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Task Order 807**

***ASSESSMENT OF THE IMPACTS OF THE
WATER POLICY REFORM PROGRAM***

Report No. 58

June 2002

**Water Policy Program
International Resources Group Winrock International Nile Consultant**

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Prepared by

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For

United States Agency for International Development/Egypt

Environmental Policy and Institutional Strengthening Indefinite Quantity Contract (EPIQ)

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LIST OF ACRONYMS

APRP	Agricultural Policy Reform Program
BCWUA	Branch Canal Water User Association
EPIQ	Environmental Policy Indefinite Quantity
EEAA	Egyptian Environmental Affairs Agency
EIA	Environmental Impact Assessment
EPADP	Egyptian Public Agency for Drainage Projects
EWUP	Egyptian Water Use Project
GOE	Government of Egypt
IAS	Irrigation Advisory Service
IIP	Irrigation Improvement Project
IMS	Irrigation Management System project
IRG	International Resources Group, Ltd.
IMT	Irrigation Management Transfer
MALR	Ministry of Agriculture and Land Reclamation
MFS	Monitoring, Forecasting and Simulation
MISD	Matching Irrigation Supply and Demand
MOSEA	Ministry of State for Environmental Affairs
MOHP	Ministry of Health and Population
MPWWR	Ministry of Public Works and Water Resources
MSM	Main System Management
MVE	Monitoring, Verification and Evaluation Unit
MWRI	Ministry of Water Resources and Irrigation
Mt/fd	Metric tons per feddan
NOPWASD	National Organization for Potable Water and Sanitary Drainage
RDI	Reform Design and Implementation
USAID	United States Agency for International Development

WPAU
WPRP
WUA

Water Policy Advisory Unit
Water Policy Reform Project
Water User Association

EXECUTIVE SUMMARY

The Water Policy Reform Project (WPRP) was funded by USAID in 1997 in order to provide the Ministry of Water Resources and Irrigation (MWRI) with technical assistance for improved policy assessment and planning, improved irrigation system management, and improved private sector participation. The Project was funded through September, 2002. This report is an assessment of the impact of the water policies developed and implemented under WPRP on Egyptian water management and agriculture.

The Task Order establishing the WPRP identified several objectives for the project including:

1. Improve MWRI knowledge and capabilities to analyze and formulate strategies, policies, and plans related to integrated water supply augmentation, conservation and utilization, and to the protection of the Nile water quality.
2. Improve water allocation and distribution management policies for conservation of water while maintaining farm income.
3. Recovery of capital cost of mesqa improvements and to establish a policy for the recovery of operation and maintenance cost of the main system.
4. Increased water user involvement in system operation and management.
5. Introduce a decentralized planning and decision-making process at the irrigation district level.

Five basic categories of policy improvement activities were conducted by WPRP as follows:

1. Agricultural production and irrigation efficiency (agricultural production per unit of water);
2. Privatization/participatory management (private water users participation);
3. Water quantity management/decentralization;
4. Water quality management; and
5. Institutional reforms.

Significant national policy changes do not occur quickly under most circumstances. National quantifiable impacts from policy changes are generally not immediately detectable, and other projects have adopted some similar outcomes. The policy process followed in the Project was to establish working groups including Government of Egypt personnel and other stakeholders focused on a specific problem, to develop pilot projects to test solutions, and then extend the pilots to general application. The Project has been in existence for less than five years and practically all of the WPRP policy adjustments have been adopted in the last three years. As a result, significant changes in national impact indicators could not be expected. Therefore, the assessment focused instead on quantitative and qualitative measures of accomplishment.

To improve agricultural production and irrigation efficiency, the Project focused on rice and sugarcane production, two crops which have been identified as water intensive. The Project was instrumental in implementing a shift in rice cultivation from long duration varieties to short duration varieties on over 82% of the rice production in Egypt. The increase in national rice production per cubic meter from this policy was estimated at 25%. At the same time, the Project developed a program of improved irrigation using laser leveling and gated pipes in sugarcane areas. The pilot project indicated good results, but the implementation has been relatively slow (about 1,100 feddans to date) due to the lack of locally produced equipment and relatively high capital expense. The MWRI has recently reached an agreement with the Ministry of Defense Production for producing that equipment locally, in order to reduce the capital cost and expand the application more quickly.

Privatization and participatory management activities included the establishment of nine branch canal water user associations in non-IIP areas in Egypt. The transfer of management to those water user associations was then undertaken in a pilot. Moreover, a public participation program on decisions involving canal cleaning activities was tested in a pilot Irrigation District with good results. The MWRI has officially adopted a policy of expanding the irrigation management transfer mechanisms used in the pilot and of expanding public participation.

Water quantity management policies developed in the Project included a method of matching supply of water to the irrigation demands at the District level. This involved creating a data collection and information transfer process between local agriculture extension and irrigation districts. Volumetric water delivery was extended through calibration of over 150 sites located at divisions between Directorates and irrigation Districts. A pilot for combining all water functions at the district level into an integrated water management district, including irrigation water, drainage water, mechanical (pumping stations), and groundwater functions is being implemented at present and will be tested as a model for further expansion by the Ministry.

Water quality issues were addressed in several ways by different working groups involving several ministries involved in environmental quality. First, intermediate drainage reuse was examined as a way to use water in the drains before they become heavily polluted by municipal and industrial waste. The Ministry is in the process of implementing intermediate drainage water reuse in several locations based on the pilot. Given that urban wastewater is a critical problem for water quality, a method of prioritizing the investments in wastewater treatment plants was developed and applied to a pilot canal. Environmental impact statements were recognized as necessary by the Ministry and a policy to require EIAs on all future projects was adopted. Finally, the revision of Law 48 on water quality was completed and is under consideration.

Institutional reforms were a part of all the above activities. The most important are the changes to Law 12 governing the management of water, and Law 48. However, other institutional changes were implemented with the Project's help, including the

establishment of the Irrigation Advisory Service within the Ministry and the adoption of policies for the application of both the integrated water management district and irrigation management transfer by the Ministry. In addition, the capacity of ministry personnel, as well as others in the Egyptian economy, was expanded through 6 training tours and 113 workshops.

The WPRP used the process of developing “incremental steps” of policy change to set the stage for substantial institutional and management changes in water management in Egypt. These changes were adopted and are in the initial stages of implementation by the Ministry. On-going monitoring programs should be established to verify the impacts of these policy changes in the long run.

1 Introduction

1.1 Overview

In 1997, the Agricultural Policy Reform Program (APRP) was established as a United States Agency for International Development (USAID) grant program involving several Government of Egypt (GOE) ministries. The program targeted reform in the agricultural sector and in the water sector. The Ministry of Water Resources and Irrigation (MWRI) is the lead Egyptian governmental agency charged with the management of water resources. The MWRI and USAID, under the umbrella of the APRP, jointly designed a water policy package consisting of integrated water policy and institutional reforms. Within this program, several activities were established. These activities included water policy analysis (Water Policy Reform Project or WPRP), the Water Policy Advisory Unit (WPAU) in the MWRI, a continuation of the water education and communications unit (GreenCOM), a continuation of a previous Main Systems Management activity (MSM-II), and a water Monitoring, Forecasting and Simulation unit including the Nile Forecast Center continued from the previous MFS-III USAID project. The focus of this impact assessment report is the WPRP. The WPRP was funded through EPIQ, the Environmental Policy Indefinite Quantity contract. Coordination among MWRI, USAID, and the water policy technical assistance program was through the WPAU and a project steering committee established by the MWRI.

As a part of the Scope of Work for this contract, an APRP Impact Assessment was required. This report presents the impact assessment for water policy reform activities over the contract period (1997-2002).

1.2 Organization of the report

This report includes six chapters and four appendices. This chapter is the introduction to the report, containing background material. Chapter 2 gives the rationale for the impact assessment and the indicators identified by USAID and their application to the WPRP assessment. Chapter 3 discusses the impact process for the WPRP program, the assessment approach, measures of accomplishment and general data sources. Chapter 4 presents the assessment for each general category using measures of accomplishment. Chapter 5 gives a general assessment of the impacts of the WPRP program. Chapter 6 consists of conclusions and recommendations for future USAID and MWRI programs. Appendix A is a listing of all the WPRP Benchmarks by tranche along with their verification indicators and the evaluation of achievement of those indicators as determined by the Monitoring, Verification and Evaluation (MVE) unit of the Agricultural Policy Reform Program (APRP). Appendix B provides documentation not directly available from reference reports and other published material. Appendix C provides a listing of all reports published under the WPRP.

1.3 Background

The terms of reference of the EPIQ task order were structured around a jointly designed results package. The package represented a continuation of USAID's involvement in supporting the efforts of the MWRI (formerly the Ministry of Public Works and Water Resources or MPWWR) to manage the Nile irrigation system through programs such as the Egypt Water Use Project (EWUP), completed in 1984, and the Irrigation Management Systems Project (IMS) which concluded in 1997. The EWUP project focused primarily on developing a research program meant to clarify on-farm management problems in Egypt and to provide solutions that would increase irrigation efficiency and agricultural productivity. The IMS project included pilot activities in local participation, including a cost sharing program for irrigation improvements. USAID and MWRI then moved to a more strategic level: "Both parties believe that a 'non-project assistance' approach will bring about policy changes generating improved water use efficiency with significant economic benefits." [Water Resources Results Package Scope of Work]. To that end, two study and research programs explored areas for water policy reforms, the first by the International Irrigation Management Institute (IIMI) and the second by the Egyptian National Water Research Center and Winrock International. By 1997, these studies resulted in the identification of potential strategies and measures for water conservation, supply augmentation, and long range plans to ensure sustainability and efficiency of water resource management.

The results package developed by USAID in the task order for EPIQ Water Policy Reform Project (WPRP) included three major results expected from implementation. USAID supported MWRI financially through a cash transfer mechanism and technical assistance under the EPIQ task order based on the successful implementation of benchmarks which were designed around these major results, which included:

1. Improved irrigation policy assessment and planning process;
2. Improved irrigation system management; and
3. Improved private sector participation in policy change.

This results package included several specific sub-tasks for each major result.

The overall objective of the results package was "to increase the global efficiency and productivity of Egypt's Nile water system." Five sub-objectives through which the general objective was to be met were identified:

1. Improve MWRI knowledge and capabilities to analyze and formulate strategies, policies, and plans related to integrated water supply augmentation, conservation and utilization, and to the protection of the Nile water quality.
2. Improve water allocation and distribution management policies for conservation of water while maintaining farm income.

3. Recovery of capital cost of mesqa improvements and to establish a policy for the recovery of operation and maintenance cost of the main system.
4. Increased water user involvement in system operation and management.
5. Introduce a decentralized planning and decision-making process at the irrigation district level.

The impact assessment is focused on determining the extent to which the WPRP contributed to achieving those objectives.

The policy process used by the WPRP, and by the APRP in general, was a process involving all stakeholders. It included several steps, as follows:

- Identification of possible policy options by the WPRP in cooperation with its counterparts in the WPAU.
- Workshops with WPRP, WPAU, MWRI, and other interested stakeholders, such as various Ministries and private entities, in which effective and feasible policy objectives were identified
- Formation of working groups, which included WPRP, Ministry, USAID and other stakeholders, that developed the analyses, specific policy goals, and implementation activities
- A workshop in which approval of the specific goals and implementation activities as benchmarks and indicators of achievement (verification indicators) was obtained from the Ministries and USAID
- Action by working groups, WPRP, and other stakeholders to achieve the goals established in the benchmarks
- A final workshop in which the policies and implementation activities were presented to the Ministries and USAID for approval, and Ministry adoption
- A transfer of funds to the involved ministries after the approval was obtained

In many cases, this process was repeated through several tranches of the project, as policies were developed, approved and implemented.

2 Impact Assessment Rationale

2.1 Need for assessment

Although the MVE unit of the APRP is charged with evaluating impacts of the various programs under the aegis of APRP, its focus throughout the life of the program has been on the achievement of benchmark indicators. The MVE is in the process of developing an overall APRP impact assessment, but the effects of the water policy activities under EPIQ will be an implicit, rather than explicit, part of that assessment. Given the importance that USAID and the MWRI place on the development and implementation of effective water policies that are targeted on the efficient and sustainable use of Egypt's limited water resources, a specific impact assessment was requested for the EPIQ program. Moreover, this assessment can serve as one guide to future USAID activities with respect to water management in Egypt.

However, adopting policy reform is usually a slow process because significant inertia exists in any socio-political system. Individuals and groups within the society have learned to gain benefits from the status quo, and are usually slow to accept change. Moreover, once a reform is adopted by the government, measurable national impacts are not easy to discern, and even more difficult to trace to a specific policy change. Therefore, impact assessment must be a long-term activity and recognize that the steps between policy formation and measurable impacts are incremental.

2.2 Relationship of impact assessment to benchmarks

The USAID Chief Technical Officer (CTO) for the WPRP and his staff, MWRI personnel and the EPIQ team jointly identified and approved benchmarks for four of the five tranches of project activity. Tranche 1 was completed by the MWRI before the establishment of the EPIQ organization. The benchmarks for Tranches 2 through 5 were intended to respond to one or more of the stated objectives of the project. For each benchmark, a set of verification indicators was developed on which an evaluation of the MWRI's success in completing the benchmark was based. Appendix A lists the various benchmarks, verification indicators, and MVE assessment of achievement related to each of the indicators. Many of the benchmarks were sequential steps in achieving the major results and objectives. Several of the benchmarks, particularly for the latest tranches of the project, are initial steps in policy development. As such, those benchmarks are unlikely to have had quantifiable, definitive effects on national impact indicators.

A benchmark by benchmark, tranche by tranche enumeration of verification indicators and their achievement is not the goal of impact assessment. The verification indicators were specific to each tranche and each benchmark, and not necessarily related to overall impacts on water management or the Egyptian economy. An impact assessment addresses the level to which the project or activity affected measures reflecting the

accomplishment of the over-arching objectives identified by the task order. This assessment will focus on these measures.

2.3 USAID performance indicators

The assessment of impacts of the EPIQ project is focused on the general outcomes of EPIQ activities in terms of measures of better water management and increasing economic and social welfare in Egypt. USAID, in its Strategic Plan 1996-2001, indicated that the Water Policy Reform Program (WPRP) activities fell under Strategic Objective 1 (SO-1), Intermediate Results (IR) 1.2.2 (Improved allocation of water resources) and IR 1.2.3 (Increased access to agricultural information). USAID identified four indicators of Water Policy Reform Program (WPRP) performance:

1. Agricultural production per unit of water;
2. Area of private water users;
3. Number of stakeholders aware of reforms; and
4. Information related reforms achieved.

Indicators 1 through 3 are quantitative measures clearly tied to objectives two through five of the program. Indicator 4 is a much more qualitative variable which reflects the first objective of the program, as well as qualitative measures of the other four. Note also that water quality reforms are not specifically included in any of the first three indicators.

Under the USAID Strategic Plan for FY 2000-2009, water resources activities were shifted to fall under Strategic Objective 19 (SO-19 – Improve management of the environment and natural resources in targeted sectors), IR 19.1 (Public-private sector partnerships), and IR 19.2 (Increasing investment in environment and natural resources best practices and technology). USAID identified two performance indicators under SO19:

1. (Primary) Real value of agricultural production per unit of water; and
2. (Secondary) Change in area of irrigated land under participatory governance.

The benchmarks established for the WPRP addressed five general areas of water policy reform that can be categorized as:

1. Agricultural production and irrigation efficiency (agricultural production per unit of water);
2. Privatization/participatory management (private water users participation);
3. Water quantity management/decentralization;
4. Water quality management; and
5. Institutional reforms.

These areas are consistent with, yet more inclusive and focused than, the list of SO1 or SO19 indicators. The analysis of impacts in this report is organized on the basis of these five areas. No categorization of impacts of policy change is likely to be completely exhaustive or mutually exclusive. Policy change is expected to have broad effects. This categorization represents, in the author's opinion, a useful description of the benchmark activities of WPRP. Discussion of the impact indicators will reference specific WPRP benchmarks and/or verification indicators in order to define the links between the indicators and project activities.

This report will attempt to identify and quantify, where possible, the performance indicators, or to present evidence related to the indicators. Specific numerical and qualitative measures will be identified for each of the four performance indicators. However, because other donors and Ministries have projects or program that will impact some of the same performance indicators, the EPIQ program can not be identified as the sole contributor to any or all of the changes in these indicators.

3 WPRP Impact Assessment

3.1 Impact assessment approach

Policy reform is a long process in any society. Even when radical reform is adopted, inertia in the economic and political system often creates long lags before impacts are observed. For a river system like the Nile, changes in operations and policies in scattered portions may not have measurable consequences for the system as a whole. Therefore, it is highly unlikely that WPRP, or for that matter the APRP of which WPRP is a small part, will have significant quantifiable impacts on the physical or economic systems in Egypt for several years. Only long-term monitoring and evaluation programs will be able to detect these kinds of impacts.

Given the likely paucity of data regarding general impacts on the physical and economic systems, an alternative approach was taken. A set of proposed specific measures of accomplishment, consistent with both the major results and the objectives of the task order, was developed under an EPIQ/WPRP Task Order by Dr. Adrian Hutchins. A working group composed of members from the WPAU and EPIQ was established to review these measures. The specific measures list was also provided to MVE for comments and suggestions. A final list of specific measures was identified and provided to USAID for review. The data available from the two Knowledge, Attitude, and Practices surveys carried out during the WPRP provide a baseline for farmer attitudes and practices. However, there is a lack of baseline data collection for some of the specific measures, since monitoring programs were not a part of the original terms of reference for the EPIQ program.

3.2 Measures of accomplishment

The following list of specific quantitative and qualitative measures of accomplishments, which indicate the achievement of the objectives, was identified by the working group. Each is associated with the indicator/category to which it relates. These measures are closely associated with the benchmark activities, as is appropriate. A more detailed presentation of the benchmarks can be found in Appendix A.

3.2.1 Agricultural production and irrigation efficiency (agricultural production per unit of water)

- Number or percentage of branch canals which have switched from rice rotation to standard rotation by the end of August 2001
- Percent of rice area planted with short duration varieties

- Changes in rice yield
- Extent of sugarcane areas under improved irrigation
- Sugarcane yield changes in areas with improved irrigation

3.2.2 Privatization/participatory management (private water user participation)

- Number of Branch Canal Water User Associations (BCWUAs) formed and functioning and area covered
- Milestones in IMT transformation process
- Awareness of public participation and irrigation management transfer within the pilot district
- Recognition and levels of acceptance of cost sharing requirements
- Water user groups established in deep groundwater areas

3.2.3 Water quantity management/decentralization

- Water savings from matching irrigation demand and supply
- Percent of districts matching irrigation demand and supply
- Changes in farmer complaints of water shortages
- Number of Directorates implementing volumetric calibration
- Number of Directorates delivering water on a volumetric basis
- Awareness of concept of integrated water management within the pilot district
- Qualitative assessment of flow from free-flowing groundwater into lakes
- Yield changes due to improved drainage in free-flowing groundwater areas
- Extent of Improved Irrigation Project (IIP) application

3.2.4 Water quality management

- Adoption of changes to Law 48
- Requirement for Environmental Impact Assessments (EIA) adopted
- Drainage reuse policies adopted
- Irrigation management transfer strategy adopted
- Integrated water management district strategy adopted
- Urban wastewater policies adopted
- Environmental impact statement policy/applications

3.2.5 Institutional reforms

- Formal inter-ministry cooperation
- Adoption of changes to Law 12

- Institutionalization of IAS
- Establishment of water quality unit in MWRI

3.3 Data sources

In order to complete an impact assessment, collection of data regarding the impact indicators was required. Data were obtained from various sources, including:

- Benchmark completion reports by EPIQ and APRP
- Other reports and studies by EPIQ and APRP
- The 1998 and 2001 Knowledge, Awareness and Practices (KAP) surveys of Egyptian farmers (GreenCOM and EPIQ Report No. 54, respectively)
- Publications and reports by MWRI, MALR, and private agencies
- Questionnaire responses from local MWRI and MALR personnel
- Personal interviews with personnel from EPIQ, APRP, MWRI and other involved ministries at the ministry and field levels
- Rapid surveys of local conditions by MWRI personnel
- Ministerial memos, decrees, and letters

These data were then translated into quantitative and qualitative measures related to the indicators. The source(s) of data or information are provided for each measure of achievement. The specific benchmarks related to the general category are listed as well.

In fact, many of the benchmarks were related in that early benchmarks, as they were accomplished, led to later benchmarks. Thus, many of the measures of accomplishment are “steps” to later indicators. Moreover, this sequential relationship is more significant for the qualitative indicators. In the discussion sections in the following chapter, linkages among benchmark activities, measures of accomplishment, and more general impacts will be highlighted.

4 WPRP Impacts: Measures of Accomplishment

4.1 Introduction

This chapter presents the assessment of impacts based on the measures of accomplishment listed in Chapter 3. For each general category, a list of the quantitative or qualitative measures of accomplishment is presented along with the source from which the data were obtained. Next, a listing of the appropriate benchmarks is presented, and finally a general discussion of the measures of accomplishment is presented.

Many of the indicators are cross-cutting, in that their achievement represents policy improvements in more than one general category. The activities under institutional reform obviously affect the achievements in the other categories, but several of the specific categories contain activities that also impact other categories. For example, the creation of water user associations should, in the longer term, result in further decentralization of decision-making by the MWRI and privatization of water management. Treating wastewater in order that it can be used for irrigation complements integrated water management at the district and directorate level. Creating integrated water management districts involves quantity and quality management, particularly with respect to drains and drainage reuse. Therefore, the treatment of the measures of accomplishment as part of a specific category is somewhat arbitrary.

4.2 Agricultural Production and irrigation efficiency

Two of the most water-consuming crops in Egypt are rice and sugarcane. These crops were specifically identified in the scope of work for the EPIQ program as targets for improved water use. Two working groups were formed from EPIQ, the Reform Design and Implementation (RDI) unit of APRP, the MWRI and the MALR. The working groups developed programs to reduce water use and increase productivity in both those crops.

4.2.1 Measures of accomplishment

The working group activity identified two programs to improve productivity per unit of water applied in rice and sugar cane. For rice, the substitution of short duration rice varieties, taking about 120 to 130 days to mature, for long duration varieties, which require about 160 days, result in a reduction of water use. The rice water rotations (4 days on and 5 days off) could be changed to the traditional rotation (5 days on and 10 days off) for the last 30 – 40 days of the traditional rice-growing season.

For sugarcane, the application of improved irrigation techniques in the form of laser leveling and gated pipe delivery of water reduces the water required to irrigate fields compared to traditional flood irrigation. These improvements not only control over-

application but they increase yields in two ways. The area of cultivation increased by reducing the number and size of open field ditches. Reducing water pooling in low areas increases productivity and reduces waterlogging.

The results from the rice and sugarcane activities are:

For rice:

- All (100%) of the branch canals in rice growing areas had changed from the traditional rice water rotation which continued through September to the short duration water rotation by the end of August, 2001, reducing the amount of applied water to irrigate the rice crop by approximately 25%. Overall applied water reduction in the pilot areas for the May through September growing season was estimated at about 13%, taking into account cropping during September after the rotation is changed. [Ministerial Decision No. 63 of 2002; Personal communications with Engineer Ragab Abdel Azim of the Irrigation Sector Central Directorate; EPIQ Report No. 22; EPIQ Report No. 26]
- Eighty-three (83) percent of all rice grown was a short duration variety in 2000, an increase of 51.7% from 1997. An estimated 91% of all rice grown was a short duration variety in 2001. [MVE Rice Subsector Baseline Update, II, Impact Assessment Report No. 18; Personal Communications with Dr. John Holtzman, MVE].
- Productivity of rice per feddan increased from 3.54 metric tons per feddan (mt/fd) in 1997 to 3.82 mt/fd in 2000, a gain of about 8%, primarily due to the higher yielding short duration varieties [MVE Rice Subsector Baseline Update, II, op. cit.].
- Rice productivity per unit of water applied rose approximately 25% over the period, due primarily to the adoption of short duration varieties and the reduction in applied water (calculated from the above data).

For sugarcane:

- 1,095 feddans of sugar cane were under improved surface irrigation in 2002, an increase of 982 feddans from 1998, the beginning of the pilot policy implementation [Sugar Crops Council Sugar Crops Report 2000]
- Yield of sugar cane under improved irrigation increased between 4 and 7 mt/fd, or about 25%, although rather wide ranges of productivity changes were obtained (from 2 to 10 mt/fd [Sugar Crops Council Sugar Crops Report 2000])
- Applied water was reduced by 15 to 20 percent on most of the sugarcane pilot areas [APRP-DAI Report No. 33]
- In May, 2002, the Minister of MWRI and the Minister of Military Production signed a protocol for joint cooperation to produce irrigation inputs – pumps and gated pipes – for 2,000 feddans of sugarcane, at a cost

of 12 million LE [Egyptian newspaper stories – El Akhbar, El Gomhoureya, El Wafd, El Ahrar all dated 28 May 2002].

4.2.2 Benchmarks

The benchmarks associated with the rice and sugarcane activities were:

- Tranche II, Benchmark C.4. Water Use on Rice: The MWRI and MALR
- Tranche III, Benchmark C.6. Rice Water Use Policies: MWRI and MALR jointly will adopt policies for the substitution of short duration varieties for long duration varieties among private commercial growers and for changing water scheduling to achieve optimal use of water for rice production.
- Tranche II, Benchmark C5. Water Use on Sugarcane: MWRI and MALR jointly will establish a strategy for the optimal use of water for sugarcane production.
- Tranche III, Benchmark C5. Sugarcane Water Use Policies: MWRI and MALR jointly will designate two areas of private commercial sugarcane growers and promote improved sugarcane water management efficiency in Upper Egypt.

4.2.3 Discussion

Short duration rice is now dominant in production, and seeds for long duration rice are not readily available on the market. While there was already interest in short duration rice in the GOE (Field Crops Research Center of MALR), APRP units (EPIQ and RDI) were instrumental in providing implementation support for the initial pilot and the first round of expansion. Once a sufficient cadre of individuals in both the MALR and MWRI were trained in the process, the remainder of the implementation was accomplished by the GOE. Although measures of the actual reduction in water application for rice are not available, the change in rice rotation is clear.

The Government of Egypt continues to implement gated pipe irrigation. Since sugarcane is grown on 5-year cycles, and the investment required is relatively high, the adoption of gated pipe irrigation has been slow relative to that of short duration rice. However, there was a 10-fold increase in the number of feddans under improved irrigation from 1998 to 2002. Implementation of the pilot projects in Upper and Middle Egypt was accomplished with EPIQ and RDI support. The results were sufficient to encourage the MWRI and MALR (Sugar Crops Research Institute) and the quasi-private Sugar Crops Council to expand the program. The new accord between the MWRI and the Ministry of Defense Production will increase the availability of locally produced equipment to farmers and should contribute to a more rapid implementation. While not an “Improved Irrigation Program” package, this activity represents one approach to improved irrigation schemes. WPRP assistance in implementation of this activity ceased at the end of Tranche 3.

During the process of developing these benchmarks and meeting the verification indicators, discussion between MWRI and MALR personnel (specifically the Central Administration for Water Distribution at MWRI and the Rice Research Institute and Sugar Crops Research Institute at MALR) led to the conclusion that water deliveries were often mistimed relative to the crop water needs (farmer demands), particularly for rice cultivation. The “mismatch” was due to the failure of communications and lack of rapid information transfer between farmers, the local MALR extension agents and the MWRI district engineer. As a result, a follow-on benchmark for developing a system of information transfer about planting dates and crop rotations from the farmers to the district engineer was developed in Tranche 4.

4.3 Privatization/Participatory management

Privatization of irrigation systems requires an organization capable of financing, managing and maintaining those systems. Many water user associations at the mesqa level have been organized in Egypt in association with irrigation improvement projects, but the transfer of management of tertiary or secondary canals will require associations of larger scope and capacity.

4.3.1 Measures of accomplishment

EPIQ and personnel from the IAS worked together to create Branch Canal Water User Associations (BCWUAs) in pilots that demonstrated both the feasibility and the requirements for formation of those associations. The next step was to use the BCWUA form to develop irrigation management transfer mechanisms and to apply them to pilot areas. The achievements are as follows:

- Inclusion of Articles 33 and 34 in the revision of Law 12/1984 which permits the formation of water user associations and private sector management entities at all levels of the irrigation system. [EPIQ Report No. 48; Ministerial letter of transmittal to the People’s Assembly dated 12 December 2001]
- A Ministerial announcement that Water User Associations can be formed in non-IIP areas [EPIQ Report No. 9]
- The number of farmers that had knowledge of water user associations increased from 3% to 6% from 1998 to 2001. However, once the concept was explained, 75% of farmers indicated a willingness to join a water user association if it were formed in their area [EPIQ KAP Report No. 54].
- Nine initial Branch Canal Water User Associations have been formed in the Nile Basin by Ministerial decree. Four of these BCWUAs were formed as a part of Tranche III, four are a part of the Irrigation Management Transfer activities of WPRP and are presently in pilot stages, and one (under the title of a Water Users Federation of Water User Unions [WUUs]) was formed in free-flowing deep groundwater area. [EPIQ Report No. 17; Ministerial Decree No. 28/1998; EPIQ Report No. 47].

- The area covered by the associations varied between 2,000 and 12,000 feddans, with an average of about 7,000 feddans.
- MWRI Ministerial and Governorate decrees establishing the policy for irrigation management transfer [EPIQ Report No. 47, Appendix A]
 - Memoranda of understanding between MWRI and BCWUAs regarding IMT signed [EPIQ Report No. 47]
 - MWRI has committed LE 4.8 million for rehabilitation of the IMT pilot areas canal system prior to full transfer to the BCWUA in accordance with the terms defined in the MOU.
 - The pilot program in public participation resulted in a significant portion of farmers reporting the following [Rapid survey of stakeholders, 9-10 March 2002, EPIQ Trip report]
 - Reduction in delivery problems at the tail end of both pilot canals
 - Reduction in number of complaints related to cleaning and maintenance
 - Recommendations by farmers to expand the pilot
 - Inclusion of Articles 34 and 117 on cost sharing as a part of the revision of Law 12/1984 [EPIQ Report No. 48; Ministerial letter of transmittal, 12 December 2001]
 - A Ministerial decree requiring the MWRI to develop and implement plans for public participation in decision making, following the procedures used in the WPRP pilot program [Ministerial Decree No. 432/2001]
 - A 10 percent increase in farmer willingness to share costs for improvements in the canal and drainage systems [EPIQ KAP Report No. 54]
 - Increase in awareness of MWRI activities at the District level by stakeholders, particularly farmers [EPIQ KAP Report No. 54; EPIQ Trip Reports on Public Participation in Decision Making, El Gharbiya Governorate and Behira Directorate, 9-10 March 2002]
 - A manual for implementing public participation activities (English and Arabic versions) was provided by EPIQ and adopted by the MWRI [WPAU/EPIQ/WPRP Manual for Public Participation; Ministerial Decree No. 432/2001]
 - Both farmers and the Undersecretary of Irrigation indicated a desire to see public participation extended in both area covered and in the number of issues considered [EPIQ Trip Report on Public Participation in Decision Making, op. cit.]
 - Three WUUs for wells established in deep groundwater areas in Farafra in Tranche III. Six additional WUU established after completion of the Tranche III benchmark [EPIQ Report No. 16; Personal communications with Dr. Fatma Abd-El-Rahman, Head of the Groundwater Section, MWRI]

4.3.2 Benchmarks

The benchmarks associated with privatization and participatory management were:

- Tranche II, C6. Water User Associations: MWRI will develop a policy to allow the formation of water user associations in areas that have not participated in the IIP and begin to promote such associations.
- Tranche III, C3. Branch Canal Water User Associations: MWRI will decree a policy and initiate an action program for formation of WUAs at the distributary and branch canal levels.
- Tranche IV, C4. Irrigation Management Transfer: MWRI will adopt a policy and strategy for transferring management of selected sections of the irrigation system to stakeholders and/or the private sector.
- Tranche V, C2. Public Participation in Decision Making. The GOE (MWRI) will adopt a policy for public participation in decision-making

4.3.3 Discussion

A very clear train of development is seen in the activities under this category. EPIQ's activities initially began with the establishment of the ability to form WUAs outside of IIP areas. Once the legal authority was obtained, secondary-level BCWUAs were developed, which entailed building the local expertise to manage the organization, including financial accounting. The next step was the transfer of local management to the BCWUAs, which involved an agreement between the MWRI and the BCWUAs regarding the activities that each would perform. A key responsibility of MWRI is to bring the water delivery system to a mutually agreed on level prior to full transfer under those agreements. MWRI has obligated the necessary funding and system rehabilitation is presently proceeding. Finally, the formal transfer of management to the BCWUAs will take place upon completion of the rehabilitation. The result will be user assumption of both responsibility and authority at the BCWUA level, which is a major step toward privatization. In addition, the involvement of stakeholders in management decisions (public participation) established mutual confidence between the MWRI District engineering staff and the farmers with respect to the ability to manage tasks on the branch canals to the benefit of both. Without this confidence, privatization will be a much slower process.

The formation of secondary WUAs has been relatively slow because the current Law 12/1984 provides for legally establishing WUAs only in the IIP areas. While Ministerial decrees can permit the creation of BCWUAs in the specific locations, the passage of the changes in Law 12/1984 is essential to give broad-based legal foundation to BCWUAs. In addition, the Law is critical to many institutional reforms, including non-IIP water user associations and irrigation management transfer. Once the revised Law 12/194 is adopted, the process of developing irrigation management transfer from MWRI to BCWUAs (or water boards) is still expected to be lengthy. It is doubtful that specific impacts will be observed for several years. In fact, the phased development plan outlined in EPIQ Report No. 47

includes a national policy for extending irrigation management transfers. This policy calls for the replication of the pilot areas to be initiated by the end of 2002, and completed by 2020. A monitoring and evaluation system has been suggested and is being developed which should provide evidence of the program's impacts. It is obvious also that implementing irrigation management transfer will require extensive resources for training members of BCWUAs and for the equipment necessary to carry out the BCWUAs functions.

While the public participation pilot was limited to two pilot areas and to a single issue (canal cleaning), the results appeared to have been positive for both the MWRI personnel involved and the farmers. Farmers noted fewer delivery problems at the tail of the pilot canals and there were fewer complaints related to the scheduling and performance of canal cleaning and maintenance. The establishment of communications among farmers and Irrigation Engineers is another crucial step toward irrigation management transfer.

4.4 Water Quantity Management

The water quantity management activities were targeted at the objective of decentralizing decision making in the MWRI. There were three distinct activities contributing to that goal. These were: (1) developing an information transfer system that will provide better water management in the short term, and be a basis for demand management in the longer term; (2) using volumetric releases and telemetry capability in the main system management; and (3) creating a pilot in which surface water, drainage, and groundwater is managed in an integrated water management district. Note that all three objectives relate to volumetric control of water at the Directorate, Inspectorate, and District levels.

Although the Irrigation Improvement Project (IIP) was considered in one early benchmark, it was not targeted for implementation by the EPIQ project. Therefore, the impacts of WPRP on IIP are expected to be limited. The installation of telemetry equipment in the Nile irrigation system took place under the Main System Management (MSM) program, which was administered separately from the EPIQ project until it terminated in 1997. MSM activities under WPRP from 1998 to 2000 included the calibration of flow measurements at the Directorate and Inspectorate level with the objective of a switch from water level releases to volumetric releases using telemetry.

4.4.1 Measures of accomplishment

The working groups associated with each of the three activities identified the specific actions necessary to achieve the goals. For matching supply and demand, data collection and computer software were developed to permit agricultural and irrigation personnel to exchange information on cropping patterns and water availability at the District level. The telemetry and volumetric delivery required the calibration of water levels to volumetric flows at each of 53 points of diversion between directorates and 113 points of division between Districts. Integrated water management needed substantial support, since it requires realignment of the four water districts (Irrigation, Drainage, Mechanical

[pumped water] and Groundwater), as well as a restructuring of personnel and financial functions. Because time was limited, pilot integrated districts could only be formed during the project but implementation could only be initiated. The following are the measures of achievement of these APRP/WPRP activities:

- 31 MWRI Districts out of 198 total (15.7%) distributed over five Directorates currently have the MISD program implemented fully as compared to the pilot of 5 Districts in 2 Directorates begun in 1999. These Districts supply 1.281 million feddans, or 16.1% of the 7.95 million irrigated feddans in Egypt. [MWRI data sheet Tranch IV, C.1, Matching Irrigation Supply with Demand, MISD expansion data]
- 38 MWRI Districts (19.2% of the total 198 districts) are currently in the process of implementing the MISD program. These Districts supply 1.66 million feddans, or 20.9% of all irrigated areas in Egypt. [MWRI data sheet. op. cit.]
- Approximately 2.94 million feddans (39% of the total 7.95 million feddans) are covered by either the fully implemented MISD program or are in the process of implementation [APRP data sheet Irrigation Districts and Agricultural Administrations Participating in the MISD Program, 14/05/02]
- The pilot studies showed potential significant decreases in the over- and under-supply of water after the full application of the MISD program [EPIQ Report No. 45; EPIQ Report No. 55]
- Farmer complaints in the pilot areas have fallen by an average of 44%, from 137 per year to 60. The minimum decrease in complaints was 15% in the East Isna pilot (from an average of 44 per year from 1995 to 1998 to 29 per year from 1999 to 2001). The maximum decrease in complaints was 77% in the Abou Hummos pilot (from an average of 57 per year from 1995 to 1998 to an average of 13 per year from 1999 to 2001). [MWRI data sheet Trach IV,C.1,Matching Irrigation Supply with Demand, Pilot District Complaint Data].
- All 53 division points between Directorates are calibrated and using volumetric distribution [MWRI APRP Water Policy Reform Program, Tranche III, Benchmark C.1.MSM Utilization data sheet: Status Report as of 2002]
- 2 Directorates have completed the process of calibrating water level releases to determine volumetric flows at 43 locations that have telemetry capability. Water deliveries are being made on a volumetric basis at the locations. [MWRI APRP Water Policy Reform Program, Tranche III, Benchmark C.1.MSM Utilization data sheet, op. cit.]
- An additional 70 locations in 13 Directorates are being calibrated [MWRI Telemetry Calibration data sheet, 2002]. A total of 113 designated telemetry locations are either calibrated or being calibrated.
- A Ministerial decree stating that water distributions for all locations that separate districts within all Directorates will be based on flows as well as water levels beginning July 1, 2002 [Ministerial Decree No. 450/2000]

- A policy that all new wells implemented by the MWRI will be controlled in the Farafra area. All wells in the investor area are capped. [Personal communication with Dr. Fatma Abd-El-Rahman, Head, Groundwater Sector]
- A Ministerial decree establishing two pilot areas for integrated water management [Ministerial Decree No. 506/2001]

4.4.2 Benchmarks

The benchmarks for the water quantity management category were:

- Tranche II, C7. National Strategy on Irrigation Improvement: MWRI will develop a national strategy for improving water-use efficiency and agricultural productivity through irrigation improvement projects. The strategy will include priorities for implementing desired improvements.
- Tranche III, C1. Main System Management Program Utilization (MSM): MWRI will implement policies and procedures to shift from distributing water based on water levels to distributing water based on volumes using the MSM Telemetry System at Main Canal intakes, barrages, and division points between Directorates for enhanced irrigation operations and decision making.
- Tranche III, C2. Free-flowing Groundwater Management: MWRI will adopt policies and procedures for reducing water loss and land degradation [sic] due to improper O&M of free-flowing groundwater in the reclaimed areas of the Western Desert.
- Tranche IV, C1. Reducing Mismatch of Irrigation Deliveries: MWRI and MALR will jointly establish a system that improves the flow of real-time information between the Ministries with respect to irrigation demands and supplies.
- Tranche IV, C3. Water Management at the Directorate Level: MWRI will establish a policy for allocating, distributing, and controlling water on a volumetric basis at the directorate and inspectorate levels.
- Tranche V, C1. Integrated Water Management at the District Level: the GOE (MWRI) will issue a policy to integrate all water management functions at the district level.

4.4.3 Discussion

The MWRI is moving toward a fully integrated system for water quantity management in which all water supplies are considered, with volumetric deliveries based on irrigation demand. Each of the benchmarks and measures of accomplishment are a part of that transition. Computer programs were created for the MISD activity with the support of RDI and EPIQ to provide real-time crop water demand data to the District level of MWRI. Training was completed at the District level for both extension agents and irrigation personnel.

Expansion of the MISD application has been rapid, with full participation of the MWRI and MALR. EPIQ provides no implementation support for this expansion; some support to MALR is provided from RDI. The reduction of irrigator complaints is, at least in part, the result of this better water management. The commitment by the two Ministries to the rapid expansion of the MISD program is an indirect indicator of its positive impacts, which includes the benefits of better water management demonstrated in the analysis of historical data. The MISD process will eventually be a part of the integrated water management system, including telemetry.

There is clear evidence of the impacts of WPRP's activities on telemetry activity, as well. Forty-three division points on 26 Districts are currently ready to deliver water on a volumetric basis. Seventy additional division points with telemetry capability are being calibrated. The expansion of volumetric measurement to all of the Directorates by July, 2002, is a policy mandated by Ministerial decree.

The Ministerial approval of the integrated water management pilots represents a significant step forward in the development of effective water management, although this activity will not likely extend beyond the pilot stage for some time. The conjunctive use of water by a single management agency reduces both physical and fiscal overlap. A major expenditure of scarce resources – money and time – by the MWRI is required to evaluate each independent district (Irrigation, Drainage, Mechanical, and Groundwater Districts), to determine the appropriate boundaries for the integrated district, to train managers as well as engineers, and to complete the transition.

The Groundwater Sector has established nine water user groups on the basis of EPIQ input. In addition, some of the recommendations made for policy changes (reducing well flows to match irrigation demands on a seasonal basis, and controlling the free flowing wells in general) have been adopted by the Sector and applied not only in Farafra but also in other groundwater regions. All new wells implemented by MWRI in deep groundwater areas must be capped and controlled. In addition, all wells in the investor areas are capped and controlled.

4.5 Water Quality Management

Water quality is a very serious problem in Egypt. Municipal, industrial and agricultural effluent have made drainage water so polluted in some areas that it cannot be mixed with fresh water for use in the irrigation of consumable crops. Seven of the 23 Ministry mixing stations in the Delta have been closed as a result. The WPRP undertook several initiatives related to water quality management and environmental control. There are several ministries that have improving water quality as a target, including MWRI, the Ministry of Health and Population (MOHP), Ministry of State for Environmental Affairs (MEA), and MALR, all of whom were involved in discussions led by WPRP.

4.5.1 Measures of accomplishment

Several different working groups associated with the water quality issue were formed. Initially, the primary activity of the WPRP was a pilot for the use of drainage water for irrigation before municipal and industrial effluents precluded even mixing. The potential for controlling urban wastewater became the second area of interest. Finally, the revision of environmental law and the inclusion of an environmental impact assessment was determined to be a critical policy for water quality maintenance. The WPRP accomplishments in water quality management are:

- The Minister has allocated enough funds to install intermediate water reuse on at least 20 sites, based on the pilot results on the Bahr Bagar Drain [Personal communication, Dr. Ragab Abdel Azim, Central Directorate for Irrigation]
- Revisions of Law 48 of 1982 have been approved by the Steering Committee and forwarded for review [Steering Committee approval of revisions, 12 June 1999]
- The Minister signed a policy statement indicating that the MWRI will “integrate the environmental dimension to all activities of the MWRI...beginning 1 January 2002” [EPIQ Report No. 51]; included in this policy is the application of Environmental Impact Assessment (EIA).
- A source book for EIA procedures was completed and provided to the MWRI in Arabic and English [Environmental Impact Assessment Source Book, Appendix A, EPIQ Report No. 51].
- Ministry adoption of 11 policy reforms for urban wastewater management [EPIQ Report No. 34]
- A prioritization for urban wastewater treatment facility construction and improvement was developed and adopted by the MWRI and NOPWASD. [Letter from Chairman of EPADP to Chairman of NOPWASD, 29 August 2001]]

4.5.2 Benchmarks

The benchmarks for the water quality category were:

- Tranche II, C8. Drainage Water Reuse: MWRI will develop and approve new policies, regulations and criteria to promote drainage water reuse with appropriate incentives and technical support.
- Tranche III, C7. Intermediate Drainage Water Reuse: MWRI will establish an intermediate drainage water reuse program for the Bahr Bagar Drain as a model for other areas.
- Tranche III, C8. Water Quality Regulation: MWRI will revise Law 48 of 1982 governing water quality management to more effectively control discharge of wastes and wastewater into the Nile and its waterways.
- Tranch IV, C2. Urban Wastewater and Drainage Reuse: MWRI will adopt policies for improved management of discharge and reuse of urban wastewater in agricultural drains.

- Tranche V, C3. Improved Environmental Management: The GOE (MWRI) will strengthen its capabilities for improved environmental management for issues related to water resources.

4.5.3 Discussion

Three major thrusts of water quality management were associated with the WPRP activities. The first was to develop procedures to enable Egypt to use drainage water for irrigation. The results of the intermediate drainage water interception and reuse pilot project, implemented with support from EPIQ, indicated that reuse of drainage water before it becomes heavily polluted by municipal and industrial wastes was highly beneficial. The MWRI has recently funded a program to provide pumps and training sufficient to extend intermediate drainage reuse pilot to many sites in the Delta.

The second thrust was to examine the problem of urban wastewater being discharged into agricultural drains. Cooperative efforts in the wastewater working group, formed from representatives of MWRI's Egyptian Public Agency for Drainage Projects (EPADP), MALR, MOHP, National Organization of Potable Water and Sanitary Drainage (NOPWASD) and the Egyptian Environmental Affairs Agency (EEAA), resulted in several recommendations regarding environmental monitoring and management, including the implementation of a prioritization approach for allocating funds to construction and rehabilitation of municipal wastewater treatment plants in a pilot area (El Salaam Canal).

The third part of the water quality activity was to develop policies with regard to environmental management in general within MWRI. Two major activities were undertaken: the revision of Law 48 of 1982, and institutionalizing an environmental impact process in the MWRI. Since revisions of the law require approval of the legislative branch of the national government, the revision is still in process, and while the EIA process was approved by the Minister of MWRI in November, 2001, implementation has only begun recently.

4.6 Institutional Reform

Almost all of the benchmarks and measures of accomplishment are some form of institutional reform. This over-arching indicator reflects the MWRI official recognition of that reform in its actions to establish offices within the ministry, have staff participate in training, by conducting workshops to inform both professionals and the public, and change the laws and regulations under which it operates. Moreover, the WPRP itself has had recognizable impacts on other donors' existing efforts and plans for the future.

4.6.1 Measures of accomplishment

The institutional reforms that were undertaken by MWRI with WPRP technical assistance were usually a part of one of the other specific categories. The specific measures addressed below, however, are more reflective of the increasing capacity of the

MWRI to make and create policy reforms now and in the future. Within this category are included changes in the legal environment, creation of administrative agencies, and training. The accomplishments of the WPRP are:

- A Ministerial decree establishing the Central Department and the Governorate Directorates (Upper and Lower Egypt) of the IAS [Ministerial Decree No. 143/1999; EPIQ Report No. 18]
- The IAS is now a recognized department of the MWRI, and has line item budget allocation [Personal communication with Dr. Essam Barakat, Head, IAS]
- Ministerial letter of transmittal of the revised Law 12 to the People's Assembly, dated 12 December 2001.
- Adoption of the management transfer strategy [EPIQ Report No. 47, Appendix A]
- Adoption of the Integrated Water Management District model (EPIQ Report No. 49; Ministerial Decree No. 506/2001]
- MISD inter-ministry coordinating groups and committees [Ministerial Decree No. 469/2001; Accomplishments in Agricultural Policy Reform in Egypt, 1997-2001, Draft]
- 6 Training study tours under DT2 involving 67 individuals to the United States, Jordan, Mexico and Turkey [EPIQ Quarterly Reports, January – March, 1998, through January – March, 2002]
- 3 Training study tours involving 58 individuals are planned for Summer, 2002, and will be implemented by the WPAU [Personal Communication with Engineer Sarwat Fahmy, WPAU]
- 113 Workshops or training meetings on specific water management problems or approaches involving approximately 3,000 individuals [EPIQ Quarterly Reports op. cit.]
- Established bases on which other donors developed and expanded programs [Personal communications with Jan Bron, Director of the Water Boards Project, and Rob van der Weert, Acting Director of the NWRP Project]

4.6.2 Benchmarks

- Tranche III, C4. Irrigation Advisory and Support Service: The MWRI will institutionalize the IAS service in the Ministry'
- Tranche IV, C5. Revision of Law 12: MWRI will prepare revisions of Law 12 of 1984 on irrigation and drainage, and its supplementary laws, to improve effective water resource management

4.6.3 Discussion

The revision of Law 12 of 1982 is essential for implementation of almost all of the reforms recommended and/or piloted by WPRP. The WPRP's role in developing the current revision was critical. Without its efforts to organize a working group and sponsor the group's activities, it is doubtful that the revision would have been completed in the near future. The revised Law 12 is now under consideration by the legislative branch of the GOE. Major revision of basic laws is a difficult process in any country, and final approval of the revised Law 12 is not expected immediately. However, the impact of the revision is expected to be significant in many areas. Among them are the creation of WUAs, the private development of facilities, stakeholder involvement in water allocation, planning and management, cost sharing, and groundwater use.

The establishment of the IAS was essential for the development of WUAs throughout Egypt. The IAS will provide technical assistance and guidance to these associations as they are created, as well as in the long term.

Inter-ministerial efforts were not absent in the GOE prior to the WPRP. However, the creation of several working groups focused on specific tasks and objectives, such as rice and sugarcane policy, MISD, intermediate drainage reuse, and urban wastewater reuse, has led to a better understanding of each Ministry's position and concerns. The establishment of permanent joint committees to oversee both pilot activities and their extension to other areas, such as MISD and urban wastewater treatment, provides better recognition of the problems faced in water quantity and quality management as well as cooperative efforts that, according to Ministry observers, had not been in evidence in the past.

Finally, other donors, in particular the Water Boards Project and the National Water Plan Project, both funded by the Netherlands, indicated that several activities of the WPRP provided the bases on which further applications and extensions were developed. Examples cited were the revisions to Law 12 which WPRP led, the process for development of BCWUAs, which led to the Water Board Project's extension of the BCWUAs in two areas to form special Water Boards, intermediate drainage reuse, and the application of volumetric water delivery. It was noted by these projects that supporting implementation activities is essential for the successful extension of pilots. They stated that the limited time provided for some of the WPRP reforms to be tested and applied left a substantial effort remaining to implement the policy changes but that support for implementation appeared to be less than required.

5 WPRP Impacts: A General Assessment

As indicated above, quantitative indicators of national physical, economic, and social impacts are not likely to be available for two reasons. First, the WPRP has been in place for less than 5 years. The length of time necessary for moving from problem identification to possible policy solutions to pilot projects to full implementation to measurable impacts of policy changes is, in most cases, much longer than that. Secondly, without a relatively intense and sophisticated monitoring program, it is very difficult to discern the impacts of a given program or policy when it is just one of several focused on similar quantitative outcomes (e.g., productivity per cubic meter of water).

Some detailed and quantified data available for a baseline and impact analysis for the WPRP are those from the two KAP surveys. While these show that many of the policies were better known by farmers at the end of the WPRP than at the beginning (short duration rice, saving water, and communications with the local irrigation engineer), specific production and water savings data were not part of the survey. Other data are available from MVE publications and some anecdotal information from APRP and the Ministries. Therefore, it is expected that the policy change impacts will be determined primarily from more indirect measures such as Ministerial decrees and pilot program expansions.

Moreover, the achievements of the APRP and WPRP with respect to water policy can be evaluated from the point of view of a process of policy change, rather than specific outcomes. The process involves both the methodological approach to policy development and to policy development itself.

As an approach to policy change, APRP and WPRP have used working groups composed of various stakeholders, including GOE officials, representatives of the private sector, and technical assistance personnel. These working groups were formed around some of the specific problems that were identified in the original scope of work. The result was to produce policy benchmarks that were both of interest to the GOE and feasible to achieve. Where multiple ministries were involved, communication was improved dramatically and ministries were able to cooperatively achieve a given objective on which all were agreed. Next, the WPRP aided in the implementation pilot activities to test the agreed-upon policy changes in order to provide evidence of success, incentive and capacity to achieve broader change among the various stakeholders. Finally, the ministries were encouraged to extend the applications of the pilots, when they proved successful, in some cases with the aid of technical assistance. The process frequently results in “small steps” and conservative approaches to policy change. However, it also provides for more frequent success and the encouragement for the adoption of further change.

There were three focus areas for the WPRP work: Participatory decision making, water quantity management, and water quality management. Within each of the categories, the policy change process demonstrates a sequence of small steps leading to the development of more significant changes in the management of the Nile system. With respect to

participatory decision making, the steps included (1) providing for the legal ability to form non-IIP water user associations, (2) forming pilot BCWUAs, (3) developing a program for the transfer of management of branch canals from the MWRI to the private users' BCWUA, (4) developing a pilot for management transfer, and (5) implementing an approach to public participation in decision making. All of these steps are necessary for the transfer of operation, maintenance, and management responsibilities and authority to water users, which was a major thrust of the original task order. The WPRP activity has set the stage for a broad application of the policy across Egypt.

The water quantity management policy program began under the rubric of “optimal use of water for rice and sugarcane.” As the activities involving the substitution of short duration varieties of rice for long duration varieties and applying improved irrigation practices in sugarcane proceeded, it became obvious from the discussions between the MWRI and MALR personnel on the working groups that the supply of water from the MWRI was often delivered at the wrong time in the wrong amounts compared to the demands for the crops. Changes in planting dates and cropping patterns under the farmer free choice coupled with irrigation deliveries based on fixed crop rotations often resulted in both water waste and lost crop productivity. The consensus of the working groups was that the next step in water management was “matching irrigation supply and demand.” The development of cropping data collection in the field by extension agents, aggregation of the data in a computer program, electronic transfer of those data to the irrigation district, and the automatic calculation of the water requirements based on crop evapotranspiration provided a mechanism to optimize water delivery. It also will aid water user associations, when they assume control of the canal, to be prepared to provide real-time demand data to the MWRI, who can then plan releases from the High Aswan Dam as needed. Further, the use of telemetry and volumetric delivery, also in pilot stages, will allow the MWRI to release the appropriate quantity of water at the appropriate time at the Directorate and District levels. Moreover, the creation of integrated water districts, which take account of all available water supplies, will also enhance the ability of the MWRI to supply water effectively and efficiently.

The development of a demand-driven decentralized system was another objective of the original task order. WPRP has provided the base on which the system can develop. The base includes the establishment of BCWUAs, and pilots for integrated water management at the district level, for irrigation management transfer, and for public participation in decision making.

The water quality management policy program began with an examination of irrigation water reuse from drains. The result of that examination demonstrated that the further toward the end of the drain, the more sewage and industrial wastes were found. In fact, several official mixing stations had been shut down because water at the end of the drains was highly polluted and mixing it with fresh water would have caused serious health hazards to both farmers and consumers. Reuse of better quality water in the upper reaches of drains was then developed as a pilot. At the same time, conflicts among the laws indicated that Law 48 of 1982 should be revised to be consistent with both Law 12 and current water quality practices. Moreover, it was determined that construction and

improvement of urban wastewater treatment plants should be prioritized based on the impact each source has on drainage water quality, rather than on a relatively arbitrary list of projects submitted by the Governorates. Finally, the recognition of the need for environmental impact assessments was adopted by the Ministry as an additional way to enforce general environmental protection including preservation of water quality in the system. These activities correspond to the general objective of developing strategies for maintaining water quality in the original task order.

There is little question that the attitude toward and acceptance of policy reform has dramatically changed during the span of WPRP. The establishment of WPRP was concurrent with a change in the Ministry leadership when Dr. Mahmoud Abou Zeid was appointed Minister of MWRI in 1998. The WPRP provided technical assistance and many specific policy recommendations that the Minister, after evaluation, approved for adoption. A wide variety of policy changes is now being discussed, considered, and tested that were rejected out of hand in the early stages of the WPRP. Among these policies are the creation of integrated water management districts, the transfer of responsibility and authority from MWRI to private organizations including user associations, cost sharing and some forms of cost recovery on the part of farmers, and the establishment of enforceable water quality controls coupled with compliance agreements. It cannot be concluded that WPRP was the sole cause of this change in perspective about water management. However, according to Ministry officials, WPRP activities had an important role in the development and implementation of policy changes within the Ministry. The fruits of these changes will not be seen in quantifiable national statistics for several years, but the acceptance of change throughout the MWRI is clearly evident.

The WPRP policy adjustment activities, while aimed at specific issues, resulted in cross-cutting impacts. While not totally attributable to WPRP, the latest KAP Survey indicates changes in farmer's knowledge that can be partially attributable to the extensions training and stakeholder workshops conducted under various WPRP activities. These are summarized as follows:

Indicator	1998 Survey	2001 Survey
Know that Egypt will face a water scarcity	33%	43%
Able to cite one key way a farmer can save water	20%	64%
Know that rice is a crop that consumes a lot of water	67%	94%
Know that the Ministry limits rice growing because of its high water requirement	57%	80%

To summarize, the impacts of WPRP can be characterized as follows:

1. Demonstrated national impacts
 - Increased productivity of rice per unit of water
 - Establishment of MISD information transfer system
 - Establishment of the IAS

- Improved cooperation among the Ministries
 - Increased MWRI capacity to develop and implement policy change
2. Important achievements
 - Revisions of Law 12 and Law 48
 - Application of intermediate drainage reuse
 - Improved irrigation of sugarcane
 3. Significant beginnings
 - Irrigation management transfer to water users
 - Integrated water management districts
 - Urban wastewater treatment policies
 - Environmental impact assessments
 4. Remaining challenges
 - Urban wastewater treatment control
 - Adoption of revised Law 12 and revised Law 48
 - Cost sharing and/or privatization programs
 - Integrated demand-driven irrigation with volumetric releases.

6 Conclusions and Recommendations

Based on the measures of achievement identified by EPIQ, MWRI, and USAID, the WPRP program has been successful, has had significant impacts on water management, and will leave a legacy of improved policy implementation in Egypt. There is ample evidence that the WPRP program provided, and continues to provide, a progressive MWRI administration with the basis on which to make significant policy changes in the coming years that will achieve the kinds of national impacts identified in the task order.

While analysis of policy problems is a valuable tool, it is also clear that implementation activities are significant with respect to policy change. MVE has drawn a similar conclusion in its report [Accomplishments in Agricultural Policy Reform in Egypt, 1997-2001]. These activities provide models that the Ministry and its stakeholders can examine, alter, and implement as well as the incentives to do so. Support for implementation by donor agencies is a critical factor.

The lack of consistent data sets over the life of the project is a serious impediment to an overall evaluation such as this one. The fact that policy change is a lengthy process and that changes in measurable national indicators of impacts are not expected in the short term, suggests that data collection should be a long term activity. Monitoring programs, like the MVE, should be established for all major projects and activities of USAID. Monitoring is often a costly process, but without it, only anecdotal evaluations are possible. Moreover, the ability to develop and maintain a monitoring and evaluation process over the long term should be as much a part of a project's legacy as other reforms.

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APPENDIX A

BENCHMARK DESCRIPTIONS BY TRANCHE

BENCHMARK DESCRIPTION BY TRANCHE

TRANCHE	BENCHMARK	VERIFICATION INDICATORS	OUTCOME
II	C4. The GOE (MPWWR and MALR jointly) will establish a strategy for the optimal water use for rice production.	<ol style="list-style-type: none"> 1. Development of a strategy regarding water use on rice, which is embodied in a document giving the objectives of the strategy, the background information considered, and a statement of the proposed new policies. 2. The strategy is presented to both Ministers. 	Fully Accomplished
	C5. The GOE (MPWWR and MALR jointly) will establish a strategy for the optimal water use for sugarcane production.	<ol style="list-style-type: none"> 1. Development of a strategy regarding water use on sugarcane, which is embodied in a document giving the objectives of the strategy, the background information considered, and a statement of the proposed new policies. 2. The strategy is presented to both Ministers. 	Fully Accomplished
	C6. The GOE will develop a policy to allow the formation of water user associations in areas that have not participated in the Irrigation Improvement Program, and begin to promote such associations.	<ol style="list-style-type: none"> 1. MPWWR develops a policy to allow the formation of water user associations in areas that have not participated in the Irrigation Improvement Program. Evidence of a policy is a document specifying the background to the development of the policy, the objectives of the policy, and the proposed new policies. 2. The strategy is presented to the Minister of Public Works and Water Resources. 3. MPWWR staff promotes water user associations by meeting with farmers and explaining the benefits of, and procedures for establishing, water user associations. 	Fully Accomplished

TRANCHE	BENCHMARK	VERIFICATION INDICATORS	OUTCOME
	C7. The GOE will develop a national strategy for improving water use efficiency and agricultural productivity through irrigation improvement projects. This strategy will include priorities for implementing the desired improvements.	<ol style="list-style-type: none"> 1. Development of a strategy for improving water use efficiency and agricultural productivity through irrigation improvement projects. Evidence of a strategy is a document giving the objectives of the strategy, the background information considered, and a statement of the proposed new policies. The strategy will include priorities for implementing the desired improvements. 2. The strategy is presented to the Minister of Public Works and Water Resources 	Fully Accomplished
	C8. The GOE will develop and approve new policies, regulations, and criteria to promote drainage water reuse with appropriate incentives and technical support.	<ol style="list-style-type: none"> 1. MPWWR develops a policy to promote drainage water reuse. Evidence of a policy is a document specifying the background to the development of the policy, the objectives of the policy, and the proposed new policy (s). The policy will include the provision of appropriate incentives and technical support. 2. The Steering Committee for Coordination and Monitoring of Water Resources Development through Agricultural Policies Reform approves the policy. 3. MPWWR identifies procedures required for the application of the policy. 	Fully Accomplished

TRANCHE	BENCHMARK	VERIFICATION INDICATORS	OUTCOME
III	C1. GOE (MPWWR) will implement policies and procedures to shift from distributing Nile River water based on water levels to distributing water based on water volumes using the Main System Management Telemetry System at Main Canal intakes, barrages on the River Nile and division points between Directorates for enhanced irrigation operations and decision-making.	<ol style="list-style-type: none"> 1. Calibrate regulators located on the River Nile, at intakes to main canals and at points dividing Directorates where telemetry exists (53 regulators) and enter the calibration relationships into the telemetry system software to achieve volumetric flow measurements at these locations. 2. MPWWR approve a policy that water management will be based on volumetric flow and that telemetry data will be used for water management decision at points where telemetry stations exist. 	Fully Accomplished
	C2. The GOE (MPWWR) will adopt policies and procedures for reducing water loss and land degradation due to improper operation and management of free-flowing groundwater in the reclaimed areas of the Western Desert.	<ol style="list-style-type: none"> 1. MPWWR will approve a policy package for free flowing groundwater in reclaimed areas. 2. Initiated the formation of a groundwater user association in a selected reclaimed area in the western Desert. 	Fully Accomplished
	C3. GOE (MPWWR) will decree a policy and initiate an action program for formation of water user organizations at the distributaries and branch canal levels.	<ol style="list-style-type: none"> 1. A Ministerial decree allowing the formation of water user organizations above the mesqa level. 2. Process Documentation reports that organizations were formed on two branch canals (one in an IIP and one in a non-IIP community). 3. A cost sharing plan prepared for two branch canals in consultation with the stakeholders. 	Fully Accomplished

TRANCHE	BENCHMARK	VERIFICATION INDICATORS	OUTCOME
	C4. GOE (MPWWR) will institutionalize an Irrigation Advisory and Support Service in the MPWWR.	<ol style="list-style-type: none"> 1. Ministerial decree establishing the Irrigation Advisory and Support Services Central Directorate under the MPWWR. 2. Submittal of necessary documents to the Central Authority for Organization and Management to establish an Irrigation Advisory and Support Services Central Directorate. 	Fully Accomplished
	C5. GOE (MPWWR and MALR jointly) will designate two areas of private commercial sugarcane growers and promote improved sugarcane water management efficiency in Upper Egypt.	<ol style="list-style-type: none"> 1. Improved irrigation technologies installed, including laser leveling and gated pipe delivery systems; water application monitoring program established; and training provided to farmers in the use of improved irrigation methods in two pilot sugar cane areas in Upper Egypt. 	Fully Accomplished
	C6. GOE (MPWWR and MALE jointly) will adopt policies for the substitution of short duration rice varieties for long duration rice varieties among private commercial growers and for changing water scheduling to achieve optimal use of water for rice production.	Approval by the two Ministers (MPWWR and MALR) of a national policy package, including a timetable for adoption, provision of seeds, farmer training, and changes in water scheduling, for the substitution of short duration rice varieties for long duration rice varieties.	Fully Accomplished
	C7. GOE (MPWWR) will establish an intermediate drainage water reuse program for the Bahr Bagar Drain as a model for other areas.	Establishment of an intermediate drainage reuse program for Bahr Bagar Drain in at least one representative district to include preparation of an operations plan and tender documents for the pumps.	Fully Accomplished
	C8. GOE (MPWWR) will revise Law 48 of 1982 governing water quality management to more effectively control discharge of wastes and wastewater into the Nile and its waterways.	A draft revision of Law 48 of 1982 and its by-laws to be presented to the Ministers.	Fully Accomplished

TRANCHE	BENCHMARK	VERIFICATION INDICATORS	OUTCOME
IV	C1. The GOE (MWRI and MALR jointly) will establish a system that improves the flow of real-time information between the Ministries with respect to irrigation demands and supplies.	<ol style="list-style-type: none"> 1. A pilot program will be initiated by the MWRI and MALR in one irrigation district in each of two governorates for mutual information transfer for cropping patterns and calendars and water supplies by December 31,2000. 2. A joint MALR/MWRI national policy for the application of the pilot program will be approved by the two Ministries by December 31, 2001. 	Fully Accomplished
	C2. The GOE (MWRI) will adopt polices for improves management of discharge and reuse of urban wastewater in agricultural drains.	<ol style="list-style-type: none"> 1. The MWRI will approve a policy and procedures for management and reusing urban wastewater discharges in agricultural drains and submit them to the Cabinet by 31 December 2000. 2. The MWRI in coordination with other ministries and authorities will apply the policy and procedures in one selected pilot area in the Delta by 31 December 2001. 	Fully Accomplished
	C3. The GOE (MPWWR) will establish a policy for allocating, distributing, and controlling water on a volumetric basis at the directorate and inspectorate levels.	<ol style="list-style-type: none"> 1. A pilot program will be conducted by MPWWR in two directorates by 31 December 2000, to provide the basis for implementing volume-based water management policy at the directorate and inspectorate levels. 2. A policy document that includes a plan and instructions for volume-based water management in the Nile Irrigation System will be approved by MPWWR and distributed to all directorates by 31 December 2000. 	Fully Accomplished
	C4. The GOE (MWRI) will adopt a policy and strategy for transferring management of selected sections of the irrigation system to stakeholders and/or the private sector.	<ol style="list-style-type: none"> 1. The MWRI will develop a policy on irrigation management transfer, to include a plan for phased implementation and to identify legal requirements, by 31 December 2000. 2. Application of the policy will be initiated in tow selected pilot areas by 31 December 2001. 	Fully Accomplished

TRANCHE	BENCHMARK	VERIFICATION INDICATORS	OUTCOME
	C5. The GOE will prepare revisions to Law 12 of 1984 on irrigation and drainage and its supplementary laws, to improve effective water resource management.	<ol style="list-style-type: none"> 1. MWRI will complete an analysis and review with stakeholder's participation, of the modification needed for law 12 of 1984 on irrigation and drainage and its supplementary law by 31 December 2000. 2. A draft revision of law 12 of 1984 on irrigation and drainage and its supplementary laws will be approved by MWRI by 31 December 2001. 	Fully Accomplished
V	C1. The GOE (MWRI) will adopt a policy to integrate all water management functions at the district to support decentralized management.	<ol style="list-style-type: none"> 1. MWRI will approve a policy to integrate all water management functions at the district level. 2. MWRI will designate two pilot districts and initiate activities in these districts to show how the policy is to be implemented. 	Fully Accomplished
	C2. The GOE (MWRI) will adopt a policy to facilitate public participation in decision-making regarding planning, development, and management of Egypt's water resources.	<ol style="list-style-type: none"> 1. MWRI will approve a policy addressing mechanisms and procedures for interactive participation by stakeholders in water resource development and management decision-making. 2. MWRI will conduct at least one public participation activity on a selected issue to identify implementation mechanisms and procedures. 	Fully Accomplished
	C3. The GOE (MWRI) will approve a policy to improve environmental management of water resources in MWRI operations.	<ol style="list-style-type: none"> 1. An approved MWRI policy that addresses procedures, mechanisms, and a plan to assure environmental concerns are addressed in MWRI activates by requiring environmental impact assessments be conducted for proposed new projects. 	Fully Accomplished