Inspection System, necessary facilities and equipment will also be procured.

Production and Supply Plan for High Quality Fruit Seedling: Fruits gardens in the Study Area are becoming more intensified than ever before reflecting general trend of farmer's attitude toward commercial base production. However, seedlings supplied in the area are poor quality because the system regarding selection of adequate seedling, its production and supply has not been well managed. In this context, the plan proposed to transfer the task of selection of adequate seedlings from AGRISEDO to Extension Center and thus AGRISEDO is planned to be specialized in production and supply of seedlings. The authority of inspection of seedling distribution will be transferred to DARD and strengthening of production system through procurement of facility and equipment at the Seedling Farm and at the Inspection Division will be planned.

Agricultural Extension and Training Plan: This plan proposed to provide training services to managers and staff of farmer's organization, private agents in rice and fruits market as well as farmers aiming at improvement of rice and fruits quality through technology transfer regarding crop management, post-harvest processing and forest management. It will be given through the extension center, so that the center was proposed to be equipped with rice milling machine for training, drying yard and other facilities.

Agricultural Mechanization Plan: Agricultural mechanization is seen mostly in cultivation and threshing operations in the Study Area. Considering the prospective further mechanization, a program was proposed dealing with demonstration of mechanized farming, provision of operation training and rental services of machinery including broadcaster, sprayer and combine. AGRISEDO is the

implementation organization.

4.2.8 Rural Credit

To respond the financial requirement for the implementation of proposed projects under the Master Plan, a proposal was made to raise a Special Fund. The fund may be provided to farmers for procurement of seed, seedling, dryer, construction of storage, facility improvement and to traders for scale expansion of transportation.

4.2.9 Farmer's Organization

Strengthening of farmer's organization is a necessary step in achievement of project goal. Cooperatives are being organized following the new cooperative law since its enactment, though, the number and scale of the cooperatives are limited and activities have not well developed. In the long run, 100 % of farmers in the region will be covered to join the organization, be trained and strengthened. For 10 years by the target year 2010, about 50% of the farmers will be targeted to be trained as organization's members. To this end, a plan was formulated to strengthen farmer's organization with provision of training services. In addition, a strengthening plan of the model cooperative mentioned in the former part will be dealt with particular emphasis on collective marketing system.

4.2.10 Integration of Sector Projects

Quality improvement of rice should be handled as one system beginning from producers through marketing and post-harvest processing. In this regard, the projects proposed in respective sector may necessarily be integrated and implemented under a coordinated scheme.

Plans dealing with quality improvement of rice were reorganized into an integrated project. The integrated project covers the Production and Supply Plan for High Quality Rice Seeds, Agricultural Extension and Training Plan, Strengthening Plan of Model Farmer's Organization and necessary special fund program.

4.3 Project Implementation Plan

4.3.1 Projects Prioritization

Comparative assessment of the projects proposed in the Master Plan was made to give priorities under the following eight criteria,

- i) project sustainability and environmental impact
- ii) farmers' benefit
- iii) conformity to regional and national plans
- iv) implementation feasibility
- v) socio-economic impacts
- vi) model effects

vii) economic impacts, and multiplier effect

List of respective projects included in the Master Plan

Sector	Project	
Agricultural Infrastructure	1.Flood Control on Boundary Area	A
	2.Flood Control on Southern Nguyen Van Tiep Canal	A
	3.Small Scale Dyke System Improvement	A
Forestry Management	4.Concentrated Plantation of National Forest	A
	5.Concentrated Plantation outside of National Forest	A
	6.Conservation Forest	A
	7.Border Protection Forest	A
	8.Scattered Plantation	A
Post Harvest Processing	9.Training and Extension of Post Harvest Technology including Quality Control and Monitoring of Harvest Losses	---
	10.Improvement of Drying Facilities/Equipment of farmers	---
	11.Improvement of Processing Facilities/Equipment of Processors	---
	12.Model Processing Activities by Farmer's Group	---
Marketing	13.Collective Marketing by farmer's Group	---
	14.Introduction and Dissemination of Collective Marketing	---
	15.Expansion of Marketing Scale at Producing Area	B
	16.Improvement of Fruits Marketing Information System	B
	17.Upgrade Wholesale Market for Fruits	B
Environmental Conservation	18.Monitoring of Acid Sulfate Soils/Water Quality	A
Extension and Support Services	19.High Quality Rice Seeds Production/Supply Project	---
	20.High Quality Fruits Seedling Production/Supply Project	B
	21.Improvement of Training/Extension System	---
	22.Agricultural Machinery Service Program	B
Rural Credit	23.Establishment of Special Fund for Respective Project Implementation	---
Farmers` Organization	24.Establishment/enhancement of cooperatives integrating the Projects of Various sectors	---

Integrated Project	Rice Production/Marketing Improvement Project <ul style="list-style-type: none"> ● Training and Extension of Post Harvest Technology including Quality Control and Monitoring of Harvest Losses ● Improvement of Drying Facilities/Equipment of farmers ● Improvement of Processing Facilities/Equipment of Processors ● Collective Marketing by farmer's Group ● Introduction and Dissemination of Collective Marketing ● High Quality Rice Seeds Production/Supply Project ● Improvement of Training/Extension System ● Establishment of Special Fund Respective Project Implementation ● Establishment/enhancement of cooperatives integrating the Projects of Various sectors 	A
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4.3.2 Implementation Plan

Implementation Plans were prepared in the form of annual plan for sector wise projects and also integrated project based on the evaluation results.

Total cost of all the projects is estimated as 5,806billion VND, among them the cost for infrastructure is 5,719billion VND.

Implementation Organization: Because of the nature and components of each project differs, those involved in project implementation vary widely. Generally, the projects are divided into 3 groups, those mainly managed by public sector, those by farmers and some by private sector. For the effective implementation of the priority project, capable and strong implementation organization is required. To establish Project Management Office should be established at provincial level, supported by Project Management Board consisted of MARD and other related organizations.

4.4 Initial Environmental Examination

Initial Environmental Examination was conducted following the Viet Nam's and JICA's Guidelines. It was made by categorizing the projects into the following eight fields of projects.

- | | |
|--------------------------------|------------------------------------|
| 1) Agricultural Infrastructure | 2) Post-Harvest Processing |
| 3) Forest Management | 4) Marketing |
| 5) Environmental Conservation | 6) Extension and Supporting System |
| 7) Rural Credit | 8) Farmer's Organization |

Considering the significant adverse environmental impacts, including alteration of hydrology, identified in the projects categorized in 'Agricultural and Rural Infrastructures' EIA was judged necessary for these projects. No significant negative environmental impacts were identified for the projects categorized in another fields, thereby, it was judged that detailed assessment is not necessary.

5. Priority Projects

Priorities were given to the following two projects among sector-wise and a integrated projects considering criteria mentioned above.

- i) Small Dike System Improvement Plan
- ii) Rice Production/Marketing Improvement Project
 - 1) High Quality Seed Production/Supply Project
 - 2) Model Cooperative Project
 - 3) Improvement Project of Training/Extension System

6. Small Dike System Improvement Plan

6.1 Outline

6.1.1 Outline of Small Dike System Improvement Plan

The study area is located in the inundation areas of the Mekong River Delta. This project aims at mitigating the damages of inundation by heightening existing dikes and also utilizing the dikes as road for the improvement of living condition of farmers. As target areas, two blocks were selected among the area of Master Plan. These are block from medium inundation zone and block from shallow inundation zone.

In block , though double cropping of paddy is currently practiced, production of Summer-Autumn is unstable due to the inundation in the harvesting season. By the project, stabilization S-A crop production and introduction of triple crop will be envisaged.

In block , triple cropping is practiced but third crop (Autumn-Winter) production is not stable due to inundation. Dike system improvement aims at stabilization of third crop production.

To exclude water within dike all at once by heightening dike may cause negative impact to the surrounding areas by raising water level. Therefore, the rotational inundation control is proposed in the project.

6.1.2 Basic idea of rotational inundation control

Existing dike systems are constructed based on the water level in August. Therefore, in October and November, farmland within dike is inundated. By heightening dike to protect the whole area at one time, huge amount of water excluded raise the water level outside of the area. In Rotational Inundation Control, though heightening of dike will be made in corresponding to the water level in October, inundation control is to be implemented rotationally among dikes, so as to minimizing the rise of water level outside of the area. To be more precise, in medium inundation zone around one thirds of the area will be non-inundated and remaining two thirds will be inundated in October-November in each year. The inundation and non-inundation areas will be rotated yearly and thus triple crop will be introduced to one thirds of the area. Crop intensity will increase to 2.3. For shallow inundation zone, inundation will be adjusted according to the harvesting schedule from September to October. By expanding the crop season, third crop production will be stabilized. In both zones, upper surface of the dike will be equipped as road.

6.1.3 Selection of F/S area

Total number of farm household amounted to 28,000 in block and block . Taking into consideration the difficulties to conduct study on consensus building among farmers on the project in the limited duration, it was decided that area of around 1,800 ha be selected for the social impact study, particularly on consensus building.

Therefore, the areas of block and block will be named as Pre-F/S area, while above 1,800 ha as F/S area.

In Pre-F/S Study, all the necessary study are to be conducted at F/S level, except those on social environment.

In F/S study, social impact study, particularly that of consensus building on project is to be conducted. After consideration of the technical, natural, social and administrative viewpoints, 1,800ha was selected from block .

6.2 Study area

6.2.1 Pre-F/S Area and F/S Area

Pre-F/S Area consists of block .in Dong Thap Province and block in Tien Giang Province. Block is located in the medium inundation zone and extends to 3 districts of Tan Binh, Cao Lanh and Tam Nong with total area of 21,000 ha and agricultural land of 18,000 ha. Block is located in shallow inundation zone and covers 2 districts of Cai Be and Cai Lay, with total area of 19,800 ha and agricultural land of 18,000 ha. Total area of Pre-F/S area is 41,000 ha, of which agricultural land is 36,000 ha.

F/S Area is located in the northern part of block ,with 1,800 ha of agricultural land. Binh Thanh commune of Tan Binh District and Gao Giong of Cao Lanh District are included in the area.

6.2.2 Present situations of agriculture and rural infrastructure in the area.

(Road network)

In general, current road network of the two blocks in the Pre-F/S area is not well developed and not suitable for transportation by vehicles. Both blocks are connected to National Road No.30 and No.1 respectively. However, within the area road network is not enough and many of them face difficulty in passage in flood season.

(Canal network)

Canals play important roles both for agriculture and transportation in both blocks. Due to the poor road network, canal network is utilized for shipping. The canals are also used for irrigation, drainage and for domestic water.

(Dike system)

In both blocks, dikes have been constructed since the beginning of 1980s. These dike systems have been constructed designed against the flood in August and cover almost all the area. In both blocks, the collapse of the slope and shoulders of embankment are so often observed.

(Irrigation / drainage and water management)

In canal system of Mekong Delta, main and secondary canals introduce water from outside while tertiary canals and those within dikes distribute water to paddy field. Aggregated density of tertiary and within dike canals is 20 m/ha for block , while that of block is 24 m/ha. Irrigation water is available for both blocks throughout the year due to abundant water resources of Mekong River. However, due to difference of water levels at canals, intake by pumping is required in dry season.

(Pumping facilities)

In the area, pump is essential for double and triple cropping of paddy. Currently so many number and types of pumps are used in the area. In block , there exist 167 fixed pump stations, of which 36 stations are owned and operated by cooperatives or farmers groups. Remaining are privately owned and operated by private individual as a commercial activity. In block , most of the pumps are mobile ones privately owned and operated by individual. No fixed pump stations exist in block .

Judging from the current situation of prevalence of private ownership in the area, practically it seems

very difficult to integrate these pumps to large-scale pump stations under public management. Regarding to replace the fuel pumps to electric one for saving the operational cost, limitation remains as electrification is not fully made in the area as yet.

6.3 Agricultural Production Plan

6.3.1 Pre-F/S area

(Block)

Among total agricultural land of 18,228 ha, nearly 98% are paddy field, as typical rice growing area. Most of the paddy field are under double cropping. By the improvement of dike system, one thirds of the area will be shifted to triple cropping. Current paddy production is 175,000 tons, which will increase to 213,000 tons, through stabilization of S-A crop and increase in third crop area.

(Block)

Currently, 82% of the agricultural land of 17,843 ha are paddy land. In these paddy land, triple cropping of paddy is common already. Compared to block , block has larger orchard of around 3,000 ha. Though no significant change in land use in expected in the area, stabilization of Autumn- Winter paddy and fruits production and increase in livestock production are expected by improving current dike system.

6.3.2 F/S area

The area is included in the block , with 1,824 ha of cultivated area and mostly double cropping is practiced. Around 600 ha or 30 % of the area will be shifted from double crop to triple crop in the plan. Paddy production will increase from 18,814 tons at present to 22,793 tons by the project.

6.4 Small Dike System Improvement Plan

6.4.1 Layout Plan of Small Dike Unit

The shape and size of dikes were designed based on the 1) present conditions of existing dikes, 2) present conditions of canal network, 3) water management within the dike unit, 4) minimizing land loss, 5) economic efficiency etc. Farmers ideas obtained during the social survey on consensus building in F/S area were also reflected in design. Total number and length of dikes in block are 33 and 345km and in block are 34 and 340 km respectively.

6.4.2 Irrigation and drainage plan

(Irrigation Plan)

As mentioned already, agriculture in the area are double and triple paddy cropping by irrigation. Irrigation water is available throughout the year from the existing canal system. However, due to the difference of water levels within and outside of the dike unit, pump irrigation is required in a certain season. In the plan, existing pumps are to be used in principle, and dike and related structure are

designed so as to enable the efficient use of the existing pumps.

(Drainage Plan)

The excessive water within the dike unit needs to be drained. Excessive water by heavy rainfall and preparation of the next crop after inundation period need drainage by pumps.

6.4.3 Water Management Plan

Water Management can be classified into two types, one for inundation control outside dikes and another for irrigation and drainage within the dike unit or on farm level. Different rotational inundation control needs to be applied for block and block . In block , ‘Rotation Control in Medium Inundation Area’ will be applied, with non inundation area in September-October at 30% of the total area, to minimize the negative impact of raising water level in surrounding area. The non-inundation area is able to introduce triple crop of paddy. Therefore, paddy land in each dike unit can grow triple crop once in three years. Each dike unit will be operated for rotational inundation control by using the control gate on the dike. Control gate will be set at the level of August flood to protect the Summer-Autumn crop harvest. In non-inundation dike unit, control gate will be closed to protect even from October flood.

In block , ‘Rotational Inundation Control in Shallow Inundation Area’ will be applied. In this area, triple crop will be practiced over the whole area and inundation will be from October to November in line with the harvesting period of each dike unit. In practice, all the dike unit will be closed until the beginning of September, then one thirds of the dike units will be inundated one by one until the end of September. Water control within dike unit follows current practice.

6.4.4 Facility Improvement Plan

(Dike)

The existing dike system will be improved by upgrading the elevation cross section of dikes so as to protect land within dike from October flood. Basic requirement for improvement is as follows;

Elevation:	Against flood at October with 10ys provability 20 ys provability for car road
Width :	3.0 m for bike road, 5.0m for car road
Roads :	Laterite pavement for bike and crashed stone pavement for car
Slope :	1:1.5
Step :	Step of 2.0 m on the slope for tree planting

(Water gate)

In the area, small boat is important transportation mode using canal system. Therefore, water gates are planned to secure boat transportation. In planning water gates, in view of economic efficiency, to secure the minimum access of small boat transportation except flood and irrigation periods was considered.

(Culvert)

Current management system of “ cut and repair ” of dike will be rectified by installing culverts for

irrigation and drainage. These culverts will be installed at the interconnection of canals, pump station and points of temporary irrigation and drainage.

(Control gate)

To implement rotational inundation control, control gates will be installed on the dike. The gate will be overflowed. The control gate also has the function of spillway. The frequency of operation (close/ open) is limited, type of control gate is planned by stop log type.

(Pier and Approach)

Some of the existing piers need to be removed for construction works of dikes. Later, they shall be reconstructed by farmers themselves. However, approach way along the dike slope will be included in the project.

(Rural road network)

Improved dikes will be utilized as rural roads. Therefore, these will be constructed so as to be usable throughout the year. The level of dike improvement as road network is for bike transportation in principle. However, for those route planned as district road improvement, enough cross section will be secured so as to avoid the duplication in future. To secure the road network, construction of bridges for bike transportation are also included in the plan. For car transportation road, bridges with required capacity for car transportation will be constructed by the plan. However, a part of them will be remained for the future action by district or provincial government.

6.5 Study on Environmental Impact

6.5.1 Natural Environmental Study

Impacts of project on natural environment were assessed and their mitigation measures were considered together with the proposal on monitoring plan. EIA Report needs to be prepared, based on the results above, and to be submitted to National Environmental Agency in accordance with law and regulation of the country.

(Assessment of the potential impacts)

Assessment on 6 items were made, namely, 1) Acidification of soil, 2) Changes in surface water hydrology, 3) Degradation of surface water quality 4) Deterioration of soil fertility, 5) loss of fishery resources, and 6) Changes in rodent population.

(Mitigation measures)

Based on the assessment of impacts for respective item, mitigation measures were considered and recommended. In general, the negative impacts to be caused by the project were considered to be able to mitigate. However, impacts on down stream areas by fertilizer and chemical use, deterioration of soil fertility and loss of fishery resources were not well clarified due to lack of baseline data.

(Monitoring plan)

Due to the above, monitoring plans are prepared and proposed for future action. These include Surface water quality monitoring plan and Biological monitoring plan.

6.5.2 Social Environmental Study

(Pre-F/S Area)

Social environmental survey was conducted for block and block , aiming mainly at identification of key stakeholders, assessment of social impacts and minimization of adverse impacts.

In public hearings which were held separately in Dong Thap Province and Tien Giang Province, the basic development ideas on small dike system improvement were introduced and general response of the farmers were obtained. Further, selecting 4 villages among the area, RRA and quantitative survey were conducted to grasp the general information of the area, present situation of community structure and rural organization, and also to clarify the characteristics and needs of beneficiary groups and also their capacity. The negative impacts of small dike system improvement were also referred in the survey. In general, paddy farmers expressed their keen interest on small dike system improvement. However, the fruits farmers expressed, in a way, negative response on the project idea, since rotational inundation control is not directly applicable to fruits production. Naturally, the effect of dike improvement will differ from medium inundation zone where paddy is single dominant crop and shallow inundation zone where diversified farming are practiced. Therefore, different approaches will be required for respective zone and needs for implementation of pilot project was emphasized to verify the intangible benefit expected by the project. It was noted that farmers had serious concerns on the loss of land to be caused by dike improvement.

(F/S Area)

The survey on F/S area was mainly focused on that relating consensus building on the project among beneficiary farmers. The survey consisted of preliminary survey, formulation of draft project design, evaluation of the consensus building and formulation of project design by participants.

In preliminary survey, emphasis was placed on, 1) to grasp the actual situation of target community and people, 2) to enhance the understanding of the people on the activities of the survey team, 3) to encourage the active participation in survey of farmers, and 4) to encourage local representatives to actively join the stakeholder meetings (SHM) and technical working groups (TWG). Preparation of draft project design was made through two sessions of SHM and the work of TWG. SHM was aimed at increasing understanding of the beneficiaries on project ideas and to obtain their reaction. Selection of TWG members was also entrusted to SHM. TWG was expected to make project feasible and acceptable one to the beneficiaries and to encourage the project ownership spirit and responsibility both at administrative and inhabitants sides.

The draft project design prepared by TWG was submitted to the 2^d SHM for consideration, which included the topics of negative impacts of the project, rotational inundation control and dike system, cropping pattern and infrastructure and operation and maintenance of dike system.

Consensus building is the process of bottom up approach to formulate various projects by people's participation and consists of public hearing, discussion at village level, install of opinion box and evaluation of the consensus building. Results of the public hearings and TWG meetings were presented

as the draft design of the project at the third SHM for open discussion for consensus among participants. (Technology Transfer Seminar)

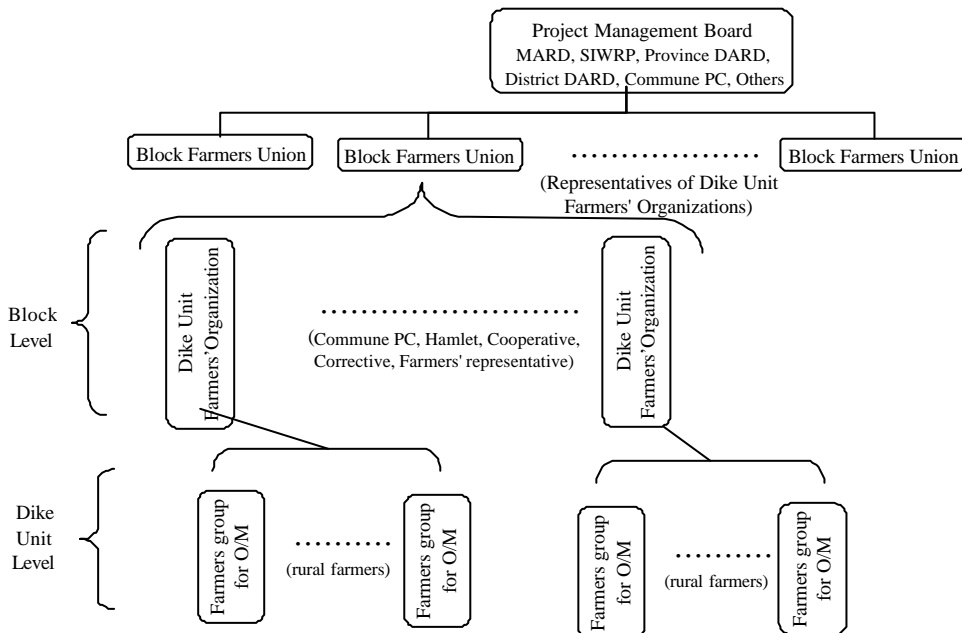
Based on the result of the Social Study above, Draft EIA Operation Manual, focused particularly on social environment was prepared. Using this Draft Manual, technology transfer seminar was held.

To confirm the consensus on project implementation among rural inhabitants, social environmental survey of EIA needs to be conducted for Pre-F/S area. Therefore, for the implementation of this survey, survey plan, including team composition, training of team members, survey procedures and implementation schedule was prepared and proposed.

6.6 Project Implementation Plan

6.6.1 Project Implementation and O/M Organizations

Four organizations are required for the project implementation and operation, one for project implementation, the second for the management of rotational inundation control and the third and the fourth for O/M of small dike and related structures. For the implementation of the project, Project Management Board will be established, consisting of SIWRP and other related institutions. For the management of rotational inundation, Block Farmers Union will be organized to make rotation plan, to cope with heavy flood and to monitor the implementation of rotational inundation. Actual implementation and management of rotation will be done by Dike Unit Farmers Organization to be established for each dike unit. Dike O/M Group will be organized among farmers at the unit of 1.0 km dike for the maintenance of the specified dike portion and it’s related structures.



6.6.2 Implementation Plan

For the implementation of the project, EIA, including consensus building needs to be conducted in advance. Project will be implemented separately and in parallel for block and block . EIA,

including consensus will require 1 year and 3 months. For detail design and tendering will require 9 months and construction period will be 3 years judging from the scale of works. Seasonal conditions were taken into consideration for the works.

6.7 Operation Plan

The operation of the rotational inundation control will be done by 4 organizations, Project Management Board, Block Farmers Union, Dike Unit Farmers Organization and Dike O/ M Group as referred in 6.6.1. Through EIA including consensus building, full discussion needs to be made among farmers and concerned organizations for agreement.

6.8 Maintenance Plan

The maintenance of small dike and related structures includes Patrol/Inspection, Routine maintenance, Periodical maintenance and Rehabilitation. To effectively conduct these maintenance activities, coordinated and comprehensive plan is required.

Under the guidance of DARD at district and province, plan for each work item be prepared by farmers organization. Work items, contents, work interval and responsible organization are described in the main text.

Basically farmers owe the maintenance cost and to be included in irrigation fee. Commune's People's Committee will be in charge of coordination of the maintenance plan.

6.9 Project Cost

Total project cost is estimated at 544,218 million VND. Of which construction cost is 381,869 million VND, consultants services 38,190 million VND and land compensation 124,159 million VND. By currency, domestic currency portion is 525,123 million VND and foreign currency portion is 19,095 million VND or 1,358,000 US\$.

6.10 Alternative Plan for Project Implementation

For the smooth implementation of the Small Dike System Improvement Project, an alternative plan is proposed to implement the project in a limited scale as 1,800ha, in advance to implement the whole area of Pre-F/S, to confirm and verify the efficacy of this new approach of rotational inundation control. As the study on social environment including consensus building has been completed, F/S Area is considered most suitable for this model project. The result and experience of the implementation and operation will provide important foundation of the succeeding implementation on Pre/FS Area.

7. Rice Production/Marketing Improvement Project

7.1 Outline

Rice is a dominant crop and its production plays important role for the economy of the area. It is not only

the staple food but also commercial crop in the area. Though achieved fairly high yield, the quality of rice produced in the area remains low and hence low income of farmers. Therefore improvement of rice quality is given high priority in the development of area.

To improve the quality of rice, comprehensive approach is required from the production to processing and marketing stages, as the current constraints are closely related each other. In this plan, project aims at improvement of rice quality through which to increase farmers income and support increasing job opportunities in the related sectors.

The project consists of following three sub projects selected from the integrated project identified in the Master Plan as a priority project

- 1) High Quality Seed Production/Supply Project
- 2) Model Cooperatives Project
- 3) Improvement Project of Training/Extension System

7.2 High Quality Seed Production/Supply Project

7.2.1 Background and objectives

Paddy seeds in Vietnam are usually classified into 3 stages,(1) Breeder Seeds: BS. (2) Foundation Seeds: FS, and (3) Certified Seeds : CS. BS are mainly developed by national research institutions and universities and provided to provinces. In province, these BS are multiplied to FS and then supply them to seed growers including farmers. The seeds produced by seed growers are called CS after seed processing and inspection, and supplied to ordinary farmers. In Dong Thap Province, AGRISED, the State Operated Enterprise (SOE) of the province and Agricultural Extension Center (AEC) are involved in seed production and marketing. AGRISED produces FS from BS obtained from National institutes at it's 2 seed farms (An Phong and Dong Cat) and from FS, further produces CS directly by these farms or seed growers. Produced CS are distributed to ordinary farmers. At present, annual production of CS amounts to 1,600 tons. AEC conducts adaptability tests and CS production in cooperation with Extension Stations at district level with annual amount of 1,000 tons. Therefore, total amount of CS production in the province is estimated at 2,600 ton per year. However, due to time lag of seed demand and supply, substantive amount of CS are supplied to the outside of the province. Actual supply of CS to the farmers in the province are estimated around 1,100 tons. This is about 1.4 % of the total seeds. Constraints on seed production and distribution are; low seed production technology, wide distribution of non - certified seeds, poor inspection system, poor storage facilities which limit the countermeasure for emergency and lack of well organized distribution system.

Therefore, project aims at creating efficient paddy seeds production and distribution system by improving production facilities of existing seed farms and strengthening seed inspection system to meet the needs of farmers.

7.2.2 Implementation Organization

Agriculture and Rural Development Department of the province is responsible for the implementation of the project. Actual project components are conducted by AGRISEDO and AEC. AGRISEDO is in charge of FS production and their supply to seed growers and also marketing of CS. AEC deals with variety adaptability test and seed inspection.

Target of CS seed production on a longer - term basis(2020) is considered as 20 % replacement ratio. Therefore, in the target year of 2010, replacement ratio will be raised to 10%. In 2010, the CS supply in the province will be raised to 8,500 tons.

7.2.3 Implementation Plan

CS production will be increased gradually, and seed replacement ratio at farmers level will reach 10 % in 2010. To achieve the target, FS production need to be increased from 140 tons at present to 420 tons in 2010. Similarly, CS need to be increased from 2,600tons to 8,500 tons.

To realize the objectives, facilities and equipment of the seed farms of AGRISEDO, and AEC are required. In addition to the existing organization, a seed center will be established in Hong Ngu additionally.

Major component includes land improvement of seed farm, construction of warehouse, introduction of farm machinery, drying and processing facilities and inspection equipment of seed farms and AEC.

No new staff member is required except seed center to be established in Hong Ngu. For the new seed center 2 staff will be recruited with 5 part time workers.

7.2.4 Facilities and Equipment Plan

The plan covers facilities and equipment improvement plan at the An Phong and Dong Cat Seed Farms, three Seed Processing Centers and Seed Control and Certification Division. It mainly deals with seed production farms, related offices, storage and dryers.

Seed storage and drier is included for the Seed Processing Center and laboratory facilities will be covered for the Seed Control and Certification Division.

7.2.5 Project Cost

Total cost of the project is estimated at 55,695 million VND. Of which for facilities is 36,010 million VND, for equipment 14,623 million VND and for consultants services 5,062 million VND.

7.3 Model Cooperatives Project

7.3.1 Background and objectives

For the production and marketing of high quality paddy/ rice by farmers themselves, model cooperatives promotion project is proposed. The project aims at producing unified variety with high quality by farmers groups, and processing and marketing collectively by cooperatives. By these activities, cooperatives will be strengthened in their technical and management capacities. By achieving

higher market value, member farmers income will be increased.

Two cooperatives were selected for Model Cooperatives Project, Gao Giong Agricultural Cooperative and Phu Tho Cooperative based on the criteria of the selection. Intensive discussions have been made among cooperatives leaders, member farmers, officials of commune, district and province and SOE to exchange ideas and information. PCM (Project Cycle Management) workshops were also held twice at two cooperatives to increase their understanding of the current situation of cooperatives and to make them consider the problem and solution. Further, PCM workshop provided opportunity to grasp current situation of cooperative management to encourage dialogue between farmers and administration.

As a approach to increase in farm income by improving quality, the idea of the Model Cooperative Project is well accepted. Two model cooperatives will implement the introduction of better variety seeds, unified variety production by member farmers, improved post-harvest processing and by introduction of drying facilities and rice mill for collective marketing. By their effective and successful implementation, these models will be diffused to the surrounding area.

7.3.2 Implementation Organization

In implementation of the project, the responsible organization is the Department of Agriculture and Rural Development (DARD). As project includes so many activities, Project Management Board will be established consisting of members from 2 cooperatives, DARD, AEC, Cooperative Alliance and others, to support and guide the project operation.

At two cooperatives, new organizational structures are to be strengthened, particularly for collective marketing and rice mill sectors. For rice mill sector, new recruitment of staff will be considered either from SOEs or private sector. Simple labor for collective marketing, warehouse management and rice mill will hire on temporary basis.

7.3.3 Implementation Plan

Operation of the cooperatives is divided to two stages, growing stage and collective marketing stage including processing. At the growing stage, member farmers grow unified variety with high quality seeds under the production plan and guidance of cooperatives. Technical support is provided by AEC and related agencies. Regarding collective marketing including processing, each model cooperative is directly responsible for operation of facilities and equipment to be introduced for collective marketing and processing. Such facilities and equipment include rice mill, warehouse, drying facilities etc. For the effective management of model cooperatives, strengthening the existing organizational structure and operational capacities are emphasized. Staff members of cooperatives, including leaders need to be given opportunity to participate in training courses on management, finance and accounting and other technical trainings on rice mill operation and maintenance.

For collective marketing and processing, regular meeting between cooperatives and SOEs, are considered so as to effectively coordinate the collection of paddy from farmers, processing of paddy and delivery of rice to SOEs in terms of the amount and timing.

7.3.4 Facilities and Equipment Plan

For two cooperatives, Gao Giong and Phu Tho, facilities and equipment related to collective marketing and processing are planned. These include drying facilities, rice milling facilities, quality inspection and control facilities etc.

7.3.5 Project Cost

Total amount of the project cost is estimated at 18,534 million VND. Of which for facilities is 14,230 million VND, for equipment 2,616 million VND and for consultants services 1,688 million VND. All of these are related to collective marketing and processing.

7.4. Improvement Project of Training/ Extension System

7.4.1 Background and Objectives

To promote effectively the improvement of quality of paddy/rice, and also to support implementation effectively of the projects on seeds production / supply and model cooperatives, as mentioned above, trainings of personnel concerned are essential. Trainings courses on seeds production, post-harvest processing, farmers organization including cooperatives are planned. By expanding functions and capacity of existing Agricultural Extension Center (AEC) the trainings will be conducted addressing broad range of trainees. Trainees include not only farmers and cooperatives staff, but also local government officials and those from private sectors related to rice production, marketing and processing.

Sector wise objectives and contents are;

Seed production

Seed growing farmers are not well aware of the importance of seeds and lack the basic technology for seed production. Local government officials in charge of seed production also need training for increasing their technical and management skills. Therefore, trainings target to seed growing farmers, local government officials.

Post harvest processing/marketing

In view of the importance of post harvest processing at all stages from production to marketing, trainings are planned on (1) post harvest technology at farmers level,(2) management and operational skill of rice millers and (3) diffusion of quality control and inspection technique.

Farmers' organization

Capacities and knowledge of leaders, senior and others of farmers' organizations differ by their organization. Therefore, training program will be considered so as to meet the actual requirement of the participants. Three programs are planned, one for leaders, another for finance and accounting staff, and study tour to successful organizations for the cooperative members.

7.4.2 Implementation Organization

Agricultural Extension Center is responsible for the implementation of the project. In addition to the extension services, new functions and activities are to be conducted. For new activities such as those for post harvest processing and farmers organization, trainers and instructors need to be invited from other agencies. In AEC, a new section will be created for the post harvest processing training with 5 staff members.

7.4.3 Implementation Plan

As mentioned, trainings are divided to three groups, seed production, post-harvest processing and farmers organization. For each training course, target of trainees, contents of and term of training are planned.

Schedule of training are also considered, taking into account the availability of the facility, recruitment of instructors and expected convenience of participants.

7.4.4 Facilities and Equipment Plan

Within the campus of existing AEC, lecture room and test rice mill are to be established. In test rice mill, flat bed dryer and quality inspection equipment will be introduced.

7.4.5 Project Cost

Total cost of the project is estimated at 9,533 million VND. Of which for facilities is 6,749 million VND, for equipment 1,912 million VND and for consultants services 872 million VND.

7.5 Rice Production/Marketing Improvement Project Cost

Total cost of the Rice Production/Marketing Improvement Project is estimated at 83,762 million VND. Of which for facilities is 56,989 million VND, for equipment 19,151 million VND and for consultants services 7,622 million VND.

8. Project Evaluation

8.1 Outline

Approach: Project Analysis may be undertaken from different point of views ranging from Economic, Financial, Soci-economic analyses to, more recently, Environmental Analysis. In this study, the analysis was undertaken with an emphasis on Economic Analysis as the proposed projects promote a broader range of social welfare.

Assumptions:

- 1) Project life : 30 years including Detailed Design and Construction Period.
- 2) Local Price Unit (VND) is adopted.

- 3) The foreign currency exchange rate : 14,010 VND/US\$ (The foreign exchange rate of State Bank as of March 2000)
- 4) Economic Discount Rate at 10.0%
- 5) Financial Discount Rate at 11.0%
- 6) Farm products are valued in Farm-Gate Prices. Construction materials and farm inputs are valued in Ex site prices.

8.2 Project Benefit

Project benefit includes tangible and intangible benefit. The former may be measured in monetary term including 1) the net value of additional farm output arising from increased cropping intensity and 2) cost saved in terms of lower maintenance cost that had previously expended without the project. The latter may not be measured in monetary term including 1) increased employment opportunity, 2) improvement of living standard 3) poverty eradication and further 4) contribution to national food security. The benefit of the projects is given below.

Small Dike System Improvement Plan

Benefit in F/S area	:	5,301 million VND
Benefit in Pre-F/S area	:	87,847 million VND
Block	:	52,968 million VND
Block	:	34,879 million VND

Rice Production/Marketing Improvement Project

40,996 million VND

8.3 Economic Analysis

Project criteria for the economic analysis of the proposed projects (Small Dike System Improvement Plan and Rice Production/ Marketing Improvement Project) are given below. In addition to independent analyses of single project, a case study was also made by combining cost and benefit of these two separate projects.

A particular consideration was made for cost allocation of Small Dike System Improvement Plan because it is deemed rather equitable if the cost for bridge construction is shared by a broader beneficiaries. It was analyzed for two cases of project costs, 1) with and 2) without bridge construction cost.

Small Dike System Improvement Plan (with bridge construction cost)

Area	EIRR	ENPV	E B/C ratio
F/S area	12.1%	4,995million VND	1.16
Blcok	15.6%	101,547million VND	1.38
Block	12.3%	30,381million VND	1.14
Pre-F/S area (+)	14.2%	131,991million VND	1.27

Small Dike System Improvement Plan (without bridge construction cost)

Area	EIRR	ENPV	E B/C ratio
F/S area	14.8%	10,453 million VND	1.34
Block	19.1%	144,282 million VND	1.64
Block	17.3%	79,962 million VND	1.49
Pre-F/S area (+)	17.6%	162,298 million VND	1.41

(2) Rice Production/ Marketing Improvement Project

EIRR, ENPV, EB/C ration are given below.

	EIRR	ENPV	E B/C ratio
Rice Production/ Marketing Improvement Project	23.2%	138,084 million VND	3.02

(3) Combination of the two projects

Area	EIRR	ENPV	E B/C Ratio
Dike Plan* F/S area and Rice Production Project **	21.4%	147,558 million VND	2.48
Dike Plan* Pre F/S area and Rice Production Project **	16.3%	270,012 million VND	1.49

*Dike Plan: Small Dike System Improvement Plan

**Rice Production Project: Rice Production/Marketing Project

(Sensitivity Analysis)

Sensitivity analyses were conducted as a part of Economic Analysis for the two projects under three different assumptions, 1) 10 % increase in Project Cost, 2) 10% decrease in Benefit and 3) Prolonged construction period for 1 year. It was confirmed that change in construction period has a larger influence on the overall valuation of the project.

Sensitivity analysis of Small Dike System Improvement Plan (Pre-F/S Area)

Area	EIRR	ENPV	E B/C Ratio
Standard Value	14.2%	131,991 million VND	1.27
10% increment in Cost	12.5%	83,753 million VND	1.16
10% decrease in Benefit	12.3%	79,495 million VND	1.15
Prolonged construction Period (1 Year)	12.0%	71,538 million VND	1.15

Sensitivity analysis of Rice Production/Marketing Improvement Plan

Area	EIRR	ENPV	EB/C Ratio
Standard Value	23.2%	138,084 million VND	3.02
10% increment in Cost	21.7%	131,230 million VND	2.74
10% decrease in Benefit	21.2%	117,425 million VND	2.71
Prolonged construction Period (1 Year)	20.4%	117,156 million VND	2.71

8.4 Financial Analysis

Financial analyses of the projects are given below.

Area	FIRR	FNPV	FB/C ratio
Dike Plan* F/S area	10.1%	-1,328 million VND	0.96
Block	13.2%	41,058 million VND	1.14
Block	9.9%	-13,480 million VND	0.94
Pre-F/S area (+)	11.8%	27634 million VND	1.05
Rice Production Project **	18.4%	84,310 million VND	1.86

*Dike Plan: Small Dike System Improvement Plan

**Rice Production Project: Rice Production/Marketing Project

FIRR of the Small Dike System Improvement Plan was valued at a lower rate.

Additional financial analysis was made excluding the cost for bridge construction.

Area	FIRR	FNPV	FB/C ratio
Dike Plan* F/S area	13.9%	6,605 million VND	1.22
Block	18.3%	132,185 million VND	1.56
Block	16.5%	55,442 million VND	1.34
Pre-F/S area (+)	17.6%	162,298million VND	1.41
Rice Production Project **	18.4%	84,310millionVND	1.86

*Dike Plan: Small Dike System Improvement Plan

**Rice Production Project: Rice Production/Marketing Project

(Sensitivity Analysis)

Sensitivity analyses were conducted as a part of Financial Analysis for the two projects under three different assumptions, 1) 10 % increase in Project Cost, 2) 10% decrease in Benefit and 3) Prolonged construction period for 1 year. It was confirmed that changes in construction period has a larger influence on the overall valuation of the project.

Sensitivity analysis of Small Dike System Improvement Plan (Pre-F/S Area)

Item	EIRR	ENPV	E B/C Ration
Standard Value	11.8%	27.634 million VND	1.05
10% increment in Cost	10.2%	-24,990 million VND	0.96
10% decrease in Benefit	10.2%	-23,580 million VND	0.96
Prolonged construction Period (1 Year)	10.1%	-30,547 million VND	0.94

Sensitivity analysis of Rice Production/Marketing Improvement Plan

Item	EIRR	ENPV	EB/C Ration
Standard Value	18.4%	84,310 million VND	1.86
10% increment in Cost	17.0%	74,493 million VND	1.69
10% decrease in Benefit	17.0%	67,718 million VND	1.69
Prolonged construction Period (1 Year)	16.1%	64,662 million VND	1.66

(Farmer's Financial Analysis)

Additional net benefit generated by the two projects is valued at 4 million VND/farm household.

8.5 Socio-Economic Evaluation

(1) Improvement of living conditions

Living conditions will be significantly improved by improved road network. This contributes not only to agricultural production but also to the better access to social amenities, such as school, medical care of the rural residents.

(2) Increase in job opportunities

By the implementation of the project, additional job opportunities for construction works will be provided temporally. Further, expanded planting area, particularly for triple cropping calls for additional hired labor in farming

(3) Poverty alleviation

By the implementation of the project, farmer's income will increase and thus contribute to the reduction of poverty in general. For those who are landless or small scale farmers, expected increase in job opportunities will help to increase their income.

(4) Contribution to the national food security

As the area is located in Mekong Delta, the granary of the country. stable and sustainable crop production, particularly of paddy in the area will contribute significantly to the national food security in a long term basis.

8.6. Conclusion of evaluation

As clarified by the above analyses, by implementation of the project, increased agricultural production with improved quality will be realized and farm income will be increased significantly. Further, living conditions will be improved by better road network. Intensification of agriculture will provide additional job opportunities, contributing to the poverty alleviation in the area. Therefore, the project is considered to contribute significantly to the economic development and social welfare of the area as well as of the country.

The implementation of the projects is justified based on the results of economic and financial evaluation, together with the socio-economic effects on poverty alleviation and increased job opportunities to be expected by the project..

9. Recommendation

The project is expected to contribute to the socio economic development of the area by stabilizing and increasing agricultural production, increasing market value of the product and improving living conditions of the inhabitants. By implementation of the project, increase in farmer's income will be achieved and also assist poverty alleviation in the area by increased job opportunities. Therefore the project needs to be implemented as early as possible.

Small dike system improvement for rotational inundation control is a rather new approach in the Mekong Delta. If successfully implemented, this will be widely applied to other part of the Delta. Accordingly it is recommended that the project be implemented at the earliest stage from the preceded area.

As for the Rice Production/Marketing Improvement Project, it is an integrated project aiming at improved rice quality. It is recommended that the project be implemented under a sound management with active participation of DARD because it deals with a broad range of issues.