



## 1. Project Data

**Project ID**

P073977

**Project Name**

EG-INTEGRATED IRRIGATION IMPR. &amp; MGT

**Country**

Egypt, Arab Republic of

**Practice Area(Lead)**

Water

**L/C/TF Number(s)**

IBRD-72910

**Closing Date (Original)**

31-Mar-2014

**Total Project Cost (USD)**

303,000,000.00

**Bank Approval Date**

03-May-2005

**Closing Date (Actual)**

31-Mar-2016

**IBRD/IDA (USD)**
**Grants (USD)**

Original Commitment

120,000,000.00

0.00

Revised Commitment

120,000,000.00

0.00

Actual

120,000,000.00

0.00

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## 2. Project Objectives and Components

### a. Objectives

The Project Development Objective (PDO) as articulated in the project Appraisal Document (PAD, p. 3) was to:

***"assist the Ministry of Water Resources and Irrigation (MWRI) in improving the management of irrigation and drainage in the project area, to increase the efficiency of irrigated agriculture water use and services."***



The Project Development Objective (PDO) as articulated in the Financing Agreement (FA, p. 12) was to:

***"assist the Borrower in improving the management of irrigation and drainage in the project area in order to increase the efficiency of irrigated agriculture water use and services."***

Although the Loan Agreement was amended three times, the PDO did not change. The PDO in the PAD and the Financing Agreement are almost identical except for the word "Ministry of Water Resources and Irrigation" in the PAD statement which was replaced by the "Borrower" in the FA statement.

**b. Were the project objectives/key associated outcome targets revised during implementation?**

Yes

**Did the Board approve the revised objectives/key associated outcome targets?**

No

**c. Will a split evaluation be undertaken?**

No

**d. Components**

The project included five components.

**1.Improved and Integrated Water Management (appraisal cost US\$224.9 million; actual cost US\$226.02 million).** This component would cover the implementation of irrigation and drainage rehabilitation, improvement and modernization works and programs at all levels of the selected command areas. It included seven sub-components:

- 1.1. Main canal system improvements.
- 1.2. Branch canal (secondary) and mesqa (tertiary) system improvements, including electrification for pumping stations wherever feasible.
- 1.3. Marwa (quaternary) and farm level irrigation system improvements.
- 1.4. Open and subsurface drainage network improvements.
- 1.5. Main pumping station improvements.
- 1.6. Tube well irrigation and groundwater monitoring improvements;
- 1.7. Engineering studies, designs, construction supervision and O&M setup.

**2. Improved On-Farm Water Management Component (appraisal cost: US\$4.62million; actual cost: US\$0.58 million).** This component would cover: (i) regional water and land management adaptive research programs; (ii) extensive on-farm water control and irrigated agriculture practice demonstrations; and (iii) irrigation advisory and production support services strengthening.

**3.Institutional Development and Capacity Building (appraisal cost: US\$14.29; actual cost US\$9.17 million).** This component would focus on the proper establishment, expansion and scaling up of water user organization functions at the levels of tertiary and secondary system irrigation and drainage hydraulic units throughout the selected command areas. It included five sub-components:



- 3.1. Establishment of secondary system irrigation and drainage BCWBs, and ensuring their voice in water management decision making at district and command area levels through formation of federated water boards (WBs) at district level.
- 3.2. Establishment of mesqa Water User Associations and ensuring their proper representation within the BCWBs.
- 3.3. Establishment and mainstreaming of Integrated Water Management Districts (IWMDs), together with establishment of suitable joint or integrated irrigatiodrainage command area management systems.
- 3.4. Execution of cadastral and water users registration surveys and preparation of corresponding data bases.
- 3.5. Preparation of updated digital and hard copy national mapping grids.

**4. Project Management Coordination and Integration (appraisal cost: US\$10.99 million; actual cost: US\$13.57 million).** This component would support the management and coordination entities, functions and activities needed for effective planning, implementation and commissioning of irrigation and drainage improvements on the basis of full command areas. It included four sub-components:

- 4.1. Establishment and operational support for an integrated Project Management Unit (PMU).
- 4.2. Establishment and operational support for Regional Coordination Units (RCUs) and regional implementation teams (RITs) to be attached to the PMU, one at each of the two project command area locations.
- 4.3. Set up and execution of monitoring and evaluation (M&E) arrangements and programs to assess project impacts and performance.
- 4.4. Assistance with the formulation and facilitation as needed of liaisons and linkages at and between central and local levels that would advance the integration of improvement planning, implementation and management maps.

**5. Environmental Mainstreaming (appraisal cost: US\$5.00 million, actual cost: US\$0.07 million).** A project Environmental Management Plan (EMP) would be implemented under this component to demonstrate how improvements in water quality could be achieved. EMP activities would address the threats to water quality posed by domestic sewage discharges into the irrigation systems and the problems caused by improper disposal of municipal solid wastes.

#### **e. Comments on Project Cost, Financing, Borrower Contribution, and Dates**

**Project Costs.** The total project was estimated at appraisal to be US\$300.00 million including physical and price contingency allowances, but excluding front end fee and unallocated loan amounts. Actual project cost according to the ICR (Annex 1) was US\$249.91 million representing 83.3% percent of the total cost at appraisal. In a further communication, the project team explained that the difference between appraisal and actual costs was due to two main reasons: the depreciation of the Egyptian Pound; and the shortages of government financial resources following political upheaval in the country. These shortages reduced the contributions by the government by about 40% of what was originally planned.

**Project Financing.** The project was to be financed through an IBRD Specific Investment Loan (SIL) worth US\$120.00 million. Co-financing was also provided by the German Development Bank (KfW) and the



Netherlands Development Corporation (NDC) in the amount of US\$53.00 million and US\$ 25.00 million, respectively. Actual amounts disbursed according to the ICR (Annex 1) were US\$118.56 million, US\$60.93, and US\$10.76 million for the IBRD, KfW and NDC, respectively.

**Borrower Contribution.** The Government of Egypt was expected to contribute US\$105.00 million of counterpart funds. Actual amount contributed was US\$57.71 million representing about 61% of the appraisal estimate.

**Dates.** The project was expected to close on March 31, 2014. Actual closing date was two years later on March 31, 2016. The delay was mainly due to the political unrest in Egypt between January 2011 and June 2013 which also affected the implementation of the project. The project was restructured three times, all Level 2. The first restructuring was carried out on October 14, 2012 when the disbursed amount was US\$43.30 million, in order to increase the percentage of expenditures to be financed under the loan from 70% to 90%, reallocate the loan proceeds among categories of expenditures, and as amend Schedule 4, Section III-I of the Loan Agreement based on the revised procurement plan, to identify the number of contracts subject to the World Bank's prior review. The second restructuring was on March 20, 2014 when the disbursed amount was US\$65.99 million, in order to extend the loan closing date from March 31, 2014 to March 30, 2016, reallocate loan proceeds among different categories of expenditures and improve the Results Framework. The third restructuring was on January 17, 2016 when the disbursed amount was US\$101.96 million, in order to reallocate the loan proceeds among different categories of expenditures to help finance procurement of emergency pumps and spare parts for large pumping stations to ensure sustainability of investments under the project. The Midterm Review was carried out on June 5, 2012 compared to an original date on July, 2008.

### 3. Relevance of Objectives & Design

#### a. Relevance of Objectives

In 2017, Egypt's population reached 95 million with a per capita availability of renewable fresh water resources of 650 cubic meters per annum. Given the scarcity of fresh water, the Government of Egypt (GOE) has a keen interest in increasing the economic return per unit volume of water. Hence, rationalizing and reforming water management is central in any strategy aimed at accelerating the country's economic growth (PAD, p. 1).

At project appraisal, objectives were in line with the Government's priorities for the irrigation sector. The Government of Egypt's efforts focused on increasing economic growth through improvements in management of water resources and agricultural productivity. The Government's Integrated Water Resources Action Plan (2005) aimed to increase water productivity, integrate the fragmented water-related agencies and empower water user associations through capacity building. Objectives were also in line with the Bank's Country Assistance Strategy for Egypt (CAS-FY02-FY04) where the overarching objective of the CAS was to reduce poverty and unemployment. The CAS (p. 26) stated that the Bank would continue to engage Egypt through interventions with major indirect poverty reduction impact including Irrigation and Drainage improvement.



At project completion, objectives continue to be in line with Government priorities for the irrigation sector. The Government's Sustainable Agricultural Development Strategy-2009 "Towards 2030" featured enhancing water use efficiency in agriculture as one of its main objectives. Objectives were also in line with Bank's Country Partnership Framework for Egypt (CPF-FY15-FY19) which had one of its objectives aiming to enhance access to improved agriculture and irrigation services. The CPF also emphasized environmental conservation, sustainability, and poverty alleviation by improving the irrigation infrastructure to address agricultural productivity.

While the PDO clearly states its aim, it lacks a link to higher level objectives. It also bundles the idea of supporting more efficient services and use, without differentiating how these two aspects need to be addressed differently.

Relevance of objectives is rated substantial.

## Rating

Substantial

## Revised Rating

Not Rated/Not Applicable

### b. Relevance of Design

The Results Framework did not provide clear links between project inputs, outputs and expected outcomes; and was later modified during implementation. The project was relevantly designed to achieve the PDO in the following ways:

**1. To improve service delivery:** design supported structural improvements of the main (primary) and branch (secondary) canals to improve the hydraulic capacity of the system and deliver more water to the mesqas (tertiary) canals. Design also would support open and subsurface drainage network improvements. These activities were relevant and directly linked to the PDO and were expected to improve irrigation efficiency and decrease water logging in project areas.

**2. To improve irrigation efficiency:** design aimed to promote the continuous flow irrigation model in branch canals and mesqas rather than the rotational flow model that continues to be practiced. In addition, design would support the construction of an electric pumping station for each mesqa (tertiary canals) which was expected to reduce pumping costs compared with use of individual diesel pumps. This was expected to improve equity of water supplies along the mesqas where head end users were favored at the expense of tail-end users, who more often experienced delayed crop establishment, reduced crop development and yields, and crop failure.

**3. To improve management of irrigation and drainage:** design aimed to address the institutional arrangements both for individual mesqa operation through supporting Water User Associations (WUAs) and supporting relevant changes and strengthening of all the relevant institutions upon which the mesqa-level WUAs depended. These activities were relevant and would ensure sustainability of project investments. Design would also support an environmental management plan (EMP) that aimed to address the threats to water quality posed by domestic sewage discharges into the irrigation systems and the problems caused by improper disposal of municipal solid wastes.

Relevance of design is rated modest due to two notable shortcomings. First, design aimed to promote a continuous flow irrigation model at the branch and mesqa level. However, during implementation, continuous



flow was found to be of limited benefit to farmers and incompatible with the incentives at the farm level; and the approach was eventually abandoned. According to the PAD (p. 15) implementation of continuous flow irrigation "will allow water savings of 10% to 30% while at the same time permit crops to be irrigated more efficiently." Continuous flow irrigation was an important element of design to promote irrigation efficiency; and the failure to implement it raises questions about the relevance of design. Furthermore, without the continuous flow model, design seems geared to improve the delivery of water services rather than creating more efficiency. A second weakness of design was the lack of attention to the coordinating mechanisms needed to adequately implement the environmental management plan, between Ministry of Water, Ministry of Environment, and the Ministry of Health, among other governmental institutions. Details for such coordination were overlooked in the project design.

**Rating**  
Modest

**Revised Rating**  
Not Rated/Not Applicable

#### 4. Achievement of Objectives (Efficacy)

##### **Objective 1**

##### **Objective**

PDO: to assist the Borrower in improving the management of irrigation and drainage in the project area in order to increase the efficiency of irrigated agriculture water use and services.

##### **Rationale**

##### **Outputs**

##### **Improving service delivery and irrigation efficiency**

- Works on Mahmoudia and Meet Yazeed main canals. 27 contracts were completed for works including dredging of the Mahmoudiya canal, rehabilitation of major structures including locks, cross-regulators, and bridges, installation of bored and sheet pile bank protection works, reprofiling and stabilizing embankments with stone pitching and internal drains, construction of reinforced concrete 'U' sections to replace unstable sections of the main canal, seepage control works, and the replacement of syphons. However, the ICR did not report on the length of the main canal system rehabilitated nor on the number of new/renovated structures on the main canal system as per the project's RF.
- Works on branch canals which served the mesqas selected for upgrading. A total of 445 km of branch canals were upgraded and 43 branch canals were rehabilitated with works including bank stabilization, new road and foot bridges, repair or replacement of cross-regulators, improved mesqa offtakes, construction of boxed culverts through residential areas, and construction of some lined sections. Also, 28 ultrasonic flow measurement systems were installed on the main and branch canals. However, the ICR did not report on number of gates and cross regulators in the branch canals.
- Marwa improvement. 24, 546 feddans of marwa were developed compared to a target of 30, 000



feddans.

- Mesqa improvement. 85,347 feddans (target: 85,000) were completed with works including providing intakes from the branch canal, gravity pipelines to the concrete pump sump, pump house with electric pump units and a standby diesel pump, suction and delivery pipework, electrical fittings including a meter, and a buried PVC pipe distribution network. The ICR did not report on the number and length of piped mesqas.
- 1,162 WUAs were fully operational at project closure compared to a target of 1,530 WUAs. According to the ICR (p. 24), this shortcoming was due to delays in installing electrical pumps. The ICR (p. 24) explained that Government funds were already budgeted to complete the electrical contracts and ensuring that all 1,530 mesqas receive project benefits.
- Drainage works. 92,085 feddans were provided with either new or rehabilitated drainage systems representing about 78% of the original target of 118,760 feddans.

### **Improved On-Farm Water Management**

- In January 2014, activities under this component were transferred to the ongoing Enhanced Water Resources Management (EWRMP) GEF project.

### **Improving irrigation and drainage management**

- The project established 2,070 WUAs in total and provided 242 training courses for these WUAs. However, these WUAs were not fully operational.
- At the mesqa level, 1,162 WUAs (target: 1,530 WUAs) were operationalized.
- 308 Branch Canal Water Users Association were established and 208 training courses were provided to strengthen the capacity of members.
- Three Integrated Water Resources and Irrigation General Directorates were established in three Governorates (Beheira, Gharbia, and Kafr El Sheikh).
- Nine District Water Boards (DWBs) were established.
- 15,525 people, including 1,926 females, were trained in various aspects of project management and operation.

### **Environmental Management.**

- Awareness campaigns were provided to board members of 56 BCWUAs and 1,668 WUAs with about 11,140 direct beneficiaries receiving awareness related to proper sewage and solid waste disposal and water quality impacts.
- Other activities were transferred in 2014 to the Enhanced Water Resources Management (EWRMP) GEF project

### **Outcome**

**Improving irrigation efficiency (service and use).** The project provided an area of 193,750 ha (target: 193,750 ha) with improved irrigation and/or drainage services that benefitted 476,662 water users. Water



productivity defined as m<sup>3</sup>/ha/crop cycle (for main crops, i.e., wheat, cotton, rice, maize, and berseem) increased by 15% which represented 75% of the original target of 20%. Also, irrigation costs were reduced from EGP 300 per 1000 m<sup>3</sup> to Egyptian Pounds (EGP) 150 per 1000 m<sup>3</sup>. The reduction in costs represented 75% of the original target of EGP100 per 1000 m<sup>3</sup>. The target of EGP100/1000 m<sup>3</sup> was not met due to the challenges of switching from diesel pumps to electrical units. The project also improved equity of water distribution where the ratio of water availability (in m<sup>3</sup>/hour) measured at head and tail reached 75% (target 75%), however, the ICR did not report on the ratio prior to the project intervention. According to the ICR (para 46), 91% of beneficiary farmers reported improved access to adequate water and drainage services. The project dropped perusing the continuous flow irrigation model as it became evident during implementation that continuous flow had limited benefits to farmers and was viewed as incompatible with the incentives at the farm level under Egyptian conditions (see section 3b).

**Improving irrigation and drainage management.** To improve management of irrigation and drainage the project contributed to institutional development in the project area. Three Integrated Water Resources and Irrigation General Directorates were established in Beheira, Gharbia, and Kafr El Sheikh; and 22 Integrated Water Management Districts, 308 Branch Canal Water Users Associations, 9 District Water Boards were established. At the mesqa level, 1,162 WUAs were operationalized which was below the target of 1,530 WUAs.

**Environmental management.** The impact of the project supported drainage activities on reducing water table and soil salinity in project areas was not captured due to the absence of indicators to assess these parameters.

Based on the aforementioned information, outcome is rated substantial, despite some shortcomings.

## Rating

Substantial

## 5. Efficiency

### Economic and Financial Analysis *ex ante*

- The PAD estimated the ERR and Net present value using an approach that estimated the benefits with and without the project. At the time of appraisal, the ERR was estimated at 20.5% and the NPV (at a 12% discount rate) was EGP 847 million.
- In calculating the ERR and NPV at appraisal, the following assumptions were made: improvements in the structures of both the main and branch as well the rehabilitation of subsurface drainage system were assumed to result in water savings of 10-30%, yields of crops were expected to grow by 4 to 25% over the seven year project period.
- The farm models used to estimate farm incomes suggested that the project would increase farm incomes by 12 to 26% thus creating an opportunity for cost recovery and also contributing to the reduction of poverty



in the project areas.

## **ex post**

- **ERR.** The ex post analysis estimated ERR and NPV at 12.20 % and EGP 1, 350 million, respectively. The ERR at completion was significantly lower than the ERR of 20.50 % estimated at appraisal.
- **Water Savings.** The ICR (paras 49 and 50) reported that the project efficiency suffered from higher costs involving mesqa rehabilitation work on sub-surface drainage systems. For example, the cost per feddan of mesqa improvement was higher by 10%; and for sub-surface drainage systems was higher by 17%. In both cases, the costs per feddan were underestimated at appraisal. While the project achieved 75% of its target on water efficiency, this came at significantly higher cost than envisioned at appraisal.
- **Crop Yields.** It was not clear from the ICR how the range of 4 to 25% growth in yields were arrived at. For example, it was not clear whether the growth in yields was driven by the improvements in water productivity alone or in combination with other improvements in crop management as the use of complementary inputs such as fertilizer and improved seeds.
- **Employment and Income.** The ICR (p. 19) reported during implementation about 120,000 person months of employment opportunities were created. Majority of employment opportunities were off-farm jobs related to project-financed infrastructure rehabilitation. The ICR did not specify the representativeness of the sample of farm households on which the growth in farm incomes were based.
- It is noteworthy that while the discount rate of 12% used during appraisal was based on the opportunity cost of capital, the discount rate of 6% used at completion represented the marginal utility of consumption of the project beneficiary. In addition, at appraisal, the water saved as a result of improvements in irrigation structures and drainage systems was assumed to be a benefit. However, at completion, it was argued that there was no water saved as such due to the reuse of the water saved by other farmers downstream. Due to these differences in assumptions and the data used to derive farm incomes, it is difficult to compare the ERR and the NPV calculated at appraisal and completion.

## **Administrative and Institutional Efficiency**

The project was delayed by two years as it suffered from implementation delays that were beyond the control of the project -- mainly due to political instability in the country known as the Arab Spring. The ICR (para 50) highlighted that implementation delays from the political upheavals were expected to have a substantial impact on the project efficiency because benefits were getting postponed while substantial expenditures were already incurred. There were also implementation delays that stemmed from limited implementation capacity of domestic contractors and technical issues in preparing procurement contracts. Delays at the mesqa level resulted from the need of a large majority (75%) of the farmers to accept design of the proposed works, which at times was difficult.

Efficiency is rated modest due to a lower ex post ERR compared to appraisal. Also, under-estimation of costs meant that the project spent half of the budgeted amount covering a smaller than the original planned area with improved mesqas and marwas. Lastly, projected water savings (water use efficiency) did not materialize due to the abandonment of the continuous flow model.



## Efficiency Rating

Modest

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	20.50	90.00 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	12.50	90.00 <input type="checkbox"/> Not Applicable

\* Refers to percent of total project cost for which ERR/FRR was calculated.

## 6. Outcome

Relevance of the objectives was rated substantial while relevance of the design was rated modest. Efficacy was rated substantial, despite some shortcomings. The project improved irrigation and/or drainage services for 476,662 water users. This was reflected in terms of improvements in irrigation efficiency and irrigation costs. The project also contributed to institutional development which was expected to improve management of irrigation and drainage services. Efficiency was rated modest due to a lower ex post ERR, under estimation of costs, and the underachievement of water savings.

Based on the assigned ratings for relevance, efficacy and efficiency, outcome is rated moderately satisfactory.

### a. Outcome Rating

Moderately Satisfactory

## 7. Rationale for Risk to Development Outcome Rating

Risk to the development outcome is rated modest.

**Institutional risk.** The sustainability of the development outcome is directly related to the success of the newly established Water User Associations in managing the project investments in irrigation infrastructure. The WUAs at the mesqas level have incentives to ensure that the systems continued to operate successfully because each farmer depends on the efficient and equitable distribution of the available water resources. The ICR did not cover the nature of capacity constraints within the newly established WUAs that may support or undermine the sustainability of the project. Also, the amount of financial resources allocated by the Government to support project-related activities after the completion of the project was not reported in the ICR. The exception was the EGP 162 million that the Ministry of Water Resources and Irrigation allocated out of counterpart funding to complete ongoing contracts (ICR, para 36). That said, over the years the Government have demonstrated commitment through allocating annual budget to maintain the irrigation and drainage infrastructure as both are



critical elements for sustaining agricultural productivity in the country.

**Technical risk.** To sustain the benefits of the project, the Government needs to follow up on the electrification of the remaining (diesel) pumps to ensure that farmers benefit from more affordable and reliable service.

#### a. Risk to Development Outcome Rating

Modest

### 8. Assessment of Bank Performance

#### a. Quality-at-Entry

- The project was a seven-year multi-donor funded operation. It built on the World Bank's long and successful partnership with the MWRI in the irrigation and drainage sector in Egypt. Also, the long-term collaboration with the German Development Bank (Kreditaustalt für Wiederaufbau, KfW) and the Netherlands Development Cooperation (NDC) in promoting a common donor vision for institutional change.
- Design benefitted from the lessons and experience of previous Bank operations in the country particularly the Irrigation Improvement Project (IIP), the National Drainage Project (NDP) and the Pumping Stations Rehabilitation Project (PSRP). Notable lessons reflected in the design included: integration of fragmented water delivery agencies and the modernization of irrigation and drainage systems to deliver water services for agriculture and other sectors, electrification of pumps in the design of new mesqa systems to reduce costs of irrigation, investments in on-farm water management schemes such as demonstrations to farmers about efficient water management techniques, and establishment and empowerment of water user associations.
- Design suffered from a number of notable shortcomings. First, it aimed to promote continuous flow irrigation model rather than the traditionally practiced rotational flow model. This approach failed and should have been carefully assessed before implementation. Second, detailed studies of the canal systems that were needed before critical major civil works contracts could be awarded were unavailable at entry. Third, design did not include detailed surveys, feasibility studies, and engineering designs, to accurately assess costs of the mesqa-level work. This resulted in underestimating costs by about 15%. Fourth, design sought to address environmental issues that were beyond the mandate of the implementing agency and required adequate coordination with relevant Ministries and government agencies. This needed coordination was not reflected in the project design.
- Seventeen risks were identified at appraisal. Two of these were considered major risks, first, the limited implementation capacity of domestic contractors, which could reduce the area improved or could result in delay. This was to be mitigated through provision of TA and training of contractors and staff. Second, the delay in design of improvement works and procurement processing which was to be mitigated



through advance actions on procurement and design work using Policy and Human Resources Development grants funds. Despite the proposed mitigation measures, these risks still caused implementation delays. Also, the provision of electrical lines for mesqa pump stations was considered a moderate risk. However, during implementation it became the main reason for not achieving the target number of operational WUAs.

- M&E suffered from some design shortcomings (see section 10 for more details).

### **Quality-at-Entry Rating**

Moderately Unsatisfactory

#### **b. Quality of supervision**

The project was implemented under a challenging political environment that extended from 2011 through 2013. The Bank supervised the project regularly throughout the implementation period and supervision missions included a relevant skill mix. The Bank was proactive during the implementation of the project and was able to rectify the problems that arose due to lack of detailed engineering designs on large civil works. This allowed the Bank to review mesqa-level designs and control costs. Supervision demonstrated an adaptive decision-making capability by dropping the continuous flow irrigation model when it became evident that it was not applicable under local conditions. The Bank Supervision helped the Government to restructure the project to get implementation back on track after political turmoil and to modify the Results Framework to better capture the project's outcomes. The Mid-term Review was carried out five years later than the expected date when the project had spent a little less than 30% of the US\$303 million of the project funds. The ICR (para 67) correctly concluded that "the need for sufficient investment with enough evidence on implementation precluded an earlier MTR."

### **Quality of Supervision Rating**

Satisfactory

### **Overall Bank Performance Rating**

Moderately Satisfactory

## **9. Assessment of Borrower Performance**

### **a. Government Performance**

The ICR (para 69) reported that the Government provided counterpart funding as planned, thus showing signs of ownership. The Government also supported implementation arrangements including appointment of key officials. Government officials availed themselves to the World Bank missions consistently; and initiated restructuring requests accordingly. In a further communication, the project team explained that given the importance of the irrigation and drainage systems, the Government was expected to continue making the necessary resources available to ensure the sustainability of the project. Nevertheless, the ICR did not shed light on the Governments strategy to continue building the capacity of the newly established water user association without which the benefits as well as the ownership dimensions of the project could



decline over time. Finally, the Government could have provided more support to facilitate electrification of the remaining pumps as originally planned.

### **Government Performance Rating**

Moderately Satisfactory

### **b. Implementing Agency Performance**

The Ministry of Water Resources and Irrigation (MWRI) was responsible for the implementation of the project. Accordingly, it had developed a detailed Project Implementation Plan and the Project Management Unit (PMU) was set up within MWRI in Cairo. The PMU was responsible for the integrated planning, financial management, budget control, procurement of goods and services, monitoring and coordination of project activities and overall technical and progress reporting.

The ICR (para 70) highlighted that the implementation of the physical dimensions of the project were managed by technical units within the MWRI. While implementation was slow at the beginning of the project, it improved in the last four years. This was possible because the technical departments within MWRI become more focused and showed better management of contracts, which ensured that works were completed according to schedule. Finally, the implementing agency could have provided more support to ensure safeguard compliance on the electrical contracts earlier in implementation. This could have helped earlier completion on the electrical contracts and achieving better results on operationalization of WUAs.

### **Implementing Agency Performance Rating**

Moderately Satisfactory

### **Overall Borrower Performance Rating**

Moderately Satisfactory

## **10. M&E Design, Implementation, & Utilization**

### **a. M&E Design**

- M&E activities were under the overall responsibility of the Project Management Unit (PMU). Other technical agencies within MWRI were also involved in monitoring and evaluation. Activities of these agencies were coordinated by the PMU. The PMU had an M&E section with one M &E specialist and a short term international consultants provided support for M&E activities.
- The original Results Framework (RF) included three outcome indicators to assess the PDO. While the first indicator "volume of water used for given level of agricultural production (m3 per ha per crop)" and the second indicator "difference between land productivity (Tons per ha) between head-and tail-end farmers" were relevant and directly related to the PDO, the third indicator "value of land (compared with non- project neighboring command area)" was not relevant because the value of land could be influenced substantially by factors extraneous to the project. Hence, it was later dropped.



- The RF also included sixteen intermediate outcome indicators to assess different activities under the project's five components. While these indicators were relevant, specifications of (intermediate and end) targets were not provided in the PAD. Also, measuring some of them would be challenging. For example, "Tons of solid wastes collected and safely disposed to (pilot) landfills."
- There were no indicators to assess improvements in drainage despite the fact the project was expected to perform a sizable rehabilitation of drainage systems. For example, assessment of water table levels and soil salinity levels before and after rehabilitation in project areas.

## **b. M&E Implementation**

The PMU used various sources of data. Some of the project specific data were obtained from the Water Management Research Institute, the Egyptian Public Authority for Drainage Projects, Agricultural Cooperatives, the Irrigation Improvement Sector, and the Ministry of Agriculture and Land Reclamation. The data from these sources, surveys of water user associations, and regular PMU reports were used to prepare the annual M&E reports. The project team indicated that some of the data were verified by field visits and reviews of the irrigation water distribution network. According to the ICR (para 28), Excel sheets were used to generate monthly tabulated or graphic physical progress of the project. However, the ICR did not report on many physical targets relating to main canal rehabilitation as envisioned in the PAD.

**Revision of the RF.** Three core sector indicators were added at the 2014 restructuring: area provided with improved irrigation and drainage services, water users provided with new/improved irrigation and drainage services (male, female); and operational WUAs created and/or strengthened. These core indicators were relevant, measurable and strengthened the RF to better assess the PDO. Further, the units of measurement for first two outcome indicators were changed. The unit for water productivity indicator was changed from m<sup>3</sup>/ha crop cycle to water productivity increase (in percentage) for main crops, because the new unit reflected better the PDO objective of 'efficiency of irrigated agriculture water use', for example, when higher value/higher water use crops were introduced by the farmer. For the same reason, the unit to measure equity within a mesqa was changed from 'difference between land productivity (T/ha) between head- and tail-end farmers' to 'ratio of water availability measured at head and tail end'.

## **c. M&E Utilization**

The ICR provided limited coverage on utilization of information. The PMU used the monthly progress reports to adjust the overall planning activities and financial forecasts and take action regarding poor performance of contractors (ICR, para 28). Information from the Mid-term Review (MTR) was used to address the earlier problems in the design of the RF by dropping some indicators, revising others, and adding new ones. In addition, during the MTR, pursuit of continuous flow in mesqa-level designs was dropped after it became evident that it did not have a significant effect on water productivity.

Overall M&E is rated modest due to design shortcomings and implementation weaknesses.



## M&E Quality Rating

Modest

### 11. Other Issues

#### a. Safeguards

- The project was an environmental category B. It triggered two safeguard policies: Environmental Assessment (OP 4.01) and involuntary Resettlement (OP4.12).
- The ICR (para 31) reported that the Government prepared an Environmental Assessment and an Environment Management Plan to address both the environmental impacts and external factors. According to the Environment Assessment, the net impact of the project was positive and the negative impacts were generally temporary and minor. However, the ICR did not provide the details of both the positive and negative impacts. Most of the envisioned activities under the EMP were not implemented.
- While the ICR did not provide an explicit statement of compliance, it stated that "overall, the project activities complied with all applicable World Bank policies" and that "there were no associated significant, sensitive, diverse, unprecedented, or irreversible impacts (para 30)."
- The ICR (para 32) reported that a provisional Resettlement Action Plan (RAP) was completed before project approval. During implementation, the need for land was significantly reduced. In a further communication, the project team explained that the project focused on rehabilitation and improvement of main and branch canals, hence the need for land was reduced because there was no new construction.
- Project contractors were careful in selecting the timing of the civil works to minimize crops losses. During project implementation, lack of crop compensation for electrification contracts was identified. This was addressed through a joint World Bank/PMU team to identify the project affected persons, assess crop damages, and pay compensation. Payment of all project affected persons was swiftly and successfully completed by end of May 2016. According to the project team, only 78 households were affected by the project. The team also explained that there was a well- established country compensation system in place.

#### b. Fiduciary Compliance

**Financial Management.** Financial management (FM) was handled by the PMU through an externally hired financial specialist and three accountants seconded from the MWRI Finance Department. The FM team had the right skills to perform their duties. The project consistently maintained sound manual and automated accounting records. The quarterly report reviewed Interim Financial Reports and the annual audited Financial Statements were consistently received on time and were of acceptable quality. The ICR did not report on the status of external financial audits.

**Procurement.** According to the ICR (para 35), civil works contracts were awarded following standard World



Bank procurement guidelines. Procurement delays stemmed from identifying works and preparing detailed designs and technical issues for bid documents rather than from the procurement process itself.

### c. Unintended impacts (Positive or Negative)

**Positive.** The project is expected to enhance adaptation to climate change and reduce emissions of greenhouse gases resulting from burning diesel fuel. This would be achieved through replacing individual diesel pumps on mesqas with electrical pumps. According to the ICR (para 57), replacement of individual diesel pumps resulted in a decrease of 80.62 kg of carbon dioxide per feddan per year. With a total farm area of 92,085 feddan of improved mesqa area, the total reduction amounts to over 7.4 million kg of carbon dioxide per year. Also, other pollutants from burning diesel fuel such as nitrogen oxides and unburned hydrocarbons will be reduced. This was expected to go up further when all diesel pumps are replaced by electric pumps. For this benefit to materialize, electric pumps need to be operational.

### d. Other

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## 12. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Satisfactory	Moderately Satisfactory	---
Risk to Development Outcome	Modest	Modest	---
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	---
Borrower Performance	Moderately Satisfactory	Moderately Satisfactory	---
Quality of ICR		Substantial	---

### Note

When insufficient information is provided by the Bank for IEG to arrive at a clear rating, IEG will downgrade the relevant ratings as warranted beginning July 1, 2006.

The "Reason for Disagreement/Comments" column could cross-reference other sections of the ICR Review, as appropriate.

## 13. Lessons

The ICR included seven lessons. The following are emphasized with some adaptation of language:



- **For large water infrastructure works, an Environmental Management Plan (EMP) and its implementation needs to be ex ante coordinated across relevant Ministries (water, environment, health and agriculture).** The project's experience showed that environmental mainstreaming was conceptual in nature and found to be infeasible during implementation. Implementing the EMP required a coordination mechanism with relevant ministries which was overlooked in the project design.
- **Design choices for water resource management projects that seek to influence water use should be grounded in a contextual understanding of farmer behavior, including their ability and willingness to monitor and regulate water use.** This is especially the case for projects that seek to influence water use equity between upstream and downstream users. The project's experience demonstrated that a more realistic project design rested on separating what was within the project's direct influence from broader benefits outside its influence. For example, the continuous flow irrigation model required farmers to participate/monitor without substantial benefits accruing to that particular farmer.
- **Irrigation management and infrastructure improvements must go hand in hand.** Project experience has demonstrated that irrigation improvement was not merely a matter of adding measurement and control structures but also required a mindset change: irrigation services for farmers and existing institutional arrangements must be systematically analyzed and redefined. Irrigation management should be based on a combination of infrastructure improvement and management solutions (for example, improvements in monitoring, planning, institutional capacity, and operation).

#### 14. Assessment Recommended?

Yes

Please explain

Agriculture is being revitalized in many countries, especially after the food crisis in 2008. Given the rising land and water constraints, especially in the Middle East and North Africa, the rehabilitation/expansion of irrigation schemes in order to increase agricultural productivity (through improvements in the efficiency of water use) is likely to gain more momentum than in the past. In this regard, a better understanding of how this project took advantage of opportunities and overcame challenges should be useful for similar interventions in Egypt and other water-scarce countries where agriculture is a major source of economic growth. This is especially the case with a better understanding of the benefits of "continuous flow" vs "rotational flow" approaches to irrigation.

#### 15. Comments on Quality of ICR



The ICR provided adequate coverage of project activities and candidly reported on most shortcomings. However, it is mainly descriptive and the evidence base was limited. For instance, it does not provide information on the details of how water productivity increased by 15%. In fact, it appears that the ICR does not differentiate between the increase in water productivity and improvements in crop yields. There is also some inconsistencies and lack of clarity across sections of the ICR. This was the case with the statements on the reduction in the costs of irrigation. The information on how the M&E system was developed and was used to monitor progress of the implementation of the project is also insufficient.

In addition, the ICR could have elaborated more on the following:

- The impact on the provision of government resources of the political upheaval and the challenges of implementation that it presented.
- The strategies of the government to sustain the project and the prospects (or discussions, if any) for developing a similar project in other parts of Egypt.
- Efforts of the KfW and NDC with regards to improving management of irrigation and drainage.

**a. Quality of ICR Rating**

Substantial