

## **IMPLEMENTING IWRM IN EGYPT: FROM CONCEPT TO REALITY**

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### **ABSTRACT**

Managing water resources in the twenty-first century has become an increasingly difficult task, from technical, economic, social, and political points of view. This is especially true in Egypt where multiple and growing demands are competing for a limited water supply.

In order to deal with increasingly complex technical issues, the Ministry of Water Resources and Irrigation (MWRI) has over the years set up various specialized units and departments able to deal with drainage, groundwater, water quality, and irrigation improvement issues. This has facilitated the implementation of specific projects and activities but the resulting fragmentation drastically hampers cross-sectoral coordination, timely decision-making, and thus modern (integrated) water resource management.

Acknowledging this situation, the MWRI has adopted Integrated Water Resource Management (IWRM) as official policy. Concepts such as decentralization, water user participation, water quality and quantity monitoring, water use efficiency, have been promoted and implemented, with the support of donor agencies, and notably USAID.

A series of projects funded by USAID in the last six years has led to the establishment and capacity building of 27 Integrated Water management Districts (IWMDs) and 601 Branch Canal Water User Associations (BCWUAs) in four governorates, two in Upper Egypt two in the Eastern Delta, covering in total half a million hectares or about 15 % of the national irrigated area. Benefits in terms of water management have been acknowledged by both Ministry officials and water users. While USAID is considering supporting the replication in other areas, the model is already being extended by the MWRI to other areas (Western Delta, Fayoum) with support from other donors (World Bank, KFW, Dutch Aid).

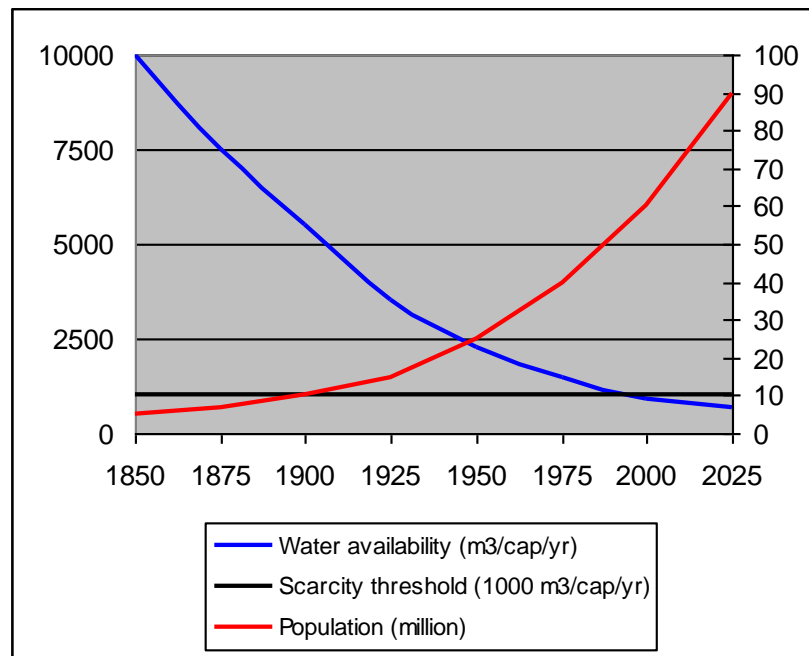
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## INTRODUCTION

Egypt's water supply relies largely on the Nile River through the Lake Nasser reservoir behind High Aswan Dam. Out of an annual inflow of about 84 billion cubic meters, Egypt's share is set by the 1959 international agreement with Sudan at 55.5 billion cubic meters. Alternative water sources are limited and involve erratic and meager precipitations (average annual rainfall being less than 2 inches over most of the country), fossil groundwater whose extraction is a "one-time shot", and expensive and yet underdeveloped desalination technologies.

The demand for fresh water resources has, on the other hand, steadily increased over the years, along with the population growth and industrialization, thus reducing the per capita share. Egypt recently became a water scarce country (i.e. with less than 1,000 m<sup>3</sup>/capita/year).



**Figure 1. Evolution of the per capita water share in Egypt**

Traditionally, the MWRI's role has chiefly been to distribute water. But facing the challenge of increasing water demands with limited options to increase the supply, the MWRI has taken steps towards Integrated Water Resource management (IWRM). Concepts such as decentralization, water user participation, water quality and quantity monitoring, water use efficiency, have been promoted and implemented, with the support of donor agencies, and notably USAID.

One of the essential components of the evolution towards IWRM is to ensure the existence of a proper institutional framework where decision-making is delegated

as much as possible (“subsidiarity” principle). In Egypt, this turns to be quite a challenge because of the fragmented organization of the MWRI.

## **CURRENT INSTITUTIONAL SETUP**

The MWRI (previously Ministry of Public Works and Water Resources, MPWWR) is significantly the oldest Ministry in Egypt, being about 150 years old. Traditionally, the MWRI’s role has chiefly been to ensure that all users (irrigation, domestic and industrial needs, navigation, energy production) receive enough and timely water resources to address their needs. Other ministries are to some extent involved in managing water resources:

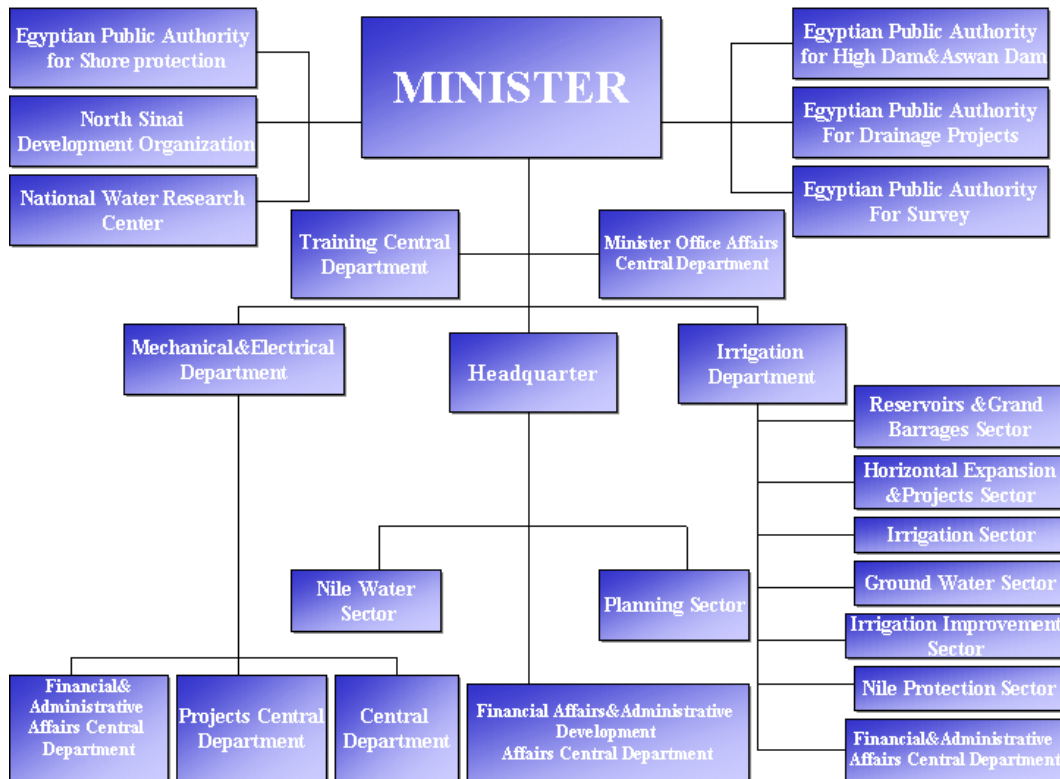
- The Ministry of Housing, Utilities and Urban Communities supervises municipal water authorities which treat and deliver drinking water.
- The Egyptian Environmental Affairs Agency assesses and monitors water use impacts on the environment; and
- The Ministry of Health and Population analyses, and reports on water quality in relation to potential health hazards.

Managing water resources has over the past 50 years become a more complex task: drainage and water quality issues have now significant impacts, while modern agriculture has much higher requirements regarding water supply. As a consequence, the MWRI has over the years diversified the technical capacity of its staff in order to tackle new responsibilities, such as drainage construction and maintenance, water quality monitoring, groundwater development and management, coastal protection, operation & maintenance of pump stations, etc. Specific units, departments or entities have also been established. Donor agencies contributed significantly to this development with each new project requesting a specific project unit to ensure timely and efficient implementation.

Today the MWRI is divided into several departments, authorities, sectors and units (see figure 2 next page). The main ones are:

- Irrigation Department (ID), which manages irrigation and subdivides into several sectors, some of these being:
  - Irrigation Sector (IS), responsible for canal O&M;
  - Irrigation Improvement Sector (IIS), implementing irrigation improvement projects (IIP);
  - Ground Water Sector (GWS), monitoring groundwater resources;
  - Planning Sector (PS), formulating and evaluating long and short term water management plans;
- Egyptian Public Authority for Drainage Projects (EPADP), originally responsible for implementing drainage projects, but which over the years has taken over the entire O&M of drains;

- Mechanical & Electrical Department (MED), in charge of the maintenance and operation of all pump stations (irrigation, drainage, drainage reuse);
- National Water Research Center (NWRC), with its twelve specialized research institutes, which conducts applied research on irrigation and water management; and
- The High Aswan Dam Authority (HADA), which operates and maintains the Aswan dam and reservoir.



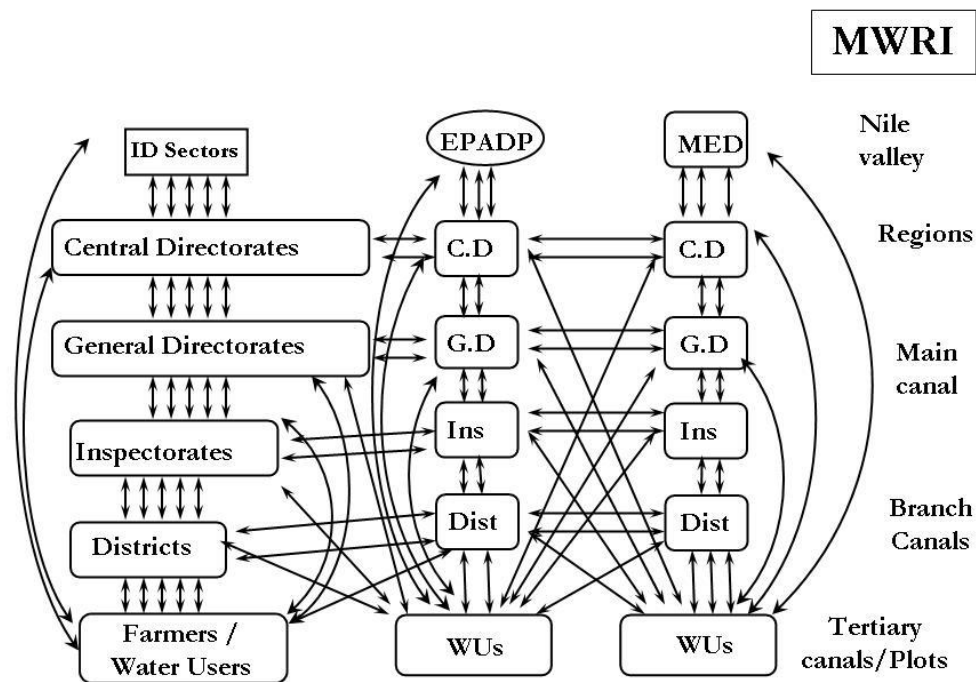
**Figure 2. Main MWRI entities**

In addition to these large entities, there are a number of small units with specific responsibilities and functions, such as the Central Directorate for Irrigation Advisory Service (CD-IAS), the Integrated Water Management Unit (IWMU), the Institutional Reform Unit (IRU), the Water Quality Unit (WQU), the Water Communication Unit (WCU), etc.

At central level, each main agency (EPADP, MED, ID, NWRC) reports only to the Minister and thus operates quite independently. The yearly planning of activities of each entity is carried out based on sound technical criteria but social, environmental and cost-efficiency criteria are marginally considered. There is also

limited, if any, consideration for the planning of other entities, and consequently limited cross-sectoral or geographic integration.

At regional level, the country is divided into central directorates, each headed by an undersecretary. This MWRI undersecretary has nominal supervision over all MWRI activities. The various MWRI central departments, sectors and authorities function however separately with their own local delegations such as general directorates, inspectorates and districts (see figure 3 below). The boundaries of these do not generally match (at directorate level or below) from one sector/department/agency to another.



**Figure 3. Breakup of the regional and local MWRI entities**

The most significant example of this fragmentation is the Egyptian Public Authority for Drainage Projects. Originally established in 1973 as the implementing unit for the first of the World Bank-funded series of National Drainage Projects, the EPADP has steadily grown over the years and extended its responsibilities. In the late 1980s, the EPADP thus became responsible for not only building (open and sub-surface) drains but also for maintaining existing drains all over Egypt. To fulfill this mission, the EPADP has thus established its own parallel administration, with regional Directorates divided into local districts. The EPADP has grown so much over the years that it moved into its own separate building. Today, although field staff from both Irrigation Department and EPADP

strive to coordinate at their level, it is as if these are two separate Ministries, with separate budgets, plans and policies.

The breakup of the MWRI into separate, specialized sectors/departments/agencies allows better execution of technical activities, notably in terms of project implementation. Conversely this fragmentation prevents integration and coordination. There is limited holistic understanding of what the overall water management situation is in any command area. As a result, parallel operation & maintenance, management and/or improvement activities may contradict or counter-impact each other.

Conversely, the situation is also quite complex for water users: they not only lack a mechanism to identify and express their needs, priorities or concerns, but also have to navigate in a bureaucratic maze to find the proper MWRI official to talk to (e.g. registering a well cannot be done with the local irrigation district but at the regional office of the groundwater sector, so few bother to register).

## **A PROCESS OF DECENTRALIZED INTEGRATION**

Although Integrated Water Resources Management (IWRM) has been a common buzzword in water communities around the world for some time now, it is often a challenge for many water managers to propose a practical translation of the concept. The same applies to Egypt, where IWRM is an official MWRI policy and is frequently quoted by MWRI managers. But while the concept has been accepted, few are able to outline a concrete process to implement IWRM. The main issue is how to define integration as it relates to management.

Geographic or cross-sectoral integration is an institutional change, and thus easily perceived as a threat by established authorities and managers. Earlier institutional reform efforts in developing countries focused on central administrative levels, striving to improve coordination and information flows, clarifying roles and responsibilities, providing standards and guidelines for technical and human resource management. Most of these efforts logically fell short for the same reasons: they required a change in mentalities, and through lack of follow-up (a project rarely lasts more than five or six years), lack of long term commitment and political will, achievements were marginal or unsustainable. Impacts were also limited in terms of improved management of water resources, and actual benefits for water users.

Today most institutional change efforts focus on the local level, in order to:

- Promote decentralization and delegation;
- Empower water users, and get them involved in the management process;
- Bring direct benefits to beneficiaries; and thus

- Demonstrate tangible and replicable achievements.

The idea is to democratize the entire management process, by empowering both water users and local managers. It is hoped that the combination of demonstrated benefits and bottom up pressure for more accountability and transparency will eventually make its way up and affect all administrative layers.

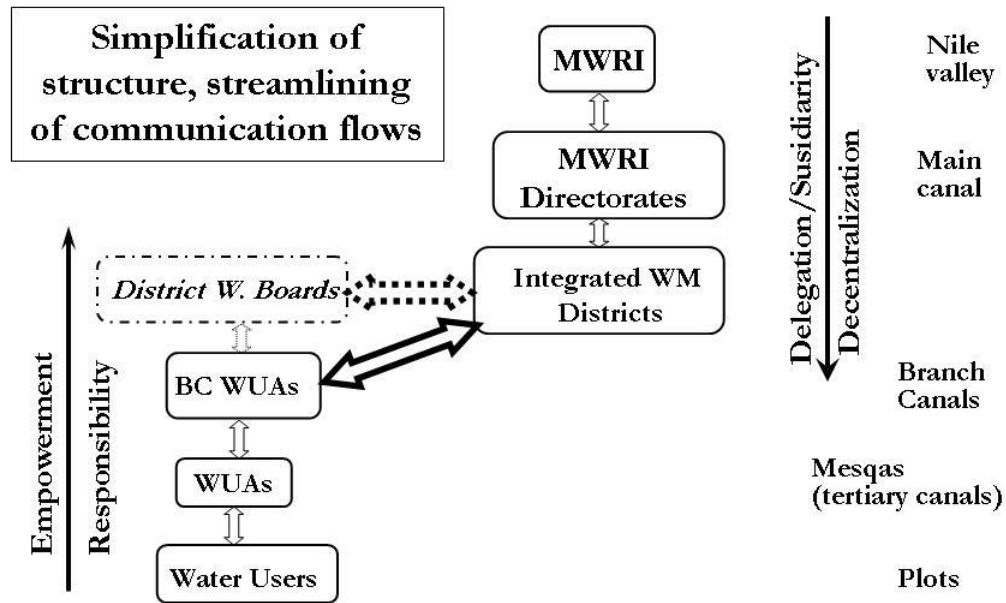
In Egypt, USAID and the MWRI agreed in 2002 to establish four Integrated Water Management Districts (IWMDs) as a pilot activity. The idea was to consolidate all water management functions at district level (about 20,000 hectares) into one sole MWRI entity. Simultaneously, Branch Canal Water User Associations (BCWUAs) were to be established to involve stakeholders in the management of water resources.

The IWMD concept was defined as follows: “IWMD is an entity that has sufficient manpower, material, and fiscal resources to operate and maintain all water resources under its jurisdiction. Implementing integrated water management at the district requires integration of staff, facilities, stakeholders, information, users, and water resources” (see also figure 4 next page). The IWMD represents a unique venue to coordinate all water management activities and implement water projects, thus resulting in more appropriate decisions, more sustainable implementation and significant economies of scale.

Progress was initially slow, as the idea faced several challenges:

- Delineating the boundaries of the new IWMDs, since the existing districts (mostly irrigation and drainage) covered somewhat different areas; this was addressed by focusing on irrigation districts as hydrologic units;
- Defining the roles and responsibilities of the new IWMDs, while roles and responsibilities of other entities had to be accordingly updated;
- Transferring staff, equipment, facilities, vehicles to the new IWMDs; the usual amount of “red tape” obstacles and delays had to be dealt with; and
- Developing water user participation: this required to demonstrate and raise awareness about benefits for both water users and MWRI staff; thankfully previous efforts funded by USAID and other donors had already paved the way in that direction.

This initial effort proved however successful, convincing MWRI managers of the viability of the concept of decentralized integration, and demonstrating immediate benefits to both MWRI staff and water users (see next section). In October 2004, USAID answered to the MWRI’s request and started funding a similar but scaled-up effort, the LIFE-IWRM Project, as a component of the larger LIFE program (LIFE stands for Livelihoods & Incomes From the Environment).



**Figure 4: The reorganized setup at district level**

The LIFE-IWRM Project has been targeting 5 entire directorates in Egypt (total of over 1 million feddans/acres, 15 % of Egypt's irrigated area). Three main tasks have been carried out:

- Establishment of IWMDs: 23 new IWMDs (adding to the four pilot ones for a total of 27) have been set up through the integration of most water management functions (irrigation and drainage O&M, quantitative and qualitative water monitoring, etc.), with project support for the definition of boundaries, identification of facilities, assignment of managers and staff, transfer of equipment, updating of roles and responsibilities;
- Formation of Branch Canal Water User Associations (BCWUAs) in all IWMDs: on average 25 BCWUAs (each covering 1500 to 2000 feddans/acres) are being formed in each IWMD; project support has focused on the definition of the process (steps and corresponding guidelines), preparation and implementation of training events for data collection and planning, WU awareness raising, election of representatives, activation of BCWUAs, communication between BCWUAs and IWMDs, monitoring and evaluation; and
- Equitable allocation of water resources: IWMD staff have been identified, assigned, and trained to carry out specific water monitoring activities;



project has been providing computers and water monitoring equipment, training IWMD staff to use this equipment, and supporting the implementation of related data-based water management activities.

The three tasks are complementary in the sense that the overall objective is to empower local managers and water users to:

- Monitor the amount, availability, quality, and use of their water resources;
- Identify and prioritize water management issues; and
- Solve local problems and conflicts in a decentralized, collaborative manner.

A Monitoring and Evaluation (M&E) process has been used to guide the implementation of the project and to assess its outcomes and impacts. The M&E program has also evolved to serve as a performance benchmarking (PB) tool for the MWRI, allowing district managers to compare the relative performance of their IWMDs and suggesting areas needing improvement to achieve expected performance outcomes.

## **ACHIEVEMENTS AND BENEFITS**

Several significant institutional benefits from the establishment of IWMDs have been identified and acknowledged by MWRI staff:

- Pooling of resources, equipment and skills at district level (mainly through the consolidation of irrigation & drainage functions): IWMD managers point out that they are able to carry out more activities, better serve water users, and use equipment more intensively.
- Streamlined communication channels: MWRI General Directors (covering four or five districts), are pleased with the empowerment and responsiveness of IWMD managers and staff.
- Decentralized and simplified decision-making (notably for water distribution with the removal of the inspectorate administrative layer).

Even more importantly, from the water users' perspective, the IWMD became the "single window office" for irrigation matters.

In parallel, the formation of BCWUAs has demonstrated significant results:

- Improved communications between IWMD staff and water users, fewer violations and complaints, and better identification and prioritization of maintenance needs.
- Improved conflict resolution among water users.

From the water data systems:

- Improved data-based decision making through access of IWMD managers and MWRI General directors to routine and reliable data.
- Water users' awareness and participation supported by the provision and explanation of water data.
- Mechanism for allocating water by volume at District level.
- Improved matching of water demand and supply resulting in water savings at District level.
- Development of District water resource inventory and integrated water management plans, taking into account surface water, groundwater, and drainage reuse as supply sources.

At central level, MWRI senior officials have come to recognize that more activities can be implemented by IWMD staff (with technical support from central level), saving time, costs and logistical resources.

Promoters of IWRM have come to acknowledge that IWRM requires not only institutional and technical changes but also an evolution of the socio-cultural environment. The formation of IWMDs has resulted in a significant change in mentality and behavior:

- The performance of IWMD staff has improved substantially, both in terms of commitment and technical capacity.
- MWRI senior officials acknowledge that IWMD staff are the “frontline soldiers” of the MWRI, dealing on a daily basis with water allocation and water users, solving technical issues, and resolving conflicts and disputes.

This mentality change is clearly demonstrated by the decentralized approach whereby IWMD staff formed and activated the BCWUAs. This new approach:

- Created a direct partnership between BCWUAs and the IWMD.
- Ensured sustainability, even after the project's end, by building the capacity of IWMD staff.
- Reinforced the IWMD as the sole MWRI entity at district level.
- Reduced the cost of establishing and strengthening BCWUAs by empowering existing field staff.
- Promoted user participation in water distribution, channel maintenance, conflict resolution, water quality protection, capacity building, and awareness activities, with a specific emphasis on gender equity.

## **NEXT STEPS**

The decentralization and empowerment concepts have been widely accepted by MWRI and are now being implemented under several other MWRI development programs, including the Irrigation Improvement Project (IIP), Integrated Irrigation Improvement and Management Project (IIIMP) and the Fayoum Water Management Project (FWMP). As of early 2008, more than 37 IWMDs and 800 BCWUAs are operating in Egypt. MWRI-IWMU, with assistance from USAID, is expected to replicate the LIFE IWRM activities in another 10 Directorates and 50 Districts in a follow-up four year program scheduled to begin in 2009. These efforts place the MWRI solidly on track to achieve or surpass its Integrated Water Resources Management Plan (IWRMP, 2005) target of establishing 32 IWMDs and 5,000 BCWUAs by the year 2015.

Further steps are also being considered, such as:

- The establishment of federations of BCWUAs at district-level; two such district water boards have recently been established in the Western Delta; and
- The integration of all irrigation and drainage functions at the directorate level.

## **CONCLUSION**

Although Integrated Water Resources Management (IWRM) has been a common buzzword in water communities around the world for some time now, it is often a challenge for water managers to develop practical translations of the concept into reality. The MWRI in Egypt has been developing and successfully implementing a concrete process to realize IWRM, by:

- Delegating increased management authority to Districts
- Establishing water users associations and getting them involved in the management process
- Bringing direct benefits to farmers
- Setting conditions for replication and sustainability

Initial results have shown improvements in some important aspects of water management. Achieving more comprehensive improvements will require more time, emphasizing the importance of continuing and expanding the LIFE-IWRM Program, including its comprehensive M&E and PB activities.

Some of the lessons learned through implementation include

- Importance of MWRI's strong commitment to the IWRM approach
- Concrete demonstration that IWRM and IWMD concepts work

- Minimization of implementation costs by using MWRI field staff
- Optimal process being to first establish IWMDs and then have IWMD staff organize and support BCWUA formation
- Need to establish all IWMDs within the larger hydrologic/organizational unit (Directorate) at one time
- Critical leadership role of General Directors (Directorate) to improve water distribution and generate real water savings
- Effective farmers' participation in water management through BCWUAs
- Importance of creating a partnership between IWMD and BCWUAs
- Data-based water management is possible at the Directorate and District levels given proper staff, training, support, software, and equipment
- IWMD staff able and willing to implement comprehensive management reforms when provided with responsibilities, training, equipment, and encouragement
- Need for adequate budget and legal reforms to ensure sustainability and replication