

JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)  
MINISTRY OF PUBLIC WORKS AND WATER RESOURCES (MPWWR)  
ARAB REPUBLIC OF EGYPT

THE MASTER PLAN STUDY  
FOR  
THE IMPROVEMENT OF IRRIGATION WATER MANAGEMENT  
AND  
ENVIRONMENTAL CONSERVATION  
IN  
THE NORTH-EAST REGION  
OF  
THE CENTRAL NILE DELTA

FINAL REPORT

APPENDIX-I

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AUGUST, 1999

SANYU CONSULTANTS INC.

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**APPENDIX-I**

**AUGUST, 1999**

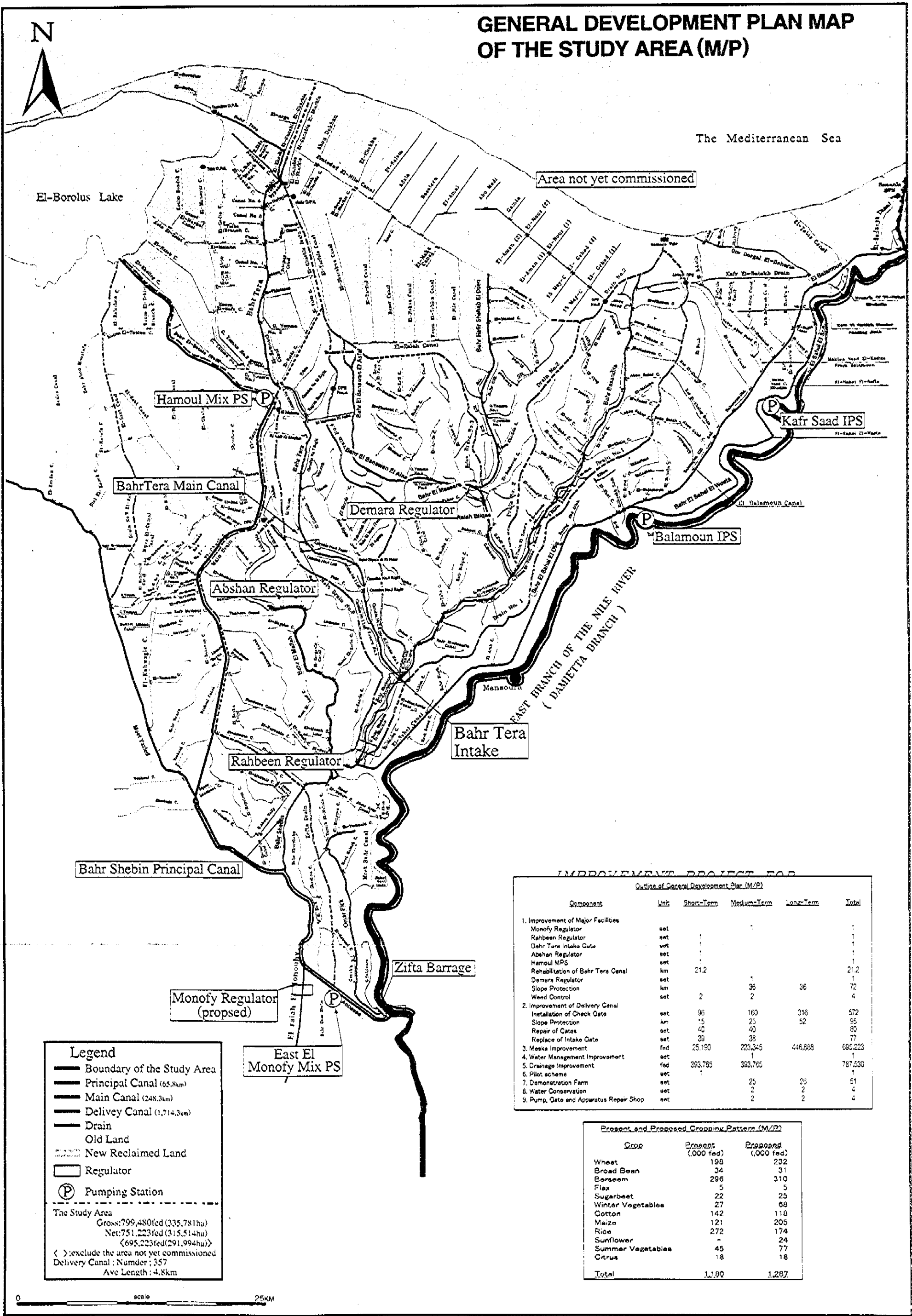
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# GENERAL DEVELOPMENT PLAN MAP OF THE STUDY AREA (M/P)



The Mediterranean Sea

Area not yet commissioned

El-Borolus Lake

Hamoul Mix PS

Bahr Tera Main Canal

Demara Regulator

Kafr Saad IPS

Balamoun IPS

Abshan Regulator

EAST BRANCH OF THE NILE RIVER  
(DAMIETTA BRANCH)

Bahr Tera Intake

Rahbeen Regulator

Bahr Shebin Principal Canal

Zifta Barrage

Monofy Regulator (proposed)

East El Monofy Mix PS

**Legend**

- Boundary of the Study Area
- Principal Canal (65.8km)
- Main Canal (248.3km)
- Delivery Canal (1,714.3km)
- Drain
- Old Land
- New Reclaimed Land
- Regulator
- Ⓟ Pumping Station

The Study Area  
 Gross: 799,480 fed (335,781 ha)  
 Net: 751,223 fed (315,514 ha)  
 < 695,223 fed (291,994 ha) >  
 < > exclude the area not yet commissioned  
 Delivery Canal : Number : 357  
 Ave Length : 4.8km

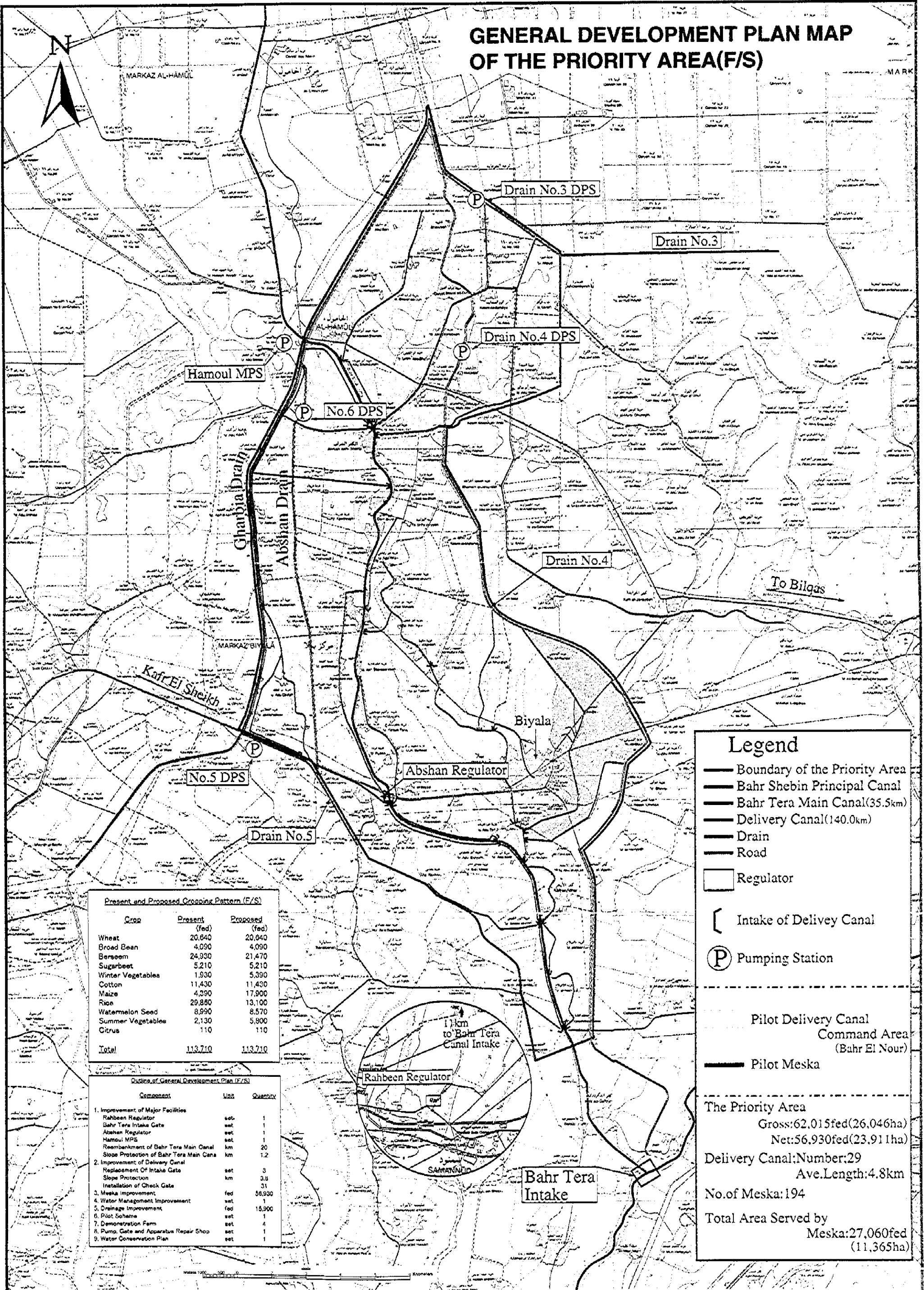
**IMPROVEMENT PROJECT FOR**  
 Outline of General Development Plan (M/P)

Component	Unit	Short-Term	Medium-Term	Long-Term	Total
<b>1. Improvement of Major Facilities</b>					
Monofy Regulator	set		1		1
Rahbeen Regulator	set		1		1
Bahr Tera Intake Gate	set		1		1
Abshan Regulator	set		1		1
Hamoul MPS	set		1		1
Rehabilitation of Bahr Tera Canal	km	21.2			21.2
Demara Regulator	set		1		1
Slope Protection	km		36	36	72
Weed Control	set	2	2		4
<b>2. Improvement of Delivery Canal</b>					
Installation of Check Gats	set	96	160	316	572
Slope Protection	km	15	25	52	95
Repair of Gats	set	40	40		80
Replace of Intake Gate	set	38	38		77
3. Meske Improvement	fed	25,190	223,345	446,688	695,223
4. Water Management Improvement	set		1		1
5. Drainage Improvement	fed	393,765	393,765		787,530
6. Pilot scheme	set		1		1
7. Demonstration Farm	set		25	25	51
8. Water Conservation	set		2	2	4
9. Pump, Gate and Apparatus Repair Shop	set		2	2	4

**Present and Proposed Cropping Pattern (M/P)**

Crop	Present (000 fed)	Proposed (000 fed)
Wheat	198	232
Broad Bean	34	31
Barseem	296	310
Flax	5	5
Sugarbeet	22	25
Winter Vegetables	27	68
Cotton	142	118
Maize	121	205
Rice	272	174
Sunflower	-	24
Summer Vegetables	45	77
Citrus	18	18
<b>Total</b>	<b>1,190</b>	<b>1,287</b>

# GENERAL DEVELOPMENT PLAN MAP OF THE PRIORITY AREA(F/S)



**Present and Proposed Cropping Pattern (F/S)**

Crop	Present (fed)	Proposed (fed)
Wheat	20,640	20,640
Broad Bean	4,090	4,090
Berseem	24,930	21,470
Sugarbeet	5,210	5,210
Winter Vegetables	1,930	5,390
Cotton	11,430	11,430
Maize	4,390	17,900
Rice	29,880	13,100
Watermelon Seed	8,990	8,570
Summer Vegetables	2,130	5,800
Citrus	110	110
<b>Total</b>	<b>113,710</b>	<b>113,710</b>

**Outline of General Development Plan (F/S)**

Component	Unit	Quantity
<b>1. Improvement of Major Facilities</b>		
Rahbeen Regulator	set	1
Bahr Tera Intake Gate	set	1
Abshan Regulator	set	1
Hamoul MPS	set	1
Rebankment of Bahr Tera Main Canal	km	20
Slope Protection of Bahr Tera Main Canal	km	1.2
<b>2. Improvement of Delivery Canal</b>		
Replacement of Intake Gate	set	3
Slope Protection	km	3.8
Installation of Check Gate	set	31
<b>3. Meska Improvement</b>		
Water Management Improvement	set	1
Drainage Improvement	fed	15,900
Pilot Scheme	set	1
Demonstration Farm	set	4
Pump, Gate and Apparatus Repair Shop	set	1
Water Conservation Plan	set	1

**Legend**

- Boundary of the Priority Area
- Bahr Shebin Principal Canal
- Bahr Tera Main Canal(35.5km)
- Delivery Canal(140.0km)
- Drain
- Road
- Regulator
- ⌋ Intake of Delivey Canal
- Ⓟ Pumping Station
- Pilot Delivery Canal Command Area (Bahr El Nour)
- Pilot Meska

**The Priority Area**  
 Gross:62,015fed(26,046ha)  
 Net:56,930fed(23,911ha)  
 Delivery Canal:Number:29  
 Ave.Length:4.8km  
 No.of Meska:194  
 Total Area Served by  
 Meska:27,060fed  
 (11,365ha)

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**APPENDIX E. AGRICULTURE**

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APPENDIX A.

**GENERAL**

**Appendix A General**

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A-1 S/W

Scope of Work

for

the Master Plan Study for

the Improvement of Irrigation Water Management and

Environmental Conservation in

the North-east Region of the Central Nile Delta

agreed upon between

Irrigation Improvement Sector of the Ministry of Public Works and Water Resources of

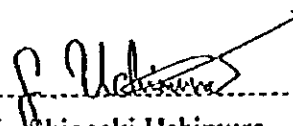
the Arab Republic of Egypt and

Japan International Cooperation Agency

Cairo, 6 August, 1997



Eng. Nabil Fawzy Nashed  
Head of  
Irrigation Improvement Sector  
Ministry of Public Works and  
Water Resources



Mr. Shigeaki Uchimura  
Leader  
JICA Preparatory Study Team

in witness of



Ms. Samiha Barakat  
Director / Japan Department  
Ministry of Planning and  
International Cooperation

## I. INTRODUCTION

In response to the request of the Government of Arab Republic of Egypt (hereinafter referred to as "Egypt"), the Government of Japan decided to provide technical assistance in conducting the master plan study for the improvement of irrigation water management and environmental conservation in the north-east region of the central Nile delta (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan and within the framework of the Agreement of Technical Cooperation between the government of Japan and the government of Egypt signed on June 15, 1983 (hereinafter referred to as "the Agreement").

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of Egypt.

Irrigation Improvement Sector, Ministry of Public Works and Water Resources (hereinafter referred to as "IIS") shall act as a counterpart agency to the Japanese Study Team (hereinafter referred to as "the Team") and coordinate in relation with other relevant organizations for the smooth implementation of the Study.

The present document sets forth the Scope of Work for the Study.

## II. OBJECTIVES OF THE STUDY

The objectives of the study are as follows:

- (a) Formulate a master plan for the improvement of irrigation and drainage facilities and water management in the study area with the overall goal of achieving more efficient use of the limited irrigation water resources in the Nile delta, and conduct feasibility study of priority area(s) aiming at increasing agricultural production and incomes of farm households, while taking account of conserving rural water environment as secondary benefit; and,
- (b) Undertake transfer of technologies relevant to the Study to Egyptian counterpart personnel through on-the-job training in the course of the Study.

## III. STUDY AREA

The study area is located in the middle delta along the west bank of Damietta Branch of the Nile River and scattered in four Governorates of Dakahlia, Gharbia, Kafr-El-Sheikh and Damietta. The total land area covered by the study would be approximately 380,000 ha, consisting of 170,000 ha in Dakahlia, 88,000 ha in Gharbia, 80,000 ha in Kafr-El-Sheikh and 42,000 ha in Damietta, and is equivalent to the Bahr Shebin canal command area.

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#### IV. SCOPE OF THE STUDY

**Phase I.** Diagnostic analysis of overall conditions of the present irrigation and agriculture in the study area, and formulation of master plan:

- (a) Review existing data and information relevant to the Study, including:
- economic conditions at the national and regional levels;
  - development policies and strategies;
  - development policies for the agricultural sector and irrigation sub-sector;
  - available agricultural research results relevant to the Study;
  - natural environmental conditions, *inter alia*, rural water environment;
  - socio-economic conditions;
  - laws and regulations relevant to the Study;
  - institutional settings of related government agencies; and,
  - documents of related development projects and programmes.
- (b) Collect additional data and information through field surveys and interviews, including:
- topographical situations;
  - meteorological situations;
  - hydrological situations;
  - geological situations;
  - existing irrigation water requirement and supply conditions at the primary, secondary and tertiary levels to enable water balance and quality simulation;
  - existing irrigation and drainage facility conditions at the primary, secondary and tertiary levels;
  - existing water management systems at the primary, secondary and tertiary levels;
  - existing farming practices;
  - existing agricultural extension and support services, including those for the post harvest processing, marketing, and agricultural credit facilities;
  - soil conditions including salinization; and,
  - socio-economic conditions including those for existing farmers' and women's organizations.
- (c) Analyze collected data and information, and identify major constraints and potentials for irrigation improvement and agricultural development;
- (d) Categorize the study area into a few groups based on the diagnostic analysis of the existing canal systems and prevalent water balance situations for convenience of proposing suitable systems in Phase II;
- (e) Formulate master plan for irrigation improvement and agricultural development taking into consideration aspects of rural water environment conservation;

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- (f) Conduct Initial Environmental Examination (IEE); and,
- (g) Select priority area(s) for Phase II.

Phase II. Conduct feasibility study on priority area(s) including following components:

- (a) Preparation of topographic maps for priority area(s), if necessary
- (b) Irrigation and drainage improvement at the primary and secondary levels:
  - Propose rehabilitation and improvement requirements for existing facilities;
  - Propose improved water management system(s); and,
  - Propose operation and maintenance methods.
- (c) Irrigation and drainage improvement at the tertiary level:
  - Propose promising canal system(s) through evaluation of various canal designs and construction methods, placing special attentions to cost aspects and experiences gained in the preceding projects;
  - Propose improved on-farm water management practices for management by Water Users' Associations (WUA); and,
  - Propose operation and maintenance methods for WUAs.
- (d) Conduct water balance and quality simulation
- (e) Strengthening of Irrigation Advisory Services (IAS) and support services including agricultural extension
- (f) Strengthening of farmers' organizations, including methods for organizing farmers into WUAs considering women's roles
- (g) Improvement of the existing farming practices
- (h) Post harvest processing and marketing support
- (i) Training for staff and farmers including IAS and WUA
- (j) Proposing a pilot scheme:
  - Design a model for technology transfer and verification of the selected facility improvements and water management systems at appropriate levels; and,
  - Identify candidate site(s), necessary facilities and equipments and training programmes for staff and farmers.
- (k) Identifying institutional strengthening requirements for project implementation
- (l) Preparing project implementation schedule
- (m) Undertake economic and financial evaluation of the proposed project

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## V. STUDY SCHEDULE

A proposed tentative schedule for the implementation of the Study is attached as appendix-1.

## VI. REPORTING

JICA shall prepare and submit the following reports, written in English language, to the Government of Egypt:

Inception Report	: Twenty (20) copies at the onset of the study
Progress I Report	: Twenty (20) copies at the end of Phase I
Interim Report	: Twenty (20) copies at the onset of Phase I
Progress II Report	: Twenty (20) copies in the middle of Phase II
Draft Final Report	: Twenty (20) copies at the end of Phase II Egyptian side shall submit written comments on the Draft Final Report to JICA in one month of time.
Final Report	: Fifty (50) copies in two months after the receipt of comments on the DF/R from Egyptian side

## VII. UNDERTAKING OF THE GOVERNMENT OF EGYPT

1. Within the framework of the Agreement, the Government of Egypt shall take necessary measures to the Team as follows:

- (a) to permit the members of the Team to enter, leave and stay in the Arab Republic of Egypt for the duration of their assignment therein, and exempt them from consular fees (the Agreement Article V.2.(a));
- (b) to exempt the members of the Team from custom duties, internal taxes and other charges of a similar nature as well as from the requirement of obtaining import licenses and certificate of foreign exchange coverage to be imposed in the Arab Republic of Egypt in respect of the equipment, machinery and materials which they carry with them for the performance of their duties, provided that these equipment, machinery and materials are registered with the authority concerned of the Government of Egypt at their initial delivery in the Arab Republic of Egypt. Such equipment, machinery and materials will remain the property of the Government of Japan unless otherwise agreed upon (the Agreement Article VII.4);
- (c) to exempt the members of the Team from income taxes and other fiscal charges payable under the legislation of the Arab Republic of Egypt in respect of any emoluments or allowances remitted to them from overseas (the Agreement Article V.1.(1).(a)); and,

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- (d) to bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties, except when the two Governments agree that such claims arise from gross negligence or willful misconduct on the part of the members of the Team (the Agreement Article VI.).

2. To facilitate smooth conduct of the Study, IIS shall take necessary measures in cooperation with other relevant organizations:

- (a) to secure permission for entry into private properties or restricted areas for the conduct of the Study within the laws and regulations in force in the Arab Republic of Egypt;
- (b) to secure permission for the Team to take all data and documents related to the Study out of Egypt to Japan, within the laws and regulations in force in the Arab Republic of Egypt;
- (c) to provide medical services as needed. Its expenses will be chargeable on the members of the Team; and,
- (d) to ensure the safety of the members of the Team when and as it is required in the course of the Study.

3. IIS shall, at its expense, provide the Team with the followings:

- (a) available data and information related to the Study;
- (b) counterpart personnel;
- (c) suitable office space with necessary office equipments and furniture in Cairo and at the project site; and,
- (d) credentials or identification cards.

#### VIII. UNDERTAKING OF JICA

For the implementation of the study, JICA shall take the following measures:

- (a) to dispatch, at its own expense, study teams to Egypt; and,
- (b) to pursue technology transfer to the Egyptian counterpart personnel in the course of the study.

#### IX. CONSULTATION

JICA and IIS shall maintain constant communication and consult with each other with respect to any matters that may arise from or in connection with the Study.

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## TENTATIVE WORKING SCHEDULE

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Work in Egypt	████████████████								████████████████							█			
Home office work in Japan	▬					▬		▬				▬							
Phasing	← Phase I								← Phase II										
Reports	Δ Ic/R			Δ P/R 1					Δ Ii/R			Δ P/R 2				Δ DF/R	○		Δ F/R

Ic/R : Inception Report

P/R 1: Progress 1 Report

Ii/R : Interim Report

P/R 2: Progress 2 Report

DF/R: Draft Final Report

F/R : Final Report

○ : Submission of written comments on DF/R by the Egyptian side

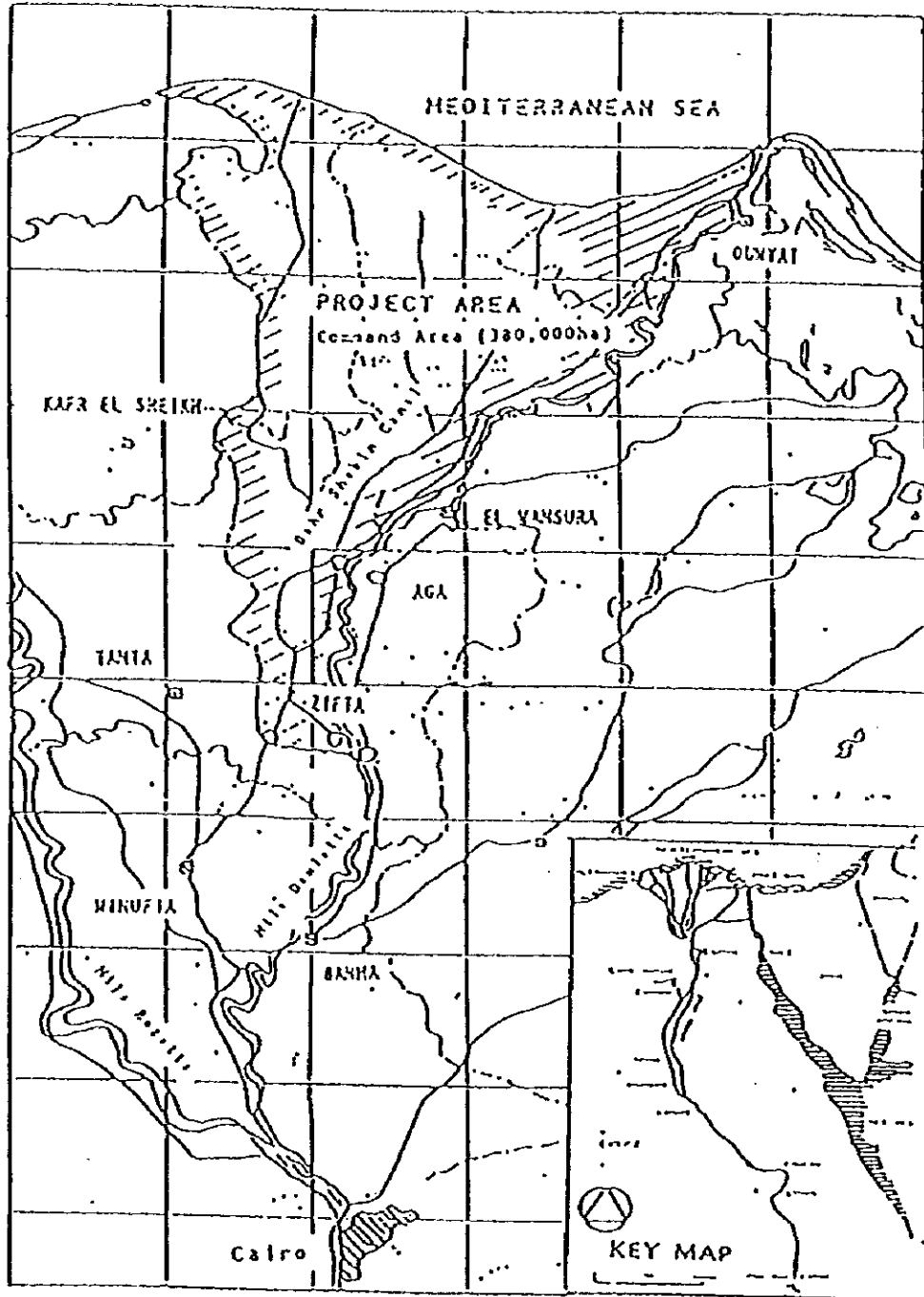
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PROJECT LOCATION MAP



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Minutes of Meeting  
on  
the Scope of Work  
for  
the Master Plan Study for  
the Improvement of Irrigation Water Management and  
Environmental Conservation in  
the North-east Region of the Central Nile Delta

The preparatory study team organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Shigeaki Uchimura, visited the Arab Republic of Egypt from July 27 to August 7, 1997 for the purpose of discussing and confirming the Scope of Work for the study on the Improvement of Irrigation Water Management and Environmental Conservation in the North-east Region of the Central Nile Delta, hereinafter referred to as "the Study."

The preparatory study team had a series of discussions with the officials concerned at the Irrigation Improvement Sector (hereinafter referred to as "IIS") of the Ministry of Public Works and Water Resources (hereinafter referred to as "MPWWR") and other organizations on the Scope of Work for the Study. The list of participants in the meetings is attached as ANNEX 1.

1. The preparatory study team and IIS agreed that the Study would place a special attention to realizing irrigation systems that would achieve more efficient use of the limited irrigation water resources in the study area. Therefore, the Study would include a careful review of preceding projects in the Nile delta region for the goal of irrigation improvement. The improved irrigation systems and farming practices to be proposed in the Study would be based on the understanding of the present and future water resource situations and existing facilities in the Study area. The attached chart as ANNEX 2 shows the basic ideas for the flow of activities in the Study.

2. Both sides agreed that the Study would be based on the following assumptions:

- (a) no more water than the present level can be taken from the Nile river to the study area for irrigation purposes in the future;
- (b) the cultivated land area for rice in the study area can not be expanded if the expansion of those cropping leads to the violation of the assumption (a) mentioned above; and,
- (c) the construction, rehabilitation and maintenance costs of meskas and operation and maintenance costs of pumps installed at meskas should be considered to be born by participating farmers.

3. Both sides agreed that topographical maps at the scale of 1/25,000 and maps without contour at the scale of 1/2,500 for all study area should be made available for the Study by the Egyptian side. Aerial photos at scales larger than 1/5,000 covering the study area should be made available for the

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Study through arrangements by IIS in collaboration with related government bodies including the General Authority of Survey. When such photos are not available, IIS should make arrangements for the Japanese Study Team to enable to make a contract with a local aerial survey company with permission of the government of Egypt.

4. Both sides agreed that a Steering Committee (SC) consisting of relevant institutions and organizations should be established within the Egyptian government before the start of the Study by the initiative of IIS for the smooth implementation of the Study.

5. Both sides agreed that the assignment of the counterpart personnel should be completed before the start of the Study.

6. Both sides agreed that the answers to the questionnaires regarding Irrigation and Drainage, Water Administration Plan, and to Agriculture should be prepared and sent to JICA Egypt office by IIS within one month from the date of signing of this Minutes of Meeting.


7. Both sides agreed that the Final Report for the Study would be made available to parties that would have interests in the Study. However, those parts of the Final Report that the Egyptian side does not agree will be excluded.

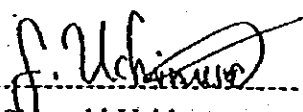
8. IIS requested counterpart training in Japan. The preparatory study team promised to convey the request to the government of Japan for consideration.

9. IIS requested that vehicles should be provided to the Study team by the government of Japan. The preparatory study team promised to convey the request to the government of Japan for consideration.

10. IIS requested that devices and equipments required for the water balance simulation, such as water velocity meter and water level meter, should be provided to the Study team by the government of Japan. The preparatory study team promised to convey the request to the government of Japan for consideration.

in Cairo, 6 August 1997

  
-----  
Eng. Nabil Fawzi Nashed  
Head of  
Irrigation Improvement Sector  
Ministry of Public Works and  
Water Resources

  
-----  
Mr. Shigeaki Uchimura  
Leader  
JICA Preparatory Study Team

## List of Participants

### Egyptian side:

#### Irrigation Improvement Sector of MPWWR

Eng. Nabil Fawzy Nashed	Head of Irrigation Improvement Sector
Eng. Adel. H. Saleh	General Director, World Bank Project
Eng. Essam Barakat	General Director, IAS
Eng. Camelia Aziz Basta	Director of Planning and Feasibility Studies
Eng. Alaa Esmail	Technical Office Director
Eng. Wael Mahmoud El-Gad	Technical Office and Construction Section

### Japanese side:

#### Preparatory Study Team

Mr. Shigeaki Uchimura	Leader
Mr. Kazuhiko Sawayama	Irrigation and Drainage Specialist
Mr. Kazuhiro Sugiyama	Water Management Specialist
Mr. Shojiro Fukuda	Agronomist
Mr. Hiroshi Imaizumi	Environment and Rural Sociology Specialist
Mr. Hajime Nabeta	Coordinator

#### Embassy of Japan

Mr. Akihisa Nakano	First Secretary
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#### JICA Egypt Office

Mr. Masami Fuwa	Deputy Resident Representative
Mr. Mostafa Hussein	Assistant Chief for Development Projects

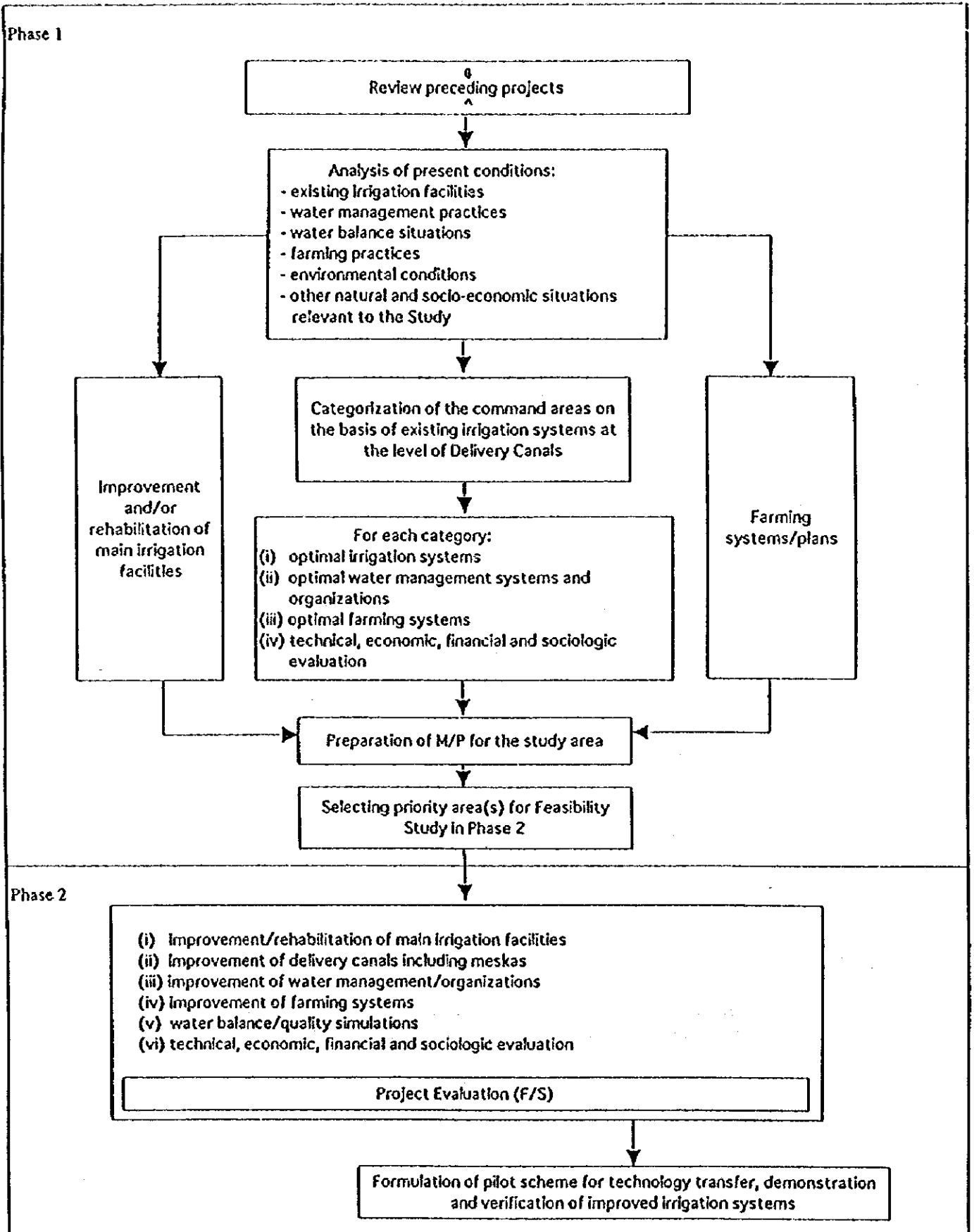
#### JICA Experts

Mr. Mitsuru Kimura	Technical Adviser to MPWWR
Mr. Kazuo Shimazaki	Technical Adviser to MPWWR

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Flow of activities for the Study



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## **A.2 List of Personnel Contacted by the Study Team**

### **1. Ministry of Public Works and Water Resources (MPWWR)**

	H.E. Dr. Mahmoud Abou Zied	Minister of MPWWR
<b>1.1 Irrigation Improvement Sector (IS)</b>		
	Eng. Nabil Fawzy Nashed	Former Head
	Eng. Ramsis Bakhom	Head
	Eng. Adel Hashem Saleh	Undersecretary
	Eng. Wael Mahmoud El-Gad	Technical Officer, Technical Office and Construction Section
	Eng. E.A. El-Shenawy	Agricultural Economist, Agricultural Economy
	Eng. Ahmed El-Garnosy	Agricultural Economist, Agricultural Economy
	Eng. Alaa Esmail	Director of Technical Office
<b>1.2 Irrigation Department (ID)</b>		
	Mr. Yehia Abdel Aziz	Chairman
<b>1.3 Irrigation Advisory Services (IAS)</b>		
	Eng. Essam Barakat	General Director
	Eng. Ezat El-Shafie	Director, Tanta Directorate
	Eng. Ibrahim El-Sharkawy	Director, Tanta Directorate
<b>1.4 Water Management Research Center</b>		
	Dr. Moheb R. Semaika	Deputy Director, Water Management Research Center
	Dr. Abd Alla Saber Aly	Agricultural Economist and Social Expert
<b>1.5 National Water Research Center</b>		
	Dr. Mona El-Kady	Chairperson
	Dr. Dia El-Din Ahmed El-Quosy	Deputy Chairman and Institute Director
<b>1.6 Training Center</b>		
	Eng. Abd El-Aty Allam	Undersecretary for Training Center, Center Director
	Dr. Saad Hussien	Director, Irrigation Training Center, Kafr El Sheikh
<b>1.7 Water Policy Team</b>		
	Dr. Max K. Lowdermilk	Water Policy Team, Concurrently Cornell University
	Dr. Robert Cardinali	Senior Anthropologist
	Mr. Robert Sillevs	Farmer Organization Specialist
	Dr. J.W. Fredericks	

- 1.8 Irrigation Improvement Project (IIP) Tanta Directorate**
- |                              |                  |
|------------------------------|------------------|
| Eng. Gamal El Shafei         | General Director |
| Eng. Abd-El Satah El-Akhras  | Sub-Director     |
| Eng. Nagwa Abdel Galiel      | Counterpart      |
| Eng. Yasser M. Salah El-Din  | Counterpart      |
| Eng. Mohamed S. El-Kodousy   | Counterpart      |
| Eng. Mohamed Said El-Fetyani | Counterpart      |
| Eng. Ahmad El Bayomy         | Counterpart      |
| Eng. Adel Hassanien          | Counterpart      |
- 2. Ministry of Agriculture and Land Reclamation**
- 2.1 MALR, Exective Authority for Land Improvement Projects (EALIP)**
- |                                      |   |
|--------------------------------------|---|
| Eng. Ahmed Dawood                    | Undersecretary  |
| Mr. Abou El Mahasen Abd              | Director  |
| Mr. Abd El-Razek Hassan              | Undersecretary of Agri-Economy Affairs                  |
| Mr. Samir M. Shehata                 | Undersecretary of Central Agency for Agri. Cooperations |
| Mr. Mohamed Ahmed Shash              | Director of Soil Department                             |
| Eng. Mohamed Nour El-Dien            | General Director for Laser Land Leveling                |
| Mr. Abd El-Sattar El-Said Ahmed Zaid | Director of MALR, Biyala office                         |
| Dr. Hassan El-Banna Osman            | Researcher, MALR, ARC, AENRI                            |
| Mr. Mohamed A. El-Megeed             | Director of MALR, Baltiem office                        |
| Prof. Dr. Ahmed El-Kafory            | Chief of Onion Res., MALR, ARC                          |
- 2.2 Economic Affair, Department of Statistics**
- |                            |  |
|----------------------------|--|
| Mr. Mohamed El Shahed      | Undersecretary for AECA  |
| Dr. Esmail M. Gamal El Din | General Director, Agro-Statistics, Department of Agricultural Statistics |
| Mr. Saad Amin Nasr         | Director General for Agricultural Census                                 |
- 2.3 MALR, Gharbia**
- |                                   |                                      |
|-----------------------------------|--------------------------------------|
| Mr. Mohamed El-Said Tarabeh       | General Director, Land & Water Dept. |
| Mr. Moustafa Abou Raya            | Undersecretary                       |
| Mr. Aziz Gomaa                    | Inspector of Extension               |
| Mr. Abd Elhamed Mohamed Alm Elden | Director of Marketary Section        |
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| Mr. Mohamed Nagi Attia     | Director, Agricultural Information Center |
- 2.5 MALR, Kafr EL Sheikh**
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| Mr. Mohamed Khalil             | Director General                    |
| Mr. Fathe Rabei                | Director of Follow-up               |
| Mr. Abd. El Rahim Mokbel Srouf | Inspector of Extension              |
| Mr. Metwally Abd El Meniem     | Director, El Hamaul District Office |



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Mr. Magdy Badawy	Chief of Technical Office
<b>2.6 MAIR, Damietta</b>	
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Mr. Ahmed Ragaic	First Secretary
<b>4. Governorate Office</b>	
<b>4.1 Gharbia Governorate Office</b>	
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Mr. Hasanen Abdel Fattah-Abdel Daicm	Director General Agricultural Affair
Eng. Reda Ahmed Ali	Chief Director of Information Center
Eng. Mohamed Salah	Telemetry Department
Eng. Heshmet Nabieh	
Eng. Mohamed El Namary	
Eng. Fikri Ali Abd El Tawab	
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Mr. Abdel Salam El-Sherbiny	General Director, Information Center
Mr. Zakaria Ahmed Saber	General Manager, Public Relation
Eng. Mohamed Anwer El Bckry	Canada Project
Eng. El Bayomi Ali El Bayouni	Telemeter
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Eng. Ahmed Mohamed Ibrahim	
Eng. Mohamed Abd El Ghafar	
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Eng. Fawzy Sabray	General Director
Mr. Salah Zafan	General Manager, Information Center
Mr. Abd El Raman Etman	Reference, Information Center
Mr. Ali Abd El Kader Abd Alla	Manager of Decision Marking, Information Center
Eng. Mohamed El Beltagy	
Eng. El Said Khamis	
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Miss. Soad Salem	Director, Information Center
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<b>6. Irrigation Improvement Development</b>	
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Eng. Galal Ahmed Bedda	Undersecretary, El Gharbia Directorate

- |  |  |
|--|--|
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| Eng. Wadie Botros  | Undersecretary, Kafr El Sheik Directorate              |
| Eng. Mohamed Dawoud  | General Director of IIP, West Et-Delta                 |
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| Mrs. Shaden Abdel Gawad  | Director   |
| Dr. Bakr Abd El-Ghany  | Head of Covered Drainage Department                    |
| <b>8. Telemetry Office Tanta</b>   |  |
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| <b>13. Rice Research and Training Center</b>                                   |  |
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| Dr. Mohamed El Zanaty  | General Director Soil Service Department               |
| Prof. Dr. Mohamed Samir M. A. Soliman  | Head of Soil Improvement & Conversion Dept., Sakha ARC |
| Dr. Hassan Saleh Soliman   | Chairman of Remote Sensing Unit                        |
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| Mr. Max K. Lowdermilk  | Consultant   |
| <b>16. Bank for Development &amp; Agr. Credit of Kafr El Sheikh</b>            |  |
| Mr. Salah Mohamed  | Vice- President  |
| <b>17. Egyptian Center for Women Right</b>                                     |  |
| Mrs. Nehad Abou El-Komsan  | Chairman   |
| <b>18. Egyptian Women's Legal Assistance</b>                                   |  |
| Mr. Yasser Abd El-Gawad  | General Director                                       |
| <b>19. Egyptian Farmers Union</b>  |  |
| Mrs. Shahenda Maklad   | Member of Directorate                                  |
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| Prof. Dr. Mohamed Hassan Mona  | Faculty of Science                                     |
| Prof. Dr. Farouk El-Aidy   | Prof. Specialist Agro-Economic Department              |
| <b>21. The Principal Bank for Development &amp; Agriculture Credit (PBDAC)</b> |  |

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Dr. Mohamed Said	Manager of Village Bank
<b>22. Ministry of Trade &amp; Supply, Egyptian Export Promotion Center (EEPC)</b>	
Dr. Mohamed Hamdy Salem	Minister's Economic Advisor & Executive Director of EEPC
<b>23. Naser Social Bank, Tanta Cold Storage</b>	
Mr. Ahmed Abd El-Aziz Roman	Supervisor
Mr. Mohamed M. Morshedy	Assistant Supervision
<b>24. Tanta Wholesale Market</b>	
Mr. Ahmed Anwar	Vice Manager
<b>25. Delta Sugar Company</b>	
Mr. Hassceb El-Sherbieny	General Manager
<b>26. Nile Company for Cotton Ginning, Kafr El-Sheikh</b>	
Mr. Mohamed El-Sadal	Manager
<b>27. Farmers</b>	
Mr. Ahmed Hasanien	Land owner (green house), Assistant Resercher in Mansoura University
Mr. Adel Mohamed Ismaiel	Farmer
<b>28. Institute of Oriental Culture (Tokyo University)</b>	
Dr. Eiji Nagasawa	Resident Representative

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Mr. Mostafa Hussein	Assistant Chief For Development Projects (formerly)
Mr. Alfred Zoser	Projects Coordinator
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Mr. Mitsuru kimura	Technical Adviser to MPWWR
Mr. Yasuhiro Kimura	Technical Adviser for Agricultural Machinery
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Mr. Kazuhiko Sawayama	Irrigation Facilities, Ministry of Agriculture, Forestry and Fisheries (MAFF)
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Mr. Toshio Ogawa	Deputy Director, Agricultural Development Study Division, AFFDSD
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**Agro-Economy/Project Evaluation (A)**  
**Agro-Economy/Project Evaluation (B)**  
**Coordinator**

**APPENDIX B.**

**SOCIO-ECONOMY**

## **Appendix B Socio-Economy**

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## B.1 National Level

Table B.1.1 National Land Use

Item	Area at 1997year		at 2017year	
	(000 ha)	(000 feddan)	(000 ha)	(000 feddan)
<b>1. Agricultural land</b>				
1) Current agricultural land #1	3,280	(7,800)	3,280	(7,800)
2) Future cultivated new land #2	(1,430)	(3,400)	1,430	(3,400)
total	3,280	(7,800)	4,700	(11,200)
<b>2. Non-agricultural land #3</b>	96,920	(231,400)	95,760	(228,000)
<b>Grand total</b>	<b>100,200</b>	<b>(239,200)</b>	<b>100,460</b>	<b>(239,200)</b>

Note: #1. Current agricultural land includes some rainfall farmland (at 1990: 168,000ha (400,000fed)).

#2. New land will be reclaimed with the horizontal expansion plan until 2017.

#3. Non-agricultural land consists of desert area, surface area of domestic water and town industrial public area.

Source: IIS, MPWRR

Table B.1.2 Population Characteristics (The 1996 Census)

Area	Population	Population Percentage by Urban/Rural		Population Density		Population Average Annual Growth Rate (1986~96)	Agricultural Land per Capita	Rate of Workers in Agriculture and Fishery (15 years and over) #1
		Urban	Rural	to All Land	to Available Area for Inhabitant			
	000 persons	%	%	96 persons/sq km	persons/sq km	%	ha/capita	%
Egypt	59,272 (100%)	43	57	59	1,686	2.08	0.055	34
Lower Egypt	25,811 (44%)	27.5	72.5	931	1,164	2.15		
Provincial Level (4 Governorates)	10,766 (18%)	27.8	72.2	1,141	1,141	1.90	0.062	40

Note: #1 in 1996

Average Annual Growth Rate (1956~96) of Egypt: 2.3%

Source: 1996 Population Census

Table B.1.3 Nominal Gross Domestic Products (GDP) (at the prices of 1996/97)

Sectors	GDP		Structure %
	LE million		
<b>Agriculture</b>	<b>42,325</b>	<b>17.7</b>	
Industry	43,383	18.1	
Petroleum	15,854	6.6	
Electricity	4,220	1.8	
Construction	12,750	5.3	
<b>Total of commodity production</b>	<b>118,532</b>	<b>49.5</b>	
Transport and Communications	16,200	6.8	
Suez Canal	6,495	2.7	
Trade	41,445	17.3	
Finance	9,400	3.9	
Insurance	182	0.1	
Restaurant and Hotels	3,830	1.6	
<b>Total of production services</b>	<b>77,552</b>	<b>32.4</b>	
Real estate property	4,375	1.8	
Public utilities	915	0.4	
Social insurance	165	0.1	
Government services	18,900	7.9	
Personal and social services	19,061	8.0	
<b>Total of social services</b>	<b>43,416</b>	<b>18.1</b>	
<b>Grand total</b>	<b>239,500</b>	<b>100.0</b>	

Source: The Fourth Five-year Plan for Economic and Social Development (1997/98--2001/02)

Table B.1.4 The Change of Real Gross Domestic Products at the Cost of Production Elements during the Five-Years(1991/92~1995/97)

Items	(in LE million at the fixed prices of 1991/92)						Remark
	91/92	92/93	93/94	94/95	95/96	96/97	
1. Real GDP	131,057	134,335	139,622	145,131	153,359	161,488	(5 years average)4.3
Real growth annual rates(%)		2.5	3.9	4.7	5.0	5.3	
2. Real GDP in Agriculture sector	21,660	22,220	23,072	22,741	24,470	25,310	(5 years average)3.1
Structure(%)	16.5	16.5	16.5	15.6	16.0	15.7	
Real growth annual rates(%)		2.5	3.8	-1.4	7.6	3.4	
3. Real GDP in Industry sector	21,730	22,260	23,295	25,087	26,970	29,228	(5 years average)6.1
Structure(%)	16.6	16.6	16.7	17.2	17.6	18.1	
Real growth annual rates(%)		2.4	4.6	7.7	7.5	8.4	
Real GDP per Capita (LE/capita)	2,302	2,304	2,344	2,399		2,725	

Source: The Fourth Five-Year Plan for Economic and Social Development(1997/98~2001/02)

Table B.1.5 Industrial Production Projected for 1996/97 and 1997/98

Detail	(in US million at 1995/97 Prices)				
	Expected fo	Projected	Growth rat	Structure in Total(%)	
	1996/97	1997/98	(%)	1996/97	1997/98
Food industries	34,827.9	37,029.0	6.3	29.5	28.8
Textile industries	32,014.0	35,158.1	9.8	27.1	27.3
Chemical industries	23,839.0	26,474.0	10.8	20.2	20.5
Metal industries	10,134.0	1,118.3	10.4	8.6	8.7
Engineering industries	16,530.5	18,103.7	9.5	14.0	14.1
Extraction industries	668.6	711.2	6.4	0.6	0.6
<b>Total</b>	<b>118,074.0</b>	<b>128,659.0</b>	<b>9.0</b>	<b>100.0</b>	<b>100.0</b>

Source: The Fourth Five-Year Plan for Economic and Social Development(1997/98~2001/02)

Table B.1.6 Values of Agricultural Production in 1996/97 and 2001/02 by Sector

Activity	(in LE million at 1996/97 Prices)							
	(1996/97)			(2001/02)			Change	
	Values	Structure	GDP	Values	Structure	GDP	Values	Rate
Plant	40,009	70.9		48,453	71.2		8444	21.1
Animal	12,420	22.0		14,198	20.9		1778	14.3
Piscine	4,004	7.1		5,360	7.9		1356	33.9
<b>Total</b>	<b>56,433</b>	<b>100.0</b>	<b>42,365</b>	<b>68,001</b>	<b>100.0</b>	<b>52,021</b>	<b>11568</b>	<b>20.5</b>

Note: GDP=Total values of production-values of medium products

Source: The Fourth Five-Year Plan for Economic and Social Development(1997/98 ~2001/02)

Table B.1.7 Estimated Main Crops Production Values for 1996/97 and 2001/02 at the Fixed Prices of 1995/97

Main crops	(in LE 1000)						
	Values	Relative Value structure		Relative structure	Change		Change rate
		Values	%		Values	%	
Wheat	3,606	9.0	5,483	11.3	1,877	52.1	
Maize	3,736	9.3	4,590	9.5	854	22.9	
Rice	3,070	7.7	2,033	4.2	-1,037	-33.8	
Beans	563	1.4	754	1.6	191	33.9	
Cotton	3,652	9.1	3,802	7.8	150	4.1	
Oil cereals	960	2.4	831	1.8	-79	-8.2	
Sugar group	1,407	3.5	1,632	3.4	225	16.0	
Vegetables	7,911	19.8	11,298	23.3	3,387	42.8	
Onion & Garlic	762	1.9	747	1.5	-15	-2.0	
Fruits & Dates	6,059	15.1	8,972	18.5	2,913	48.1	
<b>Total Plant values</b>	<b>40,009</b>	<b>100.0</b>	<b>48,453</b>	<b>100.0</b>	<b>8,444</b>	<b>21.1</b>	

Source: The Fourth Five-Year Plan for Economic and Social Development(1997/98~2001/02)

Table B.1.8 Estimations of Current Balance of Payments during 1991/92~1996/97

Items	(in LE million)						
	Year	91/92	92/93	93/94	94/95	95/96	96/97
<b>Trade</b>							
1. Commodity exports		16,185.0	15,721.5	15,476.9	18,213.2	16,851.8	17,340.0
2. Commodity imports		32,971.2	35,662.4	37,043.7	43,481.7	46,934.4	51,240.0
balance account		-16,786.2	-19,940.9	-21,566.8	-25,268.5	-30,082.6	-33,900.0
Service balance account		16,204.9	15,218.9	12,462.8	12,635.7	16,869.6	19,465.0
Production revenues balance account		8,702.3	14,517.4	15,298.4	10,202.6	9,195.8	12,951.0
Remittances balance account		4,273.4	5,362.6	3,442.7	3,551.5	2,599.0	3,281.0
<b>Current balance account</b>		<b>12,394.4</b>	<b>15,158.0</b>	<b>9,637.1</b>	<b>1,121.3</b>	<b>-1,418.2</b>	<b>1,797.0</b>

Source: The Fourth Five-Year Plan for Economic and Social Development (1997/98~2001/02)

Table B.1.9 The Trend of Imports and Exports by Main Agricultural Products during 1992~1996

Items	year	(in LE million)					change rate 1997-1993)
		1993	1994	1995	1996	1997	
<b>1. Imports</b>							
Total Items		27,550 (100.0)	32,461 (100.0)	39,891 (100.0)	44,218 (100.0)	44,769 (100.0)	62.5
Wheat • Wheat flour		1,601 (5.8)	2,737 (8.4)	3,178 (8.0)	3,781 (8.6)	2,702 (6.0)	68.8
% of total items							
Maize		807 (2.9)	893 (2.8)	1,185 (3.0)	1,478 (3.3)	1,309 (2.9)	62.2
% of total items							
Vegetable Products		3,281 (11.9)	4,737 (14.6)	5,740 (14.4)	7,152 (16.2)	5,657 (12.6)	72.4
% of total items							
Sugar refined		204 (0.7)	52 (0.2)	230 (0.6)	121 (0.3)	278 (0.6)	36.3
% of total items							
Living animals and related Products		1,410 (5.1)	1,813 (5.6)	1,990 (5.0)	1,766 (4.0)	1,635 (3.7)	16.0
% of total items							
Dairy Products		503 (1.8)	509 (1.6)	574 (1.4)	614 (1.4)	505 (1.1)	0.4
% of total items							
<b>2. Exports</b>							
Total Items		10,596 (100.0)	11,925 (100.0)	11,954 (100.0)	12,277 (100.0)	13,537 (100.0)	27.8
Cotton (raw, yarn, fabric)		1,140 (10.8)	2,480 (20.8)	1,927 (16.1)	1,270 (10.3)	1,685 (12.4)	47.8
% of total items							
Vegetable Products		753 (7.1)	830 (7.0)	1,058 (8.9)	1,201 (9.8)	847 (6.3)	12.5
% of total items							
Rice		135 (1.3)	268 (2.2)	193 (1.6)	400 (3.3)	242 (1.8)	79.3
% of total items							
Potatoes		108 (1.0)	98 (0.8)	347 (2.9)	271 (2.2)	151 (1.1)	39.8
% of total items							

Source: 1998 Statistical Year Book

Table B.1.10 National Food Security

Items	Year	Index
Food production per capita index (1989/91=100)	1995	108.5
Agricultural production (as % of GDP)	1994/95	15.5
Daily calorie per capita (kcal)	1976	3,340
	1991	3,700
Shares in daily calorie per capita %:		
Vegetable products	1976	93.6
	1991	94.5
Animal products	1976	6.1
	1991	5.5
Cereal imports: (1000 metric tons)	1993	4,910
Food exports as % of food imports	1993	16.7
Food self sufficiency ratio (%)	1993	87.7

Source: Human Development Report 1996 (Institute of National Planning)

Table B.1.11 Annually Share per Capita from Food Stuffa

Item	Year					
	90/91	91/92	92/93	93/94	94/95	95/96
Wheat	167.6	159.1	155.6	149.6	178.6	190.8
Wheat flour 72%	27.7	21.3	33.9	27.8	30.1	27.3
Corn flour	81.3	79.7	78.2	83.0	79.4	72.9
Rice	38.6	41.7	43.0	48.8	47.6	48.2
Bean	4.2	6.3	6.9	5.1	7.2	7.0
Lentil	1.2	1.7	2.9	1.5	1.0	1.0
Potato	22.0	19.4	10.9	16.2	28.6	29.0
Vegetables	136.8	144.9	142.6	144.0	160.9	175.7
Citrus	37.8	36.9	27.7	31.3	33.6	34.8
Fruits	44.9	46.4	52.1	53.9	61.7	68.3
Meat	12.0	12.4	12.4	16.1	13.7	15.7
Chicken	6.7	8.6	8.6	8.9	10.0	10.0
Fish	6.9	6.7	6.9	8.2	9.4	10.0
Milk	41.4	40.7	40.1	26.1	29.2	35.0
Eggs(number)	42.0	46.0	42.0	27.0	40.0	44.0
Oil	6.7	8.1	8.7	9.8	9.2	7.0
Margarine	2.1	1.9	3.1	2.9	2.7	4.0
Sugar	29.7	25.0	24.4	24.6	25.3	23.6
Coffee	0.1	0.1	0.1	0.1	0.1	0.1
Tea	1.7	1.4	1.4	1.1	1.2	1.2
Cigarettes	1.3	1.3	1.2	1.2	1.2	1.3

Source: 1998 Statistical Year Book

Table B.1.13 Percent of Change in Consumer Price Index(Urban) and Wholesale Price Index(86/87=100)

Items	Year				
	1993	1994	1995	1996	1997
Consumer Price Index(Urban Egypt)	12.1	8.1	8.4	7.2	4.6
Wholesale Price Index	7.4	6.0	6.3	8.4	4.2

Source: 1998 Statistical Year Book

Table B.1.14 Workers and Work Force Development during 1991/92~1996/97, and 2001/02(Estimated)

Year	Workers		Employment		Unemployment	
	Number	Rate (%)	Number	Rate (%)	Number	Rate (%)
1991/92	15,141	13.742	90.8	1,399	9.2	
1992/93	15,571	14.011	90.0	1,560	10.0	
1993/94	16,013	14.436	90.2	1,577	9.8	
1994/95	16,452	14.879	90.4	1,573	9.6	
1995/96	16,899	15.340	90.8	1,559	9.2	
1996/97	17,358	15.825	91.2	1,533	8.8	
2001/02	19,757	18.786	95.1	971	4.9	

Source: The Fourth Five-Year Plan for Economic and Social Development (1997/98~2001/02)

Table B.1.12 Percent of Self-Sufficiency of Food Stuffa

Item	Year					
	90/91	91/92	92/93	93/94	94/95	95/96
Wheat	43.8	48.2	50.5	45.9	51.4	47.9
Maize	76.1	74.8	72.3	76.0	72.1	74.3
Rice	103.8	106.1	106.6	102.6	107.0	108.1
Bean	98.3	48.4	77.3	83.5	69.7	60.7
Lentil	17.1	10.3	7.7	9.6	9.4	8.6
Potato	113.3	113.5	120.6	107.4	116.4	115.2
Vegetables	100.6	100.6	100.8	100.7	100.4	101.3
Citrus	105.1	105.2	104.4	102.0	102.5	103.0
Fruits	100.2	100.2	100.3	100.1	99.3	99.9
Meat	89.1	89.5	87.3	83.2	85.7	90.8
Chicken	100.2	99.6	99.3	99.5	99.5	99.8
Fish	79.1	73.1	79.2	72.2	73.2	72.8
Milk	100.0	100.0	100.0	100.0	100.0	100.0
Eggs	99.9	99.9	99.9	99.9	100.0	100.0
Oil	19.6	14.4	15.6	14.7	14.0	28.1
Margarine	102.6	99.0	100.0	100.6	98.1	101.3
Sugar	55.5	68.2	70.9	72.7	71.9	72.0

Source: 1998 Statistical Year Book

Table B.1.15 Development of the Number of Workers Distributed among the Economic Sectors during 1991/92~1996/97

Economic sectors	Workers' number					Increase	Relative importance of increase
	91/92	Relative structure (%)	96/97	Relative structure (%)	Annual growth rate (%)		
Agriculture	4,552	33.1	4,747	30.0	0.8	195	9.4
Mining and conversion industries	1,706	12.4	2,038	12.9	3.6	332	15.9
Oil and by-products	35	0.3	43	0.3	4.2	8	0.4
Electricity	104	0.8	120	0.8	2.9	16	0.8
Construction and building	858	6.2	1,140	7.2	5.8	282	13.5
Commodity sectors total	7,255	52.8	8,098	51.1	2.2	833	40.0
Transportation, communication and Suez Canal	600	4.4	704	4.4	3.2	104	5.0
Trade, money and insurance	1,404	10.2	1,679	10.6	3.6	275	13.2
Tourism, hotel and restaurants	151	1.1	145	0.9	-0.8	-5	-0.3
Productive services sectors total	2,155	15.7	2,528	16.0	3.2	373	17.9
Real estate	202	1.5	219	1.4	1.6	17	0.8
Personal and social services	1,219	8.9	1,413	8.9	3.0	194	9.3
Public utilities, social insurance & government services	2,911	21.2	3,577	22.6	4.2	666	32.0
Social services sectors total	4,332	31.5	5,209	32.9	3.8	877	42.1
Total	13,742	100.0	15,825	100.0	2.9	2,083	100.0

Source: The Fourth Five-Year Plan for Economic and Social Development (1997/98~2001/02)

## B.2 Provincial Level

Table B.2.1 Inhabited and Uninhabited Area by Region

Region	(Unit: sq. km)							
	Total		Inhabited			Uninhabited		
	Area	% of Egypt	Area	% of Egypt	% of Total	Area	% of Egypt	
Urban Egypt	20,806.05	2.1	907.55	2.6	4.4	19,898.50	2.1	
Lower Egypt	27,723.24	2.8	22,183.24	63.0	80.0	5,540.00	0.6	
Upper Egypt	96,193.11	9.6	12,097.70	34.4	12.6	84,095.41	8.7	
Frontier	853,016.00	85.5	-	-	-	853,016.00	88.6	
<b>Egypt</b>	<b>997,738.40</b>	<b>100.0</b>	<b>35,188.49</b>	<b>100.0</b>	<b>3.5</b>	<b>962,549.91</b>	<b>100.0</b>	

Note: Inhabited area = Arable land

Source: 1986 Population Census

Table B.2.2 Inhabited and Uninhabited Area by Governorate (Provincial Level)

Governorate	(Unit: sq. km)							
	Total		Inhabited			Uninhabited		
	Area	% of Lower Egypt	% of Egypt	Area	% of Lower Egypt	% of Egypt	Area	% of Lower Egypt
Gharbia	1,942.21	7.0	0.2	1,942.21	8.8	5.5	-	-
Dakahlia	3,470.90	12.5	0.3	3,470.90	15.6	9.9	-	-
Kafr-El-Sheik	3,437.12	12.4	0.3	3,437.12	15.5	9.8	-	-
Frontier	589.17	2.1	0.1	589.17	2.7	1.7	-	-
<b>Total</b>	<b>9,439.40</b>	<b>34.0</b>	<b>0.9</b>	<b>9,439.40</b>	<b>42.6</b>	<b>26.8</b>	<b>-</b>	<b>-</b>

Note: Inhabited area = Arable land

Source: 1986 Population Census

Table B.2.3 Agricultural Land by Governorate (Provincial Level)

Governorate	Agricultural land				
	Total area	% of Total		% of Egypt	
	ha	ha	(fedden)	Per capita	agricultural
			area	ha	land
Gharbia	194,221	167,040	(397,714)	86.0	
Dakahlia	347,090	340,494	(810,699)	98.1	
Kafr-El-Sheik	343,712	297,009	(707,165)	86.4	
Damietta	58,917	42,693	(101,651)	72.5	
<b>Total</b>	<b>943,940</b>	<b>847,236</b>	<b>(2,017,229)</b>	<b>89.8</b>	<b>0.079</b>

Source: Annual Report of Gharbia, Dakahlia, Kafr El Sheikh and Agricultural Economy 1995

Note: Agricultural land includes fallow land except for Damietta whose data of fallow land is not available.

Table B.2.4 Population Characteristics (The 1996 Census)

Governorate	Population	Population Percentage by Urban/Rural		Population Density		Population Average Annual Growth Rate (1986~96)		Agricultural Land per Capita	Rate of Workers in Agriculture and Fishery (15 years and over)*1	
		Urban	Rural	to Total Area	to Available Area for Inhabitant	Total Area	Urban			Rural
	persons	persons	persons	persons/sq. km	persons/sq. km	%	%	%	ha/capita	%
Gharbia	3,404,827	1,057,152	2,347,675	1,753	1,753	1.6	1.1	1.9	0.049	33.5
	100.0	31.0	69.0							
Dakahlia	4,223,655	1,175,333	3,048,322	1,217	1,217	1.9	2.6	1.7	0.070	41.6
	100.0	27.8	72.2							
Kafr-El-Sheik	2,222,920	509,774	1,713,146	647	647	2.1	2.2	2.1	0.134	54.2
	100.0	22.9	77.1							
Damietta	914,614	251,087	663,527	1,552	1,552	2.1	3.0	1.8	0.047	29.8
	100.0	27.5	72.5							
<b>Total</b>	<b>10,766,316</b>	<b>2,993,428</b>	<b>7,772,888</b>	<b>1,141</b>	<b>1,141</b>	<b>1.9</b>	<b>2.0</b>	<b>1.9</b>	<b>0.079</b>	<b>40.3</b>
	100.0	27.8	72.2							

Note: \*1 in 1986

Source: 1986 and 1996 Population Census

Table B.2.5 Population (more than 15 years) by Occupation in 1986  
(Unit: capita, %)

Governorate	Occupation										Sub-Total	Workers not reporting any Occupation	Without Occupation	Total	
	Professional Technical and Related Work	Administrative and Managerial Related Work	Clinical and Sales Work	Service Work	Farmers, Fishermen, Breeding, Hunting, and Lobsters	Production work Work in Transport and Lobsters	Workers not reporting any Occupation	Without Occupation	Without Occupation	Without Occupation					
<b>Total Egypt</b>															
Male	1,090,019 (9.5)	85,277 (0.7)	606,664 (5.8)	59,172 (5.2)	767,051 (6.7)	4,285,134 (37.1)	2,746,288 (23.9)	1,270,970 (11.1)	11,485,115 (100.0)	3,209,015	14,754,130				
Female	400,205 (30.0)	15,254 (1.1)	345,727 (24.1)	37,528 (2.6)	50,224 (3.5)	65,568 (4.6)	69,065 (4.6)	420,222 (29.3)	1,453,793 (100.0)	12,785,128	14,218,921				
Total	1,520,224 (11.8)	100,531 (0.8)	1,012,391 (7.8)	623,240 (4.9)	817,275 (6.9)	4,350,702 (33.5)	2,817,353 (21.8)	1,491,192 (13.1)	12,918,908 (100.0)	10,054,143	26,973,051				
<b>Gharbia</b>															
Male	66,762 (9.6)	3,015 (0.5)	43,608 (6.3)	27,192 (3.9)	43,629 (6.3)	258,101 (37.2)	168,822 (24.3)	81,398 (11.7)	692,927 (100.0)	195,799	888,726				
Female	27,523 (25.4)	395 (0.4)	21,326 (19.7)	2,720 (2.5)	2,280 (2.1)	9,982 (9.2)	8,853 (8.2)	35,344 (32.6)	108,423 (100.0)	769,383	877,806				
Total	94,285 (11.8)	4,010 (0.5)	64,934 (8.1)	29,912 (3.7)	45,909 (5.7)	268,083 (33.5)	177,675 (22.1)	116,742 (14.6)	801,350 (100.0)	965,182	1,766,532				
<b>Karf El Sheikh</b>															
Male	27,432 (6.4)	1,368 (0.3)	19,289 (4.5)	15,862 (3.7)	21,912 (5.1)	245,619 (37.3)	54,612 (12.7)	42,916 (10.0)	429,010 (100.0)	105,206	534,215				
Female	9,277 (23.5)	122 (0.3)	5,997 (15.2)	906 (2.3)	708 (1.8)	8,236 (20.8)	875 (2.2)	13,424 (33.9)	39,545 (100.0)	500,276	539,821				
Total	36,709 (7.8)	1,490 (0.3)	25,286 (5.4)	16,768 (3.9)	22,620 (4.8)	253,855 (54.2)	55,487 (11.8)	56,340 (12.0)	468,555 (100.0)	605,481	1,074,036				
<b>Dehshia</b>															
Male	69,915 (8.3)	3,261 (0.4)	43,924 (5.2)	35,989 (4.3)	44,065 (5.3)	385,222 (45.9)	150,887 (18.0)	105,940 (12.6)	838,913 (100.0)	232,548	1,071,461				
Female	27,836 (26.7)	904 (0.6)	19,959 (19.2)	1,721 (1.7)	1,834 (1.8)	7,403 (7.1)	2,042 (2.0)	42,793 (41.1)	104,192 (100.0)	929,975	1,034,167				
Total	97,751 (10.4)	3,865 (0.4)	63,883 (8.8)	37,420 (4.0)	45,899 (4.9)	392,625 (41.8)	152,929 (16.2)	148,733 (15.8)	943,105 (100.0)	1,162,523	2,106,628				
<b>Damietta</b>															
Male	12,514 (6.5)	639 (0.3)	6,742 (3.5)	11,150 (5.8)	6,982 (4.7)	63,407 (33.1)	71,954 (37.6)	16,063 (8.4)	191,451 (100.0)	41,683	233,134				
Female	7,864 (32.8)	202 (0.9)	5,285 (22.8)	231 (1.0)	913 (2.6)	864 (2.8)	1,075 (4.0)	7,851 (32.7)	23,375 (100.0)	197,593	220,968				
Total	20,178 (9.4)	841 (0.4)	12,027 (5.6)	11,381 (5.3)	9,995 (4.5)	64,061 (29.8)	73,929 (34.0)	23,714 (11.0)	214,826 (100.0)	239,276	454,102				

Source: Census of Population, Housing and Establishments 1986

Table B.2.6 GDP and GDP per Capita by Governorate  
(at 1994/95 prices)

Governorate	Estimated GDP		GDP per capita (in LE)
	Values (in LE million)	Percentage (%)	
Gharbia	11,653	32.0	3,330.6
Dakahlia	15,232	41.9	3,604.4
Kafr-El-Sheikh	6,383	17.6	2,817.0
Damietta	3,098	8.5	3,450.2
<b>Total</b>	<b>36,366</b> (46.7%)	<b>100.0</b>	<b>3,358.8</b>
<b>Lower Egypt</b>	<b>77,875</b> (100.0%)		<b>3,063.8</b>

Source: Human Development Report 1993 (Institute of National Planning)

Table B.2.7 Fundamental Social and Human Indexes

Items	Country	Lower Egypt Governorates					Total (Pro- vincial level)	Remark	
		Units	Gharbia	Dakahlia	Kafr-El- Sheikh	Damietta			
Sex ratio (male/female) (1996)		%	106	104	102	104	101	106	103
Family size (1996)		persons	4.6	4.8	4.7	4.6	5.0	4.3	4.7
Dependency ratio (1995)		%	105						
Human Development Index (HDI) (1994)			0.589	0.570	0.559	0.609	0.533	0.604	
Literacy rate (+10) (1996)		%	61.4	61.4	65.9	64.1	53.4	67.5	
Combined basic and secondary enrolment ratio (1994)		%	85.6	88.3	93.5	92.6	88.7	95.7	
Infant mortality (per 1000 live births) (1993)		number	31.8	24.8	27.6	18.4	16.9	22.6	
Unemployment rate (1995)		%	11.3	13.2	11.3	15.3	13.0	8.3	
1) Total		%	24.1	27.6	24.3	32.8	29.3	31.8	
2) Women		%	29.2	32.4	29.3	37.4	30.8	20.4	
3) Adults (15-29)		%	3,451.3	3,063.8	3,390.6	3,604.4	2,817.0	3,450.2	
GDP per capita (1994/95)		LE							
Income share (1995/96)		%	21.9	24.9	24.6	28.0	24.6	27.6	
1) Lowest 40%		%	4.4	3.4	3.4	3.1	3.7	2.7	
2) Ratio of highest 20% to lowest 20%		%							
3) Gini coefficient									
a) Total			31.6	25.5	25.9	23.4	28.1	21.4	
b) Rural									
Poverty lines; per individual (1995/96)		LE							
1) Food-based poverty line		LE	594						Urban: 702, Rural: 512
2) Lower income poverty line		LE	881						Urban: 1,005, Rural: 787
3) Upper income poverty line		LE	1,201						Urban: 1,409, Rural: 1,042
4) Lower expenditure poverty I		LE	814						Urban: 968, Rural: 638
5) Upper expenditure poverty I		LE	1,058						Urban: 1,326, Rural: 924
Poor persons (1995/96)		%							
1) % of total population		%	22.9	17.1	9.4	11.4	10.1	0.7	
a) Total poor		%	7.4	4.3	1.6	1.8	8.8	0.0	
b) Ultra poor		in 1000	13,638.0	4,385.3	321.9	475.4	220.0	6.3	
2) Total poor persons		in 1000	4,294.9	1,105.1	54.8	75.1	56.8	0.0	
3) Ultra poor persons									

Source: 1) 1996 population Census

2) Human Development Report (Institute of National Planning)

B.3 the Study Area

Table B.3.1 Estimated Demographic Profile in the Study Area in 1996

Governorate	District	Population in the Study Area										Total Area (km <sup>2</sup> )	Pop. Density (persons/km <sup>2</sup> )
		Urban Area		Rural Area		Total		Pop. 15/60 years old		Total Area (km <sup>2</sup> )	Pop. Density (persons/km <sup>2</sup> )		
		Total	Male	Female	Male	Female	Total	Male	Female				
<b>Gharbia</b>	<b>El Mahalia El Kubra</b>	810,411	366,189 (45%)	184,713	181,476	444,222 (55%)	223,371	220,851	63%	64%	61%	411.26	1,971
	<b>El Santa</b>	5,327	462 (9%)	237	225	4,865 (91%)	2,466	2,399	60%	57%	60%	3.67	1,451
	<b>Samanoud</b>	249,931	47,745 (19%)	23,847	23,898	202,186 (81%)	100,482	101,704	59%	63%	58%	144.61	1,728
	<b>Tanta</b>	2,453	1,113 (45%)	563	550	1,340 (55%)	683	657	64%	65%	62%	1.00	2,453
	<b>Zifta</b>	122,798	27,084 (22%)	13,854	13,230	95,654 (78%)	48,610	47,044	60%	61%	60%	70.33	1,745
	<b>Sub Total</b>	1,190,860	442,593 (37%)	223,214	219,379	748,267 (63%)	375,612	372,655	62%	64%	60%	630.87	1,898
<b>Dakohia</b>	<b>Bilqas</b>	365,267	88,264 (24%)	44,237	44,027	277,003 (76%)	140,826	136,177	60%	66%	58%	757.70	492
	<b>Sherbin</b>	256,996	42,075 (16%)	21,216	20,859	214,921 (84%)	110,238	104,683	61%	66%	61%	241.59	1,064
	<b>Talkha</b>	439,910	97,682 (22%)	49,576	48,106	342,228 (78%)	174,851	167,377	61%	66%	60%	303.99	1,447
	<b>Sub Total</b>	1,062,173	228,021 (21%)	115,029	112,992	834,152 (79%)	425,915	408,237	61%	66%	60%	1303.28	815
<b>Kafr El Sheikh</b>	<b>El Burullus</b>	103,522	25,346 (24%)	12,725	12,621	78,176 (76%)	39,293	38,883	56%	63%	54%	153.66	674
	<b>Biyala</b>	192,240	53,551 (28%)	26,489	27,062	138,689 (72%)	68,998	69,691	61%	64%	60%	333.74	576
	<b>El Hamoul</b>	182,828	36,339 (20%)	18,142	18,197	146,489 (80%)	74,590	71,399	58%	59%	58%	555.24	329
	<b>El Riyad</b>	7,346	854 (12%)	431	423	6,492 (88%)	3,258	3,234	60%	62%	60%	17.30	425
	<b>Sub Total</b>	485,936	116,090 (24%)	57,787	58,303	369,846 (76%)	186,139	183,707	59%	62%	58%	1059.94	458
<b>Damietta</b>	<b>Damietta</b>	128,453	36,333 (28%)	18,608	17,725	92,120 (72%)	47,187	44,932	66%	69%	64%	33.05	3,887
	<b>Kafr Sead</b>	234,593	42,120 (18%)	21,844	20,276	192,473 (82%)	98,992	93,481	60%	61%	60%	330.67	709
	<b>Sub Total</b>	363,046	78,453 (22%)	40,452	38,001	284,593 (78%)	146,179	138,414	62%	65%	61%	363.72	998
<b>Total</b>		3,102,015	865,157 (28%)	436,482	428,675	2,236,858 (72%)	1,133,845	1,103,012	61%	64%	60%	3357.81	924

Source: The first result of the general accounting for population and building in 1996

Note: The population in the Study area is estimated by dividing the districtwise population by the study area.



Table B.3.2 Estimated Number of Households in the Study Area in 1996

Governorate	District	No. of Household			Average Family Size	
		Total	Urban Area	Rural Area	Urban Area	Rural Area
Gharbia	El Mahalla El Kubra	182,191	88,565	93,626	4.1	4.7
	El Santa	1,117	100	1,017	4.6	4.8
	Samanoud	51,761	10,931	40,830	4.4	5.0
	Tanta	544	266	278	4.2	4.8
	Zifta	25,301	5,974	19,327	4.5	4.9
	Sub Total	260,914	105,836	155,078	4.2	4.8
Dakahlia	Bilqas	77,518	20,190	57,328	4.4	4.8
	Sherbin	57,712	9,426	48,286	4.5	4.5
	Talkha	92,817	20,108	72,709	4.9	4.7
	Sub Total	228,047	49,724	178,323	4.6	4.7
Kafr El Sheikh	El Burullus	17,953	5,373	12,580	4.7	6.2
	Biyala	38,594	11,791	26,803	4.5	5.2
	El Hamoul	33,276	6,456	26,820	5.6	5.5
	El Riyad	1,358	179	1,179	4.8	5.5
	Sub Total	91,181	23,799	67,382	4.9	5.5
Damietta	Damietta	29,603	8,993	20,610	4.0	4.5
	Kafr Saad	53,179	9,763	43,416	4.3	4.4
	Sub Total	82,782	18,756	64,026	4.2	4.4
Total		662,924	198,115	464,809	4.4	4.8

Source: The first result of the general accounting for population and building in 1996

Note: The population in the Study area is estimated by dividing the districtwise population by the study area.

Table B.3.3 Distribution of Farm Households by type of land holding

Governorate	District	Total	No. of Farm Household			
			fully owned	Rented (cash)	Rented (other type)	Others
Gharbia	El Mahalla El Kubra	37,787	19,379 (51%)	9,265 (25%)	354 (1%)	8,789 (23%)
	El Santa	30,504	18,860 (62%)	4,644 (15%)	37 (0%)	6,963 (23%)
	Samanoud	16,758	10,836 (65%)	3,224 (19%)	22 (0%)	2,676 (16%)
	Tanta	39,024	26,857 (69%)	4,224 (11%)	89 (0%)	7,854 (20%)
	Zifta	28,540	20,455 (72%)	2,944 (10%)	36 (0%)	5,105 (18%)
	Sub Total	152,613	96,387 (63%)	24,301 (16%)	538 (0%)	31,387 (21%)
Dakahlia	Bilqas	22,406	19,257 (86%)	565 (3%)	1,054 (5%)	1,530 (7%)
	Sherbin	16,917	12,977 (77%)	1,665 (10%)	799 (5%)	1,484 (9%)
	Talkha	32,109	22,296 (69%)	6,206 (19%)	407 (1%)	3,201 (10%)
	Sub Total	71,432	54,530 (76%)	8,435 (12%)	2,260 (3%)	6,215 (9%)
Kafr El Sheikh	El Burullus	6,458	5,715 (88%)	339 (5%)	3 (0%)	411 (6%)
	Biyala	15,094	10,494 (70%)	627 (4%)	2,138 (14%)	1,835 (12%)
	El Hamoul	17,200	15,245 (89%)	836 (5%)	660 (4%)	459 (3%)
	El Riyad	9,251	8,585 (93%)	120 (1%)	159 (2%)	387 (4%)
	Sub Total	48,013	40,039 (83%)	1,922 (4%)	2,960 (6%)	3,092 (6%)
Damietta	Damietta	5,746	3,128 (54%)	1,526 (27%)	47 (1%)	1,052 (18%)
	Kafr Saad	15,934	13,599 (85%)	660 (4%)	591 (4%)	1,084 (7%)
	Sub Total	21,680	16,727 (77%)	2,186 (10%)	631 (3%)	2,136 (10%)
Total		293,738	207,683 (71%)	36,844 (13%)	6,389 (2%)	42,830 (15%)

Source: Agricultural Census 1990

Table B.3.4 Number of Farm Household by Farming Area in 1989/90

Scale	Gharbia		Dakahlia		Kafr El Sheikh		Damietta	
	Number	rate(%)	Number	rate(%)	Number	rate(%)	Number	rate(%)
<1fed.	84,442	(39.0)	85,541	(31.4)	23,091	(15.5)	6,240	(18.2)
1<2	57,816	(26.8)	66,738	(24.6)	31,387	(20.9)	7,918	(23.1)
2<3	38,625	(17.9)	54,794	(20.2)	35,849	(23.9)	7,134	(20.8)
3<4	17,368	(8.0)	25,143	(9.3)	19,935	(13.3)	4,436	(12.9)
4<5	6,873	(3.2)	11,303	(4.2)	10,457	(7.0)	2,570	(7.5)
5<7	5,983	(2.8)	13,979	(5.2)	15,897	(10.6)	2,943	(8.6)
7<10	2,389	(1.1)	5,898	(2.2)	6,091	(4.1)	1,395	(4.1)
10<15	1,297	(0.6)	3,962	(1.5)	3,916	(2.6)	830	(2.4)
15<20	516	(0.2)	1,692	(0.6)	1,364	(0.9)	336	(1.0)
20<30	408	(0.2)	1,154	(0.4)	972	(0.6)	268	(0.8)
30<50	271	(0.1)	685	(0.3)	583	(0.4)	122	(0.4)
50<100	111	(0.1)	257	(0.1)	217	(0.1)	56	(0.2)
100<	23	(0.0)	48	(0.0)	78	(0.1)	12	(0.0)
Total	216,122	(100.0)	271,194	(100.0)	149,837	(100.0)	34,260	(100.0)
Total Area(fed)	405,970		670,931		525,992		118,676	
Farm size (fed/household)	1.9		2.5		3.5		3.5	

Note: Data includes whole governorate  
Source: Agricultural census 1990

Table B.3.5 Data on Living Conditions in the Study Area

Item	Year	Governorate					Total Egypt
		Urban/ Rural	Gharbia	Dakahlia	Kafr El Sheikh	Damietta	
Human development Index	1995/96		0.599	0.609	0.538	0.604	0.589
Gini Coefficient	1994/95		25.9	23.4	28.1	21.4	31.6
Income Share Ratio of Lowest 40% (%)	1995/96		24.6	26.0	24.6	27.6	21.9
Basic and Secondary Enrollment (%)	1994		93.5	92.6	86.7	95.7	85.6
Literacy rate (more than 10 years old)	1996	Urban	79	74	61	72	74
	1996	Rural	62	54	48	64	51
Unemployment Rate(%)	1995	Urban	12.5	14.2	17.4	6.7	11.9
15<64 Years old	1995	Rural	10.6	15.7	11.4	9.0	10.7
Annual Household Expenditure(LE)	1995/96	Urban	8,072	7,601	7,887	6,981	7,635
		Rural	6,898	6,375	6,725	6,432	6,608
Annual Expenditure per Capita(LE)	1995/96	Urban	1,794	1,767	1,834	1,623	1,779
		Rural	1,277	1,226	1,159	1,369	1,038
Engel's Coefficient(%)	1995/96	Urban	45	49	44	53	46
		Rural	54	56	53	53	55

Table B.3.6 Data on Social Infrastructure in the Study Area

Item	Year	Governorate					Total Egypt
		Urban	Gharbia	Dakahlia	Kafr El Sheikh	Damietta	
Population with access to Piped Water (%)	1995	Urban	99.2	96.5	100	96.7	96.5
	1995	Rural	87.9	77.1	95.8	94.9	69.4
No. of Beds per 10,000 People	1994		19	17	12	31	20
House with Electricity (%)	1986		98.5	97.5	90.1	99.3	96.0
Paved Road Density (Km/Km2)	1997		0.23	0.43	0.29	0.38	0.32

Source for Table B-3-5, B-3-6 : Human Development Report 1996 (Institute of National Planning), Statistical Year Book 1997  
The First Result of the General Accounting for Population and Building in 1996  
Expenditure and Consumption Survey 1995-1996

B.4 the Priority Area

Table B.4.1 Administrative Structure of the Priority Area

Governorate	District	Local Unit	Mother Village	Area (fed)	No. of Sub Villages in the Priority Area	
Kafr El Sheikh	El Hamoul	El Hamoul Town	El Hamoul Town	16,490	29	
		El Zafaran	El Kafr El Sharki Zafaran	3,759 5,778	7 14	
			Sub-Total (a)	9,537	21	
			Sub-Total A	26,027 (42.0%)	50	
	Biyala	Kafr El Garayda	Kafr El Garayda	Kafr El Garayda	1,474	8
			Kafr El agamy	Kafr El agamy	387	1
		Abou Badawe	Sub-Total (b)	Sub-Total (b)	1,861	9
			Hazek	Hazek	7,391	6
		Biyala Town	Abu Badawe	Abu Badawe	1,857	3
			Abshan	El Hema	1,787	6
		Sub-Total (c)	11,035	15		
		Sub-Total B	28,324 (45.7%)	51		
Gharbia	El Mahalla El Kubra	Bash Beesh	Abu El Naga Bashbeesh	1,537 2,879	7 1	
			Insha	1,159	1	
		Sub-Total 2	5,575 (9.0%)	9		
		Sub-Total 1	54,351 (87.6%)	101		
Dakhalia	Talkha	Dreen	Kafr El Abhar Dreen	734 786	2 1	
			Tirah	569	1	
		Sub-Total 3	2,089 (3.4%)	4		
	Total	Total	62,015	114		

Note: The area is measured from 1:50000 map.

Table B.4.2. Estimated Population in the Priority Area

Governorate	District	Local Unit	Mother Village	1986		1996		Growth Rate	Average Family Size	No. of Households	Population by Age in 1996				Total	
				Total	Male	Female	Total				Male	Female	-5	6-15		16-60
Kafr El Sheikh	El Hamoul	El Hamoul Town	El Hamoul Town	33,989	20,836	20,970	41,806	2.09	5.0	8,361	6,814	8,987	23,747	2,258	41,806	
				9,743	6,246	5,955	12,201	2.28	4.8	2,555	1,988	2,621	7,053	539	12,201	
				13,339	8,274	8,495	16,769	2.31	6.0	2,789	2,733	3,619	9,678	739	16,769	
	Biyala	Kafr El Gareyda	Kafr El Gareyda	Kafr El Gareyda	57,071	35,355	35,420	70,776	2.18	5.2	13,705	11,535	15,227	40,478	3,526	70,776
					3,579	2,261	2,214	4,475	2.26	4.0	1,107	728	961	2,587	199	4,475
					825	493	540	1,033	2.27	4.9	212	167	220	599	47	1,033
					10,592	6,576	6,666	13,242	2.26	5.1	2,582	2,161	2,845	7,653	583	13,242
					6,040	3,769	3,922	7,691	2.45	5.2	1,479	1,379	1,772	4,078	462	7,691
					3,868	2,370	2,465	4,835	2.26	6.1	793	786	1,040	2,792	217	4,835
					47,702	29,762	29,881	59,143	2.17	5.0	11,828	9,640	12,715	34,183	2,605	59,143
Abshah	Abshah	Abshah	Abshah	11,597	7,450	7,159	14,609	2.34	6.4	2,267	2,382	3,142	8,435	650	14,609	
				348	215	220	435	2.26	6.3	69	71	96	249	19	435	
Gharbia	El Mahalla El Kubra	Bashbeesh	Abu El Naga	84,551	52,896	52,567	105,483	2.23	5.2	20,337	17,314	22,791	60,576	4,782	105,483	
				1,482	901	888	1,789	1.90	4.7	377	353	295	1,027	114	1,789	
Dakhalia	Talkha	Dreen	Kafr El Abher	12,854	7,960	7,557	15,517	1.90	4.7	3,274	2,989	2,428	8,922	1,178	15,517	
				2,208	1,291	1,374	2,665	1.90	4.7	562	515	529	1,424	197	2,665	
Dakhalia	Talkha	Dreen	Kafr El Abher	16,544	10,152	9,819	19,971	1.90	4.7	4,213	3,857	3,252	11,373	1,489	19,971	
				4,375	3,057	3,021	6,078	3.34	7.8	780	875	1,213	3,710	280	6,078	
Dakhalia	Talkha	Dreen	Kafr El Abher	4,804	2,861	2,825	5,686	1.70	4.7	1,210	819	1,136	3,470	261	5,686	
				4,323	3,013	2,976	5,989	3.31	6.2	966	863	1,195	3,655	275	5,989	
Dakhalia	Talkha	Dreen	Kafr El Abher	13,502	8,931	8,822	17,753	2.77	6.0	2,956	2,557	3,544	10,836	815	17,753	
				171,688	107,335	106,628	213,963	2.23	5.2	41,211	35,263	44,814	123,263	10,623	213,963	
Dakhalia	Talkha	Dreen	Kafr El Abher	(50.2)	(49.8)	(49.8)	(100.0)			(16.5)	(20.9)	(57.6)	(5.0)	(100.0)		

Source: Gharbia, Dakhalia, Kafr El Sheikh Governorate Information Center.

Note: The average family size and the growth rate of El Mahalla El Kubra district is used to estimate the number of household in the mother villages of the district and the population in 1986. The data are based on population census 1996.

APPENDIX C.

**METEOROLOGY AND HYDROLOGY**

## **APPENDIX C METEOROLOGY AND HYDROLOGY**

<b>C.1</b>	<b>Climate</b> .....	<b>C-1</b>
<b>C.2</b>	<b>Hydrology</b> .....	<b>C-4</b>
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## **APPENDIX C. METEOROLOGY AND HYDROLOGY**

### **C.1 Climate**

Egypt lies in a virtually rainless zone, and about 86% of the total area is classified as extremely arid and 14% as arid. There are three exceptions to the arid conditions; such as the Nile Valley including Nile Delta, the Mediterranean Coast where there are winter rainfalls and Oases.

The Delta, on which the Study Area lies, is predominantly characterized by a Mediterranean climate (especially in the coastal belt). The cool season is between October and April, while summer begins as early as in May, accompanied with high humidity. The mean monthly temperature in the Delta area ranges between 12°C and 27°C. The relative humidity in the Delta is surprisingly high for an area falling in arid zone, ranging from 52% to as high as 72%. The average annual rainfall is only 28 mm at Cairo and 190 mm at Alexandria. The average annual rainfall on the Mediterranean Coast varies from 150 mm to 200 mm but that falls in narrow strip only along the coastal area. The average rainfall over the country as an average is only 100 mm a year.

Recording meteorological data in and around the Study area is at such stations as Damietta, El Mansoura, and Tanta. The stations could represent the meteorological condition in the northern tip and the rest of the Study area respectively. The stations have been measuring such meteorological and agro-meteorological data as rainfall, humidity, temperature, sunshine hours, evaporation and wind velocity, those of which are referred to in calculating the crop water requirements. This Study refers to the monthly normals, mean values since the commencement of the recording, of Damietta station as the representative of northern tip and of Mansoura for the rest of the Study Area (See Tables C.1.1 – C.1.3).

Mean monthly maximum temperature ranges between 18°C and 31°C with the annual mean of 25°C at Damietta, and between 19°C and 34°C with the annual mean of 28°C at Mansoura. While, mean monthly minimum is between 9°C and 22°C with its annual mean of 16°C at Damietta, and between 7°C and 20°C with its annual mean of 14°C at Mansoura. Mean monthly temperature ranges between 13°C in January and 26°C in August with the annual mean of 20°C at Damietta, and between 12°C in January and 27°C in July with the annual mean of 20°C at Mansoura.

Mean monthly relative humidity falls in a relatively small range of between 71 % and 76 % with its annual mean of 74 % at Damietta, and between 56 % and 74 % with its annual mean of 67 % at Mansoura. The humidity recorded at Damietta is higher than that of Mansoura due to the influence of the Mediterranean Sea. The most humid month shows up in winter, while the driest one appears in early summer, as early as May.

Mean monthly wind speed ranges between 8 km/hour and 13 km/hour with the annual mean of 10 km/hour at Damietta, and between 7 km/hour and 12 km/hour with the annual mean of 10 km/hour at Mansoura. The winds blow mostly from such directions as north, north-west and north-east towards inland of the Delta. It is also well known that strong and hot wind, called Khamsin, blows during spring season from east-south direction.

Sunshine-hour is about 11 - 12 hours per day during summer and 6 - 7 hours per day even during winter for the two stations. The annual averages are 9.5 hours per day at Damietta, and 9.0 hours per day at Mansoura, thus assuring long sunshine hours preferable to crop growth. Mean daily evaporations, measured in pitch tube, for the stations reach to as much as 5 to 6 mm/day in summer due to the long sunshine hours and hot weather, and it becomes about 2 to 3 mm/day during winter season. Annual evaporation is worked out to be about 1,480mm at Damietta and 1,420mm at Mansoura.

Annual rainfalls at Damietta and Mansoura are 112 mm and 53 mm respectively. The rainfall is well known to fall in winter season with the maximum monthly rainfall of about 26 mm at Damietta and 11 mm at Mansoura. Summer season from June to September has negligible rainfall or almost zeros. Thus, the rainfall in the Study area cannot be expected enough for the crop growth and it is also known to fall erratically from place to place. Therefore this Study does not consider the effective rainfall in calculating crop water requirements.

Table C.1.1 Monthly Normal Meteorological Data at Damieta Station (Normal Period:1931-1995, Longitude:31.49, Latitude:31.26 Elevation:MASL1.89m)

Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Remarks
Maximum Air Temperature, C	18.2	18.5	20.3	23.1	26.4	29.2	30.6	30.9	29.3	27.3	23.6	19.7	24.8	
Minimum Air Temperature, C	8.6	9.0	11.0	13.6	16.8	20.0	21.4	21.6	20.2	18.4	15.1	10.7	15.6	
Mean Air Temperature, C	12.9	13.4	15.3	18.1	21.0	24.5	25.8	26.0	24.5	22.4	18.4	14.6	19.8	
Relative Humidity, %	76	75	73	71	71	71	72	76	75	75	76	76	73.9	
Wind Speed, Knot	5.5	6.0	6.8	5.4	6.1	5.7	5.4	4.7	4.3	4.6	4.8	5.1	5.4	MASL:16.80 m
Wind Speed, Km/hour	10.2	11.1	12.6	10.0	11.3	10.6	10.0	8.7	8.0	8.5	8.9	9.4	9.9	
Sunshine Hour Duration, hour/day	6.7	7.7	8.3	9.8	11.0	12.3	12.2	11.7	10.5	9.4	7.7	6.4	9.5	
Evaporation, mm/day	2.8	3.2	3.9	4.4	5.0	5.3	4.9	4.6	4.3	4.1	3.4	2.8	1482.7	until 1987
Rainfall, mm	26.0	19.7	13.0	4.6	1.5	0.2	trace	trace	0.4	7.1	15.7	24.0	112.2	trace<0.1mm

Note: Evaporation measured in pitch tube. Source: Meteorological Authority, May 1998

Table C.1.2 Monthly Normal Meteorological Data at El Mansoura Station (Normal Period: 1961-1995, Longitude:31.27, Latitude:31.00 Elevation:MASL4.25m)

Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Remarks
Maximum Air Temperature, C	19.3	20.4	22.9	27.2	30.9	33.8	34.4	34.2	32.5	30.0	25.4	20.8	27.7	
Minimum Air Temperature, C	6.8	6.9	9.0	11.7	15.2	18.2	20.3	20.3	18.7	16.6	13.2	8.7	13.8	
Mean Air Temperature, C	12.0	12.6	14.7	18.6	22.2	25.7	27.3	26.3	24.6	21.5	17.9	13.5	19.8	
Relative Humidity, %	73	71	67	61	56	58	67	70	68	67	71	74	66.9	
Wind Speed, Knot	5.4	5.8	6.2	6.0	5.5	5.0	4.0	3.5	3.7	4.0	4.4	4.8	4.9	MASL:10.00 m
Wind Speed, Km/hour	10.0	10.7	11.5	11.1	10.2	9.3	7.4	6.5	6.9	7.4	8.1	8.9	9.0	
Sunshine Hour Duration, hour/day	6.4	7.4	8.1	9.2	10.1	11.6	11.4	10.9	10.0	8.9	7.4	6.7	9.0	
Evaporation, mm/day	2.2	2.7	3.4	4.4	5.6	6.0	4.9	4.3	4.2	3.9	2.8	2.2	1419.1	until 1987
Rainfall, mm	10.9	9.2	7.4	2.8	3.0	0.4	trace	trace	0.1	3.4	6.3	9.2	52.7	trace<0.1mm

Note: Evaporation measured in pitch tube. Source: Meteorological Authority, May 1998

Table C.1.3 Monthly Normal Meteorological Data at Tanta Station (Normal period:1968-1995, Longitude:30.56, Latitude:30.49 Elevation:MASL 5.40m)

Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Remarks
Maximum Air Temperature, C	18.5	19.7	22.2	26.2	30.7	33.4	32.9	32.7	31.8	29.4	24.0	19.8	26.8	
Minimum Air Temperature, C	6.4	6.3	8.0	11.0	13.7	17.8	19.6	19.6	17.8	15.4	11.6	7.7	12.9	
Mean Air Temperature, C	11.9	12.5	14.6	18.3	22.0	25.1	26.1	25.7	24.2	21.7	17.3	13.3	19.4	
Relative Humidity, %	73	69	68	60	57	58	67	71	70	68	71	72	67.0	
Wind Speed, Knot	4.9	5.5	5.7	5.8	5.8	5.4	4.4	3.7	3.9	4.1	4.2	4.3	4.8	MASL:14.76 m
Wind Speed, Km/hour	9.1	10.2	10.6	10.7	10.7	10.0	8.1	6.9	7.2	7.6	7.8	8.0	8.9	
Sunshine Hour Duration, hour/day	6.6	7.0	8.2	9.3	10.3	11.9	11.6	11.0	10.0	9.0	7.6	6.4	9.1	
Evaporation, mm/day	3.4	4.2	5.3	7.2	9.2	9.8	7.6	6.6	6.4	6.0	4.4	3.4	2238.1	until 1987
Rainfall, mm	11.4	10.2	9.3	3.4	0.6	0.1	trace	trace	0.2	1.7	7.3	12.0	56.2	trace<0.1mm

Source: Meteorological Authority, May 1998

## **C.2 Hydrology**

The renewable water resources available to Egypt are derived from the Nile River and its watershed. The Nile River, with a main channel of 6,700 km long, is one of the longest rivers in the world and drains an area of 2.9 million sq.km. The river has two main branches, Blue and White, with the beginning in Ethiopia and Tanzania and drains parts of nine countries.

Over the past years, number of agreements have been reached between the countries involved in the watershed with regard to sharing the water resources of the Nile basin. These agreements culminated in arrangement whereby Egypt would be allocated a net of 55.5 billion cu.m of water annually at the High Aswan Dam based on an average annual runoff of 84 billion cu.m from the watershed. The Aswan High Dam was commissioned in 1968.

In addition, Egypt and Sudan have agreed to share the cost and the additional runoff generated by reducing evaporation losses in the swamps in southern Sudan by the construction of the Jonglei canal and related civil works. This improvement could increase Egypt's net share of the Nile River water to approximately 58 billion cu.m by the turn of the century. However, the construction of Jonglei stopped in 1984 though the Phase I of the project was supposed to be completed by 1985.

Other Upper Nile water conservation projects such as Bahar El Ghazal, Sobat River and Machar Marshes, could also be considered. With these completed, Egypt's net share of the Nile River water could increase as much as 65 billion cu.m. However, it must be noted that those Upper Nile projects including Jonglei canal could not be counted for a certain time.

The Nile River actually satisfies Egypt of supplying more than 95 % of its total demand. The rest is met from rainfall at the northern coast, from deep groundwater, and from floods in Sinai and the Nile Valley. Rainfall in the Mediterranean coastal strip gives as much as 200 mm/year at its western side and decreases eastward. The rainfall dramatically drops toward inland to some 20 mm/year near Cairo. Rainfall is utilized only in the northern part of the Delta to supplement irrigation diversions in the winter closure period, but it cannot be considered as a dependable source for present farming.

Groundwater can be found in the Nile aquifer, in the western desert and in Sinai. Groundwater in the Nile aquifer cannot be considered as a separate source of water as it is renewed by seepage from the Nile, irrigation canals, drains and irrigated lands. The groundwater in the western desert and in Sinai exist in a very deep aquifer, mostly composed of non-renewable water.

Re-use of agricultural drainage and wastewater also consist of a part of the water resource. Re-use of drainage water in Egypt is very common and the total amount that can be utilized is estimated to be about 7.5 billion cu.m annually by the year 2000.

## **C.3 Present and Future Water Demand Forecast**

In terms of water demand in Egypt, the agricultural sector represents the largest component. The gross water demand of irrigation is of the order of 54.5 billion cu.m/year, including all application, distribution and conveyance losses. With the amount of the irrigation water, 7.4 million fed (3.1

million ha) of arable land is currently irrigated, while the area cropped annually is 14.7 million fed (6.1 million ha), giving a great cropping intensity of 199%. Besides the irrigation water, others are required such as navigation, hydropower generation, industrial and municipal. The first two sectors, navigation and hydropower, require no additional release from Aswan High Dam since these can be substituted by the others.

In turn, the means to cope with the demands are, besides the Aswan High Dam allocation of 55.5 billion cu.m annually, re-use of drainage water, groundwater from Nile aquifer, improvement of irrigation efficiencies, limitation of high-consumption crops (specially rice), re-use of wastewater and non-renewable groundwater. Saad and Farid gave a summary of present and future overall water balance in Egypt (16th International Congress on Irrigation and Drainage, 1996, Saad and Farid). The summary gives two means especially related to this Study in order to meet with the future demand; namely, irrigation improvement projects and limitation of high-consumption crops such as rice (See Table C.3.1).

Half a billion cu.m is given by Saad and Farid as the new resource by the irrigation improvement project. This amount was estimated to be born with 700,000 fed irrigation improvement (saving water in depth is 17 cm which is approximately 10 % of the present irrigation amount). With the assumption, 1.7 billion cu.m shortage could be expected in year of 2027. However, according to the overall plan of the latest Irrigation Improvement Projects, about 3,480,000 fed (1,461,600 ha) old land is to be improved (annual average is 145,000 fed) until year of 2017, with which about 2.5 billion cu.m water (about 4.5% of the 55.5 billion cu.m) could be saved. Therefore, following the IIP overall plan, the deficit of 1.7 billion cu.m in 2017, originally estimated by Saad and Farid, would be overcome (See Table C.3.2).

Limitation of high-consumption crops will apply to sugar cane and rice, with the latter as the majority. The 3.0 billion cu.m, to be saved by the crop limitation, is derived from reducing the rice cultivation area from present 1.6 million fed to 0.7 million fed (about 44%). The equivalent water saving, shown in water depth, is calculated at 750 mm. Taking into consideration the farmers current tendency, the reduction of the rice cultivation would be a difficult task but could be a key to save irrigation water.

**Table C.3.1 Present and Future Overall Water Balance In Egypt by Saad & Farid**

	1,996	2,000	2,027	Remarks
<b>Demand, BCUM/year</b>				
Agriculture	54.5	63.5	69.1	To increase with reclamation
Industrial	5.9	7.2	9.0	
Municipal	2.7	2.9	3.9	
<b>Total Demand</b>	<b>63.1</b>	<b>73.6</b>	<b>82.0</b>	
<b>Resources, BCUM/year</b>				
Nile River	55.5	55.5	55.5	
Re-use of Drainage	3.7	7.5	7.5	
Groundwater from Nile Aquifer	4.1	7.5	7.5	
Irrigation Improvement Projects		0.5	0.5	700,000fed impr. (17cm in depth)
Limitation of High-consumption Crops		3.0	3.0	Rice: 1.6 Mfed to 0.7 Mfed (79cm in depth)
Re-use of Wastewater	0.6	1.7	2.4	
Non-renewable Groundwater			3.9	
<b>Total Resources</b>	<b>63.9</b>	<b>75.7</b>	<b>80.3</b>	
<b>Balance, BCUM/year</b>	<b>0.8</b>	<b>2.1</b>	<b>-1.7</b>	

Source: 16th International Congress on Irrigation and Drainage, 1996

**Table C.3.2 Modified Present and Overall Water Balance In Egypt**

	1,996	2,017	2,027	Remarks
<b>Demand, BCUM/year</b>				
Agriculture	54.5	67.0	69.1	To increase with reclamation
Industrial	5.9	8.3	9.0	
Municipal	2.7	3.5	3.9	
<b>Total Demand</b>	<b>63.1</b>	<b>78.8</b>	<b>82.0</b>	
<b>Resources, BCUM/year</b>				
Nile River	55.5	55.5	55.5	
Re-use of Drainage	3.7	7.5	7.5	
Groundwater from Nile Aquifer	4.1	7.5	7.5	
Irrigation Improvement Projects		2.5	2.5	Equivalent to 3,480,000fed impr. (17cm)
Limitation of High-consumption Crops		3.0	3.0	Rice: 1.6 Mfed to 0.7 Mfed (79cm in depth)
Re-use of Wastewater	0.6	1.14	2.4	
Non-renewable Groundwater		2.4	3.9	
<b>Total Resources</b>	<b>63.9</b>	<b>79.54</b>	<b>82.3</b>	
<b>Balance, BCUM/year</b>	<b>0.8</b>	<b>0.7</b>	<b>0.3</b>	

Note: Other figures than IIP in 2017 were interpolated by original figures in years of 2000 and 2027.

**APPENDIX D.**

**SOIL AND LAND USE**

## **Appendix D Soil and Land Use**

### **D.1 Soils**

### **D.2 Land Use**

**Table D.1.1 District-wise Land Area by Land Class (M/P Area)**

**Table D.1.2 Result of Study on Land Improvement (1980/81-1996/97)**

**Table D.1.3 Land Use by District (1996/97)**

**Table D.1.4 Implemented Area on Land Improvement (1980-1996/97)**

**Table D.2.1 Land Use in Priority Area**

**Figure D.1.1 Land Formation Map of Soil Sector**

**Figure D.1.2. Soil Salinity Distribution in the Central Nile Delta**



## **APPENDIX D. SOIL AND LAND USE**

### **D.1 Soils**

The Land Formation Maps to cover Study Area by district are collected from Soil, Water and Environment Research Institute, Ministry of Agriculture(MALR). Because the maps to cover some part of Biyala , Bitqas, El Mahalla El Kubra and El Burulus are missing, the area by soil sector are estimated from the soil distribution in the adjacent area. Most of the soils are of recent alluvial origin, where the alluvium varies from light to heavy clay, with heavier clay occurring towards the north. However in the northern area beyond the heavy clay soil area, there are the an extensive belt of sand dunes and fine sandy soils most probably derived from the river, where there are a large area which have suitability to introduce vegetables and various upland crops. The district -wise land area by land class is collected from Governorate offices of MALR. The above Land Formation Map as well as the data on the area by land class area based on Soil Survey in Egypt, 1957-1973.(refer to Figure D.1.1)

The soil salinity distribution in the central Nile delta is prepared in Land Drainage in Egypt, Drainage Research Institute. On the other hand the result of study on land improvement is prepared by Egyptian Authority of Land Improvement Project(EALIP), based on the soil survey which was conducted recently ( refer to Figure D.1.2, Table D.1.1 and D.1.2 )

### **D.2 Land Use**

The Study Area is divided into three areas, namely upstream, midstream and downstream areas according to irrigation boundary at water district service areas. The district-wise statistical data are collected to estimate the land use in each area in Study Area, where the total are measured with planimeter by Study Team. ( refer to Figure D.1.3, )

The Priority Area is also divided into three areas, namely upstream, midstream and downstream areas according to the location of irrigation system. The gross area is measured with planimeter, and the cultivated area estimated based on the data in agricultural cooperatives(refer to Table D.2.1 )

Table D. 1.1 District-wise Land Area by Land Class ( M/P Area )

District	Total	Cultivated Area						( Unit: feddan. % )		
		Subtotal	1st Class	2nd Class	3rd Class	4th Class	Land of 5th and 6th Land			
							5th Class	6th Class	6th Class	
						Cultivable	Fallows	& Others		
<b>A. Upstream Area</b>										
<b>1. Gharbia Governorate</b>										
(1) Zifta	50,027	44,861	6,019	31,978	6,105	759	106	13	5,047	
(2) Samanoud	34,432	30,924	1,937	15,282	12,610	1,095	122	20	3,366	
(3) El Mahalla Kubra	105,749	94,964	0	52,774	37,874	4,316	136	32	10,617	
<u>Subtotal</u>	<u>190,208</u>	<u>170,749</u>	<u>7,956</u>	<u>100,034</u>	<u>56,589</u>	<u>6,170</u>	<u>364</u>	<u>65</u>	<u>19,030</u>	
% of Total Area	100.0	89.8	4.2	52.6	29.8	3.2	0.2	0.0	10.0	
<b>B. Midstream Area</b>										
<b>1. Dakahlia Governorate</b>										
(1) Sherbeen	64,150	55,103	1,251	13,058	28,952	11,842			9,047	
(2) Talkha	72,379	42,943	1,214	19,723	19,487	2,519			29,436	
<b>2. Kafr El Sheikh Governorate</b>										
(1) Biyala	84,150	55,989	0	6,447	29,375	20,167	569	0	27,592	
<u>Subtotal</u>	<u>220,679</u>	<u>154,035</u>	<u>2,465</u>	<u>39,228</u>	<u>77,814</u>	<u>34,528</u>	<u>569</u>	<u>0</u>	<u>66,075</u>	
% of Total Area	100.0	69.8	1.1	17.8	35.3	15.6	0.3	0.0	29.9	
<b>C. Downstream Area</b>										
<b>1. Dakahlia Governorate</b>										
(1) Bilqas	180,405	108,576	0	14,375	84,492	9,709	21,800	27,200	22,829	
<b>2. Kafr El Sheikh Governorate</b>										
(1) El Hamoul	143,185	26,927	9,350	8,928	8,649				116,258	
(2) Burullus	45,782	21,229	0	1,885	8,460	10,884	15,439		9,114	
<b>3. Damietta Governorate</b>										
(1) Kafr Saad	78,731	60,643	0	7,346	30,950	22,347			18,088	
(2) Damietta	24,048	15,836	0	3,397	9,329	3,110			8,212	
<u>Subtotal</u>	<u>472,151</u>	<u>233,211</u>	<u>9,350</u>	<u>35,931</u>	<u>141,880</u>	<u>46,050</u>	<u>37,239</u>	<u>27,200</u>	<u>174,501</u>	
% of Total Area	100.0	49.4	2.0	7.6	30.0	9.8	7.9	5.8	37.0	
<u>Total</u>	<u>1,270,077</u>	<u>867,103</u>	<u>30,197</u>	<u>311,128</u>	<u>401,422</u>	<u>124,335</u>	<u>39,105</u>	<u>27,330</u>	<u>336,539</u>	
% of Total Area	100.0	68.3	2.4	24.5	31.6	9.8	3.1	2.2	26.5	
		(100.0%)	(3.5%)	(31.4%)	(49.6%)	(15.5%)				

Source : MALR

Table D. 1. 2 Result of Study on Land Improvement ( 1980/81-1996/97 )

Area	Study Area (fed)	Required Area of Gypsum (fed)	Required Area of Sbsolling (fed)	Area by Soil Salinity Class					Water Table			
				0-0.2%	0.2-0.5%	0.5-1.0%	>1.0%	Over 120cm (fed)	70-120 cm (fed)	Less than 70cm (fed)		
				(fed)	(fed)	(fed)	(fed)	(fed)	(fed)	(fed)		
<b>A. Upstream</b>												
1. Gharbia												
(1) Zifta	56,508	11,835	51,582	46,054	6,668	735	3,051	13,166	42,551	791		
(2) Samanoud	24,134	5,951	20,827	19,355	4,465	290	24	1,007	23,127	0		
(3) El Mahalla Kubra	70,658	44,357	68,603	42,835	25,305	2,261	257	13,545	57,113	0		
Subtotal	151,300	62,143	141,012	108,244	36,438	3,286	3,332	27,718	122,791	791		
% of Study Area	100.0	41.1	93.2	71.5	24.1	2.2	2.2	18.3	81.2	0.5		
<b>B. Midstream</b>												
1. Dakahlia												
(1) Sherbin	99,943	40,416	99,437	64,763	31,182	2,198	800	3,598	96,345	0		
(2) Talkha	53,557	32,248	52,777	42,417	10,711	351	0	25,707	27,850	0		
2. Kafr El Sheikh												
(1) Biyala	85,891	67,607	85,273	40,283	38,186	6,184	1,288	24,307	61,240	344		
Subtotal	239,391	140,271	237,487	147,463	80,029	9,733	2,088	53,612	185,435	344		
% of Study Area	100.0	58.6	99.2	61.6	33.4	4.1	0.9	22.4	77.5	0.1		
<b>C. Downstream</b>												
1. Dakahlia												
(1) Bilqas	128,648	31,280	127,747	51,845	65,739	8,619	2,445	9,135	119,513	0		
2. Kafr El Sheikh												
(1) El Hamoul	32,892	23,383	30,581	10,065	17,071	4,835	921	0	32,892	0		
(1) El Burullus	11,778	1,236	0	10,412	1,272	94	0	0	11,778	0		
3. Damietta												
(1) Kafr Saad	118,801	66,694	103,325	42,768	50,966	23,166	1,901	7,009	104,426	7,366		
(2) Damietta	18,358	8,822	16,614	10,097	7,380	881	0	0	14,540	3,818		
Subtotal	310,477	131,115	278,267	125,187	142,428	37,595	5,267	16,144	283,149	11,184		
% of Study Area	100.0	42.2	89.6	40.3	45.9	12.1	1.7	5.2	91.2	3.6		
Total	701,168	333,529	656,766	380,894	258,895	50,614	10,687	97,474	591,375	12,319		
% of Study Area	100.0	47.6	93.7	54.3	36.9	7.2	1.5	13.9	84.3	1.8		

Source : MAIR, EALIP

Table D.1.3 Land Use by District (1996/97)

Area	Total a=b+f+e (fed)	Cultivable Area (Including Area under Reclamation) b=c+f	Actually Cultivated		Under Recla- mation/ Fallow			Housing and Others (fed)	% of Actually Cultivated Area h=c/ax100 (%)	% of Cultivable Area i=c/ax100 (%)
			Subtotal c=d+e (fed)	Annual Crops d (fed)	Orchard e (fed)	Fallow f (fed)	g			
<b>A. Upstream</b>										
1. Gharbia										
(1) Zifta	50,027	43,626	43,216	37,619	5,597	410	6,401	86	87	
(2) Samanoud	34,432	29,422	29,278	26,088	3,240	144	5,010	85	85	
(3) El Mahalla Kubra	105,749	91,523	91,523	89,783	1,740	0	14,226	87	87	
Subtotal	190,208	164,571	164,017	153,440	10,577	554	25,637	86	87	
<b>B. Midstream</b>										
1. Dakahlia										
(1) Sherbin	64,150	59,806	59,806	59,345	461	0	4,344	93	93	
(2) Talkha	72,379	62,176	62,176	61,421	755	0	10,203	86	86	
2. Kafr El Sheikh										
(1) Biyala	84,150	77,023	73,785	73,492	293	3,238	7,127	88	92	
Subtotal	220,679	199,005	195,767	194,258	1,509		21,674	89	90	
<b>C. Downstream</b>										
1. Dakahlia										
(1) Bilqas	180,405	178,530	107,363	106,655	708	71,167	1,875	60	99	
2. Kafr El Sheikh										
(1) El Hamoul	143,185	133,056	91,129	90,928	201	41,927	10,129	64	93	
(2) El Burullus	48,916	45,736	29,061	26,106	2,955	16,675	3,180	59	93	
3. Damietta										
(1) Kafr Saad	78,731	76,054	60,643	55,678	4965	15,411	2,677	77	97	
(2) Damietta	24,048	23,400	15,836	14,985	851	7,564	648	66	97	
Subtotal	475,285	456,776	304,032	294,352	9,680	152,744	18,509	64	96	
Total	886,172	820,352	663,816	642,050	21,766	234,321	65,820	75	93	
(%)			100.0	96.7	3.3					

Note: Any district of which a small area cover the Study Area is excluded in the above table.

Source : MALR (Total area is measured by planimeter by Study Team)

Table D.1.4 Implemented Area on Land Improvement (1980/81-1996/97)

Area	1992-93		1993-94		1994-95		1995-96		1996-97		Total	
	Sub Soiling	Gypsum	Sub Soiling	Gypsum	Sub Soiling	Gypsum	Sub Soiling	Gypsum	Sub Soiling	Gypsum	Sub Soiling	Gypsum
	(fed)	(fed)	(fed)	(fed)	(fed)	(fed)	(fed)	(fed)	(fed)	(fed)	(fed)	(fed)
<b>A. Unisircan</b>												
1. Garbia	0	0	0	4,000	16,221	2,600	6,017	1,160	8,917	7,760	31,155	
(1) Zifta	0	0	0	0	0	588	0	370	0	958	0	
(2) Samaanoud	1,300	8,000	0	6,000	600	1,252	0	514	3,947	3,215	18,547	
(3) El Mahalla Kubra	1,300	8,000	0	6,000	16,821	4,440	6,017	2,044	12,864	11,933	49,702	
Subtotal												
<b>B. Midsircan</b>												
1. Dakahlia	2,286	0	0	2,399	0	4,666	16,634	3,148	0	12,499	16,634	
(1) Sherbin	655	0	0	2,746	4,200	1,992	6,601	3,114	5,917	8,507	16,718	
(2) Taikha												
2. Kafr El Sheikh	510	0	0	0	0	0	0	2,826	11,596	2,826	11,596	
(1) Biyala	3,451	0	0	5,145	4,200	6,658	23,295	9,988	17,513	23,832	44,948	
Subtotal												
<b>C. Dornahicran</b>												
1. Dakahlia	3,234	0	13,323	3,006	10,114	10,953	10,826	0	11,485	14,890	48,982	28,849
(1) Bilcas												
2. Kafr El Sheikh	813	0	0	3,217	5,406	104	0	2,294	2,162	6,428	7,568	
(1) El Hasoni	0	0	0	0	0	0	0	995	0	995	0	
(1) El Burullus												
3. Damietta	3,017	0	0	0	0	6,199	0	9,541	0	1,489	0	
(1) Kafr Saad	0	0	0	0	0	14	0	0	0	1,489	0	
(2) Damietta	7,064	0	2,665	3,005	16,765	17,143	0	24,315	17,052	59,383	36,417	
Subtotal	11,815	8,000	2,665	9,006	26,059	37,380	29,252	35,447	47,429	95,148	131,067	
Total												

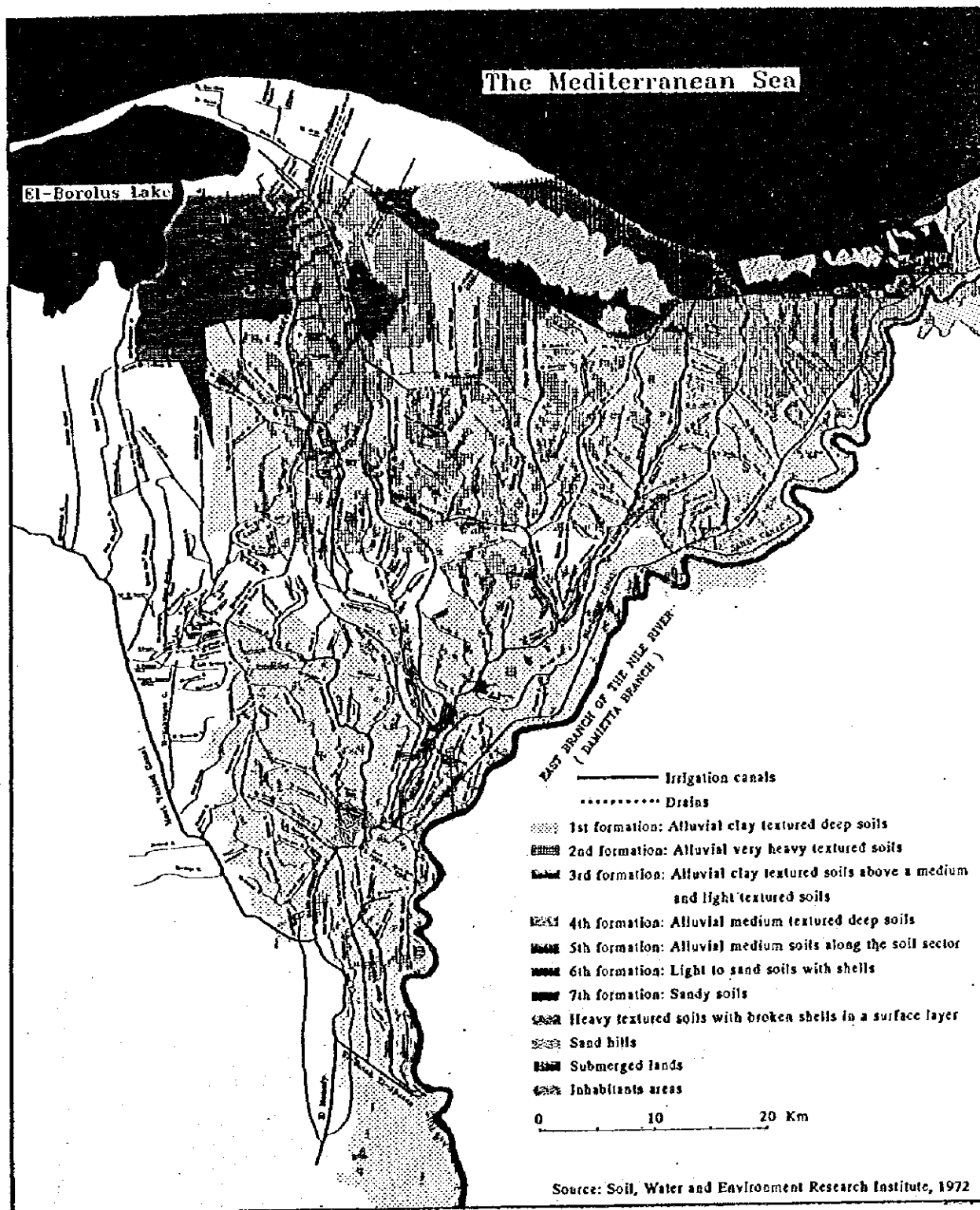
Source : EALIP

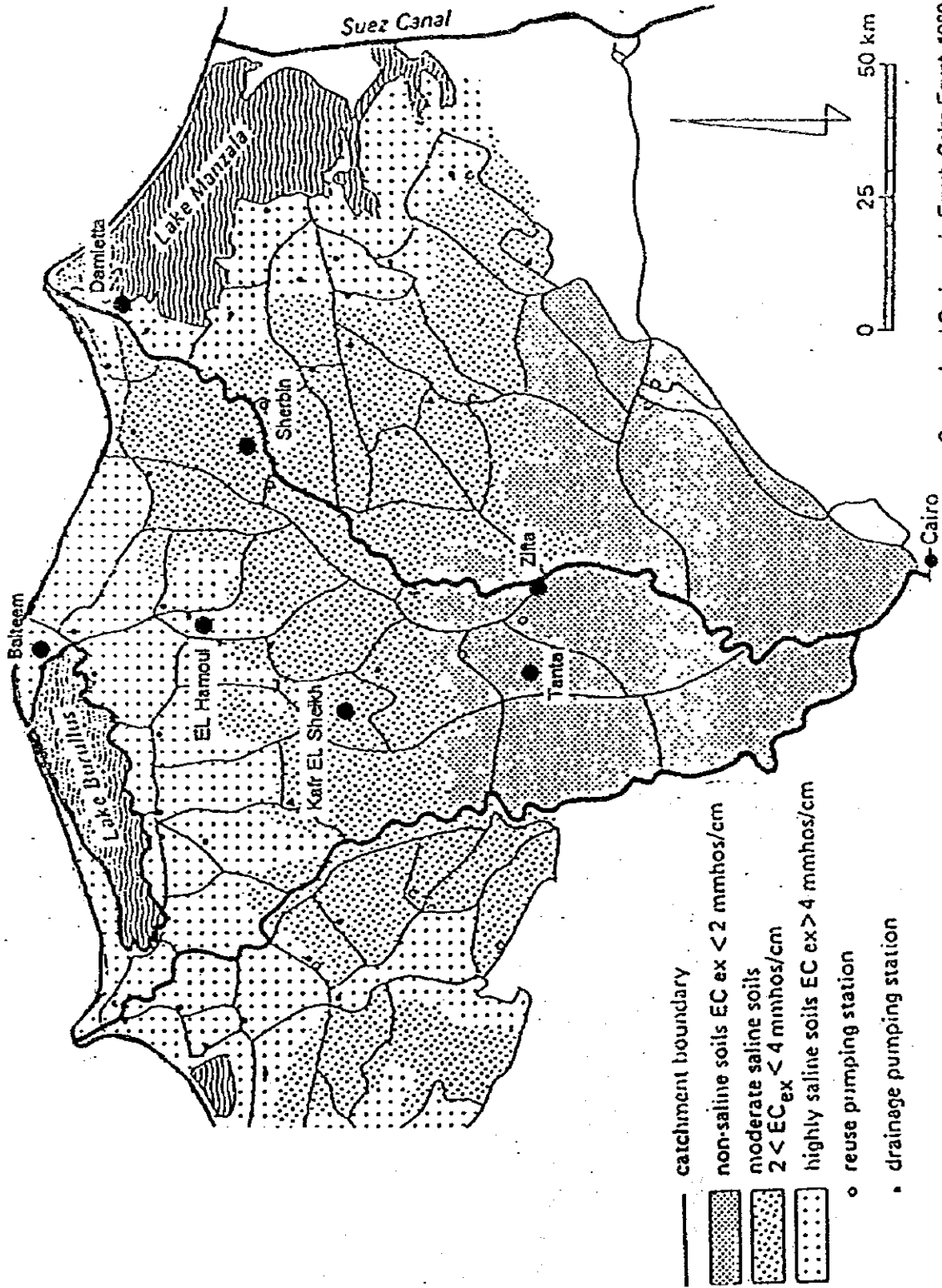
Table D.2.1 Land Use in the Priority Area

District/Village	( Unit: feddan )			%
	Total Area	Cultivated Area	Non-Cultivated	
<b>Upstream</b>				
<b>(1) Bilqas</b>				
Tirah	569	536	33	94.2
Dreen	786	761	25	96.8
Kafr El Abhar	734	692	42	94.3
<b>(2) El Mahallah El Kubra</b>				
Insha	1,159	1,119	40	96.5
Bashbeesh	2,879	2,767	112	96.1
Abou El Nagah	1,537	1,459	78	94.9
Koum El Hegna	186	176	10	94.6
<b>(3) Biyala</b>				
Abshan	3,187	2,940	247	92.2
Subtotal	11,037	10,450	587	94.7
<b>Midstream</b>				
<b>(1) Biyala</b>				
Biyala City	12,055	10,388	1,667	86.2
El Hema	1,787	1,662	125	93
Abou Badawe	1,857	1,714	143	92.3
Kafr El Agamy	387	375	12	96.9
Hazek	7,391	6,922	469	93.7
Subtotal	23,477	21,061	2,416	89.7
<b>Downstream</b>				
<b>(1) El Hamoul</b>				
Zafaran	5,778	5,554	224	96.1
El kafr El Shariki	3,759	3,557	202	94.6
El Hamoul City	16,490	14,901	1,589	90.4
<b>(2) Biyala</b>				
Kafr El Garaida	1,474	1,407	67	95.5
Subtotal	27,501	25,419	2,082	92.4
Total	62,015	56,930	5,085	91.8
Total(ha)	26,046	23,911	2,136	

Source: Study Team

Figure D.1.1 Land Formation Map of Soil Sector





Source: Land Drainage in Egypt, Cairo Egypt, 1989

Figure D.1.2 Soil Salinity Distribution in the Central Nile Delta



**APPENDIX E.**

**AGRICULTURE**



## **Appendix E Agriculture**

### **E.1 Land use and Cropping Pattern**

### **E.2 Crop Production and Farm Inputs**

### **E.3 Crop Production**

### **E.4 Animal Husbandry**

### **E.5 Agricultural Supporting Services**

**Table E.1.1 Distribution of Agricultural Land Owner by Category of Size (1996/97)**

**Table E.1.2 Cultivated Area and Number of Land Holdings (1989/90)**

**Table E.1.3 Cropping Intensity (1995/96)**

**Table E.1.4 Area by Crop (1996), Winter**

**Table E.1.5 Area by Crop (1996), Summer**

**Table E.1.6 Area by Crop (1996), Main Nile**

**Table E.1.7 Area by Fruit Crops (1996)**

**Table E.1.8 Permitted and Actual Area of Rice Cultivation**

**Table E.1.9 Present Cropping Pattern (M/P Area)**

**Table E.1.10 Proposed Cropping Area (200 %)**

**Table E.1.11 Proposed Cropping Area (170 %)**

**Table E.1.12 Proposed Cropping Pattern (F/S Area)**

**Table E.1.13 Proposed Cropping Pattern (F/S Area, Case1)**

**Table E.1.14 Proposed Cropping Pattern (F/S Area, Case2)**

**Table E.2.1 Crop Unit Yield by Area (M/P Area 1994/95-1996/97)**

**Table E.2.2 Crop Unit Yield with Project per Feddan (M/P Area)**

**Table E.2.3 Crop Unit Yield without Project (F/S Area)**

**Table E.2.4 Crop Unit Yield with Project per Feddan (F/S Area)**

**Table E.2.5 Proposed Unit Yield by Crop (Upstream Area, M/P Area)**

**Table E.2.6 Proposed Unit Yield by Crop (Midstream Area, M/P Area)**

**Table E.2.7 Proposed Unit Yield by Crop (Downstream Area, M/P Area)**

**Table E.2.8 Proposed Unit Yield by Crop (Upstream and Midstream Area, F/S Area)**

**Table E.2.9 Proposed Unit Yield by Crop (Downstream Area, F/S Area)**

**Table E.2.10 Percentage of Increase in Crop Production with Land improvement**

**Table E.2.11 Percentage of Water Saving by Precise Land Leveling**

**Table E.2.12 Crop Yield of Crop Sampling Survey, Biyala District**

Table E.2.13 Crop Yield of Crop Sampling Survey, Hamoul District

Table E.2.14 Comparative Crop Yields by Area in Study Area

Table E.2.15 Farm Input by Crop per Feddan

Table E.3.1 Crop Production without Project, M/P Area

Table E.3.2 Crop Production with Project (200 %, M/P Area)

Table E.3.3 Crop Production with Project (170 %, M/P Area)

Table E.3.4 Crop Production without Project (F/S Area)

Table E.3.5 Crop Production with Project (F/S Area, Case2)

Table E.4.1 Number of Livestock and Poultry by District

Table E.4.2 Number of Cattle and Buffaloes by District

Table E.4.3 Inventory of Livestock and Poultry per Farmhousehold (N=130 Farm Households)

Table E.5.1 Comparison of Land Leveling Work by Laser beam between Egypt and Japan

Table E.6.1 Status of Principal Bank for Development and Agricultural Credit

Table E.6.2 No. and Amount of Loan by Type and Year in the Priority Area

Table E.6.3 Wholesale Price and Supply at Tanta Wholesale Market (Vegetables and Fruits)

Figure E.1.1 Reason to Grow Rice and Intention to Grow Other Crops than Rice

Figure E.1.2 Present Cropping Pattern (M/P Area)

Figure E.1.3 Proposed Cropping Pattern (M/P Area, 200 %)

Figure E.1.4 Proposed Cropping Pattern (M/P Area, 170 %)

Figure E.1.5 Present Cropping Pattern (F/S Area)

Figure E.1.6 Case Study on Proposed Cropping Pattern

Figure E.1.7 Proposed Cropping Pattern (F/S Area)

Figure E.2.1 General Relationship of Yield per Unit of Area and  
Water as a Function of Irrigation Efficiency

Figure E.5.1 Needs on Various Land and On-Farm Irrigation (N=130, Farm Economy Survey)

Figure E.5.2 Schema of Approach on Integrated Agricultural Development

Figure E.5.3 Organization of Regional Research Center

Figure E.5.4 Farmers' Organization and Agricultural Supporting Organization

Figure E.5.5 Organization Structure, Ministry of Agriculture and Land Reclamation (October 1997)

Figure E.5.6 Organization of Agricultural Office in Gharbia

## **APPENDIX E. AGRICULTURE**

### **E.1 Land use and Cropping Pattern**

#### **1. Land use and Cropping Pattern in Master plan Area**

The farm size is small in Study area. 53.6 % of the land owners have the land of less than one (1) feddan with overall average size of 1.7 feddan per land owner . On the other hand, the average of farm management size is 2.9 feddan. The farmers cultivate the land which owned not only by him, but also brothers and relatives.(refer to E.1.1 and E.1.2)

The Study Area is divided into the three areas namely the upstream, midstream and downstream areas as shown in the Appendix D. The cropping intensities are estimated at 200%, 185% and 148% respectively in the upstream, midstream and downstream based on the district-wise land use in 1995/96. It is observed that the cropping intensities is generally as high as 200% in the upstream area. Then cropping intensities in the district-wise data are revised applying the cropping intensities in Gharbia Governorate in the same year as show in the above. The cropping pattern is prepared for the said cropping intensities. (refer to Table E.1.3 to E1.9).

The excess of rice area is estimated based on the actual cropped area and the permitted area by MPWWR from 1991 to 1997 in each Governorate area. The fourth Five Year Plan for Economic and Social Development( 1997/98-2001/02 ) indicates the plan to reduce rice area by 36 % from 1.4 million feddan in 1996/97 to 0.9 million feddan in 2001/2002. Then it is proposed to reduce the existing rice area by 36 %. The rice reduction area is distributed to vegetable areas as well as the cropping of maize and other summer crops in the proposed cropping pattern (refer to Table E.1.8, E.1.10 to E.1.11)

#### **2. Land use and Cropping Pattern in Priority Area**

The Priority Area is also divided in to three areas, namely upstream, midstream and downstream area according to the location of canals. The annual cropping intensities is estimated at 200 % in each area based on the data on area by crop in the concerned agricultural cooperatives from 1995/96 to 1997/98 as well as the result of Farm Economy Survey. The cropping pattern is estimated also the data on area by crop from the cropped area. The rice reduction rate is 36 % in Study Area. However rice area is reduced by 57 % in the proposed cropping pattern, following the proposed cropping pattern. Although the rice is reduced by 36 % in Study Area, the upstream

and the midstream areas have the reduction at 57 % without any reduction in the downstream area. (refer to E.1.12 to E.1.14)

## **E.2 Crop Production and Farm Inputs**

### **1. Crop Unit Yield , Farm Inputs and Crop Production in Master Plan Area**

Based on the collected data on the average crop unit yield from 1994/95 to 1996/97 by district, the unit yields of respective crops are estimated in the upstream, midstream and downstream areas. The average amount of farm input in Study Area is estimated for fertilizers , chemicals ,labor, animal power and others based on the result of Farm Economy Survey in Biyala and Hamoul areas. The crop yield with project is estimated from the unit yield and increase rates of crop yield with IIP. The increase rates are estimated on the basis of yield difference between the farmers yield in the head reach and tails in Meskas. ( refer to Table E.2.1, E.2.2, E.2.5,E.2.6,E.2.7,)

### **2. Crop Unit Yield , Farm Inputs and Crop Production in Priority Area**

The unit yields of respective crops are estimated in the upstream, midstream and downstream areas, mainly based on the yield data of crop cutting data by Sampling Directorate, Economic Affair, Ministry of Agriculture and Land Reclamation. The crop yields with project are also estimated in the same way in the master plan area. The same data in the above on farm input is applied. ( refer to Table E.2.3, E.2.4,E.2.8, E.2.9,E.2.12, E.2.13, E.2.15,E.3.4 and E.3.5)

## **E.3 Crop Production**

### **1. Crop Production in Master Plan Area**

Finally the crop production without and with project is estimated from the cropping pattern and the yields in the above, including the yields of by products.( refer to E.3.1, E.3.2 and E.3.3)

### **2. Crop Production in Priority Area**

Applying the same way in master plan area, the crop production without and with project is estimated from the cropping pattern and the yields in the above, including the yield of by products.(refer to Table e.3.4 and E.3.5)