

APPENDIX E : AGRICULTURE

APPENDIX-E AGRICULTURE

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E.1. INTRODUCTION

This Appendix details the present agriculture and agriculture development plan in the Study Area prepared based on the study and is composed of E.1, E2 and E.3.

E.1, the introduction explains briefly the contents of this Appendix.

E.2 deals with the present agriculture conditions in the Study Area. The Section E.2.1 indicates the present land use in the Study Area by categorizing into 5-land use types.

Section E.2.2 describes the present agricultural production in the Area. The main topics of this chapter are paddy, fruits, livestock and aquaculture.

Section E.2.3 and E.2.4 mention farming system and farm mechanization in the Study Area, respectively.

Section E.2.5 and E.2.6 deal with the financial analysis of farming models and farming constraints in the Study Area.

Chapter E.3 presents the proposed agriculture development plan in the Study Area. Section E.3.1. is discussed the proposed land use plan. In the land use plan, the agricultural land is expected to increase little while the triple rice cropping area and perennial crop area will be increased.

The proposed crop production plan is given in Section E.3.2. In this section, target of agricultural production and improving quality are discussed.

E.2 PRESENT AGRICULTURE IN THE STUDY AREA

E.2.1 Land Use

The Study Area of about 290,000 ha is classified into five by land uses. More than 79% of land area is used for agriculture, 4% for forestry, 11% for residence and 5% for other purposes such as roads and public facilities. The remaining 2% are unused land. The most of agricultural land are used for annual crops of which paddy is the dominant with the share of 88%. Agricultural land comprises 200,116 ha of rice based annual cropland, 1,273 ha for other annual cropland and 26,981 ha for perennial cropland.

Present land use in the Study Area is shown in the following table.

Estimate from GIS ha			Source from Statistic Book ha
Total Area	290,309		
Agricultural land	228,370	79%	206,100
Rice based cropland	200,116	88%	176,100
Other annual cropland	1,273	1%	4,200
Perennial cropland	26,981	12%	26,100
Forestry land	10,772	4%	8,994
Residential Area	32,400	11%	-
Unused land	5,333	2%	-
Others land	13,434	5%	-

The Study Area is the rice crop zone where the paddy field spreads. The riverbanks of the Mekong River are used for road, houses and orchards, and some parts of the areas are used for rice and upland crop cultivation. The north-eastern periphery of the study area, in which acid sulphate soils exist with a belt of 10 to 15 km wide, had been developed mainly for single rice crop and reserved forest. Forestland and unused land area are concentrated around this area. Most of residential land areas are located along the road and canals scattering in the whole area.

Present land use in the Study Area by district is shown in the following table and details in Table E 2.1.

Land Use in Each District

	Dong Thap Province							Tien Giang Province	
	TX Cao Lanh	Tan Hong	Hong Ngu	Tam Nong	Thanh Binh	Cao Lanh	Thap Muoi	Cai Be	Cai Lay
Total Area	8,362	29,153	22,696	46,033	24,402	46,165	51,887	40,098	21,513
Agricultural land	5,152	25,420	16,461	31,987	19,172	36,480	39,162	36,325	18,211
	62%	87%	73%	69%	79%	79%	75%	91%	85%
Rice based cropland	3,255	24,973	16,316	31,741	18,737	34,760	37,993	21,198	11,143
Other annual cropland	657	142	145	126	155	0	0	0	48
Perennial cropland	1,240	305	0	120	280	1,720	1,169	15,127	7,020
Forestry land	0	165	0	3,021	0	2,032	5,393	161	0
Residential Area	1,740	2,282	3,186	7,651	3,005	4,070	5,929	2,554	1,983
Unused land	0	743	0	2,996	148	137	1,215	21	73
Others land	1,470	543	3,049	378	2,077	3,446	188	1,037	1,246

Source from Sub-NIAPP in 1998 (Estimate from GIS)

Though agricultural land in Cai Be and Cai Lay districts in Tien Giang Province covers more than 85% of the area, the share of land for paddy production is lower in comparison with other districts in Dong Thap, reflecting the progress of crop diversification in the districts. Among the districts in Dong Thap Province, the coverage of agricultural land is the largest in Tan Hong district (87%) with high contribution of paddy area. Remoteness and such natural environmental constraints as hydrological conditions may be the key determinants for this agricultural setting. It is noted that the share of agricultural land in Thap Muoi district is relatively small, while the forest cover is the largest. This is due to the presence of Acid Sulfate Soils, to which *Melaleuca* is well adapted. In Tam Nong district the share of agricultural land is 69% which is smaller than most of the districts in the Study Area, as the district includes Tram Chim National Park. In Cao Lanh town, the agricultural land occupies about 62% of the area with the smallest share of land for paddy production.

The characteristics of agricultural land use in the study area are;

- 1) Area used for paddy production is dominant.
- 2) Rotation of paddy and other crops is not usually practiced.
- 3) Perennial cropland is limited due to flood and inundation.
- 4) Forest area is also very much limited as a result of the progress of reclamation.

E.2.2 Agricultural Production

(1) General Features

In the Study Area, paddy rice is a dominant crop, occupying more than 92 % of total sown area of 424 thousand ha. However, the Study Area can grow different kinds of crops owing to its tropical

climate. Blessed with tropical monsoon climate, other cereal crops, industrial crops, fruits and vegetables are grown in addition to paddy under different cropping systems. Provincial statistics on planted area and production of different crop groups in the year 1998 are given below. Planted area and agricultural production of each district indicates Table E.2.2 and Table E.2.3.

Agricultural Product

		Planted Area		Production (ton)	Yield (ton/ha)
		(ha)	(%)		
Food Crop	Paddy	388,710	91.66	1,859,433	4.8
	Maize	1,048	0.25	5,295	5.1
	Sweet potato	84	0.02	618	7.4
	Other starch crop	279	0.07	2,881	10.3
Vegetable and Beans	Vegetables	1,259	0.30	12,923	10.3
	Beans	1,205	0.28	1,753	1.5
Annual Industrial Plants	Sedge	334	0.08	1,838	5.5
	Sugarcane	983	0.23	52,283	53.2
	Groundnut	119	0.03	299	2.5
	Soybean	3,727	0.88	7,740	2.1
	Sesame	42	0.01	19	0.5
	Tobacco	156	0.04	500	3.2
Perennial Plants	Coconut	864	0.20	4,547	5.3
	Citrus	1,484	0.35	21,077	14.2
	Longan	6,993	1.65	81,576	11.7
	Banana	2,216	0.52	17,087	7.7
	Mango	7,358	1.74	24,973	3.4
	Star apple	99	0.02	644	6.5
	Jack fruit	35	0.01	76	2.2
	Plum tree	314	0.07	2,845	9.1
	Papaya	294	0.07	3,652	12.4
	Guava/Apple	784	0.18	5,152	6.6
	Custard-apple	111	0.03	194	1.7
	Sapodilla	326	0.08	2,967	9.1
	Rambutan	158	0.04	1,309	8.3
	Durian	103	0.02	715	6.9
	Others	4,983	1.18	185,344	37.2
Total		424,068			

Source from Provincial Statistic Books in 1998 (calculated within only study area)

(2) Paddy Production

Rice production in the Study Area has increased rapidly in the past ten years. However, increase in average yield is rather slow, from 4.1 ton/ha in 1988 to 4.8 ton/ha in 1998. In contrast, the paddy-cultivated area increased from 224 thousand ha in 1988 to 388 thousand ha in 1998. And gross paddy production increased from 877 thousand ton in 1988 to 1,859 thousand ton in 1998.

Major factors contributed to the increase in rice production are;

- (a) Progress in flood control by construction of canal system.
- (b) Introduction of new high yielding and short period varieties that enable double and triple cropping.
- (c) Progress in irrigation and drainage system with dyke system.
- (d) Increased input such as fertilizer and agricultural chemicals.

Total planted area, production and yield of paddy from 1988 to 1998 in the Study Area are summarized as follows.

Rice Cultivation Area, Production and Yield

The Change of Rice Cultivation Area ha

	1988	1990	1992	1994	1996	1997	1998
Winter-Spring Paddy	100,189	134,020	143,389	151,304	166,119	174,712	173,039
Summer-Autumn Paddy	110,651	138,330	121,539	139,981	157,378	145,371	164,997
Autumn-Winter Paddy			26,423	45,391	54,172	34,649	50,674
Tenth month Paddy	12,746	4,548	3,225				
Total	223,586	276,898	294,576	336,676	377,669	354,733	388,710

The Change of Rice Production ton

	1988	1990	1992	1994	1996	1997	1998
Winter-Spring Paddy	518,386	747,900	817,275	844,512	915,804	1,017,237	1,031,223
Summer-Autumn Paddy	348,246	513,083	437,723	539,180	624,999	552,547	624,277
Autumn-Winter Paddy			95,842	174,852	219,366	140,234	203,934
Tenth month Paddy	11,006	6,929	0				
Total	877,638	1,267,913	1,350,840	1,558,544	1,760,169	1,710,019	1,859,434

The Change of Rice Yield ton/ha

	1988	1990	1992	1994	1996	1997	1998
Winter-Spring Paddy	5.174	5.581	5.700	5.582	5.513	5.822	5.847
Summer-Autumn Paddy	3.147	3.709	3.602	3.852	3.971	3.801	3.874
Autumn-Winter Paddy			3.627	3.852	4.049	4.047	3.956
Tenth month Paddy	0.863	1.524	0.000				
Average	4.114	4.579	4.596	4.633	4.661	4.821	4.784

Source from Provincial Statistic Books

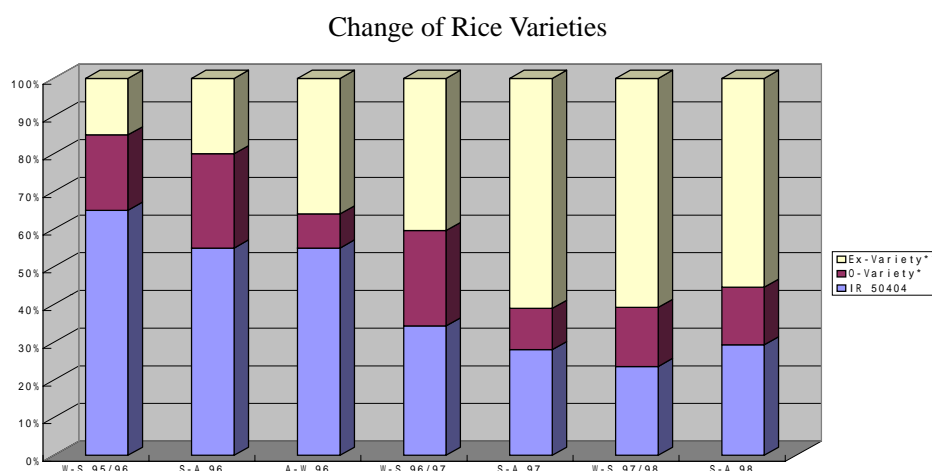
Total planted area, production and yield of paddy from 1988 to 1998 in each district are summarized in Table E.2.4, Table E.2.5 and Table E.2.6.

Rice variety

Before 1995, main rice variety produced in Dong Thap was IR50404. It gives high yield but is lower quality due to high chalkiness ratio.

A rapid change in the rice varieties grown has been observed in recent years shifting to the high

quality ones. The change in the varieties grown from '95/'96 to '98 is shown in the following table. The variety IR5040 is decreasing while those varieties for export are increasing.



Source: Dong Thap Province

Varieties are shown in the following table and in Table E.2.7 in ditaily.

List of Varieties Introduced to Farmers in Dong Thap Moui

Year	Varieties	Year	Varieties
1990	OM997, OM1327, KSB54, KSB55	1997	VND95-26, VND95-20, VND95-10, IR60819-31
1992	IR 50404, IR50401, IR35546		CK 96, IR62914, OM1570, IR56-9656
1993	MLT99, MLT103, MLT105	1998	IR62065, OM1723, TN105, CK96-1
1994	OM269, OMF1, OM997, S976B	1999	MTL233, MTL145, OM70140, OM1308,
1995	IR66707, OM1630, OMCS94		IR64-15-12, AS1007, MTL231, MTL234,
1996	IR62065, IR62579, OMCS94		OM1490, OM2031, IR64NCM

OM, MTL, OMCS : Improved by Regional Research Institute
IR : Improved by International Research Institute

VND, TN, CK, KSB : Improved by National Research Institute

Source: Dong Thap Province

As seen in the above, so many varieties have been introduced. However, these have not effectively contributed to the improvement of rice quality, especially those for export. At the same time there still remain large area cultivated in IR50404 and other low quality varieties.

Seed production

In Dong Thap province there exist two rice seed stations of Agriculture and Development Service Company (AGRISEDO). These stations screen and multiply rice varieties provided by Can Tho University, Cuu Long Delta Rice Research Institute and Institute of South Viet Nam Agriculture. These stations produce 100-200 tons of foundation seed and supply them to farmers groups who multiply seeds as certified seed.

Current Difficulties for Seed production

- Inspection or certification system for seed quality control is not well established. Therefore, the quality of seeds is not effectively guaranteed.
- Current production amount of multiplied seed in Dong Thap doesn't meet the requirement. While total demands of rice seed are about 40,000 tons for 200,000 ha, seed stations can supply only 1,000 tons.
- Most of farmers use seed produced by themselves, because the price of seed is high.
- Seed requirement is unstable. In case of earlier flood or heavy rain in harvest time, farmers lose their seed for next crop.
- Facilities for seed processing such as drying and storage facility are generally poor.

(3) Other Crops

1) Fruits

Rich soils, good weather, plenty of water and cheap labor have made it possible for the south of Viet Nam to grow many kinds of fruit trees. However, the area devoted to growing fruits in the Study Area is limited due to floods. The main fruit production area concentrates on the southern part of the Study Area along the Tien River. Reliable and up-to-date information on fruit production and processing is limited, but estimates suggest that in 1998 there were about 26,000 ha planted with fruits, and that production totaled around 193,000 tons in Study Area. The most important fruits grown are mango, longan, citrus and banana. The cultivation of longan and citrus are increasing rapidly in this decade, while banana and papaya are decreasing. As for the fruit garden, mixed planting of many kind of fruit was dominant in the past. However, the monoculture fruit garden of mango, longan or citrus is increasing as the market has expanded in recent years.

In the entire Dong Thap Province and Cai Be and Cai Lay districts in Tien Giang Province, total planted area for perennial crop planted from 1990 to 1998 are estimated as follows. District wise planted area and production are shown in Table E.2.8 and Table E.2.9.

Total Planted Area for Perennial Crop in Dong Thap Province, Cai Be and Cai Lay districts

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Mango	6,100	6,575	6,633	6,280	6,906	7,587	7,834	8,365	8,842
Longan	1,377	2,369	2,936	4,052	4,333	7,625	9,451	11,379	13,175
Banana	3,811	3,351	2,929	3,182	3,300	2,919	2,887	2,795	3,594
Citrus	3,618	3,901	4,303	5,199	4,319	4,907	5,856	5,821	5,573
Papaya	393	259	281	412	375	249	198	111	338
Jack-fruit	59	41	40	3	3	23	38	36	36
Starapple	393	259	271	9	10	27	20	10	36
Coconut	2,524	2,523	2,366	1,912	1,760	1,068	777	588	500
Others	13,303	12,876	12,849	11,146	23,059	10,966	9,815	8,597	10,548
Total	25,478	25,579	25,975	25,915	37,159	27,784	29,042	29,337	33,800

ha

Current Difficulties for Fruit seedling

- Farmers lack access to proper seedling resources. In case the farmer purchases bad seedling (low yield and bad quality) they can only know after 3-4 years when those bear fruit.
- Many pests and diseases from other provinces. For example, mandarins are infected by such virus diseases as Greening and Triteza.
- Recently, longan and lychee seedlings imported from Thailand and China were sold. Many of them do not flower due to the different climate of their origin.

2) Subsidiary crops

Subsidiary crops are maize, beans and vegetables. Cultivation area and yield of subsidiary crops are stable in the past several years. In 1998, cultivated maize area was 1,048 ha and production was nearly 5,295 tons. For bean, corresponding figures are 1,205 ha and 1,753 tons, for vegetable 1,259 ha and 12,923 tons respectively.

3) Industrial crops

In 1998, the growing area for annual industrial crops was 5,360 ha, accounting for 1.3% of the total annual crop grown in the Study Area. These crops are soybean, sugarcane, sedge, etc.

(4) Livestock and Aquaculture

1) Animal husbandry

In the Study Area, animal husbandry is less developed due to the effect of flood, lack of breeding space, affection of diseases and lack of technology. Therefore, the share of livestock production in agriculture remains low of 8.1% in 1998. Recent trend on livestock shows that buffaloes and cows, traditionally used as draft animals, have decreased rapidly in this decade while pigs, chickens and ducks have increased. The decrease is attributed to the replacement of draught animal by machine,

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IN THE DONG THAP MUOI AREA VIET NAM FINAL REPORT**

and the increased demand for poultry and pigs resulting from the improvement of the standard of living.

The Change of Livestock in entire Dong Thap Province, Cai Be and Cai Lay districts

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Buffalo	17,363	13,110	12,938	8,387	5,100	4,180	3,961	3,335	2,710
Cow	15,455	11,683	11,451	6,122	3,544	3,186	3,561	3,346	3,455
Pig (x10)	24,336	19,557	28,456	31,939	27,592	28,004	30,201	31,856	31,830
Chicken (x100)	18,009	16,725	31,436	33,199	30,754	26,973	40,675	38,394	38,006
Duck & Goose (x100)	11,578	14,128	21,914	20,436	22,109	20,834	27,982	26,687	27,051

Livestock production in each district is shown in the following table.

Livestock Production of Each District

	Total in the Study Area	Dong Thap Province							Tien Giang Province	
		Town	District						District	
			Cao Lanh	Tan Hong	Hong Ngu	Tam Nong	Thanh Binh	Cao Lanh	Thap Muoi	Cai Be
Pig	202,188	11,042	8,819	17,400	13,241	11,017	21,059	14,266	64,200	41,144
Buffalo	2,253	8	779	530	463	188	88	23	150	24
(Draft buffalo)	1,658	4	545	409	428	167	62	19		24
Cow	2,312	224	466	182	66	196	315	242	263	357
(Draft cow)	402		69	92	55	132	48	5		
Chicken	2,085,110	292,489	67,127	220,503	157,778	126,076	225,510	75,328	650,000	270,300
Duck & Goose	1,746,378	19,421	44,772	157,981	94,997	120,462	114,570	362,575	450,000	381,600

Buffaloes and cows decreased to 2,253 and 2,312 heads in 1998 respectively in the Study Area as a result of the introduction of tractors in the Study Area. Buffaloes and draft cows are largely raised in Tan Hong, Hong Ngu, Tam Nong and Thanh Binh districts. Pigs amounted to 202,188 heads with an average annual growth rate of 2.72% over the period 1990- 1998. Major pig areas are found in Cai Be and Cai Lay districts. Duck and Goose in the Study Area accounted for around 1,746,000 heads in 1998. The average annual growth rate was 8.86% over the period 1990-1998. The main duck areas are found in Thap Muoi, Cai Be and Cai Lay districts. Chicken in the Study Area were 2,085,110 heads with an approximate growth rate of 7.76%, consisting of layer hens in 1998. Main poultry areas are Cao Lanh town, Cai Be and Cai Lay districts.

2) Aquatic production

a. Inland fishery (Catching)

According to the survey result carried out in 1998, the Study Area had a total of 5,000 fish-farmers who professionally used fishing nets. Taking into account the off-farm fish-farmers, the total persons who are involved in fishing may be 3 or 4 times more than the above-mentioned figure. As presented in the following figure, the inland fish catch in the Study Area totaled 17,464 tons in 1998. Compared with the total inland fish catch in 1996, there is a marked decrease of 1,000 tons. The reduced inland fish catch is attributed to the flood condition of each year.

b. Fish breeding

Aquaculture, especially by fishponds, fish crawls and by cages has been rapidly developing recently. The fish production was 7,500ton in 1991 and 26,000ton in 1997. The fishing ponds in the Study Area covered 4,000ha in 1998, increased by two times from that in 1991.

Many high-value fish species are raised such as common silver bard (*Puntius Gonionotus*), shrimps (*Matcobrachium Rosebergii*), and snakehead fish (*Ophiocephalus Striatus*).

The Change of Fish Production

	1991	1992	1993	1994	1995	1996	1997
Cage Breeding	1,345	2,250	2,200	7,500	11,667	13,440	13,000
Pond Breeding	5,862	5,846	5,764	3,005	12,794	13,735	12,920
Shrimp Breeding	315	142	152	191	48	41	80

Fishry production and fish raising area in 1998 are shown in Table E.2.10.

(Fish in Pond)

Farmers in the Study Area have a custom to raise fish in ponds. However, since attention has been paid mainly to asian catfish and fed naturally, the catch and yield is low. Recently, the fish varieties have been diversified including *Belti*, *Trichogas Microplepis*, *Clarias Macrocephalus*, *Carp*, and other natural fishes, such as *Anabas Testudineus*, *Ophiocephalus Striatus*, *Cirrhinus Jullieni*, etc. Farmers dig ponds and ditches in garden along rivers or canals.

(Fish in cages and crawls)

Making use of rivers, major canals and deep water areas, farmers along the Tien River and inland areas (especially in Tam Nong district) raise *Matcobrachium Rosebergii* in bamboo crawls during rainy season when fresh water are abundant. Cage-fishery is a fish raising technique being gradually commercialized and widely practiced in the Mekong Delta. With better feeding, disease prevention and protection, fishes are raised in cages (mainly *Basa*, *Ophiocephalus*, *Leptobarbs Glossogobius Sparsipapillus*, *Puntius Gonionotus*, etc). Yields of 14 to 20 ton per cage can be obtained after 10 to 12 months.

E.2.3 Farming System

Farming systems in the Study Area reflect the different resources endowments such as rainfall and soil fertility, farmers' manpower, capital and knowledge. They also reflect the present status of agricultural support.

In the Study Area, there are two main farming systems, rice-based farming system and fruit trees-based one. Other farming systems are too minor. The share of agricultural land for the rice-based system is 87% and is 12% for the fruit trees-based based system. The dominant rice-based farming system can be divided into triple cropping, double cropping and single cropping patterns. When the physical land area for rice-based system is set at 100%, the respective share for the 3 types of cropping patterns are 38%, 42% and 7% respectively.

The intensive farming methods of multicropping involve the introduction of high yielding varieties with the combination of practices such as season selection, mechanized land preparation, fertilization, irrigation, pest control, etc.

The agricultural land for different cropping patterns are shown in the following table.

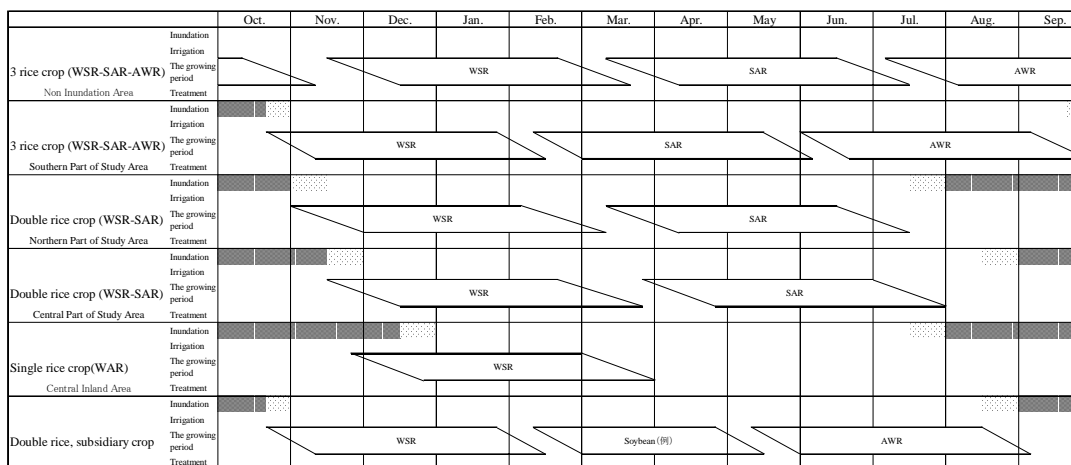
Annual crop land		ha	
Triple rice cropping land	87,363	38%	
Double rice cropping land	94,910	42%	
Single rice cropping land	15,011	7%	
Rice + Upland crops land	2,832	1%	
Upland crops, vegetables land	1,273	1%	
Perennial crop land			
Fruit tree, perennial crop land	26,981	12%	
Total	228,370		

* Data calculated from Land Use Map 1998 at 1:100,000 scale by GIS

The typical cropping patterns and the typical fruit-bearing season in the Study Area are shown in the

following charts and Table E.2.11.

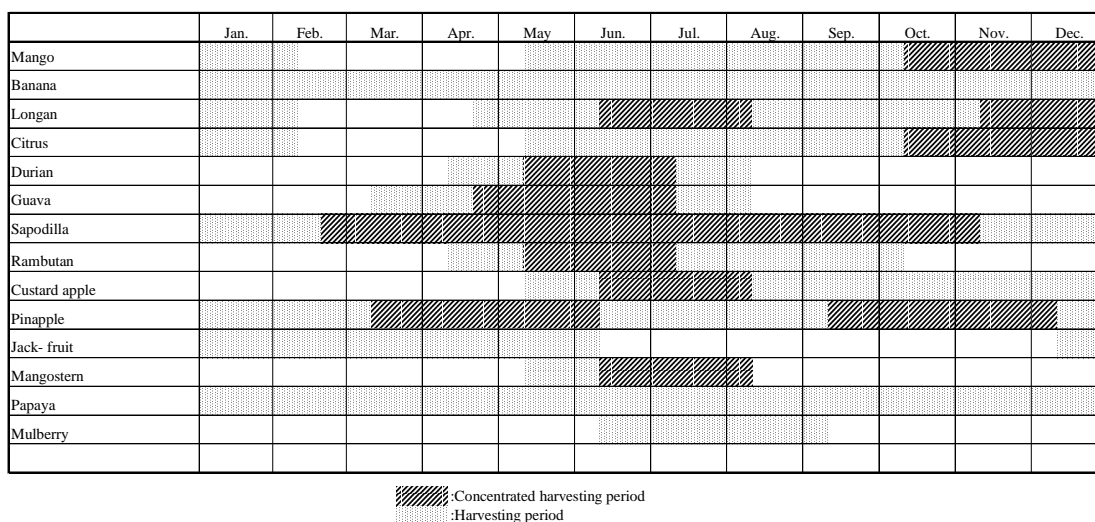
Typical Cropping Pattern



More attention is now being paid to crop diversification to respond the market demand, to increase value added and profit and to create more job opportunity for farmers. The major alternative crops are sugarcane, banana, orange, mandarin, longan and vegetable. This diversification is a precondition to the development of commercial agricultural production in compliance with market economy.

The typical fruit-bearing season in the Study Area are shown in the following charts.

Fruit Harvest Season



E.2.4 Farm Mechanization

In 1997, there were approximately 1,500 tractors and 5,000 power tillers with total capacity of some 120,000 HP. The average power capacity per 100ha cultivated rice was 30HP. In 1997, there were 402 draught cattle and 1,658 draught buffaloes. As mentioned, draught animals used for land preparation are mainly found in the northern part of the Study Area. There were approximately 3,500 threshers with a total capacity of some 3,700 ton/h. There are 40,000 pumps for irrigation and drainage.

Land preparation accounts for the main part of mechanization. According to the Statistics of the province, approximately 95% of paddy land are prepared mechanically. More than 95% of the farmers use tractors for land preparation and 99% of the farmers use machines for threshing. Presently, the works of fertilizer application, seeding and harvesting are done by manually. The labor input is about 100-140 days/ha for rice production, of which more than 70 days are managed by family labor.

Though the rice cultivation is partly mechanized, it has not been systematized yet. It might be said that the mechanization has only advanced in rice cultivation partly and not in upland farming, vegetable culture and fruit growing at all.

The most of large tractors and power tillers are imported ones. They are also produced locally. Local manufacturers provide some types of spare parts, small threshers, movable rice mills, small cleaners and husker, tools and carts.

E.2.5 Financial Analysis of Farming Models

(1) Benefit of Farming Types

By analyzing the income and expenditure of the typical farming from the data in 1997, the estimated results is shown in the table below.

The results indicate that fruit is very profitable crop as the market price in 1997 were high, and the data covers only the adult tree orchard. The difference between the paddy-upland rotation and the continuous paddy cropping didn't come out clearly. However, the planted area of upland crop is not increasing during these several years. Upland crops seem not profitable in this area. The triple rice cropping exceeds double rice cropping in the point of income.

The details refer from Table E.2 12 to Table E.2 15.

Land use types	Capital investment (1000 VND)	Recurrent cost (1000 VND)	Gross income (1000 VND)	Gross margin (1000 VND)	Note
MONORICE CULTIVATION					
3 irrigated rice crops	-	15,030	21,920	6,890	
2 irrigated rice crops	-	10,580	15,520	4,940	
1 irrigated rice crop	2,040 (*)	6,120	8,800	2,680	(*) in new -
RICE-UPLAND CROP CULTIVATION					
2 irrigated rice - 1 upland crops					reclaimed land
2 Rice - Soybean	-	16,850	23,500	6,650	
2 Rice - Maize	-	16,430	23,680	7,250	
1 irrigated rice - 1 upland crop					
Rice - Soybean	-	12,420	17,260	4,840	
Rice - Maize	-	12,000	17,440	5,440	
Vegetables	-	ND	ND	ND	ND : No data
PERENNIAL CROPS GROWING					
Fruit trees	8,500 (**)				(**)for making
Longan	-	9,030	55,000	45,970	raised-beds
Mango	-	14,570	43,200	28,630	
Orange	-	22,250	45,600	23,350	
Mandarin	-	18,710	51,000	32,290	

Source : Investigation data of Sub-NIAPP and Dong Thap Province in 1998 (include total labor cost)

(2) Farmer's Income

Information and data obtained during the field investigation indicate that the average farmer has 1.1ha paddy field with 2.2 crops per year and average yield of 4.8 ton/ha. Other income sources are from orchard (0.09ha), 1.1pigs and 12 chicken and 10 ducks. He gets 300kg fish from pond or river per year. These gross income amount to 26millionVND per year. Drawing the operating cost and the labor cost from this gross income, the average net income of farm household is estimated to be approximately 8 million VND per year.

(3) Economic Efficiency of Rice Farming

According to some investigation results, the average production cost of the rice is about 5 million VND/ha. When the rice price is 1,700 VND/kg and average yield of 4.8 ton/ha, net income is about 3.1 million VND/ha. If farmer uses own family labors for regular works and rice reaping instead of hired labors, the farmer's net income becomes about 4.7 million/ha. As for the proportion of the

respective cost, the labor cost is 34%, fertilizer cost is 20%, chemical cost is 10% and seed cost is 9% of the total expenses. Production cost of rice is shown in the following table.

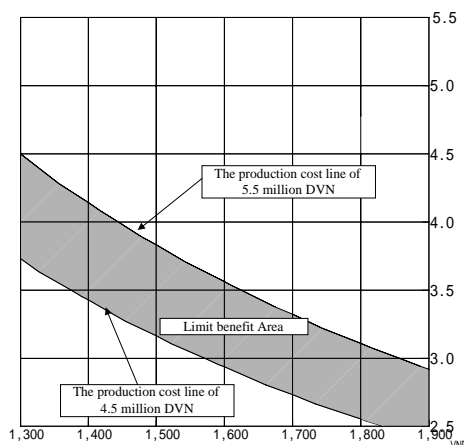
Production Income and Cost of Rice

Income					
Rice yield			4.8		
Rice price	Dong/Kg		1,700		
					8,160,000 ①
Expenses					
	Unit	Volume	Price	Cost	
Seed	kg/ha	170-200	1,750-2,000	427,500	9%
Fertilizer					20%
Urea	kg/ha	200-250	2,100-2,300	450,833	
DAP	kg/ha	75-150	3,300-3,600	288,333	
NPK	kg/ha	0-200	2,000	115,000	
Kalium	kg/ha	0-100	850	56,167	
Others	kg/ha			96,250	
Chemical					10%
Pesticide	Dong/ha			330,833	
Herbicide	Dong/ha			177,667	
Pumping cost	Dong/ha			331,667	7%
Land preparing cost	Dong/ha			376,667	8%
Small tools cost	Dong/ha			42,500	1%
Threshing hirer	Dong/ha	30kg(Rice)		383,333	8%
Interests and other expense				195,967	4%
Labor cost		112	15,000	1,680,000	34%
Total cost				4,952,717	②
Tax				140,000	③
Profit					① - ② - ③ =
				3,067,283	

Hired labors are 68% of total labor

The income from rice cultivation fluctuates due to yield and the market price. In case the production cost is from 5.5 to 6.5 million VND per ha, the limit benefit line can be drawn as the follows.

The marginal benefit line from rice price and yield



In this graph, when the rice price is 1,300 VND/kg, the marginal benefit line will be 3.8 to 4.5ton/ha. When the rice price is 1,600 VND/kg, it will be 2.9 to 3.6 ton/ha.

E.2.6 Farming Constraints

Farming constraints raised by the interviewed farmers in the Study Area are summarized as follows:

Lack of means for drying rice

Most of the farmers lack means of drying rice. They usually dry rice on the road under limited sunshine in the rainy season. This causes low quality of the rice.

Limited access to loan

Many farmers complained of limited access to loans, especially to medium term applicable to procure farming machine such as tractors. The small-scale farmers who have no mortgage are almost shut out from a chance to get loan.

Lack of transportation means and poorly developed road network

Most of the small-scale farmers in the Study Area lack transportation means to carry their produce from the field to the farmyard or market. Due to the poor road network, most traders depend on boat to collect paddy from farmers.

Lack of extension service

The majority of small-scale farmers have limited access to updated technological information to be provided through extension service. The existing extension service system is facing financial and physical difficulties hindering the communication with farmers.

High price and shortage of farming inputs

Due to a hike in price for seeds, fertilizers, agro-chemicals and farming tools, the small-scale farmers can not manage their farming practice intensively and can not get out of the current extensive farming.

E.3 AGRICULTURE DEVELOPMENT PLAN

E.3.1 Land Use Plan

(1) Basic Approaches

The basic approaches for agricultural land use planning have been established taking into account 1) Socio-economic Master Plans of both provinces, 2) land suitability for farming, 3) present land use, 4) results of irrigation and flood control study, 5) requirement for reserved land and 6) Master Plans of Flood Control Planning for the Inundation Area of the Mekong Delta.

(2) Land Use Plan

The proposed area-wise land use plan in the Study Area was formulated based on the basic approaches for agricultural land use planning. The plan aims at increasing the area of triple paddy cropping by mean of the inundation control. The proposed overall land use plan for Study Area in comparison with the present land use is summarized in the following. The map of land use plan is shown in Figure below.

Land Use	Present Land Use	Proposed Land Use	Change
Agricultural land	206,200	207,000	+ 800
Single rice cropping land	11,100	8,000	- 3,100
Double rice cropping land	112,100	87,000	- 25,100
Triple rice cropping land	50,700	75,000	+ 24,300
Rice + Upland crop land	2,000	2,800	+ 600
Upland cropping land	4,200	4,200	0
Perennial crop land	26,100	30,000	+ 3,900
Forest land	8,994	10,000	+ 1,006
Presidential land	32,400	35,000	+ 2,600
Unused land	5,333	800	- 4,533
Other land	13,434	13,500	+ 66

As mentioned above, the agricultural land increases very little but triple rice cropping area and the perennial cropland increase 24,300ha and 3,900ha respectively.

(3) Land Use Plan for Each Zone

The proposed land use plan for each zone is given below. When comparing with the present land use, triple rice cropping area and the perennial crop land increase in Zone B and C.

Land Use Plan for Each Zone

(Unit : ha)

	1 Rice Cropping	2 Rice Cropping	1Rice+Upland crop or 2 Rice Cropping	3 Rice Cropping	2 Rice+Upland crop or 3 Rice Cropping	Perennial crop or 2 Rice+Upland crop	Perennial crop or 3 Rice Cropping	Total
Zone A	0	13,000	3,000	0	0	0	0	16,000
Zone B	0	49,500	13,000	21,000	5,500	0	0	89,000
Zone C	0	0	0	7,000	0	9,000	51,000	67,000
Zone D	0	0	0	0	0	16,000	4,000	20,000
Zone F	7,000	7,500	0	500	0	0	0	15,000
Total	7,000	70,000	16,000	28,500	5,500	25,000	55,000	207,000

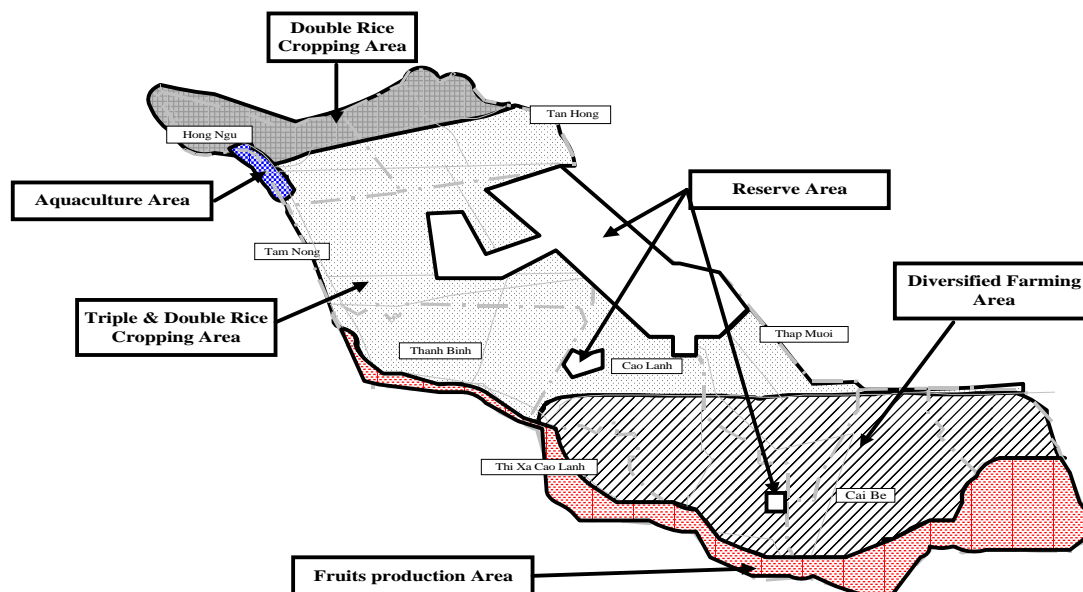
Present Land Use for Each Zone

	1 Rice Cropping	2 Rice Cropping	1Rice+Upland crop	3 Rice Cropping	Upland crop	Perennial crop	Total
Zone A	0	15,800	200	0	0	0	16,000
Zone B	3,900	66,800	0	16,000	2,000	0	88,700
Zone C	200	22,000	300	32,000	0	12,000	66,500
Zone D	0	0	1,500	2,200	2,200	14,100	20,000
Zone F	7,000	7,500	0	500	0	0	15,000
Total	11,100	112,100	16,000	50,700	5,500	25,000	206,200

(4) Land Use Plan and Major Farming for Each Zone

More attention is now being paid to farming diversification to respond to market demand, to increase value and profit and to create more job opportunities for farmers. The major alternatives for farming diversification are fruits, aquaculture and livestock. The basic farming plan for each zone is drawn as following figure.

Main Farming of the Study Area



a) Triple and Double Rice Cropping Area: (Zone B)

The area is expected to increase crop intensity through enhanced inundation mitigation based on the Master Plan.

The paddy is a dominant in agricultural production of this area, and rice cultivation is the most suitable profitable crop in this area. However, the quality of rice is not so high as to have better price in the international market. Rice production should shift the focus from the quantity to the quality. The new rice farming methods should involve the introduction of high quality varieties with the combination of such practices as season selection, planting uniformed varieties among farmers group, mechanized land preparation, fertilization, irrigation, pest control etc.

b) Diversified Farming Area: (Zone C)

The area will be protected completely from inundation under the Master Plan. Based on rice farming, various types of farming will be considered. Diversification will be the most suitable for this area. In addition to paddy production, animal husbandry, fruit gardening and aquaculture are also promising for future development.

c) Fruit Production Area: (Zone D)

The area is fertile with alluvial soil and protected from the flood damage. The fruit production concentrates in this area. Although mixed planting of many kind of fruit is popular, the monoculture fruit gardens are increasing in recent years. The fruit is the second most important crop in this area. It can be fairly profitable, through the market price fluctuates. The problem is how to respond the market requirement, namely good quality of fruits.

d) Double Rice Cropping Area: (Zone A)

The paddy rice is dominant in agricultural production of this area, and rice is a single suitable crop in this area.

Significant prevention of inundation mitigation is not foreseen. Therefore, it is important to introduce the short-term rice varieties and promote agricultural mechanization in order to make farming efficient in the short period.

e) Reserve Area: (Zone F)

This area has a lot of acid sulphate soil, being developed on the sediment of swamp. The area has difficulties for the agriculture development.

The forest area and its production have decreased continuously in recent years. The development plan should encourage protection and expansion of forest in this area.

f) Aquaculture Area: (Zone E)

The area is endowed with rich aquatic resources. Fish breeding of this area has been rapidly developing recently. It is shifting from self-sufficient production to the commercial production. There exist possibilities of further development of fisheries if included the fishponds on the river bank in addition to the cages on the river. The main development plan should include promotion of large-scale aquaculture.

E.3.2 Agricultural Production

(1) Constraints on Agriculture Production

1) Basic constrains

1. There are unpredictable big floods with long flooding period.
2. The acid-sulphate soils influence or water quality during the dry-season.
3. There exist limited area to expand cultivated land due to limited unused land.
4. Present supporting systems for farmers are insufficient
5. Farmers do not have enough knowledge, technique, fund, etc.

2) Specific constraints

Rice seed

- Seed registration agency to control seed quality is lacking.
- Seed station of Dong Thap doesn't supply enough seed to farmers.
- The mixture of different rice varieties is observed in cultivation at farmers level.

- Most of farmers use seed produced by themselves, because the price of seed is high.
- Facilities for seed processing in seed station are poor such as drying facility, storage and agricultural machinery.

Fruit seedling

- Farmers lack access to proper seedling resources, and purchase bad seedling.
- Many pests and diseases from other provinces.
- Recently, longan and lychee seedlings are imported from Thailand and China. Many of them do not flower because of different climate of the origin.

(2) Target of Agricultural Production

Target crops of agricultural production should be paddy and fruit.

The Study Area will be the rice crop zone even in future. Paddy is the best suitable crop, and it occupies more than 90% of total cultivation area.

Though the area devoted to growing fruits is limited due to floods, the area is suitable for fruits in general. Farmers are able to get higher income from the fruits although the market's price will fluctuate year by year.

Meanwhile, livestock and aquaculture are rather limited in production and marketing capacity.

(Paddy)

As for the paddy production in Vietnam, the major goals were placed on the increasing the yield and the cropping ratio. As the result of the efforts, rice has been produced enough to the domestic demand and exported to the international market. The target of rice production is now sifting from the quantity to quality.

(Fruit)

As for the fruit garden, the monoculture fruit garden of mango, longan and citrus is increasing as the market has expanded in recent years. However, the Don tap province lagged behind in the introduction of the proper variety and quality of seedlings. Therefor farmers lack access to proper seedling resources, and purchase bad seedling.

DARD began to the public watch for the fruit seedling business and the introduction of the proper seedlings. It needs the support of the future.

(3) Agricultural Production Plan

Target of agricultural production is set based on the estimation of the anticipated crop yields and cropping ratio obtained from the investigations and discussions with officials. In addition, the targets

of agricultural production in the Master Plan of both provinces are considered.

Comparing with the present data in the agricultural production plan, the target of cropping ratio of paddy will be to 2.33 from 2.22, the yield to 5.00 from 4.80 and increased rice production will be 182,360ton.

Targets are summarized in the following table.

Main Target of Agricultural Production Plan to Year 2010

		Present	Target	Remark	
		1998	2010	(Land increase and decrease)	
Rice		Exportable quality			
Productivity	ton	1,880,640	2,063,000	1/	+ 182,360ton
Yield	ton/ha	4.80	5.00		
Cropping intensity		2.22	2.33		
Cultivated area	ha	391,800	412,600		+ 20,800ha
Paddy land	ha	176,100	177,000		+ 900ha
Perennial crop					
Cultivated area	ha	26,100	30,000		+ 3,900ha
Fruit		Exportable quality 2/			
Mango	ton	24,973	40,000		
Longan	ton	81,576	120,000		
Citrus	ton	21,077	35,000		
Banana	ton	17,087	17,000		
Upland crop					
Cultivated area	ha	6,400	7,000		+ 600ha
Maize	ton	5,295	6,000		
Soybean	ton	7,740	8,000		
Vegetables	ton	12,923	15,000		
Livestock product				3/	
Pig		318,300	440,000		
Hen		3,800,600	5,000,000		
Duck		2,705,100	4,500,000		
Aquatic product				4/	
Natural catching yield	ton	17,464	17,000		
Breeding cage yield	ton	13,000	58,000		
Breeding pond yield	ton	12,920	25,000		

1/ Estimate of productivity of rice in 2010 is based on Master Plan of both provinces

2/ Estimate of productivity of fruit in 2010 is based on Master Plan of both provinces and annual increase rate of late years.

3/ Estimate of productivity of livestock in 2010 is based on annual increase rate of late years.

4/ Estimate of productivity of fruit in 2010 is based on Master Plan of both provinces and annual increase rate of late years.

In case of increasing income of farm household, it is important not only to get high yield but also to improve quality. This importance of the quality improvement will be emphasized more and more in the future. The improving targets of quality for rice and fruit are set follows.

Target of improving rice quality

Item	The influence time		Target	Remark (Existing data)
	Before harvest	After harvest		
Bulk Density			It isn't possible to specify for bulk density.	None
Whole Grain Ratio 1)			~ 60%	None data for the paddy and the unpolished Polished rice are 40 ~ 48%.
Appearance 2)			The target is not occur a problem.	None
Moisture Content Ratio			Below 14.5% for paddy	Around 16% for the paddy and the unpolished

1) Whole Grain : Without broken grain, damaged grain, opaque grain, different varieties grain, inert matter

2) Appearance : Evaluation contents are thickness, fullness, strength degree, uniformity, shape, luster, skin abraded rice, white core rice, white belly rice.

Main target of improving fruit quality

Mango	Renewal to the high quality varieties
Longan	Renewal to the high quality varieties
Citrus	Introduce to the tolerant varieties of Greening disease

(4) Land Use Plan for Each Zone

The basic farming system and proposed land use plan for each zone is drawn as following table.

Zone	Present Farming	Proposed Main Farming	Proposed Main Agricultural Land Use
A	Double Rice Cropping	Double Rice Cropping	Same as the present
B	Double Rice Cropping	Double Rice Cropping Triple Rice Cropping	Double Rice Cropping land : 70% Triple Rice Cropping land : 30%
C	Double Rice Cropping Triple Rice Cropping	Triple Rice Cropping Specializing Fruit Garden Livestock & Aquaculture with VAC system	Triple Rice Cropping land : 80% Fruit garden : 15% Others : 5%
D	Triple Rice Cropping Mixed planting Fruit Garden	Triple Rice Cropping Specializing Fruit Garden	Triple Rice Cropping land : 50% Fruit garden : 50%
E	Aquaculture	Specializing Aquaculture	
F	Single Rice Cropping Reserve Area	Reserve Area Same as the present	Forest reserve program

Table E.2.1 PRESENT LAND USE (1998 - 1999) OF THE DONG- THAP- MUOI STUDY AREA
(Source : Data estimated from Land Use Map at 1:100,000 scale by GIS)

Land Use Type	TOTAL AREA		DONG THAP PROVINCE							TIEN GIANG PROVINCE			
	Ha	%	+	TX. Cao Lanh town (*)	H. Cao Ngu district (*)	H. Tan Hong district	H. Tam Nong district	H. Thanh Binh district (*)	H. Cao Lanh district (*)	H. Thap Muoi district	+	Cai Be district	Cai Lay district (*)
RICE CULTIVATED LAND	200,116	69	167,775	3,255	16,316	24,973	31,741	18,737	34,760	37,993	32,341	21,198	11,143
1. 03 rice crops	87,363	30	55,138	1,952			234	5,718	23,555	23,679	32,225	21,142	11,083
2. 02 rice crops	94,910	33	94,851		16,316	24,099	20,942	12,262	10,790	10,442	59		59
3. 01 rice crop	15,011	5	15,011			594	10,565	130	19	3,703	0		
4. Rice + Upland crops	2,832	1	2,775	1,303		280		627	396	169	57	56	1
UPLAND CROPS CULTIVATED LAND	1,273	0	1,225	657	145	142	126	155			48		48
5. Upland crops, Vegetables	1,273	0	1,225	657	145	142	126	155			48		48
PERENNIAL CROPS GROWING LAND	26,981	9	4,834	1,240		305	120	280	1,720	1,169	22,147	15,127	7,020
6. Fruit trees, Other perennial crops	26,981	9	4,834	1,240		305	120	280	1,720	1,169	22,147	15,127	7,020
FORESTRY LAND	7,751	3	7,590			165	(a)		2,032	5,393	161	161	
7. Melaleuca forest	7,751	3	7,590			165	(a)		2,032	5,393	161	161	
UNUSED LAND	2,337	1	2,243			743	(a)	148	137	1,215	94	21	73
8. New reclaimed land	281	0	250			169			22	59	31		31
9. Unused land	2,056	1	1,993			574	(a)	148	115	1,156	63	21	42
OTHER LAND	51,851	18	45,031	3,210	6,235	2,825	14,046	5,082	7,516	6,117	6,820	3,591	3,229
10. Tram Chim National Park	6,017	2	6,017				6,017						
11. Settlement area, Built- up area	32,400	11	27,863	1,740	3,186	2,282	7,651	3,005	4,070	5,929	4,537	2,554	1,983
12. River, Creek	13,434	5	11,151	1,470	3,049	543	378	2,077	3,446	188	2,283	1,037	1,246
TOTAL	290,309	100	228,698	8,362	22,696	29,153	46,033	24,402	46,165	51,887	61,611	40,098	21,513

(*) : Data calculated within only study area boundary

(a) : Included in gross area of Tram Chim National Park

Table E.2.2 Planted Area of Each District

	Dong Thap Province										Tien Giang Province		
	Tx. Cao Lanh	H. Tan Hong	H. Hong Ngu	H. Tam Nong	H. Binh	H. Thanh Binh	H. Cao Lanh	H. Thangp Muoi	H. Cai Be	H. Cai Lay	H. Cai Lay	(*)	
Food Crop	7,680	42,765	31,035	45,694	34,741	59,249	77,988	59,940	29,618				
Paddy	12	30	540	-	273	-	-	145	48				
Maize	-	20	-	24	-	-	7	-	33				
Sweet potato	-	-	-	-	8	-	-	-	75				
Other strach crop	13	118	163	187	310	-	-	210	258				
Vegetable and Beans	732	23	118	22	96	47	-	64	103				
Annual Industrial Plants													
Sedge	-	-	-	-	-	334	-	-	-				
Sugarcane	542	-	76	-	81	-	-	-	284				
Groundnut	-	28	91	-	-	-	-	-	-				
Soybean	1,966	1	728	56	133	843	-	-	-				
Sesame	-	42	-	-	-	-	-	-	-				
Tobacco	-	-	112	-	44	-	-	-	-				
Perennial Plants													
Coconut	33	6	224	32	-	120	5	200	159				
Citrus	12	-	-	-	41	54	-	1,239	138				
Longan	59	19	28	-	29	716	14	3,975	2,153				
Banana	2	10	129	6	75	278	1,021	350	345				
Mango	266	49	57	19	237	989	143	5,354	244				
Star apple	-	-	16	-	-	10	-	-	73				
Jack fruit	-	-	24	-	-	-	1	-	10				
Plum tree	-	-	28	-	-	36	-	250	-				
Papaya	3	5	28	-	25	53	180	-	-				
Guava/Apple	47	31	-	3	63	115	35	490	-				
Custard-apple	3	5	41	-	-	40	-	-	22				
Sapodilla	20	3	22	-	-	-	-	-	281				
Rambutan	-	-	-	-	-	-	-	-	70				
Durian	-	-	-	-	-	-	-	-	30				
Others	146	-	180	28	344	37	-	1,463	88				
									73				
									2,785				

(*)Data calculated within only study area from Statistical book in 1998

Table E.2.3 Agricultural Production of Each District

	Dong Thap Province						Tien Giang Province		
	Tx. Cao Lanh	H. Tan Hong	H. Hong Ngu (*)	H. Tam Nong	H. Thanh Binh (*)	H. Cao Lanh	H. Thau Muoi	H. Cai Be	H. Cai Lay (*)
Food Crop	36,615	205,592	157,346	212,368	168,928	268,243	340,709	309,690	159,942
Paddy	26	72	3,112	-	1,668	-	-	305	112
Maize	-	180	-	162	-	-	55	1,538	221
Sweet potato	-	-	-	-	66	-	-	-	1,277
Other strach crop	-	-	-	-	-	-	-	-	-
Vegetable and Beans	93	1,405	907	4,439	3,753	-	-	1,785	541
Vegetables	833	29	144	36	479	47	-	48	137
Beans	-	-	-	-	-	-	-	-	-
Annual Industrial Plants	-	-	-	-	-	1,838	-	-	11,370
Sedge	32,791	-	3,130	-	4,992	-	-	-	-
Sugarcane	-	43	256	-	-	-	-	-	-
Groundnut	4,128	2	1,762	110	305	1,433	-	-	-
Soybean	-	19	-	-	-	-	-	-	-
Sesame	-	-	374	-	126	-	-	-	-
Tobacco	-	-	-	-	-	-	-	-	-
Perenial Plants	142	28	501	188	378	718	27	180	2,385
Coconut	45	-	-	-	111	267	-	19,824	830
Citrus	177	5	91	-	70	3,599	26	45,315	32,293
Longan	13	53	824	47	508	2,259	6,258	3,675	3,450
Banana	485	-	138	53	389	1,760	287	18,204	3,657
Mango	-	-	11	-	-	10	-	-	623
Star apple	-	-	24	-	-	-	1	-	51
Jack fruit	-	-	91	-	-	254	-	2,500	-
Plum tree	-	-	396	-	259	550	2,351	-	-
Papaya	61	35	-	-	37	115	35	4,900	-
Guava/Apple	43	19	-	3	-	40	-	-	131
Custard-apple	-	4	19	-	-	-	-	2,810	-
Sapodilla	95	-	62	-	-	-	-	630	679
Ranbutan	-	-	-	-	-	-	-	330	385
Durian	-	-	-	-	-	-	-	-	-
Others	1,196	235	2,257	429	1,969	10,939	9,164	102,019	57,136

(*)Data calculated within only study area from Statistical book in 1998

Table E.2.4 The Change of Rice Cultivation Area of Each District

Total Paddy Area		(ha)						
	1986	1988	1990	1992	1994	1996	1997	1998
Dong Thap Province								
Thi Xa Cao Lanh	6,210	5,761	5,776	5,842	6,270	7,590	7,696	7,680
Huyen Tan Hong	35,453	35,672	18,523	30,648	33,390	41,576	41,083	42,765
Hong Ngu	/	/	20,400	21,285	24,366	31,150	27,495	31,035
Tam Nong	13,064	13,540	23,015	27,825	33,346	42,294	39,319	45,694
Thanh Binh	17,079	17,777	23,277	25,416	28,405	33,246	32,510	34,741
Cao Lanh	33,485	32,964	44,956	47,791	52,623	54,216	55,720	59,249
Thap Muoi	30,252	35,808	52,382	47,739	66,778	78,266	61,666	77,988
Tien Giang Province								
Huyen Cai Be	41,821	48,947	57,214	57,016	59,760	58,905	58,283	59,940
Cai Lay	27,720	29,571	31,356	30,994	31,738	30,426	30,960	29,618
Total	205,084	220,040	276,899	294,556	336,676	377,669	354,732	388,710

(*)Data calculated within only study area from Statistical book in 1998

Area for Winter-Spring Paddy		(ha)						
Dong Thap Province								
Thi Xa Cao Lanh	3,131	2,746	2,876	2,918	3,036	3,823	3,937	3,833
Huyen Tan Hong	18,000	18,506	9,001	14,404	17,040	20,467	21,383	21,500
Hong Ngu	/	/	12,218	12,448	13,178	15,994	16,067	16,136
Tam Nong	5,421	8,003	15,015	18,038	19,795	24,402	25,848	26,546
Thanh Binh	10,176	12,032	13,853	14,078	14,666	16,999	17,312	17,577
Cao Lanh	10,077	13,151	23,179	24,196	24,693	25,103	28,017	28,037
Thap Muoi	9,379	16,503	25,997	26,397	28,194	30,599	31,848	32,877
Tien Giang Province								
Huyen Cai Be	18,610	19,024	20,641	20,269	19,980	18,945	19,980	19,980
Cai Lay	10,224	10,224	11,240	10,642	10,722	9,786	10,320	9,872
Total	85,018	100,189	134,020	143,389	151,304	166,119	174,712	176,358

(*)Data calculated within only study area from Statistical book in 1998

Area for Summer-Autumn Paddy		(ha)						
Dong Thap Province								
Thi Xa Cao Lanh	2,903	3,016	2,900	2,924	3,234	3,767	3,759	3,847
Huyen Tan Hong	5,701	10,484	4,974	13,019	15,642	20,350	19,700	21,265
Hong Ngu	/	/	8,182	8,837	11,099	14,902	11,428	14,856
Tam Nong	2,351	4,757	8,000	9,787	13,551	17,892	13,471	19,148
Thanh Binh	6,564	9,386	9,424	11,339	13,739	16,246	15,198	17,164
Cao Lanh	8,636	15,539	21,777	23,595	24,552	24,263	26,895	27,047
Thap Muoi	10,336	18,295	26,385	21,237	27,584	29,658	24,620	27,982
Tien Giang Province								
Huyen Cai Be	23,211	29,923	36,573	20,289	19,980	19,980	19,980	19,980
Cai Lay	17,400	19,251	20,115	10,512	10,600	10,320	10,320	9,872
Total	77,102	110,651	138,330	121,539	139,981	157,378	145,371	161,162

(*)Data calculated within only study area from Statistical book in 1998

Area for Autumn-Winter Paddy		(ha)						
Dong Thap Province								
Thi Xa Cao Lanh								
Huyen Tan Hong					708	759		
Hong Ngu					89	254		405
Tam Nong								
Thanh Binh								
Cao Lanh					3,378	4,850	808	4,165
Thap Muoi				105	11,000	18,009	5,198	17,129
Tien Giang Province								
Huyen Cai Be				16,478	19,800	19,980	18,323	19,980
Cai Lay				9,840	10,416	10,320	10,320	9,872
Total				26,423	45,391	54,172	34,649	51,551

(*)Data calculated within only study area from Statistical book in 1998

Area for tenth-month Paddy		(ha)						
Dong Thap Province								
Thi Xa Cao Lanh	176	-						
Huyen Tan Hong	11,752	6,682	4,548	3,225				
Hong Ngu	/	/						
Tam Nong	5,292	780						
Thanh Binh	3,185	-						
Cao Lanh	14,772	4,274						
Thap Muoi	10,537	1,010						
Tien Giang Province								
Huyen Cai Be								
Cai Lay								
Total	45,714	12,746	4,548	3,225				

(*)Data calculated within only study area from Statistical book in 1998

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Table E.2.5 The Change of Paddy production of Each District

Total Paddy Production

		(ton)							
		1986	1988	1990	1992	1994	1996	1997	1998
Dong Thap Province									
Thi Xa	Cao Lanh	22,601	22,093	24,935	26,250	30,002	34,075	37,779	36,615
Huyen	Tan Hong	151,110	158,470	68,285	119,426	136,809	177,365	189,877	205,592
	Hong Ngu	/	/	110,468	99,248	125,989	151,574	145,305	157,346
	Tam Nong	35,314	63,585	111,281	132,737	152,679	191,292	191,333	212,368
	Thanh Binh	67,115	78,996	117,398	124,576	143,995	159,489	162,645	168,928
	Cao Lanh	22,601	121,501	207,579	217,617	224,112	246,958	260,016	268,243
	Thap Muoi	86,551	138,652	242,299	239,315	292,905	342,587	273,442	340,709
Tien Giang Province									
Huyen	Cai Be	176,588	202,369	245,672	253,727	294,278	295,551	284,837	309,690
	Cai Lay	114,729	119,484	140,004	141,022	158,989	161,278	164,784	159,942
Total		676,608	905,151	1,267,921	1,353,919	1,559,758	1,760,169	1,710,019	1,859,433

(*)Data calculated within only study area from Statistical book in 1998

Paddy Production, Winter-Summer crop

		(ton)							
Dong Thap Province									
Thi Xa	Cao Lanh	13,269	12,439	14,785	16,893	19,036	21,527	24,973	23,105
Huyen	Tan Hong	113,006	110,554	43,947	75,006	77,173	100,328	107,728	122,755
	Hong Ngu	/	/	70,941	62,320	77,070	91,343	97,222	96,805
	Tam Nong	25,651	44,641	82,240	92,689	104,873	122,304	142,164	145,111
	Thanh Binh	43,055	51,582	77,629	79,109	88,808	95,007	108,200	105,251
	Cao Lanh	43,171	60,626	129,182	135,463	130,595	136,852	167,373	162,694
	Thap Muoi	37,609	75,152	143,091	168,311	162,901	167,185	175,578	188,056
Tien Giang Province									
Huyen	Cai Be	109,614	105,084	119,532	123,641	121,358	117,649	125,794	122,877
	Cai Lay	59,191	58,308	66,553	63,843	62,698	63,610	68,205	64,569
Total		444,566	518,386	747,900	817,275	844,512	915,804	1,017,237	1,031,222

(*)Data calculated within only study area from Statistical book in 1998

Paddy Production, Summer-Autumn

		(ton)							
Dong Thap Province									
Thi Xa	Cao Lanh	8,930	9,654	10,150	9,357	10,966	12,548	12,806	13,510
Huyen	Tan Hong	25,669	44,559	17,409	44,420	56,421	75,071	82,149	82,837
	Hong Ngu	/	/	39,518	36,929	48,706	59,469	48,083	59,083
	Tam Nong	6,438	18,944	29,041	40,048	47,806	68,988	49,169	67,257
	Thanh Binh	20,716	27,414	39,769	45,467	55,187	64,482	54,445	63,678
	Cao Lanh	30,635	26,951	78,397	82,124	83,597	91,773	90,098	92,149
	Thap Muoi	35,342	62,262	99,208	70,689	88,801	111,471	82,246	98,014
Tien Giang Province									
Huyen	Cai Be	66,974	97,285	126,140	69,794	94,314	89,990	82,178	96,903
	Cai Lay	55,537	61,176	73,452	38,894	53,382	51,208	51,373	50,846
Total		250,241	348,246	513,083	437,723	539,180	624,999	552,547	624,277

(*)Data calculated within only study area from Statistical book in 1998

Paddy Production, Autumn-Winter crop

		(ton)							
Dong Thap Province									
Thi Xa	Cao Lanh								
Huyen	Tan Hong					3,215	1,966		
	Hong Ngu	/	/			213	763		1,458
	Tam Nong								
	Thanh Binh								
	Cao Lanh					9,920	18,333	2,545	13,400
	Thap Muoi				315	41,203	63,931	15,618	54,639
Tien Giang Province									
Huyen	Cai Be				60,989	78,606	87,912	76,865	89,910
	Cai Lay				34,538	41,695	46,461	45,206	44,527
Total					95,842	174,852	219,366	140,234	203,934

(*)Data calculated within only study area from Statistical book in 1998

Area for tenth-month Paddy

		(ton)							
Dong Thap Province									
Thi Xa	Cao Lanh	402	-						
Huyen	Tan Hong	12,435	3,357	6,929	0				
	Hong Ngu	/	/						
	Tam Nong	3,225	-						
	Thanh Binh	3,344	-						
	Cao Lanh	20,056	6,411						
	Thap Muoi	13,600	1,238						
Tien Giang Province									
Huyen	Cai Be								
	Cai Lay								
Total		53,062	11,006	6,929	0				

(*)Data calculated within only study area from Statistical book in 1998

Table E.2.6 The Change of Paddy Yield of Each District

Paddy Yield Average		ton/ha							
		1986	1988	1990	1992	1994	1996	1997	1998
Dong Thap Province									
Thi Xa	Cao Lanh	3.639	3.834	4.317	4.493	4.785	4.489	4.909	4.768
Huyen	Tan Hong	4.262	4.442	3.686	3.897	4.097	4.270	4.622	4.807
	Hong Ngu	/	/	5.415	4.663	5.171	4.870	5.285	5.070
	Tam Nong	2.703	4.696	4.835	4.770	4.579	4.520	4.866	4.648
	Thanh Binh	3.929	4.443	5.044	4.901	5.069	4.797	5.003	4.862
	Cao Lanh	2.576	3.685	4.617	4.554	4.259	4.555	4.666	4.527
	Thap Muoi	2.861	3.872	4.626	5.013	4.386	4.377	4.434	4.367
Tien Giang Province									
Huyen	Cai Be	4.222	4.134	4.294	4.450	4.920	5.038	4.887	
	Cai Lay	4.036	4.040	4.465	4.550	5.010	5.300	5.322	
Total				4.528	4.492	4.492	4.489	4.702	
Paddy Yield of Winter-Spring crop		ton/ha							
Dong Thap Province									
Thi Xa	Cao Lanh	4.238	4.530	5.114	5.789	6.270	5.631	5.643	6.028
Huyen	Tan Hong	6.278	5.973	4.882	5.207	4.529	4.902	5.038	5.709
	Hong Ngu	/	/	5.807	5.006	4.938	5.710	6.051	6.137
	Tam Nong	4.732	5.578	5.477	5.139	5.298	5.012	5.500	5.466
	Thanh Binh	5.097	5.165	5.603	5.619	6.055	5.590	6.250	5.988
	Cao Lanh	4.284	4.610	5.573	5.600	5.289	5.452	5.974	5.802
	Thap Muoi	4.010	4.553	5.504	6.376	5.778	5.464	5.513	5.720
Tien Giang Province									
Huyen	Cai Be	5.890	5.523	5.790	6.100	6.740	6.210	6.296	
	Cai Lay	5.789	5.703	5.921	6.260	5.961	6.500	6.609	
Total					5.540	5.547	5.410	5.703	
Paddy Yield of Summer- Autumn crop		ton/ha							
Dong Thap Province									
Thi Xa	Cao Lanh	3.076	3.202	3.500	3.200	3.391	3.331	3.407	3.511
Huyen	Tan Hong	4.502	4.250	3.500	3.412	3.607	3.689	4.170	3.895
	Hong Ngu	/	/	4.830	4.179	4.388	3.991	4.207	3.977
	Tam Nong	2.738	3.982	3.630	4.092	3.528	3.560	3.650	3.512
	Thanh Binh	3.802	3.518	4.220	4.010	4.017	3.969	3.582	3.710
	Cao Lanh	2.667	3.504	3.600	3.481	3.405	3.782	3.350	3.407
	Thap Muoi	3.419	3.403	3.760	3.329	3.219	3.590	3.341	3.502
Tien Giang Province									
Huyen	Cai Be	2.885	3.251	3.448	3.440	4.720	4.504	4.113	
	Cai Lay	3.191	3.177	3.651	3.700	5.040	4.962	4.978	
Total					3.517	3.541	3.780	3.618	
Paddy Yield of Autumn-Winter Crop		ton/ha							
Dong Thap Province									
Thi Xa	Cao Lanh								
Huyen	Tan Hong				4.541	2.590			
	Hong Ngu	/	/		2.391	3.000			3.600
	Tam Nong								
	Thanh Binh								
	Cao Lanh				2.937	3.780	3.150	3.217	
	Thap Muoi				3.000	3.746	3.550	3.005	3.190
Tien Giang Province									
Huyen	Cai Be				4.197	4.000	4.400	4.195	
	Cai Lay				3.700	3.970	4.502	4.380	
Total					2.368	3.218	3.309	2.980	
Area for tenth-month Paddy		ton/ha							
Dong Thap Province									
Thi Xa	Cao Lanh	2.284	-						
Huyen	Tan Hong	1.058	0.502		0.860				
	Hong Ngu	/	/						
	Tam Nong	0.609	-						
	Thanh Binh	1.050	-						
	Cao Lanh	1.357	1.500						
	Thap Muoi	1.290	1.225						
Tien Giang Province									
Huyen	Cai Be								
	Cai Lay								
Total					0.860	1.027	3.030	0	0

Table E.2.7 Characteristics of paddy varieties which have been producing in Dong Thap

Variety name	Origin	Growing period	Height period	Resist of milarpavata lugens stall	Resist of pyricularia oryzae	Paddy quality	Yield ton/ha	Shape	Suitable trait and other cultivating request
1 OM1570	MRD paddy Institute	90-95	90-95	Slightly resistancy	Slightly resistancy	Long paddy shape, non silver belly, Good for export	6-8	Rarely hidden ear, fast open, give many branches	Good intensive farming, suitable 2 crops/year
2 OM 1704 (S-A 95)	MRD paddy Institute	90-95	92-95	Slightly resistancy	Resistancy	High quality, long paddy shape, non silver belly	6-8	Rarely show off ear, fast open	Good intensive farming, suitable 3 crops/year
3 VND 95-26	Southern agricultural Institute	95-100	95-100	Slightly resistancy	Slightly resistancy	High quality, big & long paddy shape, non silver belly	6.5-8	Give many branches, strong trunk	Suitable 2 crops/year, need intensive farming
4 IR59656-68	IRRI	88-93	95-100	Resistancy	Resistancy	Good quality, big & long paddy shape, non silver belly	6-7.5	Show off ear, fast open	Good intensive farming, 3 crops/year cultivating
5 OM 1643	MRD paddy Institute	90-95	95-100	Resistancy	Resistancy	Good quality, non silver belly, exportable	6.5-8	Rarely show off ear, strong rice stubble	3 crops/year cultivating
6 IR 62065 T	Choosing of IR 62065	88-92	90-95	Resistancy	Resistancy	Good quality, non silver belly, exportable	6.5-8	Rarely show off ear, fast open	3 crops/year cultivating, fertilize in moderation
7 Tai nguyen dot bien	Season paddy variety	90-95	90-95	Slightly resistancy	Slightly resistancy	Smaller paddy shape, non silver belly	7-8	Small halo	2 crops/year
8 IR 64 B	IR 64 Selected	95-100	95-100	Resistancy	Resistancy	Good quality, non silver belly, exportable	7-8	Rarely show off ear, nice shape	Suitable for S-A rice crop, need intensive farming
9 OM 1490	MRD paddy Institute	90-95	95-100	Resistancy	Resistancy	Good quality, non silver belly, exportable	7-8	Show off year, fast open	Suitable 3 crops/year, less fertilizing
10 IR 62126	IRRI	90-95	95-100	Resistancy		Good quality, non silver belly, exportable	6-8	Rarely show off ear, nice shape	Suitable 2 crops/year, less fertilizing
11 OM 1643	MRD paddy Institute	90-95	90-100	Slightly resistancy	Slightly resistancy	Good quality, non silver belly, exportable	6.5-8	Rarely hidden ear, nice shape, give many branches	Suitable 2 crops/year, need intensive farming
12 VND 95-20	Southern agricultural Institute	88-95	90-95	Slightly resistancy	Slightly resistancy	Good quality, non silver belly, exportable	6-8	Rarely show off ear, nice shape	Good intensive farming, suitable 3 crops/year
13 IR 50404	IRRI	88-92	90-95	Contracted	Contracted	Silver belly, not for exporting	6-7.5	Rarely show off ear, week rice stubble, nice shape	Suitable 3 crops/year, less fertilizing
14 OM 1723-62	MRD paddy Institute	90-95	90-95	Resistancy	Resistancy	Good quality, non silver belly, exportable	6-7.5	Rarely hidden ear, nice shape, give many branches	Suitable 3 crops/year, need intensive farming

Table E.2.8 Fruit Cultivating Area and Production in 1998

Perennial Plants	Cultivating Area by District														ha
	Dong Thap Province							Tien Giang Province							
	Thi Xa Cao Lanh	Huyen Tan Hong	Hong Ngu	Tam Nong	Thanh Binh	Cao Lanh	Thap Muoi	Huyen Cai Be	Thap Muoi	Cao Lanh	Thanh Binh	Tam Nong	Tan Hong Cai Lay	Hong Ngu	
	Planted Area (ha)	(%)	Production (ton)	Yield (ton/ha)											
Mango	7,358	28.85	24,973	3.4	266	49	57	19	237	989	143	5,354	244		
Longan	6,993	27.42	81,576	11.7	59	19	28	-	29	716	14	3,975	2,153		
Banana	2,216	8.69	17,087	7.7	2	10	129	6	75	278	1,021	350	345		
Citrus	1,484	5.82	21,077	14.2	12	-	-	-	41	54	-	1,239	138		
Coconut	864	3.39	4,547	5.3	33	6	224	32	85	120	5	200	159		
Plum tree	314	1.23	2,845	9.1	-	-	28	-	-	36	-	250	-		
Sapodilla	326	1.28	2,967	9.1	20	3	22	-	-	-	-	281	-		
Papaya	294	1.15	3,652	12.4	3	5	28	-	25	53	180	-	-		
Others	5,658	22.18	34,711	6.1	58	36	75	31	116	202	36	2,053	3,051		
Total	25,507		193,435	8.8	453	128	591	88	608	2,448	1,399	13,702	6,090		

Source : Provincial Statistic Books in 1998 (Dong Thap/Tien Giang) (*)Data calculated within only study area from Statistical book in 1998

	Production by District														ton
	Dong Thap Province							Tien Giang Province							
	Thi Xa Cao Lanh	Huyen Tan Hong	Hong Ngu	Tam Nong	Thanh Binh	Cao Lanh	Thap Muoi	Huyen Cai Be	Thap Muoi	Cao Lanh	Thanh Binh	Tam Nong	Tan Hong Cai Lay	Hong Ngu	
Mango	485	-	138	53	389	1,760	287	18,204	3,657						
Longan	177	5	91	-	70	3,599	26	45,315	32,293						
Banana	13	53	824	47	508	2,259	6,258	3,675	3,450						
Citrus	45	-	-	-	111	267	-	19,824	830						
Coconut	142	28	501	188	378	718	27	180	2,385						
Plum tree	-	-	91	-	-	254	-	2,500	-						
Sapodilla	95	-	62	-	-	-	-	2,810	-						
Papaya	61	35	396	-	259	550	2,351	-	-						
Others	222	137	207	144	292	1,697	251	15,371	16,390						
Total	1,240	258	2,310	432	2,007	11,104	9,200	107,879	59,005						

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Table E.2.9 Fruit Cultivating Area

Dong Thap Province									
	ha								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
Mango	3,490	3,630	3,234	2,325	2,416	2,898	2,436	2,742	3,028
Longan	274	603	896	1,032	1,110	2,206	3,370	4,279	5,138
Banana	2,553	2,226	1,837	2,171	2,320	1,912	1,848	1,825	2,593
Citrus	403	721	1,124	1,527	1,569	2,940	4,227	4,260	4,073
Papaya	393	259	281	412	375	249	198	111	338
Jack-fruit	59	41	40	3	3	23	38	36	36
Starapple	393	259	271	9	10	27	20	10	36
Coconut	0	0	0	0	0	0	0	0	0
Others	450	72	84	707	904	908	905	701	2,208
Total	8,015	7,811	7,767	8,186	8,707	11,163	13,042	13,964	17,450

Tien Giang Province (Cai Be district)									
	ha								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
Mango	2,200	2,500	2,910	3,424	4,150	4,360	5,030	5,215	5,354
Longan	120	570	630	1,494	1,560	2,180	2,530	3,250	3,975
Banana	850	700	650	550	500	450	450	350	350
Citrus	2,200	2,100	2,030	2,450	1,450	1,380	1,150	1,190	1,239
Papaya	0	0	0	0	0	0	0	0	0
Jack-fruit	0	0	0	0	0	0	0	0	0
Starapple	0	0	0	0	0	0	0	0	0
Coconut	1,742	1,700	1,500	1,000	800	500	300	200	200
Others	5,233	5,333	5,510	4,009	16,130	4,603	3,633	2,788	2,584
Total	12,345	12,903	13,230	12,927	24,590	13,473	13,093	12,993	13,702

Tien Giang Province (Cai lay district)									
	ha								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
Mango	410	445	489	531	340	329	368	408	460
Longan	983	1,196	1,410	1,526	1,663	3,239	3,551	3,850	4,062
Banana	408	425	442	461	480	557	589	620	651
Citrus	1,015	1,080	1,149	1,222	1,300	587	479	371	261
Papaya	0	0	0	0	0	0	0	0	0
Jack-fruit	0	0	0	0	0	0	0	0	0
Starapple	0	0	0	0	0	0	0	0	0
Coconut	782	823	866	912	960	568	477	388	300
Others	7,620	7,471	7,255	6,430	6,025	5,455	5,277	5,108	5,756
Total	11,218	11,440	11,611	11,082	10,768	10,735	10,741	10,745	11,490

Total of The Study Area									
	ha								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
Mango	6,100	6,575	6,633	6,280	6,906	7,587	7,834	8,365	8,842
Longan	1,377	2,369	2,936	4,052	4,333	7,625	9,451	11,379	13,175
Banana	3,811	3,351	2,929	3,182	3,300	2,919	2,887	2,795	3,594
Citrus	3,618	3,901	4,303	5,199	4,319	4,907	5,856	5,821	5,573
Papaya	393	259	281	412	375	249	198	111	338
Jack-fruit	59	41	40	3	3	23	38	36	36
Starapple	393	259	271	9	10	27	20	10	36
Coconut	2,524	2,523	2,366	1,912	1,760	1,068	777	588	500
Others	13,303	12,876	12,849	11,146	23,059	10,966	9,815	8,597	10,548
Total	25,478	25,579	25,975	25,915	37,159	27,784	29,042	29,337	33,800

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Table E.2.10 Fishry production and Fish Raising Area in 1998

Fishry production	ton											
	Thi Xa Cao Lanh			Huyen Tan Hong			Dong Thap Province			Tien Giang Province		
Catching	99	2,332	2,100	2,712	1,979	3,807	1,675	1,500	1,260			
Raising	370	911	20,250	2,763	542	1,536	573	3,319	4,243			
Total	469	3,243	22,350	5,475	2,521	5,343	2,248	4,819	5,503			

Fish Raising Area	ha											
	Thi Xa Cao Lanh			Huyen Tan Hong			Dong Thap Province			Tien Giang Province		
Raising Area	31	63	286	138	125	175	112	1,129	1,920			

The Change of Fishry production in Study Area	ton							
	1991	1992	1993	1994	1995	1996	1997	1998
Cage Breeding	1,345	2,250	2,200	7,500	11,667	13,440	13,000	
Pond Breeding	5,862	5,846	5,764	3,005	12,794	13,735	12,920	
Shrimp Breeding	315	142	152	191	48	41	80	

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**Table E.2. 1 1 CROPPING CALENDAR OF PRESENT LAND USE TYPES
IN THE DONG THAP MUOI PROJECT AREA**

No	Present land use type	MONTH											
		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
MONORICE CULTIVATION													
1	03 Irrigated Rice crops												
	a/ WS - SS - SA crops	WS		SS			SA			WS			
	b/ WS - SA - AW crops	WS		SA			AW			WS			
2	02 Irrigated Rice crops												
	a/ early WS - early SA crops	WS		SA			WS						
	b/ WS - SA crops	WS		SA			WS						
3	01 Irrigated Rice crop (WS)	WS		WS		WS		WS		WS		WS	
RICE-UPLAND CROPS CULTIVATION													
4	02 Irrigated Rice - 01 Upland crops												
	(WS rice - SS Soybean/Maize	WS		SS soybean			SA			WS			
	- SA rice)	WS		SS maize			SA			WS			
5	01 Irrigated Rice - 01 Upland crop												
	(WS rice - SS Soybean/Maize)	WS		SS soybean			SA			WS			
		WS		SS maize			SA			WS			
6	Vegetables (40 - 50 days/crop)	2 nd crop		3 rd crop		4 th crop		5 th crop		1 st crop		2 nd crop	
PERENNIAL CROPS GROWING													
7	Fruit trees (Longan, Mango, Orange, Coconut,..)	Perennial crops growing throughout the year											

WS : Winter - Spring crop

SS : Spring - Summer crop

SA : Summer - Autumn crop

AW : Autumn - Winter crop

Flooding duration

Starting time/ending time of actual flooding season

Time of flooding peak

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Table E.2. 1 3 Income and Cost of Soybean and Maize

Soybean				Maize							
Income				Income							
Soybean yield price	2.1	Dong/Kg	3,800	Maize yield price	5.1	Dong/Kg	1,600				
			7,980,000				8,160,000				
Expenses				Expenses							
Seed	kg/ha	Volume	Price	Cost	Seed	kg/ha	Volume	Price	Cost		
Fertilizer					Fertilizer						
Urea	kg/ha	160	2,200	352,000	Urea	kg/ha	250	2,200	550,000		
NPK	kg/ha	150	2,000	300,000	DAP	kg/ha	150	3,500	525,000		
Phosphorous	kg/ha	200	1,050	210,000	Others	kg/ha	50	2,200	110,000		
Others	kg/ha			60,000							
Pesticide	Dong/ha			1,600,000	25%	Dong/ha			141,000	2%	
Anti-grass medicine	Dong/ha			450,000	7%	Anti-grass medicine	Dong/ha		270,000	5%	
Fuel	Dong/ha			250,000	4%	Fuel	Dong/ha	60	4,500	270,000	
Pumping cost	Dong/ha			610,000	10%	Pumping cost	Dong/ha	13	15,000	195,000	3%
Marking soil cost	Dong/ha					Marking soil cost	Dong/ha	10	30,000	300,000	5%
Small tools cost	Dong/ha					Small tools cost	Dong/ha				
Interests and other expense						Interests and other expense					
Harvesting cost						Harvesting cost					
Reaping hirer	Dong/ha	20	25,000	500,000	8%	Reaping hirer	Dong/ha	45	15,000	675,000	11%
Threshing hirer	Dong/ha	10	25,000	250,000	4%	Threshing hirer	Dong/ha	8	30,000	240,000	4%
Transporting cost	Dong/ha	73	15,000	1,095,000	17%	Transporting cost	Dong/ha	20	15,000	300,000	5%
Labor cost	Man/day					Labor cost	Man/day	92.5	15,000	1,387,500	24%
Total cost				6,297,000		Total cost				5,879,500	
Tax				140,000		Tax				140,000	
Profit				1,543,000		Profit				2,140,500	

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Table E.2. 1 4 Income and Cost of Soybean and Maize

		Longan		Mandarin	
		5 Years			
Income		Unit	Volume	Price	Cost
Longan yield price	11.0	piece/ha	300÷10year	6,000	180,000
	5,000	Dong/Kg	5,000		55,000,000
Expenses					
Seedling Fertilizer		kg/ha	210	2,100	441,000
Urea		kg/ha	200	4,600	920,000
DAP		kg/ha	150	2,200	330,000
Potassium		kg/ha			200,000
Others		Dong/ha			320,000
Pesticide		Dong/ha			250,000
Anti-grass medicine		Dong/ha			292,500
Fuel		Dong/ha	65	4,500	100,000
Pumping cost		Dong/ha			300,000
Marking soil cost		Dong/ha			500,000
Small tools cost		Dong/ha			200,000
Harvesting cost		Dong/ha			850,000
Transporting cost		Dong/ha			2,500,000
Land repairing cost		Dong/ha			1,650,000
Interests and other expense					18%
Labor cost		Man/day	110	15,000	1,650,000
Total cost					9,033,500
Tax					840,000
Profit					45,126,500
Income					
Mandarin yield price	17.0	Dong/Kg	3,000		51,000,000
Expenses					
Seed Fertilizer		kg/ha	500÷10year	6,000	300,000
Urea		kg/ha	220	2,100	462,000
DAP		kg/ha	400	4,600	1,840,000
Potassium		kg/ha	200	2,200	440,000
Others		Dong/ha			200,000
Pesticide		Dong/ha			400,000
Anti-grass medicine		Dong/ha			250,000
Fuel		Dong/ha	70	4,500	315,000
Pumping cost		Dong/ha			400,000
Marking soil cost		Dong/ha			500,000
Small tools cost		Dong/ha			400,000
Harvesting cost		Dong/ha			200,000
Transporting cost		Dong/ha			750,000
Land repairing cost		Dong/ha			5,500,000
Interests and other expense					29%
Labor cost		Man/day	450	15,000	6,750,000
Total cost					18,707,000
Tax					429,000
Profit					31,864,000

**THE STUDY ON INTEGRATED AGRICULTURAL DEVELOPMENT PLAN
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**Table E.2. 1 5 YIELD OF RICE CROPS IN AREAS WITH AND WITHOUT DIKE SYSTEM
IN THE DONG THAP MUOI PROJECT AREA**

Rice crop	Observed year	Yield of rice (in Thap Muoi District)	
		Area with dike system	Area without dike system
WINTER - SPRING RICE CROP	1992 - 1993	5.63 ton/ha	5.07 ton/ha
	1993 - 1994	5.99 ton/ha	5.31 ton/ha
	1994 - 1995	5.74 ton/ha	5.33 ton/ha
SPRING - SUMMER RICE CROP	1993	4.30 ton/ha	3.40 ton/ha
	1994	4.71 ton/ha	3.41 ton/ha
	1995	5.66 ton/ha	3.39 ton/ha
SUMMER-AUTUMN RICE CROP	1993	3.94 ton/ha	-
	1994	3.76 ton/ha	-
	1995	4.36 ton/ha	3.33 ton/ha

Source : Institute of Agricultural Science.

THE STUDY ON INTEGRATED AGRICULTURAL DEVELOPMENT PLAN
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Table E.2.1.6 INPUTS (MATERIAL INPUTS AND HIRED LABOUR/MACHINE) AND OUTPUTS /HA
OF LAND USE TYPES IN DONG THAP MUOI STUDY AREA

LAND USE TYPE	CROP	Yield Kg	Seed Kg	Fertilizer (kg/ha)							Lime Kg	Fuel Litres	Pesti- des VNS/1,000	Herbi- des VNS/1,000	Land preparation VNS/1,000	Thre- shing VNS/1,000	Labor		Tax VNS/1,000	Other expenses VNS/1,000	Income VNS/1,000	Farm cost VNS/1,000	Net Benefit VNS/1,000			
				Urea Kg	DAP Kg	NPK Kg	P2O5 Kg	K2O Kg	1 Kg	2 Kg							3 Kg	4 Kg						5 Kg	6 Kg	7 Kg
3 irrigated rice crops	WS Rice	6,150	200	250	100	200	200				90	90	120	350	431	125	73	140	520	10,763	7,143	3,620				
	SS Rice	5,150	200	220	75	175	200				95	85	100	280	361	115	75	140	300	9,013	6,317	2,696				
	SA Rice	4,450	200	200	50	150	150				90	85	100	250	312	95	62	140	250	7,788	5,424	2,364				
	TOTAL	15,750	600	670	225	525	550				275	260	320	880	1,103	335	210	420	1,070	27,563	18,883	8,680				
	WS Rice	6,100	200	275	100	200	200				90	90	120	350	427	120	68	140	520	10,675	7,064	3,611				
	SA Rice	4,450	200	200	50	150	150				90	85	100	250	312	100	65	140	250	7,788	5,549	2,239				
	AW Rice	3,850	200	180	50	100	150				60	85	100	225	270	95	62	140	200	6,738	5,028	1,710				
	TOTAL	14,400	600	655	200	450	500				240	260	320	825	1,008	315	195	420	970	25,200	17,640	7,560				
	Early WS Rice	5,800	200	230	75	200	200				95	120	120	350	406	120	68	140	520	10,150	6,915	3,236				
	Early SA Rice	4,450	200	200	50	150	150				95	100	100	270	312	100	65	140	250	7,788	5,603	2,185				
TOTAL	10,250	400	430	125	350	350				190	220	220	620	718	220	133	280	770	17,938	12,517	5,421					
2 irrigated rice crops	WS Rice	6,200	200	275	100	200	200				85	90	120	350	434	120	68	158	520	10,850	7,070	3,781				
	SA Rice	4,350	200	200	50	150	150				90	85	100	250	305	100	65	158	200	7,613	5,509	2,104				
	TOTAL	10,550	400	475	150	350	350				175	175	220	600	739	220	133	315	720	18,463	12,579	5,884				
	WS Rice	5,700	200	230	100	200	200				90	90	120	380	399	120	68	158	500	9,975	6,974	3,002				
	TOTAL	5,700	200	230	100	200	200				90	90	120	380	399	120	68	158	500	9,975	6,974	3,002				
	WS Rice	6,150	200	250	100	200	200				90	90	120	350	431	125	73	140	520	10,763	7,143	3,620				
	SS maize	6,200	20	250		200	200				60	70		250		95	62	140	250	8,680	4,973	3,707				
	SA Rice	4,450	200	200	50	150	150				90	85	100	250	312	95	62	140	250	7,788	5,424	2,364				
	TOTAL	16,800	420	700	150	550	550				240	245	220	850	742	315	197	420	1,020	27,230	17,539	9,691				
	WS Rice	6,150	200	250	100	200	200				90	90	120	350	431	125	73	140	520	10,763	7,143	3,620				
SS soybean	1,850	25	175		150	200				60	65		280		75	49	140	250	8,325	3,933	4,392					
SA Rice	4,450	200	200	50	150	150				90	85	100	250	312	95	62	140	250	7,788	5,424	2,364					
TOTAL	12,450	425	625	150	500	550				240	240	220	880	742	295	184	420	1,020	26,875	16,499	10,376					
1 irrigated rice - 1 upland crop	WS Rice	6,000	200	230	75	200	200				90	90	120	350	420	125	73	140	520	10,500	7,005	3,496				
	SS Maize	5,850	20	250		200	200				60	70		250		90	59	140	250	8,190	4,848	3,342				
	TOTAL	11,850	220	480	75	400	400				150	160	120	600	420	215	132	280	770	18,690	11,853	6,838				
	WS Rice	6,000	200	230	75	200	200				90	90	120	350	420	125	73	140	520	10,500	7,005	3,496				
	SS soybean	1,800	25	150		200	200				60	65		280		70	46	140	250	8,100	3,758	4,342				
	TOTAL	7,800	225	380	75	350	400				150	155	120	630	420	195	119	280	770	18,600	10,763	7,838				
	Vegetable crop	15,000	(a)	200	150	100	100	50			80	120		500		100	55	140	550	12,000	5,489	6,511				
	Vegetable crop	14,000	(a)	250	150	100					50	100		250		125	69	140	540	11,200	5,620	5,580				
	Vegetable crop	13,000	(a)	150	120	80					20	80		200		110	61	140	350	10,400	4,516	5,884				
	TOTAL	42,000		600	420	280	100	50			150	300		950		335	184	420	1,440	33,600	15,625	17,975				
Coconut	6,400			50						120					55	39	315		6,400	1,763	4,637					
Orange	15,200		50	400	1,000					200	200				450	315	429	5,500	45,600	22,251	23,349					
Star Apple	8,800		150	300	200					60	120				350	245	840	2,500	30,800	13,615	17,185					
Apple	11,200		150	400	250					140					380	266	840	2,000	22,400	14,056	8,344					
Mango	9,600		150	400	250					140					350	245	840	3,500	43,200	14,574	28,626					
Custard apple	5,500		50	150	250					50	120				95	67	429	250	19,250	4,330	14,920					
Longan	9,600		200		350					60	120				110	77	840	2,500	176,800	9,203	67,597					

(a) Included in other expenses

(b) Annual costs of dredging the garden - ditches and repairing the raised - beds

Note : Input/output data of fruit trees (perennial crops) are only calculated in the harvesting - period of trees (about 5 years after planted)

(Source : Investigation results of Sub-NIAPP in the Dong Thap Muoi region, 1998)

Table E.2. 17

Land used plan -1									
	1 Rice Cropping	2 Rice	3 Rice	1 Rice+Upland crop or 2 Rice Cropping	2 Rice+Upland crop or 3 Rice Cropping	Perennial crop or 2 Rice+Upland	Perennial crop or 3 Rice Cropping		
Zone A		16,843		3,877					
Zone B		89,007		22,927	6,878				
		62,305	26,702	16,049					
Zone C			9,064			11,395	63,940		
Zone D						22,336	4,701		
Zone E	8,186		444						
Zone F	8,186		444						
Total	16,372	87,162	36,210	19,926	6,878	33,731	68,641		
								total	260,734

Land used plan -2									
	1 Rice Cropping	2 Rice	3 Rice	1 Rice+Upland crop or 2 Rice Cropping	2 Rice+Upland crop or 3 Rice Cropping	Perennial crop or 2 Rice+Upland	Perennial crop or 3 Rice Cropping	Expected rate of cultivated area	
Zone A	0	13,138	0	3,024	0	0	0	78.00%	16,162
Zone B	0	49,844	21,362	12,839	5,502	0	0	80.00%	89,547
Zone C	0	0	7,161	0	0	9,002	50,513	79.00%	66,675
Zone D	0	0	0	0	0	16,752	3,526	75.00%	20,278
Zone E	7,040	6,892	382					86.00%	14,314
Zone F	7,040	6,892	382						
Total	7,040	69,874	28,904	15,863	5,502	25,754	54,038		206,976
Perennial crop						19,000	14,000		33,000
Upland crop				1,000	2,000	4,000			7,000
Rice									
Single Cropping	7,040								7,040
Double Cropping		69,874		14,863		2,754			87,491
Triple Cropping			28,904		3,502		40,038		72,445
Rice Cultivated A	7,040	139,747	86,712	27,726	10,507	5,508	120,115		397,356

Final Land Used Plan									
	1 Rice Cropping	2 Rice	3 Rice	1 Rice+Upland crop or 2 Rice Cropping	2 Rice+Upland crop or 3 Rice Cropping	Perennial crop or 2 Rice+Upland	Perennial crop or 3 Rice Cropping		
Zone A	0	13,000	0	3,000	0	0	0		
Zone B	0	49,500	21,000	13,000	5,500	0	0		
Zone C	0	0	7,000	0	0	9,000	51,000		
Zone D	0	0	0	0	0	16,000	4,000		
Zone E	7,000	7,500	500						
Zone F	7,000	7,500	500						
Total	7,000	70,000	28,500	16,000	5,500	25,000	55,000	Total	207,000

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LAND SUITABILITY CLASSIFICATION BY ZONES IN THE DONG THAP MUOI STUDY AREA
(in cases with and without project)

ZON	LMU No	SELECTED LAND USE TYPE (LUT)																								LMU Area				
		LUT 1		LUT 2		LUT 3		LUT 4		LUT 5		LUT 6		LUT 7		Ha	%													
		S	F	A	P	F1	F2	P	F1	F2	P	F1	F2	P	F1	F2	P	F1	F2	P	F1	F2	P	F1	F2					
A	4	1	4	1	Nf	-	-	S2s	-	-	Nf	-	-	S1	-	-	S3f	-	-	Nf	-	-	Nf	-	-	-	-	-	2718	11.18
	6	1	5	1	Nf	-	-	S2s	-	-	Nf	-	-	S2f	-	-	S3f	-	-	Nf	-	-	Nf	-	-	-	-	-	4777	19.65
	7	1	6	1	Nf	-	-	S2s	-	-	Nf	-	-	S2f	-	-	S3f	-	-	Nf	-	-	Nf	-	-	-	-	-	1301	5.35
	12	2	3	1	Nf	-	-	S2s	-	-	Nf	-	-	S1	-	-	S3f	-	-	Nf	-	-	Nf	-	-	-	-	-	1015	4.17
	13	2	4	1	Nf	-	-	S2s	-	-	Nf	-	-	S1	-	-	S3f	-	-	Nf	-	-	Nf	-	-	-	-	-	144	0.59
	14	2	5	1	Nf	-	-	S2s	-	-	Nf	-	-	S2f	-	-	S3f	-	-	Nf	-	-	Nf	-	-	-	-	-	840	3.46
	15	2	6	1	Nf	-	-	S2s	-	-	Nf	-	-	S2f	-	-	S3f	-	-	Nf	-	-	Nf	-	-	-	-	-	1862	7.66
	24	3	3	1	Nf	-	-	S1	-	-	Nf	-	-	S2s	-	-	S3f	-	-	Nf	-	-	Nf	-	-	-	-	-	170	0.70
	28	3	5	1	Nf	-	-	S2f	-	-	Nf	-	-	S2sf	-	-	S3f	-	-	Nf	-	-	Nf	-	-	-	-	-	1019	4.19
	29	3	6	1	Nf	-	-	S2f	-	-	Nf	-	-	S2sf	-	-	S3f	-	-	Nf	-	-	Nf	-	-	-	-	-	6275	25.81
50	5	5	1	Nf	-	-	S1	-	-	Nf	-	-	S3s	-	-	S3sf	-	-	Nf	-	-	Nf	-	-	-	-	-	467	1.92	
51	5	6	1	Nf	-	-	S1	-	-	Nf	-	-	S3s	-	-	S3sf	-	-	Nf	-	-	Nf	-	-	-	-	-	132	0.54	
	River																								3592	14.77				
	Total area																								24312	100				
B	3	1	4	2	-	-	-	S2s	-	-	-	-	-	S2s	-	-	-	-	-	Nf	-	-	-	-	-	-	-	-	523	0.46
	4	1	4	1	-	-	-	S2s	-	-	-	-	-	S2s	-	-	-	-	-	Nf	-	-	-	-	-	-	-	-	2974	2.60
	5	1	5	2	-	-	-	S2s	-	-	-	-	-	S2s	-	-	-	-	-	Nf	-	-	-	-	-	-	-	-	3466	3.03
	6	1	5	1	-	-	-	S2s	-	-	-	-	-	S2s	-	-	-	-	-	Nf	-	-	-	-	-	-	-	-	8578	7.50
	7	1	6	1	-	-	-	S2s	-	-	-	-	-	S2s	-	-	-	-	-	Nf	-	-	-	-	-	-	-	-	1991	1.74
	12	2	3	1	-	-	-	S2s	-	-	-	-	-	S2s	-	-	-	-	-	Nf	-	-	-	-	-	-	-	-	2888	2.52
	13	2	4	1	-	-	-	S2s	-	-	-	-	-	S2s	-	-	-	-	-	Nf	-	-	-	-	-	-	-	-	1524	1.33
	14	2	5	1	-	-	-	S2s	-	-	-	-	-	S2s	-	-	-	-	-	Nf	-	-	-	-	-	-	-	-	375	0.33
	15	2	6	1	-	-	-	S2s	-	-	-	-	-	S2s	-	-	-	-	-	Nf	-	-	-	-	-	-	-	-	608	0.53
	17	3	2	2	-	-	-	S1	-	-	-	-	-	S2sf	-	-	-	-	-	S2s	-	-	-	-	-	-	-	-	52	0.05
21	3	3	2	-	-	-	S1	-	-	-	-	-	S1	-	-	-	-	-	S2s	-	-	-	-	-	-	-	-	4413	3.86	
23	3	3	4	-	-	-	S1	-	-	-	-	-	S1	-	-	-	-	-	S2s	-	-	-	-	-	-	-	-	5674	4.96	
24	3	3	1	-	-	-	S1	-	-	-	-	-	S1	-	-	-	-	-	S2s	-	-	-	-	-	-	-	-	2592	2.27	
25	3	4	2	-	-	-	S1	-	-	-	-	-	S1	-	-	-	-	-	S2s	-	-	-	-	-	-	-	-	4034	3.53	
26	3	4	4	-	-	-	S1	-	-	-	-	-	S1	-	-	-	-	-	S2s	-	-	-	-	-	-	-	-	604	0.53	
27	3	4	1	-	-	-	S1	-	-	-	-	-	S1	-	-	-	-	-	S2s	-	-	-	-	-	-	-	-	23008	20.11	
28	3	5	1	-	-	-	S1	-	-	-	-	-	S1	-	-	-	-	-	S2s	-	-	-	-	-	-	-	-	6432	5.62	
	SELECTIONED LAND USE TYPE																													
ZON	LMU No	SELECTED LAND USE TYPE																						LMU Area						
		LUT 1		LUT 2		LUT 3		LUT 4		LUT 5		LUT 6		LUT 7		LUT 7		LUT 7		LUT 7		LUT 7		LUT 7						

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

ZON/No	Code		LUT 1		LUT 2		LUT 3		LUT 4		LUT 5		LUT 6		LUT 7		Area		
	S	F	F1	F2	P	F1	F2	P	F1	F2	P	F1	F2	P	F1	F2	Ha	%	
35	4	5	2	Nfa	-	-	S2sfa	-	-	S2s	-	-	Nsfa	-	-	Nsfa	-	953	2.87
36	4	5	4	Nfa	-	-	S3a	-	-	S2s	-	-	Nsfa	-	-	Nsfa	-	602	1.81
37	4	5	1	Nf	-	-	S2sf	-	-	S2s	-	-	Nsf	-	-	Nsf	-	814	2.45
40	5	2	1	S2sf	-	-	S2s	-	-	S1	-	-	S3s	-	-	Nf	-	555	1.67
43	5	3	1	Nf	-	-	S2s	-	-	S1	-	-	Nf	-	-	Nf	-	432	1.30
44	5	4	2	Nfa	-	-	S2sa	-	-	S1	-	-	Nfa	-	-	Nfa	-	2344	7.05
45	5	4	3	Nfa	-	-	S2s	-	-	S1	-	-	Nfa	-	-	Nfa	-	2406	7.24
46	5	4	4	Nfa	-	-	S3a	-	-	S1	-	-	Nfa	-	-	Nfa	-	7316	22.00
47	5	4	1	Nf	-	-	S2s	-	-	S1	-	-	Nf	-	-	Nf	-	1309	3.94
48	5	5	2	Nfa	-	-	S2sfa	-	-	S1	-	-	Nfa	-	-	Nfa	-	2738	8.23
49	5	5	4	Nfa	-	-	S3a	-	-	S1	-	-	Nfa	-	-	Nfa	-	862	2.59
50	5	5	1	Nf	-	-	S2sf	-	-	S1	-	-	Nf	-	-	Nf	-	1459	4.39
River																			
Total area																			
																	33255	100	
																	290309	100	

TOTAL PROJECT AREA

Note:

- a. LMU : Land Mapping Units.
- b. S-F-A : Land characteristics (S: Soil ; F: Flooding depth/ Flooding Duratron ; A: Acid surface water).
- c. LUT1 : 03 irrigated rice crops.
LUT2 : 02 irrigated rice crops.
LUT3 : 01 irrigated rice crop.
LUT4 : 02 irrigated rice + 01 Upland crops
LUT5 : 01 irrigated rice + 01 Upland crop.
LUT6 : Vegetables.
LUT7 : Fruit trees.
- d. Project alternatives:
F : Present case (without project).
F1 : August Flooding Control (with project).
F2 : Full Flood Protection/ October Flood Control (with project).
- e. Land suitability classes f. Land constraint factors :
S1 : Highly suitable. s : Soil constraints.
S2 : Moderately suitable. f : Flooding depth/flooding duration constraints.
S3 : Marginally suitable. a : Surface water acidification constraints.
N : Non - suitable.