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Report No: 53349-EG

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF
US$100 MILLION

TO THE

ARAB REPUBLIC OF EGYPT

FOR A

FARM-LEVEL IRRIGATION MODERNIZATION PROJECT

NOVEMBER 16, 2010

Sustainable Development Department
Middle East and North Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective (June 14, 2010)

Currency Unit	=	Egyptian Pounds
Egyptian Pounds 5.5	=	US$1

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AC	Agricultural Cooperatives
AE	Agricultural Extension
AFD	Agence Française de Développement
ARC	Agricultural Research Center
AWMP	Agricultural Water Management Project
CACU	Central Agricultural Cooperation Union
CAS	Country Assistance Strategy
CF	Continuous Flow
DA	Designated Accounts
EALIP	Executive Authority for Land Improvement Projects
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
FAO	Food Agriculture Organization
FIMP	Farm-level Irrigation Modernization Project
FM	Financial Management
FMU	Financial Management Unit
GDP	Gross Domestic Product
GIS	Geographic Information System
GOE	Government of Egypt
GPS	Global Positioning System
GTZ	German Agency for Technical Cooperation
ICB	International Competitive Bidding
ICD	Information and Communication Department
IFAD	International Fund for Agriculture and Development
IIIMP	Integrated Irrigation Improvement and Management Project
IIP	Irrigation Improvement Project
ILO	International Labor Organization
IRR	Internal Rate of Return
IWMD	Integrated Water Management District
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt fr Wiederaufbau
MALR	Ministry of Agriculture and Land Reclamation

MC	Marwa Committees
M&E	Monitoring and Evaluation
MENA	Middle East and North Africa
MEP	Ministry of Electric Power
MOU	Memorandum of Understanding
MWRI	Ministry of Water Resources and Irrigation
NDP	National Drainage Program
OFIDO	On-farm Irrigation Development Project in the Old Lands
O&M	Operation & Maintenance
PAD	Project Appraisal Document
PMU	Project Management Unit
PPP	Public Private Partnerships
PSC	Project Steering Committee
PVC	Polyvinyl Chloride
RADCON	Rural and Agricultural Development Communication Network
SBD	Standard Bidding Documents
SBDG	Standard Bidding Documents for Goods
SIL	Specific Investment Loan
SWERI	Soil, Water and Environment Research Institute
USAID	United States Agency for International Development
VERCON	Virtual Extension and Research Communication Network
WBP	Water Boards Project
WUA	Water User Associations

Vice President:	Shamshad Akhtar
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Sector Manager:	Luis Constantino
Task Team Leader:	Julian A. Lampietti

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

CONTENTS

ARAB REPUBLIC OF EGYPT

FARM-LEVEL IRRIGATION MODERNIZATION

PROJECT APPRAISAL DOCUMENT

MIDDLE EAST AND NORTH AFRICA

MNSSD

Date: November 16, 2010	Team Leader: Julian A. Lampietti
Country Director: A. David Craig	Sectors: General agriculture, fishing and forestry sector (50%); Crops (50%)
Sector Manager/Director: Luis F. Constantino	Themes: Rural services and infrastructure (50%); Other rural development (50%)
Project ID: P117745	Environmental category: Partial Assessment
Lending Instrument: Specific Investment Loan	Joint IFC:
	Joint Level:

Project Financing Data

[X] Loan [ ] Credit [ ] Grant [ ] Guarantee [ ] Other:

For Loans/Credits/Others:
Total Bank financing (US$m.): 100.00
Proposed terms: IBRD Flexible Loan repayable in 28.5 years, including 7 years of grace and level principal repayment, at six-month LIBOR for US$ plus variable spread.

Financing Plan (US$m)

Source	Local	Foreign	Total
Borrower	30.00	0.00	30.00
International Bank for Reconstruction and Development	62.91	37.09	100.00
AFD	31.49	18.51	50.00
Total:	124.40	55.60	180.00

Borrower:
Government of Egypt
Cairo
Arab Republic of Egypt

Responsible Agency:
Ministry of Agriculture and Land Reclamation
Dokki
Arab Republic of Egypt
Tel: (20-2) 337-2667
Ministry of Agriculture and Land Reclamation
Arab Republic of Egypt

Estimated disbursements (Bank FY/US$m)									
FY	2011	2012	2013	2014	2015	2016			
Annual	3.50	8.40	17.40	29.20	29.10	12.40			
Cumulative	3.50	11.90	29.30	58.50	87.60	100.00			

Project implementation period: Start January 3, 2011 End: January 4, 2016
Expected effectiveness date: May 2, 2011
Expected closing date: June 30, 2016

Does the project depart from the CAS in content or other significant respects? ***Ref. PAD I.C.***	[ ]Yes [X] No
Does the project require any exceptions from Bank policies? ***Ref. PAD IV.G.*** Have these been approved by Bank management? Is approval for any policy exception sought from the Board?	 [ ]Yes [X] No [ ]Yes [X] No [ ]Yes [X] No
Does the project include any critical risks rated "substantial" or "high"? ***Ref. PAD III.E.***	[X]Yes [ ] No
Does the project meet the Regional criteria for readiness for implementation? ***Ref. PAD IV.G.***	[X]Yes [ ] No

Project development objective ***Ref. PAD II.C., Technical Annex 3***

10. The project development objective is to increase agricultural profitability and improve equity in access to higher-quality water for up to 140,000 small-scale farmers on up to 200,000 feddans (80,000 hectares) in the command areas of Mahmoudia, Manaifa and Meet Yazid located in the Nile Delta. This would be conducted specifically in areas where upstream irrigation improvement interventions, both physical and institutional, have occurred and are fully functional. These objectives would be achieved through both structural improvements and a strengthening of farmer support services.

Project description *[one-sentence summary of each component]* ***Ref. PAD II.D., Technical Annex 4***

Component 1 calls for marwa and farm-level irrigation improvements (approximately US$ 139.3 million excluding contingencies). Component 2 calls for farm-level technology development and dissemination (approximately US$ 14.1 million excluding contingencies).

Which safeguard policies are triggered, if any? ***Ref. PAD IV.F., Technical Annex 10***

The Environmental Assessment safeguard (OP 4.01), the Pest Management safeguard (OP 4.09), and the safeguard regarding projects on International Waterways (OP 7.50) are triggered by the project. FIMP is designated a Category B project, meaning the impacts are limited and reversible.

Significant, non-standard conditions, **if any**, for:
Ref. PAD III.F.

Board presentation:

None

Loan/credit effectiveness:

There are no conditions of effectiveness.

Covenants applicable to project implementation:
The Borrower shall maintain throughout the duration of the Project: (a) the PSC, and (b) the PMU, as detailed in the POM, with membership, functions and responsibilities and with staff in adequate numbers whose qualifications and experience shall be at all times acceptable to the Bank.

Not later than one month after the Effective Date, the Borrower shall, through EALIP, furnish to the Bank the POM on terms acceptable to the Bank.

The Co-financing agreement with the Agence Française de Développement is expected to become effective no later than June 30, 2011.

The Borrower shall: (a) establish by not later than June 30, 2011 an M&E system designed under terms of reference acceptable to the Bank; (b) provide adequate training to staff responsible for M&E of the Project activities; and (c) thereafter, use this M&E system to monitor the progress achieved in the execution of the Project.

The Borrower shall: (a) carry out an assessment, based on terms of reference acceptable to the Bank, of the following procurement methods i.e. force account, community based procurement and community based contracting schemes; (b) by June 30, 2013 furnish the results of this assessment to the Bank for its review and comments; and (c) integrate the recommendations resulting from this assessment as they shall have been agreed upon with the Bank to enhance these contracting schemes to ensure sustainable implementation of the Project.

Modification to the anti-corruption guidelines have been placed in the minutes of negotiations and agreed with the borrower.

I. STRATEGIC CONTEXT AND RATIONALE

A. Country and sector issues

1. The agriculture sector is a critical part of the Egyptian economy. Although agriculture's share of GDP has fallen steadily from over 20 percent in the mid-1980s to 14 percent in 2008, it remains vital for economic growth and rural incomes. The sector employs 30 percent of the workforce and provides livelihoods for 55 percent of the population. Many of these people depend on agriculture as the primary source of income and employment, particularly the poor. Rural poverty is relatively high (15 percent in Lower Egypt[1] and 40 percent in Upper Egypt[2]) compared to urban poverty (5 percent in Lower Egypt and 15 percent in Upper Egypt). In addition, rural poverty is higher among farmers (20 percent in Lower Egypt and 32 percent in Upper Egypt) and agricultural laborers (37 percent in Lower Egypt and 71 percent in Upper Egypt) than among those with jobs outside agriculture (13 percent in Lower Egypt and 33 percent in Upper Egypt).

2. Farms are typically small (with an average of about 1 feddan (0.42 hectare) and with about 90 percent of the farms being less than 3 feddans), yet farmers get a lot out of their land. Egypt has achieved some of the highest rice yields in the world with an average of 9.5 tons per hectare in 2005, boosted by the introduction of a range of new varieties. In addition to rice, yields in the Old Lands[3] for sugar cane, wheat, maize, cotton, and sorghum are also very high. However, yield growth has slowed markedly in recent years, and Egypt still imports about 40 percent of its food requirements. For non-traditional high-value crops, yields remain below potential and the margin for improvement is quite high.

3. Long-term challenges put pressure on Egypt to increase agricultural productivity. One challenge is water scarcity. Egypt has approximately 750m^3/capita/year of renewable water resources[4], less than half the Middle East and North Africa (MENA) average of 1,200m^3/capita/year. The Nile is Egypt's only source of renewable water resources and is shared among Egypt and nine other upper riparian nations[5]. Meanwhile, the demand for water, fuelled by rapid population growth, agricultural expansion, and industrial development, has increased substantially since the Nile Waters Treaty and will continue to do so in the future. Another challenge is the need to improve food security. Projections of the country's food balance indicate that dependence on grain imports will increase by over 100 percent over the next twenty years, implying that domestic production cannot keep pace with increasing demand. Given limited land and water resources, an increase in agricultural productivity is necessary to enhance supply. A third challenge is climate change, which puts further strain on scarce water resources and food security. Climate change models project an increasing probability of severe weather events that would increase yield volatility and decrease global production of key crops. This would contribute to food commodity market instability and increase Egypt's risk of food shortage.

4. Irrigation is a critical input for domestic agricultural production. Virtually all Egypt's agricultural lands are irrigated from the Nile River. The Nile plays such a vital role that roughly 90 percent of the country's population is concentrated in and around the Nile Delta and its Valley. In

[1] Lower Egypt runs from the Nile Delta north of Cairo to the Mediterranean Sea.
[2] Upper Egypt runs from the Nile Valley from Giza southward to Aswan.
[3] Old Lands are found in the Nile Valley and Delta. They include land claimed from the desert many generations ago that has been intensively cultivated since. They are typically deep, flat and extremely fertile through millennia of Nile silt deposits.
[4] This includes surface water and groundwater
[5] Burundi, Rwanda, the Democratic Republic of Congo, Tanzania, Kenya, Uganda, Ethiopia, Eritrea, and Sudan

most of the Old Lands, irrigation is based on the long-standing, yet inefficient flood irrigation system: canals deliver water below field elevation, and farmers typically lift water into the marwas[6] to their fields through diesel operated mobile pumps. The drainage system consists of open drains that are run by gravity. Pumps are used along the course of the drains to raise the low water level, to lift water at terminal points or to be mixed with irrigation water. The latter is often done by tail-end farmers, who lack access to sufficient quality water from the irrigation system. Indeed water quality is declining, particularly in the Delta because of insufficiently treated industrial/municipal discharges, inadequate sanitation coverage in rural areas, and heavily polluted drainage canals. In some areas, groundwater aquifers are severely contaminated.

5. Marwa and farm-level segments of the distribution networks require modernization and do not yet benefit from efficient conveyance management systems. Conveyance and distribution efficiencies do not exceed 70 percent, while farm-level efficiencies average about 50 percent with application levels usually in excess of crop and soil water needs. Many farmers do not yet use available technology such as low head bubblers and polyvinyl chloride (PVC) pipes. Such innovations would allow farmers – particularly tail-enders, who are among the poorest – to better control the flow of water and the speed with which they can irrigate their crops. These innovations are useful for growing high-value crops, which are more sensitive to timing and amount of water applications. Consequently, farmers who may want to switch from growing low-value crops to high-value crops lack the means to do so. Use of flood irrigation through earthen ditches results in higher labor and energy costs than if they had PVC pipes and other modern techniques that increase the speed and control with which they can irrigate. Thus, the use of less productive irrigation systems drives a vicious cycle where farmers' incomes are depressed, leaving them unable to invest in modern farm-level irrigation systems.

6. Farmers' awareness and knowledge of modern irrigation systems needs to grow and they require training in the use of such systems. For crops where the potential of domestic and/or international markets exist, weak market linkages and lack of application of the proper pre- and post harvesting technologies have caused significant losses to smaller farmers. Concurrently, the link between research and extension is weak and farmers' needs are not fully reflected. The extension system is limited by insufficient information flow, lack of logistical support, and inadequate incentive structures. Further, the extension services of the Ministry of Agriculture and Land Reclamation (MALR) and the irrigation advisory services of the Ministry of Water Resources and Irrigation (MWRI) do not yet provide an effective and harmonized message to smallholders for the efficient utilization and management of on-farm irrigation water.

7. MALR is aware of these issues and is acting accordingly. Attempts to address them are underway through an on-farm participatory research program, for example through the Field Crops Research Institute and the Rice Research and Training Center, and through the development of an interactive web-based information and communication system linking research to extension and farmers. In addition, to achieve an integrated approach with a unified message, agents from the agricultural and irrigation advisory services have participated in a joint training program under the German Agency for Technical Cooperation's (GTZ) Agricultural Water Management Project (AWMP), while a group of specialists has recently been trained in irrigation extension in the US.

8. The GoE recently completed its Strategy of Sustainable Agricultural Development 2030. The strategy has six main objectives: (i) sustainable use of natural agricultural resources (ii) increasing

[6] Quaternary farm-level ditches

the productivity of both land and water units (iii) raising the degree of food security of the strategic food commodities (iv) increasing the competitiveness of agricultural products in domestic and international markets (v) improving the climate for agricultural investment, and (vi) improving the living standards of rural inhabitants, and reducing poverty rates in rural areas.

9. For irrigation, one of the strategy's main components is to develop a national irrigation modernization program that gradually improves the efficiency of water conveyance and distribution systems, as well as the efficiency of on-farm irrigation systems. The national program would aim to modernize irrigation on an area of 5 million feddans and increase farm- level efficiencies from 50 percent at present to 80 percent by 2030. The strategy notes that accomplishing this requires (i) designing and implementing extension campaigns and strengthening research to popularize new systems, and (ii) strengthening research in the field of planning and designing modern irrigation systems for each crop and environment.

B. Rationale for Bank involvement

10. MALR is mobilizing donors to support the strategy, and has requested the Bank's assistance to address farm-level irrigation modernization on about 200,000 feddans through the Farm-level Irrigation Modernization Project (FIMP). FIMP serves as a first phase of the longer-term national program to modernize irrigation on 5 million feddans. FIMP complements the recent On-Farm Irrigation Development Project in the Old Lands financed by The International Fund for Agricultural Development (IFAD) and GTZ's AWMP. The Bank's objectives in the agriculture sector, as consistently expressed over the last three CASs, have included improving the management and efficiency of the use of water and land resources, and have made lending for agricultural water management the major sustained program over past decades. FIMP is aligned with these objectives and achievements.

11. The Bank has detailed knowledge to support the project due to its central role in the development of the irrigation sector, with almost 85 percent of the irrigated area served through its irrigation, drainage and pump station projects. The objectives of the Bank's irrigation projects have been to increase agricultural production and farm incomes, to increase the efficiency of water use, to facilitate a more equitable distribution of water and to improve on-farm irrigation management by deputizing responsibility for operation and maintenance at the tertiary level to the end-users (through Water User Associations, WUAs) and establishing cost-sharing arrangements for tertiary level investments. These projects, which primarily fell under the purview of MWRI, have focused on improving water delivery and drainage, reducing water-logging and salinity, and improving capacity to operate and manage the infrastructure.

12. The two precursor projects to FIMP focused on upstream irrigation improvements through the mesqa[7] level. The Irrigation Improvement Project (IIP) (FY 95) completed water delivery systems for 68 branch and sub-branch canals serving 210,000 feddans. The follow-up project, the Integrated Irrigation Improvement Management Project (IIIMP) (FY 05) aims to improve the irrigation system over 550,000 feddans and to introduce a more innovative approach to water resources management by integrating irrigation, drainage, and pumping at the district level. Lessons learned from IIP and IIIMP indicated a need to focus on irrigation system improvement at the marwa level as well as farm-level improvements to build on these upstream investments, resulting in pilot and demonstration areas covering some 6,000 feddans that have been established under the IIIMP.

[7] Tertiary channels that receive water from branch canals

This marwa-level activity is known as the W-10 pilot. An important step taken by the GoE has been to give responsibility to the MALR for irrigation development at the marwa-level, in recognition of their close ties to the farm community. FIMP would enable MALR to scale-up ongoing marwa and farm-level activities coupled with improvements in agriculture extension service delivery. This would also prepare the MALR for implementation of the national program for farm-level irrigation modernization. The project would also promote more participatory contracting and implementation approaches such as community based procurement to encourage the involvement and build the capacity of farmers, the private sector and local farmer organizations. This would contribute to sustainable sector development that continues after completion of the project.

C. Higher level objectives to which the project contributes

13. Since irrigated water is vital for agricultural production and rural livelihoods in Egypt, FIMP can greatly benefit the agriculture sector by improving equity in the distribution of quality water to farmers; improving the speed and efficiency of water conveyance, which will lower labor and pumping costs; and enhancing farmer knowledge and awareness of innovative irrigation technology and associated cropping practices. An increase in agricultural profitability among farmers through such benefits could help reduce rural poverty, with many of the rural poor depending on agriculture as their primary income source.

II. PROJECT DESCRIPTION

A. Lending instrument

14. The project proposes to use the instrument of a Specific Investment Loan (SIL) to support GoE's efforts to modernize farm-level irrigation.

B. Program objective and Phases: N/A

C. Project development objective and key indicators

15. The project development objective is to increase agricultural profitability and improve equity in access to higher-quality water for up to 140,000 small-scale farmers on up to 200,000 feddans (80,000 hectares) in the command areas of Mahmoudia, Manaifa and Meet Yazid located in the Nile Delta. This would be conducted specifically in areas where upstream irrigation improvement interventions, both physical and institutional, have occurred and are fully functional. These objectives would be achieved through both structural improvements and a strengthening of farmer support services. The project's success would be measured by the following indicators:

a) Increased agricultural output in LE per feddan (relative to baseline and non-project neighboring comparison areas);
b) Reduced irrigation operating costs in LE per feddan (relative to baseline and non-project neighboring comparison areas);
c) Difference in yields between farmers at the tail-end and head-reach of quaternary canals reduced (relative to baseline and non-project neighboring comparison areas);
d) Reduced drainage water re-use by farmers, especially those at the tail-end of quaternary canals (relative to baseline and non-project neighboring comparison areas); and

e) Increased number of active Marwa Committees[8].

D. Project components

16. The project comprises two components and has an estimated baseline cost of US$153.5 million. The estimated total cost is US$180.0 million including physical and price contingency allowances. The components with their estimated baseline costs are outlined below and described in more detail in Annex 4. Cost estimate details are given in Annex 5.

17. *Component 1: Marwa and Farm-Level Irrigation Improvements (approximately US$139.3 million excluding contingencies)*. Component 1 supports marwa and farm-level irrigation modernization in the command areas of Mahmoudia, Manaifa and Meet Yazid. In these locations, branch canal and mesqa[9] improvements have been carried out or are currently ongoing, and mesqa water user associations (WUAs) have been formed for sustainable O&M and irrigation management. Component 1 would provide financing for the following activities: (i) marwa and off-farm improvements comprising various pipe and hydrant systems, open channels and small gated outlets, with options designed and implemented in accordance with farmer needs and agreement; mesqa pump stations and associated fittings will also be upgraded and new valves provided for off-take into the marwas as needed; (ii) change of approximately 75 percent of the mesqa pump stations from diesel pumps to electric ones and installation of dedicated rural electric-power grids; (iii) farm-level improvements such as laser land-leveling, reshaping field drains, soil improvements, flexible hose systems, and gated pipes; (iv) support workshops for use and maintenance of mesqa and marwa-level works and land improvement activities; and (v) field surveys, designs, and construction supervision and management.

18. *Component 2: Farm-level Technology Modernization (approximately US$ 14.1 million excluding contingencies)*. Component 2 aims to enhance farmer knowledge and uptake of improved irrigation and associated land improvement and crop production technologies in parallel with and in support of the marwa-level irrigation modernization carried out under Component 1. The component would include: (i) increasing farmer awareness of marwa improvements through farmer meetings and exchange visits; (ii) demonstrations of improved marwa and farm-level irrigation systems, improved on-farm water management, and associated land improvement and agronomic practices for both field crops and horticultural crops; (iii) training of lead farmers and extension staff in irrigation management and associated practices, private sector service providers such as workshops in installation and repair of irrigation infrastructure, project implementation and administration staff, and senior management and policy level officials; (iv) improved extension delivery through publications and mass media broadcasting, increased outreach of the MALR's interactive web-based extension information networks, the Rural and Agricultural Development Communication Network (RADCON) and the Virtual Extension and Research Communication Network (VERCON), facility improvement, and provision of transportation and field allowances; (v) implementation support, including pilots and studies to support development of future field-level irrigation improvement and M&E activities; and (vi) environmental monitoring and mainstreaming.

19. Component 2 would also strengthen relevant MALR agencies and organizations[10] responsible for implementation through training programs and support for the development of an

[8] Water user organizations at the marwa level
[9] Tertiary channels that receive water from branch canals
[10] This includes EALIP, Marwa Committees, WUAs, and agricultural cooperatives.

improved information and monitoring system (MIS). The component would also encompass project management, with support for EALIP on procurement, financial management and implementation of monitoring and evaluation (M&E). Component 2 would build capacity within EALIP both to manage its own program and to undertake their required responsibilities through training, support for surveys and impact assessments and logistical support.

E. Lessons learned and reflected in the project design

20. The project draws mainly on World Bank experiences with the implementation of previous water projects in Egypt, particularly the ongoing IIIMP and the earlier IIP as well as the national level National Drainage Program (NDP) that was supported by the World Bank through successive projects since the early 1970's. The relevant lessons learned are outlined below:

a) **Need for strong inter-institutional cooperation between MALR and MWRI.** Lessons learned from IIP and IIIMP suggest that strong coordination between the two ministries on data collection, planning, social mobilization and construction is critical for FIMP's success. To date, performance in this regard has been very good.
b) **Electrification of mesqa pumping stations is feasible and highly desired by farmers.** Previous experience from IIP and IIIMP implementation indicated that electrification of mesqa pump stations and use of electric pumps rather than the use of diesel pumps would be feasible even if it would require augmentation of power grids in the project areas. It also demonstrated a strong desire among farmers to switch to electric-powered pumps because it reduces costs.

F. Alternatives considered and reasons for rejection

21. As an alternative to electric pumping, the Government and the Bank project team considered continued use of diesel pumping. The fixed costs of this alternative would be lower than replacing the system with electric pumps and a large dedicated rural electrification program. However, this alternative was rejected for several reasons. First, most if not all of the existing diesel pumps would either need to be replaced or modified to integrate them with the new irrigation system. Second, diesel pumping is less reliable and more difficult to manage than an electric-powered system. Third, farmers prefer electric-based pumping because it has lower operating costs and is quieter than the diesel option. This would be a major factor in farmers' rapid acceptance, adoption, and repayment of modernized, buried marwa pipes. Fourth, the upfront cost advantage of diesel quickly disappears when one considers the shorter lifespan of the pumps versus the electric powered ones. Fifth, the Government has expressed plans to have electrified pumping for the greater national irrigation modernization program, and thus electric pumps for the FIMP project mark a first step in that direction. Sixth, diesel pumping is less environmentally sustainable, resulting in greater GHG emissions than electric pumping.

III. IMPLEMENTATION

A. Partnership arrangements

22. The Bank has worked in close partnership with various donors in water resources in Egypt for two decades including Agence Française de Développement (AFD), The Netherlands and German aid agencies, KfW and GTZ. The social analysis and appraisal in this Project Appraisal Document (PAD) (Annex 16) are based on previous work of GTZ. The Bank has delivered a

proposal to the Government of Japan requesting funding for innovative pilots in community organization and contracting, and technology dissemination under the project.

B. Institutional and implementation arrangements

23. The project would be executed almost entirely by units of MALR. Only the modification of mesqa pumps would be implemented in coordination with another ministry, MWRI. Component 1 would be managed by the Executive Authority for Land Improvement Projects (EALIP), while Component 2 would be managed by units of the Agricultural Research Center (ARC) and EALIP based on their specific mandates. EALIP would be responsible for procurement and financial management. Design of the Monitoring and Evaluation (M&E) program and analysis of FIMP outcomes/results would be done through ARC's quality control and inspection unit. Component 2 would also strengthen EALIP's management capacity through a training program, support for surveys and impact assessments, and logistics support.

24. At the central level, to ensure coordination and detailed management review and control, a Project Management Unit (PMU) would be headed by the President of the ARC or another representative acceptable to the World Bank, with the approval of a high-level Steering Committee (discussed below) and the Bank. A full-time FIMP project manager would also be part of the PMU. This person would be appointed by and report directly to the President of ARC. The Management Unit would also be comprised of members from the two governorates (Beheira and Kafr El-Sheikh); working-level representatives of all relevant ARC project units (e.g. the Central Administration for Agricultural Extension and research institutes), EALIP, the Central Agricultural Cooperative Union, and MWRI. The EALIP and ARC implementers would report to and be coordinated by this unit. Annex 6 includes an illustration of project management structure.

25. This PMU would report to the high-level Project Steering Committee (PSC) chaired by the Principal Advisor to the Minister of MALR (Chairman of Agricultural Research and Development Council) or another representative acceptable to the World Bank. The Steering Committee would provide overall policy guidance and oversight and institutional problem solving. This committee would include representatives of the Ministries of Agriculture and Land Reclamation, International Cooperation, Water Resources and Irrigation, and Finance and Planning. The unit would meet on average three times per year for the first year and then two times per year every year thereafter.

26. To ensure coordination at the field level, governorate-level coordination committees are proposed that would be chaired by the Under-Secretary of the Governorate and would include governorate-level managers from EALIP, Agricultural Directorate, Cooperative Unions, regional Research Stations, the North Delta and Beheira Electric Distribution Companies and the Irrigation Advisory Service. The units would meet on average three times per year for the first year and then two times per year every year thereafter.

27. *Component 1:* FIMP would modernize roughly 22,000 marwas over the 200,000 feddan, or 1 marwa for an average of 9 feddan. A 12 step process for working with farmers commencing with the formation of Marwa Committees, and deploying demand-driven marwa improvement services is provided in Annex 6. This process would be accompanied by a flexible implementation design to encourage rapid adoption of the improved marwa technology at the farm level. The project includes three implementation approaches: force account, small scale contracting and community based

procurement. The force account approach has already proved successful under W-10, yet, there are concerns that EALIP would need to massively scale up its capacity very quickly.[11] Therefore, approaches that are better able to take advantage of local existing capacity may increase the speed and improve the quality of implementation. Possible alternatives include small-scale contracting consisting of fixed-price contracts with village-level contractors or community-driven development (CDD) contracting that would consist of communities procuring the services of contractors directly based on three bids. The project would start with all three approaches and after two years of implementation the advantages and disadvantages of each of these approaches will be defined and will be incorporated into the design of the project in such a way that the most successful approach can be scaled up.

28. *Component 2:* MALR agencies and units, including ARC and EALIP, would carry out implementation of Component 2 activities. Extension activities would be organized primarily by the extension system under the governorate-level Agricultural Directorate, in coordination with participating farmers and local farmer organizations, under the overall direction of the ARC's Central Administration for Agricultural Extension. Agronomic and horticultural demonstrations would be managed by the ARC's Field Crops Research Institute and Horticulture Research Institute, respectively, with implementation coordinated through their regional research stations, and with support from other research units including the Soil, Water and Environment Research Institute (SWERI) and Agricultural Engineering Research Institute as well as the local extension centers. Farmer exchange visits to marwa improvement demonstration sites would be managed by EALIP in coordination with the extension system and local farmer organizations. The extension system at the governorate level would lead training programs for farmers and extension specialists, while EALIP would organize training programs for private sector workshop operators, EALIP technicians and administrators. Trainers would likely be drawn from a group of specialists recently trained in irrigation extension in the US (at UC-Davis) and in integrated on-farm water management through GTZ's AWMP, as well as specialists from research units and universities as appropriate. ARC's Central Lab for Agricultural Expert Systems and Agricultural Extension and the Rural Development Research Institute would manage the program to improve the web-based information and communication systems with cooperation from the local extension centers. Overall, Component 2 provides a comprehensive training, demonstration and support program involving units of ARC, EALIP and the governorate-level Agricultural Directorate for extension programs. At the farm level, implementation teams consisting of EALIP staff, extension workers, lead farmers, and private sector contractors would work together with Marwa Committees. Coordination of these activities would be ensured by the PMU and the governorate-level coordination units.

C. Monitoring and evaluation of outcomes/results

29. ARC and EALIP would work together to monitor and evaluate project outcomes and results in the three command areas. ARC will design the M&E program (e.g. creation of survey instruments), taking into account the proposed monitoring indicators shown in Annex 3. Some indicators such as irrigation operating cost measurements require regular reporting. Other outcomes are static and only require baseline and final period data collections (e.g. upgrading MALR's web-based extension information and communication systems). As part of the M&E program, ARC will design a scorecard to assess farmers' satisfaction with the participatory contracting and implementation approaches. Farmers' feedback on the pilot projects is critical to help develop this

[11] It is critical that EALIP visits the marwas throughout the process, and this will likely be a very time-consuming process. Further details are provided in Annex 6.

infant private sector. EALIP will implement the program and collect the results utilizing its MIS. The outcomes/results will be subsequently analyzed by ARC and included in annual progress reports submitted to MALR, the Bank and donors. They will also be made available to the stakeholders at the local/community level.

30. ARC would establish an M&E program that builds on the experiences of similar projects focusing on farm-level irrigation modernization and support and delivery of improved extension services, ongoing Bank-financed benchmarking studies, the sustainability monitoring of WUAs introduced by the Water Boards Project, and the USAID supported establishment of Integrated Water Management Districts. It is suggested that the project measure all relevant monitoring indicators relative to baseline values and relative to a pre-identified non-project neighboring area. It is also recommended that the project conduct three surveys over the course of the project lifetime- baseline, mid-term and end-line. The surveys should cover the same farm households, WUAs, and Marwa Committees over the course of the project, covering both project areas and non-project neighboring areas where mesqa improvements are in place.

D. Sustainability

31. A more participatory planning and decision-making process is expected to develop substantially through the creation of Marwa Committees and the involvement of WUAs and other local farmer organizations. In addition, farmers are expected to take over the corresponding O&M activities associated with Component 1, giving them a greater sense of ownership of the irrigation systems. Under Component 2, a comprehensive demonstration and training program will enhance farmer knowledge and uptake of improved irrigation and associated land improvement and crop production technologies in parallel with the marwa-level irrigation modernization carried out under Component 1. This program will not only increase the potential benefits from the irrigation modernization, but is also likely to result in longer-term benefits to the farming communities after the completion of the program. The involvement of private sector operators from the project area villages in training and implementation will help to create a network of locally-based people skilled in the installation, maintenance and repair of the irrigation structures in the future. Improvements in the MALR's extension service both through development of a cadre of qualified village-level specialists able to provide continuing support to farmers in on-farm water management, and by increasing the outreach of the interactive information and communication systems will also help future sustainability.

32. Regarding the financial aspects of sustainability, the standard Egyptian irrigation repayment period of 20 years (without interest) will be reduced to 10 years for the quaternary, farm-level investments of this project. Payments will be collected together with land taxes. Completion of a cost recovery agreement with every farmer to be included in the project is a critical step in the marwa planning and design process. The proposed approach increases the cost recovery rate for these capital investments from 45 percent in real terms to 65 percent, quite possibly the highest general repayment rate for irrigation capital investment in the world.

E. Critical risks and possible controversial aspects

Risks	*Rating*[a]	*Mitigation measures*	*Residual risk*
EALIP may not provide a sufficient enabling environment for more participatory approaches for modernizing irrigation and cropping practices. This refers in particular to the participation of community members (such as farmers in marwa committees and local hardware store owners), and in the design and implementation of SSC and CDD contracting approaches for modernizing water distribution.	H	1. The linkage of the pilot to FIMP and the larger GoE program on farm-level irrigation modernization will help the potential scaling-up of the activities. 2. ARC will design the M&E system and evaluate the outcomes of the three contracting approaches. 3. MALR senior management, particularly within ARC expressed strong support for the alternative contracting approaches.	M
Poor quality of materials and workmanship, particularly of buried pipelines but also of other project works, is a major project risk, dispersed as they are and largely hidden from view.	H	FIMP is instituting a system of works quality inspection and control whereby all inspection and acceptance is by agencies different from that which executed the works.	M
There may be delays in procurement processing because MALR's procurement capacity is generally weak, and for EALIP, it will be the first time it uses Bank procurement procedures.	H	1. The procurement packages will be subject to the Bank's prior review. 2. A donor agency would provide procurement training to EALIP's project support team early in the project life; timing is under discussion. 3. Pro-forma contracts will be put in place for SSC and CDD contracting which will simplify the implementation at the field level.	M
The tender process for the bulk procurement of pipes is not conducted on a competitive basis.	M	The Bank team will closely monitor the bidding process to help ensure free and fair competition.	M
The modernization of marwas and the adoption of improved irrigation and cropping practices by farmers are expected to lead to reduced irrigation water applications, but possibly may not reduce crop consumptive use (or evapotranspiration).	M	Consumptive use may be reduced if, as a result of project interventions, farmers switch to alternative cropping patterns with less water-consuming crops. The GoE has a very strong program to reduce the cropping of paddy rice, the highest consumer of water. The Bank is undertaking a study to assess the effects of modernized quaternary canals on water availability, cropping patterns, consumptive use and yields.	M
Coordination among MALR, MWRI and local user organizations could be improved.	M	During preparation, the Bank team has encouraged close coordination among the various stakeholders. MALR's Executive Agency for Land Improvement Projects (EALIP) and MWRI have demonstrated willingness to work together and involve local organizations including WUAs, marwa committees where they exist, and agricultural cooperatives.	M
Individual or groups of farmers do not want to participate in the project, and	M	Stakeholders are aware of this risk from experience with W-10. EALIP notes this	L

Risks	*Rating*[a]	*Mitigation measures*	*Residual risk*
effectively block improvements for all farmers in that marwa.		was not a major problem in W-10 because farmers were aware of the benefits of modernization. Ag. Cooperatives and WUAs will promote the benefits of modernization via awareness campaigns.	
IV. Overall Risk (including Reputational Risks)			M

F. Loan/credit conditions and covenants

33. There are no conditions of effectiveness.

Legal covenants:

34. The Borrower shall maintain throughout the duration of the Project: (a) the PSC, and (b) the PMU, as detailed in the POM, with membership, functions and responsibilities and with staff in adequate numbers whose qualifications and experience shall be at all times acceptable to the Bank.

35. Not later than one month after the Effective Date, the Borrower shall, through EALIP, furnish to the Bank the POM on terms acceptable to the Bank.

36. The Borrower shall: (a) establish by not later than June 30, 2011 an M&E system designed under terms of reference acceptable to the Bank; (b) provide adequate training to staff responsible for M&E of the Project activities; and (c) thereafter, use this M&E system to monitor the progress achieved in the execution of the Project.

37. The Borrower shall: (a) carry out an assessment, based on terms of reference acceptable to the Bank, of the following procurement methods i.e. force account, community based procurement and community based contracting schemes; (b) by June 30, 2013 furnish the results of this assessment to the Bank for its review and comments; and (c) integrate the recommendations resulting from this assessment as they shall have been agreed upon with the Bank to enhance these contracting schemes to ensure sustainable implementation of the Project. The co-financing agreement with the Agence Française de Développement is expected to become effective no later than June 30, 2011.

IV. APPRAISAL SUMMARY

A. Economic and financial analyses

38. The economic analysis of the project was performed assuming continuation of the current diesel-powered pumping regime. The rate of return on these investments, based only on conservative estimates of yield increases of 11-20% for various crops, was 30%, with a net present value (NPV) of LE 992 million at a 10% discount rate. The ERR was unusually high for an irrigation intensification project due to a) the large sunk costs embodied in the previous rehabilitation of virtually all upstream infrastructure (major pump stations, main and branch canals, mesqas), and also downstream infrastructure in terms of drainage.

39. It became clear to both GOE and Bank teams, that a better option was electrified pumping not only in the project area but throughout Egyptian agriculture. First, it was believed this was more

economic, not only in sheer energy cost terms, but also because electric motors suffer much fewer breakdowns than diesel engines and require much less handling as against continual supply of barrels or tanks of diesel - to small remote pumphouses usually at the end of rutted dirt roads. The social assessment also revealed overwhelming farmer support for electrification, indeed in many cases expressed as a willingness to sign up to repay the entire marwa modernization program only if electrification were included. But this process is not inexpensive. Incremental costs of electrification are now estimated at about US$41 million. The existing rural electric grid is not strong enough to bear thousands of new electric pumps all turning on at the beginning of an irrigation season. In addition, in a gradual fashion, aging diesel pumps in the project areas will have to be replaced with electric ones. Hence an incremental economic analysis was performed on the switch from diesel to electricity. Current standard conversion factors of 2.15 for electricity and 3.07 for diesel were used, to eliminate subsidy effects. The result was an ERR of 26% for the switch to electricity based purely on energy and operation savings, and an NPV of LE 160 million for the switch, which ignores the non-quantifiable factors associated with farmer acceptance. This justifies the switch, while reducing the overall ERR of the larger investment to 29% with an enlarged NPV of LE 1152 million. The analysis confirmed the financial feasibility of the proposed interventions and the positive impact on beneficiaries' family income even if the same cropping pattern is maintained. The project investments would allow not only about 15 - 18 percent of water use reductions but would also contribute to a significant increase in household income, ranging from 12 percent to 29 percent just from FIMP induced efficiency gains. If some conversion to higher value crops would occur as result of the project interventions, the income increases could easily be doubled in only 8 years time.

B. Technical

40. The project is based on several years of earlier experience, particularly in the W-10 area, and would scale up findings there to nearly 200,000 feddans. Marwas would be modernized using low pressure pipes and existing mesqa pipe systems would be upgraded to allow for such undertaking. A number of critical technical choices were made in its design, chief among them to switch from diesel to electric pumping through installation of a dedicated rural grid, which is covered above in paragraph 20 and in Annex 9. The improved system would be designed to further enhance irrigation water distribution equity and ensure that tail-end farmers would be served without having to resort to pumping from drains, water that is often saline, highly polluted, or both, as is often the case today. The piped marwas would also facilitate subsequent investment by farmers in the simpler forms of localized irrigation (specifically low head bubblers), which would be very useful for eventual switching to high-value cropping, especially horticultural crops. The pressure would not be sufficient for drip, mini-sprinkler, or full pressure bubblers, but these anyway would cost 2-3 times as much as low head bubblers, likely without equivalent benefits to smallholders in the Old Lands for some years to come.

41. Component 2 activities are also based on lessons learned from W-10 and the parallel support from GTZ through the AWMP and the Egyptian-German Water Resources Management Reform Program. These projects have highlighted the importance of including a comprehensive extension activity both in on-farm water management and in improved cropping practices to complement the physical marwa improvements, and have already laid the base through experimentation in modern water management technologies and practices, development of training modules, initial training of irrigation and agricultural extension staff, and supporting EALIP to design the implementation mechanisms for *marwa* improvement. At present, extension services are provided through a number

of different MALR and MWRI organizations and do not fully reflect farmers' needs. The component would pilot an improved extension model that could be monitored and transferred to other regions in support of the national program for irrigation modernization. This would include greater private sector participation including lead farmers and local contractors, increased opportunities for farmer-to-farmer learning, enhanced farmer access to information and feedback through the interactive information networks, improved capacity of extension staff to respond to farmer demand through training in both technical and facilitation skills, and development of a harmonized message for on-farm water management by each service. The proposed extension, demonstration and training activities are expected to accelerate the process of adoption of new technologies such as improved varieties, proper fertilization, use of manure/compost and IPM, resulting in increases in productivity. The greater security of water delivery and more equitable water distribution coupled with demonstrations of horticultural crop production would also encourage production of high-value crops such as fruits and vegetables.

C. Fiduciary

42. The Bank conducted a financial management assessment (Annex 7) of EALIP, which is leading project implementation. EALIP has assigned a finance manager and four accountants from its staff to serve as the Financial Management Team (FMT). The FMT will develop the FM manual that describes the control, accounting, authorization and disbursement cycles of the envisaged project. The FMT will also produce interim reports that include sources and uses of funds, forecasts, variance analysis and bank reconciliation information. EALIP will use the existing Al Bouraq MIS developed by its own IT department. The system can be modified to absorb the project's requirements and it is robust enough to be applied at both the centralized and decentralized levels, to possess the security measures required from the FM perspective, and to capture FIMP revenue and cost data. The project will use the cash-basis method of accounting for all transactions. The loan will be made in US dollars and payment to beneficiaries by the project can be made in Egyptian pounds through bank transfers, which poses a lower foreign exchange risk than check payment. In addition, a private independent auditor will be engaged early in the project to review interim financial reports and to audit the project in accordance with standards acceptable to the Bank.

43. Procurement activities under the proposed project would be carried out by EALIP in accordance with World Bank Guidelines (Annex 8). All elements of each contract to be financed by the loan would be agreed upon between EALIP and the Bank in the Procurement Plan, which would be updated at least annually or as required. Procurement of works would involve three contracting approaches: force account, small-scale contracting, and community-driven development contracting (CDD). The purpose is to test the most suitable and cost effective contracting approach during the first 18 months of project implementation, and then scale-up the most successful pilot. Further details on the procurement aspects of the three approaches can be found in Annex 8. The procurement of goods will be done using the Bank's Standard Bidding Documents for Goods (SBDG) for International Competitive Bidding (ICB) and National Standard Bidding Documents (SBD) agreed with or satisfactory to the Bank. Procurement of non-consulting services, selection of consultants, and financing of operating costs would all follow guidelines and procedures acceptable to the World Bank.

D. Social

44. FIMP promotes transparency and informed participation of the target beneficiaries, encouraging farmer demand for the project and supporting the realization of the project's expected

broad range of positive social impacts including: reduced time and efforts to irrigate fields, maintain marwa canals, and conduct weeding; reduced conflicts as a result of better on-farm water management practices; improved access to higher-quality water at tail-ends of the marwas; and increased participation of women in on-farm irrigation, resulting from less physically-demanding operations at the farm outlet. An ongoing study will assess FIMP's potential impact on employment of tenants, sharecroppers, agricultural workers, and particularly women. Findings from interviews and focus group discussions will be available to inform project interventions in advance of the start of implementation. The project will be implemented through full and informed participation of potential beneficiaries, which will involve project support for the formation of Marwa Committees (MCs). MCs will plan and implement marwa improvements and will be responsible for marwa O&M, including O&M cost recovery. FIMP does not trigger OP4.12 on involuntary resettlement. It will not result in resettlement or land acquisition as the main focus is on marwa-level improvement and farmer participation is voluntary. A critical step in the marwa implementation process is unanimous support among the concerned farmers along the marwa line. Further details on social issues are provided in Annex 16.

E. Environment

45. The overall environmental impact of FIMP is expected to be positive, leading to improved water management in the Nile delta. The modernization of on-farm irrigation will lead to more efficient and productive use of irrigation water, as well as to increased yields. Irrigation technology modernization and the development of Marwa Committees and the strengthening of local farmer organizations will further improve overall water and land management at the local level. For purposes of O.P. 4.01 on Environmental Assessment, FIMP has been classified as Category B, given that no significant, irreversible or long-term adverse environmental impacts are anticipated and that any identified adverse impacts can be effectively addressed through appropriate preventive or mitigating measures.

46. OP 7.50 on International Waters is triggered. However FIMP will not adversely change the quantity or quality of water flows to the other riparian countries, and will not be adversely affected by the other riparian's possible water use. This determination has been made on the basis of the assessment carried out during the preparation of the proposed Project, including the Project Environmental Assessment and supporting documentation. Based on the nature of the project and in compliance with OP 7.50, the review of the project has concluded that while the OP is applicable in this case, notification of riparian is not mandated. Indeed, the proposed Project will rehabilitate existing irrigation schemes and does not include any investments to upgrade the capacity of the upstream supply infrastructure (secondary canals, main canals and/or main pumping stations). Replacing existing earthen field ditches with buried PVC pipes and laser-land leveling is expected to reduce irrigation water conveyance loses. Buried PVC pipes will reduce water borne bacteria and parasites. Egypt is the farthest downstream Nile riparian and the target command areas are in the farthest downstream (northernmost) area of the country. Therefore the project will not affect the quality or quantity of water flows to the other riparian and it is not expected to be adversely affected by the other riparian's possible water use.

47. Although, FIMP will neither procure pesticides nor aim to horizontally expand irrigation lands, the project could result in intensifying crop production through vertical expansion, which could increase the residual pesticide/fertilizer load per feddan in some project areas. However, the likely increase in pollutant concentration would not exceed 20% of the current baseline level, which would still be well below the permissible WHO/GOE standards. Nevertheless, OP 4.09 has been

triggered as a precautionary measure. These and other environmental issues were examined during the environmental impact assessment (EIA) and are addressed in the environmental management plan (EMP) conducted by SWERI (which houses the Environmental Management Unit for FIMP). Discussions about FIMP's environmental impact were held at the local level and an executive summary of the EIA was disclosed in Arabic. Overall, EALIP will be responsible for implementation of the EMP. Day-to-day management of prevention/mitigation activities will be undertaken by EALIP, SWERI, CAAE, CASWE, and MWRI/IIIMP, each per its related mandate. The EMP addresses the environmental impacts identified by the EIA through a combination of preventive and mitigation measures, including environmental monitoring and institutional capacity building. Further details are provided in Annex 10.

F. Safeguard policies

48. As indicated in Sections D and E above, the Environmental Assessment safeguard (OP 4.01), the Pest Management safeguard (OP 4.09), and the International Waterways safeguard (OP 7.50) are triggered by the project. FIMP is designated a Category B project, meaning the impacts are limited and reversible. Further details on project safeguards are provided in Annex 10.

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP 4.01)	[X]	[ ]
Natural Habitats (OP/BP 4.04)	[ ]	[X]
Pest Management (OP 4.09)	[X]	[ ]
Indigenous Peoples (OP/BP 4.10)	[ ]	[X]
Physical Cultural Resources (OP/BP 4.11)	[ ]	[X]
Involuntary Resettlement (OP/BP 4.12)	[ ]	[X]
Forests (OP/BP 4.36)	[ ]	[X]
Safety of Dams (OP/BP 4.37)	[ ]	[X]
Projects on International Waterways (OP/BP 7.50)	[X]	[ ]
Projects in Disputed Areas (OP/BP 7.60)*	[ ]	[X]

G. Policy Exceptions and Readiness: The project is ready for implementation.

* *By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas*

Annex 1: Country and Sector or Program Background

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

1. Egypt is comprised of two parts: Upper and Lower Egypt. Upper Egypt runs from the Nile Valley from Giza southward to Aswan. Lower Egypt runs from the Nile Delta north of Cairo to the Mediterranean Sea. Upper and Lower Egypt, can also be divided into "Old Lands" and "New Lands." Old Lands are found in the Nile Valley and Delta. They include land that was claimed from the desert many generations ago and has been intensively cultivated since. New Lands (Old-new Lands and New-new Lands) include recently claimed land (i.e. since the construction of the Aswan High Dam in the 1960s) or is currently in the process of being claimed. The Old Lands are typically deep, flat and extremely fertile through millennia of Nile silt deposits. The New Lands are generally less fertile and face greater agricultural challenges. However, their productivity may improve with time and better management of water resources and cropping.

2. The agriculture sector is a critical part of the Egyptian economy. Although agriculture's share of GDP has fallen steadily from over 20 percent in the mid-1980s to 14 percent in 2008, it remains vital for economic growth and rural incomes. The sector employs 30 percent of the workforce and provides livelihoods for 55 percent of the population. Many of these people depend on agriculture as the primary source of income and employment, particularly the poor. Rural poverty is relatively high (15 percent in Lower Egypt[12] and 40 percent in Upper Egypt[13]) compared to urban poverty (5 percent in Lower Egypt and 15 percent in Upper Egypt). In addition, rural poverty is higher among farmers (20 percent in Lower Egypt and 32 percent in Upper Egypt) and agricultural laborers (37 percent in Lower Egypt and 71 percent in Upper Egypt) than among those with jobs outside agriculture (13 percent in Lower Egypt and 33 percent in Upper Egypt).

3. Farms are typically small (with an average of about 1 feddan (0.42 hectare) and with about 90 percent of the farms being less than 3 feddans), yet farmers get a lot out of their land. Egypt has achieved some of the highest rice yields in the world with an average of 9.5 tons per hectare in 2005, boosted by the introduction of a range of new varieties. In addition to rice, yields in the Old Lands[14] for sugar cane, wheat, maize, cotton, and sorghum are also very high. However, yield growth has slowed markedly in recent years, and Egypt still imports about 40 percent of its food requirements. For non-traditional high-value crops, yields remain below potential and the margin for improvement is quite high.

4. Long-term challenges put pressure on Egypt to increase agricultural productivity. One challenge is water scarcity. Egypt has approximately 750m^3/capita/year of renewable water resources[15], less than half the Middle East and North Africa (MENA) average of 1,200m^3/capita/year. The Nile is Egypt's only source of renewable water resources and is shared among Egypt and nine other upper riparian nations[16]. Meanwhile, the demand for water, fuelled

[12] Lower Egypt runs from the Nile Delta north of Cairo to the Mediterranean Sea.
[13] Upper Egypt runs from the Nile Valley from Giza southward to Aswan.
[14] Old Lands are found in the Nile Valley and Delta. They include land claimed from the desert many generations ago that has been intensively cultivated since. They are typically deep, flat and extremely fertile through millennia of Nile silt deposits.
[15] This includes surface water and groundwater
[16] Burundi, Rwanda, the Democratic Republic of Congo, Tanzania, Kenya, Uganda, Ethiopia, Eritrea, and Sudan

by rapid population growth, agricultural expansion, and industrial development, has increased substantially since the Nile Waters Treaty and will continue to do so in the future. Another challenge is the need to improve food security. Projections of the country's food balance indicate that dependence on grain imports will increase by over 100 percent over the next twenty years, implying that domestic production cannot keep pace with increasing demand. Given limited land and water resources, an increase in agricultural productivity is necessary to enhance supply. A third challenge is climate change, which puts further strain on scarce water resources and food security. Climate change models project an increasing probability of severe weather events that would increase yield volatility and decrease global production of key crops. This would contribute to food commodity market instability and increase Egypt's risk of food shortage.

5. Irrigation is a critical input for domestic agricultural production. Virtually all Egypt's agricultural lands are irrigated from the Nile River. The Nile plays such a vital role that roughly 90 percent of the country's population is concentrated in and around the Nile Delta and its Valley. The Egyptian irrigation system is comprised of an extensive and complex water distribution network. From upstream to downstream, water in the Nile is diverted to agricultural lands from main canals, to branch canals, to tertiary channels (mesqas), and finally to quaternary farm ditches (marwas). Within Egypt's Old Lands (which comprise roughly 5.5 million feddans/2.3 million hectares in the Nile Valley), there are some 80,000 mesqas and an estimated 500 to 600 thousand marwas. Both mesqas and marwas are owned, operated and maintained by farmers. In most of the Old Lands, irrigation is entirely based on the long-standing, yet inefficient flood irrigation system. Canals deliver the water below the field elevation, and farmers typically lift water into the marwas to their fields through diesel operated mobile pumps. The drainage system consists of open drains that are run by gravity. Pump stations are used along the course of the drains to raise the low water level, to lift water at terminal points or to be mixed with irrigation water. The latter is often done by tail-end farmers, who lack access to sufficient quality water from the irrigation system. Indeed water quality is declining, particularly in the Delta because of insufficiently treated industrial/municipal discharges, inadequate sanitation coverage in rural areas, and heavily polluted drainage canals. In certain areas, groundwater aquifers are severely contaminated.

6. Marwa and farm-level segments of the distribution networks require modernization and do not yet benefit from efficient conveyance management systems. Conveyance and distribution efficiencies do not exceed 70 percent, while farm-level efficiencies average about 50 percent with application levels usually in excess of crop and soil water needs. Many farmers do not yet use available technology such as low head bubblers and PVC pipes. Such innovations would allow farmers to better control the flow of water and the speed with which they can irrigate their crops. This is particularly useful for growing high-value crops, which are more sensitive to timing and amount of water applications. Consequently, farmers who may want to switch from growing low-value crops to high-value crops lack the means to do so. Use of flood irrigation through earthen ditches results in higher labor and energy costs than if they had PVC pipes and other modern techniques that increase the speed and control with which they can irrigate. Thus, the use of less productive irrigation systems drives a vicious cycle where farmers' incomes are depressed, leaving them unable to invest in modern farm-level irrigation systems.

7. Farmers' awareness and knowledge of modern irrigation systems needs to grow and they require training in the use of such systems. For crops where the potential of domestic and/or international markets exist, weak market linkages and lack of application of the proper pre- and post harvesting technologies have caused significant losses to smaller farmers. Concurrently, the link between research and extension is weak and farmers' needs are not fully reflected. The extension system is limited by the staff age structure and motivation level, insufficient information flow, lack of logistical support, and inadequate incentive structures. Further, the extension services of the Ministry of Agriculture and Land Reclamation (MALR) and the irrigation advisory services of the Ministry of Water Resources and Irrigation (MWRI) do not yet provide an effective and harmonized message to smallholders for the efficient utilization and management of on-farm irrigation water.

8. The Government is aware of these issues and is acting accordingly. Attempts to address them are underway through an on-farm participatory research program, for example through the Field Crops Research Institute and the Rice Research and Training Center, and through the development of the interactive web-based information and communication system linking research to extension and farmers. In addition, to achieve an integrated approach with a "unified" message, agents from the agricultural and irrigation advisory services have participated in a joint training program under the German Agency for Technical Cooperation's (GTZ) Agricultural Water Management Project (AWMP), while a group of specialists has recently been trained in irrigation extension in the US.

9. The GoE recently completed its Strategy of Sustainable Agricultural Development 2030. The strategy has six main objectives: (i) sustainable use of natural agricultural resources (ii) increasing the productivity of both land and water units (iii) raising the degree of food security of the strategic food commodities (iv) increasing the competitiveness of agricultural products in domestic and international markets (v) improving the climate for agricultural investment, and (vi) improving the living standards of rural inhabitants, and reducing poverty rates in rural areas.

10. For irrigation, one of the main components of the strategy is to develop a national irrigation modernization program that gradually improves the efficiency of water conveyance and distribution systems, as well as the efficiency of on-farm irrigation systems. The national program would aim to modernize irrigation on an area of 5 million feddans and increase farm-level efficiencies from 50 percent at present to 80 percent by 2030. The strategy notes that accomplishing this requires (i) designing and implementing extension campaigns and strengthening research to popularize new systems, and (ii) strengthening research in the field of planning and designing modern irrigation systems for each crop and environment.

11. At the national level, the Ministry of Agriculture and Land Reclamation (MALR) manages the Government's agricultural service programs and is in charge of implementing the strategy. Its service programs are provided at the governorate level through the Agriculture and Veterinary Directorates which are administratively responsible to the Governor but technically responsible to MALR. The MALR has the responsibilities of overseeing irrigation and water management improvements at the marwa and farm-levels. Its Executive Authority for Land Improvement Projects (EALIP) is responsible for farm-level irrigation improvement at marwa level, and is tasked to coordinate with the Ministry of Water Resources and Irrigation (MWRI) at the

marwa/mesqa interface. The Agricultural Research Center (ARC) is responsible for overseeing all research and extension activities under MALR. The agricultural research and extension activities at the governorate level are under the overall planning and supervision of the ARC, which prepares the extension work programs for implementation at the governorate level.

12. The Executive Authority for Land Improvement Projects (EALIP) is the unit of the MALR focused on land improvement programs nationwide, and on civil works and other physical projects generally. When the MALR was given responsibility for farm-level irrigation works by the government, in recognition of MALR's close relationship to the farm community, EALIP was the agency entrusted with this responsibility. Therefore, under the IIIMP, EALIP was given the task to manage and implement the new structural (mainly pipe) marwas or quaternary canals. Hence they are the repository of whatever experience now exists in Egypt in this field. EALIP has 2,921 permanent staff, distributed in 25 regional offices, 47 branches, 24 technical workshops, and 10 laboratories, in addition to headquarters. Field works employ an additional 3000 contracted and seasonal workers. Staff includes 29 managers, over 80 mechanical and civil engineers, 600 agriculturalists and water management specialists, while a fairly large volume of agricultural and earth-moving equipment is kept at the branches and workshops.

13. While EALIP's main modus operandi is force account, it also has considerable experience in contracting, and even, in the distant past, some experience in helping to implement World Bank projects. Given its strong project orientation, at least the initial intention is to not create a separate project implementation unit for this project, but to use EALIP as essentially a large PIU. Thus, some capacity building in procurement, accounting, and project management skills would be required. If this arrangement fails to produce results in a reasonable time, it will be reviewed.

14. The Agricultural Research Center (ARC) has the overall responsibility for overseeing research and extension activities under MALR. Research is carried out through an extensive system consisting of 16 research institutes focusing on different commodities or subjects and 12 research laboratories at the central level, and a network of regional research stations. The extension system is complex, and includes agriculture extension agents usually housed with the regular (credit) cooperatives at the village level; a separate group of agents associated with the agriculture reform cooperatives; and soil and water and other subject matter specialists. The agricultural extension services are managed at the governorate level through the Agriculture Directorate with staff located at the governorate, district and village level. Nearly all villages are served by one or more village extension worker. Extension support centers with facilities for training and computer access are located in mother villages, usually the largest village at the center of a cluster of smaller settlements. Overall, there are approximately 7,200 agricultural extension staff members including roughly 3,400 village extension workers. Although the services are managed at the governorate level, the system as a whole is administered by the ARC’s Central Administration for Agricultural Extension. In parallel is a separate Irrigation Advisory Service under the Ministry of Water Resources and Irrigation.

15. At the local level, the two primary farmer-led organizations that could play an important role in supporting irrigation modernization are Agricultural Cooperatives and Water Users Associations (WUAs). Agricultural Cooperatives have played a strong role in encouraging rural development and are well-positioned to help MALR implement key objectives of the agriculture

strategy. The main functions of agricultural cooperatives include: directing and controlling agricultural production of the farmers; providing farm inputs at regulated and subsidized prices; marketing of the farm produce; and keeping the land registry. Most of the village-level cooperative societies have their own office buildings which are often used by village extension workers, but there is no strong linkage between cooperative's activities and extension services. In some areas district or governorate level federations have sizeable training facilities and warehouses. Agricultural cooperatives are not directly involved in irrigation management. In some areas, however, they take the lead in mobilizing farmers to clean canals and drainages.

16. Most of the agricultural cooperative staff (members of the board of directors) are seconded from MALR and are on state payroll. In addition, MALR and its line departments at the governorate and district levels have a unit ('cooperative department') which supervises and provides guidance to agricultural cooperatives. Government interference is believed to be an inhibiting factor for agricultural cooperatives to becoming independent, service-oriented organizations accountable to the members and responsive to their needs. Reform of agricultural cooperatives is proposed as part of the overall institutional reform in the agricultural sector in the recent government strategy paper[17]. Amendments to the law have been discussed, but not yet presented to the Parliament, which would give more autonomy to the cooperative sector.

17. WUAs have supported irrigation modernization activities at the mesqa level that fell under the purview of MWRI. Important functions of WUAs include: O&M of the lift pump; irrigation scheduling; conflict resolutions and mesqa O&M. Each WUA has a board consisting of about 5 elected members, including chairperson, secretary, treasurer and operator. WUAs are allowed to collect fees from the members according to the tariff they set. Such fees cover the cost of pump house and mesqa O&M. Existing WUAs in the project area seem capable of carrying out the assigned tasks as mesqas and pump-houses are operated and maintained at an acceptable standard. However, WUA's organizational strengths beyond the above-mentioned specific tasks are untested although there are some encouraging examples of WUAs taking initiatives, such as replacing a diesel operated pump with an electric one. There is little interaction between the board and marwa level farmers although the Law 213 provides that a leader be selected at the marwa level and charged with certain responsibilities. In the eyes of ordinary members, a WUA is mostly equated with the board, and members' sense of belongingness is generally low.

[17] *Sustainable Agricultural Development Strategy Towards 2030*, MARD, 2009.

Annex 2: Major Related Projects Financed by the Bank and/or other Agencies
ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

1. Recent irrigation sector projects supported by the Bank and/or other agencies include:

Sector/Issue	Project	Latest Supervision Ratings (Bank-financed Projects Only)	
		Implementation Progress	Project Development Objective (PDO)
Completed Projects			
Water-logging and increasing salinity	Pumping Stations Rehab. Project I (Bank-financed)	Satisfactory	Satisfactory
	Drainage I-V Projects (Bank/IDA-financed)	Satisfactory	Satisfactory
Inefficient on-farm water management, aging and malfunctioning pump stations	Irrigation Improvement Project (USAID-financed)	Satisfactory	Satisfactory
	Pumping Stations Rehabilitation Project II (Bank-financed)	Highly Satisfactory	Highly Satisfactory
Ongoing Projects			
Inefficient on-farm water management, aging and malfunctioning pump stations	National Drainage Project I (Bank/KfW-financed)	Satisfactory	Highly Satisfactory
	National Drainage Project II (Bank/KfW-financed)	Satisfactory	Satisfactory
	Irrigation Improvement Project (Bank/KfW-financed)	Marginally Satisfactory	Satisfactory
	Pumping Stations Rehabilitation Project III (Bank/KfW-financed)	Satisfactory	Marginally Satisfactory
	Integrated Irrigation Improvement and Management Project	Marginally Unsatisfactory	Marginally Satisfactory
	Integrated Sanitation and Sewerage Infrastructure Project	Marginally Satisfactory	Marginally Satisfactory

2. Ongoing projects supported by other international agencies:

Sector/Issue	Project	Organization/Donor
Inefficient on-farm water management	Egypt: On-farm Irrigation Development Project in the Old Lands (OFIDO)	IFAD
Agricultural water management	Egypt: Agricultural Water Management Project	GTZ

Annex 3: Results Framework and Monitoring

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

1. Results Framework

Project Development Objective	Project Outcome Indicators	Use of Project Outcome Information
To increase agricultural profitability and improve equity in access to higher water quality for up to 140,000 small-scale farmers on up to 200,000 feddans (80,000 hectares) in the command areas of Mahmoudia, Manaifa and Meet Yazid located in the Nile Delta.	PO-1: Agricultural output from the main irrigated crops, in LE per feddan increased by 10% (relative to baseline and non-project neighboring comparison areas) PO-2: Irrigation operating costs in LE per feddan reduced by 30% (relative to baseline and non-project neighboring comparison areas) PO-3: Difference in yields between farmers at the tail end and head reach of quaternary canals reduced by 20% (relative to baseline and non-project neighboring comparison areas) PO-4: Drainage water re-use by farmers, especially those at the tail end of quaternary canals reduced by 50% (relative to baseline and non-project neighboring comparison areas) PO-5: Approximately 20,000 marwa (quaternary canal) committees established.	Track progress and make adjustments when necessary during implementation
Intermediate Outcomes	**Intermediate Outcome Indicators**	**Use of Intermediate Outcome Monitoring**
Component 1: **Marwa (quaternary canals) and farm-level irrigation improvements** (i) Installation of electric grid and replacement of diesel with electric pumps on tertiary (mesqa) canals	IO-1a: Electric pumps installed on mesqas serving 150,000 feddan IO-1b: Farmers' costs for pumping water into mesqas as a result of switch from diesel to electric pumps, in LE per feddan, reduced by 30%	Track progress and make adjustments if necessary during implementation
(ii) Modernization of marwas with PVC pipes and hydrants, including piloting more participatory contracting and implementation approaches	IO-1c: Marwa modernization adopted for about 180,000 feddan IO-1d: Farmers' time for applying water to fields, in hours per irrigation, as a result of marwa modernization reduced by 30%	Track progress and make adjustments if necessary during implementation

	IO-1e: Alternative contracting approaches for marwa improvement adopted in 30% of contracts IO-1f: 80% of marwa committees with alternative contracting approaches satisfied with contracting and implementation (measured by scorecard assessment)	
(iii) Farm-level land improvements	IO-1g: Laser land leveling applied on 105,000 feddan IO-1h: Deep ploughing applied on 50,000 feddan IO-1i: Gypsum applied on 70,000 feddan	Track progress and make adjustments if necessary during implementation
Component 2: **Farm-level technology modernization** (i) Support for farmer awareness and knowledge (farmer meetings and exchange visits), and improved extension delivery	IO-2a: 100% of farmers in project area familiarized with marwa modernization program, including cost recovery (measured by scorecard assessment) IO-2b: Visit of extension agents to farmer communities increased by 75,000 field days	Track progress and make adjustments if necessary during implementation
(ii) Training of lead farmers, extension staff, EALIP staff, private sector operators, and senior management officials	IO-2c: Training in technical and agronomic skills received by 7,500 key farmers IO-2d: Women account for at least 25% percent of people trained	Track progress and make adjustments if necessary during implementation
(iii) Demonstrations of on-farm irrigation and cropping practices	IO-2e: Improved irrigation technologies, such as low head bubblers, adopted by farmers on an additional 10,000 feddan IO-2f: Higher value horticultural crops grown on an additional 12,000 feddan	Track progress and make adjustments if necessary during implementation
(iv) Implementation support and studies	IO-g: Monitoring and evaluation system established and applied	Track progress and make adjustments if necessary during implementation

2. Arrangements for results monitoring

		Target Values					Data Collection and Reporting		
Project Outcome Indicators	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
PO-1: Agricultural output from the main irrigated crops, in LE per feddan increased by 10% (relative to baseline and non-project neighboring comparison areas)[18]	0	0	1%	4%	7%	10%	Annual M&E Report	Field Surveys	PMU
PO-2: Irrigation operating costs in LE per feddan reduced by 30% (relative to baseline and non-project neighboring comparison areas)	0	0	-3%	-10%	-20%	-30%	Annual M&E Report	Field Surveys	PMU
PO-3: Difference in yields between farmers at the tail end and head reach of quaternary canals reduced by 50% (relative to baseline and non-project neighboring comparison areas)	0	0	-5%	-10%	-15%	-20%	Annual M&E Report	Field Surveys	PMU
PO-4: Drainage water re-use by farmers, especially those at the tail end of quaternary canals reduced by 20% (relative to baseline and non-project neighboring comparison areas)[19]	0	0	-2%	-5%	-10%	-20%	Annual M&E Report	Field Surveys	PMU
PO-5: Approximately 20,000 marwa (quaternary canal) committees established.[20]	0	1,000	3,000	6,000	12,000	20,000	Annual M&E Report	Field Surveys	PMU

[18] This includes the main winter crops (what, berseem short season, berseem long season) and summer crops (rice, cotton, maize).
[19] Based on experience in W-10 area.
[20] A marwa supplies an average of 9 feddan. About 180,000 feddan are expected to be covered by the marwa modernization.

Intermediate Outcome Indicators									
Component 1:									
IO-1a: Electric pumps installed on mesqas serving 150,000 feddan	0	0	20,000	60,000	110,000	130,000	Annual M&E Report	Field Surveys and Contractor Payments	PMU
IO-1b: Farmers' costs for pumping water into mesqas as a result of switch from diesel to electric pumps, in LE per feddan, reduced by 30%[21]	0	0	-5%	-10%	-20%	-30%	Annual M&E Report	Field Surveys	PMU
IO-1c: 1c: Marwa modernization adopted for about 180,000 feddan[22]	0	0	20,000	50,000	100,000	180,000	Annual M&E Report	Field Surveys and Contractor Payments	PMU
IO-1d: 1d: Farmers' time for applying water to fields, in hours per irrigation, as a result of marwa modernization reduced by 30%[23]	0	0	-5%	-10%	-20%	-30%	Annual M&E Report	Field Surveys	PMU
IO-1e: Alternative contracting approaches for marwa improvement adopted in 30% of contracts	0	0	5%	10%	20%	30%	Annual M&E Report	Field Surveys and Contractor Payments	PMU
IO-1f: 80% of marwa committees with alternative contracting approaches satisfied with contracting and implementation (measured by scorecard assessment)	0	0	10%	25%	60%	80%	Annual M&E Report	Field Surveys and Scorecard Assessment	PMU

[21] Based on experience under IIIMP project.
[22] About 90% of the project area is expected to participate in the marwa modernization.
[23] Based on experience with rice and cotton irrigation in the W-10 area.

IO-1g: Laser land leveling applied on 105,000 feddan	0	0	20,000	50,000	80,000	105,000	Annual M&E Report	Field Surveys and Contractor Payments	PMU
IO-1h: Deep ploughing applied on 50,000 feddan	0	0	10,000	20,000	40,000	50,000	Annual M&E Report	Field Surveys and Contractor Payments	PMU
IO-1i: Gypsum applied on 70,000 feddan	0	0	15,000	30,000	50,000	70,000	Annual M&E Report	Field Surveys and Contractor Payments	PMU
<u>Component 2:</u>									
IO-2a: 100 % of farmers in project area familiarized with marwa modernization program, including cost recovery (measured by scorecard assessment)	0	10%	40%	70%	90%	100%	Annual M&E Report	Field Surveys and Scorecard Assessment	PMU
IO-2b: Visit of extension agents to farmer communities increased by 75,000 field days[24]	0	10,000	20,000	40,000	60,000	75,000	Annual M&E Report	Field Surveys and Field Allowance Payments	PMU
IO-2c: Training in technical and agronomic skills received by 7,500 key farmers[25]	0	0	1,000	4,000	6,000	7,500	Annual M&E Report	Field Surveys and Training Records	PMU
IO-2d: Women account for at least 25% percent of people trained	0	0	10%	15%	20%	25%	Annual M&E Report	Training Records	PMU
IO-2e: Improved irrigation technologies, such as low head bubblers, adopted by farmers	0	0	1,000	3,000	6,000	10,000	Annual M&E Report	Field Surveys	PMU

[24] Based on expected field allowance payments.
[25] Assuming 2-3 farmers from about 3,000 mesqas.

on an additional 10,000 feddan	0	0	1,000	4,000	8,000	12,000	Annual M&E Report	Field Surveys	PMU
IO-2f: Higher value horticultural crops grown on an additional 12,000 feddan	0	80%	100%	100%	100%	100%	Annual M&E Report		PMU
IO-g: Monitoring and evaluation system established and applied									

3. Indicators on gender development: In order to ensure that the impacts on women are measured and monitored, a distinction will be made between men and women farmers in all relevant Intermediate Outcome Indicators outlined in the above table. Gender sensitive measurements will be introduced for all the indicators where impacts on farmers are discussed, e.g. IO-1d, IO-1e, IO-1g, IO-2a, IO-2e, and others as appropriate.

Annex 4: Detailed Project Description

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

1. The project comprises two components and has an estimated baseline cost of US$153.5 million. The estimated total cost is US$180.0 million including physical and price contingency allowances. The components with their estimated baseline costs are discussed in detail below.

2. *Component 1: Marwa and farm-level irrigation improvements (Approximately US$ 139.3 million excluding contingencies).* This component would support marwa and farm-level irrigation modernization for up to 140,000 farming families on up to 200,000 feddans (about 80,000 ha) primarily in three Nile Delta Old Lands irrigation command areas: Mahmoudia, Manaifa, and Meet Yazid. These areas were chosen, as pilots of a proposed national scale (to a total of 5 million feddans) farm-level irrigation modernization effort, for practical reasons. In these areas, past projects (e.g. IIP of FY95, IIIMP of FY05), financed by the Bank and the Governments of Germany and Netherlands, have made major improvements of branch canals and then the tertiary (mesqa) canal systems, which provide the platform for the degree of water management which the current project will seek to attain. Part of this higher level of water management, necessary to improve farmer welfare in several ways, to improve water delivery services and to maximize the return per unit of water used, involves amalgamation of pumping from dozens of inefficient small private pumps to larger scale batteries of pumps in small pump-houses.

3. Drainage for these areas, at finer and finer grids, has been provided by a series of Bank/Germany/Netherlands financed drainage projects, reaching the relatively high order of sophistication of tile drains (perforated buried pipes) for much of the region. Most of the subsurface drainage improvements required by the presently proposed project areas would be provided by the ongoing IIIMP. However, one drainage treatment which will be implemented throughout the project areas under this project will be private open field drain reshaping, where hydraulic excavators reestablish 1.5-2.0 meter depths and trapezoidal sections along field boundaries.

4. Mesqa pump-houses, serving about 30-100 feddan each, are critical upstream nodes for the proposed project in two ways. They provide the pumping pressure which will be transferred to quaternary canals (marwas) under the project, and indeed many of the mesqa pumps will have to be upgraded under this project for that purpose (see para. 6). Secondly, they are the base for the Water User Associations (WUAs) formed and developed under the previous projects, which will have various roles to play in project implementation and operation.

5. The main target of Component 1 will be installation of improved marwas to serve the planned area. This would entail replacement of about 22,000 earth marwas, serving about 9 feddans (4-10 farmers) a piece with low pressure pipes. No marwa would be improved unless and until all farmers on the marwa line agree to this in writing, and to the standard financial conditions (they will repay costs, but without interest) this will activate. Based on assessment of acceptance of the farmers of the marwa improvement program, it is assumed that 90 percent of the marwas will be improved. About 95 percent of improved marwas would be buried PVC

pipes, in all cases where the mesqas are also piped. The piped marwas will start with a standard diameter of 200 mm, progressively reduced towards tail-ends.

6. The modernized marwa system is designed to improve quality water distribution equity so that tail-end farmers would receive irrigation water without having to resort to pumping from drains, water that is often saline, highly polluted, or both. It would also facilitate subsequent investment by farmers in the simpler forms of localized irrigation (specifically low head bubblers), which would be very useful for eventual switching to high-value cropping, especially horticulture, including fruit trees, vines, and vegetables. The working pressure would not be sufficient for drip, mini-sprinkler, or full pressure bubblers, but these anyway would cost 2-3 times as much as low head bubblers, likely without equivalent benefits to smallholders in the Old Lands for some years to come.

7. For piping the marwas, the following additional modifications will be needed:

a) Modifications to the pumps themselves, in the mesqa pumping stations. For cases where the required additional pressure is low and diesel pumps are in good condition, the original diesel pumps (generally installed under the IIP) would be kept and modified if needed to allow for higher heads. This will involve only installing a higher pressure impeller. If the diesel pumps are not in good condition (some approaching their 10-year mark) and/or additional head requirements are too high, they will have to be replaced mainly by electric pumps. More discussion on the use of electric pumps are included in the next paragraph;
b) Raising the towers at the pump-houses or bypassing the tower and adding a special valve to allow for direct pumping;
c) Adding a mesqa-marwa butterfly valve to allow for diverting the water from piped mesqas to piped marwas, distributed along the mesqa. Finally, marwas would discharge water to every farmer's field by means of hydrants. It is this feature which would allow the highest possible degree of diversification and flexibility to each farmer, with anticipated shifts into higher value cropping, mainly horticulture. There would be no more field-to-field flooding with attendant wastage of water.

8. For improved open marwas, no upstream modifications will be required. Each field will be served by the marwa, but no pressure will be available for localized irrigation within the plot.

9. Earlier experiences from IIP and IIIMP have shown the superiority of the option of using electric mesqa pumps over the practice of using diesel pumping units. Most of the mesqas in the FIMP areas had been equipped earlier with diesel pumping units. If the head requirement is too high and/or a pump's condition is poor, the diesel mesqa pumps will be replaced by electric ones. It is estimated that about 85 percent of the project mesqa pump stations will need to be upgraded (75 percent and 10 percent to be diesel) while the other 15 percent would not need or want upgrading. Earlier experience has shown that there may be a need to implement dedicated medium voltage grids (11KV) and /or low voltage grids including transformers to supply power to the mesqa electric pump stations. Based on preliminary results from ongoing assessments carried out as part of project preparations regarding the condition of pumps, head requirements and electric grid conditions, it is expected that more than 60 percent of the mesqa pump stations

would require both dedicated medium and low voltage grids, 15 percent of the areas would require either low voltage alone or would be supplied through existing transformers. Twenty five percent of the mesqa pump stations are expected to be kept as diesel, with 15 percent in need of rehabilitation or upgrade and approximately 10 percent will receive rehabilitation if needed without upgrade as the improved mesqas are open raised lined channels.

10. For purposes of construction of dedicated grids, EALIP would contract the respective local distribution Electric Companies to prepare layouts, bidding documents, specification and supervision of contactors. EALIP will invite qualified electric contractors to compete for the installation of the medium- and low-voltage grids under supervision of the respective electric distribution company. The above arrangements are similar to that followed by the MWRI during the implementation of the IIIMP.

11. The 8 to 10 percent of open marwas, which will be constructed in cases where mesqas are raised J-section lined open canals, would be open-channel brick and mortar canals also, providing much better levels of service than present earth marwas (particularly including husbanding the water allocations, and speed of conveyance), but without pressure.

12. A second program under Component 1 would complement the marwa modernization by ensuring that the farmers fields themselves were in optimal condition to benefit from timely and controlled irrigation. Here a menu of relatively low-cost treatments would be offered to farmers by EALIP, to be provided by EALIP on force account during the first two years of project implementation, and by private contractors thereafter on a payment schedule to be established by EALIP. The costs will be financed either in cash by the farmers, or via a credit account system with EALIP bearing the initial charge. The recovery target is 100 percent with fairly rapid (e.g. less than five years) repayment. The treatments are by now well-known to the farmers, and are expected to be widely selected in areas where they would be effective, which have already been surveyed and estimated by EALIP. The origination and promulgation of these agriculturally-oriented programs in combination with marwa improvement, under the umbrella of the IIIMP project, may be seen as one concrete benefit of the Egyptian experiment of entrusting field level irrigation to the MALR and specifically its agency EALIP, rather than the conventional approach of retaining this level within an engineering agency.

13. A popular treatment expected to be implemented in slightly over half the fields (105,000 feddan) is laser land leveling. Here a heavy tractor-pulled hydraulic scraper, elevated and depressed by an electronic receptor based on laser technology, repeatedly covers a field to redistribute soil and establish a level surface. About 85 percent of the uneven fields are estimated to require surface ploughing before land leveling.

14. About a quarter of the project areas, particularly heavy clay areas repeatedly planted to paddy rice, develop impermeable hard pans, which prevent healthy drainage. Such soils benefit from deep ploughing or sub-soiling, another low-cost treatment. Finally, as against the above three physical treatments, soils with different degrees of salinization have been shown to benefit from heavy applications of gypsum, a higher cost option than the physical ones. For field crops, an average of about 3.5 tons/ha of gypsum have proven optimal, while for orchards, with more

dispersed plant spacing, 1 ton/ha is usually sufficient. These are estimated to be economic over about 22 percent and 8 percent of the project areas respectively.

15. *Component 2: Farm-level Technology Modernization (approximately US$ 14.1 million excluding contingencies)*. The component would aim to enhance farmer knowledge of improved irrigation and associated land improvement and crop production technologies in parallel with and in support of the marwa-level irrigation modernization carried out under component 1. The activities would cover up to 140,000 farming families on up to 200,000 feddans, primarily in three Delta old land irrigation command areas (Mahmoudia, Manaifa and Meet Yazid) where mesqa improvements have already been carried out and where farmer-led water user associations have been formed. The component would also support the development of improved irrigation technology for around 25,000 feddans of horticultural (fruit and vegetable) crops in these areas through a demonstration program and improved information flow. The relevant MALR agencies and organizations[26] responsible for implementation of the activities would also be strengthened through training programs and support for the development of an improved information and monitoring system (MIS). The component would also encompass project management, with EALIP taking responsibility for procurement, financial management and monitoring and evaluation (M&E). Component 2 would build capacity within EALIP both to manage its own program and to undertake required responsibilities through training, support for surveys and impact assessments and logistical support.

16. Component 2 would include a comprehensive range of activities including: (i) increasing farmer awareness of marwa improvements through farmer meetings and exchange visits; (ii) demonstrations of improved marwa and farm-level irrigation systems, improved on-farm water management, and associated land improvement and agronomic practices for both field crops and horticultural crops; (iii) training of lead farmers and extension staff in irrigation management and associated practices, private sector service providers such as workshops in installation and repair of irrigation infrastructure, project implementation and administration staff, and senior management and policy level officials; (iv) improved extension delivery through publications and mass media broadcasting, increased outreach of the MALR's interactive web-based extension information networks, the Rural and Agricultural Development Communication Network (RADCON) and the Virtual Extension and Research Communication Network (VERCON), facility improvement, and provision of transportation and field allowances; (v) implementation support, including pilots and studies to support development of future field-level irrigation improvement and M&E activities; and (vi) environmental monitoring and mainstreaming. Overall, the component would aim to pilot an improved extension model that could be monitored and transferred to other regions in support of the national MALR program for farm-level irrigation improvement. This model will include greater participation of the private sector including lead farmers and local contractors, increased opportunities for farmer-to-farmer learning, enhanced farmer access to information and feedback through the interactive information networks, and improved capacity of extension staff to respond to farmer demand through training in both technical and facilitation skills. The proposed extension, demonstration and training activities are expected to accelerate the process of adoption of new technologies such as improved varieties, proper fertilization, use of manure/compost and IPM, resulting in increases in productivity. The greater security of water delivery and more equitable water

[26] This includes EALIP, local farmer and other organizations.

distribution coupled with demonstrations of horticultural crop production is also likely to encourage the production of riskier but higher value crops such as fruits and vegetables.

17. **Farmer awareness activities** would be carried out in two broad categories:

a) **Farmer meetings**: Information meetings would be held with all farmers in each marwa group at the outset of the marwa improvement process to explain key details of the proposed improvements and the beneficiaries' responsibilities and obligations, including cost recovery modalities. It is expected that up to 150,000 farmers will participate in such meetings, possibly including some farmers from outside of the project area to prepare for expansion of the program. Meetings would take place at local extension and cooperative facilities with costs including only provision of beverage and a snack, and information provided by EALIP and extension staff and through printed material.

b) **Farmer exchange visits to improved marwas**: A program of farmer exchange visits for key farmers would be instituted to view marwa-level and on-farm irrigation improvements and associated land improvement activities such as laser-leveling, gypsum application and sub-soiling. Such improvements have already taken place in the W-10 pilot area under IIIMP and will be initiated from the outset of the FIMP project. Farmers are generally aware of what the proposed physical marwa improvements and on-farm modifications would entail and are broadly aware of the benefits, but are unsure of the specific implications in terms of costs, benefits, cost recovery mechanisms and farmer participation. Accordingly, these demonstrations would focus on areas where improvements have already been carried out, where the costs and cost recovery mechanisms are representative of the project modalities, and through direct interactions with farmers who are already operating improved marwas. Costs associated with this activity would thus be primarily for transport and allowances for farmers and staff attending field days at the demonstration locations, rather than costs of establishing demonstrations. It is anticipated that around three key farmers from each mesqa (representing the marwas) would participate in farmer exchange visits/field days at these demonstration locations.

18. **Demonstration activities** would be carried out in three broad categories:

a) Improved agronomic practices on improved marwas: These demonstrations would take place where mesqa and marwa improvements have already been carried out. In this case, the demonstration sites would cover the whole marwa (typically 10 feddan) and would be managed to show improved on-farm irrigation management, land improvement, new crop varieties, soil fertility management, and weed control and pest management (IPM) options in an integrated (holistic) manner. In the first year, one demonstration per district would be carried out increasing to up to eight per district by the fifth year. To widen the impact, sites would be used for only one year encompassing both summer and winter seasons. It is anticipated that three field days would be carried out at each demonstration site at different stages during the cropping season, with around three key farmers from each mesqa (representing the marwas) participating. Costs would include expenses to establish the field demonstrations,

continuous support for participating farmers from extension and research staff, attendance by farmers and staff at field days and workshops, and surveys to monitor results and farmer uptake.

b) Upgrading on-station demonstration sites: Two sites already exist in Kafr el Dawar (Beheira) and Sakha (Kafr El Sheikh) where possible appropriate technology options for on-farm improvements such as lined marwas, gated pipe, drip systems and drainage systems can be demonstrated. It is not considered necessary to develop additional sites since the existing sites are readily accessible. However, some upgrading of these sites would be undertaken to include additional options and to test and demonstrate potential irrigation technologies. These sites would be used primarily during training of extension workers and irrigation engineering staff.

c) On-farm irrigation methodology suitable for horticultural crops: To support the expansion of high value fruit and vegetable crops, a demonstration program would also be instituted in locations where fruit and vegetable crops are important and where mesqa and marwa improvements have already been carried out. The demonstration sites would normally cover the whole marwa (typically 10 feddan). These demonstrations would focus on field-level irrigation methodologies such as use of drip irrigation, mini-sprinklers, and bubblers and raised beds, coupled with improved agronomic practices for orchards and horticulture crops. In the first year, it is anticipated that one demonstration per district would be established, increasing to up to eight per district by the third year. In this case, the project would support both the establishment of the demonstrations as well as the maintenance for two further years. Costs would include expenses to establish and maintain the field demonstrations, continuous support for participating farmers from extension and research staff, attendance by farmers and staff at field days and workshops, and surveys to monitor results and farmer uptake.

19. **Training activities** would take place in six broad categories:

a) Key farmers: This activity would consist of training key farmers and cooperative members in improved farm-level water management, irrigation operations and maintenance, irrigation scheduling, land improvement and improved cropping practices including horticultural production and marketing. It is anticipated that around 2-3 key farmers from each mesqa (representing the marwa groups) would participate in two or three-day training sessions in these and related topics, including both classroom and practical field training, organized primarily through local extension support centers. These key farmers would form part of the implementation teams for marwa improvement and would continue to provide support in their villages subsequently. Trainers would be drawn from the qualified extension staff trained as described below.

b) Extension staff: There are a large range and number of extension providers at the village level, including MALR agriculture and soil and water extension staff usually associated with the regular cooperatives; a separate group of agents associated with agriculture reform cooperatives; and the Irrigation Advisory Service agents under MWRI. To achieve an integrated approach with a “unified” message, training activities would encompass agents from each extension system in a joint training

program. The program would focus not just on technological considerations such as water requirements, integrated on-farm water management, land improvement, agronomic practices and marketing, but also on more effective extension delivery and facilitation skills. It is anticipated that up to 250 extension providers would participate in five-day training courses over the course of the project encompassing both classroom and practical training. These providers would form part of the implementation support teams for marwa improvement activities and for support to marwa groups and farmers thereafter. Trainers would be drawn from the group of specialists recently trained in irrigation extension in the US (at UC-Davis) and in integrated on-farm water management through GTZ's AWMP, as well as specialists from research units and universities as appropriate.

c) Private sector: Installation, maintenance and repair of irrigation infrastructure, especially after the project period has been completed, are essential elements of future sustainability. Accordingly, a training program is proposed to improve capacity of some 250 village-level private sector service providers such as workshop operators to support farmers in installation, maintenance and repair of irrigation infrastructure. The training program would include technical topics such as information on the marwa improvement activities, installation and repair of pipes and hydrants, and manufacture of parts/systems, as well as business management, planning and contracting. These private sector operators would be eligible to bid for contracts and participate in marwa implementation teams and would be able to provide support to marwa groups and farmers thereafter. Trainers would be drawn primarily from EALIP engineers and technicians with training taking place at local training centers including both classroom and hands-on training.

d) EALIP engineers and technicians: Courses would be provided for around 10 civil engineers, 180 agricultural engineers and up to 300 technicians to support the implementation of the marwa improvement activities. It is anticipated that a 5–day course for civil engineers would focus on design, planning and management, costs and budgeting as well as technical aspects concerned with material specifications and standards. Five-day courses for agricultural engineers would focus on technical aspects of water requirements, on-farm water management, field surveys including use of GPS, and land improvement as well as supervision requirements and effective communication with farmers and private sector partners. Three-day courses for technicians would focus on practical aspects of manufacturing, installation, O&M of improved marwas and on practical aspects of land improvement activities. Courses would take place at local training centers with both classroom and field activities, and would be delivered by EALIP engineers and staff from SWERI, Agricultural Engineering Research Institute and other research units as needed.

e) Administrative staff: This category would include a range of training courses to strengthen administrative and project management capacity, including topics such as financial management, procurement, human resource development, computer programming, and monitoring and evaluation for staff of EALIP and other implementing agencies. Training and sensitization of project staff in the facilitation skills required in the participatory process of marwa improvement planning and implementation would also be provided.

f) Management and policy level staff: This category includes training and study tours for senior-level management and policy level staff from MALR and its agencies such as EALIP and ARC, and units within ARC, to increase capacity to manage, plan and program project activities. To bring skills to the level required, provision has been made for overseas training in project management, financial management, procurement and M&E for senior management at locations such as the ILO training center in Turin.

20. **Improved extension delivery** would be supported as follows:

a) Publications and broadcasting: Provision would be made for preparation and publication of brochures, leaflets, posters and other information materials including videos, and mass media (TV and radio) broadcasts to disseminate information to a wider audience including farmers outside of the project area to prepare for future expansion of the program.
b) Improvement of information systems: Provision would be made to maintain and improve the MALR's interactive web-based extension information and communication systems, the Rural and Agricultural Development Communication Network (RADCON) and the Virtual Extension and Research Communication Network (VERCON). The system is an interactive information and communication network that farmers can use to access information and obtain feedback on questions that they may have. The project would help to create "internet cafes", with computers with internet access provided at local extension centers where farmers can access the network, usually together with the village extension worker who would be able to help the farmer navigate the system. Training will be provided for the village extension worker in the use of the system, who will in turn help (and train) farmers. At present, this communication network/system covers 250 "nodes" in 50 villages in 19 Governorates, operated by 150 facilitators trained to help poor farmers and rural communities in finding the answer to their questions and inquiries. Support would be provided for information needs assessments in selected villages, widening outreach to include all project area villages, updating of information and developing a special tool for on-farm water management, and development and maintenance of software. This would be coupled with the improvement of facilities at the extension support centers described below and training of local extension staff in the use of the system.
c) Facility improvement at extension support centers: There are many training facilities available in the project area, including extension support centers, cooperative facilities, and other facilities at the governorate and regional level. Some upgrading and re-equipping of these facilities is warranted, particularly at the 10 extension support centers in each governorate where most farmer and extension training would take place. Provision has been made for small equipment such as audio-visual equipment, whiteboards and computers to improve access to the ARC's web-based extension information and communication systems, RADCON and VERCON, at these centers, and furniture as needed. Some refurbishment of the centers has also been included.
d) Provision of transportation for extension staff: Motorcycles would be provided for some 250 extension agents participating in the training program and continuing to

provide services for the marwa groups. Some of these would be three-wheel motorcycles with attached box or cart to allow transportation of materials.

e) Provision of field allowances. Field allowances would be provided as an incentive for around 250 extension and other staff both during the marwa improvement process and, after improvement, for extension to provide continued technical support so that full benefits can be derived from the investment. Around 100 days has been allocated for each participating extension agent.

21. **Implementation support** would be provided as follows:

a) Survey equipment: Survey equipment including GIS for maps for design of irrigation improvements, hand-held GPS for field surveying, and soil testing equipment for soil fertility and soil salinity would be provided.

b) Transportation: Motorcycles would be provided for EALIP staff participating in the program. It is anticipated that around 40 three-wheel motorcycles with attached box or cart to allow transportation of materials and workers would be purchased and provided to each implementation team.

c) Pilots and studies: Provision would be made for pilots and studies by staff of research units/universities and local consultants to support development of future field-level irrigation improvement, including land used for fruit and vegetable crops. This could include: a) evaluation of effects of marwa improvement on water quality and equity of distribution; b) surveys of areas to prepare for future expansion of the marwa improvement program; c) testing and demonstration of marwa improvement and on-farm irrigation in areas of future expansion; d) market surveys and studies of the potential for different horticultural crops; and e) other studies identified during project implementation.

d) Monitoring and Evaluation: Provision has been made for M&E activities including a baseline survey, mid-term review study and completion report which would be carried out by staff of research units/universities and/or local consultants.

e) Technical assistance: Provision has been made for international technical assistance to: a) assist in coordination of project capacity-building, training and demonstration activities; b) further define training needs for implementers of marwa improvement programs; c) help to define a suitable integrated and participatory extension approach for on-farm water management and associated agronomic practices; d) develop appropriate training modules that could be transferred and applied in all irrigated areas in the future; e) support the evaluation of marwa improvement and associated training and demonstration activities; f) provide technical assistance for specific activities such as upgrading the web-based information system, methodology of marwa improvement including development of model contracts, and development of proposals for community involvement and ownership.

Project Areas

22. Mahmoudia Sub-project. Water is supplied to the Mahmoudia canal serving a total net irrigable area of about 246,000 feddans from the Rasheed branch of the River Nile at the left bank through El Atf pumping station. Mahmoudia canal is about 75 km long and has also two supplemental sources of water. The first one is Edko drain reuse pumping station at 8.85 km with

a maximum capacity of 5.8 m^3/sec or 0.5 MCM/day. The second source is in the tail escape of El Khandak canal which discharges into Mahmoudia canal by gravity at 15.37 km with a maximum capacity of 23 m^3/sec or about 2 MCM/day during the peak irrigation demand period. The subproject area of about 160,000 feddan is served by the Mahmoudia canal from 15 km to 44 km; and 23 secondary canals with a total length of about 320 km.

23. Drainage water from the Mahmoudia area on the right bank is pumped to Abu Keir bay near Alexandria through El Tabia and Edko drainage pumping stations. These two major stations receive the drainage water from three secondary drainage pumping stations. On the left bank, drainage water is pumped to the Mediterranean Sea through El Max drainage pumping station which receives the drainage flow from four secondary drainage pumping stations. Subsurface drainage has been installed in almost 100 percent of the sub-project area, while rehabilitation of malfunctioning systems is underway through support from other ongoing projects such as IIIMP.

24. Manaifa Subproject. The area is located on the northern edge of the Middle Delta region just south of Lake Burulus and its source of water is El Bagouria main canal with El Kadabba canal (18 km long) conveying the water to the area through 24 secondary canals (150 km total length). Drainage water from the area is lifted at El Mandoura drainage pumping station into Drain No. 9, which discharges into Lake Burulus. The area is completely covered by subsurface drainage systems; however rehabilitation of malfunctioning systems is underway through support from other ongoing projects such as the NDP-2.

25. El Wasat subproject. Irrigation water is supplied to El Wasat area through Meet Yazid canal (24 km length) fed from Bahr Shebeen canal. The water is distributed to the area through 29 secondary canals (210 km total length). Drainage water from the area is pumped at pumping stations No. 7 and 8 and conveyed through drains No. 7 and 8 into Lake Burulus. The area is completely covered by subsurface drainage systems; however rehabilitation of malfunctioning systems is underway through support from other ongoing projects such as the IIIMP.

Annex 5: Project Costs

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

Project Cost By Component and/or Activity	Local US $million	Foreign US $million	Total US $million
1. Marwa and farm-level irrigation improvements	95.095 10.610	44.253	139.347
2. Farm-level technology modernization		3.537	14.147
Total Baseline Cost	105.705	47.789	153.494
Physical Contingencies	9.822	4.529	14.351
Price Contingencies	8.903	3.277	12.180
Total Project Costs[1]	124.429	55.596	180.025
Total Financing Required	124.429	55.596	180.025

[1]Identifiable taxes and duties are US$ 18.0 million, and the total project cost, net of taxes, is US$ 162.0 million. Therefore, the share of project cost net of taxes is 90%.

1. Project cost tables

a) Table 1. Expenditure Accounts by Financiers

Expenditure Accounts by Financiers
(US$ Million)

	IBRD		AFD		The Government		Total		For.	Local (Excl.	Duties &
	Amount	%	Amount	%	Amount	%	Amount	%	Exch.	Taxes)	Taxes
I. Investment Costs											
A. Comp 1											
1. Works Contracted at Mezqa Level	25.1	59.9	12.6	30.1	4.2	10.0	41.8	23.2	10.3	27.3	4.2
2. Works Contracted at Marw a/Land Improvement Level	41.4	57.8	20.8	29.0	9.5	13.2	71.7	39.8	17.7	46.8	7.2
3. New Electrical Grid											
Low Voltage Grid	14.3	59.9	7.2	30.1	2.4	10.0	23.8	13.2	11.8	9.6	2.4
Medium Voltage Grid	12.3	59.9	6.2	30.1	2.1	10.0	20.6	11.4	10.2	8.3	2.1
Subtotal New Electrical Grid	26.6	59.9	13.4	30.1	4.4	10.0	44.4	24.7	22.1	17.9	4.4
5. Equipment for Improvement Works	2.1	46.1	1.1	23.1	1.4	30.8	4.6	2.6	1.1	3.0	0.5
6. Design and Supervision of Improvements	-	-	-	-	1.5	100.0	1.5	0.8	0.4	1.0	0.1
Subtotal Comp 1	95.2	58.1	47.8	29.1	21.0	12.8	164.0	91.1	51.6	96.0	16.4
B. Comp 2											
1. Goods and Equipment	2.9	61.7	1.3	28.3	0.5	10.0	4.7	2.6	1.2	3.0	0.5
4. Know ledge Dissemination	1.0	55.3	0.5	27.7	0.3	17.0	1.8	1.0	0.5	1.2	0.2
6. Vehicles & Machinery	0.8	59.9	0.4	30.1	0.1	10.0	1.3	0.7	0.3	0.8	0.1
7. Incremental EALIP and ARC Operation Costs	0.1	0.8	0.0	0.4	8.1	98.9	8.2	4.6	2.0	5.4	0.8
Subtotal Comp 2	4.7	29.5	2.2	14.0	9.0	56.5	16.0	8.9	4.0	10.4	1.6
TOTAL PROJECT COSTS	100.0	55.5	50.0	27.8	30.1	16.7	180.0	100.0	55.6	106.4	18.0

b) Table 2. Summary of Project Component Costs by Financiers

	IBRD		AFD		The Government		Total		For.	Local (Excl.	Duties &
	Amount	%	Amount	%	Amount	%	Amount	%	Exch.	Taxes)	Taxes
A. Marw a and Farm Level Irrigation Improvements											
1. System Improvements											
Design and Supervision	-	-	-	-	1.7	100.0	1.7	1.0	0.4	1.1	0.2
New Electricity Grid Low & Medium Voltage	26.6	59.9	13.4	30.1	4.4	10.0	44.4	24.7	22.1	17.9	4.4
Mesqa Adaptation	25.1	59.9	12.6	30.1	4.2	10.0	41.8	23.2	10.3	27.3	4.2
Marw a Improvements	41.4	59.9	20.8	30.1	6.9	10.0	69.1	38.4	17.1	45.1	6.9
Land Improvements	-	-	-	-	2.6	100.0	2.6	1.4	0.6	1.7	0.3
Subtotal System Improvements	93.1	58.3	46.7	29.2	19.9	12.4	159.7	88.7	50.6	93.2	16.0
2. Machinery for Improvements	2.1	46.1	1.1	23.1	1.4	30.8	4.6	2.6	1.1	3.0	0.5
Subtotal Marw a and Farm Level Irrigation Improvements	95.2	58.0	47.8	29.1	21.3	12.9	164.3	91.3	51.7	96.2	16.4
B. Farm Level Technology Modernization											
Farmer Aw areness	0.5	59.9	0.2	30.1	0.1	10.0	0.8	0.5	0.2	0.5	0.1
Demonstrations	1.4	22.6	0.7	11.3	4.2	66.1	6.3	3.5	1.6	4.1	0.6
Training	0.5	51.6	0.3	25.9	0.2	22.6	1.0	0.6	0.3	0.7	0.1
Improved Extension Delivery	0.5	34.0	0.3	17.1	0.7	48.9	1.5	0.8	0.4	1.0	0.1
Environment Mainstreaming	0.8	38.7	0.4	19.4	0.8	41.9	2.0	1.1	0.5	1.3	0.2
Implementation Support	1.0	24.1	0.4	9.1	2.7	66.8	4.1	2.3	1.0	2.7	0.4
Subtotal Farm Level Technology Modernization	4.7	29.9	2.2	14.2	8.8	55.8	15.7	8.7	3.9	10.3	1.6
TOTAL PROJECT COSTS	100.0	55.5	50.0	27.8	30.1	16.7	180.0	100.0	55.6	106.4	18.0

c) Table 3. Summary of Project Costs by Year

	Totals Including Contingencies (US$ '000)					
	2011	2012	2013	2014	2015	Total
A. Marwa and Farm Level Irrigation Improvements						
1. System Improvements						
Design and Supervision	422	432	442	452	-	1,747
New Electricity Grid Low & Medium Voltage	2,094	4,282	10,943	15,661	11,435	44,416
Mesqa Adaptation	1,965	4,023	10,294	14,752	10,786	41,820
Marwa Improvements	3,249	6,651	17,020	24,390	17,833	69,143
Land Improvements	163	299	626	865	620	2,573
Subtotal System Improvements	7,893	15,686	39,325	56,121	40,674	159,699
2. Machinery for Improvements	2,174	614	1,806	-	-	4,593
Subtotal Marwa and Farm Level Irrigation Improvemen	10,066	16,300	41,131	56,121	40,674	164,293
B. Farm Level Technology Modernization						
Farmer Awareness	77	158	194	199	187	816
Demonstrations	328	839	1,634	1,718	1,779	6,299
Training	217	263	247	152	148	1,026
Improved Extension Delivery	244	288	275	322	370	1,498
Environment Mainstreaming	664	548	525	171	110	2,018
Implementation Support	2,012	474	534	496	560	4,076
Subtotal Farm Level Technology Modernization	3,541	2,570	3,409	3,058	3,154	15,732
TOTAL PROJECT COSTS	13,607	18,870	44,540	59,179	43,829	180,025

Annex 6: Implementation Arrangements

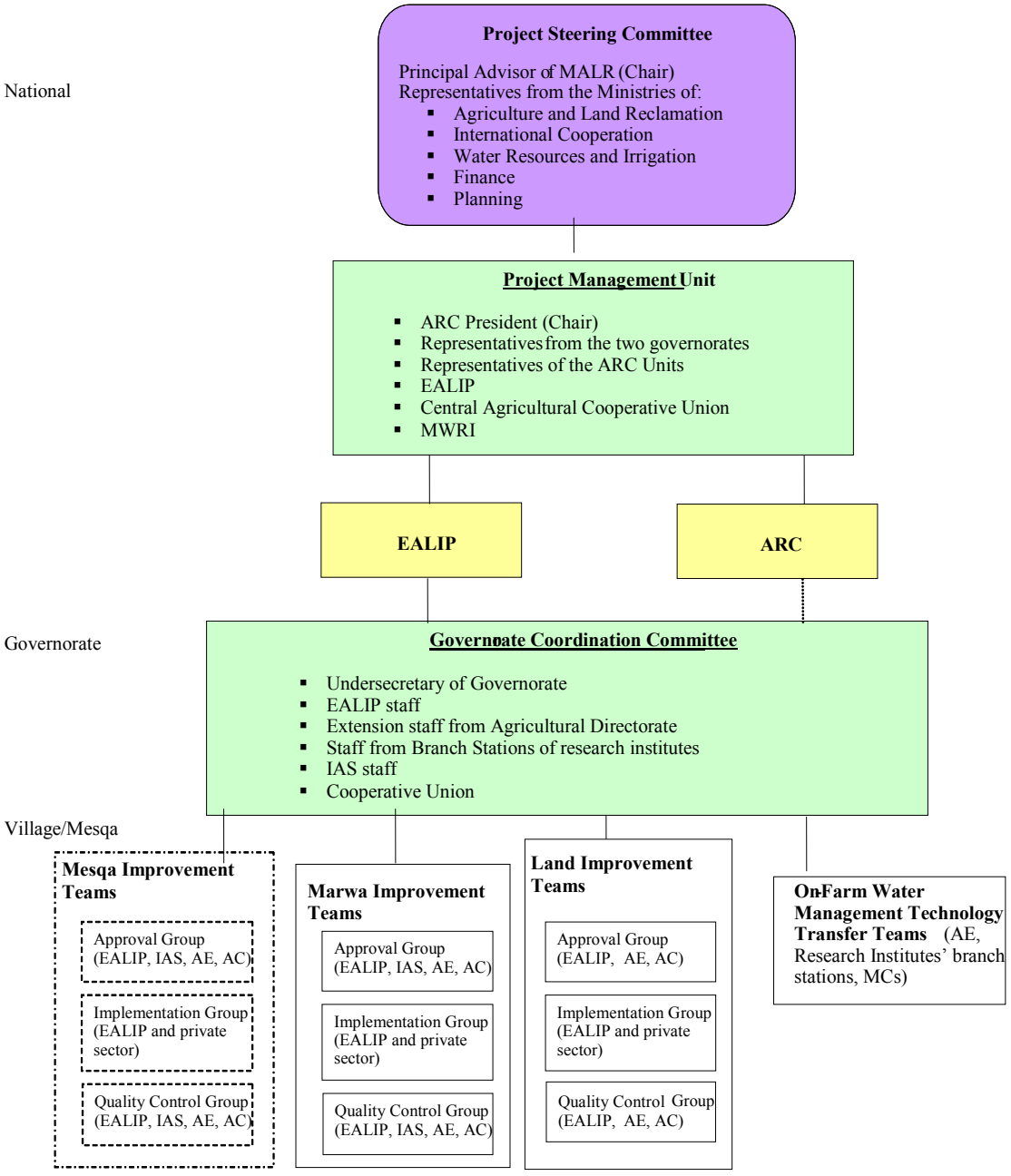
ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

General

1. The project would be executed almost entirely by units of MALR. Only the modification of mesqa pumps would be implemented in coordination with another ministry, MWRI. Component 1 would be managed by EALIP, while Component 2 activities would be carried out primarily by agencies and units of ARC and EALIP based on their specific mandates. EALIP would be responsible for procurement, financial management (specifically preparation of loan withdrawal requests, quarterly financial management reports, and arrangements for annual auditing). Monitoring and Evaluation (M&E) would be done through the ARC department responsible for quality control and inspection. Component 2 would also strengthen EALIP's management capacity through a training program, support for surveys and impact assessments, and logistical support.

2. At the central level, to ensure coordination and detailed management review and control, a Project Management Unit (PMU) would be headed by the President of the ARC or another representative acceptable to the World Bank, with the approval of a high-level Steering Committee (discussed below) and the Bank. A full-time FIMP project manager would also be part of the PMU. This person would be appointed by and report directly to the President of ARC. The PMU would also be comprised of members from the two governorates (Beheira and Kafr El-Sheikh), working-level representatives of all relevant ARC project units including the Central Administration for Agricultural Extension and research institutes, EALIP, the Central Agricultural Cooperative Union, and MWRI. The EALIP and ARC implementers would report to and be coordinated by this unit. An illustration of project management structure is provided below (Box 1 and Box 2). Box 2 illustrates the organizational set up for the EMP (see its details in Annex 10).

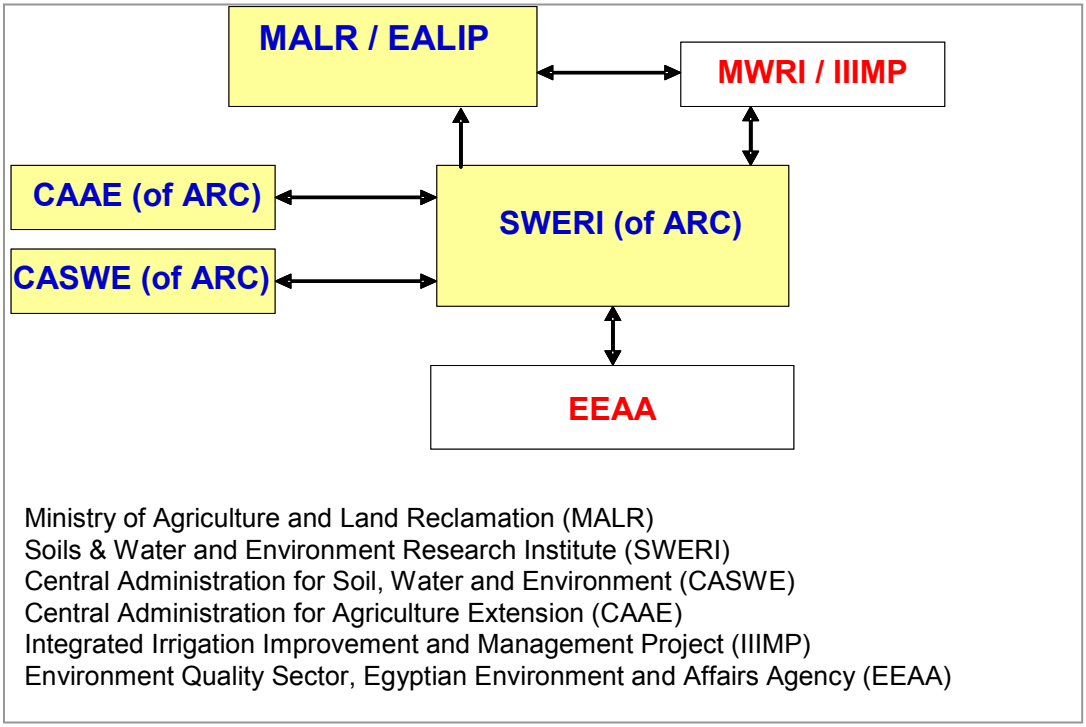
Box 1: **Project Oversight, Management, and Implementation**



Keys:
AC: Agricultural cooperatives
ARC: Agricultural Research Center
AE: Agricultural Extension
EALIP: Executive Authority for Land Improvement Projects
IAS: Irrigation Advisory Service
MARL: Ministry of Agriculture and Land Reclamation
MC: Marwa committee
MWRI: Ministry of Water Resources and Irrigation

3. This PMU would report to the high-level Steering Committee chaired by the Principal Advisor to the Minister of Agriculture and Land Reclamation (Chairman of Agricultural Research and Development Council) or another representative acceptable to the World Bank. The Steering Committee would provide overall policy guidance and oversight and institutional problem solving. This committee would include representatives of the Ministries of Agriculture and Land Reclamation, International Cooperation, Water Resources and Irrigation, and Finance and Planning. The unit would meet on average three times per year for the first year and then two times per year every year thereafter.

Box 2: **The set-up of the EMP**



Ministry of Agriculture and Land Reclamation (MALR)
Soils & Water and Environment Research Institute (SWERI)
Central Administration for Soil, Water and Environment (CASWE)
Central Administration for Agriculture Extension (CAAE)
Integrated Irrigation Improvement and Management Project (IIIMP)
Environment Quality Sector, Egyptian Environment and Affairs Agency (EEAA)

4. To ensure coordination at the field level, governorate-level coordination committees are proposed. These committees would be chaired by the Under-Secretary of the Governorate and would include governorate-level managers from EALIP, Agricultural Directorate, Cooperative Unions, regional Research Stations, and the Irrigation Advisory Service. The units would meet on average three times per year for the first year and then two times per year every year thereafter.

Component 1

5. FIMP would modernize roughly 22,000 marwas over the 200,000 feddan, or 1 marwa for an average of 9 feddan. A 12 step process for working with the farmers and deploying demand-driven marwa improvement services is illustrated below. This process will have to be accompanied by a flexible implementation design in order to encourage rapid adoption of the

improved marwa technology at the farm level. Three approaches that can help achieve this include force account, small-scale contracting and community based procurement.

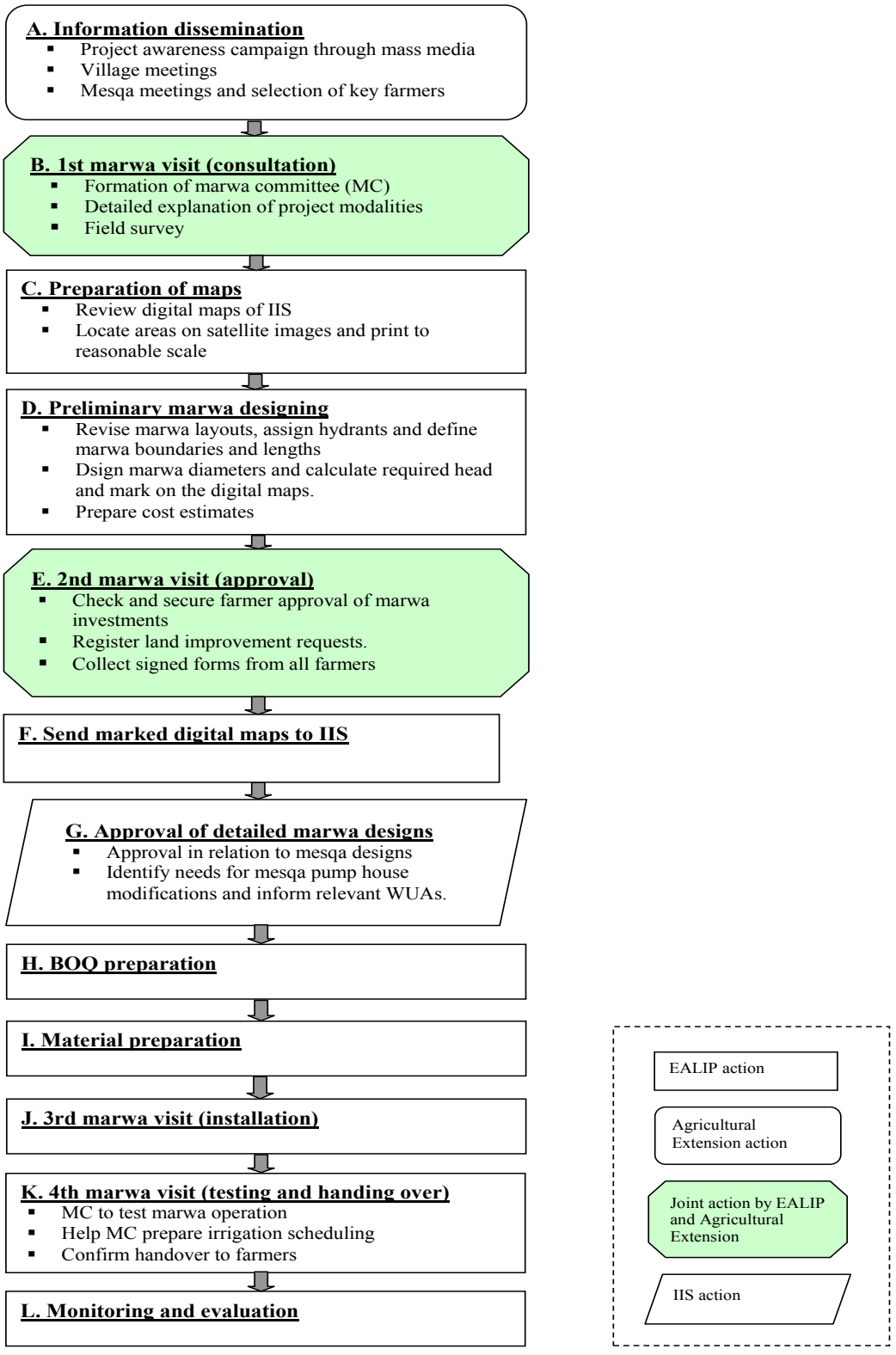
6. The force account approach has already proved successful under the W-10 pilot. However, there are concerns that there would need to be a massive scale-up of EALIP's capacity in a timely fashion.[27] Therefore, approaches that are better able to take advantage of local existing capacity may increase the speed and improve the quality of implementation. Possible alternatives include small-scale contracting consisting of fixed-price contracts with village-level contractors or community-based contracting that would consist of communities procuring the services of contractors directly based on three bids. It was agreed that the project would start with all three approaches and that over the coming months the advantages and disadvantages of each of these approaches will be defined and will be incorporated into the design of the project in such a way that after one or two years of implementation, the most successful approach can be scaled up.

7. Force Account Approach: EALIP's proposed approach would focus on four branch canals at once (of 45 in the project areas), moving on in campaign fashion after about 5-6 months to a new set of branch canals. For force account implementation (as explained below), ten implementation teams would work in each branch canal area simultaneously, with 40 marwas under implementation on any given day. These teams would generally consist of a technician, laborer, two local private plumbing technicians, and a driver of a motorcycle-powered pickup truck. Their work would be coordinated with that of a small rented or agency excavator trenching ahead of the pipe-laying and connection process. As contracting would be introduced and implementation accelerated, these teams would be shifted to pipeline preparation work, obtaining farmer approvals, or testing and acceptance (see further details below).

[27] It is essential that EALIP visits the marwas throughout the process, and it is envisaged that this will be a very time-consuming process. Every step which would seem to involve visits by EALIP staff (and others) to each marwa is listed in Annex 6, commencing with the phrase "visit marwas". There are four steps, which would seem to place a heavy burden on the staff of the agency, even with compound tasks for most visits. The need for these several visits by EALIP staff and others, to each small project location, underlines the importance of adequate arrangements for transport of staff, including both vehicles and operational and running costs on a continuing basis.

8. The marwa modernization process would include the following 12 steps (Box 3):

Box 3: **Marwa Improvement Process**



9. Envisaged evolution of small scale contracting. At present, EALIP installs modernized marwas only on a force account basis, early attempts at contracting them under IIP having failed to elicit required quality, low price, and speed. But the agency has installed only 6,000 feddans under that project in two years of active effort. Admittedly, some of this process may be seen as experimentation, which typically slows implementation. But even scaled up several times, it appears that total reliance on force account by one government agency will not be adequate for the 200,000 feddans of FIMP, much less the proposed national program of 5 million feddans. It seems imperative to plan from the beginning for a switch to contracting and perhaps other methods for the physical implementation of the marwa modernization process. However, reliance on contracting for marwa installation seems unlikely to be workable at project commencement. Still emerging from decades of socialism, the Egyptian countryside does not yet offer a plethora of small contractors experienced in excavation and pipe-joining and laying. In some respects, the situation with trenching and pipe-laying now is comparable to that of sub-surface drainage about 20 years ago, when the Bank's large drainage program was just gearing up. But while start-up work proceeded with agency force account, various steps were taken to train and develop a cadre of efficient and competitive drainage contractors, who now carry all the implementation work.

10. Thus, for the first 18 months of active project implementation (January 2011 - June 2012) it is envisaged that the bulk of marwa modernization under the project would have to be borne by EALIP itself on force account, i.e. using its own staff, workers, and machines. To do this, EALIP would create a new, engineering-oriented Department for On-Farm Irrigation Improvement, by September 30, 2010, which would assume responsibility for executing marwa modernization in the field. In addition, it would be staffed and equipped to provide other engineering services, such as preliminary surveys of marwa courses and farmers, design of the marwas, and bulk procurement of pipes and fittings.

11. Quality control of both materials to be used, and finished marwa lines, is especially important in the case of these marwas. As they will be buried, defects, flaws, and shoddy workmanship in installation which would be obvious in surface works could escape notice here for some time, until flows are choked off by failure. Meanwhile, contractors would be paid. Thus, poor quality of material and workmanship is a major project risk, no matter who executes the works. No implementation department, including the one noted above, can be the judge of the quality of its own work.

12. The ARC Department responsible for quality control and inspection would control the quality of, and accept or reject, all finished marwa lines and other project civil works. It will do this both for force account works implemented by EALIP's implementation department, and later on for works implemented by private contractors or by community mobilization. It is important that the same standards be applied for all. EALIP’s Department of Finance and Administration would tender all contracts, as well as materials required for force account construction of pipelines. Testing of materials may, however, be done by the inspection department of ARC.

13. A second urgent task for the inspection department during the early months of its existence would be to develop in detail the tendering process which will be used to recruit and

select contractors. This work should be preceded by a quick but thorough investigation of the reasons for past failures of commercial contractors in these and related fields in the Delta. The new process would have to overcome those reasons. Separate programs to enroll qualified contractors and potential contractors, and provide them training, would be undertaken. All these activities would aim at target dates of February 29, 2012 for issuance of a substantial number of tenders across the project areas, anticipating award of those contracts by June 2012, and startup of works by July 1. Thereafter, it is expected that volume of work procured by contract would increase steadily through 2012 and the following two years, as more and more experienced contractors would be added to the EALIP register (failure on more than one contract should be a strict condition of deregistration). While some force account capacity for marwa installation would be retained, partly as a check on the private sector, it is envisaged that this capacity would be allowed to gradually decline (or hived off as private contractors if staff wished to purchase the assets at fair prices) as the contracting industry in the field was developed.

14. One important requirement would have to be met by any marwa implementation system, and that is a minimal time between agreement of all the farmers of a marwa to participate in the program, and start (and finish) of construction. Unanimous agreement, even of a small group of farmers, is an uncommonly strict standard, but a critical condition for this project. To maintain a reputation of seriousness and professionalism of this program, it is best that farmers observe that when they decide to accept an offer to join a government program, that government follows up with dispatch. This means there is not enough time to tender individual marwas after agreement of all farmers is achieved, no matter how efficient and simplified such tendering can be. Thus, tenders need to be issued periodically and the most efficient way to do this would be through a fixed-price type of contract. Thus, following any agreement signed by all farmers of a marwa to participate (step "e" of the process), the EALIP staff concerned would then identify a contractor near to that marwa willing to do the work for the agreed price and fax him to offer that particular contract. It is hoped that with a mechanism like this, the time between step "e" and step "j", could be reduced to perhaps a week or two.

15. Pilot scheme for community-based procurement. As the works in marwa modernization are not of a high level of technical complexity, it is possible that in some cases Marwa Committees would prefer, and be able to manage the process themselves. While the planning, design, and bulk procurement of pipes and fittings could be executed by EALIP as outlined in “steps b-i" if not available locally, step "j" would be executed by the marwa farmers themselves, either with their own hands, animals, and machines, or by hiring the same on the open market, or by engaging a small contractor. An account would be created in EALIP for the marwa committee, against which payments would be debited per instructions of the committee - payments to contractors, or laborers, or equipment renters, etc. The same quality control would be applied as for commercial contractors and EALIP force account (step "j"), and the same testing (step "k"). If the finished marwa passed all the tests, remaining funds would be cancelled, with hopefully a savings to the marwa farmers. It is recommended that this pilot program be executed by EALIP with quality control and inspection handled by ARC.

16. Pilot scheme for small-scale contracting: This pilot would consist of fixed-price contracts with village-level contractors. It would be structured similarly to the community-based

contracting approach described above, except EALIP, rather than the local communities, would directly hire the small-scale contractors.

17. Private Sector Participation in Marwa Improvement: Both the community-based contracting and small-scale contracting approaches promote the participation of private contractors in marwa improvements with a view to complimenting the implementation capacity of the EALIP and strengthening local businesses in relation to marwa improvement and O&M works outside the public sector. Private sector participation will be in the execution of marwa improvements (installation of pipes and hydrants), initially on the pilot basis. The project will work with individual plumbers and small contractors (typically hardware stores) operating at the village level. Using small, local operators is considered most appropriate in light of their closeness (both physical and social) to the farmers and less layers of subcontracting involved, which put them in a more favorable condition compared to large contractors in terms of accountability and clients' satisfaction. Village plumbers have basic hydrological knowledge and relevant experience, which can be strengthened and fine-tuned to the specific work of marwa improvements under the project-sponsored training. It is envisaged that one contract may cover one village (the initial pilot size and potential scale-up will receive further consideration over the coming months). It will be a 'framework contract' which determines the overall work to be carried out, but allows flexibility in case some modifications are needed during the execution in response to farmers' requests and due to other factors.

18. The project's overall approach to informed participation of farmers in all phases of marwa improvement – planning, execution and O&M – remains the same under the private contractor execution. Key actions during the planning stage (project information dissemination, explanation of designs and cost estimates to marwa committee, followed by formal approvals) will be undertaken by the same actors (EALIP and extension staff). During the execution, EALIP engineers will supervise the work. Farmers' own participation in the private contractor executed works (transporting materials, digging, etc.) as their contributions to reduce the cost and/or paid laborers will be encouraged.

Component 2

19. Activities would be carried out primarily by agencies and units of MALR, including ARC and EALIP, in line with their specific mandates. Extension activities would be organized primarily by the extension system under the governorate-level Agricultural Directorate, in coordination with participating farmers and local farmer organizations, under the overall direction of ARC's Central Administration for Agricultural Extension. Agronomic and horticultural demonstrations would be managed by the ARC's Field Crops Research Institute and Horticulture Research Institute, respectively, with implementation coordinated through their regional research stations and with support from other research units including the Soil, Water and Environment Research Institute (SWERI) and Agricultural Engineering Research Institute as well as local extension centers. The extension system at the governorate level would take the lead in training programs for lead farmers and extension specialists, while EALIP would organize training programs for private sector workshop operators, EALIP technicians and administrators. It is anticipated that trainers would be drawn from the group of specialists recently trained in irrigation extension in the US (at UC-Davis) and in integrated on-farm water

management through the AWMP, as well as specialists from research units and universities as appropriate. The program to improve the web-based information system would be managed by ARC's Central Lab for Agricultural Expert Systems and the Agricultural Extension and Rural Development Research Institute with cooperation from the local extension centers.

20. Coordination and Management: Overall, component 2 provides a comprehensive training, demo and support program involving units of the ARC, EALIP and the Agricultural Directorate at the governorate level for extension programs. To ensure coordination at the field level, governorate-level coordination committees are proposed. These committees would be chaired by the Under-Secretary of the Governorate and would include governorate-level managers from EALIP, Agricultural Directorate, Cooperative Unions, regional Research Stations, and the Irrigation Advisory Service. The units would meet on average three times per year for the first year and then two times per year every year thereafter.

21. At the central level, to ensure coordination and detailed management review and control, a PMU would be headed by the President of the ARC, with the approval of a high-level Steering Committee (discussed below) and the Bank. A full-time FIMP project manager would also be part of the PMU. This person would be appointed by and report directly to the President of ARC. The PMU would also be comprised of members from the two governorates (Beheira and Kafr El-Sheikh), working-level representatives of all relevant ARC project units including the Central Administration for Agricultural Extension and research institutes, EALIP, the Central Agricultural Cooperative Union, and MWRI. The EALIP and ARC implementers would report to and be coordinated by this unit.

22. The PMU would report to a high-level Steering Committee chaired by the Principal Advisor to the Minister of Agriculture and Land Reclamation (Chairman of Agricultural Research and Development Council). The Steering Committee would provide overall policy guidance and oversight and institutional project solving. This committee would include representatives of the Ministries of Agriculture and Land Reclamation, International Cooperation, Water Resources and Irrigation, and Finance and Planning. The unit would meet on average three times per year for the first year and then two times per year every year thereafter.

23. Component 2 would build capacity within EALIP both to manage its own program and to undertake required responsibilities through a training program, support for surveys and impact assessments and logistical support.

24. Detailed implementation arrangements for the different Component 2 activities are described below:

a) Farmer exchange visits to improved marwas: Farmer exchange visits to marwa improvement demonstration sites would be managed by EALIP in coordination with the extension system and local farmer organizations including cooperatives. Key farmers would be selected with the help of extension staff and cooperative members based on interest and standing in the community.
b) Improved agronomic practices on improved marwas: The agronomic demonstration program would be managed by the ARC's Field Crops Research Institute (FCRI) with

implementation coordinated through their regional research stations including the Rice Research and Training Center in Kafr el Sheikh. Support would be provided by other research units including the SWERI and the Agricultural Engineering Research Institute. Regular extension support would be provided by village extension workers and sites used for training of key farmers. Multi-disciplinary teams consisting of research and extension staff would be formed to oversee each site. Sites would selected based on the FCRI's existing practice, with criteria including: a) where mesqas and marwas have been improved; b) where marwa groups, cooperative leaders and extension agents are in agreement; c) where farmer-led water users' groups are functioning; and d) where appropriate cropping patterns are in use. Two surveys (summer and winter) would be carried out to assess impact and farmer acceptance.

c) Upgrading on-station demonstration sites: SWERI would be responsible for upgrading the two existing sites in Kafr el Dawar (Beheira) and Sakha (Kafr El Sheikh), which would be used for training programs for EALIP and extension staff.
d) On-farm irrigation methodology suitable for horticultural crops: The horticultural demonstrations would be managed by the ARC's Horticulture Research Institute with implementation coordinated through their regional research stations and support provided by other research units including SWERI and the Agricultural Engineering Research Institute. Regular extension support would be provided by village extension workers and sites used for training of key farmers. Site selection criteria and surveys would be similar to the agronomic demonstrations.
e) Key farmer training: This training program consisting of two or three-day training sessions would be arranged by the extension system under the governorate-level Agricultural Directorate and would normally take place in the extension support centers in "mother" villages (usually the largest village in the center of a cluster of smaller settlements) and at field sites. Key farmers would be selected with the help of extension staff and cooperative members based on interest and standing in the community. Trained and qualified extension staff skilled in facilitation would carry out this training.
f) Extension staff training: The program would be arranged by the extension system under the governorate-level Agricultural Directorate and would take place at residential training centers such as at the Sakha Research Station in Kafr El Sheikh and the Beheira Governorate Extension Center. Training activities would encompass agents from each extension system in a joint training program consisting of three or five-day courses. Trainers would be drawn from the group of specialists recently trained in irrigation extension in the US (at UC-Davis) and in integrated on-farm water management through GTZ's AWMP, as well as specialists from research units and universities as appropriate.
g) Private sector training: EALIP would organize training programs for private sector workshop operators from project area villages. Trainers would be drawn primarily from EALIP engineers and technicians with two or three-day training courses taking place at local training centers.
h) EALIP staff training: Training programs for EALIP engineers and technicians, administrators and management staff would be arranged by EALIP normally at governorate-level residential training centers. Three or five-day training courses

would be delivered by EALIP engineers and staff from SWERI, Agricultural Engineering Research Institute and other research units and universities as needed.

i) Farmer meetings: Farmer meetings would be organized by EALIP and carried out at extension support centers or village cooperative facilities.
j) Publications and broadcasting: The extension publications and mass media would be prepared primarily by the Information and Communication Department (ICD) of the ARC's Central Administration of Agricultural Extension and through the regional ICD Units in Beheira and Kafr El Sheikh based on information provided by EALIP and the participating research institutes.
k) Improvement of information systems: The program to improve the web-based information system would be managed by the ARC's Central Lab for Agricultural Expert Systems and the Agricultural Extension and Rural Development Research Institute. The information needs assessments would be carried out with cooperation from the local extension staff.
l) Facility improvement at extension support centers: This program would be coordinated by the Agricultural Directorate in each governorate with support from ARC's Central Lab for Agricultural Expert Systems and the regional ICD Units for selection of IT equipment and training of extension staff in its use.
m) Implementation support. EALIP would be responsible for managing implementation activities including procurement of motorcycles and survey equipment, planning for study tours and training, coordination with technical assistance and organization of monitoring and evaluation activities.

25. **Beneficiary Participation:** The proposed project incorporates in its design features to ensure full and informed participation of potential beneficiaries. Particular emphasis will be placed on: (1) information dissemination and awareness building efforts to encourage farmers' voluntary decisions to participate in the project on the basis of their thorough understandings of benefits and responsibilities, and to familiarize them with the implementation process and modalities; and (2) institutional arrangements at the grassroots level that will facilitate the target farmers' participation in and benefiting from various project activities.

26. **Information Dissemination:** Component 2 section of Annex 4 (Detailed Project Description) provides detailed descriptions of the project's information dissemination and awareness building activities. Main activities are: project information dissemination at village meetings and through various media (publications and broadcasting) and farmer exchange visits to improved marwa. A first project information meeting will be organized at the village level, inviting village leaders, agricultural cooperative representatives and other key figures. This will be followed by several meetings at the mesqa level, participated by representatives from all marwas, where important features of the project will be explained in detail. These meetings will be organized by EALIP and agricultural extension staff working for the project, who will be trained in facilitation of meetings, communications, participatory decision-makings, conflict resolutions and other relevant skills (under 'extension staff training' of Component 2). Various communication materials (posters, leaflets, etc.) will be prepared by specialists and distributed at these meetings. Exchange visits will center on direct interactions between the visiting farmers and their hosts with already improved marwas for the former to learn about important implications of the marwa improvement, including cost recovery requirements.

27. In addition to the above-mentioned activities at the onset of the project designed to facilitate farmers' broad understandings, project field teams (EALIP and extension staff) will continue to interact with participating farmers at the marwa level through Marwa Committee (see below) and provide them with detailed and relevant information at each key stage of the marwa and land improvement processes. Special attention will be paid to consult with the farmers on the locations of the hydrants before the design is finalized as experience in the pilot area suggests this is an important issue to the farmers. Cost estimates are another important piece of information which has to be communicated to each farmer before a formal agreement is signed[28]. The farmers will also be informed of the opportunities to take part in the marwa improvement works either as their own contributions to reduce the cost or paid laborers hired by the project team or private contractors.

28. **Institutional Arrangements for Beneficiary Participation**

a) Marwa improvement. The project will support the creation of Marwa Committees (MCs) formed at the marwa level. Each MC will comprise all the farmers (about 5-10) cultivating the land served by the same marwa. Unlike WUAs, MCs would be informal groups formed according to the members' shared, voluntary interests in marwa improvement. MCs will play the key role in the process of planning, implementation and O&M of marwa improvements. During the planning and execution, its representative will be responsible for coordinating with project staff, and make sure that all members have essential information related to the project. After completion of the marwa improvements, MC members are expected to continue to act collectively, especially in coordination with WUA, for irrigation scheduling and other irrigation related matters.

b) Farmer Trainings. It is proposed that around 2-3 farmers from each mesqa will participate in the exchange visits to improved marwa, as well as farmer training activities. Since not all marwas can send their own representatives, it is essential that the selected farmers will disseminate the obtained information and knowledge outside their own marwas or the immediate circle of their peers. It is proposed that leadership of the mesqa WUA together with representatives from the village agricultural cooperative will take the lead in selecting the key farmers. In the selection process, they will take into consideration technical competencies and interests, as well as personal quality (leadership, willingness to share and teach, etc.). Efforts will be made to include poorer farmers and tenants where such groups are a majority in order to avoid a bias towards fewer, better-off farmers. Female farmers' participation will also be encouraged especially in view of a more important role they are expected to play in the on-farm water management when marwa improvement is completed[29].

c) Mesqa Pump-house Improvement. The mesqa and its pump-house belong to the mesqa WUA, which was created when the mesqa improvement was undertaken.

[28] This agreement will serve the basis for each farmer's obligation for repayment. The repayment will be in installments (up to 10 years) and individually paid to the tax agent. The agreement may include land improvement activities where these are also requested by the farmers.

[29] A recent study (Dalia M. Gouda, *On-Field (Marwa) Improvement in the Nile Delta in Egypt*, GTZ, draft, November 2009) indicates that *marwa* improvement may encourage involvement of more women in on-farm water management as a result of shorter, simpler and less physically-demanding operations.

Mesqa WUAs are formal institutions recognized under the irrigation law and MWRI ministerial decree. Each mesqa WUA comprises all the farmers cultivating the land served by the mesqa, but in most cases only its executive committee (chairperson, secretary, treasurer and pump house operator) is directly involved in day-to-day operations and decision makings. Any work involving the mesqa pump-house would need to be based on the full participation of the WUA.

Annex 7: Financial Management and Disbursement Arrangements

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

Executive Summary

1. The Bank conducted a financial management assessment (Annex 7) of EALIP, which is leading project implementation. EALIP has assigned a finance manager and four accountants from its staff to serve as the Financial Management Team[30] (FMT). The FMT will develop the FM manual that describes the control, accounting, authorization and disbursement cycles of the envisaged project. The FMU will also produce interim reports that include sources and uses of funds, forecasts, variance analysis and bank reconciliation information. EALIP will use the existing Al Bouraq MIS developed by its own IT department. The system can be modified to absorb the project's requirements and it is robust enough to be applied at both the centralized and decentralized levels, to possess the security measures required from the FM perspective, and to capture FIMP revenue and cost data. The project will use the cash-basis method of accounting for all transactions. The loan will be made in US dollars and payment to beneficiaries by the project can be made in Egyptian pounds through bank transfers, which poses a lower foreign exchange risk than check payment. In addition, a private independent auditor will be engaged early in the project to review interim financial reports and to audit the project in accordance with standards acceptable to the Bank.

Financial Management Risks:

General Risks:

Risk	Risk Before MM	Mitigating Measures (MM)	Risk After MM
The Observance of Standards and Codes (ROSC) report (2007) and Country Financial Accountability Assessment (CFAA) report (2007) identified weaknesses in the Egyptian financial accountability, in both the public and the private sector. Another issue that affects inherent risk is the level of corruption within Egypt as according to the 2009 Corruption Perception Index Egypt is at 2.8.	Significant	- Hire an independent qualified private audit firm. - A project Financial Management Team is assigned. The FMT will be responsible for the FM arrangements and will carry out the project's FM activities	Moderate
Overall Inherent Risk Before MM	**Significant**	**Overall Inherent Risk after MM**	**Moderate**

[30] These individuals must be familiar with computerized systems and fluent in English.

Specific Risks:

Risk	Risk before MM	Mitigating Measures (MM)	Risk After MM
Lack of experienced staff with WB-financed projects	High	- The Chairman of EALIP has assigned a finance manager and four accountants from EALIP staff to work as the project's financial management Team (FMT). An external FM consultant can be hired ,if needed, to assist in developing the capacity of the assigned staff - The Bank's FM team met with the FMT to explain the Bank's FM guidelines. Meetings will continue with the project's FMT to enhance its knowledge of the Bank's FM guidelines. - Quarterly reviews of the project reports will be conducted by the external auditor to ensure accuracy of reported information.	Significant
Recording may not be in line with the project's categories' classification and/or project components.	Significant	- Develop a chart of accounts that is based on project's financing sources, categories, components, activities and subcomponents. - Project's policies and procedures manual, which will be developed by the project FM team, will clarify accounting treatment, controls and flow of information.	Moderate
Accounting system may not provide comprehensive information on all sources and uses of funds	Significant	- The formats of the reports will be agreed with the FMT and EALIP's IT department before project negotiations to ensure the capability of the existing system of producing the reports. - Project accounting will cover all sources of project funds and all utilization of said funds. - All project-related transactions would be recorded in the automated books of accounts and supporting documents will be kept at the FMT (audit trail). - The project financial reports will be subject to quarterly reviews by the external auditor to ensure comprehensiveness and accuracy of information before submission to the Bank. - Funds received from different sources under the project, would be identified separately and reflected on the project's accounts, quarterly IFR, and annual Financial Statements.	Moderate
Delays in flow of funds	Significant	- Ensure timely submission of withdrawal applications. - Develop annual disbursement plan that is consistently updated. - Payments will be centralized and will be managed by the project's FMT through the project's DA.	Moderate
Inconsistent application and adherence to unified	Significant	The FMT will develop a clear, detailed and written financial and accounting policies and procedures in the FM Manual. The manual	Moderate

and documented policies and procedures		will ensure coverage of: (i) treatment of expenditures, including their classification, (ii) eligibility of expenditures to be reimbursed from the loan, (iii) efficient management of funds, (iv) project accounting policies, including those related to authorization and payments system, and (v) internal control systems.	
No internal auditor in the FMT	Moderate	The five assigned FM staff will segregate the work in a way that allows independent review of documents. In addition, the project will use the Internal Audit Department of EALIP to review the project's related documents.	Low
Reporting and budgeting	Significant	EALIP's existing MIS will be modified to meet the project's needs. The system will be used for recording and reporting of project's transactions in a timely and accurate manner. As part of the quarterly project IFRs, the FMT will prepare a forecast of the project's expected disbursements for the next 6 months for proper cash management with a deviation analysis of differences exceeding 15 percent between actual and planned figures of previous periods.	Moderate
Lack of timely audit/review reports on Project FS/IFRs	Significant	An independent and qualified private auditor will be hired in accordance with TOR acceptable to the Bank. Part of the audit ToR will be the review of the project's IFRs before submission to the Bank. This review is critical to ensure issues are dealt with in a timely manner, which will contribute to achieving year-end audit compliance.	Moderate
Overall Control Risk before MM	**Significant**	**Overall Control Risk after MM**	**Moderate**

Staffing

2. For the purpose of the project, the Chairman of the EALIP has assigned a financial management team comprised of four accountants and a finance manager who are holding university degrees in accounting and possessing computer and English knowledge to be responsible for the Financial Management of the envisaged project.

3. The option that an outside consultant is hired, as deemed necessary, to build the capacity of the assigned team and ensure FM requirements of the Bank are met will be maintained until the FMU team is operational and their capacity is determined.

Internal Controls

4. The FMT is developing the Financial Management manual. The manual will detail the controls that will be applied for the project to ensure that:

a) Proper segregation of duties is maintained at the project level;
b) Proper ex-ante review is conducted before final payments are made and before interim and final reports are issued by the project and submitted to the Bank;
c) Monthly bank reconciliations are carried out for month-end bank balances with the amounts received from the World Bank and the amounts disbursed by the project;
d) Any purchased items are subject to an acceptable level of controls. First, the FM manual will detail controls on inventory so that money is not idle for long periods of time and so that materials are turned over at appropriate intervals. Second, controls would also ensure the traceability of purchased items until they reach the final user;
e) Any goods purchased under the project are detailed in a registry that specifies for each item: a) the date of purchase, b) amount of purchase, c) financing source and, d) location of the purchased item;
f) Proper filing system is maintained at the project level where all original supporting documents can be easily reached.

5. A draft manual has already been developed by the project. Necessary underpinning points, including the ones above, were discussed with the FM team to be reflected in the manual.

Accounting System, Budgeting and Record Keeping

6. The EALIP IT department has developed a computerized financial information system (Bouraq) that links the centralized (HQ) and the decentralized level (Governorates). A demonstration of the financial modules of the system was conducted by the Ministry's IT department during the preparation mission. The Bouraq system is capable of capturing the accounting data at the levels of sources and uses of funds. According to the IT manager at EALIP, the system can be easily modified to insert the project accounts and issue the project required interim and annual financial reports. Security measures embedded in the system limit access to authorized employees and also limit the authorization of posting entries and making adjustments to the senior management levels.

7. The preliminary demonstration of the system indicates that after making the necessary modifications, it can be used as the financial accounting and reporting system for the project purposes by the appointed financial team. The system was developed by the IT department of the EALIP, providing the additional advantage of maintenance and backup of financial data by the same department which reduces the possibility of data loss and eliminates the maintenance cost.

8. As referred to in the internal control section of this assessment, supporting documentation for the project transactions will be maintained by the FMT assigned to the project in an organized and traceable manner. Each original invoice or payment certificate will be filed with all relevant documents for the transactions and the accounting entry produced by the system.

9. For reporting purposes, the Bouraq system will be modified to issue interim and annual financial reports for the project showing sources and uses of funds by project category and component. With each interim financial report, the project FMT will ensure that bank reconciliation for the project's designated account is included to substantiate the figures in the sources and uses of funds report.

10. The project financial team will:

a) Prepare, on annual basis, budgets and disbursement plans reflecting the project cash needs per quarter. The initial plan will be developed based on the initial procurement plan, implementation schedules and estimated payments cycles, and revised thereafter. The budget will be used as a monitoring tool to analyze variances and manage cash. Updating the annual budget will be the responsibility of the project financial team;
b) Include, as part of the project's interim financial reports, quarterly forecasts and deviation analysis between actual and planned figures of the previous period. In order for the project financial team to produce reliable forecast, they will need to work collaboratively with the other members of the project to ensure timely provision of reliable information that may affect their cash forecast.

11. The project will be using cash basis of accounting to account for all the transactions. As the loan will be in US Dollar and payment to beneficiaries by the project can be in Egyptian pounds through bank transfers. The project will need to limit the use of checks for payments and replace it with bank transfers to avoid foreign exchange gain and loss.

12. Project-related transactions and activities are distinguished at the data-capture stage. An identifiable Trial Balance for the project capturing all projects receipts, expenditures, and other payments under the project will be prepared. A Chart of Accounts for the project will be developed. The Chart of Accounts will conform to the classification of expenditures and sources of funds as indicated in the project documents. The Chart of Accounts allows data to be captured in a manner to facilitate financial reporting of project expenditures by: (i) project components; (ii) subcomponents, (iii) expenditure categories, (iv) disbursement categories, and (v) contracts.

Flow of Funds

13. To ensure that funds are readily available for project implementation, a US dollar Designated Accounts (DA) will be opened at the Central Bank of Egypt. Deposits into and payments from the DA will be made in accordance with the disbursement letter. The FMT will prepare withdrawal applications with the related supporting documents, signed by the designated signatories.

14. All Project related invoices will be subject to the applicable controls and procedures which stipulate the following process: (i) invoices and supporting documents are received by the FMT under and are verified by the Financial Officer at the FMT (ii) invoices are checked for their accuracy, eligibility based on the signed contract before the Financial Officer prepares a payment, (iii) the head of the FMT performs an ex–ante compliance check regarding the

expenditure's compliance then (iv) the accountant checks the accuracy of the payment, (v) once approved, the expenditure is recorded in the project accounting system of the project, also the safeguard of the assets under the project will be defined.

Reporting

15. The FMT will be responsible for issuing monthly automated financial reports (FR), quarterly Financial Monitoring Reports (IFRs) and annual Project Financial Statements (PFS):

Report	Frequency	Due Date	By	Sent to:	Language
FR	Monthly	2 weeks from end of month.	FMT	EETC	Arabic/English
IFR	Quarterly	3 weeks from end of quarter	FMT	Bank/EETC	English
PFS	Annual	3 months from end of FY.	FMT	Bank/EETC	Arabic/English

a) Monthly un-audited FR. The reports will be prepared, generated from the automated system, by the FMT on a monthly basis. They will not be sent to the Bank, however as part of the Bank supervision, they will be reviewed and reconciled with the monthly withdrawal applications and quarterly IFRs sent to the Bank. The format of the reports should be quite simple (a trial balance listing all sources and uses of funds and bank reconciliation/s).
b) Quarterly reviewed IFRs. The format and content of the Interim Financial Reports (IFRs), which will be submitted within 45 days from each quarter closing date will be agreed by negotiations, and included in the financial management manual. IFRs include sources and uses of funds by category and component, financial commitment information, Designated Account reconciliation as well as six month cash flow and deviation analysis.
c) Annually audited PFS. The PFS should be ready 3 months from the end of fiscal year to enable the submission of the audit report within 6 months after the closing date of the fiscal year. The PFS would have to include: (i) a statement of sources and uses of funds indicating funds received from various sources, project expenditures, assets and liabilities; (ii) schedules classifying project expenditures by components, sub-components, and category; (iii) a DA reconciliation statement and (iv) detailed statement of withdrawals made on the basis of SOEs.

External Audit

16. A private, independent auditor will be assigned to perform the annual audits for the project. Terms of reference for the audits will clearly reflect the nature of the project and its exact needs relating to the equipment distribution and management and must be reviewed and cleared by the Bank Financial Specialist. A technical audit is recommended to take place under this project in addition to the financial audit. The audit report and opinion, accompanied by a management letter, will cover the project's financial statements. The report should be submitted to the Bank no later than six months following the closing of the fiscal year. The external audit

report should encompass all project components and activities as a “whole” under the Loan Agreement. The audit should be in accordance with the Bank’s auditing requirements and conducted according to International Standards on Auditing.

Supervision Plan

17. A Bank-accredited FMS will assist in the supervision process. At least two supervision missions for the project will be carried out annually in addition to follow up visits as deemed necessary. The IFRs for the Project will be reviewed on a regular basis by the Project FMS and the results or issues will be followed up during the supervision missions. Financial audit reports and management letters will be reviewed and issues identified will be followed up by the FMS. Also, During the Bank's supervision missions, the Project's financial management and disbursement arrangements (including a review of a sample of SOEs and movements on the Special Account) will be reviewed to ensure compliance with the Bank's requirements and to develop the financial management rating to the Implementation Status Report (ISR).

Disbursement Arrangements

18. To ensure that funds are readily available for project implementation, the project, will open, maintain and operate a Designated Account (DA) at the Central Bank of Egypt to IBRD. Deposits into, and payments from the DA, will be made in accordance with the provisions stated in the loan agreement. Disbursement under this loan will be made according to the transaction-based disbursement procedures that include withdrawal applications for direct payment, reimbursement and requests for the issuance of special commitments. Withdrawal applications and replenishments of the DA will be prepared and sent by the FMT signed by authorized signatories. The name and corresponding specimen of signature of each of the authorized signatories will be submitted to IBRD.

Annex 8: Procurement Arrangements

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

A. General

1. The CPAR of 2003 concluded that Egypt's Procurement Law (Law No. 89) and the Executive Statues provide important concepts for public procurement in Egypt and generally contain sound principles. However, the broad nature of their principles and the absence of written guidelines for their application leave considerable room for extensive discretionary power which can result in inconsistent decisions and loss of transparency.

2. In addition, a follow-on sector specific assessment to the CPAR, an institutional procurement capacity assessment in the water sector, was carried out in 2005 as part of the PER also issued at about the same time in early 2006.The assessment emphasized the importance of developing the National Procurement Guidelines (NPG) to avoid conflicting interpretation of the above mentioned Law 89. The proposed guidelines should explain all steps necessary for the efficient procurement of goods and works, as well as provide guidelines for the selection of consultants (currently non-existent) based on qualitative criteria, as well as guidelines on thresholds.

3. More recently upon the request of the GAGS, the Bank has provided support through legal TA to modernize the Executive Regulations in line with UNCITRAL good practice to the extent Law 89 would allow. The revisions are expected to be endorsed by GoE shortly and rolled out nationally to all procuring agencies in the country.

4. Procurement for the proposed project would be carried out in accordance with the World Bank's "Guidelines: Procurement Under IBRD Loans and IDA Credits" dated May 2004 and revised October 2006 and May 1, 2010; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004 and revised October 2006 and May 1, 2010; the "Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants" known as the "2006 Anti-Corruption Guidelines" and the provisions stipulated in the Loan Agreement. For each contract to be financed by the Loan, the different procurement methods or consultant selection methods, estimated costs, prior review requirements, and time frame would be agreed between EALIP and the Bank in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

5. **Procurement of Works**: Works procured under this project would include: (a) Upstream works; such as electric grid works, mesqa intake rehabilitation; replacement of diesel operated pumping units by electric ones; electromechanical works inside the pump houses and other necessary modifications along the mesqa pipeline. Procurement of this category of works will be done on supply and install basis using NCB procedures on the basis of National SBDs agreed with or satisfactory to the Bank for contracts below $10,000,000. In addition, some special parts may be procured in bulk with installation done by contractors or under EALIP force account. (b) Small scale marwa improvement works which will be conducted during the initial phase of

project implementation (18-24 months) using EALIP's force account approach under the aegis of a new Department for On-Farm Irrigation and, under the quality control of a new unit for inspection established in the ARC.

6. Given the long-term limitations of using EALIP's force account approach to adequately address the large scope of marwa improvements, envisaged under the FIMP, as well as the full marwa improvement program (including non-IBRD financed), two innovative approaches for procurement of small-scale marwa works would be piloted during the initial phase of project implementation:

a) ***Community contracting for marwa improvement.*** Considered the most sustainable option for implementing as well as maintaining the marwa level improvements, these small works would be executed using community participation following paragraph 3.17 of the Guidelines. In cases where it is not possible or practical to obtain three quotations or even two under the CDD option, works similar to the option described above would then be contracted without competition, and based on a fixed-price defined by EALIP/ARC. This would be done on the basis of agreement on a unit cost schedule for marwa PVC pipe and hydrant installation according to predetermined specs. The unit rates which will be applicable for a set period will be determined by an ARC inspection body and verified with local area small contractors. These local contractors/plumbers would be the same ones mentioned above as the target beneficiaries of capacity building under the FIMP. Over time, sample bid documents for contracting marwa level subprojects will be developed using "shopping for works." Here local contractors would be invited to submit quotations, all of which will be opened at the same time in the presence of marwa or mesqa (WUAs) level communities. EALIP would take responsibility for developing the Community Contracting Manual (CCM) and part of the POM using resources from the proposed JSDF grant for FIMP, which will provide guidance on both the technical, fiduciary and social aspects of community contracting including samples of the simplified quotation forms (which describe the scope of works, detailed specs and drawings where possible). The sample contracts, as well the draft format of the subproject Financing Agreement between the Marwa Communities and EALIP which upon review and determination are satisfactory to the Bank, would all be included in the POM to be finalized by Effectiveness and thereby be the trigger for community contracting under FIMP; and

b) ***Implementation of marwa improvements by small contractors contracted by EALIP.*** Marwa level works procurement under EALIP would be based on fixed-price contracts EALIP would pilot for the first 18-24 months of implementation. The unit rates would be defined by EALIP using market-based indices for determining unit rates similar to the contracts under Marwa level "community contracting: described in paragraph (a) above for procurement under the CDD pilot option, would be target recipients of EALIP capacity building under the FIMP. EALIP would utilize fixed-price contracts on a pilot basis since earlier attempts at competitive bidding for these small works failed under IIIMP. This would be an addition to the EALIP force account and CDD pilot approaches. The POM would stipulate the number of contractors EALIP is committed to train in technical skills aspects of PVC pipe laying

and hydrant installation, as well as enable these village based contractors to benefit from on-the-job experience as part of EALIP's Annual Operational Plan (AOP) to be agreed with the Bank.

7. **Procurement of Goods:** Goods procured under this project would include: land improvement activities, conveyance pipes, special parts such as valves and hydrants, office furniture and IT equipment, motorcycles and commodities for marwa-level land improvements. The procurement of goods will be done using the Bank's Standard Bidding Documents for Goods (SBDG) for ICB and National SBDs agreed with or satisfactory to the Bank. Goods and Equipment contracts estimated to cost less than US$ 1,000,000 would follow applicable NCB procedures for IBRD financed projects in Egypt. Shopping may be used for contracts with estimated contract values of less than US$100,000 in accordance with paragraph 3.9 of the Guidelines. Direct contracting for goods may be used in exceptional cases, such as for an extension of an existing contract, standardized proprietary items, spare parts for existing equipment, and emergency situations, in accordance with paragraph 3.6 and 3.7 of the Guidelines. When EALIP conducts bulk procurement of goods such as PCV pipes it plans to store and secure these assets in either Agriculture Cooperatives or WUA site locations on the basis of a due diligence process which would establish on-the-ground competency of these two locations on a case-by-case basis.

8. **Procurement of non-consulting services:** The proposed project would utilize the procurement of non-consulting services. Based on an established budget for each activity approved by the Bank, the project will cover specific services requiring physically measurable outputs related to training (exclusive of financing for consultants) related costs.

9. **Selection of Consultants:** Consultant services under the project would include technical assistance for capacity building in EALIP; support for agronomic and horticultural demonstrations at regional research stations; and surveys including M&E, social and environmental impact assessments, financial and technical audits, and if necessary TA for project implementation support such as hiring experts to support marwa communities from a roster of consultants or NGOs. Most contracts with firms will be awarded through use of QCBS method. Consulting services for audits and other contracts of a standard nature may be procured under the LCS method. Consulting assignments less than $200,000 may be procured using CQS method. Contracts for ICs will be done by comparing the qualifications of at least three candidates, in accordance with Section V of the consultant guidelines. Short lists of consultants for services estimated to cost less than $200,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

10. **Operating Costs:** Operating costs would be financed by the project and procured using the implementing agency's administrative procedures and reviewed and found acceptable to IBRD:

a) **Operating costs incurred by EALIP for project implementation activities include**: office supplies and stationary, bank charges pertaining to Designated Accounts for the project, communication services, transportation, maintenance and insurance of vehicle(s), operation and maintenance of office equipment, fuel, printing services, vehicle rental,

translation services, travel costs within the country and per diem, and salaries and labor costs for local support staff but excluding salaries of officials of the Borrower's civil service.

b) **Operating costs incurred by ARC for quality control and outreach services include:** travel costs of MALR staff, car rental costs, local transport costs of agricultural inputs, stationary, fuel, campaign launching workshop costs, printing costs, cameras, and relevant communication/media materials.

11. The procurement procedures and SBDs to be used for each procurement method, as well as model contracts for works and goods procured, would be presented in the POM.

B. Assessment of EALIP's capacity to implement procurement

12. Procurement activities will be carried out by EALIP. The preliminary assessment of EALIP was first conducted in November 2009 and a follow-up assessment was done in May 2010. It confirmed the earlier finding that EALIP clearly has no previous exposure to Bank financed procurement experience, although the Authority has a cadre of competent procurement function staff and management reporting to the Director General of the Department of Finance and Administration in charge of handling EALIP's own procurement of goods, services and materials from the market. The civil works component in quaternary canals (marwa level) irrigation system construction, given the negative experience when attempts were made to contract marwa level on a competitive selection basis on the one hand, and the W-10 project area success under the ongoing IIIMP on the other hand, would be implemented through EALIP's own departmental forces for a limited period of the first 18-24 months.

13. The rationale for the Borrower's request for using Force Account (as provided for in Bank procurement guidelines by EALIP to carry out the civil works component of marwas during the proposed project's initial implementation period) is the apparently less than satisfactory outcomes in quality and timeliness when attempts were made in the past to tender the overall small and scattered marwa works to the private sector. The Bank team had previously expressed its commitment to EALIP management to further explore how and when procurement for CDD subprojects for marwa communities can be suitably adopted to reflect conditions on the ground under Agricultural Cooperatives and/or mesqa-level WUAs. The May 2010 assessment has determined that the legal framework for WUAs (although not directly referencing marwa communities) does not stipulate the exclusion of marwa communities as farmer organizations who are already members of WUAs from being organized sufficiently and with the requisite capacity building to undertake the responsibilities of community contracting. The POM would clearly define the minimum requirements for how this CDD certification protocol would work as well as "community force account" under community contracting. The second option can actually be cost effective (inputs can be provided by the marwa communities themselves at below-market-costs) and enables the FIMP to inject funds to the farmer groups (e.g. through payment of wages and materials).

14. The key issues and risks concerning procurement aspects for implementation of the project have been identified and include: (i) broad unfamiliarity of EALIP technical staff with IBRD guidelines notwithstanding that EALIP has a cadre of competent procurement function staff and

management; to help mitigate the risk of unfamiliarity EALIP has in the process of establishing a designated Project Support Team (PST). The PST would consist of technical (3 engineers) and fiduciary staff (4 staff) who will soon be receiving support from GTZ under a human capital grant to EALIP; (ii) For a limited period of about 18 months use of EALIP's project staff comprised of its own labor force, engineers and on-farm irrigation equipment under force account, (iii) The bid documents used for contracting CDD projects can be cause for fiduciary risk since they often involve a multiplicity of stakeholders, which enhance the management and coordination burden on EALIP.

15. The use of fixed-price contracts using verifiable unit rates will ensure transparency during the early phase of implementation. However, after the pilot phase (when marwa communities have had a chance to benefit from FIMP sponsored capacity building mandatory use of sample bid documents for contracting marwa-level subprojects using "shopping for works") local contractors would be called upon to submit quotations which shall be all opened at the same time in the presence of marwa communities or WUAs. The simplified quotation forms (which describe the scope of works, detailed specs and drawings where possible) and also the sample contracts would be included in the POM to be finalized by Effectiveness.

16. The overall project risk for procurement based on the update in May 2010 to the preliminary assessment done in November 2009 is SUBSTANTIAL.

Procurement Action Plan

Issue/Problem	Remedial Actions	Responsibility	Estimated Timeframe
Component 1:			
EALIP which has the necessary technical and procurement staff to properly address the compliance regime under Law 89, has no previous experience with Bank financed procurement.	A Technical/Fiduciary quasi PIU (since it will not be ring-fenced entity) for FIMP, as well as for other projects EALIP is arranging for its co-financing by other DPs such as IFAD, KfW would be set up. EALIP's Project Operations Manual will provide generic guidance and templates for use by the quasi PIU to be established in the Department of Finance and Administration in EALIP.	EALIP	By appraisal in June 2010. Prior to project Effectiveness
WUA/marwa-level community contracting and Community Force Account will generate significant numbers of low value works contracts below the prior review	The post review contracts by marwa-level communities will consist of reviewing technical, financial and procurement reports carried out by consultants hired under the FIMP according to procedures acceptable to the Bank.	Bank Task Team	In about 12-18 months post Effectiveness date

threshold.			
	Remedial Actions	Responsibility	Estimated Timeframe
Component 2: Institutional Capacity Development			
Weak capacity of EALIP particularly for implementing Component 2 in terms of capacity to recruitment consultants in line with Bank guidelines	For capacity building: (i) periodic workshops on upstream actions (tech. specs. and TORs) necessary prior to preparing and issuing BDs and RFPs; and (ii) on-going TA during the project implementation period.	EALIP	Prior to project Effectiveness

C. Procurement Plan

17. EALIP has developed a draft procurement plan for project implementation to be finalized during Negotiations which provides the basis for the procurement methods. This plan will be signed and be part of the minutes of Negotiations between the Borrower and the Project Team and will be made available at EALIP offices in Cairo. It will also be available in the project's database and in the Bank's external website. The Procurement Plan will be updated in agreement with the Project Team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

D. Frequency of Procurement Supervision

18. In addition to the prior review supervision to be carried out from Bank offices, the capacity assessment of EALIP to be finalized at appraisal would confirm the need for at least two annual supervision missions.

E. Prior and Post Reviews

19. *Prior Review and Methods Thresholds.* The first 3 contracts for both CDD and small-scale contracting approaches would be subject to prior review by the Bank. However, prior review of only a limited number of goods contracts is expected. As per the July 2009 OPCPR Guidance Note, the post review of CDD contracts awarded by marwa-level communities will consist of reviewing technical, financial and procurement reports carried out by consultants hired under the FIMP according to procedures acceptable to the Bank. For consultant service assignments, most contracts will involve prior review. In terms of applicable post review, given the SUBSTANTIAL risk rating, all ICB contracts and the first three contracts of each category regardless of their value will be subject to prior review. In addition, the first two NCB contracts at the beginning of each calendar year will be subject to prior review. All other contracts under FIMP will be subject to post review as part of project supervision. This action is required to mitigate the risk of any capacity issues that may occur during implementation including changes in procurement staff..

Annex 9: Economic and Financial Analysis

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

Introduction

1. The continuous growth in the demand for water, together with the impossibility of enlarging its availability, determines that Egypt has no option other than to improve the productivity and sustainability of the use of this resource. The Irrigation Improvement Project (IIP), implemented by the Ministry of Water Resources and Irrigation (MWRI) between 1994 and 2006, aimed to increase agricultural production and farmers incomes while enhancing equity, over about 200,000 feddan. It did this by improving main and secondary canals, control structures, and tertiary systems (single point lifting pumps on tertiary canals or mesqas, substituting for dozens of individual private pumps); and by forming water user associations (WUAs) for introducing participatory irrigation management. The project has demonstrated its potential for enhancing agricultural productivity and farmer incomes, and hence for alleviating poverty, through improved physical and operational status and efficiency of irrigation systems. Increased rental and land values stemming from the improvements were seen as a clear indicator of real IIP-generated assets being financed to beneficiaries that are mostly poor.

2. At the final stage of the IIP, a 6,000 feddan pilot area (W-10[31]) was introduced for testing innovative new approaches and design criteria for improvements that were at the time planned to be taken up by the follow-up project, the Integrated Irrigation Improvement and Management Project (IIIMP). The new approach extended the IIP improvements to i) the electrification of mesqa pump stations; ii) the reduction of then oversized pumps, conveyance pipes, and control valves; iii) the introduction of radical improvements of the quaternary or marwa canals - with most of them being converted to low pressure pipelines; and iv) on-farm land improvements including laser land leveling, soil amendments, etc. W-10 was completed under the currently ongoing IIIMP and implemented through cooperation among ministries, with MWRI handling mesqa and mesqa pump station improvements, and marwa reconstruction and land improvements handled by the Ministry of Agriculture and Land Reclamation's (MALR's) Executive Authority for Land Improvement Projects (EALIP). Meanwhile, WUAs were formed and mandated to take over operation of the mesqa pump stations and canals. The underlying rationale of the W-10 pilot was that what could be demonstrated to work in the 6,000 feddan should work elsewhere in Egypt since the area presented in concentrated form most of the problems of irrigation in Egypt.

3. The focus of the current project is on scaling-up these W-10 pilot validated improvements in the former IIP areas, together with improvements in MALR extension service delivery to extract the maximum benefit for the farm community out of these irrigation improvements, on up to 200,000 feddan (80,000 hectares). In part, this scaling-up in turn will be a pilot for the implementation of a proposed national program of irrigation improvement over 5 million feddans by 2030, which will require a combination of the higher level upgrades executed by MWRI in IIP and IIIMP, and the farm level improvements of this current project. This Annex presents the

[31] W-10 is a tail end area of IIP project area, with restricted water supply at peak summer season, which used to be forced to rely on recycled, highly polluted drainage water due to water shortages, especially at the tail ends of the canal system.

methodology used for the ex-ante economic and financial analysis of this farm level program, describing the outcomes and impact that could be derived from project interventions. It also presents some of the design alternative assessments and underlying criteria used to support the selection of alternative project interventions.

Project Area and Development Approach

4. The project development objective is to increase agricultural profitability and improve equity in access to higher-quality water for up to 140,000 small-scale farmers on up to 200,000 feddans (80,000 hectares) in the command areas of Mahmoudia, Manaifa and Meet Yazid located in the Nile Delta. These areas were previously improved (down to the mesqa level) under the IIP. Upstream IIP interventions, both physical and institutional[32], have occurred and are fully functional. The PDO would be achieved through modernization of the marwa network (including adjustments at the mesqa level where necessary) and the farm-level irrigation systems, and though improved water management practices. Improvements would also increase overall water use efficiency. The FIMP area comprises also some orchard areas and some pilot activities will be developed to validate several improvements aiming to support cultivation of higher value crops. This could lead the way for accelerating the productive diversification of the Old Lands which are mostly based on field crops that offer limited opportunities for substantially higher incomes, especially given the small sizes of most farms.

5. The main physical advantages provided to farmers by the project, beyond those achieved in IIP, will be i) switching to electricity as a source of power for pumping; ii) provision of structural quaternary (90 percent PVC pipe, 10 percent brick and mortar rectangular channel) with off-takes to each farmer's field. No farmer will have to receive water from another's field, and tail enders should receive as good service as those at head of quaternaries; iii) provision of water under pressure (2.5 bars), capable of supplying simple bubbler hose systems, capable of supplying individual trees or plants, reaching every corner of field; iv) land leveling for excellent irrigation, in terms of lack of ponding, and other land improvements such as gypsum application for improved use of nutrients, and improved drainage. In addition, a larger and more focused agricultural extension program, strengthened with a series of demonstration areas, and funding to carry farmers to those areas at their request to observe developments, in both irrigation and cropping per se, is part of the FIMP project.

Project Investment Costs

6. For purposes of this economic evaluation, all costs of the current FIMP project, for both Components 1 and 2, were considered in the economic and financial analysis. On the other hand, no costs expended before this project, e.g. those for IIP and IIIMP projects stretching back to 1995, were considered; they were regarded as sunk costs. It should be noted that this fact,

[32] Beyond the physical innovations outlined above, IIIMP is actually handing over completed infrastructure to WUAs and their federations and drainage boards, is attempting to commence the radically new continuous flow operational procedure to replace the ancient rotational irrigation method, and is attempting to begin the reorganization of irrigation management from a system based on the three fragmented divisions of the MWRI (with separate hierarchies for drainage, irrigation, and pump stations) to an integrated one based on geographical areas - hence the "integrated" in its name. Another institutional innovation in this process is the unprecedented degree of operational cooperation being achieved between EALIP of MALR and the Irrigation Improvement Service of MWRI.

based on the reality of a niche of 200,000 feddan with almost all upstream work completed by previous operations, will give the FIMP project higher rates of economic and financial return than can be achieved later on by the proposed national irrigation improvement program, over 5 million feddan of old lands. For that project, the sorts of upstream investment already implemented under projects like IIP and IIIMP will have to be implemented alongside the farm-level irrigation investment program proposed here.

Expected Benefits from FIMP

7. While most of the benefits created by the project will be private goods, i.e. benefits to the participating farmers (and their families) themselves**,** there will be some public goods created as well. First, the project should be able to save water (about 18 percent of current usage**,** see below), due to improved method of conveyance to the fields, with each being served by a structural conveyor and outlet (hydrant). Field-to-field flooding loses considerable water to drains, evaporation, and evapotranspiration of weeds; in each case, losses are permanent in the season itself, they cannot be recovered, because of the proximity of the project area to the sea, and the fact that saline intrusion long ago salinized the aquifer below the project area. Thus part of the wastage of water in the project area, are true losses, and can be recovered for use elsewhere, by administrative authority higher up in the system, or failing this, by the project area farmers themselves, for more production. The value of this water is surprisingly high, virtually enough to justify the project in itself (paragraph 17). The decision to convert from diesel to electric pumping will also result in some positive environmental impact from reduction of carbon emissions and of pollution from spills of diesel fuel.

8. At the private level, benefits could be summarized in one or several of the improvements in the following aspects: (i) production and productivity increases (due to enhanced water distribution efficiencies, timely irrigation, equity for tail end farms, improved water quality and quantity, improved drainage, reduced water table and water and soil salinity, etc.); (ii) land gains for production and/or communal service space (due to covering of marwas); (iii) reduced irrigation costs (depreciation and O&M costs of pumps: energy costs, labor, etc. due to enhanced water productivity, fertilizer savings, reduction of weed control costs and of marwa maintenance costs); (iv) change in cropping pattern (due to improved reliability and timely access to water, less risks, and renewed technical assistance providing support for reconversion to higher value crops); and (v) increased water productivity (conveyance speed is increased, controlled drainage is introduced, land leveling is applied, higher yields and lower costs of irrigation are attained, etc.).

9. The improved production aspects mentioned above as benefitting the project area are all being estimated and are being introduced in crop and farm representative budget models with FARMOD[33] to represent the "with" and "without" project situations. Modeling facilitates the quantification of most of the above mentioned benefits that the project interventions would bring about. It also facilitates assessing the capacity to pay of beneficiaries for cost recovering the on-farm project financed capital investments.

[33] FARMOD is a software developed by FAO and the WB for evaluation of agricultural projects

Financial Analysis

10. A first estimate of the financial benefits of the FIMP was prepared based on the findings of previous evaluations of the on-going IIIMP including the W-10 pilot area, and through field visits done by the preparation mission members. Previous IIIMP Bank missions worked closely with officers of the Center of Agricultural Economics and Statistics of the MALR for building the representative crop budgets and cropping patterns for the project area, simulating the situation before and after the irrigation system improvements. Inputs from the M&E team of the IIIMP, based on monitoring information being obtained from SWERI and WMRI for IIP and IIIMP were also used. Benefits from the marwa and the on-farm improvements, including the proposed dissemination of improved technologies were estimated over those attributable to the mesqa improvements completed under IIP.

11. Crop models for the most important field crops being produced in the project area, including wheat, berseem, clover, broad beans, sugar beets, winter and summer vegetables, rice, cotton and maize are being updated. As representative of the orchard crops, models were prepared for citrus, guava, apple and grapes. In each crop budget table, columns *without the project* are considered to be representative of the existing situation, and the *with the project* columns provide the average expected changes to be induced by the proposed project improvements, including higher yields, reduced irrigation costs and water consumption, etc. The resulting income before and after labor costs allows for quantifying the average net benefits that could be attained at each crop level. The following Table 1 summarizes the assumed yields and resulting net income parameters of the main crops cultivated in the area, both before and after (as an approximation of "with" and "without") the irrigation improvements.

Table 1. Average Incremental Yields and Incomes by Crop

	Crop Yields (kg/fed)			Income (LE/fed)		
Crop/Activity	Without Project	With Project	Increase %	Without Project	With Project	Increase %
Wheat	2,700	3,000	11%	2,418	2,924	21%
Berseem Long Season	35,000	40,000	14%	3,923	4,790	22%
Berseem Short Season	20,000	24,000	20%	1,903	2,529	33%
Broad Beans	1,300	1,500	15%	2,552	3,173	24%
Winter Vegetable	12,000	13,500	13%	1,919	2,503	30%
Rice	4,000	4,500	13%	3,272	4,169	27%
Cotton	1,300	1,500	15%	3,234	4,276	32%
Maize	3,600	4,000	11%	2,133	2,660	25%
Summer Vegetables	14,000	16,500	18%	5,108	6,740	32%
Citrus	9,000	10,500	17%	2,930	4,495	17%
Guava	10,000	11,500	15%	9,830	12,295	25%
Grapes	10,000	11,500	15%	14,830	18,045	22%

12. As can be seen from the expected productivity gains and values detailed in Table 1 yields could be increased by 11 – 20 percent while net incomes per cultivated feddan would increase between 17 – 32 percent as a result of the combined effects of increased production and reduction in the irrigation costs (reduced labor and energy costs, etc.). It can also be observed that citrus and guava orchards could generate more than double the net income provided by

summer and winter field crops, and grapes about four times what is obtained with traditional field crops.

13. Farm model budgets representing the typical rural household production systems including the most important activities and sources of income, production costs, off-farm employment, repayment of the cost of project improvements in 10 years, and other relevant parameters allow for estimating the expected beneficiaries' family incomes before and after improvement of the irrigation system. A summary of these models' resulting indicators are shown in the following Table 2.

Table 2. Farm Models: Estimated Income Increases (in LE/farm)

	Income Increases (%)	Model size (in fed)	FIMP Area per model (fed)	Number of Farms	Farmers net Income	
					Without Project	With Project
Traditional Field Crop Areas			200,000	140,000		
Model 0.75 feddan (30% of area)	**12%**	0.75	60,000	80,000	15,777	17,603
Model 2 feddan (50% of area)	**17%**	2	100,000	50,000	17,931	20,946
Model 4 feddan (20% of area)	**29%**	4	40,000	10,000	29,782	38,543

14. The models confirm the financial feasibility of the proposed improvements and project support activities and the positive impact on beneficiaries' family income. As shown in the table, the project investments would allow not only about 15 - 18 percent of water savings but obtain a significant increase in household income, ranging from 12 percent to 29 percent just from FIMP induced efficiency gains. If some conversion to higher value crops would occur, the income increases could easily be doubled in only 8 years time.

15. About 25 percent of the FIMP costs correspond to the installation of new electrical grids in the project area, as well as the substitution of pump-sets and the required civil works. The electrification of pumps at the mesqa level besides reducing O&M costs including energy and labor will enhance convenience; they will also reduce noise and air pollution as well as other ambient pollution from oil spills. An additional financial benefit that could be claimed by WUAs could be to tap the carbon finance (CF) against the greenhouse gas (GHG) emissions reductions (ERs) associated with the diesel-to-electrification switch. Alongside electrification, the single-point pumping at the mesqa's head, the marwa/on-farm improvements, and the timely irrigation would all ration the pump sizes, thus minimizing the at-source GHG from the thermal electric plants. Tentative estimates of the ER were done based on a pilot study on W -10 area, sized at 6,450 feddans:

- Energy consumed in pumping within the W-10 area was about 1,400 MWh/year;
- Diesel emission-to-energy factor being 1.5 tCO2e/MWh. Accounting for the extra oils needed for engine lubrication, the factor arrives to some 1.75 tCO2e/MWh
- Thus, CO2 emissions reduced in W–10 area amount to 25,000 tons/year, and for the FIMP area would amount to about 750,000 tons/year;
- At a minimal purchase price of $4/tCO2e, remuneration for the ERs amounts to $3 million per year (LE 16.8 million) which could help farmers to recover at least 20 percent of all irrigation costs.

16. **Cost Recovery.** Egypt has one of the most highly developed cost-recovery systems in the world for water resource investments, which will be applied here. Theoretically, it diverges widely from Bank thinking, as it is not related to volume of water used and hence is not a disincentive to wastage of water. Indeed, it is not related to operations and maintenance at all. The policy and law is actually based on 100 percent recovery of capital investment on behalf of farmers, but without interest, for religious reasons. Thus the length of the repayment period determines the degree of cost recovery. Historically, larger-scale irrigation investments under MWRI (including Bank-financed investments) have been recovered from farmers over 20 years, which in recent years has equaled a true cost-recovery of about 45 percent. From the farm model budgets it appears that the repayment of the FIMP capital investments (about 200 LE per year during 10 years) would represent less than 10 percent of the expected increases of net family income to be induced by the project.

17. EALIP's own tradition, focused on lower-level and smaller-scale works such as laser land leveling, soil improvements (gypsum applications), field drain reshaping, and other activities which will also be done under FIMP, is for a 10-year repayment period, and this is proposed for the current project for installation of marwa pipelines and all other project irrigation and land improvement investments. Agreement to these terms by every farmer to be included in the project will be a critical step in the marwa planning process. This will give a capital cost recovery close to 65 percent, which is possibly the highest in Bank history, but still readily affordable from net income benefits to the farmers (see below). All irrigation and EALIP cost recovery is recovered from farmers together with the annual land taxes, is based on land areas, and has a very low incidence of avoidance.

Economic Analysis. Financial prices were based on 2009 data[34]. Conversion Factors (CFs) for shadow pricing were applied for energy costs, based on recent estimations (CF were 3.07 and 2.15 for diesel and electricity costs respectively), given the high levels of existing subsidies on Egypt's energy market prices. Economic prices for traded inputs and outputs are not expected to show major variations according to the most recent forecasts of commodity prices prepared by the World Bank. No adjustment was considered for labor costs. From the analysis, the economic value of water saved was estimated based on the residual imputed value approach (average net economic value generated from irrigated agriculture in the area). The average for the project area, given the existing cropping pattern, is LE 454 per thousand cubic meter of water. Overtime water is having an increasing opportunity cost as it becomes scarcer, the productivity increases, the horizontal expansion of irrigated areas continues to grow, and higher value crops gain more space.

18. Aggregating expected results throughout the FIMP project area after all improvement costs are matched with the quantified expected benefits to be obtained by beneficiaries through their production activities, allows for the assessment of the project results. With project improvements

[34] Since the mid-1980s the GOE has moved from an emphasis on state planning and high level of protection towards a reliance on private economic activity and trade openness. Especially since the late 1990s, Egypt has been committed to macroeconomic stability and private sector development; it has privatized several state-owned firms, and made legal reforms to spur private investment. In addition, the government has also pursued a policy of trade liberalization, the elimination of quantitative restrictions on imports, and the reduction in tariffs overall. However, huge energy subsidies distort considerably market prices by creating additional advantages to some sectors relative to others. Not only do energy subsidies distort the incentive framework, they represent a high fiscal cost. Energy subsidies are estimated to cost more than US$7 billion per year.

water consumption in the project area could be reduced by 18 percent from 1.45 billion to 1.19 billion m^3 per annum as a result of the new improvement package to be implemented including piped marwas, reduction of water duties, irrigation scheduling, land leveling, technical assistance, etc. As the net value of production is expected to increase with the project from LE 657 million to LE 991 million at project maturity, the resulting productivity of irrigation water could be increased by 83 percent (from LE 454 to LE 833 per thousand m^3). The ERR for the FIMP investments was estimated at 28.9 percent and the NPV (with a 10 percent discount rate) at LE 1,152 million without assigning any value to the expected benefits in public goods: (i) the water use being reduced for its use in other sectors or areas; or (ii) the environmental benefits. The expected high ERR is mainly due to the fact that the FIMP is capitalizing the IIP investments, which were considered sunk costs in this exercise.

19. The Bank team considered different alternatives to the design of the project. One was the electrification of about 85 to 90 percent of the pump sets in the FIMP project area, given that most farmers are demanding it based on the significant irrigation operational cost reductions that this source of energy would bring, and the consequent increase in income from irrigated agriculture. However, the electrification of these pump sets requires the installation of new electricity grids in the area which would cost (together with the substitution of aging diesel pumps with electrical pumps) about US$ 40 million in additional investments. A marginal analysis was undertaken towards the analysis of the impact of this project design alternative. Results showed that if all the incremental investment including 100 percent of the investment in the new grid is confronted with the benefits stemming from the farmed area only, the ERR of the cash flow showing the difference between with and without electrification of the area/pumps, is 26 percent and the NPV LE 160 million, increasing the overall NPV from LE 992 million to LE 1,152 million.

Conclusions

20. The assessment allows for the justification of the project from the financial and economic perspectives. It demonstrates that the expected benefits from marwa and on-farm improvements in the IIP previously improved area would result in significant incremental benefits both from the point of view of the benefited farmers and of the country's economy. Indicators about IIIMP results being obtained by the M&E Unit, IWMI, SWERI, and MALR can provide additional data for revising the expected water efficiency improvements, irrigation water use under different scenarios, and the production and costs parameters to be averaged for each crop, and should be monitored during implementation.

Annex 10: Safeguard Policy Issues

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

Overview: Environmental assessment and management, and responsible institutions

1. The project focuses on 200,000 feddans in 3 sub-basins:
    a) Mahmoudia: northern edge of West Delta;
    b) Meet Yazid: El Wasat in Middle Delta; and
    c) Manaifa: Northern edge of Middle Delta, immediately south of Lake Burulus;

2. These sub-basins almost overlap with the same boundaries of IIIMP; whereas in terms of a spatial focus, FIMP focuses on modernizing the quaternary-canal and on-farm subsystems of IIIMP. Thus, as far as the safeguards policies concern, FIMP is deemed a "sub-set" of IIIMP. For purposes of OP 4.01 on Environmental Assessment: since IIIMP already operates under an ongoing well-developed ESMP and RPF, the MENA and GOE preparation/appraisal teams have agreed to undertake an EIA & EMP for FIMP (environmental impact assessment and environmental management plan).

3. The EIA/EMP confirmed that FIMP is classified as Category B, given that no significant, irreversible or long-term adverse environmental impacts are anticipated and that any identified adverse impacts can be effectively addressed through appropriate preventive actions or mitigation measures. These and other environmental issues were examined during the EIA/EMP. Also the overall environmental impact of FIMP is expected to be very positive: the marwa and on-farm improvements (Component 1) and farm technology modernization (Component 2) will overall help improve water management in the Delta.

4. The EIA/EMP has been conducted by SWERI[35], which will house the Environmental Management Unit (EMU) for FIMP. SWERI will be responsible for providing guidance and technical monitoring for implementing the EMP, whereas EALIP and SWERI (in coordination with few other institutions as described below) will manage the day-to-day EMP activities (depending on type/scale of the mitigation/activity). The EMP will also essentially build on the ongoing IIIMP-ESMP that is being implemented by MWRI.

5. The EIA/EMP has aimed at:
    a) Priority 1: Minimize any likely negative impact on environment (primarily water quality);
    b) Priority 2: Assess likely positive impacts on water and soil quality (being one of several intermediary outcomes expected from FIMP, per its design).

6. In so doing, SWERI has undertaken in-situ sampling for the following parameters:

[35] SWERI is equipped with new laboratories with the following water-quality analysis instruments: Plasma (ICP); GC Mass and HPLC; EC and pH meters; Atomic Absorption; BOD and COD sets; Spectrophotometer. SWERI seeks to obtain ISO-17025 CERTIFICATE.

a) pH, EC, Cations, Anions, RSC and SAR.
b) Zn , Fe , Mn , Cu , B, P, NO3-N and NH4-N.
c) Pb, Cd , Mo, Cr, Co and Ni.
d) Pesticides residues (Positive / Negative).
e) Pathogenic indicators (COD and BOD).
f) Bacteria (Total Coliforms, Fecal Coliforms, Salmonella and Shigella).

7. These parameters are sampled in several parts of the water cycle: (A) soil, (B) crops, (C) ambient canal and drain in-stream waters, and (D) sludge accumulating at bottom of canals/drains (to give a sense of the quality of the substrate) [36].

Likely negative impacts and their mitigation

8. The EIA assessed the likely negative impacts including measuring the baseline concentration for the water-quality parameters that may unfavorably increase due to the project. These are primarily the "diffuse" pollutants resulting from residues of the agricultural pesticides/herbicides and fertilizers. In addition to measuring these baseline concentrations and comparing them with the permissible standards, the EIA attempted to indicatively estimate the likely increase (if any) in these concentrations after implementing the project (associated with increasing the yield/hectare in several sub-areas/tail-ends). To address the likely impacts, the EMP proposed a combination of preventive actions and mitigation measures, including environmental monitoring/benchmarking (SWERI) and institutional capacity building (SWERI and EALIP). The checklist of possible negative impacts, and their mitigations, can be summarized as follows:

Likely site-specific impacts

9. Intensifying crop production (observing OP4.09 on Pest Management): FIMP will neither procure pesticides nor aim at horizontal expansion of irrigation lands. However, FIMP could result in intensifying crop production in terms of vertical expansion (likely no more than 30 percent), which could increase the residual pesticide/fertilizer load per hectare in some FIMP areas. However, the likely increase in their pollutants concentration may not exceed 20 percent of their current baseline level, which will still be well below the permissible WHO/GOE standards. The baseline data from MWRI/IIIMP taken from the Mahmoudia area indicated that the baseline concentration of the pesticide residues in irrigation canals scores lower than 50 percent of their permissible norms (see details in Appendix #1 below). Also the baseline data from the samples taken by SWERI from crop tissues (shoots and roots) in the 3 FIMP command areas indicated that there is sufficient content of micro and macro nutrients in these crop tissues (source: EIA tables on the water quality measurements in FIMP's 3 areas). This implies that the presence of some pesticide residues in irrigation water has not negatively impacted crop growth. Nevertheless, provisionally, OP4.09 has been triggered. The EMP of FIMP would (as in the case with the ESMP of IIIMP) apply the good-practice IPM measures (with SWERI oversight and per the national mandate of MALR) in case these pollutants violate their norms in few specific FIMP sites. During FIMP implementation, if SWERI determines that these residuals tend to approach

[36] The baseline sampling and analysis for this particular media will be duly completed after FIMP effectiveness, in coordination with IIIMP.

their permissible norms in any specific FIMP site (in the irrigation water, soil or crop tissues), the EMP would apply the ongoing good-practice IPM preventions/mitigations per the existing national mandate/program of MALR (with SWERI oversight), which will be further facilitated by the extension activities introduced by FIMP. Control of pesticide application is already an ongoing policy of MALR, and the success of enforcing this policy has been observed in the general long-term downward trend in misusing pesticides throughout the last two decades. This can be attributed to a number of MALR's ongoing IPM actions, which FIMP will support through its extension and EMP activities:

a) Market reform (phasing out of subsidies);
b) Ban environmentally persistent and damaging compounds such as organochlorines (such as DDT in the late 1960s);
c) Introduce a more rigorous approval and registration system for pesticides;
d) Increase availability of low-dose compounds (requiring applications as low as 5 g/ha in contrast to more than 2 kg/ha with older pesticides practices);
e) Discontinue inefficient methods of application (aerial spraying) and phasing out of aquatic weed control by agro-chemicals;
f) Promote better awareness of pesticides and environmentally-benign management systems to manage pests (Integrated Pest Management IPM); and
g) Ensure adequate monitoring of the FIMP sites, and hence ensure the enforcement of the prevention activities noted above.

10. Civil works: There is a need to avoid/minimize impacts related to FIMP civil works (e.g. disposal of construction waste, quarries and borrow pits, disruption from contractor vehicles/equipments to the surrounding roads, etc). The mitigation (mimicking the practice in IIIMP) would be to include respective clauses in the contract-bid document, mandating the contractor (under EALIP/SWERI oversight) to avoid/minimize these impacts. These clauses would also mandate the contractor to purchase environment-related insurance certificates. In the bidding document, there are only four insurance certificates covering:

a) Any damage due to contract works including construction materials, preparation for work and construction components;
b) Any damage to construction equipment;
c) Any damage for assets within the project area due to construction activities; and
d) Any injury or death due to construction work.

11. The special conditions in the contract will state that the contractor should not cause any damage to the surrounding environment during the period of implementation of the contract and ensure no contamination of waterways will occur as a result of equipment, machinery or means of transport or due to the remnants from their operation with lubricants, fuels, oils and grease. In the event that a contractor damages the environment, the project manager will evaluate the cost of the environmental damage and then impute its mitigation (cost) on the contractor according to article 12 (contractor risks) and article 48 of the general conditions of the contract (costs of remedies). See details in the Appendix 2 below.

12. Likely component-specific and location-specific impact: While FIMP would improve soil salinity for most tail-enders, (due to reducing fresh-water shortage and/or helping to replace the unregulated reuse of drainage), front-end farmers who used to flood their lands with water may encounter reduced on-farm water application to an extent which raises salinity and concentration of other water-quality parameters unsuitable for horticultural crops (Component 2). However, generally, FIMP farm-level technologies are designed to provide better field distribution of water. Mitigations such as applying irrigation water with some extra leaching fraction, improved drainage, and use of gypsum, can all be facilitated by the technology switch offered by FIMP, hence reducing salinity as needed. Also horticulture activities should be implemented only in suitable areas following water/soil quality testing.

13. OP 7.50 on International Waters is triggered. However, FIMP will not adversely change the quantity or quality of water flows to the other riparian countries, and will not be adversely affected by the other riparian's possible water use. This determination has been made on the basis of the assessment carried out during the preparation of the proposed Project, including the Project Environmental Assessment and supporting documentation. Based on the nature of the project and in compliance with OP 7.50, the review of the project has concluded that while the OP is applicable in this case, notification of riparian is not mandated. Indeed, the proposed Project will rehabilitate existing irrigation schemes and does not include any investments to upgrade the capacity of the upstream supply infrastructure (secondary canals, main canals and/or main pumping stations). Replacing existing earthen field ditches with buried PVC pipes and laser-land leveling is expected to reduce irrigation water conveyance loses. Buried PVC pipes will reduce water borne bacteria and parasites. Egypt is the farthest downstream Nile riparian and the target command areas are in the farthest downstream (northernmost) area of the country. Therefore the project will not affect the quality or quantity of water flows to the other riparian and it is not expected to be adversely affected by the other riparian's possible water use.

14. OP 4.12 on involuntary resettlement is not triggered. FIMP will not result in resettlement or land acquisition; the main focus is on marwa-level and on-farm improvements where farmer participation is fully voluntary; also modernizing the marwa will result in a net increase in the farmer’s irrigable land area. The upgrading of transmission lines will be carried out to ensure that any impacts on farmers are minimized. Farmers will be consulted prior to implementation and must agree to the proposed alignment. If farmers object, the alignment will be modified accordingly and the process will be carefully documented. Any crop damage would be minimal and will be compensated in accordance with existing procedures for crop compensation. However, the upgrading of transmission lines will generally follow existing alignments, and no private land will be involuntarily acquired as a result of the upgrading process.

15. OP 4.11 on Physical Cultural Resources is not triggered. OP 4.11 applies when projects involve "significant excavations, demolition, movement of earth, flooding or other environmental changes" or if the project is located "in, or in the vicinity of, a physical cultural resource site recognized by the government". FIMP does not involve significant excavations as modernizing the marwas will require trenches of about 1 meter in depth, and the areas in question are not considered physical cultural resource sites. Nevertheless, in case physical cultural resources are unexpectedly encountered, a mandatory “chance-find” provision is to be

inserted in the civil-works Bid Documents, thus replicating the IIIMP and other ongoing WB-supported operations in Egypt (where such provisions have been accepted by the WB).

Summary of likely negative impacts, preventative actions and mitigations

Main likely impacts	Prevention or Mitigation
Location-specific soil salinization and water logging	• Drain excess water to evaporation ponds or to the sea. • Provide irrigation with a leaching fraction. • Improved drainage. • Use of gypsum (facilitated by modernizing the on-farm system). • Focus horticulture in areas following water/soil quality testing.
Location-specific alkalinization	• Maintain canals and modernized systems to prevent leakage/seepage, allow easy access to canals to enable maintenance, reduce inefficiencies from siltation and weeds.
Site-specific increase in pesticide residues	• Support the ongoing Integrated Pest Management program of MALR. • Educate on pesticide and sewage contamination dangers.
Site-specific civil works disrupt environment	• Enforce the environment-related clauses in the contractor's contract.
Mixed results on water quality in some project sites	• Coordinate with MWRI/IIIMP to monitor both the positive and negative impacts from IIIMP and FIMP on soil and water quality.

Positive impacts on water and soil quality

16. The EIA confirmed that FIMP will complement IIIMP in terms of:

a) Generally improve soil and ambient water quality parameters such as salinity (EC), BOD, DO, fecal-coliforms, heavy metals, and salmonella;
b) Reduce soil erosion (a public benefit) and increase net farm area (a private benefit);
c) Reduce air pollution and GHEs due to electric pumping;
d) Increase the water accruing to tail-end farmers, hence helping them to do without the prevalent practice of reusing agricultural drainage unsafely (to supplement their shortage in fresh-irrigation water).

17. The latter of this positive list has been the focus of GOE in the latest decade, and has been one of the IIIMP intermediary objectives. For the big agricultural drains in the Delta (main-level drains), the official drainage-reuse plants adopted by the GOE (which ensure sufficient mixing of drainage and canal waters) are often constrained by the excessive pollution from the domestic/industrial effluents in a few of these main drains (e.g. with BOD and NH as high as 140 mg/l and 30 mg/l respectively), to the extent that GOE has closed down few of these mixing plants.

18. As for the so-called unofficial (i.e. unregulated) reuse: at least 50 percent of IIIMP command areas comprise small agricultural drains (e.g. branch-level drains), carrying significant pollution from untreated/maltreated domestic sewage (e.g. where ratio of domestic-to-agricultural effluent loads exceeds 1:10), thus resulting in DO levels much lower than 5 mg/l, BOD levels as high as 20 to 60 mg/l, and fecal coliform bacteria far exceeding 8000 MPN/100ml. Farmers (particularly tail-enders) have direct access to these small drains that are adjacent to their farms, hence they supplement irrigation water by pumping from those drains in ad-hoc manners. The consequence is that: polluted water may reach the food chain and ambient livelihoods, thus jeopardizing public health, recreation, and fishery production.

19. As shown in the two maps below (depicting the "dose" and "exposure-to-dose"), one of the several positive impacts of FIMP and IIIMP would be providing fresher water to the tail-enders, thus helping them to do without the "unofficial" reuse, in addition to helping GOE (MWRI) to do without any potentially-unsafe "official" reuse. Per the maps below, this likely incremental improvement could occur in around 50 percent of the FIMP/IIIMP command area. Benefits would include:

a) Improve equity, reliability and convenience of on-farm freshwater delivery;
b) Increase crop yields at tail ends (e.g. by 10 percent to 20 percent) due to reducing soil-water salinity[37] and/or due to increasing the fresh-water quantity; and
c) Improve public health (reduce morbidity and mortality), water-related recreation, and fish production in the Nile and its northern lakes (by raising DO levels above 5 mg/l, being the norm below which fish production will decrease).

Consultation:

20. Farmers along the marwas in the project area who choose to participate will be the primary beneficiaries. Consultation records have been provided in the EIA/EMP during project preparation, as ten farmer representatives (farmer cooperatives) in the project's 3 command areas were interviewed about their views on: the best option to improve the marwa; the expected benefits from the project; and the EIA results and EMP-related prevention and mitigation actions. The participants' feedback was positive on these 3 aspects (see summary Table below). In addition to the consultations carried out in the context of EIA/EMP preparation, social aspects (see also Annex 15) of the project design were informed by the main findings of a socio-economic study recently carried out by GTZ in a pilot area where marwa improvements have been implemented (On-field (marwa) improvement in the Nile Delta of Egypt, November 2009). This study included in-depth consultation with farmers. A 12-step Marwa improvement process is detailed in Annex 6 which includes consultations and the establishment of Marwa Committees. While the farmers are likely to benefit considerably from the project, an additional study has recently (June 2010) been initiated to identify potentially vulnerable stakeholders. This study (a social survey of the impacts of irrigation modernization in Egypt on women and men tenants and

[37] Particularly in the summer peak-demand period, the unofficial drainage reuse at the tail ends prior to IIP and IIIMP amounted to 30-40 percent of the volume of on-farm irrigation water per farm, which led to increasing soil salinity, loss of soil quality, and reduction in crop yield. After introducing IIP and IIIMP, it is reported that the soil-water salinity at the tail-end farms has been improved.

agricultural workers) will further strengthen consultation with local stakeholders through interviews and a variety of focus group discussions.

Table: Percentage of consulted farmers* agreeing on impacts of FIMP**

Parameter	%
1- Increase crop production	100
2- Increase Agriculture area	100
3- Deeper Groundwater	90
4- Lower soil salinity	100
5- Reduce application of chemical fertilizers	40
6- Reduce application of chemical pesticides	60
7- Prevent seepage from marwa ditches	100
8-Save energy	100
9- Reduce Blight insects	100
10 - Protect Farmers Health from direct contact of irrigation water	100
11- Overcome earth Borer risk	100

***Note: Some of the consulted farmers complained that their lands encounter shallow groundwater table due to high water level in adjacent main drain (e.g. from discharged wastewater from Slater buildings), or because manholes and collectors are blocked. They implied that these "external" factors undermine the benefits from modernizing the mesqa or the marwa.

The EMP subcomponent (subcomponent of FIMP Component B): SWERI-EMU, EMP Institutional Arrangements, and Budget Breakdown

21. As there is no safeguard policy triggered apart from OP4.01 and OP4.09, the budget allocated for the EMP subcomponent of FIMP (housed by EMU in SWERI) may not exceed US$1 million, because most of the above-listed EMP measures/mitigations are already part of the mandate of SWERI and MALR/EALIP (in coordination with MWRI/IIIMP). The activities under this EMP subcomponent include:

a) Monitor, assess and mitigate any site-specific excess residues from fertilizers or pesticides, thus enforcing the above-mentioned national IPM program of MALR;
b) Assess and mitigate any site-specific increase in soil salinity or erosion;
c) Ensure that the civil-work contractors abide by the EMP-related clauses of the contract;
d) Assess and mitigate salinization, alkalinization or contamination by heavy metals in the water;
e) Assess and mitigate any site-specific irrigation-canal leakages that may impact the environment;
f) Evaluate contaminated levels of groundwater and suggest solutions;
g) Monitor soil fertility and groundwater salinity to ascertain the extent of salinization problems;
h) Develop nutrient management practice at the farm-level;

i) Support FIMP (EALIP) with obtaining the M&E indictors on the EMP-related negative and positive impacts;
j) Improve farmer public awareness on on-farm environmental management; and
k) Enhance capacity building of SWERI and EALIP in the field of environmental impact assessment and management.

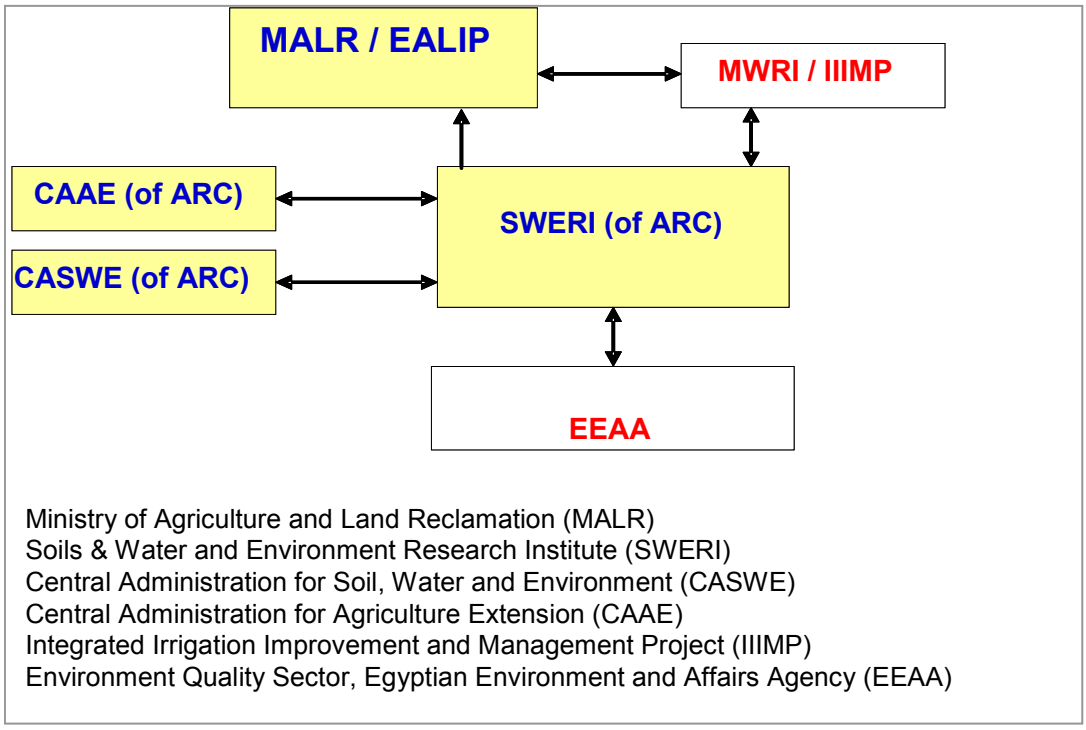
Institutional Arrangements for EMP Implementation and Reporting (who will do what):

22. MALR agencies would lead project implementation. A Project Steering Committee will be established, chaired by the ARC (which includes SWERI), with membership of MALR, MWRI (mainly IIIMP), project area governorates, private sector and civil society, farmer associations and others. Its Executive Director would be responsible for project management and supported by staff responsible for M&E, financial management, procurement, and reporting. MALR's EALIP would be responsible for farm-level irrigation improvements at the marwa level, and hence would coordinate with the MWRI at the interface with the mesqa level. The ARC (primarily through the EMU in SWERI) will lead the EMP implementation with support from EALIP and other MALR entities, each per its mandate, as follows:

1. **SWERI:** To take the water-quality samples, do the lab and desk analysis of the samples, undertake TA studies, and hence provide recommendations to guide the implementation of the EMP. SWERI will also provide training (for MALR staff) in-situ as well as on its premises, and will provide EALIP (PMU) with the M&E progress reports of the EMP.
2. **Central Administration for Agriculture Extension (CAAE) of MALR:** To reach out to farmers to help SWERI and EALIP to execute the farmer-level training/extension/awareness activities of the EMP.
3. **Central Administration for Soil, Water and Environment (CASWE) of MALR:** To help MALR/EALIP to enforce the on-farm water-quality regulations as per the EMP.
4. **MWRI (as part of IIIMP budget):** To enforce the off-farm water-quality regulations as per the EMPs of FIMP and IIIMP.
5. **EALIP (PMU):** will synthesize the progress reports received from SWERI, and will be responsible for the EMP prevention/mitigation measures related to civil works.
6. **Environment Quality Sector, Egyptian Environment and Affairs Agency (EEAA):** will provide overall oversight for the EMP, as per its ongoing national mandate.

23. SWERI (in coordination with the aforementioned supportive institutions) will report to the EALIP-PMU as presented in the Figure below. Through the PMU, the progress reports submitted by SWERI will be forwarded to the World Bank. Progress reports will include information on progress of EMP implementation, including on the indicators listed in the Table below, details on capacity building and training aspects, and on impacts resulting from civil works (Component 1) as relevant, and on the other likely FIMP impacts and their respective EMP preventative/mitigation measures as identified above under Section 15.

Figure: Institutional Setup for EMP Implementation and Reporting



24. **Parameters to be monitored under the EMP:** The following Table presents the list of the parameters to be monitored under the EMP (cross-referenced in Annex 3), their monitoring frequency and method. The parameters which are likely to be negatively impacted (e.g. pesticide/fertilize residues & salinity) will be monitored more frequently than those which are likely to be positively impacted (e.g. water microbiology and groundwater table). The FIMP Intermediary-Outcome Indicators in Annex 3 include tracking the incremental FIMP percent land area that will gradually do without the unsafe drainage-reuse practices.

Table: EMP Monitoring Indicators/Media, Frequency and Monitoring Method

Indicators/Media	Methods and frequency	Monitored sites
Pesticides		
Soil **Crop** **Water**	▪ Sampling for lab analysis ▪ Sampling twice a year (for two seasons) ▪ In first and last year: will sample only once a year for one season	27 sites
Salinity and Alkalinity		
Soil	▪ Sampling for lab analysis ▪ Sampling twice a year (for two seasons) ▪ In first and last year: will sample only once a year for one season	27 sites
Water	▪ Sampling four times a year ▪ In first and last year: will sample only once a year for one season ▪ Portable EC meter & sampling for lab analysis	27 sites
Fertilizers & Nutrients		
Soil **Crop**	▪ Sampling for lab analysis ▪ Sampling twice a year (for two seasons) ▪ In first and last year: will sample only once a year for one season ▪ Five crops per season will be sampled	27 sites
Water Microbiology		
Summer **Winter**	▪ Sampling twice a year (two seasons) ▪ In first and last year: will sample only once a year for one season	▪ 27 sites
Water Table Level		
Water Table	▪ Twice a year (two seasons) ▪ In-situ	▪ 27 sites ▪ 3 observation wells per site
Other Environmental Protection/Mitigation		
Civil works, Contractor transportation, Quarries, Safe Disposal of Construction Wastes, "Chance find" for Historical Properties	▪ Monitoring frequency: ongoing (per contract) ▪ Method: EALIP construction supervision reports	▪ 27 sites

Figure A10.1 Official and unofficial reuse of agricultural drainage

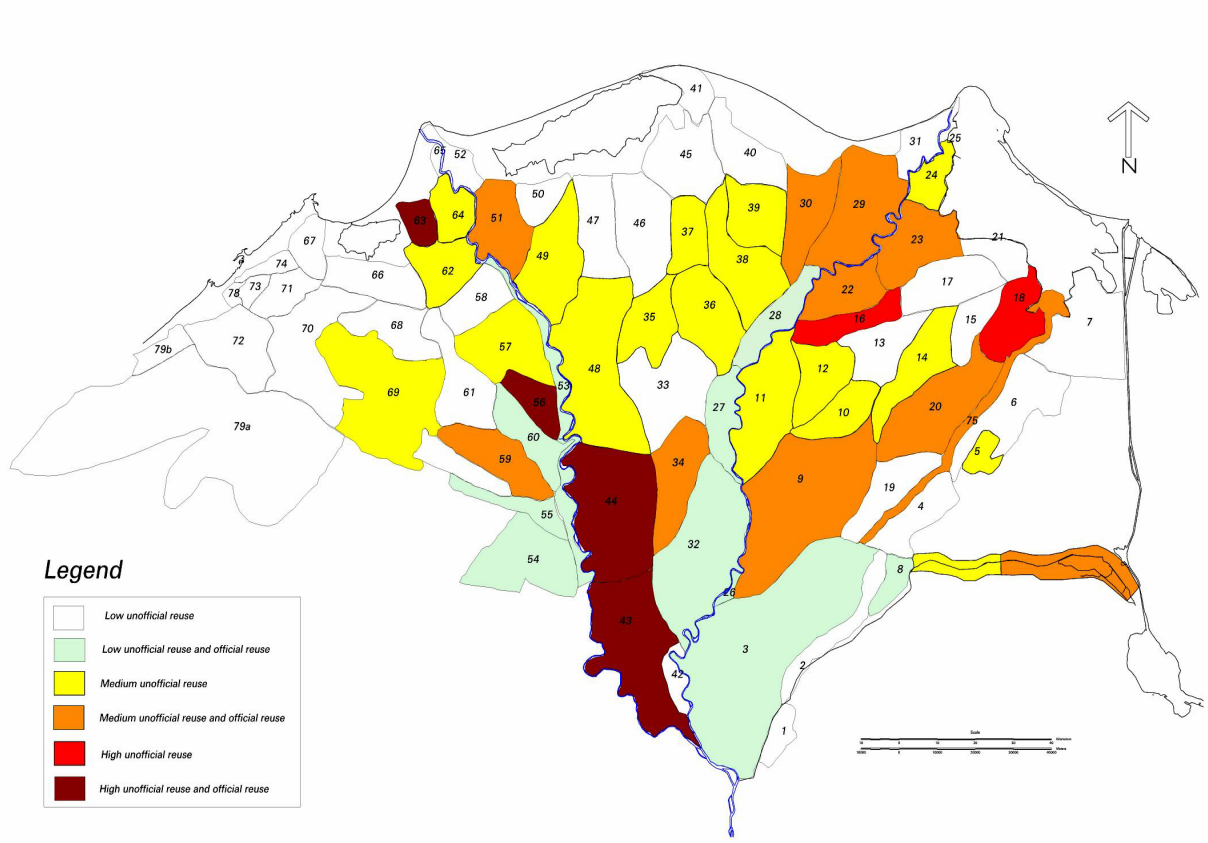


Figure A10.2 Hot spots of health exposure to water pollution

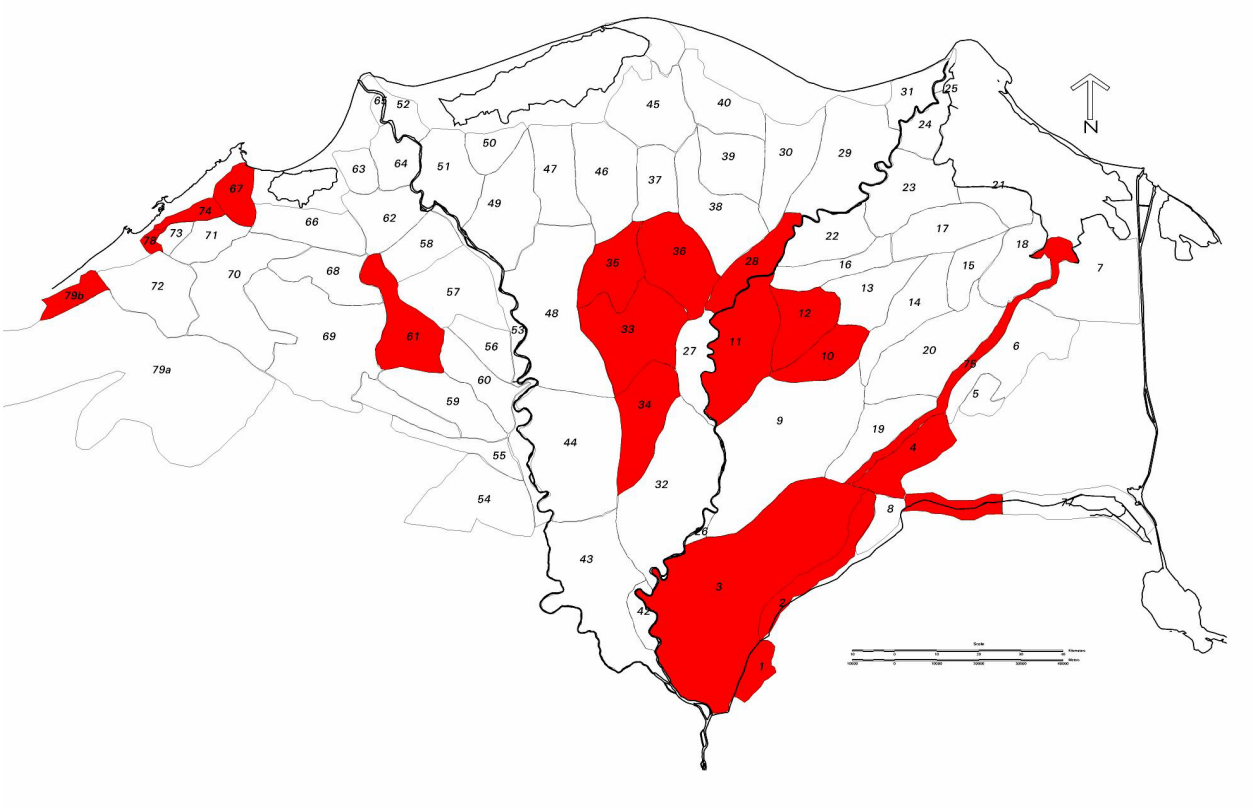
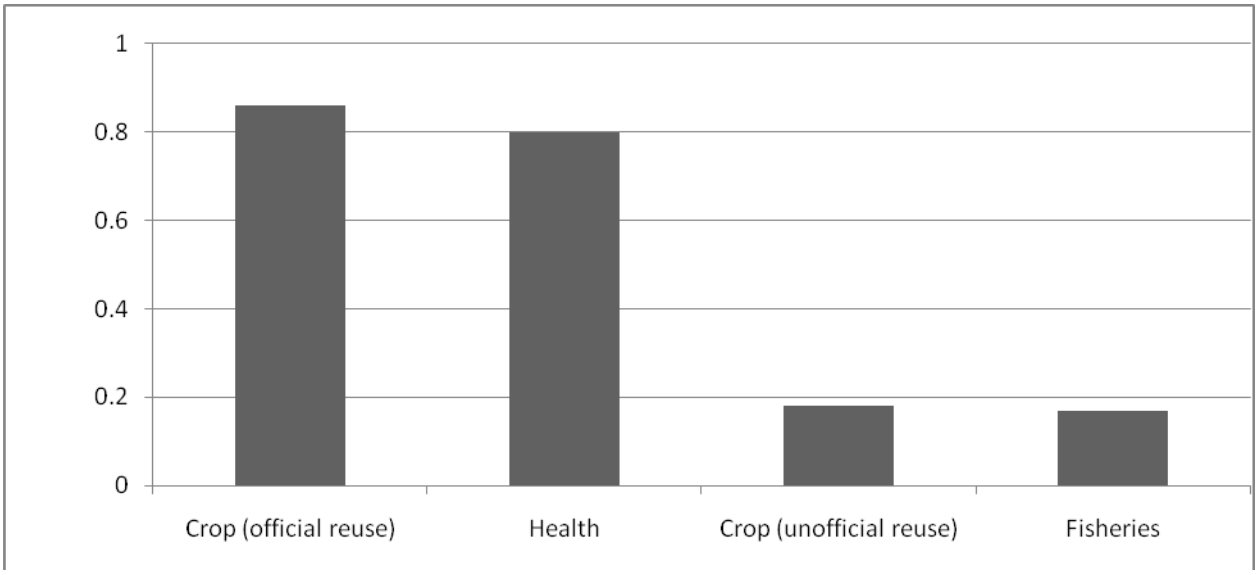


Figure A10.3 Benefits forgone (in percent of GDP) due to water pollution from untreated & maltreated domestic sewage in the Nile Delta



Safeguard policies

25. OP4.01 is triggered for FIMP as is the case with most irrigation/drainage-related projects, and OP4.09 and OP7.50 are triggered as per the discussion above. As per the assessment provided above, FIMP is designated a Category-B project and no other safeguard policy is triggered.

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP 4.01)	[X]	[ ]
Natural Habitats (OP/BP 4.04)	[ ]	[X]
Pest Management (OP 4.09)	[X]	[]
Indigenous Peoples (OP/BP 4.10)	[ ]	[X]
Physical Cultural Resources (OP/BP 4.11)	[ ]	[X]
Involuntary Resettlement (OP/BP 4.12)	[ ]	[X]
Forests (OP/BP 4.36)	[ ]	[X]
Safety of Dams (OP/BP 4.37)	[ ]	[X]
Projects on International Waterways (OP/BP 7.50)	[X]	[]
Projects in Disputed Areas (OP/BP 7.60)*	[ ]	[X]

Appendix 1: Assessment of the likely increase in agricultural residues (examining OP4.09) under IIIMP

26. The ex-ante theoretical rationale: For IIIMP, OP4.09 on "Pest Management" was not triggered per IIIMP appraisal ISDS and per its ESIA, due to the following reasons:

a) The project procurement plan does not include procuring pesticides or herbicides;
b) The project does not seek to horizontally develop new lands, and thus adds no major pollution load; and
c) While the project may result in vertical expansion (i.e. some intensification in yield per hectare), this will not be so substantial. The vertical expansion per hectare cannot be so substantial because the baseline yield is already toward its high end[38]

* By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas

[38] Also, any big increase in crop yield will entail a proportionally-high increase in crop "transpiration" (hence water usage, which is not on par with FIMP design).

27. The ex-post rationale: The EMU of IIIMP obtained sample analysis for around 30 pest-related parameters for the baseline before-project case. The concentration of these parameters proved to fall way below the permissible norms(per WHO and Law 48 of GOE). As shown in the Table below, the baseline concentrations are already lower than the permissible norms by more than 50 percent; therefore the after-project concentrations are not expected to violate the norms. This is because, as argued above, IIIMP & FIMP are not expected to increase yield/hectare by more than 20 percent, and hence the increment in pesticide/fertilizer load may not exceed 10 percent (assuming that a 20 percent yield increment requires only 10 percent extra pesticides/fertilizers: due to the "rationing" positive effect enabled by modernizing the irrigation system).

28. Water quality monitoring for detecting pesticides in Mahmoudia canal: In November 2008, the EMU/PMU of IIIMP carried out water quality monitoring for detecting pesticides in Mahmoudia canal in cooperation with the Central Laboratory for Environmental Quality Monitoring (QLEQM) and the Central Laboratory of Residue Analysis of Pesticides and Heavy Metals. The monitoring was carried out at strategic points along Mahmoudia canal, which are:

a) The downstream El Atf pumping station from Rosetta branch;
b) The downstream mixing point of Edko drain with Mahmoudia canal;
c) The downstream supply from El Khandel El Sharky canal; and
d) The downstream intake of Alexandria drinking water supply.

29. The analysis included measuring about 30 parameters at these locations for the before-project case. The analysis was carried out by "Multi-residue" method. The concentrations of these parameters proved to mostly fall below the permissible norms of WHO and the guidelines of the Ministry of Health and population regarding drinking water, as below.

N	compound	unit	Detecting	Standard Limit
1	Alpha-BHC	Ug/l	<0.01	0.02
2	Gamma-BHC	Ug/l	<0.01	0.02
3	BETA-BHC	Ug/l	<0.01	0.02
4	Delta-BHC	Ug/l	<0.01	0.02
5	Heptachlor	Ug/l	<0.01	0.25
6	aldrine	Ug/l	<0.01	0.02
7	Heptachlorepoxide	Ug/l	<0.01	0.05
8	DDE-p',p	Ug/l	<0.01	0.10
9	Endosulfane-alpha	Ug/l	<0.01	0.10
10	Dieldrin	Ug/l	<0.01	0.10
11	Endrin	Ug/l	<0.01	0.10
12	DDD-p',p	Ug/l	<0.01	0.10
13	Endosulfane-beta	Ug/l	<0.01	0.10
14	DDT-o,p	Ug/l	<0.01	0.10
15	Endrin aldehyde	Ug/l	<0.01	0.10
16	Methamidophos	Ug/l	<0.01	0.25
17	Endosulfane sulphate	Ug/l	<0.01	0.10
18	Malathion	Ug/l	0.10	0.25

Appendix 2: Translation of the Arabic version of the civil-works related safeguards clauses in the civil-works contracts

Article 22-1 Special conditions of contract: Monuments and historical property

30. Taking into account the law of the protection of monuments Act No. 117 of 1983, all movable monuments which may be found by the contractor or one of his followers during drilling must be handed over immediately to the employer otherwise the contractor will be a violator to the monuments law by possession of the monuments without a license. And if an antique is found, the contractor should inform the administrative agency which shall notify the Supreme Council of Antiquities. In the event of implementing works in an archaeological area or next to these areas, the Supreme Council of Antiquities should hire technicians at the expense of the contractor to observe the location and its monuments, and the contractor should take such precautions and he is the guarantor of the prevention of damage of any monuments. And the monument is in all cases, the property of the state.

Article 22-1: special conditions of the contract - protection of the environment

31. General: The Contractor shall not harm the surrounding environment during the period of implementation of the contract and to ensure that contamination of waterways will not occur as a result of any activities by: For example, the operation of equipments, machinery and means of transportation may result in residues of fuel, oil and grease, and the contractor must not harm the surrounding environment. The disposal of the excavated materials and the remnants of construction materials should not be in the agricultural land or the waterways. In the case of damage to the environment by the contractor, the project manager should estimate the value of the environmental damage and restore the thing to its original state at the expense of the contractor against receivables in accordance with item 12 contractor risks and item 48 of the General Conditions of the contract. The contractor should undertake the implementation of any measures to prevent the damage to the environment and take all the precautions required by the project manager to prevent damage and reduce the impact on the environment and works to make sure that employees and workers are committed to these measures and precautions as follows:

a) The roads should not be occupied as a result of the contractor works.
b) The finishing works should be done as quickly as possible and return the situation to its original state and the minutes of the final receipt will be signed unless the supervisor committee is sure that waterways is clean from any construction materials and the banks of the canals are clear from any obstacles resulting from the construction and ensure the flow of water.
c) The Contractor shall limit the construction work between the hours of 6 am to 7 pm if it exists in a residential area or close to it.
d) The Contractor shall avoid the use of heavy equipment in certain areas during the night or in sensitive areas such as near hospitals.
e) The contractor must prevent dust pollution during periods of drought by spraying water on dust and gravel sub-bases on a regular basis and the transporting vehicles

should be covered to prevent the spilling over of the construction materials to the roads.

32. Transportation:

a) The contractor must use selected roads in agreement with the project manager and must use vehicles with the proper size for the type of road and determine the load to prevent damage of roads and bridges used in the transport process to the project site, the contractor carries over the responsibility for any damage to roads and bridges due to overloading the transporting vehicles by construction materials and should be asked to repair the damage in agreement with the project manager.
b) The contractor should not use any polluting vehicles, resulting in excess of pollution from exhaust or noise to the environment especially in the dwelling zones (residential areas).
c) The contractor should use appropriate controls for traffic safety in the project site throughout the implementation of the contract and these controls should be subject to prior approval of the project manager.

33. Employment:

a) The Contractor should provide the necessary training for his workers on the environmental safeguard issues.
b) The Contractor shall install and maintain temporary septic tanks to collect sewage waste from labor camps and to ensure no contamination will be dumped into the nearby watercourses.
c) The contractor must establish a system for collection and disposal of all solid waste resulting from labor camps or administration offices.
d) The Contractor should be not allowed to use trees as fuel wood for cooking or heating in any of the overnight workers or administration offices, and must use other alternatives non-polluting the environment.
e) The Contractor shall ensure that the office and warehouse site and especially the storage sites for diesel fuel, bitumen and asphalt, is located at a distance (500) meters away, at least, from waterways and managed so as not to result in pollutants reaching the waterways, both surface and groundwater, especially during periods of rain. This requires the recycling of lubricants and digging a trench around the area for collecting oils when necessary.

34. Quarries and areas of the supply of construction materials:

a) The contractor should get an approval from the project manager to get soil or stones from outside the approved quarries without any violations of the technical specifications and laws and should avoid getting such materials from any areas of conflict with the natural drainage paths or planned. And should avoid sites near waterways, where it can lead to the decline or destruction of bridges or cause the fall of large amounts of materials to the waterways

b) The contractor must ensure that any used areas as quarries were left in the case of constant and stable side slopes and dry to ensure that no accumulation of stagnant water leading to mosquito breeding.
c) The project manager should approve the sites of crushing machines in the quarries site and the environmentally sensitive areas or residential areas should be avoided.

35. Earth works:

a) The earth works must be controlled in an appropriate manner in the earth and especially during the rainy season.
b) The contractor should protect the stability of slopes in the areas of cutting and filling at all times and to reduce as much as possible from the surrounding areas affected by the work area.
c) The contractor should complete the excavation and filling of the final cross sections at any site as soon as possible, preferably in one continuous process, and should not leave an incomplete part of the work, especially in the rainy season.
d) Ditches must be implemented in the upper and lower top and bottom of the slopes in order to protect it from erosion, in conformity with the designs and planting it with grass or other appropriate green cover.
e) The contractor must get rid of any inappropriate materials in the public landfill areas in agreement with the project manager.

36. Disposal of construction waste and lubricants from vehicles:

a) The contractor must re-use the construction waste resulting from the removal of any facilities existing as much as possible in the construction of the proposed sites (such as the use of materials filling) if they are in conformity with the specifications and approved by the project manager, and should dispose the rest of the construction wastes in the public landfill and the contractor must guarantee that these sites (i) do not exist in environmentally sensitive areas or forest areas, (ii) do not affect the natural drainage paths, (iii) do not affect rare wildlife and endangered species.
b) In the case of the disposal of any garbage or waste sludge in the building or neighboring land, the contractor must react immediately to remove them and clean the affected area and return it to its original condition in accordance with the guidance of the project manager and at the expense of the contractor.
c) The contractor must get rid of clayey materials resulting from excavation or other construction activities so that no pollution will reach the surface water and no mud blocks will be built up in the region.
d) All transport arrangements during construction, including supply, maintenance, dismantling and removal of waste (if necessary) will be considered complementary to the work and included in the contract cost and should be planned and executed by the contractor and approved and instructed by the project manager.
e) All the transporting vehicles and machines must be run and maintained in a manner not conducive to spilled fuel and lubricants and contamination to the ground. And buffers for oil must be provided in the areas of washing and refueling. Fuel tanks must also be at a suitable venue and isolated.

f) The contractor must get rid of all petroleum spills in accordance with the procedures / instructions of environmental standards. The fuel storage tanks must be located at a distance of at least 300 meters from drainage facilities and water sources as instructed by the project manager.

Annex 11: Project Preparation and Supervision

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

	Planned	Actual
PCN review	09/21/2009	09/21/2009
Initial PID to PIC	11/02/2009	11/02/2009
Initial ISDS to PIC	10/29/2009	10/29/2009
Appraisal	10/01/2010	09/07/2010
Negotiations	11/01/2010	11/02/2010
Board/RVP approval	12/14/2010	12/14/2010
Planned date of effectiveness		
Planned date of mid-term review		
Planned closing date		

Key institutions responsible for preparation of the project: MALR

Bank staff and consultants who worked on the project included:

Name	Title	Organization	Unit
Julian Lampietti	Lead Rural Sector Coordinator	World Bank	MNSSD
Hani El Sadani	Sr. Water Resources Engineer	World Bank	MNSWA
David Lugg	Sr. Agricultural Officer	FAO	TCIN
Yoshiko Ishihara	Socio-Economist	FAO	TCIN
Juan Morelli	FAO Consultant	FAO	TCIN
Sean Michaels	Extended-Term Consultant	World Bank	MNSAR
Joseph Goldberg	Consultant	World Bank	MNSSD
Jose Simas	Consultant	World Bank	MNSSD
Mohammed Mehany	Operations Analyst	World Bank	MNSWA
Ahmed Shawky	Sr. Water Resources Specialist	World Bank	MNSWA
Knut Opsal	Sr. Social Scientist	World Bank	MNSSO
M.F. How Yew Kin	Program Assistant	World Bank	MNSSD
Enas Mahmoud	Program Assistant	World Bank	MNC03
Akram El-Shorbagi	Sr. Financial Management Specialist	World Bank	MNAFM
Mikael Mengesha	Sr. Procurement Specialist	World Bank	MNAPR
Susanne Scheierling	Sr. Irrigation Water Economist	World Bank	ETWWA
Danielle Malek Roosa	Counsel	World Bank	LEGEM
T. Mpoy-Kamulayi	Lead Counsel	World Bank	LEGEM
Jamal Abdulla Abdulaziz	Sr. Procurement Specialist	World Bank	MNAPR
Laila Mohamed Kotb	Program Assistant	World Bank	MNCO3

Bank funds expended to date on project preparation:

1. Bank resources: 425,222.04
2. FAO: 128,830.00
3. Total: 554,052.04

Estimated Approval and Supervision costs:

1. Remaining costs to approval: 71,607.96
2. Estimated annual supervision cost: 110,000.00

Annex 12: Documents in the Project File

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

1. Bank Staff Assessments
    a. Project Concept Note
    b. Draft Project Appraisal Document
    c. ISDS
    d. PID
    e. BTOs
    f. Aide Memoires

2. Other Documents/Studies
    a. Environmental Management Plan
    b. Environmental Impact Assessment
    c. Draft Operational Manual

Annex 13: Statement of Loans and Credits

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

			Original Amount in US$ Millions						Difference between expected and actual disbursements	
Project ID	FY	Purpose	IBRD	IDA	SF	GEF	Cancel.	Undisb.	Orig.	Frm. Rev'd
P116194	2010	EG-Giza North Power Project	600.00	0.00	0.00	0.00	0.00	600.00	0.00	0.00
P116011	2010	EG-Enhancing Access to Finance for SMEs	300.00	0.00	0.00	0.00	0.00	299.25	15.00	0.00
P113416	2010	EG-Wind Power Development	70.00	0.00	0.00	0.00	0.00	70.00	0.67	0.00
P080228	2010	EG-Health Insurance Systems Development	75.00	0.00	0.00	0.00	0.00	75.00	0.00	0.00
P112346	2010	EG-Affordable Mortgage Finance DPL	300.00	0.00	0.00	0.00	0.00	200.00	-99.25	0.00
P101201	2010	EG-Cairo Airport Development Project-TB2	280.00	0.00	0.00	0.00	0.00	280.00	0.00	0.00
P101103	2009	EGYPT-Railways Restructuring	270.00	0.00	0.00	0.00	0.00	269.33	6.00	0.00
P100047	2009	EG-Ain Sokhna Power	600.00	0.00	0.00	0.00	0.00	558.41	-21.59	0.00
P095392	2008	EG-NATURAL GAS CONNECTIONS	75.00	0.00	0.00	0.00	0.00	21.26	-26.28	0.00
P094311	2008	EG INTEGRATED SANITATION & SEWERAGE INFR	120.00	0.00	0.00	0.00	0.00	112.21	28.31	0.00
P093470	2007	EG-MORTGAGE FINANCE	37.10	0.00	0.00	0.00	0.00	3.50	-0.08	0.00
P087970	2007	West Delta Water Conserv. & Irrig. Rehab	145.00	0.00	0.00	0.00	0.00	145.00	145.00	145.00
P091945	2006	EG-EL TEBBIN POWER	259.60	0.00	0.00	0.00	0.00	45.09	24.56	0.00
P090073	2006	EG-Second Pollution Abatement	20.00	0.00	0.00	0.00	0.00	14.80	13.96	0.00
P082952	2005	EG-Early Childhood Education Enhancement	20.00	0.00	0.00	0.00	0.00	12.21	0.16	0.54
P073977	2005	EG-INTEGRATED IRRIGATION IMPR. & MGT	120.00	0.00	0.00	0.00	0.00	92.27	58.94	-2.07
P045499	2000	EG-NATIONAL DRAINAGE II	80.00	0.00	0.00	0.00	0.00	30.11	0.11	-0.25
P050484	1999	EG Secondary Education Enhancement Proj	0.00	50.00	0.00	0.00	0.00	11.94	8.30	0.00
		Total:	3,371.70	50.00	0.00	0.00	0.00	2,840.38	153.81	143.22

EGYPT, ARAB REPUBLIC OF
STATEMENT OF IFC's
Held and Disbursed Portfolio
In Millions of US Dollars

		Committed				**Disbursed**			
		IFC				**IFC**			
FY Approval	Company	Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
1996	ANSDK	1.33	0.00	0.00	0.00	0.56	0.00	0.00	0.00
2004	Alexandria Fiber	8.00	0.00	0.00	0.00	7.00	0.00	0.00	0.00
2001	Amreya	4.69	0.00	0.00	0.00	4.69	0.00	0.00	0.00
2006	CIB LLC	0.00	0.72	0.00	0.00	0.00	0.48	0.00	0.00
1999	CIL	0.00	0.74	0.00	0.00	0.00	0.74	0.00	0.00

2004	CIL	0.00	0.15	0.00	0.00	0.00	0.15	0.00	0.00
1992	Carbon Black-EGT	0.00	1.48	0.00	0.00	0.00	1.48	0.00	0.00
1997	Carbon Black-EGT	0.00	1.48	0.00	0.00	0.00	1.48	0.00	0.00
1998	Carbon Black-EGT	4.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00
2000	Carbon Black-EGT	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	Ceramica Al-Amir	3.33	0.00	0.00	0.00	3.33	0.00	0.00	0.00
2006	Cmrcl Intl Bank	0.00	23.28	0.00	0.00	0.00	23.03	0.00	0.00
2006	EFG Hermes	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	EHF	0.00	1.70	0.00	0.00	0.00	1.70	0.00	0.00
2005	Egypt Factors	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	Gippsland	0.00	4.61	0.00	0.00	0.00	2.03	0.00	0.00
2001	IT Worx	0.00	2.00	0.00	0.00	0.00	2.00	0.00	0.00
2004	Lecico Egypt	8.94	0.00	0.00	0.00	8.94	0.00	0.00	0.00
1986	Meleiha Oil	0.00	8.62	0.00	0.00	0.00	0.00	0.00	0.00
1988	Meleiha Oil	0.00	9.20	0.00	0.00	0.00	0.00	0.00	0.00
1992	Meleiha Oil	0.00	13.00	0.00	0.00	0.00	0.94	0.00	0.00
2005	Merlon Egypt	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	Metro	10.50	0.00	0.00	0.00	10.50	0.00	0.00	0.00
1992	Misr Compressor	9.70	0.00	0.00	0.00	9.70	0.00	0.00	0.00
	Orix Leasing EGT	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	Orix Leasing EGT	0.00	0.53	0.00	0.00	0.00	0.53	0.00	0.00
2001	Orix Leasing EGT	1.09	0.00	0.00	0.00	1.09	0.00	0.00	0.00
2001	Port Said	41.07	0.00	0.00	132.53	41.07	0.00	0.00	132.53
2002	SEKEM	4.18	0.00	0.00	0.00	4.18	0.00	0.00	0.00
2006	SONUT	10.00	0.00	4.00	0.00	0.00	0.00	0.00	0.00
2004	SPDC	18.40	0.00	0.00	0.00	18.40	0.00	0.00	0.00
2001	SUEZ GULF	40.40	0.00	0.00	129.07	40.40	0.00	0.00	129.07
1997	UNI	2.05	0.00	0.00	0.00	2.05	0.00	0.00	0.00
2001	UNI	2.06	0.00	0.00	0.00	2.06	0.00	0.00	0.00
2005	Wadi Group	15.00	0.00	0.00	0.00	7.50	0.00	0.00	0.00
	Total portfolio:	214.74	70.51	4.00	261.60	165.47	34.56	0.00	261.60

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic.
2004	ACB Acrylic	0.00	0.00	0.00	0.00
2004	Merlon Egypt	0.00	0.00	0.00	0.02
2000	ACB Expansn III	0.00	0.00	0.00	0.00
2006	Rally Energy	0.01	0.00	0.00	0.00
	Total pending commitment:	0.01	0.00	0.00	0.02

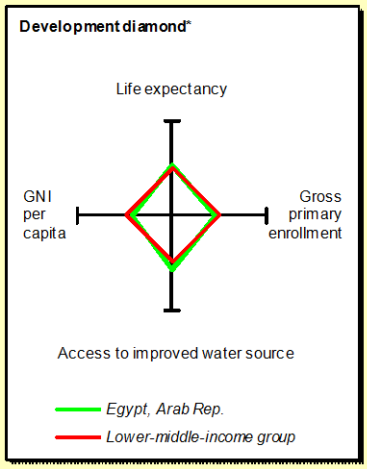
Annex 14: Country at a Glance

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

Egypt, Arab Rep. at a glance

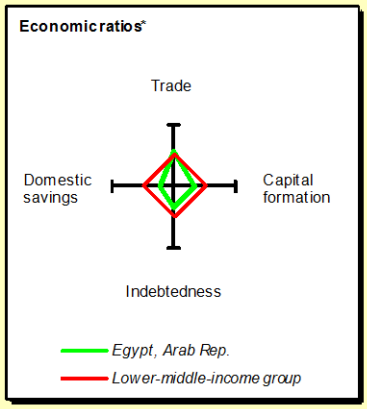
12/9/09

POVERTY and SOCIAL	Egypt	M. East & North Africa	Lower-middle-income
2008			
Population, mid-year *(millions)*	81.5	325	3,702
GNI per capita *(Atlas method, US$)*	1800	3,242	2,078
GNI *(Atlas method, US$ billions)*	146.8	1053	7,692
Average annual growth, 2002-08			
Population *(%)*	1.9	1.9	1.2
Labor force *(%)*	3.0	3.0	1.6
Most recent estimate (latest year available, 2002-08)			
Poverty *(% of population below national poverty line)*	..	..	..
Urban population *(% of total population)*	43	57	41
Life expectancy at birth *(years)*	70	70	68
Infant mortality *(per 1000 live births)*	20	32	46
Child malnutrition *(% of children under 5)*	7	..	26
Access to an improved water source *(% of population)*	98	88	86
Literacy *(% of population age 15+)*	66	73	83
Gross primary enrollment *(% of school-age population)*	100	106	109
Male	102	109	112
Female	97	104	106

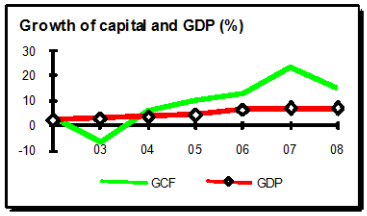


KEY ECONOMIC RATIOS and LONG-TERM TRENDS	1988	1998	2007	2008
GDP *(US$ billions)*	35.0	84.8	130.5	162.3
Gross capital formation/GDP	34.9	21.5	20.9	22.5
Exports of goods and services/GDP	17.3	16.2	30.3	33.2
Gross domestic savings/GDP	17.1	12.0	16.3	16.9
Gross national savings/GDP	28.1	18.6	22.6	23.4
Current account balance/GDP	-1.6	-2.9	1.7	0.5
Interest payments/GDP	3.5	1.1	0.7	0.6
Total debt/GDP	131.6	38.1	25.2	20.1
Total debt service/exports	22.1	9.9	5.6	4.3
Present value of debt/GDP	..	..	20.9	16.7
Present value of debt/exports	..	..	56.0	37.0

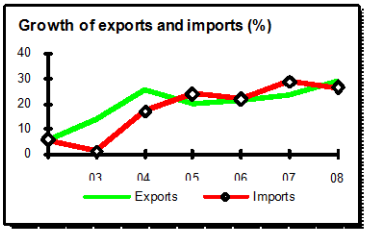
	1988-98	1998-08	2007	2008	2008-12
(average annual growth)					
GDP	4.1	4.6	7.1	7.2	5.3
GDP per capita	2.0	2.7	5.1	5.2	3.1
Exports of goods and services	4.8	14.9	23.3	28.8	2.9



STRUCTURE of the ECONOMY	1988	1998	2007	2008
(% of GDP)				
Agriculture	19.0	17.1	14.1	13.2
Industry	28.8	30.9	36.3	37.5
Manufacturing	17.7	18.3	15.7	15.7
Services	52.2	52.0	49.6	49.2
Household final consumption expenditure	69.0	76.7	72.4	72.2
General gov't final consumption expenditure	13.9	11.3	11.3	10.9
Imports of goods and services	35.2	25.7	34.8	38.8



	1988-98	1998-08	2007	2008
(average annual growth)				
Agriculture	2.9	3.4	3.7	3.3
Industry	6.0	4.9	7.9	10.3
Manufacturing	5.5	4.8	7.6	7.9
Services	3.0	5.1	7.4	8.6
Household final consumption expenditure	4.4	3.1	5.1	2.5
General gov't final consumption expenditure	3.2	2.8	0.2	1.1
Gross capital formation	0.9	5.3	23.8	15.5
Imports of goods and services	2.8	11.4	28.8	26.3



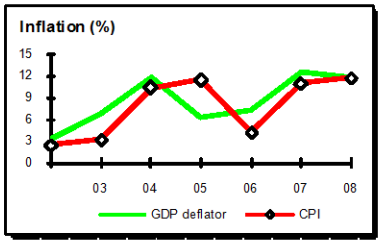
Note: 2008 data are preliminary estimates.

This table was produced from the Development Economics LDB database.

*The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

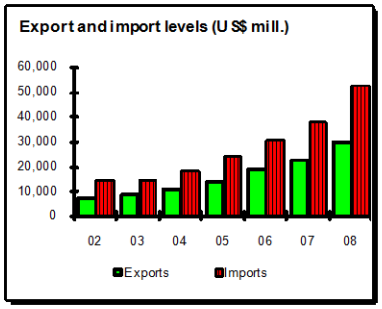
PRICES and GOVERNMENT FINANCE

	1988	1998	2007	2008
Domestic prices				
(% change)				
Consumer prices	18.6	5.7	11.0	11.7
Implicit GDP deflator	13.7	3.9	12.6	11.8
Government finance				
(% of GDP, includes current grants)				
Current revenue	20.1	22.2	23.2	23.4
Current budget balance	-5.5	2.9	-3.2	-4.4
Overall surplus/deficit	-17.6	-1.0	-7.3	-6.8



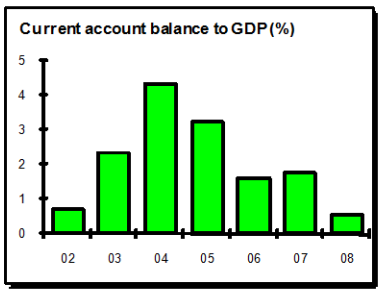
TRADE

	1988	1998	2007	2008
(US$ millions)				
Total exports (fob)	3,274	5,128	22,018	29,356
Cotton	480	1,728	110	194
Other agriculture	354	103	10,223	14,628
Manufactures	961	1,685	7,519	10,932
Total imports (cif)	8,858	16,899	38,308	52,771
Food	1,254	3,193	2,671	3,927
Fuel and energy	2,148	2,188	4,336	10,001
Capital goods	2,188	4,801	9,845	11,871
Export price index *(2000=100)*	98	96	157	183
Import price index *(2000=100)*	11	104	140	170
Terms of trade *(2000=100)*	928	92	112	107



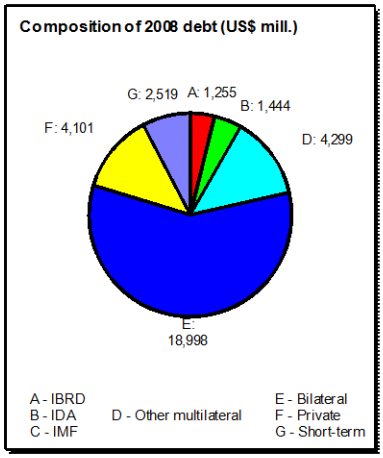
BALANCE of PAYMENTS

	1988	1998	2007	2008
(US$ millions)				
Exports of goods and services	7,225	13,502	39,428	53,277
Imports of goods and services	11,689	21,795	45,398	63,086
Resource balance	-4,465	-8,292	-5,969	-9,809
Net income	-161	1,213	1,177	1,360
Net current transfers	4,081	4,600	7,061	9,338
Current account balance	-545	-2,479	2,269	888
Financing items (net)	1,001	2,344	3,013	4,532
Changes in net reserves	-456	135	-5,282	-5,420
Memo:				
Reserves including gold *(US$ millions)*	..	..	30,320	39,516
Conversion rate *(DEC, local/US$)*	1.8	3.4	5.7	5.5



EXTERNAL DEBT and RESOURCE FLOWS

	1988	1998	2007	2008
(US$ millions)				
Total debt outstanding and disbursed	46,122	32,289	32,830	32,616
IBRD	1,515	846	1,181	1,255
IDA	900	1,268	1,490	1,444
Total debt service	2,487	1,897	2,740	3,131
IBRD	291	170	144	136
IDA	10	26	58	62
Composition of net resource flows				
Official grants	444	1,374	1,246	1,303
Official creditors	909	-249	646	-860
Private creditors	676	34	572	-235
Foreign direct investment (net inflows)	1,190	1,076	11,578	9,495
Portfolio equity (net inflows)	0	-160	-3,199	-674
World Bank program				
Commitments	70	285	0	1,075
Disbursements	131	104	737	154
Principal repayments	142	132	144	127
Net flows	-11	-28	593	26
Interest payments	159	65	58	70
Net transfers	-170	-92	535	-44



Note: This table was produced from the Development Economics LDB database. 12/9/09

Annex 15: Social Issues

ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

Introduction

1. Social aspects of the project design were informed by main findings of a socio-economic study recently carried out by GTZ in a pilot area ('W-10' in Kafr-el-Sheikh) where marwa improvement had been implemented. The W-10 pilot area is located in the Meet Yazid command area, which is adjacent to the proposed site of the FIMP in the Governorate and inhabited by a population whose socio-economic characteristics are similar to those of the project target. The study was conducted between March 2008 and January 2009 by a team of extension staff trained under the Agricultural Water Management Project of GTZ who conducted interviews with farmers and other key informants. Study results are presented in a GTZ report titled 'On-Farm (Marwa) Improvement in the Nile Delta in Egypt'[39]. Following sections are extracts from the report, focusing on main findings of the study[40].

Importance of Marwa

2. Fieldwork has established that the benefits expressed by the farmers with regard to marwa improvement are economic and social. The economic benefits are reflected in decreased costs and increased revenue. Decreased costs are a result of lower operating costs, especially because improved marwa fills up quickly. In addition, farmers do not need to hire extra workers to clean the marwas every season or rebuilding its banks as a result of the holes created by the sweet water lobsters.

3. Increased revenues are realized due to the decrease in the marwa's width, which leads to larger yields because the cultivated area has increased (marwa improvement reduces width of marwa from 2m to 1m in case of lining and to 0m in case of piping). In addition, plants are watered equally and water is quicker in the field. The land has also benefited from the constant availability of water because one can quickly irrigate the land (ray ala el-hamy), which is better than slow irrigation (ray ala el-bared), which dissolves the soil. Furthermore, the land cultivated with cotton is protected from being spoiled by excess water of neighboring land cultivated with rice, which means better yield.

4. **Social Benefits.** The social benefits that are valued by farmers that result from the improvement of the marwa relate to less working effort, fewer disputes among neighbors, and better health conditions.

a) Farmers used to sleep beside their pumps in the field to irrigate their land. Irrigation is now an easy task and takes much less time. Men, women, and even young children can open the marwa gate or farm outlet to irrigate their land. Less work enables farmers to have the time to raise cattle, which is very profitable.
b) The improvement of the marwa prevents flooding of neighboring land. Marwas that have been lined with brick and cement marks boundaries between fields, preventing

[39] Authored by Dalia M Gouda. GTZ
[40] Based on a November 2009 draft.

one farmer from encroaching on his neighbor's land. Less flooding from unimproved marwas and clear boundaries between farms means fewer disputes among the farmers.

c) Improving the marwa impacts the health of farm families by reducing contact with irrigation water and the possibility of contracting bilharzia.

The Marwa Committees

5. The Irrigation and Drainage Law No. 12 for the year 1984 and its amendment, No. 213/1994 formalized farmers' groupings on the tertiary canal level in order to operate and maintain the improved infrastructure (raised or buried mesqa and pumping machines). As for the marwa level, the law referred only to the marwa leader, who is selected by the Water User Association (WUA) Board and charged with certain responsibilities.

6. It is essential to note the importance of groupings, whether formal or informal, on the marwa level. To improve a marwa, farmers have to collectively decide and agree on where to locate it and where to put the field turnouts. The execution of marwa improvement by EALIP/SWERI involved farmers in laying the underground pipelines without using heavy machinery, which enabled them to decide on the placement of risers or farm outlets.

7. It can be expected that participation by the farmers making up a Marwa Committee (MC)—and sharing the same marwa—will positively affect water management on an improved marwa, when serving as a mechanism to include farmers on a grassroots level in decisions that will affect their livelihoods. It is anticipated that the MC would play a role in strengthening the WUA by increasing farmers' participation on the grassroots level as well as improving their decision-making capacities. This is especially necessary when agreed-upon irrigation schedules are violated.

8. This is a problem that requires an active role by the MC to act as supervisors (social control agents), as the WUA on the mesqa level cannot effectively deal with this problem. In addition, many farmers are not aware that the WUA exists, nor do they know what its responsibilities might be. Their involvement in MCs could provide an organized bridge between the grassroots level and the WUA that makes visible the benefits of working together and cooperating through collective actions to improve water management.

9. Farmers suggested that the MC have a role in the following aspects of marwa management:

a) Agree with marwa members on cropping patterns;
b) Participate in the planning of marwa improvements, its direction, and the number of risers (farm outlets);
c) Agree with marwa members on irrigation schedules and duration in accordance with the WUA;
d) Supervise farmers' adherence to irrigation schedules;
e) Maintain the marwa;
f) Execute the decisions agreed upon at the mesqa level on the marwa;

g) Report the needs and problems of the marwa members to the WUA Board;
h) Link between water users on the marwa and those on the mesqa level, together with the WMS and Irrigation Advisory Services (IAS);
i) Cooperate with the agricultural cooperatives, PBDAC, and the local administration;
j) Coordinate with other Marwa Leaders; and
k) Manage conflict on the marwa level.

10. Apart from the legal top-down aspects that devolve from the law, there are a number of aspects on the grassroots level that should be taken into consideration when seeking to improve a marwa and/or strengthen/ form a Marwa Committee.

Socio-Economic Aspects affecting Marwa Committees and Marwa Improvement

11. **Number of Farmers on a Marwa.** The number of farmers on the marwa affects activities on the marwa level. It has been established that more effort is needed to gain farmers' acceptance and to participate in the installation works [involved in improving a marwa], especially where there is a large number of farmers sharing the same marwa[41]. In such cases, communication among family members has proven to be easier than having to communicate with non-relatives. Usually what happens when different families share a marwa is that representatives—in most cases the eldest and most respected man—are chosen from each family to represent their families in any negotiations about placement of the improved marwa, collection of money to help fund improvements, and labor to install the marwa. The family representatives negotiate and pay the money on behalf of the extended family.

12. Statistics show that in the Sidi Salem District, those owning less than 3 feddan account for about 85 percent of farmers, and they own 57 percent of the total agricultural land. This reflects that the number of farmers is also associated with small land ownerships on the marwa, which indicates that farming households are either poor or having to depend for their livelihood on other sources of income.

13. **Farmers' Sources of Additional Income.** It is established that only about 20 percent of farmers are exclusively farmers. The rest have other jobs—working at the local administration, as an agricultural extension worker, or as a teacher, etc. This means that the degree of dependence on agriculture as the main source of income differs from one household to another.

14. For those farmers who are not only farmers, i.e. who have other occupations, irrigation is a burdensome activity when conducted in areas with no mesqa improvements. Irrigation takes a long time and they have to leave their other work in order to irrigate their land if they wished to cultivate it. Many would sharecrop their land based on a half share in the harvest, because this required the owner to be present only during harvest. However, the improvement of the irrigation infrastructure of the mesqa enabled them to attend to their land due to the existence of a pump operator. Marwa improvement added more simplicity to the irrigation process, enabling those employed off the land to take care of their land without having to lease it.

[41] Nour, Mohamed. Technical Support for On-Farm Improvements in the W-10 Pilot Area, AWMP/GTZ, Cairo, October 2008.

15. **Impacts of Marwa Improvements.** Irrigation improvement in general, and marwa improvement in particular, have impacts on:

a) The level of employment in rural areas—Farmers owning small plots can now cultivate them on their own while holding another job, due to the simplicity of irrigation following the improvements. They no longer have to drag a mobile pump to their land and stay there for at least half a day to irrigate 1 feddan, nor do they have to channel the water in the field. This means that more and more landless farmers may not find land to rent or to sharecrop, but these issues are being studied in further detail in the ongoing study on the impacts on tenants and women from irrigation modernization.
b) The owners of small plots who are both farmers and have other occupations will be able to keep their small plots, because irrigation is not as burdensome as it used to be. This will obstruct the objective of the government's 96/ 1992 Owner–Tenant Law that sought to encourage land reconsolidation.
c) More and more farmers or owners of land can be absent, because a member of the extended family can take care of more land as a result of the improvements. For example, Abdallah Salem said, "Now I can take care of my cousin's—who is always gone—land, because after the improvements to the irrigation system, I only have to open their farm outlets." This could mean that decisions relating to the adoption of certain water management practices and technologies in general and marwa improvement in particular may be delayed until the owner is contacted.

16. **Landowner–Tenant Relationships.** Law 96/1992 was introduced in 1992 and made effective 4 years later, with the intention of freeing the land from tenants who had occupied the land as a result of agrarian reform, and thus allowing land consolidation. This law abolished the agrarian land reform rulings that fixed the land rent and removed all rights of inheritance in perpetuity in order to let the land rent be decided by the market[42].

17. This has led to increasing the number of landless farmers and necessitated that new types of leases be introduced. Currently, there are several different types of rent arrangements. They center on whether rent is paid in cash or in kind, or sharecropping. The latter type accounts for about 80 percent of rent agreements, usually covering one season only. The shares are mostly of two kinds: 50 percent belongs to the tenant farmer and the other 50 percent belongs to the landowner, or 25 percent belongs tenant farmer and the remaining 75 percent belongs to the landowner. In such agreements, the tenant contributes his labor and shares in the cost of production inputs, while depending on the harvest for his livelihood. The type of rent, either cash or sharecropping has implications on the subdivision of the responsibilities between the landowner and the tenant and thus affects the marwa improvement processes.

18. **Relationships and Cooperation.** In most cases, a marwa is owned by one extended family. Islamic inheritance laws devolve ownership in specific parts to immediate and extended family members. After several generations, many family members may own small plots on the single marwa. Farmers on a marwa agree on crops to be cultivated in order to be able to service

[42] Bush, Ray. "Civil Society and the Uncivil State: Land Tenure Reform and the Crisis of Rural Livelihoods." Paper presented at the Conference on Agrarian Reform and Rural Development: Taking Stock, American University in Cairo, March 4–7, 2002.

the land and harvest collectively. They meet before the summer crop is planted in February and the winter crop in September to agree on the crop to be chosen.

19. The idea behind capitalizing on MCs is because it brings like-minded people with common and concrete interests—generally family members—together. They are cultivating and irrigating adjacent land with the aim of maximizing profit and minimizing cost. Due to the family relationships and physical proximity, communication on the marwa level is easy.

20. Nevertheless, such harmony should not be taken as a rule. Because the marwa community is small, problems do exist and emerge among its members—not only problems related to water management, but also social and family problems that can affect the level of accord among the members as well as the adoption and application of water management technologies and practices. The socio-economic changes and cultural influences that have impacted Egyptian society over the past decades are also affecting rural society. In the past, a respected elder of the extended family—called al-kebeer, or 'the big one'—played a central role as the head of the family. The al-kebeer adjudicated quarrels, resolved disputes, and negotiated on behalf of the family. However, the influence of such family heads is fading and may be, in some cases, non-existent. Conflicts may arise between brothers or cousins about irrigation schedules or unclear land boundaries. These used to be immediately settled by the head of the family. Now, however, they may lead to mutual avoidance—the quarreling family members avoiding one another in order not to start problems.

21. Another aspect that made an avoidance strategy among marwa or mesqa members possible is that the irrigation improvement on the mesqa level decreased water fluctuations and unpredictability leading to fewer conflicts among farmers. Conflicts used to arise between farmers at the head, or beginning, of the mesqa and those at the tail, or far end. However, the irrigation improvement project has contributed to water equity, which in turn impacts the level of confrontation among farmers. Thus, farmers have expressed that, because they face no water scarcity or inequity problems, the need to cooperate with or confront one another has decreased. This means that the allocation of water—the water supply—should exactly meet the farmers' demands in order to compel farmers to cooperate and to rotate and schedule their irrigation.

22. **Women on the Marwa[43].** The role of women varies from canal to canal, but one thing is true: their influence is increasing as a result of a number of things:

a) Irrigation improvements have made irrigation easier;
b) The absence of husbands or sons;
c) Limited resources that make women's participation in agricultural and irrigation activities necessary in order to decrease the costs for labor as much as possible; and
d) Women may need to undertake all agricultural activities, if they are tenants themselves.

23. The study found that women play an important role, whether visible or invisible. If women are undertaking agricultural activities, including irrigation, and are actively (even if invisibly) participating in making household decisions, they have to be better informed. They

[43] The situation of women on the marwa is being assessed in the ongoing study noted in paragraph 15a of this annex.

need to be supported just as men have been, in terms of availability of information and training about water management issues.

Annex 16: Map

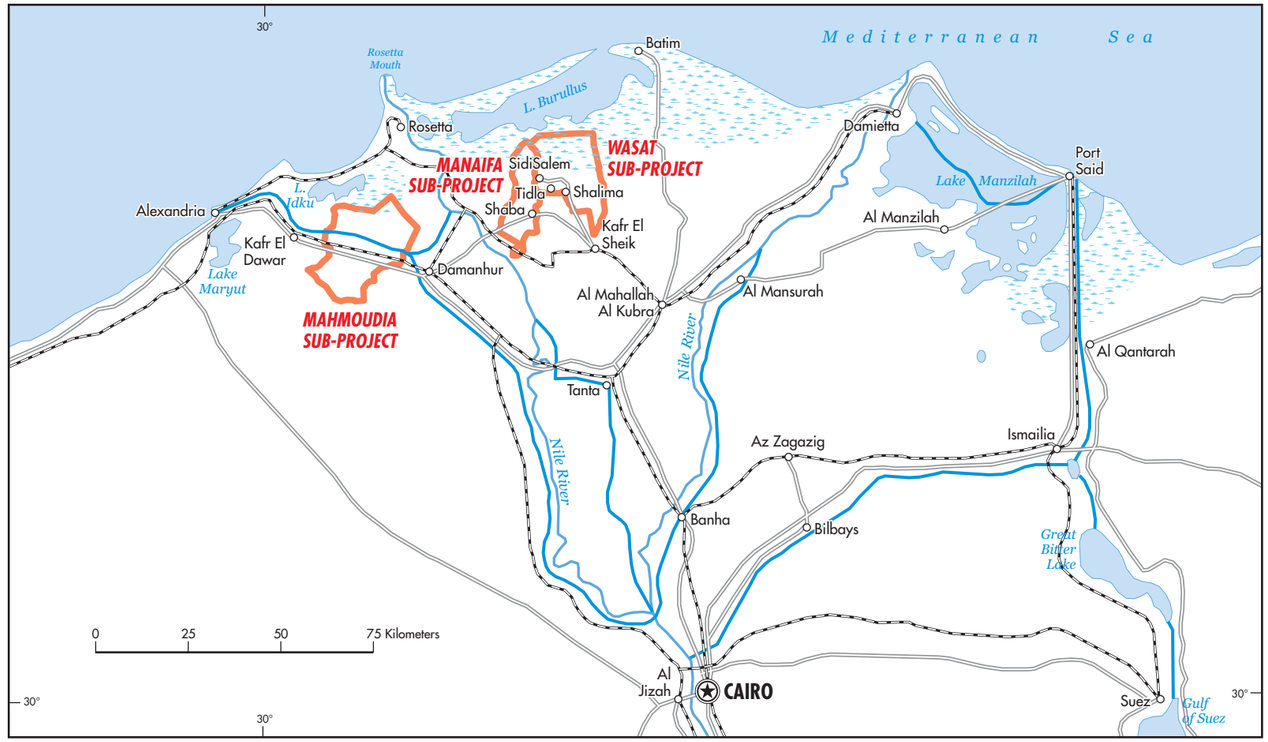
ARAB REPUBLIC OF EGYPT – Farm-level Irrigation Modernization Project

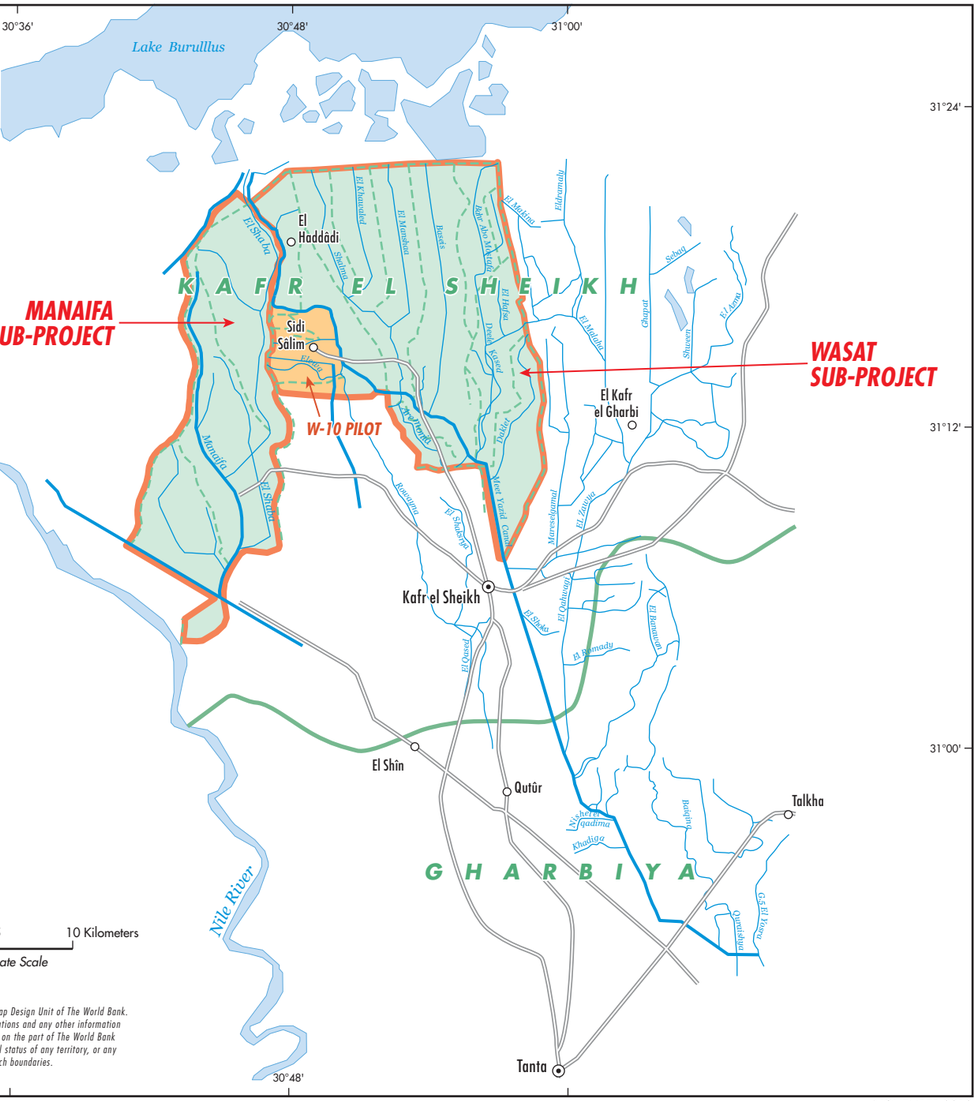
IBRD 38216

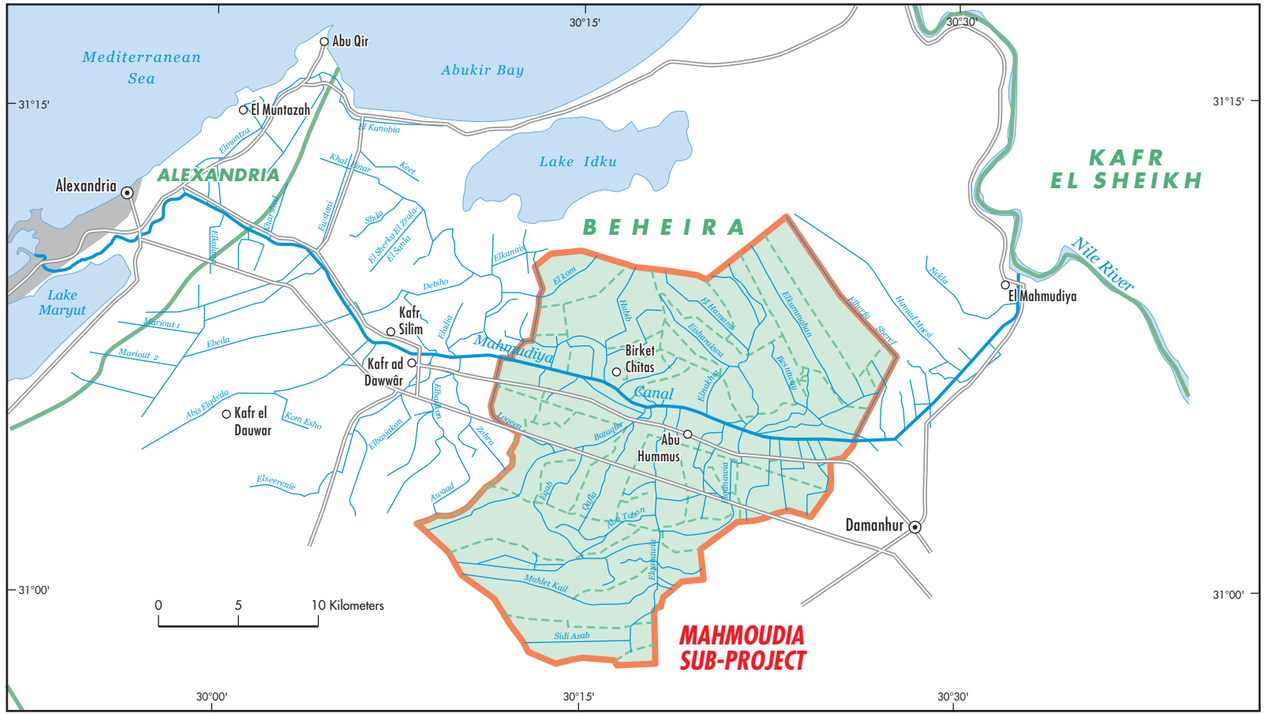
ARAB REPUBLIC OF EGYPT

FARM-LEVEL IRRIGATION MODERNIZATION PROJECT

- SUB-PROJECT BOUNDARIES
- W-10 PILOT AREA
- MAIN CANALS
- BRANCH CANALS
- DRAINS
- MARSH
- MAIN ROADS
- RAILROADS
- MAIN CITIES AND TOWNS
- GOgovernorate CAPITALS
- NATIONAL CAPITAL
- GOVERNORATE BOUNDARIES







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NOVEMBER 2010