



**Vietnam National Mekong
Committee**

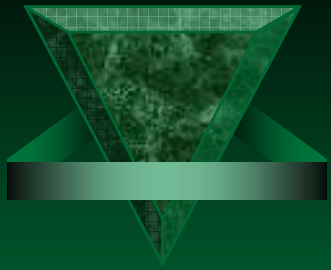
**Mekong River Commission
Secretariat**



IMPROVEMENT OF IRRIGATION EFFICIENCY ON PADDY FIELDS IN LMB

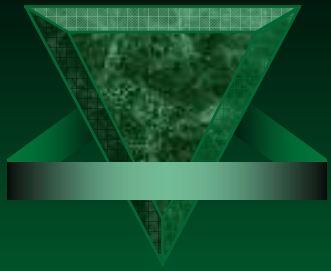
**CASE STUDY: LONG HAI IRRIGATION AREA
GOCONG IRRIGATION PROJECT
MEKONG DELTA, VIETNAM**

VTE, 25th Mar, 2007



CONTENTS

- ✓ Introduction
- ✓ Outline of field observation
- ✓ Result of field observation data
- ✓ Analysis and discussion
- ✓ Key findings
- ✓ Recommendation



Introduction

Introduction

Within past decades, the production of agriculture has increased quickly in Mekong delta.

➤ The delta contributed about 40% of agricultural production, and half of rice production in the country.

➤ Rice production is 11 million tons. Accounts for 85% of exported rice for Vietnam.

One successful reason is the improvement of water management in Mekong Delta.



IRRIGATION SYSTEMS IN MK DELTA

ArcView GIS 3.2

File Edit View Theme Analysis Surface Graphics XTools Window Help Tìm kiếm thông tin Các tiểu dự án Tiện ích

MekongDelta

- Ranh giới quốc gia
- Ranh giới tỉnh
- Ranh giới huyện
- Ranh giới xã
- Đê bao
- Atlas Các Công Trình Thủy Lợi - Hồ Thặng Thủy Lợi Tỉnh Trà Vinh
- Cầu
- Đồn ã Hồ Thặng Thủy Lợi Tỉnh Trà Vinh
- Mặt Cái Đê Bao
- Trạm
- Kênh Quản Lý
- Công Thủy Lợi
- Trạm Bơm
- Đập
- Công Trình
- Địa Danh Hành Chính
- Đường Giao Thông
- Ranh Giới Hành Chính
- Châu Giao Thủy

Information (104.485, 10.3934)

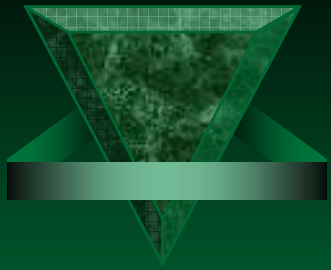
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NO2: -	Mặn: 46,0	NO2: -	Mặn: 60,9
SO2: 0,12	Nhiệt độ: 34,0	SO2: 0,25	Nhiệt độ: 28
CO: 4	Tiếng ồn: 61-80	CO: 3	Tiếng ồn: 61-76
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IRRIGATION SYSTEMS IN MK DELTA

Some Large Irrigation Projects in Mekong Delta (1990 – 2005)

NO.	NAME OF THE IRRIGATION SYSTEMS	LOCATION	SERVICE AREA (HA)	FUNCTIONS
1	Go Cong	Tien Giang	54,000	Fresh water supply, salinity control
2	Tiep Nhat	Soc Trang	53,910	Fresh water supply, salinity control
3	South Mang Thit	Vinh Long, Tra Vinh	225,682	Fresh water supply, salinity control
4	Quan Lo – Phung Hiep	Soc Trang, Bac Lieu	178,888	Fresh water supply, salinity control
5	Nhat Tao Tan Tru	Long An	13,320	Fresh water supply, salinity control
6	Ba Lai	Ben Tre	50,800	Fresh water supply, salinity control
7	Ba Rinb – Ta Liem	Soc Trang, Can Tho	30,944	Fresh water supply, salinity control
8	Huong My	Ben Tre	17,000	Fresh water supply, salinity control
9	Ba The – Tri Ton	An Giang, Kien Giang	43,700	Soil reclamation, Flood control
10	Cai San – Thot Not	Can Tho, Kien Giang	58,000	Fresh water supply, Flood control
11	Ke Sach	Soc Trang , Can Tho	32,000	Fresh water supply, salinity control



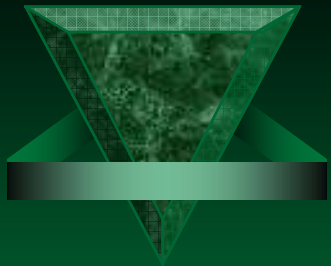
THE PROBLEMS OF IRRIGATION SYSTEMS IN MEKONG DELTA

Irrigation Structures Performance

- Low efficiency of structures such as pump stations, canals, and regulators, due to degradation and poor maintenance.
- Old technology for the regulation and monitoring system
- Lack of water quantity control system

Water Resources Development

- impacted by many factors such as flooding or spring tide, acidity pollution or salinity intrusion,
- polluted by domestic and agricultural wastewater disposals such as fertilizers, pesticides and solid wastes,
- conflicts over water because farmers change from freshwater rice to brackish water shrimp cultivation of higher value



THE PROBLEMS OF IRRIGATION SYSTEMS IN MEKONG DELTA

The policy of water management

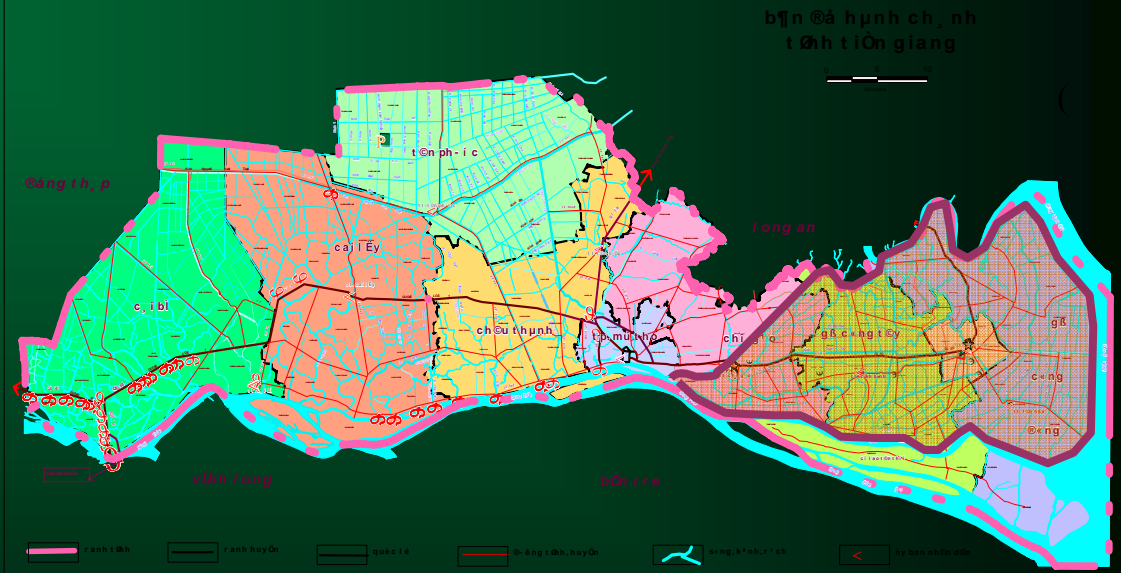
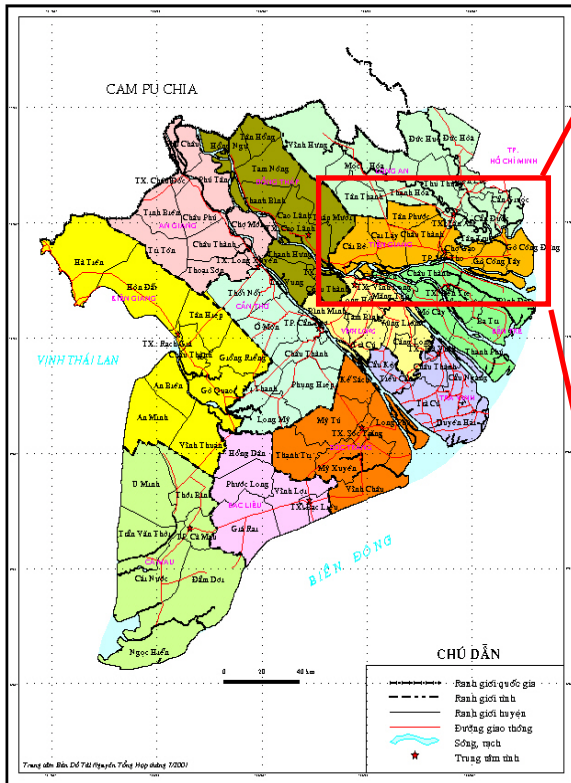
- ✦ Water prices and tariffs for irrigation in Vietnam are rather low so that Irrigation Management Company (IMC) can not generate enough revenue for operation and maintenance of systems. Tariffs are set by politicians of the Provincial Committees, not by IMC.
- ✦ The farmers, who are clients of an IMC, are still not organized into Water Users Associations (WUAs). There is no legal framework in place to take over, operate and maintain the newly controlled tertiary level.

Operation and Maintenance

- ✦ Lack of procedures or guidelines for the operation and maintenance of most systems,
- ✦ have not installed a monitoring system for water level, water quantity and quality in the intakes/ off-takes,
- ✦ The power of managers is not strong enough to solve the conflicts between water users.

GO CONG IRRIGATION PROJECT

BẢN ĐỒ RANH GIỚI HÀNH CHÍNH
ĐỒNG BẰNG SÔNG CỬU LONG

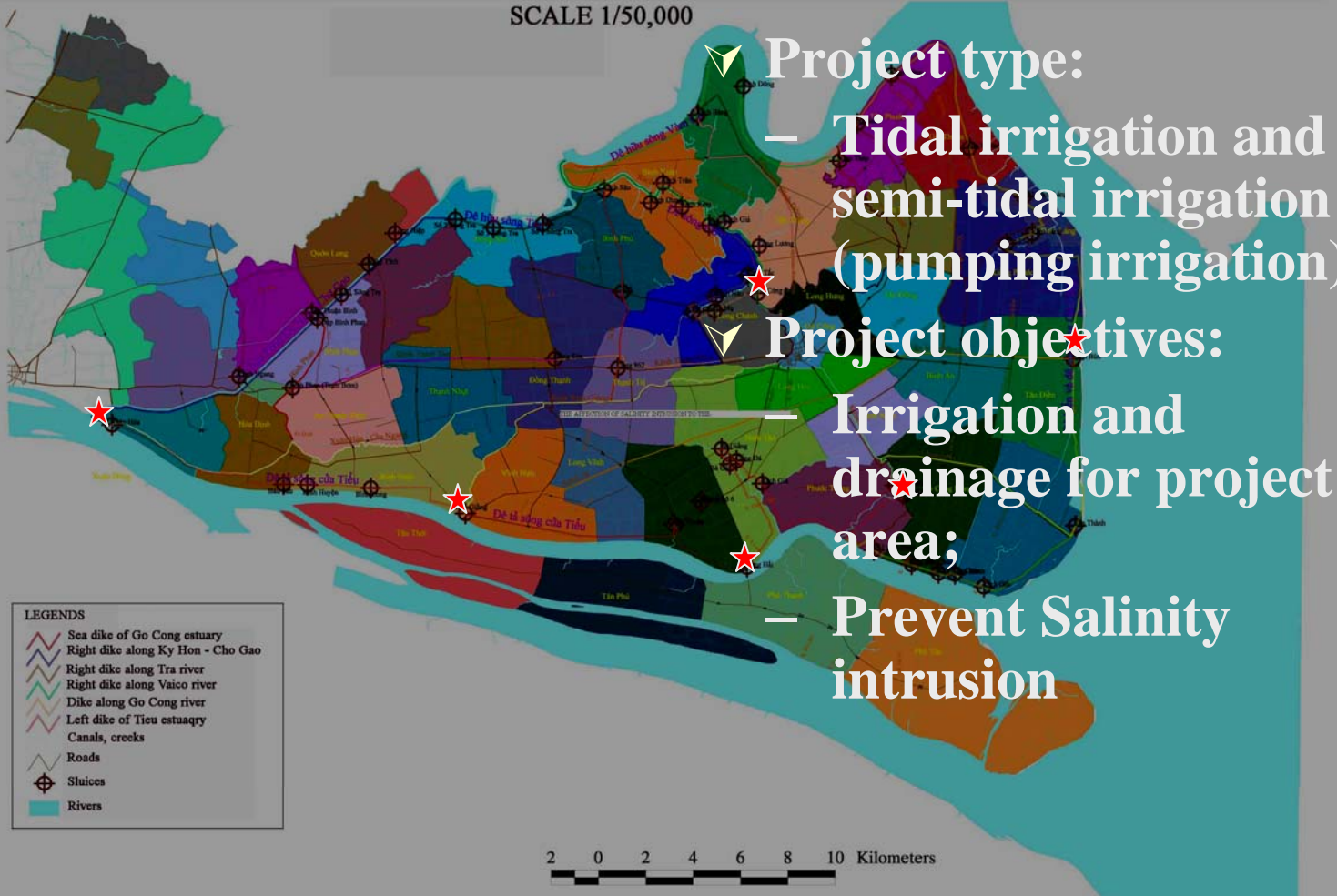


GO CONG IRRIGATION PROJECT

Background

GO CONG IRRIGATION SYSTEM IN MEKONG DELTA

SCALE 1/50,000



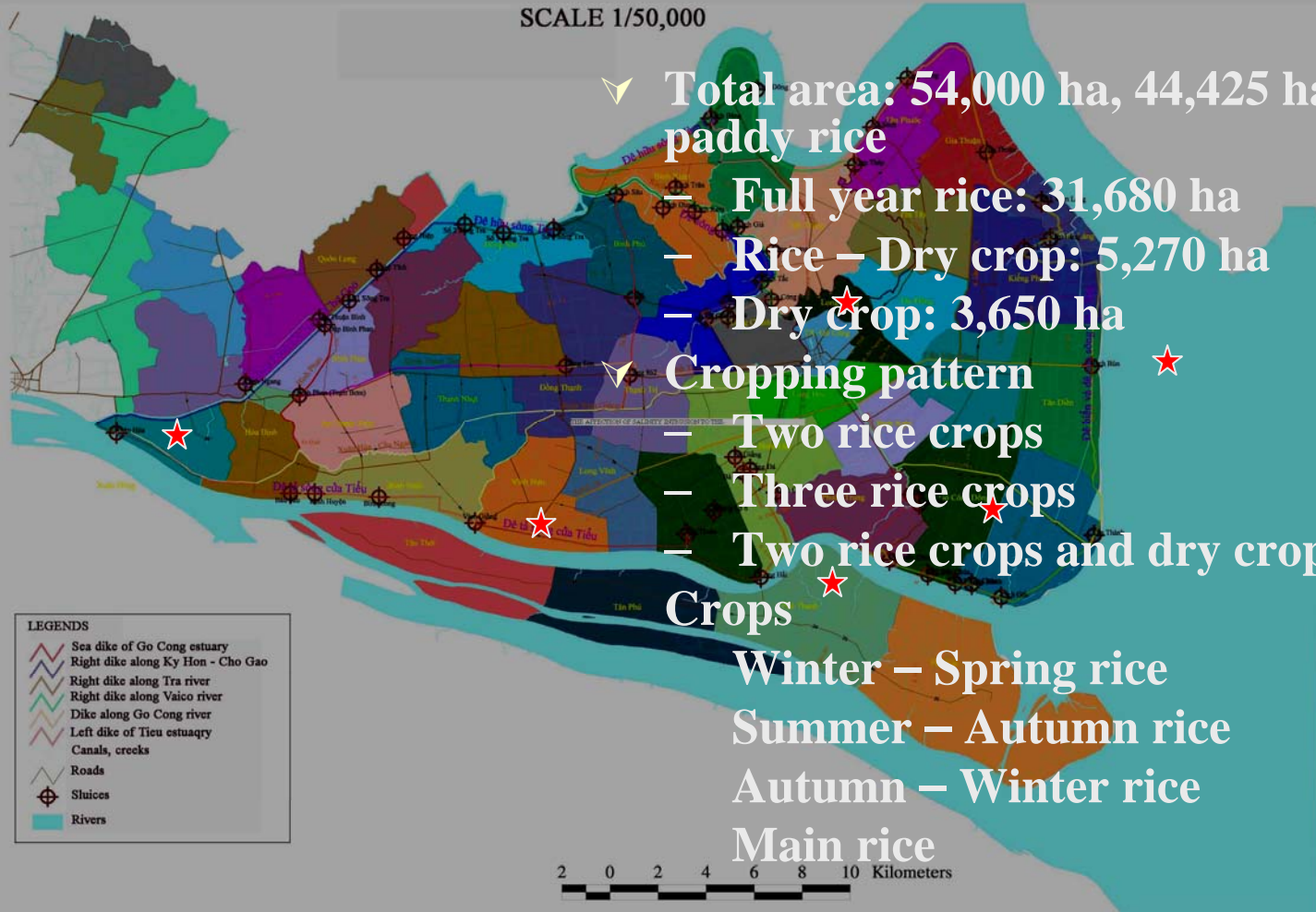
- Project type:
 - Tidal irrigation and semi-tidal irrigation (pumping irrigation)
- Project objectives:
 - Irrigation and drainage for project area;
 - Prevent Salinity intrusion

GO CONG IRRIGATION PROJECT

Present condition

GO CONG IRRIGATION SYSTEM IN MEKONG DELTA

SCALE 1/50,000



✓ Total area: 54,000 ha, 44,425 ha of paddy rice

Full year rice: 31,680 ha

– Rice – Dry crop: 5,270 ha

– Dry crop: 3,650 ha

✓ Cropping pattern

– Two rice crops

– Three rice crops

– Two rice crops and dry crop

Crops

Winter – Spring rice

Summer – Autumn rice

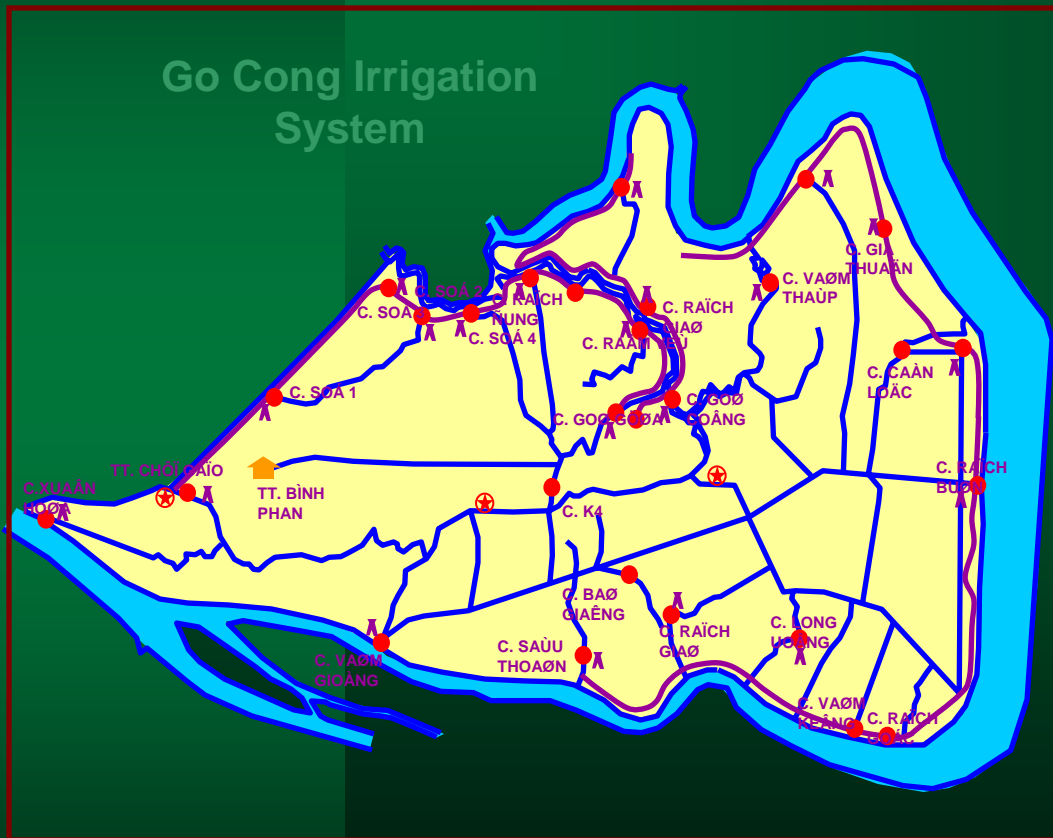
Autumn – Winter rice

Main rice

2 0 2 4 6 8 10 Kilometers

INFRASTRUCTURES OF GO CONG PROJECT

Present condition



Main canal network :

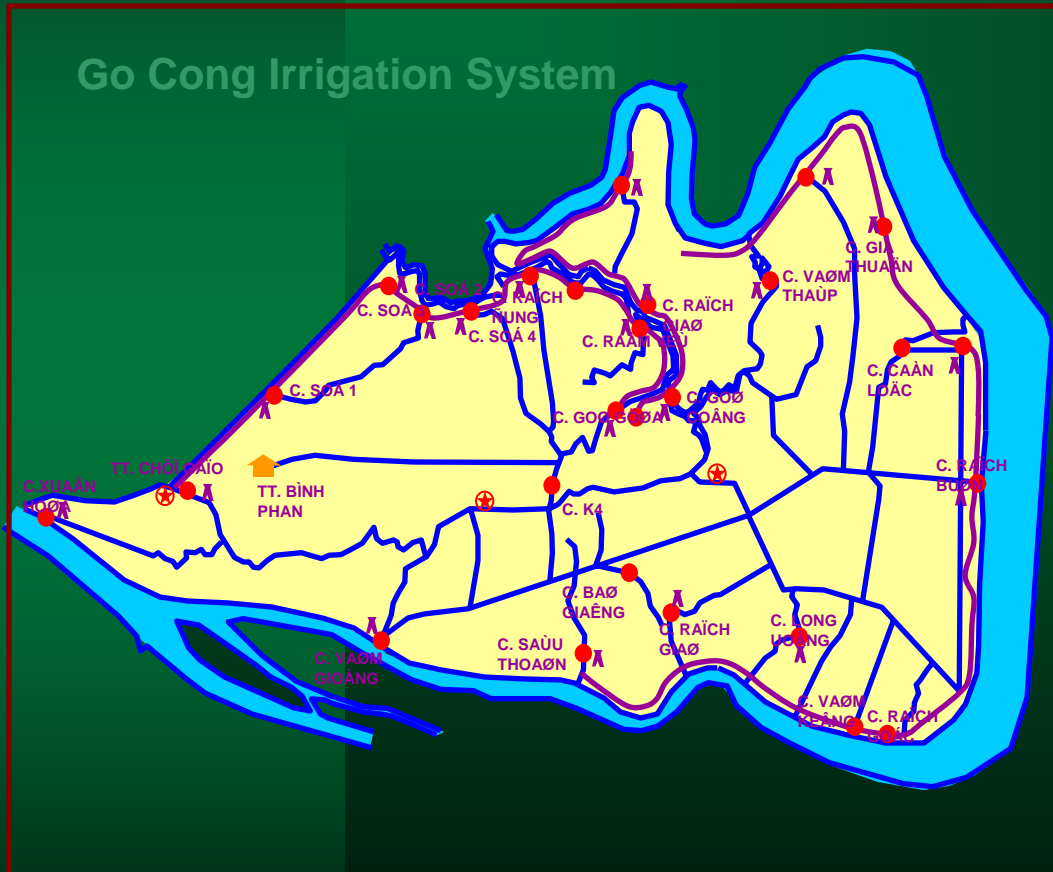
- 14 canals, total length of 157 km



Keanh Xuan Hoa
Trạm Máng Bể Công Nghệ An

INFRASTRUCTURES OF GO CONG PROJECT

Present condition



Sluices :

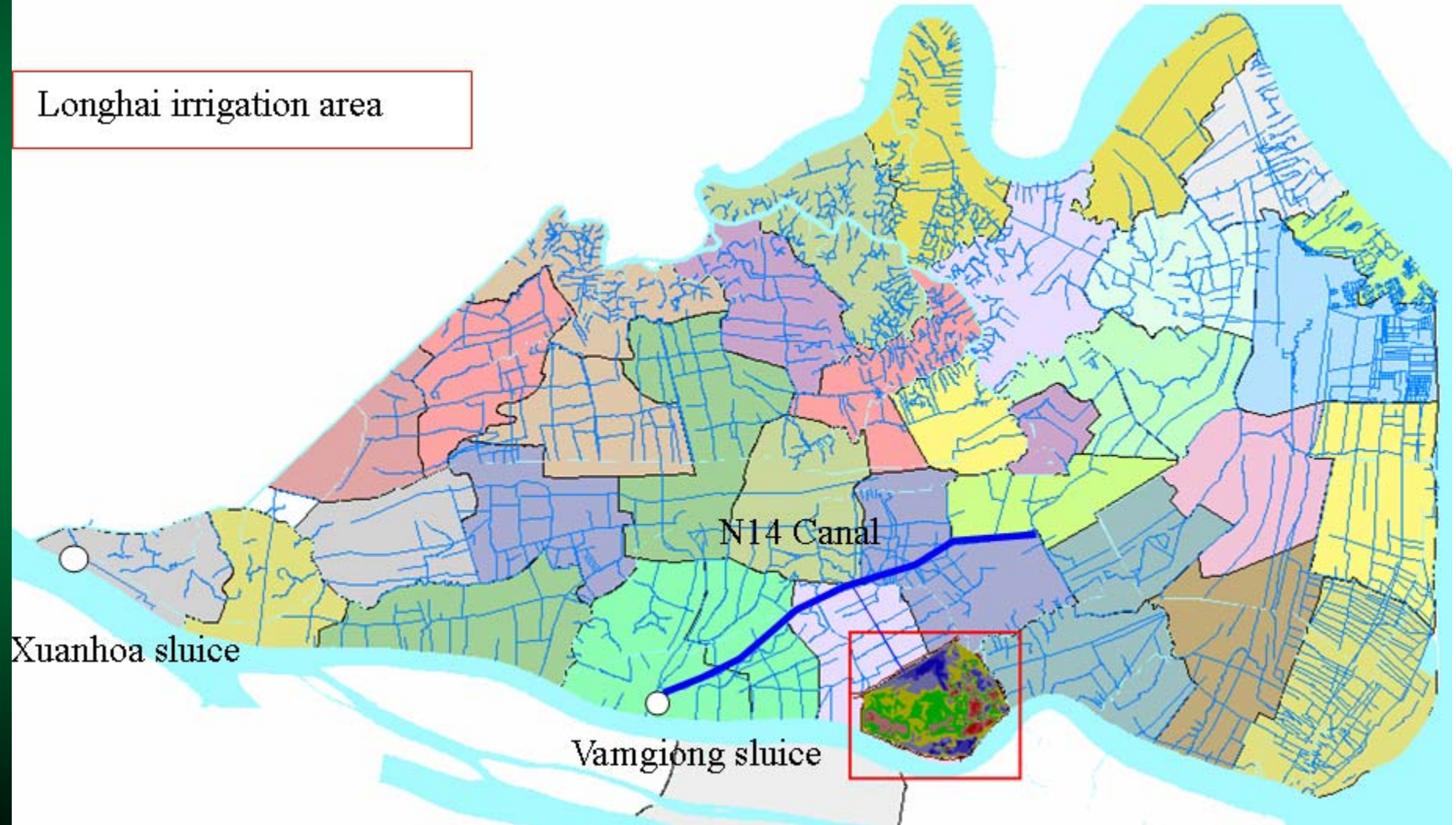
54 sluices with the width of 1.5 m to 32 m



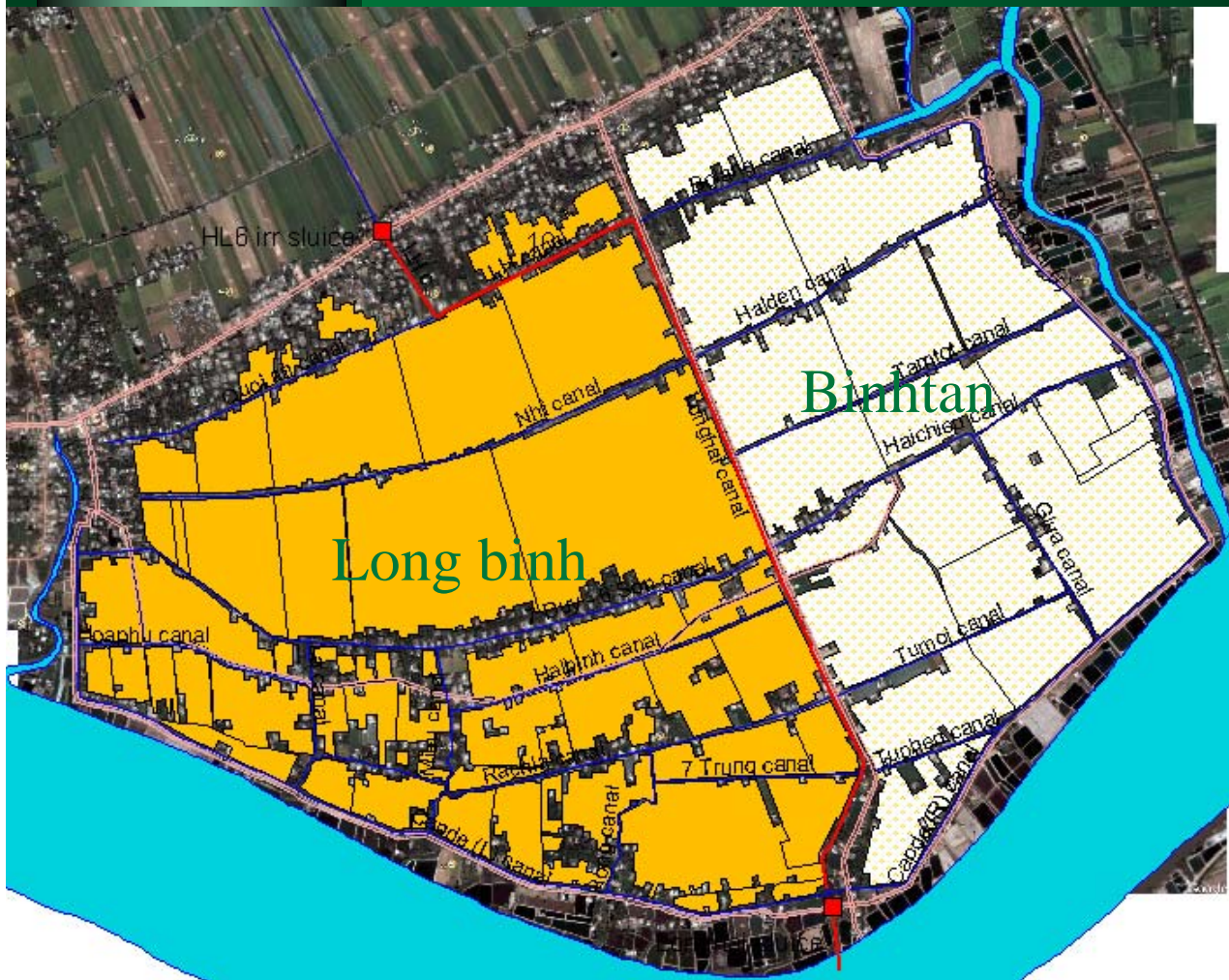
Xuaân Hoa sluice $W_c = 32$
 Raich Giaø sluice $W_c = 13,5m$

Introduction

Longhai irrigation area



LONG HAI IRRIGATION AREA (LHIA)



- Total area: 950 ha
- Agri. area: 707 ha
- Population: 6176
- Consists Longbinh and Binhtan communes
- Cropping pattern: W-S, S-A and A-W
- Water sources: HL6 and Longhai sluices
- Water management: Under Gocong management board, Tien giang IMC

Introduction

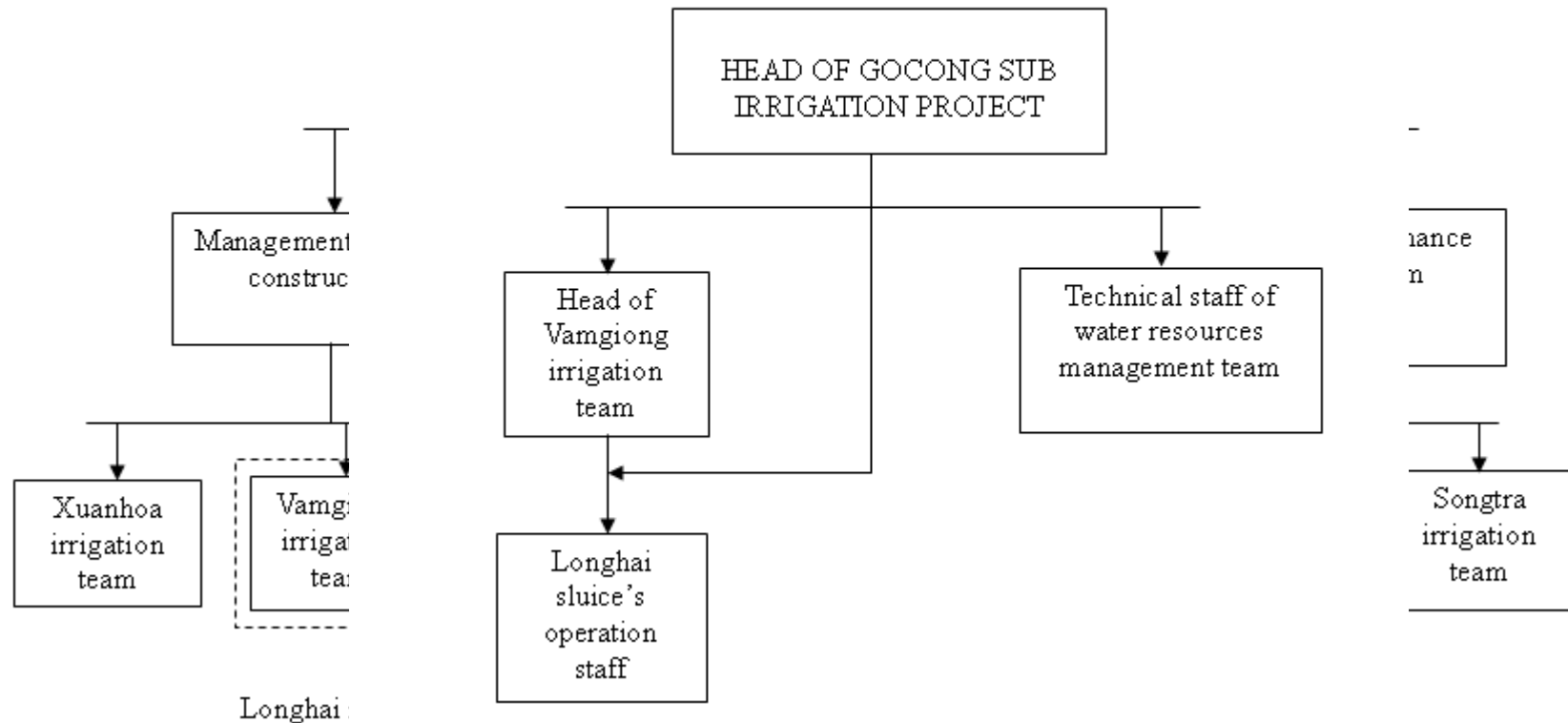


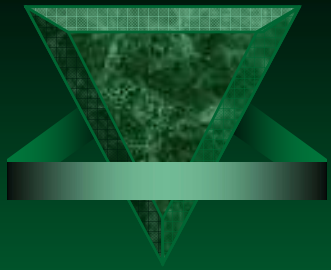
Organization chart

Flow chart of the Tiengiang's irrigation company

DIRECTOR

Flow chart of irrigation management in the Longhai irrigation area





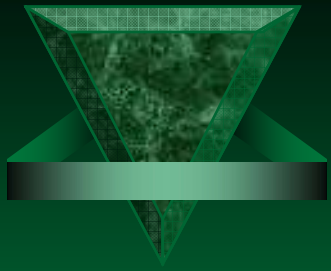
Water management activities

- ✓ Project authorities
 - Responsible for the head works (sluices) and the main and secondary canals;
 - Planning for water supply;
 - Monitor gate operation and water quality;
 - Informing farmers the operation schedule on time.
- ✓ Water users
 - Maintenance and management of tertiary canals;
 - Pay water fee to IMC via local taxmen;
- ✓ Agreement between IMC and WUs by contract, total irrigation area by each farmer each year;
- ✓ Priority for water distribution: limited by condition of salinity intrusion.



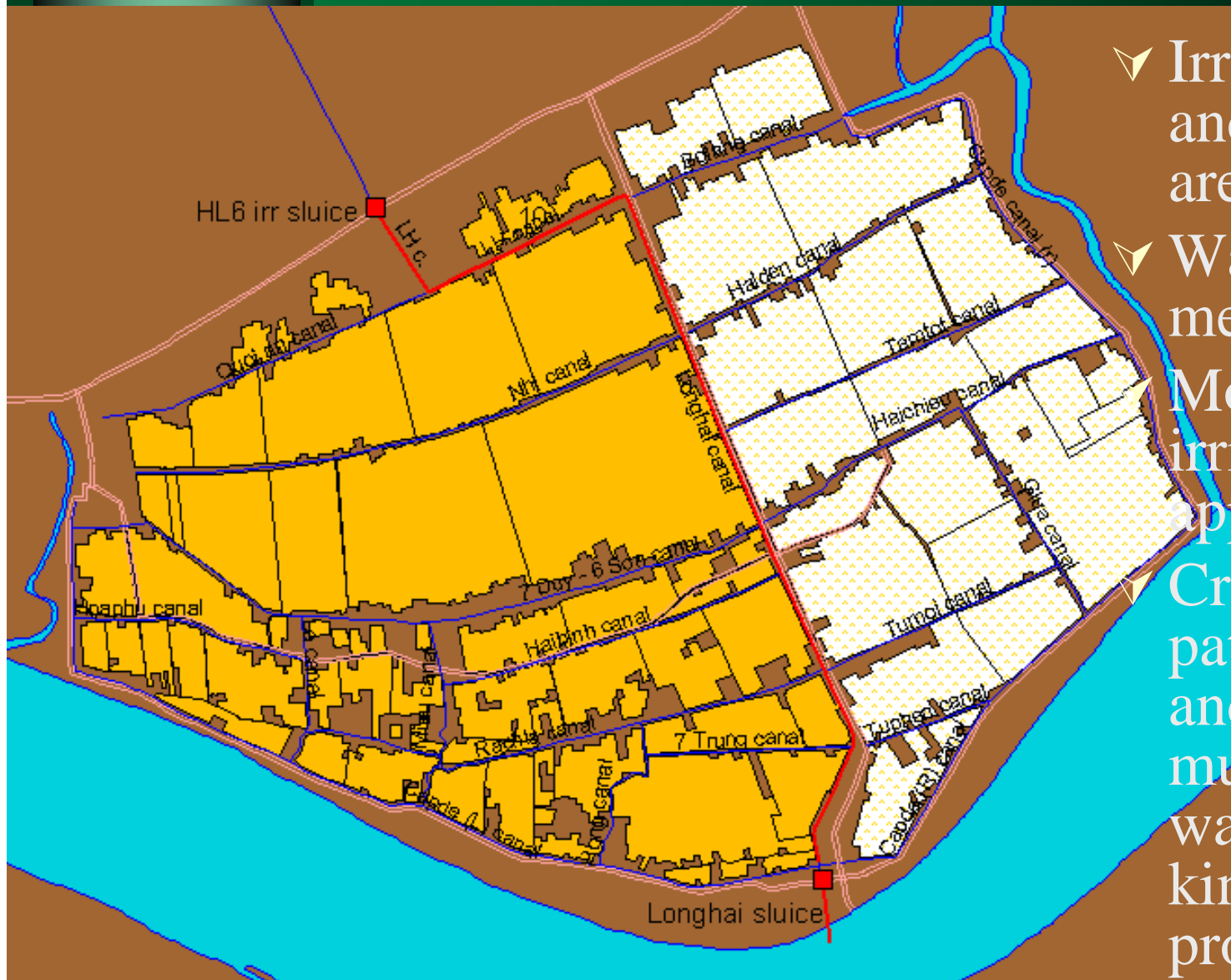
ADVANTAGES

Criteria	Gocong Project	Longhai irrigation area
Location	Closer (100 km)	Closer (150 km)
Size	Large (44,425 ha)	Large (700 ha)
Boundary	Closed	Closed
Management condition	Good	Good
Maintenance condition	Good	Good
Available data	Good	To be collected
Water fee collection	Good (90%)	Good (90%)
Available facilities	Good	Rain gauge



Outline of field observation

Outline of field observation



- ▼ Irrigation system and command area map
- ▼ Water flow measurement
- ▼ Monitor irrigation water applied
- ▼ Cropping pattern, calendar and record multiple use of water, obtain all kind of production...

Outline of field observation



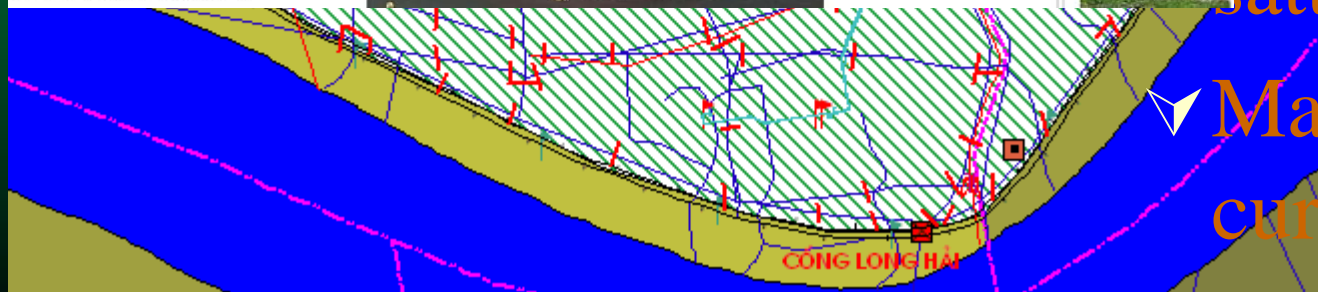
Topographic survey

Canal system survey

Crop area survey

Map digitized with assisted from satellite image

Making Z-W curve of canal





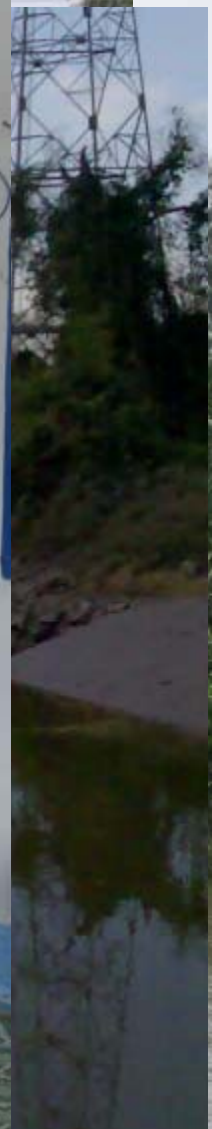
Outline of field observation



At Longhai sluice

- ✔ Instal water level sensors to record water levels up/downstream
- ✔ Record operation schedule
- ✔ Record rainfall and evaporation
- ✔ Monitoring the water flow
- ✔ Calculating water flow by equation

Outline of field observation





Outline of field observation

At HL6 sluice

- ▼ Instal water Data Logger to record water levels up/downstream
- ▼ Record operation schedule
- ▼ Monitoring the water flow
- ▼ Calculating water flow by equation

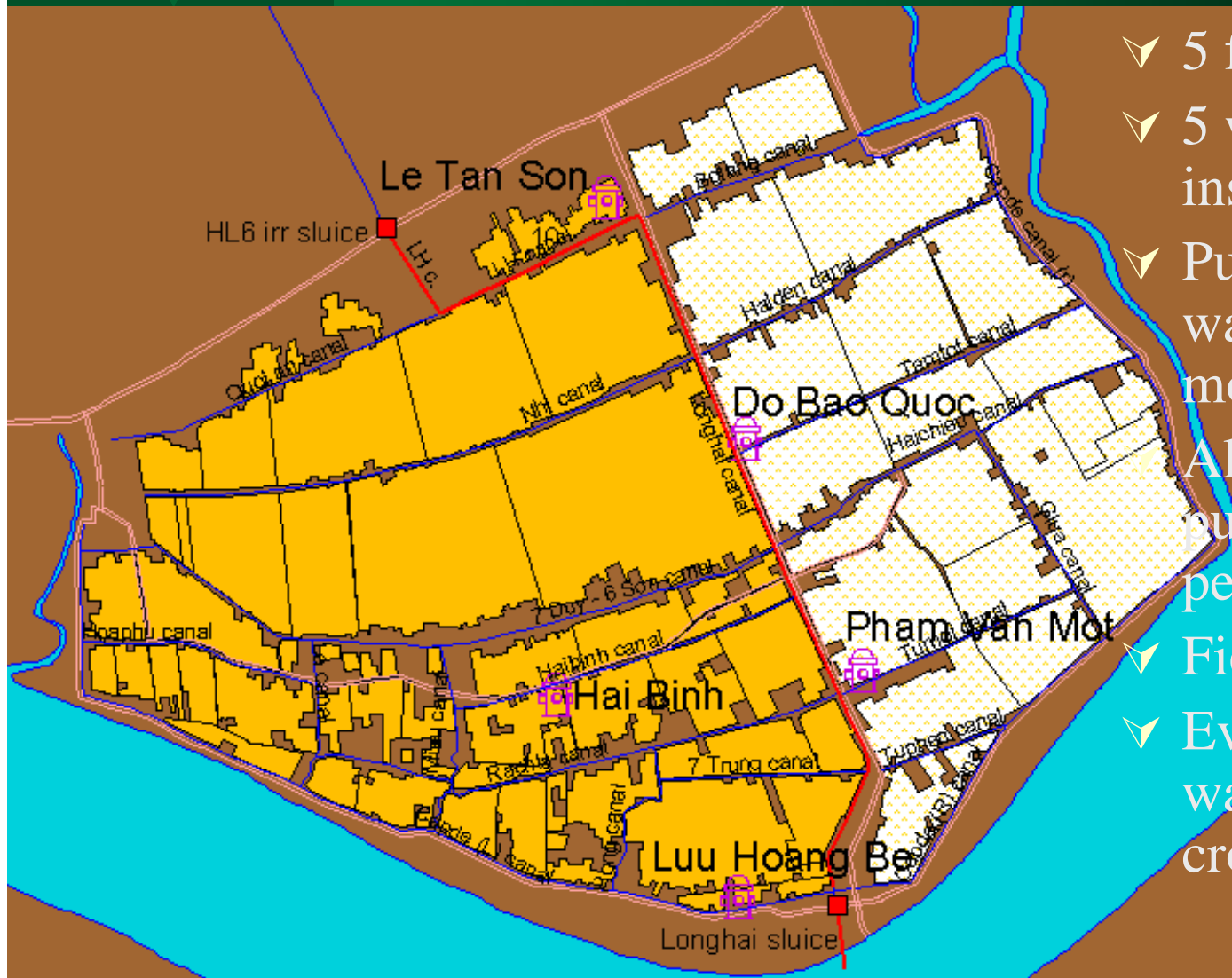




Outline of field observation

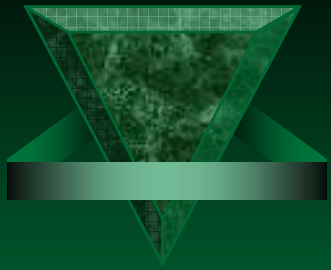
At field level

- 5 field plots selected
- 5 water meters installed at each field
- Pump and drainage water, water level monitored
- All expenditure for pump, fertilizer and pesticides monitored
- Field survey form
- Evaluation of actual water used for rice crop and the expend



Outline of field observation





Outline of field observation

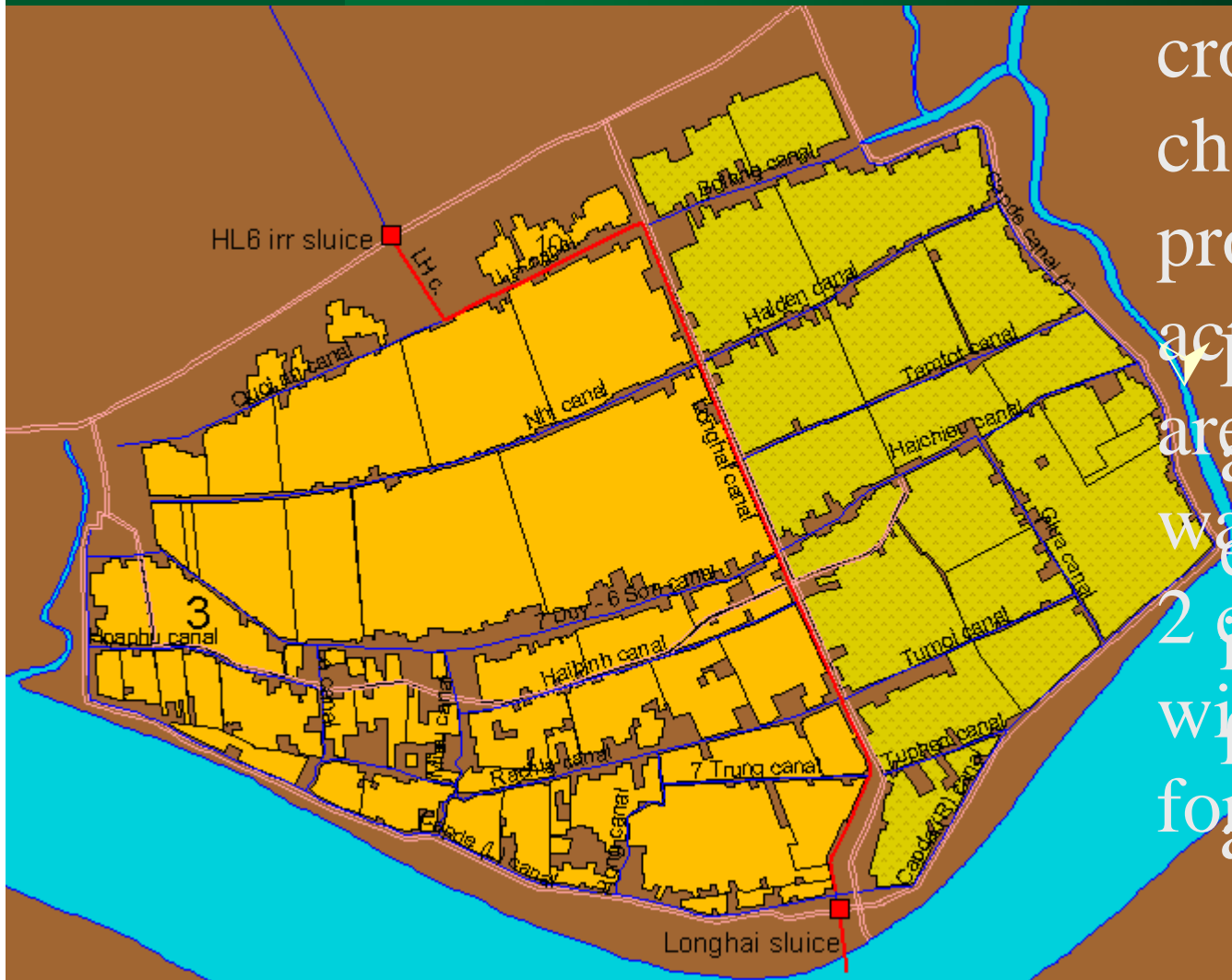
Recording

cropping pattern,
calendar, multiple
changed, use of water,

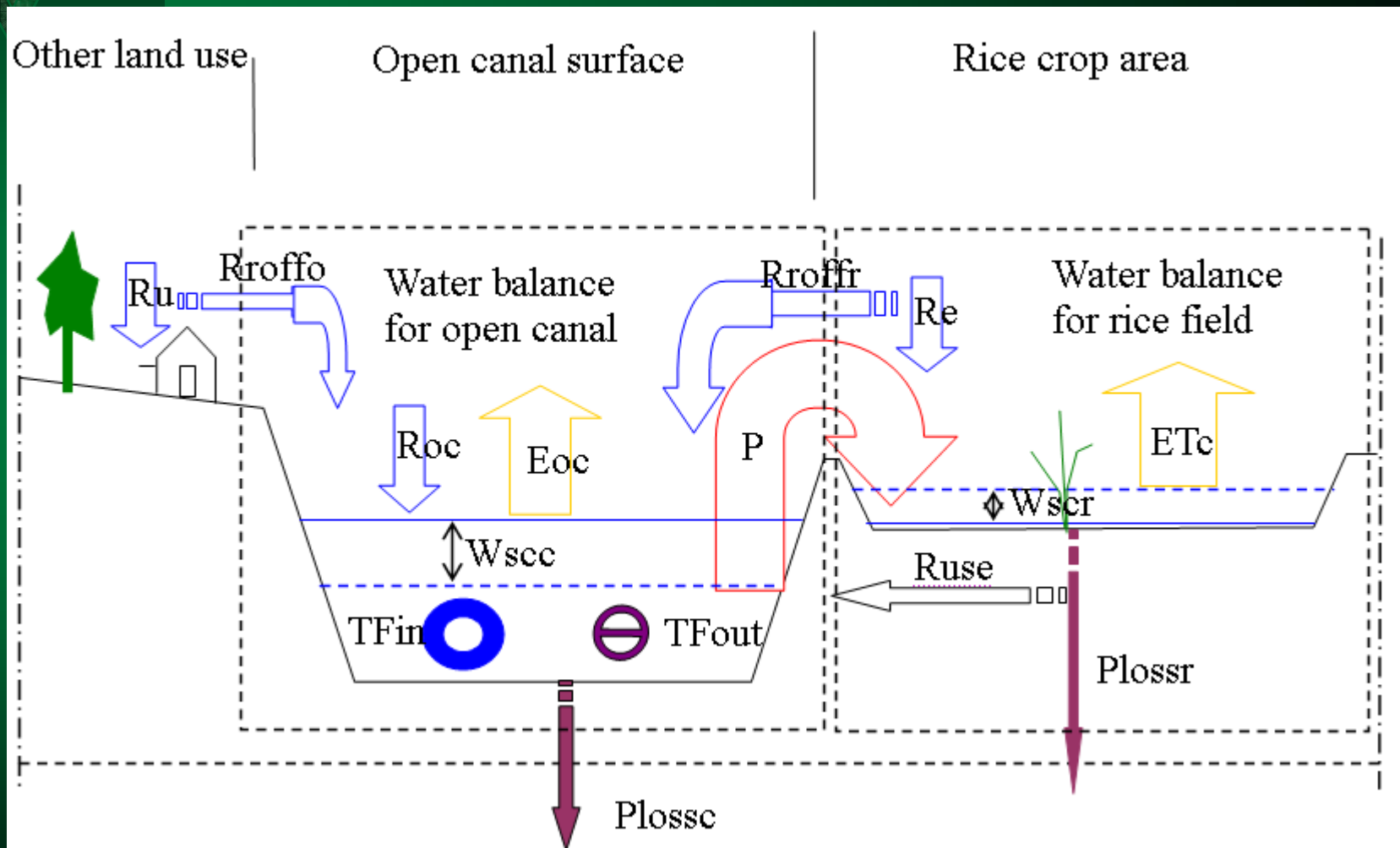
production, at 120
families... with
actual irrigated area

Data analysis
area, multiple
water use, at
evaluated

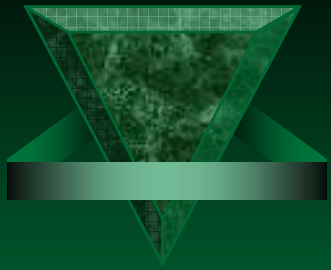
2 communes
information
with survey
for Longhai
form area



Outline of field observation



Water balance: Separated water balance for canal system and rice fields



Results of field observation

Result of field observation data



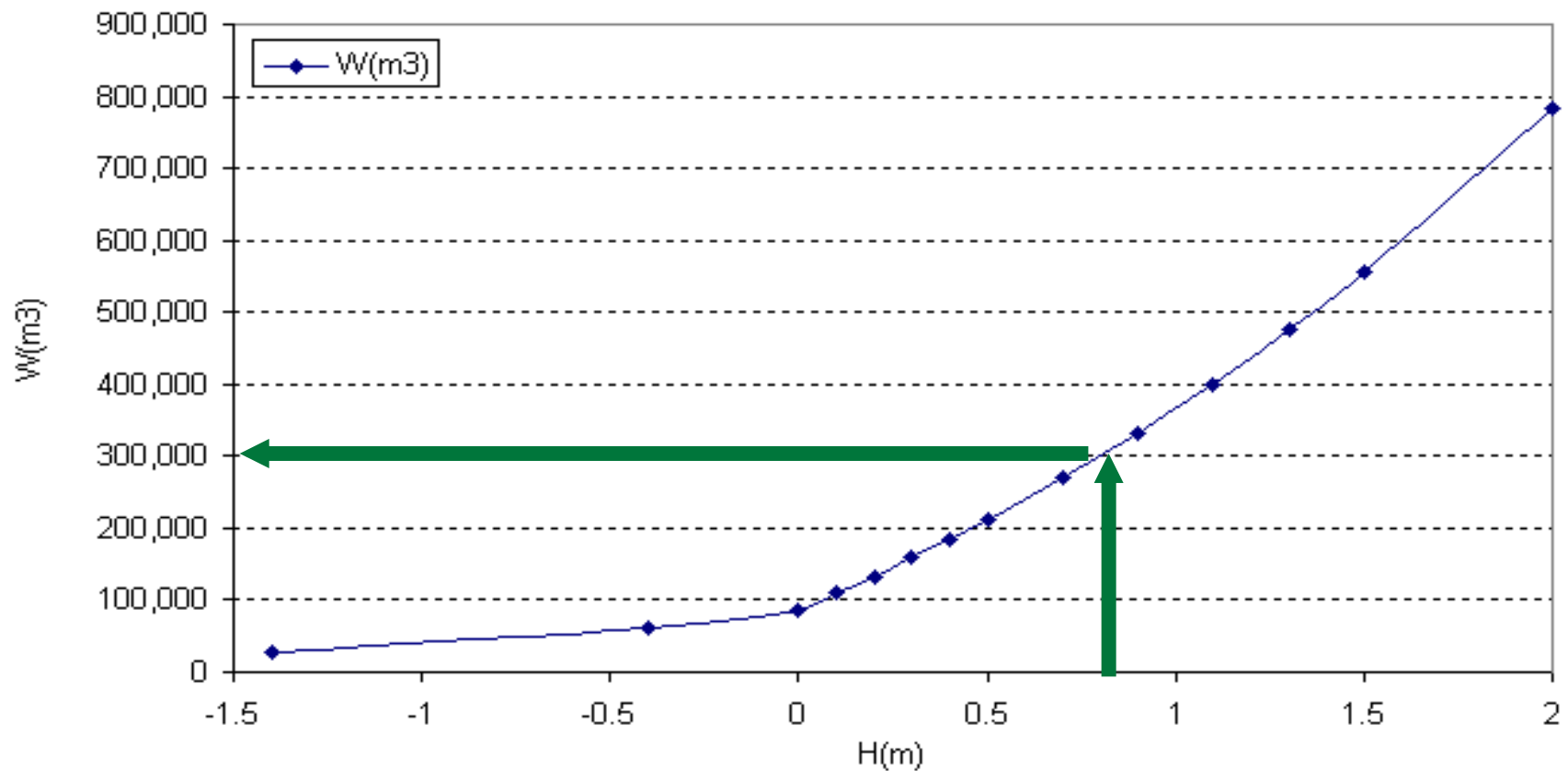
- ▼ Elevation rangers from 0.75-1.35 m
- ▼ <0.85: 2.5%
- ▼ <1m: 34.4%
- ▼ 0.95-1.15: 73%

Result of field observation data

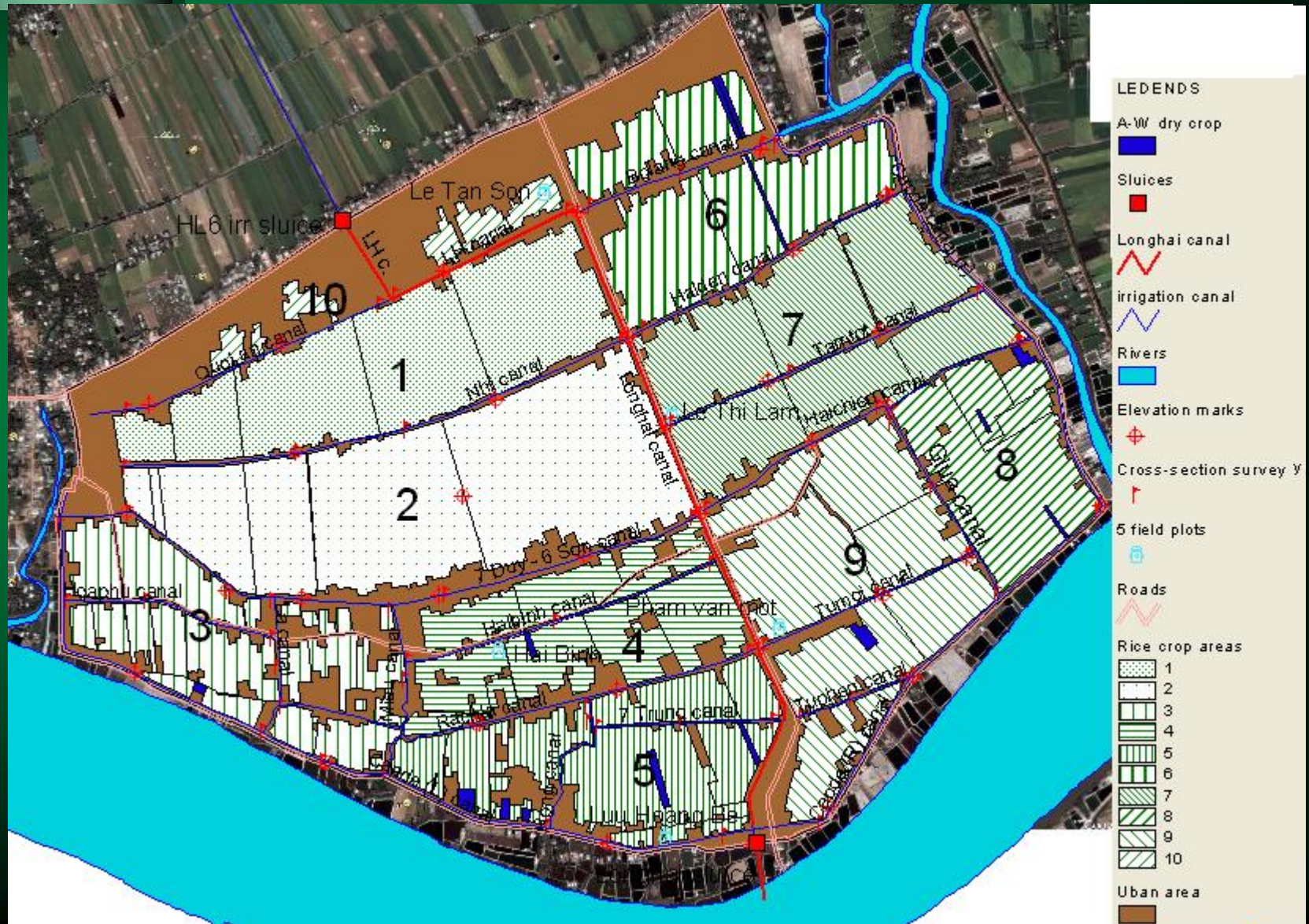
No	Name of canal	Length (m)	Bed elevation (m+MSL)	Surface width (m)	Surface area (m2)
1	7 Duy - 6 Son canal	2,820	-0.4	10.0	28,200
2	7 Trung canal	811	-0.4	5.0	4,055
3	Bolang canal	886	-0.7	13.0	11,518
4	Capde canal (left)	3,676	-0.2	18.0	66,168
5	Capde canal (right)	4,458	-1.2	22.0	98,076
6	Giua canal	904	-0.1	7.5	6,780
7	Haibinh canal	1,367	-0.2	8.5	11,620
8	Haichieu canal	1,557	-0.6	7.5	11,678
9	Haiden canal	1,301	-0.1	10.0	13,010
10	Hangnhi canal	2,191	-0.5	11.0	24,101
11	Huonglo 6 canal	4,050	-1.1	13.0	52,650
12	Hoaphu canal	915	-0.5	9.5	8,693
13	Hong canal	672	-0.3	7.0	4,704
14	La channel	591	-0.3	10.0	5,910
15	Mieu canal	833	-0.2	5.5	4,582
16	Quoian canal	1,353	-1.2	6.0	8,118
17	Rachla canal	2,087	-0.4	8.0	16,696
18	Tamtot canal	1,452	-0.1	9.0	13,068
19	Tumoi canal	1,004	-0.5	6.0	6,024
20	Tuphen canal	508	-0.1	8.0	4,064
	Total length	33,436			40(ha)

Result of field observation data

Z-W curve of Longhai irrigation system



Result of field observation data

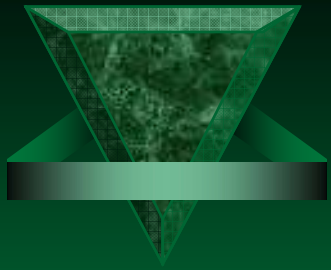




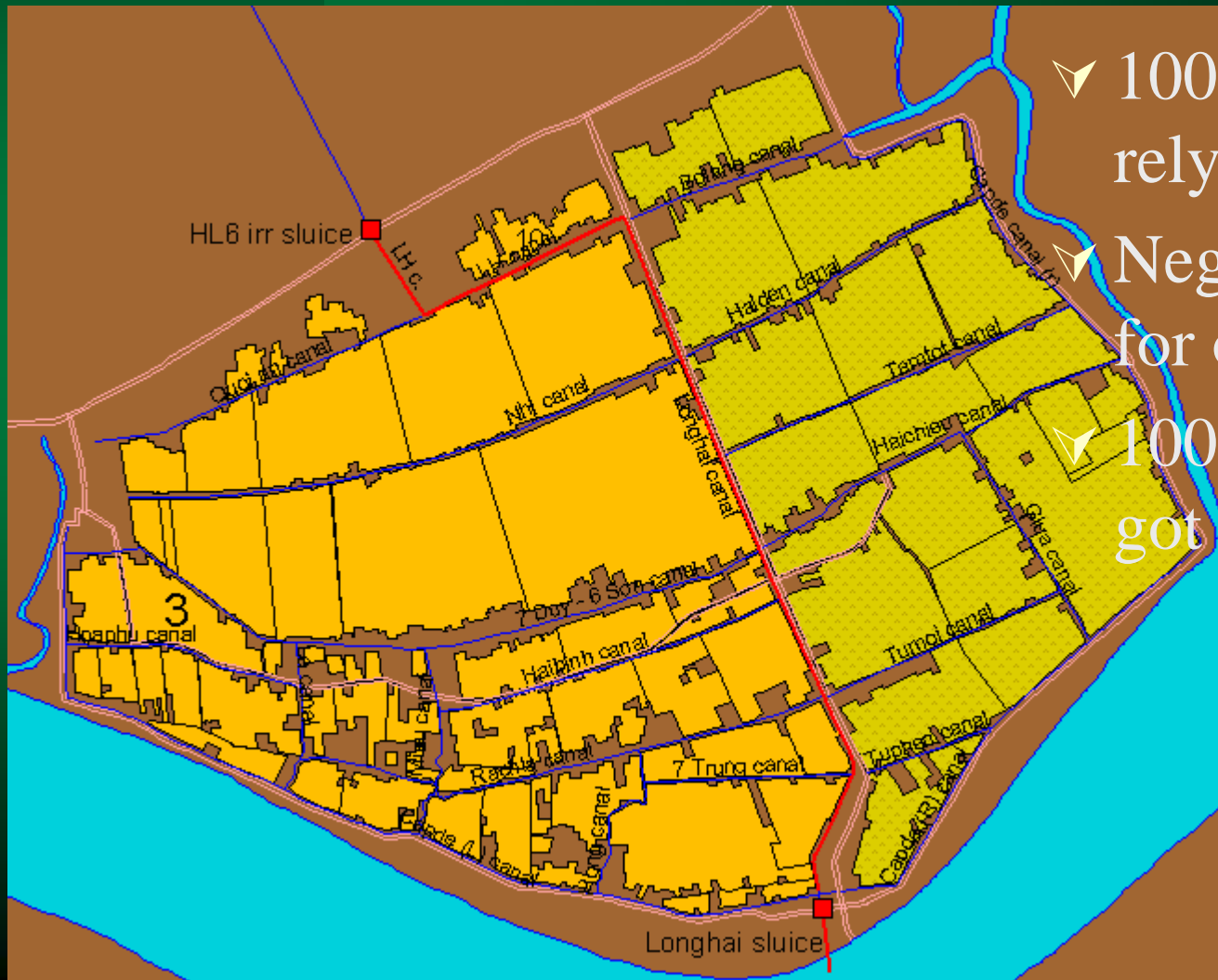
Result of field observation data

Table 3: Land use of the project area during 3 crop seasons in 2007

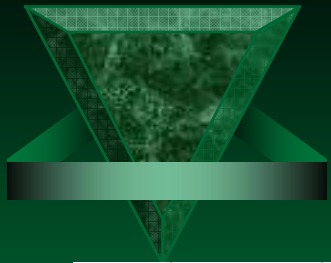
No	Land use type	Abbreviation	Area for each crop season (ha)			Remark
			WS	SA	AW	
1	Agricultural area	TRA	707.3	707.3	707.3	Surveyed data
	- Rice crop	TRA	697.1	704.8	701.7	Surveyed data
	- Dry crop (water melon)		10.2	2.5	5.6	Surveyed data
2	Open canal system	TCSA	40.0	40.0	40.0	Calculated
	Open canal surface (at level of 0.8 m)	TCOWA	30.0	30.0	30.0	Calculated
3	Other land	TOA	201.3	201.3	201.3	Based on GIS data
	Total		948.6	948.6	948.6	Based on GIS data



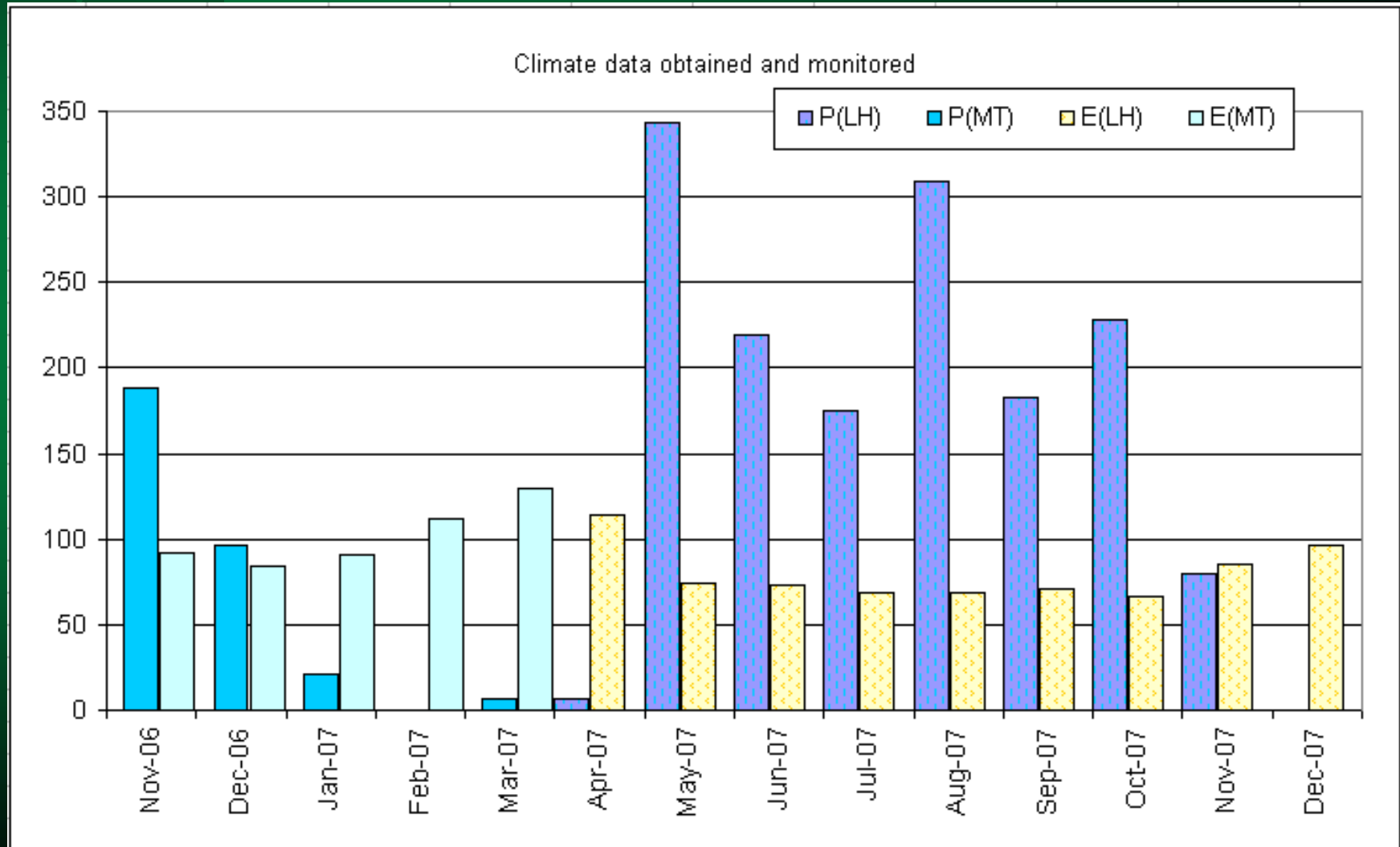
Result of field observation data

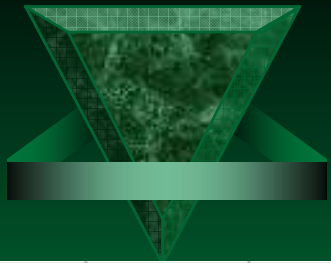


- ▼ 100% agricultural area relays on canal water
- ▼ Negligible water use for other purpose
- ▼ 100% agricultural area got irrigation water



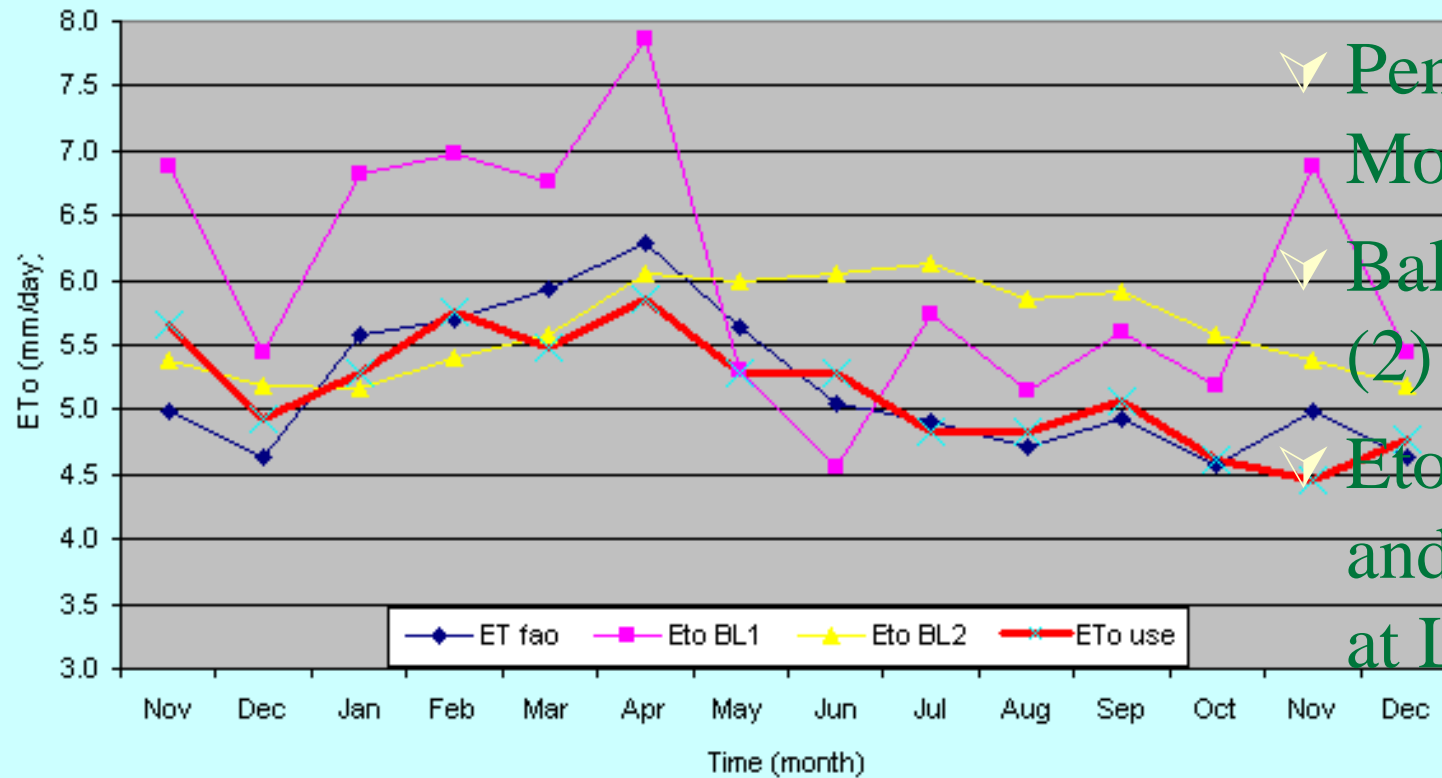
Result of field observation data





Result of field observation data

Reference crop evapotranspiration at Longhai project area



Calculate Eto
Penman
Monteith (FAO)
Balney-Criddle
(2)
Eto use (FAO
and Evaporation
at Longhai)

Result of field observation data

Table 7: Basis information and calculated flow at the HL6 sluice

No	Month	Average water level (cm)	Data available	Average discharge during measured period (cms)	Total water flow through HL6 sluice (m ³)	Total water flow during the crop season (m ³)	Crop season
(1)	(2)	(4)	(5)	(6)	(7)	(8)	
1	Dec-06		No data		1,756,757		
2	Jan-07	78.7	25-31 Jan	0.34	923,002		
3	Feb-07	57.5	Full	0.70	1,690,754		
4	Mar-07	43.3	Full	0.66	1,762,612	3,679,875	W-S
5	Apr-07	12.2	No				
6	May-07	49.7	Full	0.07	167,303		
7	Jun-07	74.4	Full	0.24	614,565		
8	Jul-07	78.8	Full	0.45	1,216,147		
9	Aug-07	67.1	Full	-0.18	-201,095	1,796,921	S-A
10	Sep-07	69.2	1-19 sep	0.41	646,728		
11	Oct-07	85.0	23-31 oct	-0.59	365,549		
12	Nov-07	69.1	Full	1.10	2,843,966	3,856,243	A-W
13	Dec-07	75.9	Full	0.66	1,756,757		
14	Jan-08	87.7	No data				

Result of field observation data

Table 8 : Basis information and calculated flow at the Longhai sluice

No	Month	Number of operation day (day)	Number of operation for irrigation	Total drainage water (m ³)	Drainage of water for each purpose		Total flow for irrigation (m ³)
					Due to rainfall (m ³)	On scheduled (m ³)	
1	Dec - 06	2	-	115,839	-	115,839	-
2	May - 07	5	-	651,091	437,763	213,328	-
3	Jun - 07	3	-	469,010	469,010	-	-
4	Jul - 07	4	-	459,249	-	459,249	-
5	Aug - 07	12	6	1,197,955	235,610	962,345	886,096
6	Sep - 07	9	4	1,096,966		1,096,966	788,252
7	Oct - 07	7	5	1,169,903	206,740	963,163	1,165,245
8	Nov - 07	7	-	821,177	315,937	505,240	-
9	Total	49	15	5,981,190	1,665,060	4,316,130	2,839,593
10	W-S			115,839	-	115,839	-
11	S-A			2,777,305	1,142,383	1,634,922	886,096
12	A-W			3,088,046	522,677	2,565,369	1,953,497

Result of field observation data

Table 9: Summary of irrigation water used at 5 selected pilots

Crop	No	Information	Unit	Family name					Average of 5 plots
				1	2	3	4	5	
				Diep	Son	Be	Binh	Mot	
W-S	1	Area	Sqm	3,358	4,968	2,701	5,757	7,257	4,808
	2	Amount of used water	m ³	3,143	2,504	2,468	4,139	6,002	3,651
	3	Water use/ha	m ³ /ha	9,360	5,040	9,137	7,190	8,271	7,799
	4	Number of irri. application	Time	17	14	18	23	13	17
	5	Daily average of irrigation	cm/day	1.25	0.73	1.33	1.26	1.06	1.13
S-A	6	Area	Sqm	3,358	4,968	5,000	5,757	7,257	5,268
	7	Amount of used water	m ³	709	895	2,229	3,071	3,445	2,090
	8	Water use/ha	m ³ /ha	2,111	2,003	8,252	5,335	4,747	4,489.8
	9	Number of irri. application	Time	6	4	15	12	8	9
	10	Amount of drainage water	m ³	146.7	651.5	466.0	-	267.0	306.2
	11	Drainage volume per ha	m ³ /ha	437.0	1,311.4	1,725.3	-	367.9	768.3
A-W	12	Area	Sqm	3,358	4,968	2,701	5,757	7,000	4,757
	13	Amount of used water	m ³	526	808	1,459	4,802	3,716	2,262
	14	Water use/ha	m ³ /ha	1,566	1,626	5,402	8,341	5,309	4,448.8
	15	Number of irri. application	Time	5	3	11	12	7	8

Result of field observation data

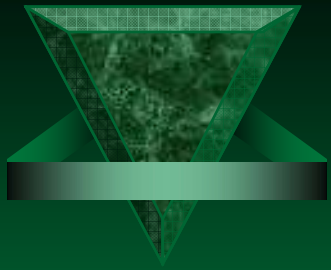
Table 10: Basic information evaluated from data collected from 120 farmers

	No	Items	Unit	Information from 120 selected farmers	Account in %, or area	Evaluated data for Longhai
	(1)	(2)	(3)	(4)	(5)	(6)
	1	Average of length of crop	day	93		93
	2	First crop grown	date	15-Aug		
	3	Last crop harvested	date	18-Dec		
A-W	4	Area grow from 15/08 to 31/08	ha	28.859	41.32%	289.9
	5	Area grow from 1/09 to 10/09	ha	26.61	38.10%	267.3
	6	Area grow from 11/09 to 30/09	ha	14.58	20.55%	144.5
	7	First crop harvested	date	04-Nov		
	8	Last crop harvested	date	18-Dec		
	9	Total area harvested in Nov	ha	18.709	26.78%	
	10	Total area harvested in Dec	ha	51.14	73.22%	
	11	Yield of A-W crop	Ton/ha	4.48		4.48

Result of field observation data

Table 11: Information and production of Longhai project area during 2007

No	Information	Unit	Crop season			Overall 2007
			W-S	S-A	A-W	
7	Total expend for pump in project area	1000 VND	353,335	183,817	155,961	693,113
		USD/ha	21,974	11,431	9,699	43,104
8	Total benefit for project area	1000 VND	6,941,961	5,141,240	7,036,656	19,119,857
		USD/ha	431,714	319,729	437,603	1,189,046
9	% Benefit from other income in compare with from rice	%	3.7	17.7	21	14
10	Benefit from other activities	1000 VND	256,853	909,999	1,477,698	2,644,550
		USD	15,973	56,592	91,897	164,462
11	Total benefit of the project area	1000 VND	7,198,813	6,051,239	8,514,354	21,764,406
		USD	447,687	376,321	529,500	1,353,508
12	Income for each	1000 VND/per	1,166	980	1,379	3,524
		USD/per	72	61	86	219

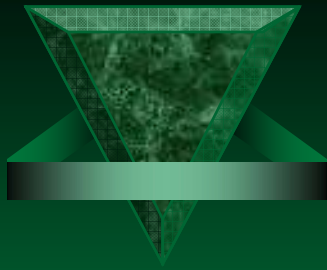


Analysis and discussion

Analysis and discussion

Table 12: Calculation of crop water requirement of the Longhai project area during year 2007

Crop season		Grown duration	% crop area (%)	Crop area (ha)	Total crop water requirement (m ³)	Total crop water requirement - Pe (m ³)	Total irrigation water requirement (m ³)	
Abbreviation				TA	TCWR	TCWR-Pe	TIWR	
W-S	Nov	1st-30th	24.6	171.5	2,530,090	2,268,027	4,199,547	
	Dec	1st - 10th	52.8	368.1	2,456,194	2,407,625	4,152,137	
	Dec	11th - 20th	19.0	132.4	660,921	659,066	4,255,472	
	Dec	21st - 31st	3.6	25.1	123,094	123,094	3,991,199	
	<i>Evaluated for W-S</i>				697.1	3,470,741	3,343,471	16,598,354
	<i>Daily average (mm/day)</i>							
S-A	May	1st - 20th	40.1	282.3	2,171,560	908,234	1,297,344	
	May	21st - 31st	53.7	378.4	2,063,885	1,086,231	1,734,517	
	June	1st-30th	6.3	44.1	2,079,360	843,600	1,945,752	
	<i>Evaluated for S-A</i>				704.8	6,314,805	2,838,065	4,977,613
	<i>Daily average (mm/day)</i>							
A-W	Aug	15th - 31th	41.3	289.9	1,895,732	980,085	2,098,195	
	Sep	1st - 10th	38.1	267.3	1,804,550	1,098,533	2,359,764	
	Sep	11st - 30th	20.6	144.5	1,791,829	1,216,564	2,496,200	
	<i>Evaluated for A-W</i>				701.7	5,492,111	3,295,182	6,954,157
	<i>Daily average (mm/day)</i>							



Analysis and discussion

Total irrigation water applied for irrigation in Longhai project area

No	Information	Abbr.	Unit	Crop season		
				W-S	S-A	A-W
1	Crop Area	TA	ha	697.1	704.8	701.7
2	Water use/ha	TIW1ha	m ³ /ha	7,779	4,489.8	4,448.8
3	Total irrigation water applied	TIW	m ³	5,436,371	3,164,411	3,121,723



Analysis and discussion

Evaluation of scheme water requirement

No	Information	Unit	Crop season			Overall year 2007
			W-S	S-A	A-W	
(1)	Total irrigation requirement of the scheme (TIWR)	m ³	5,849,141	2,418,768	3,733,806	12,001,715
(2)	Total irrigation water applied of the scheme (TIW)	M ³	5,436,371	3,164,411	3,121,723	11,722,505
3	(2)/(1)*100	%	92.9	130.8	83.6	97.7

Analysis and discussion

Calculation of water balance on the canal

No	Information	Abbr.	Unit	Crop season			Overall 2007
				W-S	S-A	A-W	
9	Open evaporation from the canal	Eoc	m ³	125,130	85,470	66,750	277,350
10	Total rainfall to the open canal	Roc	m ³	26,040	419,160	196,120	641,320
11	Rainfall runoff from rice fields	Rroffr	m ³	0	907,466	0	907,466
12	Rainfall runoff from other lands	Rroffo	m ³	53,345	1,267,989	452,120	1,773,454
13	Change on storage volume of canal	Wsec	m ³	-131,236	277,894	-52,886	93,772
(14)	Irrigation water used evaluated from equation (1)	IWused	m ³	3,649,527	2,136,962	3,356,069	9,142,559
15	Irrigation water used per ha	IWused/ ha	m ³ / ha	5.236	3.032	4.783	13.039
16	Ratio (14)/(3)*100	IWused/ TIW	%	67.1	67.5	107.5	78.0

Analysis and discussion

Calculation of water balance on the rice field

No	Information	Unit	W-S	S-A	A-W
1	Irrigation applied per ha (TIW)	M ³ /ha	7,799	4,490	4,449
(2)	Irrigation module per day (TIW/day)	mm/day	8.2	4.7	4.7
3	Average of (ETc-Pe) per day	mm/day	5	2.2	2.8
4	Drainage water, Tdf	mm/day	0	0.8	0
5	Storage water changed, Wscr	mm/day	0	0	0
(6)	Plossr+Ruse	mm/day	3.2	1.7	1.9
7	(6)/(2)*100	%	39.1	35.8	40.2

Analysis and discussion

Evaluation of overall command-area efficiency

No	Information	Abbr.	Unit	Crop season			Overall 2007
				W-S	S-A	A-W	
(1)	Total crop water requirement –Pe	CRW-Pe	m3	3,343,471	1,536,513	1,759,001	6,638,985
(2)	Total irrigation water requirement	IWR	m3	5,849,141	2,418,768	3,733,806	12,001,715
3	Diverted water via Longhai sluice		m3	-	886,096	1,953,497	2,839,593
4	Diverted water via HL6 sluice		m3	3,679,875	1,796,921	3,856,243	9,333,038
(5)	Total diverted to system	TFin		3,679,875	2,683,017	5,809,740	12,172,631
(6)	Total water applied to fields by pump	TIW	m3	5,436,371	3,164,411	3,121,723	11,722,505
(7)	CEA=(1)/(5)*100		%	90.9	57.3	30.3	54.5
(8)	CEA=(1)/(6)*100		%	61.5	48.6	56.3	56.6
9	CEA=(2)/(5)*100		%	158.9	90.2	64.3	98.6
10	CEA=(2)/(6)*100		%	107.6	76.4	119.6	102.4

Analysis and discussion

Evaluation of water productivities

No	Information	Abbr.	Unit	Crop season			Overall 2007
				W-S	S-A	A-W	
(1)	Average of rice yield per ha		Ton/ha	4.93	4.14	4.48	13.6
(2)	Diveted water per ha through HL6 and Longhai	TFin/ha	m ³ /ha	5,279.1	3,806.8	8,279.5	17,365.4
(3)	Diverted water to field by pump	TIW/ha	m ³ /ha	7,799.0	4,489.8	4,448.8	16,738
4	$POW=(1)/(2)*1000$		Kg/m ³	0.93	1.09	0.54	0.78
5	$POW=(1)/(3)*1000$		Kg/m ³	0.63	0.92	1.01	0.81



Key findings

The results of field observation data analysis

- ✔ 100% of irrigation area has relied on the water from the canal system;
- ✔ There was an average of 47 m length of the canal per ha of the cultivated area or 35 m length per ha in comparison to the overall natural area;
- ✔ The elevation of the rice crop area in the project area ranges from 0.75 to 1.35 m+MSL, the most common area has elevation ranges from 0.95 to 1.15 m+MSL (73.3%). Therefore, improvement of water management in the project area should be taken into account this common area;
- ✔ Rice is the most common crop in the project area as it is accounted for more than 98.6% of the total cultivated area during three crops in 2007;
- ✔ An average area for each family is 0.58 ha, and an average of 86% of the income for the families is from the rice cultivation;



Key findings

Results of surveyed crop data analysis

- ✔ W-S rice seeds in December accounted for 75% and in November 25%;
- ✔ S-A rice seeds in May accounted for 93.7%; and in June 6.3%;
- ✔ W-S rice seeds in Aug accounted for 41.3% and in September 59.7%;
- ✔ The average crop length is 95 days for W-S and S-A and about 93 days for A-W crop.
- ✔ Highest rice yield production is in W-S (4.93 ton/ha), the lowest yield production is in S-A (4.14 ton/ha);
- ✔ An average of seeds is 190 kg/ha for W-S, 174 kg/ha for S-A and 188 kg/ha for A-W;
- ✔ The VD20 and 3536 is considered as the dominated rice varieties of the LHIP it is accounted for more than 50% of the rice cultivated area;
- ✔ Average of benefit from rice cultivation is 566 USD/ha/crop, the highest benefit is 624 USD/ha come from A-W rice,
- ✔ Average of total expenditure for irrigation, pesticide and fertilizer is about 475 USD/ha/crop;
- ✔ The net income per person is about 3.52 MVND/per or \$219/person.
- ✔ Farmers implemented an average of 17 irrigated times, 6 fertilized times and 5 used times for pesticides during W-S, and an average of 9 irrigated times, 4-5 fertilized times and 4-5 used times for pesticides during S-A and A-W.



Key findings

Results of monitored data analyses:

- ✔ The average of CWR was 461 mm/ha/crop, the highest CWR was 497.0 mm/ha for W-S rice crop;
- ✔ The average of CWR-Pe was 315 mm/ha/crop, the lowest value was 206 mm/ha for S-A rice crop;
- ✔ The average of IWR was 580 mm/ha/crop and the highest IWR was 835 mm/ha for W-S rice crop;
- ✔ Farmer used an average of 7,799 m³/ha of water in W-S, 4,489.8 m³/ha in S-A and 4,448.8 m³/ha in A-W;
- ✔ Total irrigation water diverted to the system over the year 2007 in gravity condition was 12,172 thousands m³ it was approximated equal to the TIWR of the system (12,000 thousand m³);



Key findings

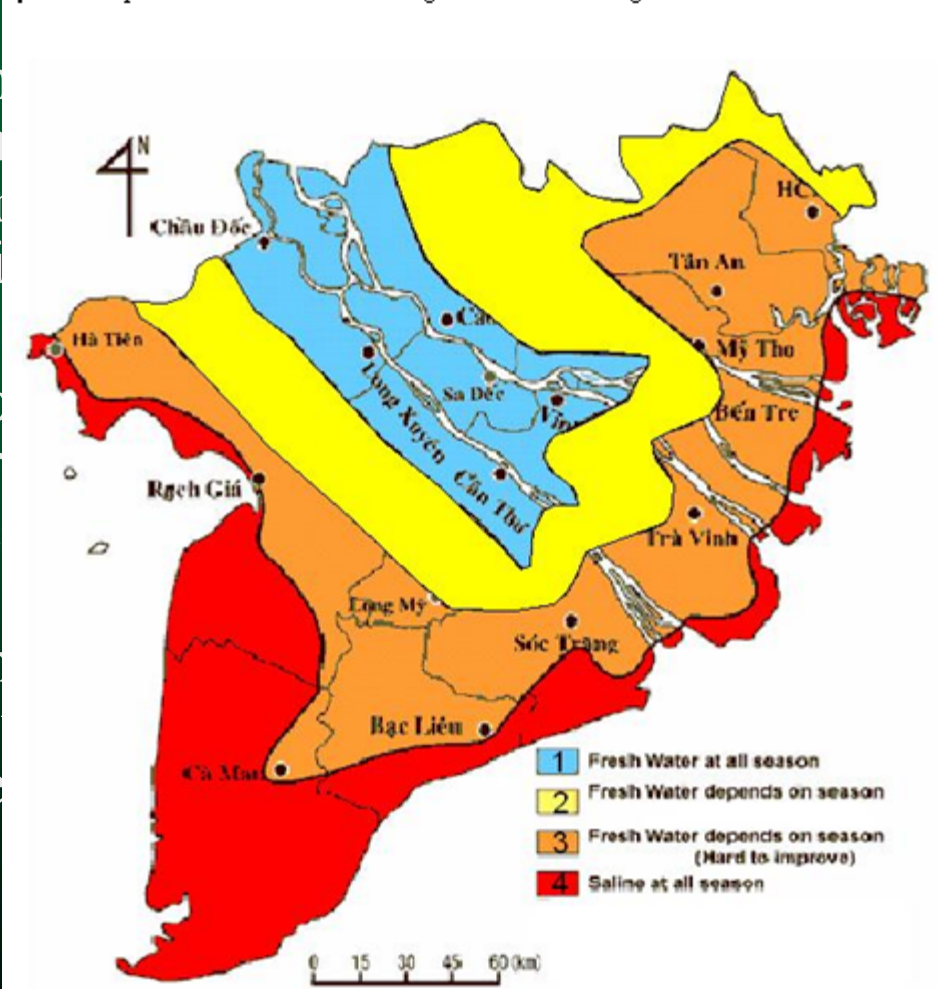
Results of monitored data analyses:

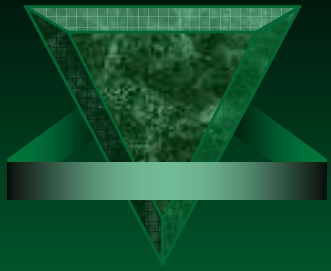
- ✔ Overall CAE at the field level in 2007 was about 56.6%, the highest CAE at the field level was 61.5% in W-S;
- ✔ Overall CAE at the system level in 2007 was about 54.5%, the highest CAE at the system level was 90.9% in W-S, the lowest CAE at the system level was 30.3% in A-W;
- ✔ The POW at system level in 2007 was 0.78 kg/m³ and the POW at the field level was 0.81 kg/m³;
- ✔ Pumping is main mean of irrigation for all rice crop in the LHIA, there was only 2.5 % of the cultivated area could get gravity irrigation condition for a total of 2.5 months over the year;

Recomendation

- Some farmers took water more than needed in comparison with the requirement, therefore to improve the system the basic experience could be useful;
- The irrigation expenditure is not proportional with the total expenditure, therefore the introduction of rice cultivation to the farm could be introduced;
- This is considered as the irrigation zone in the Mekong delta, a similar study could make sense in the Mekong delta.

Sketch for potential water resources management in the Mekong delta





THANK YOU
FOR YOUR KIND ATTENTION