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INTEGRATED WATER MANAGEMENT DISTRICT

***Report No. 49
Main Document***

December 2001

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Executive Summary

Introduction

The purpose of this report is to present the results of Benchmark C.1 of the Memorandum of Understanding between the Government of the Arab Republic of Egypt (GOE) and USAID/Egypt for the Agricultural Policy Reform Program (APRP) Tranche V (FY 01/02). The benchmark states:

The GOE (MWRI) will adopt a policy to integrate all water management functions at the district level to support decentralized management.

The verification indicators to measure success are:

- 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.*

This report documents the success of the ministry in establishing two pilot districts for integrated water management and approving a policy to integrate all water management functions at the district level.

Background

In recent years, a global understanding has developed that water management is best served through an integrated package of services and practices, including irrigation, drainage, conjunctive water utilization, rainfall management and flood control. It is also widely accepted that water management policies can be made more effective by directing the level of operation to localized coordination entities. The MWRI has a long-term goal to reorganize its internal functions and operations through a process of local consolidation and ministry-wide decentralization, including devolution of authority to the local level.

Under present operational and administrative conditions, the management of supplies and services within the MWRI is handled through line department directives and functions emanating from the central ministry to lower line offices at the inspectorate and district levels. Usually there is limited coordination or communication in the planning and delivery of services and supplies, or consolidation and sharing of resources, at these levels. As a result, the District Engineer focuses solely on irrigation issues, and has little or no management coordination authority to integrate the other aspects of delivery and use, *i.e.*, drainage, groundwater and rainfall.

The objectives of this policy reform are to move toward the goal of reorganization of the MWRI internal functions and operations including devolution of authority to the local level thereby decentralizing water management and eliminating district-level inefficiencies and redundancies.

This report focuses on the achievements leading to the national policy to integrate all water management functions at the district level.

Achievements

There have been several achievements of the IWMD benchmark that are noteworthy:

1. The concept of exactly what an IWMD should be was developed from intensive discussions with MWRI staff at different levels (central, governorate, and district) as well as reviewing previous studies and documents concerning an “integrated” or “ideal” district for water management within the MWRI.
2. Criteria for selecting the pilot districts were developed and approved by the MWRI leaders.
3. Two pilot areas were selected from the seven proposed districts. Each pilot district includes all MWRI activities and obtains water from the multiple sources: Nile system canal water, drainage system water, and groundwater.
4. Detailed assessment of conditions and practices in each pilot district was conducted and the IWMD policy was outlined.
5. Activities were initiated in both pilot districts to show how the IWMD policy is to be implemented.
6. Modification of irrigation and drainage districts boundaries was made as the first step of implementation of the policy.
7. The Arabic name:
هندسة الموارد المائية والرى
was selected for use throughout Egypt to replace IWMD.
8. An organizational plan, including an organization chart, position descriptions, definitions of roles and responsibilities, resources required, and proposed timeline for implementing the IWMD national policy was developed and discussed in seminars and a stakeholder workshop. The result was the finalized institutional plan contained in this report and recommended to MWRI management.
9. A water monitoring plan was developed for implementation with the objective of ensuring that the IWMDs have the ability to integrate the various supply sources in a rational manner consistent with most effective use of Egypt’s total water resources.
10. Formal training courses were conducted in the two pilot districts and directorates involving 26 participants and a total of 102 participant days.
11. The MWRI policy committee approved the IWMD national policy on 4 December 2001.
12. The ministerial decree was issued establishing the IWMD national policy effective 10 December 2001.

Recommendations

The IWMD benchmark working group recommends that the MWRI:

1. Implement the organization of the IWMD in a stepped (or phased) process.
2. Provide the necessary personnel and equipment to each newly established IWMD district.
3. Direct the Mechanical and Electrical Department at the district level to operate and maintain the central pump stations. Operation and maintenance of district

pumps such as groundwater pumps, branch canal pumps, and intermediate drainage reuse pumps should be the responsibility of the IWMD. This recommendation may involve transferring some M&E staff to the IWMD district.

4. Clearly define decisions that are to be made by the IWMD locally (decentralized). The IWMD must have the authority to make these decisions and the responsibility for consequences of their decisions.
5. Assign a separate annual budget for the IWMD to conduct its operation and maintenance plans.
6. Establish a water monitoring program for both quantity and quality of canals, drains, and groundwater within each newly formed IWMD. Provide suitable measurement equipment to the district and assist the district to establish a link with a regional or central laboratory for quality measurements of water samples.
7. Provide suitable training for different positions in the IWMD.

1 Introduction

1.1 Overview

The Agricultural Policy Reform Program (APRP) is a United States Agency for International Development (USAID) grant program involving several ministries. The Ministry of Agriculture and Land Reclamation (MALR) is the primary Egyptian governmental agency charged with support of agricultural production. The Ministry of Water Resources and Irrigation (MWRI) has the prime management responsibility for Egypt's water resources. The MALR, MWRI and USAID, under the umbrella of the APRP, jointly designed an agricultural and water policy package, which consists of integrated policy and institutional reforms. USAID supports the ministries' efforts through annual cash transfers based on performance in achieving identified and agreed-upon policy reform benchmarks and technical assistance.

Technical assistance for the water policy analysis activity is provided through a task order (Contract PCE-I-00-96-00002-00, Task Order 807) under the umbrella of the Environmental Policy and Institutional Strengthening Indefinite Quantity Contract (EPIQ) between USAID and a consortium headed by the International Resources Group (IRG) and Winrock International. Local technical assistance and administrative support is provided through a subcontract with Nile Consultants.

1.2 Purpose of the Report

This report documents the activities of MWRI under the Tranche V, C.1 Benchmark, which states:

The GOE (MWRI) will adopt a policy to integrate all water management functions at the district level to support decentralized management.

Satisfactory achievement of the BM requires the accomplishment of two verification indicators:

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.

1.3 Background

In recent years, a global understanding has developed that water management is best served through an integrated package of services and practices, including irrigation, drainage, conjunctive water utilization, rainfall management and flood control. It is also widely accepted that water management policies can be made more effective by directing the level of operation to localized coordination entities. The objective of this benchmark is to initiate such a program in Egypt by decentralizing water management and focusing on integrated district-level coordination and management.

Decentralized management is not a new concept for the water resources sector in Egypt. A study during the 1990s conducted by the office of the Minister recognized the “model irrigation district” as a means of testing decentralized management and authority at the local level, and consolidating operations and management of water resources at the district level. In addition, participation of the water users has been at the center of a movement leading toward increased local private sector water management. The Irrigation Improvement Project, started by USAID in 1989, established a pattern of tertiary-level system transfer to water users. More recently, policy reforms under the APRP program are leading toward private sector involvement in secondary level system O&M through Branch Canal Water User Associations. The associations allow for initiation of other donor-assisted projects in this area. Most recently, also under APRP sponsorship, a policy reform and pilot program in irrigation management transfer to water users and the private sector was undertaken. These are all efforts in privatization and are leading toward progressive decentralization and localized management of water resources that are expected to increase agricultural production per unit of Nile system water.

Despite the progress noted above, the concept of district level integrated water management has yet to be introduced in Egypt, although it is now a major feature in many other countries. These countries, among the most successful examples being Mexico, USA, France, Spain, and the Netherlands, have demonstrated satisfactory experience in using this means of local water management. The MWRI has a long-term goal to reorganize its internal functions and operations through a process of local consolidation and ministry-wide decentralization, including devolution of authority to the local level. This benchmark supports this goal and its successful implementation will mark a major turning point for the decentralization process to be introduced in Egypt.

Under present operational and administrative conditions, the management of supplies and services within the MWRI is handled through line department directives and functions emanating from the central ministry to lower line offices at the inspectorate and district levels. Usually there is limited coordination or communication in the planning and delivery of services and supplies, or consolidation and sharing of resources, at these levels. As a result, the District Engineer focuses solely on irrigation issues, and has little or no management coordination authority to integrate the other aspects of delivery and use, i.e., drainage, groundwater and rainfall. The impetus for this policy reform, therefore, is to: (a) develop a strategy and procedure for decentralizing services and delivery, (b) improve and focus district level operations to remove costly inefficiencies and redundancies, and (c) provide greater flexibility and control to technical service providers and cultivators at the district level.

The objectives of this policy reform are to move toward the goal of reorganization of the MWRI internal functions and operations including devolution of authority to the local level thereby decentralizing water management and eliminating district-level inefficiencies and redundancies.

The specific objectives of this benchmark are to:

- Enable the MWRI to make the most efficient use of water from all sources.
- Integrate all sources of water into district-level management decisions thereby increasing production per unit of Nile system water.
- Allow timely adjustments of water deliveries to and within the districts.

- Determine if the existing legal framework governing water and water management allows for all administrative and operational reforms encompassed by this benchmark.

1.4 Organization of the Report

This report consists of six chapters plus five appendices printed as two volumes – the first containing the main document plus Appendix A and the second containing Appendices A – E. Chapter 1 is an introduction giving the benchmark statement, verification indicators, and background plus the purpose and organization of the report. Chapter 2 describes the selection of the pilot districts and briefly describes the two pilot Integrated Water Management Districts. Chapter 3 discusses activities in the pilot districts. Chapter 4 deals with the organizational structure proposed for the IWMDs. Chapter 5 gives the approved national policy in Arabic together with an English language translation. Chapter 6 gives recommendations of the IWMD working group for implementation of the national policy.

2 The Pilot Districts

2.1 Introduction

The district is the smallest unit of the MWRI hierarchy responsible for all operational management aspects within its domain. The district office is a governmental office similar to other localities that exists in the administrative district called “Markaz”. However the boundaries of MWRI district is usually different than the Markaz where the MWRI district is determined by the hydraulic characteristics of the irrigation and drainage network. Therefore, the MWRI district may overlap with more than one Markaz, and the Markaz may overlap with more than one MWRI district.

Due to the different activities conducted by the MWRI at the district level, such as irrigation activities, drainage activities, groundwater activities, *etc.*, the MWRI had established separate specific entities for these activities. Usually there are two MWRI districts – an irrigation district and a drainage district. However, in some districts, a groundwater district and a mechanical and electrical district exist to take care of groundwater utilization and operation and maintenance of the pump stations, respectively. Although all these districts are MWRI units, they have different boundaries. One purpose of an IWMD is to integrate all these various activities into a single district so as to facilitate efficient operation of the system and management of the water resources.

Recently, the MWRI launched national and pilot programs to improve irrigation management in Egypt. One of these programs is the Irrigation Improvement Project (IIP); another is the Water Boards program. The MWRI has plans to establish certain units to work closely with the district staff. These innovations impacted the selection of the pilot areas for the IWMD benchmark.

2.2 Selection of Pilot Districts

The IWMD benchmark team made several visits to some irrigation districts nominated for consideration as pilot districts in upper and lower Egypt. Also, the team had several meetings with MWRI staff at different levels (undersecretary, general director, inspector and district engineer) in all MWRI activity areas, *e.g.* irrigation, drainage, mechanical and electrical O&M, groundwater, *etc.* Several meetings and detailed discussions were held by the IWMD core working-group that included the heads of the irrigation department and the drainage authority in order to set and agree on the criteria for selecting the two pilot districts.

2.2.1 Criteria

The selection criteria were developed to consider most of the MWRI activities at the district level. It was important to include districts practicing and/or planning for groundwater use and drainage water reuse. In order to facilitate the work of the IWMD, it was proposed also to select districts with maximum correspondence of irrigation and drainage boundaries, *i.e.*, so that the irrigation district and the drainage district covered the same area. The list of the selection criteria were as follows:

1. A pilot area should have a distinct boundary.
2. A pilot district should contain only one drainage district if possible.

3. The boundary of the drainage district should coincide as closely as possible with the pilot irrigation district boundary.
4. The inflow-outflow points of a pilot district should be few and easily monitored.
5. Use of non-conventional water resources (*e.g.*, groundwater or drainage water) should be widely practiced in a pilot district
6. If the district is not already using non-conventional water resources, a pilot district should have a high potential for development of such resources.
7. A pilot district should contain IIP components as well as functioning WUAs.
8. An IWM pilot district should have already implemented MISD activities.
9. The pilot district should contain at least one Water Board.
10. Well-trained staff should exist in sufficient numbers in both districts (irrigation and drainage).
11. There should already be fairly good cooperation between the district irrigation engineer and drainage engineer.
12. The two pilot districts should be of size reasonably typical of the irrigation districts served by the Nile system.

2.2.2 Procedure

In order to select two pilot districts that meet the mentioned criteria, the working group had intensive consultations and meetings with MWRI staff at different levels (central, governorate, and district). There were seven districts proposed or nominated for consideration as an IWMD pilot. Some data and information for these districts are shown in Table 2-1. These results were discussed within the IWMD core working-group that included the heads of the MWRI Irrigation Department and Egyptian Public Authority for Drainage Projects.

2.2.3 Districts Selected

Based on the criteria, the two pilot districts were selected for the IWMD benchmark. One of them has water board pilot program. Both districts are in lower Egypt (Nile Delta region). The two pilot districts are:

1. South Zifta Irrigation District in the Menoufia Irrigation Directorate.
2. Ibrahimia Irrigation District in the West Sharkia Directorate.

2.3 Brief Description of Pilot Districts

2.3.1 South Zifta District

2.3.1.1 Irrigation District

South Zifta irrigation district is one of 3 districts that constitute the Zifta inspectorate. The Zifta inspectorate is one of 3 inspectorates included in the Menoufia irrigation directorate. The current command area of the South Zifta irrigation district is 42360 feddans. The district receives its water quota from three canals: El-Sahel, El-Atf and Elkhadrawia. These canals branch from the Menoufi Rayah through a main canal called the Mit Berah canal as shown in Appendix B, Figure B-1. The South Zifta district shares the water of the three canals with

two other districts: Quesna (55110 feddans) and Beket Elsabaa (39490 feddans). The water quota for the South Zifta irrigation district is measured at three reference points: the Shobra

Table 2-1. Districts nominated for consideration as IWMD pilot districts.

Item	1. Abou Kebir District	2. Fakous District	3. Wasta District	4. South Zifta District	5. Shebin Elqanater District	6. Hehia	7. Ibrahimia
1. Irrigation Directorate	West Sharkia	Salhia	Beni Suef	Menoufia	Qalubia	East Sharkia	West Sharkia
2. Area (feddans)	48,000	74,000	36,320	42,360	52,888	45250	59214
3. irrigation & drainage Boundaries	Coincidence about 95%	Coincidence about 100%	Coincidence about 80%	Coincidence about 70%	Coincidence about 50%	Coincidence large	Coincidence about 90%
4. Water inflow points	Few (one major & four minors)	Few (two)	Few (two)	Few (three)	Few (one)	Few (two)	Few (two canals + Direct irrig)
5. non-conventional water resources (<u>currently used</u>)	3 reuse p.s	9 reuse p.s.	·One GW well ·5 reuse p.s.	· 9 existing GW wells ·21 GW wells under construction.	·3 wells under construction		·10 wells under construction ·2 reuse p.s under construction
6. non-conventional water resources (<u>future use</u>)	Possible (GW)	Need to be studied	possible	possible	possible		possible
7. IIP & WUAs	No	·3000 fed covered ·6500 fed under imp. ·the rest of area is under study	·8000 fed. covered	No	No	No	No
8. MISD	Yes	No	Under expansion	No	No	No	Under MISD expansion
9. Cooperation between Drainage and Irrigation Engineers	good	good	good (even at directorate level)	good	good	good	good
10. Trained staff	good	good	Not mentioned	good	They need training	good	good
11. Water Boards	No	No	No	No	No	Yes	Yes

Note:

All districts practicing groundwater through individual wells in addition to the governmental wells mentioned in the table

IWMD: Integrated Water Management District

MISD: Matching Irrigation Supplies and Demands benchmark

Bekhoum Regulator at km 16.450 on the Elsayhel canal, the Begeiram regulator on the Elkhadrawia canal at km 16.660 and the Kafr Nafra regulator on the El-Atf canal at km 34.000. The South Zifta district is the end district of Zifta inspectorate. Therefore, a water deficit is experienced many times. The surplus of the canal water is diverted to a unique drainage network that runs parallel to the irrigation network.

In addition to canal water, the district is using groundwater from nine wells scattered throughout the district. The wells are mainly located at the canal ends in order to compensate for insufficient canal flow. Farmers have dug their own wells in their fields for use in cases of water shortage. It was found that many farmer wells exist in the South Zifta district and most of them are illegal, *i.e.*, without proper permits.

2.3.1.2 Drainage District

The Zifta drainage district is 31871 feddans and is responsible for maintaining the open drains and tile drains system. The area is totally covered with a tile drainage system and divided into five sub-regions. The area of the sub-regions ranges from nearly 3300 feddans to 8200 feddans. The boundary of the drainage district is different than that of the irrigation district. The coincidence of boundaries is estimated as 70%.

There are four main open drains in the district as shown in Appendix B, Figure B-3. These drains are the Masgad Wasif drain, the Elkhadrawia drain, the Mastay drain and the Kala Elbab drain. All these drains collect drainage water of branch drains and tile drains and spill into a major drain called the Dahtoura drain. The Dahtoura drain runs parallel to the Rayah Elabbasi and then underneath the Rayah to spill into the Zifta drain. At the end of the Dahtoura drain there is a relatively large pump station to divert most of drainage water of the Dahtoura drain into the Abbasi Rayah to be mixed with its water.

2.3.1.3 Groundwater District

Zifta Groundwater District is a unit of the Mechanical and Electrical Department of the MWRI. The district is mainly responsible for operation and maintenance of the well pumps. The area of the district includes 13 wells of which, nine are in the South Zifta irrigation district. The design discharge of each well is about 1000 m³/hour. However, the existing discharge of each well has declined to be about 500 m³/hour on the average. The average depth of the groundwater wells is about 10 m and district engineers consider the water as deep groundwater compared to farmer wells. Operation of the wells is according to the request of the irrigation district engineer as he determines when and how long to operate each well.

2.3.2 Ibrahimia District

2.3.2.1 Irrigation District

The Ibrahimia irrigation district is one of two irrigation districts that constitute the Zagazig inspectorate. The Zagazig inspectorate is one of two inspectorates in the West Sharkia irrigation directorate. The current command area of the Ibrahimia irrigation district is 59000 feddans. The district receives its water quota from the Bahr Muis canal from km 36.000 to km 56.000 on the left side.

In addition to canal water, the district is proposing use of groundwater through 10 wells scattered throughout the district. The wells are mainly located at the canal ends in order to compensate for insufficient canal flow. Farmers have dug their own wells in their fields for use in cases of water shortage. It was found that many farmer wells exist in the Ibrahimia district and most of them are illegal, *i.e.*, without proper permits.

2.3.2.2 Drainage District

There are two drainage districts in Ibrahimia overlapping with the irrigation district: the East Ibrahimia and the West Ibrahimia drainage districts. The area of the East Ibrahimia district is 41100 feddans and that of West Ibrahimia is 37500 feddans. The two district offices are in one building close to the Ibrahimia irrigation district building. The drainage districts are responsible for maintaining the open drains and tile drains system. The area is totally covered with a tile drainage system and divided into five sub-regions. The area of the sub-regions ranges from nearly 3300 feddans to 8200 feddans. The boundaries of the two drainage districts do not coincide with irrigation district boundaries. The coincidence of boundaries is estimated as 70%.

There are two main open drains in the district as shown in Appendix C, Figure C-3. These drains are the Akwa and Bahr Saft drains. All the drains collect drainage water of branch drains and tile drains and spill into these two main drains. Drainage water of these drains is reused in the downstream parts of the irrigation system outside of the district.

2.3.2.3 Groundwater District

It is proposed to construct ten wells in the district to compensate for insufficient canal flow at the tail ends. The irrigation district (not the Mechanical and Electrical department) plans to operate these wells. Therefore, there is no groundwater district similar to that in Zifta.

2.3.2.4 Water Boards

The water boards in Ibrahimia are part of a pilot program aimed at establishing boards of water user representatives from different villages. The water boards are expected to participate in water management at the district level. The legal framework was not yet developed during the period of activity on the IWMD benchmark. However, there were some meetings being conducted at the district to get the water boards acquainted with their tasks. Only two pilot canals are being considered for water boards in the Ibrahimia district.

3 Pilot District Activities

This chapter describes the IWMD activities in the two pilot integrated water management districts: South Zifta and Ibrahimia. .

3.1 Understanding the MWRI Structure at the District Level

Several meetings were held at the directorate and district levels in addition to seminars and workshops. The purpose of these meetings was to expand the understanding of the MWRI structure in the district, including the roles and responsibilities of units and personnel.

3.2 Evaluation of Current Responsibilities and Mandates

3.2.1 Overlap of Boundaries

Detailed evaluation of information regarding each of the districts revealed that the irrigation and drainage district boundaries do not coincide. This lack of agreement of district boundaries will likely be a major constraint in establishing an IWMD. The groundwater district boundaries were also found to differ from irrigation and drainage district boundaries. For a properly constituted IWMD, it is important that the new district officer has responsibility and authority to manage all water resources within the new district. Hence, the boundaries especially for irrigation and drainage activities must agree as closely as possible under the IWMD approach. Adjustments of boundaries must be an integral part of the process of forming IWMDs as the policy is implemented nationwide so that overlaps between different IWMDs are minimized.

3.2.2 Organization, Staff and Responsibilities

The current organization of the irrigation district, drainage district and groundwater district has been reviewed and evaluated. In Appendix B, Figure B-5, and Appendix C, Figures C-5 and C-6, show examples of the structure of these districts. It is noted that one civil engineer heads each district (irrigation or drainage) and is responsible for all operation and maintenance activities within the district. The district is divided into small entities each of which is headed by a technician who has a certificate of a technical school. The technician has some assistants to help him carry out the entity tasks. Irrigation and drainage districts have nearly the same staff and roles as listed in the following:

3.2.2.1 Irrigation District and Drainage District

3.2.2.1.1 *Administration Section*

This section is currently responsible for completing the procedures of the permit of irrigation issues such as permission for establishing an irrigation opening from the canal. The section is also responsible for salary distribution.

3.2.2.1.2 *Encroachment Section*

This section is responsible for completing and following up the procedures of reporting and removing encroachments along the canal systems. This may include transgression on canal

banks, dumping wastes into canals, *etc.* It is responsible for editing and redaction of encroachment reports according to Law 48 and Law 12.

3.2.2.1.3 Complaints Section

This section is responsible for receiving beneficiary's complaints and preparing the reply to them.

3.2.2.1.4 Personnel Section

This section is responsible for personnel affairs such as working hours, vacations, preparing salary time sheets.

3.2.2.1.5 Legal Affairs Section

This section is responsible for legal procedures of work issues for personnel and also for collecting fines from violators.

3.2.2.1.6 Contractors Section

This section is responsible for assisting the district engineers in preparing the technical data of canals such as levels, cross sections, drawings, *etc.*

3.2.2.1.7 Book-keeping (Archiving) Section

This section is responsible for receiving and sending mails.

3.2.2.1.8 Telephone Operators

The telephone operators section is very important as it receives all messages concerning water management at the district such as adjusting water levels, canal rotation, water allocation problems, *etc.* So they work day and night continuously.

3.2.2.1.9 Gatekeepers

Gatekeepers are responsible for opening the canal gates to maintain the required water levels upstream and downstream of the gate as ordered by the district engineer.

3.2.2.1.10 Maintenance Crew

The maintenance crew is responsible of cleaning canals (manually or with small weed-cutting machines) and removing any obstacles that hamper the water flow. For the drainage district, the crew is also responsible for maintaining and cleaning the tile drains.

3.2.2.2 Groundwater District

The groundwater district is different than the irrigation and drainage districts. This district belongs to the Mechanical & Electrical Department. Therefore, it is headed by a mechanical engineer. At Zifta, the groundwater district has nine mechanical engineers in addition to a number of technicians. The district is responsible for operation and maintenance of the

groundwater pumps based on instructions of the irrigation engineer. The groundwater district has its own organization regarding administrative and personnel aspects.

3.2.2.3 Irrigation Inspectorate

The irrigation district is supervised by an irrigation inspectorate. The irrigation inspectorate of Zifta is shown in Figure B-6, in Appendix B. The Zifta inspectorate includes three irrigation districts. The Menoufia irrigation directorate consists of three inspectorates as shown in Figure B-7, in Appendix B.

3.2.3 Equipment and Buildings

The irrigation districts are lacking maintenance equipment as most of the maintenance work is done by the private sector under contract with the General Directorate. The district has small equipment for manual cleaning of canals. The drainage district has one each of washing machine, tractor, and manual weed-cutting machine.

There is one building for the Zifta inspectorate, South Zifta irrigation district, Zifta drainage district, and groundwater district. The building is old and not well furnished. In Ibrahimia, the buildings look good enough because there are separate buildings – one for irrigation and two for drainage. These buildings could be reorganized to better serve the IWMD.

3.2.4 Existing Water Management and Monitoring

The irrigation district engineer is not involved in preparing the water distribution plan. The General Director of the directorate prepares this plan. The irrigation district engineer is responsible to distribute the water within his/her district for the branch canals according to the canal rotation table set by the General Director. The district engineer adjusts water levels in the canals to meet the farmer demands. In case of water shortage, he asks the General Director to provide him additional water. There is no routine measurement of canal discharges.

Gatekeepers are responsible for opening the gates to maintain the required water levels. They also report the water levels three times (two times in some districts) a day to the district engineer at 6.00 a.m., 2.00 p.m., and 6.00 p.m. Water levels are measured using a marble gauge upstream and down stream of the gate. The end of the canal also has a marble gauge to measure water level. The telemetry system is used to measure water levels upstream and downstream of the main gates – particularly those separating districts, inspectorates, and directorates. However, the district engineer has no direct access to such data as the telemetry system is operated by the General Director.

The drainage water levels are recorded through reading the marble gauge at the start and outfall of each drain.

There is no regular monitoring of groundwater – quality, quantity pumped, and piezometric levels are not measured at the production wells or elsewhere in the aquifer.

3.2.5 Financial and Funding Issues

There is no specific budget for district. All financial aspects and issues are managed through the General Director.

3.2.6 Decision-Making Process

In most decisions, the district engineer must refer to the general director. Regarding operation of canals, the district engineer is not involved in the determination of canal water requirements and scheduling of water releases (the annual water allocation plan). However, the district engineer may have the right to change the canal rotation within his/her district (small branch canals) to solve some water allocation problems but he/she must inform the general director. Regarding canal maintenance, the district engineer determines the maintenance requirements such as dredging, removal of aquatic weeds, rehabilitation of structures, *etc.* Then she/he tabulates and prioritizes these requirements and sends them to the general director who in turn determines the district maintenance plan.

3.3 Training

In order to improve the performance of the district, a computer database should be developed. The pilot districts were found lacking of needed computers and training. Therefore, EPIQ provided a computer to the district and established training courses for the district staff including the irrigation engineer, drainage engineer, and technicians. The training included basic computer operation, use of spreadsheets for data processing including data entry, data analysis, and performing calculations. The computer training included also instructing district/directorate staff on use of email including sending, receiving, and managing attachments. The email system enabled the district to be in direct contact with the directorate and hence receive the telemetry data.

3.4 Water Monitoring

None of the existing districts have intensive water monitoring programs. In order for an IWMD to function most effectively, the new district should have a comprehensive monitoring plan covering all the various sources of supply. This plan and resulting monitoring program should include both quantity and quality of water. To develop this plan, the EPIQ team hired a water-monitoring specialist on a TDY assignment. The complete report of this effort is included in this report as Appendix D. Some considerations and recommendations for water monitoring are briefly given here for canal water, drainage water, and groundwater.

3.4.1 Canal Water Monitoring

The district water resource officer needs to manage the district service area based on equity and efficiency considerations, which implies monitoring the following parameters relating to canal water:

- Flow discharge and water volumes entering the district service area.
- Physical condition of canals and water surface levels.
- Calculation of crop water needs.

The district canals have flow regulation gates at the intake, where water levels are read through the existing telemetry system. Flow discharge could be easily monitored at this control location with the additional measurement of gate opening. The telemetry system does not extend to the branch canal control gates. At such points, water levels and gate opening will have to be manually read to know flow discharge at this level.

3.4.2 Drainage Water Monitoring

A special concern with drainage water is its quality for reuse as irrigation supply, either alone or by mixing other sources. Some relevant water quality parameters are:

- Salt content expressed as electrical conductivity, EC, or total dissolved solids, TDS.
- Biological oxygen demand, BOD.
- Agricultural chemicals including nitrates, pesticides, and herbicides.

3.4.3 Groundwater Monitoring

Proper evaluation and planning requires at least the following data from the field:

- Number of groundwater wells (both public and private), average discharge, and relevant water quality parameters.
- Do all wells have permits? Are permit requirements satisfied with respect to well spacing and depths, pumping rates, *etc.*?

3.5 Proposal of a New Structure

Several proposals of organization have been developed by the ministry. These proposals were reviewed in addition to intensive discussions with MWRI staff at different levels. Field visits were also made to the districts for discussions with the district staff. Then, the EPIQ team developed a proposal for a new structure for the pilot IWMDs. This proposal considers the innovations of the district activities and MWRI plans and policies. The developed structure involves also determination of the roles and responsibilities of the IWMD and the required staff as well.

3.6 Seminars and Workshops to Formulate Organizational Structure

In addition to several meetings, one seminar and one workshop were conducted to discuss the new organization chart that was developed by the EPIQ team. The purpose was to investigate other issues and concerns of the proposed organization. Four different possible organizational structures were suggested by the discussions and working groups. The IWMD core working-group then met at the MWRI central level to formulate the final organizational structure proposed for an IWMD.

3.7 Definition of an IWMD

The final definition of what constitutes an Integrated Water Management District as developed by the IWMD core working-group is as follows:

The Integrated Water Management District is an entity that has sufficient manpower, material, and fiscal resources to operate and maintain all water resources under its jurisdiction. As the primary responsibility of the district is to deliver water to the users, therefore, all of the divisions support the water distribution process to ensure that water is delivered equitably. As a result, the different water entities currently existing at the district level should be merged to constitute only one entity defined as an IWMD.

4 Organizational Structure

4.1 Organization

The developed organization of an IWMD includes mainly four sections. They are: water management and distribution section, maintenance section, planning and follow-up section and administrative section. These four sections are headed by the Markaz Officer. A markaz coordination committee consisting of 8 – 12 persons will be considered in the organization to work with Markaz Officer as an advisory unit. The committee members are not MWRI personnel but are local water user representatives. Some individuals suggested adding to the IWMD organization another management level that would be an investigation level headed by a director of works. This level would supervise the IWMD sections except for the water management and distribution section that will be supervised directly by the Markaz Officer due to its critical issues.

The Markaz Officer will be supervised by the General Director of the irrigation directorate. This means that the Markaz Officer will not report to an irrigation inspector as is done currently by the irrigation district engineer. Therefore, the irrigation inspectorate may be removed from the organization especially since the IWMD will become equivalent in authority and responsibility as a present inspectorate. Figure 4-1 shows the proposed organization of the IWMD.

4.2 Phased Implementation of Organization

After intensive discussions with the MWRI officials at the central level, they recommended developing a phased organization plan that can be implemented in sequential phases. The reason is that the IWMD is still a pilot program and all necessary facilities (equipment, buildings, *etc.*) and staff may not be available for complete implementation immediately. The first-phase organization of the IWMD will include only the pre-mentioned four sections (water management and distribution section, maintenance section, planning and follow-up section and administrative section), *i.e.*, the advisory committee and director of works will not be included in this phase (see Figure 4-2). As the first phase makes progress and proves successful, the MWRI will move to the other phases.

4.3 Roles and Responsibilities

Figure 4-3 shows the divisions of each section of the IWMD organization. From this, the roles and responsibilities can be defined as follows:

4.3.1 Water Management and Distribution Section

This section is primarily responsible for determining water demands and distributing water. The section is also responsible for monitoring water quality of the irrigation and drainage networks and groundwater and monitoring the quantity of water used from canals, drains, and groundwater wells. The section has a division for studying and solving water complaints and another division for investigation of encroachments that affect the water distribution equity and pollute the water. This section contains a unit for groundwater use and development. The groundwater unit has two technicians responsible for surveying all groundwater use in the district – both official and non-official uses. The groundwater unit may propose solutions

to water resource problems and participate in plans for groundwater development within the district. The water resources development unit has primary responsibility for planning and development of all water resources of the district.

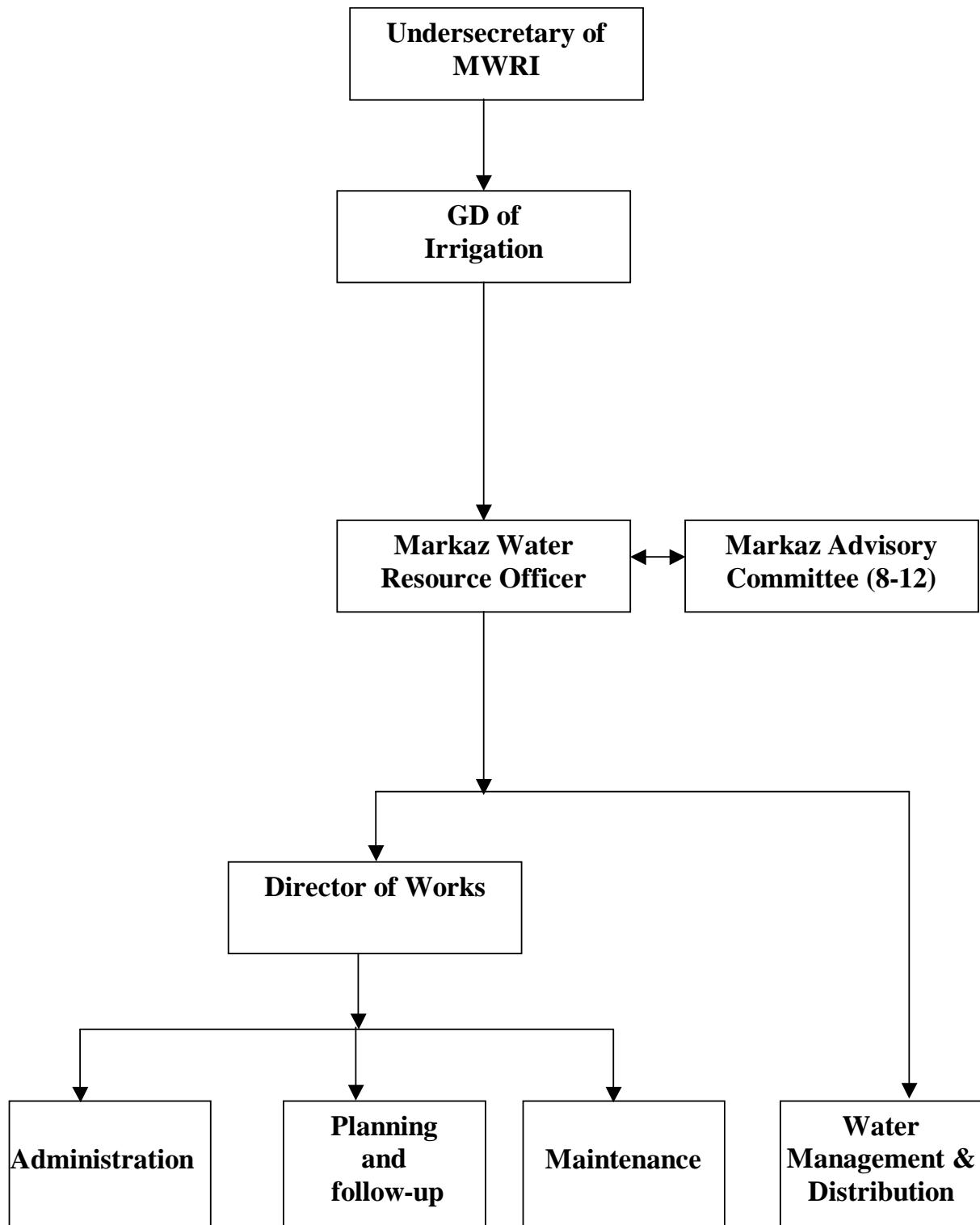


Figure 4-1. Proposed organizational chart for an IWMD.

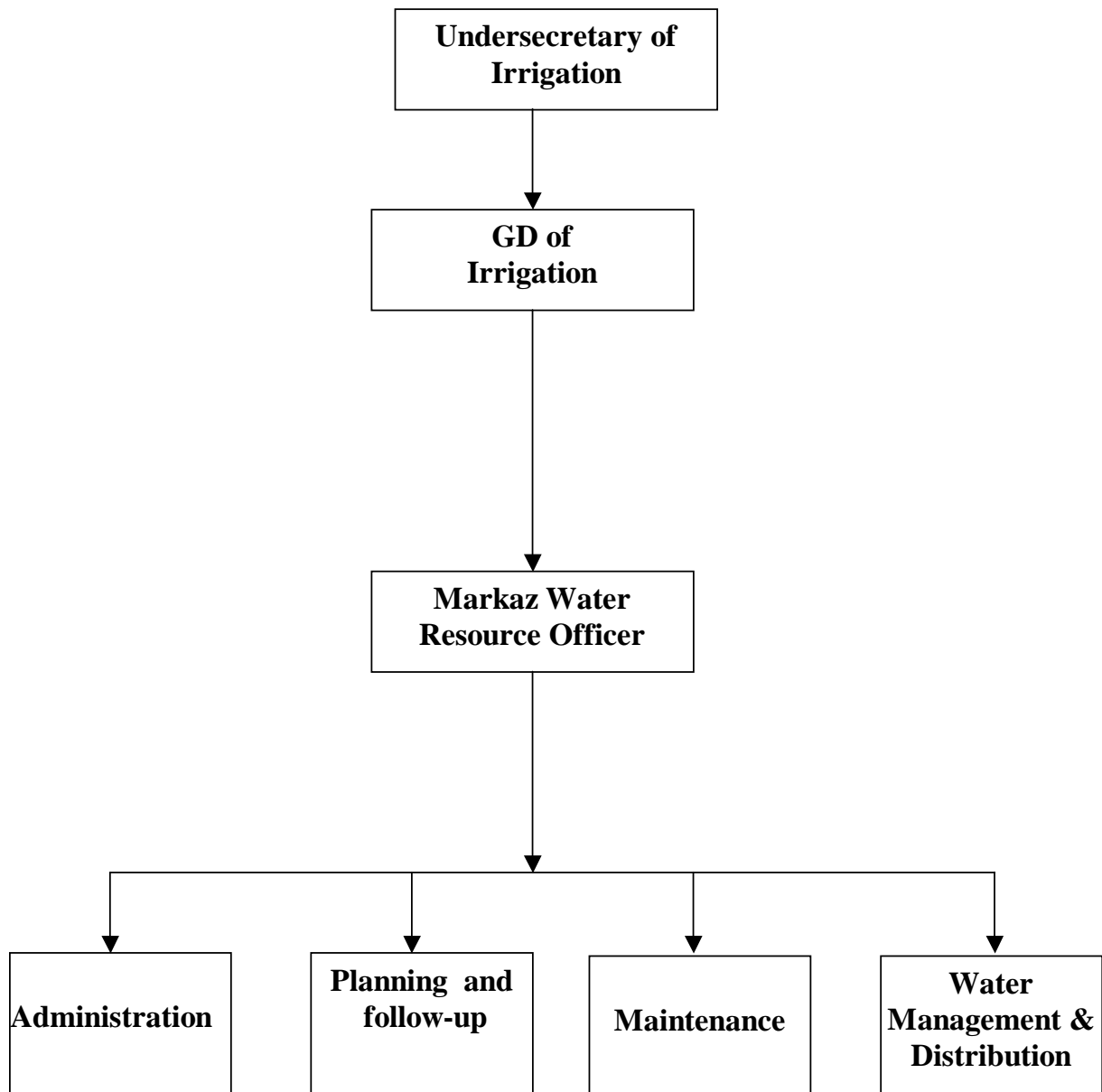


Figure 4-2. Proposed first phase organizational chart for an IWMD.

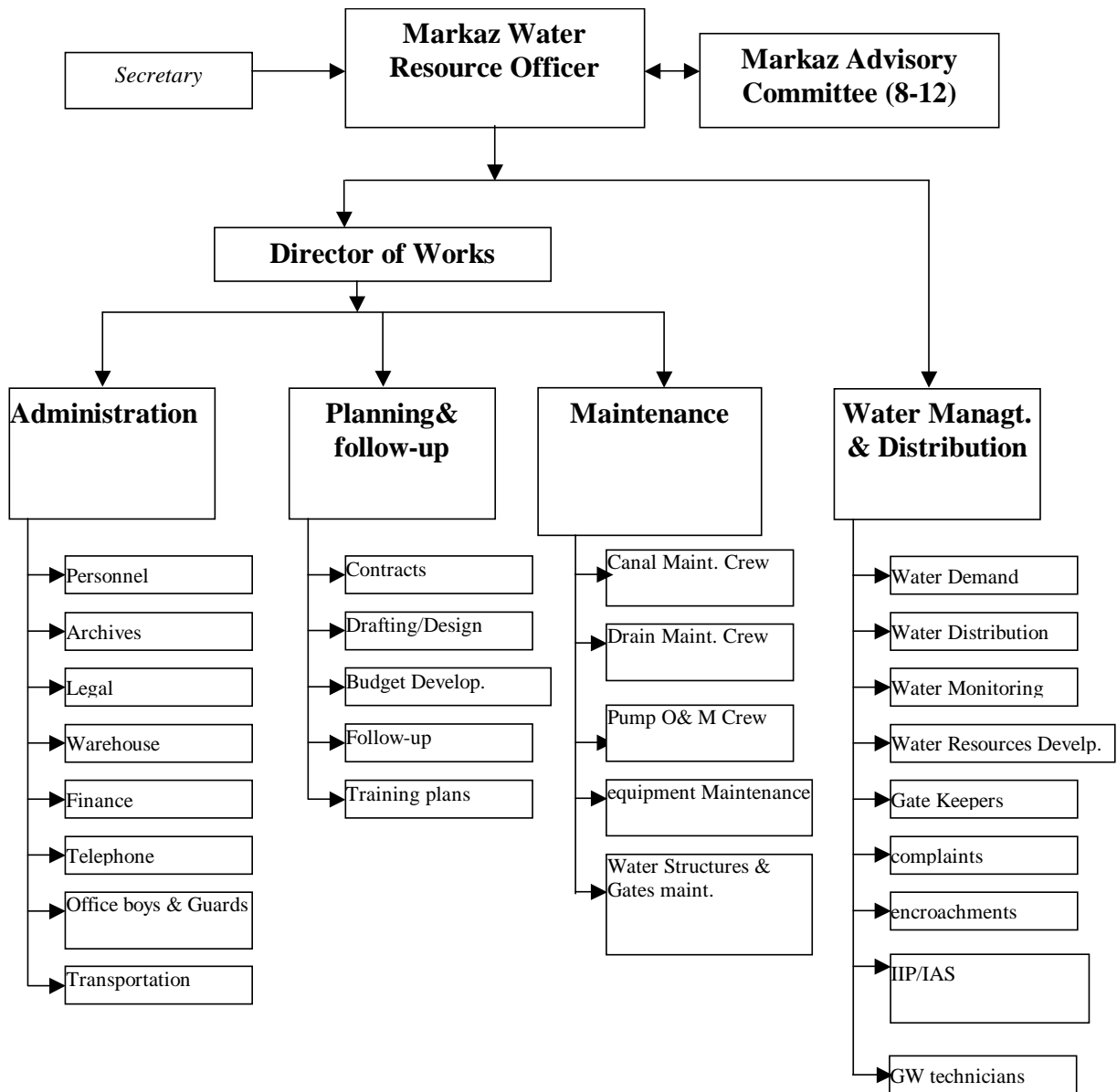


Figure 4-3. Proposed divisions and roles within an IWMD.

4.3.2 Maintenance Section

This section is responsible for maintenance activities on irrigation and drainage networks including open and closed drains. The section is also responsible for operation and maintenance of the small pump stations that are used in the irrigation network, intermediate drainage reuse pumps, and groundwater pumps. The water structures maintenance unit is responsible for routinely checking the gates and water structures and doing necessary repair on them. A preventive maintenance vehicle is needed for this unit. The maintenance section must have a workshop at the district to maintain the district equipment including cars and motorcycles.

4.3.3 Planning and Follow-up Section

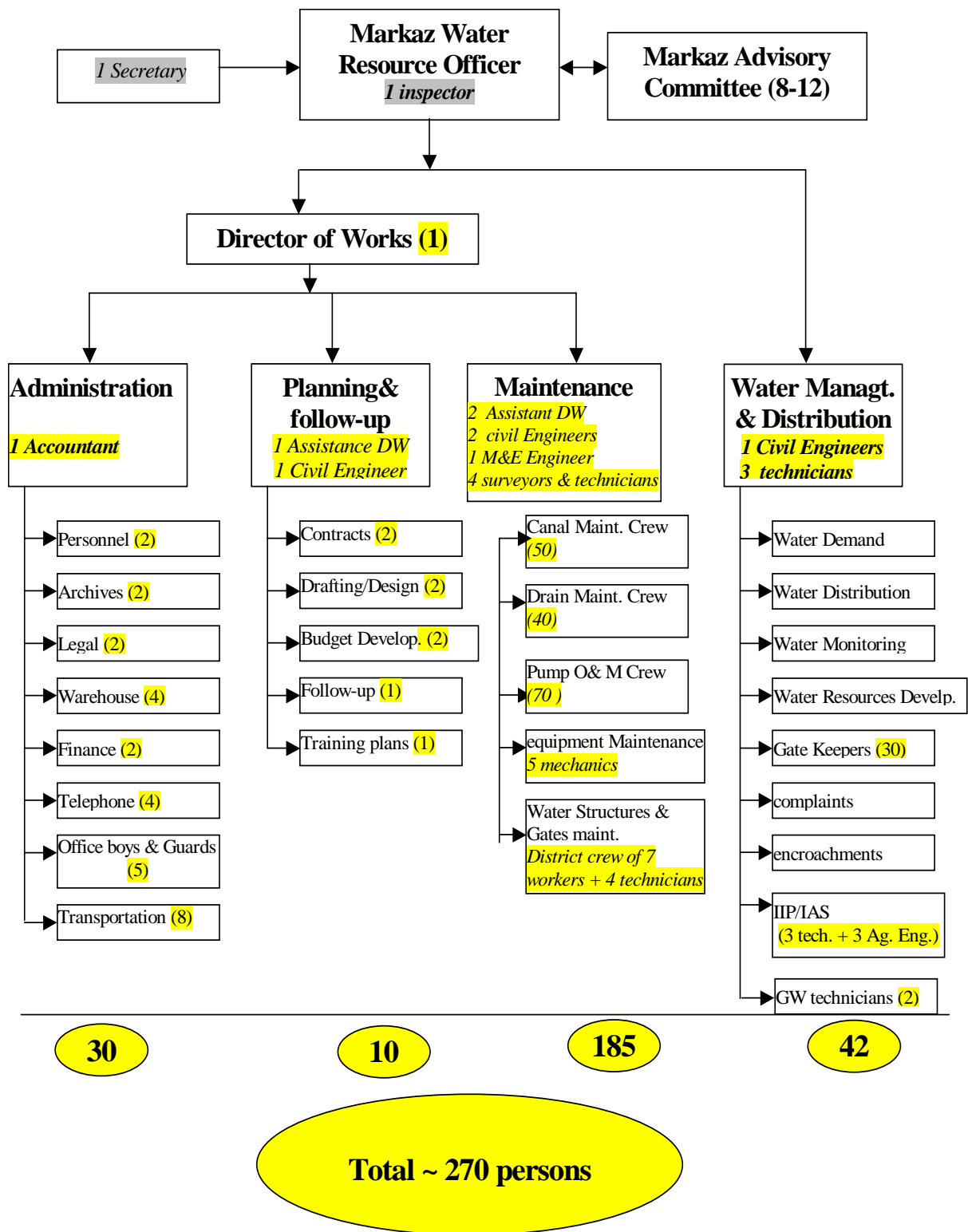
This section is responsible for detailed plans necessary for improvements to the district and for rehabilitation of drains and canals within the district. This section proposes improvements and changes to the operating plans of the district to be taken before the district council to be authorized and budgeted. The proposals would include budgets that would need to be approved. The section provides plans for contractors to work within the irrigation system and inspects the works as they are in progress. This organization supports the water management and distribution section to be able to more effectively carry out distribution of water.

4.3.4 Administrative Section

This section is responsible for all administrative duties of the district including payment of salaries, finance, archiving, complaints, encroachments, legal, secretarial, phone operators, tea boys, *etc.* The section also assists in preparing the annual budget by receiving requested budgets from each of the section supervisors. The administrative section supervisor determines the actual personnel needs and responsibilities within the district and reorganizes the staff accordingly. Each individual of the unit should have combined duties, for example: secretarial, telephone answering, and archiving. Two or three people should probably be able to handle the work of this section.

4.4 Manpower

The total manpower for an IWMD in full organization may reach 270 persons. This is not too many as all current MWRI entities (irrigation, drainage, groundwater, and M&E) at the district level will be merged into one organization. However, the task of the staff may be redistributed and redefined according to the new role of the IWMD. Figure 4-4 shows the manpower for each division of an IWMD.



Note: The numbers in parentheses are the number of staff proposed.

Figure 4-4. Proposed staff for an IWMD.

5 National IWMD Policy

Section 5.1 of this chapter presents the national IWMD policy in the Arabic language. This policy is in the form of a Memorandum together with the ministerial decree establishing the national policy and designating the two pilot districts as Integrated Water Management Districts. The first three pages of section 5.1 give the Memorandum agreed to by H. E. Dr. Mahmoud Abu Zeid. Three pages that contain the MWRI ministerial decree, No. 506, dated 10 December 2001, follow the Memorandum.

Section 5.2 of this chapter follows with an English language translation of Section 5.1 presented in the same order as in the Arabic versions.

5.1 The Signed Policy

5.1.1 Memorandum

MWRI Ministry of Water Resources and Irrigation

وزارة الموارد المائية والري

Water Policy Advisory Unit

الوحدة الاستشارية للإستراتيجيات المائية

مذكرة للعرض

علي السيد الأستاذ الدكتور الوزير

تعلمون سيادتكم أنه أصبح من المسلم به علي المستوى العالمي أن حسن أدارة الموارد المائية، يتحقق من خلال مجموعة متكاملة من الخدمات والأعمال التي تتضمن الري والصرف والمياه الجوفية ومياه المطر والتحكم في مياه الفيضان. كذلك أصبح من المفاهيم الواسعة الانتشار أن سياسات إدارة المياه يمكن تحقيقها بكفاءة من خلال اللامركزية في التنفيذ .

واللامركزية في إدارة الموارد المائية ليست مفهوما جديدا علي وزارة الموارد المائية والري، بل كنتم سيادتكم وراء دراسات عديدة قامت بها جهات الوزارة المختلفة منذ التسعينات لما يسمي بهندسات الري النموذجية كوسيلة لاختبار اللامركزية في أدارة الموارد المائية علي المستوى المحلي. كما أن تكوين روابط مستخدمي المياه علي مستوي المساقى، وما بدأت الوزارة من نشاطات تستهدف نقل أدارة المياه في بعض أجزاء شبكة الري إلي المنتفعين كلها أنشطة نحو اللامركزية في إدارة موارد المياه بما يستهدف زيادة الإنتاجية الزراعية من وحدة المياه.

وفي هذا الاتجاه اختصت العلامة الإرشادية رقم C₁ في الشريحة الخامسة لمشروع السياسات المائية المنبثق من مشروع إصلاح السياسات الزراعية بموضوع الإدارة المتكاملة للمياه علي مستوي هندسات المراكز لما من شأنها تحقيق الأهداف التالية:-

1. إحكام ضبط توزيع المياه علي مستوي هندسة المركز بالسرعة المطلوبة حسب الظروف المحلية للطلب علي المياه
2. رفع كفاءة شبكة الري والصرف علي مستوي هندسات المراكز ورفع كفاءة القائمين عليها من العاملين في الهندسة

٣. تكامل استخدام الموارد المائية وإدارتها علي مستوي المركز ، وسرعة اتخاذ القرار المناسب محليا بما يساعد علي زيادة إنتاجية وحدة المياه .
٤. تمكين الوزارة من رفع كفاءة استخدام المياه من مصادرها المختلفة والوصول بهذه الكفاءة علي المستوي القومي إلي أعلا معدلاتها .
٥. يؤدي تنفيذ إدارة الموارد المتكاملة علي مستوي المركز إلي التخطيط السليم لإعادة تنظيم الوزارة وتأهيل العاملين وتطوير أداره فيها علي ضوء المتغيرات الاقتصادية والفنية.

♦ وتتص معايير إنجاز هذه العلامة الإرشادية علي :-

١. موافقة وزارة الموارد المائية والري علي سياسة تحقيق تكامل جميع أنشطة أداره الموارد المائية علي مستوي هندسة المركز.
٢. اختيار هندستي ري كمنطقة تجريبية لتطبيق هذه السياسة والبدء بأعمال من شأنها التوصل إلي تحقيق هذه السياسة.

♦ ولقد قمنا في المشروع بتحديد المعايير التي تؤخذ في الاعتبار في اختيار هندستي ري لتطبيق سياسة الإدارة المتكاملة للموارد المائية فيها وأسفر تطبيق هذه المعايير عن اختيار هندسة ري جنوب زفتي التابعة للإدارة العامة لري المنوفية، وهندسة ري الإبراهيمية التابعة للإدارة العامة لري الشرقية لتطبيق هذه السياسة فيهما.

♦ ويقترح تغيير المسمي لجميع هندسات الري بالمراكز لتصبح (هندسة الموارد المائية والري) وأن تقام المنطقتين التجريبيتين في هندستي جنوب زفتي والإبراهيمية، بأن يرأس كل منهما مدير أعمال يكون مسؤولا عن جميع أنشطة الري والصرف والمياه الجوفية و أعاده استخدام مياه الصرف وإدارة وتشغيل وصيانة شبكات الري والصرف ومحطات الطلمبات وآبار المياه الجوفية داخل حدود الهندسة التي يرأسها ، طبقا للخريطة التنظيمية المرفقة.

وعلي هذا النحو ، فالأمر معروض علي سيادتكم برجاء التفضل بالنظر نحو الموافقة علي أن تكون من سياسات الوزارة تحقيق تكامل أنشطة الموارد المائية علي مستوي هندسات المراكز ، وتفضل سيادتكم بإصدار القرارات الوزارية اللازمة لإنشاء المناطق الرائدة في الهندستين المشار إليهما ، وتعديل حدودهما لتكونا متطابقتين ربا وصرفا بقدر الإمكان .

مدير الوحدة

الاستشارية للإستراتيجيات المائية



(م/ جميل السيد محمود)

صوائحه

كسلا

٢٠٠١ / ١٢ / ٨

5.1.2 Ministerial Decree

بسم الله الرحمن الرحيم



جمهورية مصر العربية
وزارة الموارد المائية والري
الوزير

قرار وزاري

رقم ٥٦ لسنة ٢٠٠١

بتاريخ ١٠ / ١٢ / ٢٠٠١

وزير الموارد المائية والري

- بعد الاطلاع على القانون رقم ١٢ لسنة ١٩٨٤ والمعدل بالقانون رقم ٢١٣ لسنة ١٩٩٤ بشأن الري والصرف ولاحتيهما التنفيذية.
- وعلى القانون رقم ٤٧ لسنة ١٩٧٨ بشأن نظام العاملين بالدولة وما تلاه من تعديلات وعلى تنظيم وزارة الموارد المائية والري
- وعلى برنامج إصلاح السياسات الزراعية وما تضمنه بشأن مشروع السياسات المائية الخاص بتحسين نظم الري والصرف ورفع كفاءة أداره المياه ، والعلامات الإرشادية المنبثقة عنه .
- وعلى العلامة الإرشادية الخاصة بتكامل أداره المياه على مستوى هندسات مراكز الري
- وعلى موافقة لجنة السياسات بالوزارة في اجتماعها المنعقد بتاريخ ٢٠٠١/١٢/٤ .

قرر

مادة أولى :

يعدل المسمى الحالي لهندسات الري بالمراكز إلى "هندسة الموارد المائية والري" .

مادة ثانية:

يعدل الهيكل التنظيمي لهندسة الموارد المائية والري بكل من المنطقتين التجريبتين في هندستي جنوب زفتي بالإدارة العامة لري المنوفية والإبراهيمية بالإدارة العامة لغرب الشرقية ليكون علي النحو الوارد بالهيكل المرفق بهذا القرار . ويتم تزويد الهندستين بكافة الإمكانيات

بسم الله الرحمن الرحيم



جمهورية مصر العربية
وزارة الموارد المائية والري
الوزير

البشرية والتجهيزات اللازمة لتحقيق الإدارة المتكاملة للموارد المائية (ري وصرف ومياه جوفية وأية مصادر مائية أخرى) علي مستوى الهندسة.

مادة ثالثة

تتكامل أنشطة إدارة الموارد المائية علي مستوى الهندسة في المنطقتين التجريبتين المشار إليهما في المادة الثانية وعلى أن يرأس مدير الهندسة جميع أنشطة الري والصرف والمياه الجوفية وإعادة استخدام مياه الصرف في الري وتشغيل وصيانة شبكات الري والصرف ومحطات الطلمبات وآبار المياه الجوفية داخل حدود الهندسة التي يرأسها.

مادة رابعة

تتابع التجربة الرائدة المشار إليها بالمادة الثانية والثالثة ويتم تقييمها تباعا للتأكد من تحقيق الأهداف المطلوبة منها قبل البدء في تعميمها علي مستوى الهندسات بالجمهورية.

مادة خامسة

يعمل بهذا القرار اعتبارا من تاريخه وعلي الجهات المعنية تنفيذه .

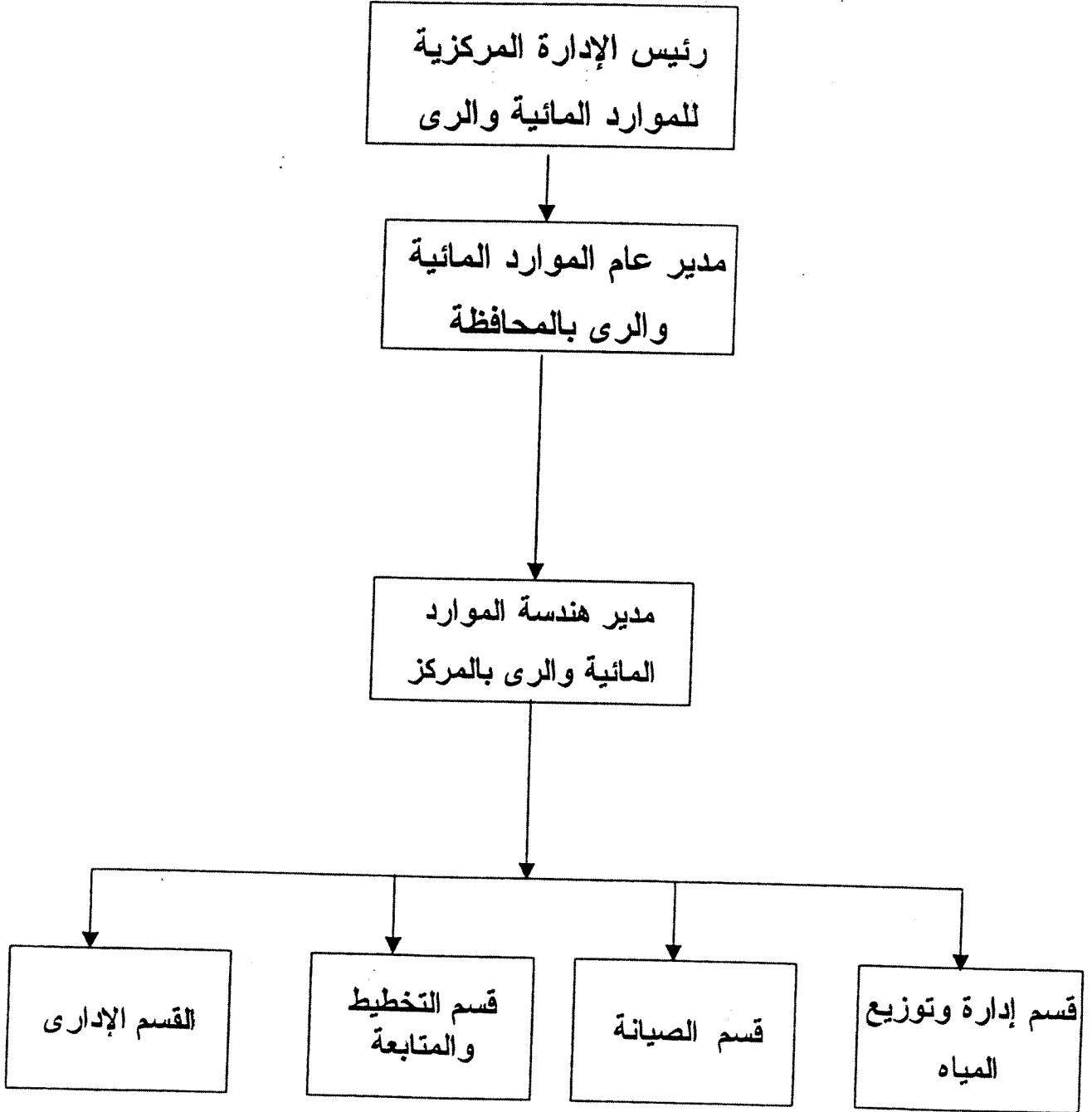
وزير

الموارد المائية والري

"د. محمود أبو زيد"

٢٠٠١ / ١٢ / ٢

١. الهيكل التنظيمي لهندسة الموارد المائية والري
(الهندسة المطورة)



5.2 English Language Translation

5.2.1 Memorandum

IWMD Memorandum Presented to H.E. the Minister

- Your Excellency: In recent years, a global understanding has developed that water management is best served through an integrated package of services and practices, including irrigation, drainage, conjunctive water utilization, rainfall management and flood control. It is also widely accepted that water management policies can be made more effective by directing the level of operation to localized coordination entities.
- Decentralization of water management is not a new concept for the water resources sector in Egypt. Your Excellency supported many studies during the 1990s conducted by different agencies of the MWRI that recognized the “model irrigation district” as a means of testing decentralized management and authority at the local level.

In addition, establishing water users associations and the activities of the MWRI to transfer the water management of some parts of the irrigation network have been at the center of a movement leading toward decentralization of the water management aiming at increasing the agricultural productivity of the water unit.

- Therefore, the benchmark C.1 of Tranche V of the Water Policy Reform Program concerned integrated water management at the district level to achieve the following objectives:
 1. Better control of water distribution at the district level according to the local conditions of water demand.
 2. Improving the performance efficiency of the irrigation and drainage at the district level and personnel as well.
 3. Integration of the use and management of water resources at the district level and taking the suitable decision locally and on time aiming at increasing the productivity per water unit.
 4. Enable the MWRI to make the most efficient use of water from all sources.
 5. Implementation of IWMD will lead to proper planning for reorganization of the ministry and building capacity of the staff and improving management under economic and technical changes.
- Verification indicators of this benchmark are:
 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.

- Criteria for selection of the two pilot districts were developed through the benchmark in order to implement the IWMD policy. The selected pilot districts were South Zifta Irrigation District in Menoufia Irrigation Directorate and Ibrahimia Irrigation District in Sharkia Irrigation Directorate.
- It is proposed to change the current name of the irrigation districts to be “Water Resources and Irrigation District هندسة الموارد المائية والرى” and to establish the two pilot districts in South Zifta and Ibrahimia districts. Each district will be headed by Director of Works who will be responsible for all activities of irrigation, drainage, groundwater, drainage reuse, and operation and maintenance of the irrigation and drainage network, pump stations, and groundwater wells within the district boundary according to the attached organization chart.
- This is then presented to Your Excellency to agree on considering the IWMD policy one of the MWRI policies and issuing the required decree concerning the establishment of the two pilot areas mentioned above and to be monitored and evaluated.

**Director of
Water Policy Advisory Unit**

**18/ 11/ 2001
(Eng. Gamil Mahmoud Elsayed)**

Approved,

*Signature Dr. Mahmoud Abu Zeid
8/12/2001*

5.2.2 Ministerial Decree

Ministerial Decree No. 506 for the Year 2001 10/ 12 /2001

Minister of Water Resources and Irrigation:

In reference to:

- Irrigation and Drainage Law No. 12 for the year 1984 and Law No. 213 for the year 1994 and their executive regulations.
- With regard to Law 47 for the year 1978 regarding state employees organizations.
- With regard to Agricultural Policy Reform Program (APRP) and Water Policy Reform Project (WPRP) and its benchmarks related to the improvement of the irrigation and drainage systems and increase the efficiency of water management.
- And based upon the WPRP-benchmark on Integrated Water Management Districts.

Decided

Article No. 1

Changing the existing name for Irrigation Districts to “Water Resources and Irrigation Districts”.

Article No. 2

Modifying the organization chart for the two water resources and irrigation districts in the two pilot areas “ South Zifta District in Menoufia Irrigation General Directorate and Al-Ibrahimia District in West Sharkia Irrigation General Directorate” to follow the attached organization chart. Providing the two Districts with all the necessary human resources and equipments to achieve the desired integrated water resource management (irrigation, drainage, groundwater, and any other sources of water) on the District level.

Article No. 3

Water resources management activities must be integrated on the District level in the two previously mentioned pilot districts in Article No. 2. The District director has to supervise all the activity of the irrigation, drainage, groundwater, drainage water reuse, O&M irrigation and drainage networks, pump stations, and groundwater wells within the district’s borders.

Article No. 4

The pilot experiment previously mentioned in Articles No. 2 & 3 must be monitored and evaluated to make sure that it will meet the aimed targets before expanding its application nationwide.

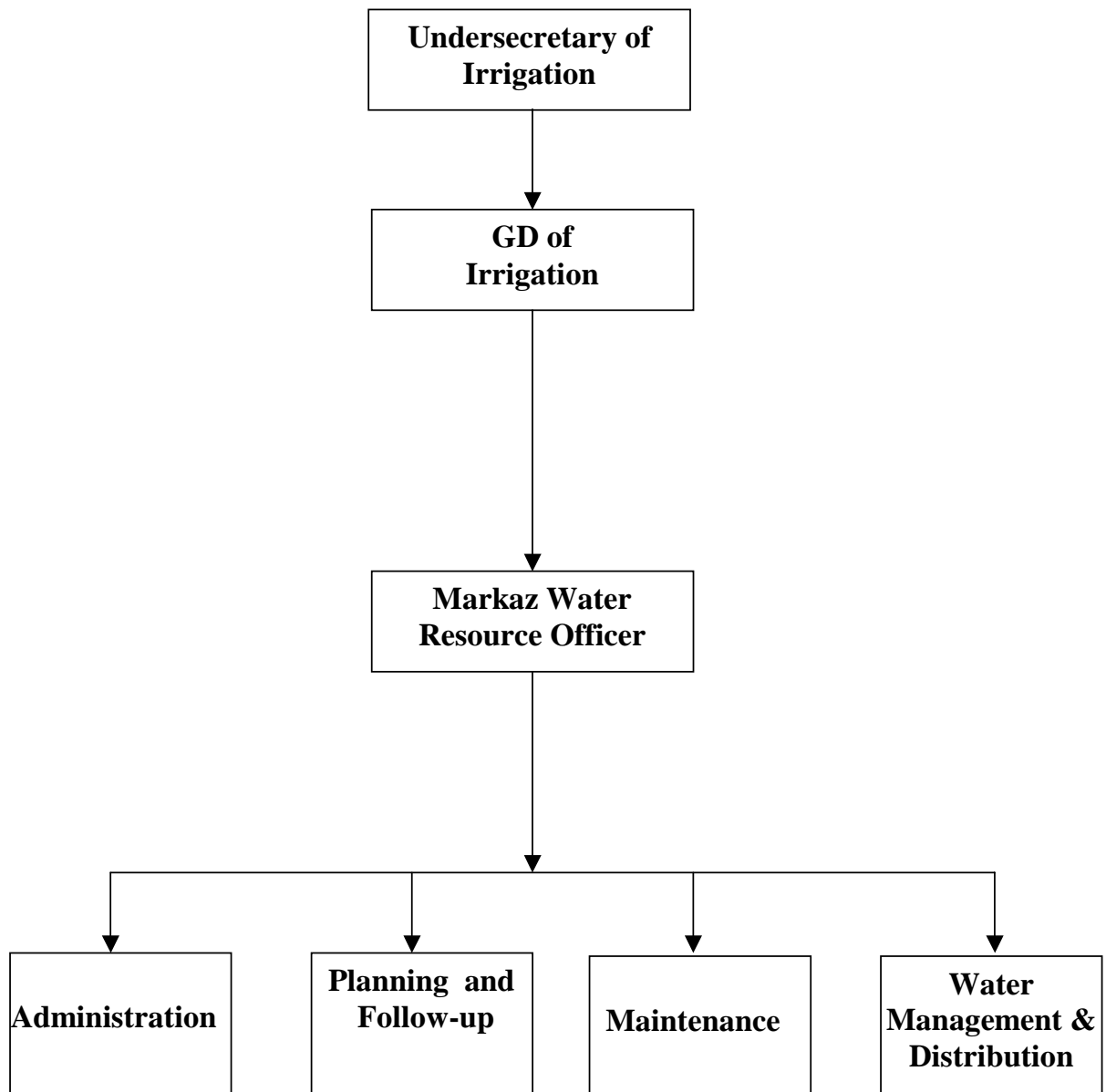
Article No. 5

This decree is effective from this date and executable by all concerned agencies.

**Minister of
Ministry of Water Resources and Irrigation**

Dr. Mahmoud Abu Zeid

Organization Chart for IWMD



6 Implementation Recommendations

As the MWRI begins to implement the national policy creating Integrated Water Management Districts, it is recommended that:

1. The MWRI delegate authority for management of district resources to the District Water Resource Officer (more briefly called Officer in the following).
2. The Officer delegate authority to the district unit supervisors or supervisory engineers to organize their staff for most effective execution of their duties. This includes the authority and responsibility to redistribute positions, if necessary, and personally train and coach individuals under their supervision.
3. Each unit supervisor be responsible for training staff in their duties.
4. The MWRI provide a budget for the Officer from existing Directorate funding for operation, maintenance, and salaries. Savings in salaries should be used in maintenance.
5. The investment portion of the budget be used to purchase an excavator, drain washers, transportation, wagons, ditcher, tools and other equipment required to adequately maintain the facilities. The district should also budget for replacement of that equipment.
6. The maintenance portion of the budget be used to purchase maintenance materials and contract with small private entities as required for maintaining the canals.
7. Water be distributed equitably among all of the branch canals.
8. Water be measured at each branch canal to ensure equitable distribution. This measurement initially could be by gate rating curves. Each district should purchase their own measurement set with transportation to measure canals regularly.
9. Each district provide for water sample collection for analyzing water qualities and conduct monitoring of quantities and depths in the canals and drains and groundwater quantities withdrawn for irrigation.
10. Alternative sources of water such as groundwater, drainage reuse, and effective precipitation be used as much as possible to supplement Nile River water. The IWMD Officer and his staff, in coordination with higher-level authorities within the Ministry of Water Resources and Irrigation, should assess these sources and decide how these resources contribute to meeting a part of the water requirements of the district.
11. A goal of reusing one million cubic meters per 1000 feddans per year be set for those districts where drainage water is reusable. The reuse pumping plants should all be similar small plants (package plants) that could supplement branch canal water needs. A spare pump should be installed at each plant for operation rotation and for water shortages. Pump usage should be continuous during the branch canal rotation. Excess

water supply from the Nile should result in shutting off the pumps. These small pumping plants would best be served by an electrical supply source if possible.

12. Those districts where groundwater is available set goals for groundwater utilization by private development of wells. Groundwater should not be considered a district responsibility. Use of groundwater as a continuous supply should be encouraged as much as possible. Groundwater can play a huge role in meeting the municipal and industrial requirements as long as it is protected to produce good water quality. The district should monitor annual use from the groundwater pumps within the district boundaries and ensure groundwater protection.
13. Canal and drain maintenance be by district staff with limited contracting to small private companies.
14. Equipment maintenance be by district staff unless there is not sufficient work to keep the employee continuously busy. Maintenance that cannot be performed by staff should be performed by local mechanics. Preventative maintenance of the equipment is still the responsibility of the district and needs to be budgeted.
15. A ditcher and several heavy chains be purchased for cleaning the canal.
16. Canals be dredged only as needed to restore design cross-sections. Banks should be trimmed using a ditcher to dress the canal banks and clean out grass.
17. Washer machines be used to flush collector drains at least once per year. This work should be transferred to the benefited landowners as soon as possible.
18. When the washers are not in use, tractors be used to pull the ditcher and for other construction work on the canals and drains.
19. One or two construction wagons be purchased to provide material transportation to work sites.
20. Canals and drains be cleaned to ensure good flow of water to and away from the farms.
21. The district monitor water quality and communicate the results to the water users of the branch canals and drains.
22. A Coordination Committee for the district be formed with a primary purpose to communicate more effectively with the water users. Monthly meetings should be held in the locations rotated throughout the district to provide more access and information to the water users on district activities.
23. The district be an organizing catalyst in obtaining a fenced solid waste disposal area for each branch canal or community.
24. The district encourage some form of sewage treatment for each community by utilizing the threat of violations of the dumping laws. Most small communities could consider a sewage lagoon with a deep anaerobic pit for decomposition of the solid wastes. This

would not require excessive area or cost and would not be a public nuisance but would need to be fenced.

25. Districts be formulated as much as possible to be responsible for a command area so that water is delivered to the head of a canal by the Directorate and the district is responsible for the area. South Zifta is a district that probably should be expanded to include the head of the two canals that deliver water to the branch canals.

7 References

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5. An Action Plan for Strengthening Water Resource Management in Egypt, Report No. 3, IIMI, Strengthening Irrigation Management in Egypt, December 1995.
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10. Opportunities for Improving Water Management in the Sharkia Command Area, Draft Report submitted to IMS Project, Planning Sector, MPWWR, and to USAID. Logan, UT: Utah State University, September 1995.
11. Evaluation of the Planning Distribution Model in the Sharkia Directorate, Logan, UT: Utah State University, November 1995.
12. Improved Operating Procedures Manual for the Sharkia Directorate. Logan, UT: Utah State University, November 1995.

Appendix A

Table A-1. Agencies, Groups, and Individuals Within MWRI Involved in IWMD Activities.

1. Eng. Ali Morsi	Head of Irrigation Department
2. Eng. Mohamed Fathy	Head of EPADP
3. Dr. Hesham Mostafa	Head of WCU
4. Eng. Mohamed Hamed	WPAU Engineer
5. Eng. Abdel Hamid Elgayyar	General Director for Irrigation, Menoufia
6. Eng. Nadia Hafez Menoufia	Former General Director for Drainage, Menoufia
7. Eng. M. Abdel Kawy	General Director for Drainage, Menoufia
8. Eng. Mohamed Samir	Irrigation Inspector of Zifta
9. Eng. Azza Abdel Hamid	District Engineer for Irrigation, Zifta
10. Eng. Gamal Gergis	Director of Irrigation Works, Zifta Inspct.
11. Eng. Fatma Abdel Aziz	District Engineer for Drainage, Zifta
12. Mr. Ezzat Abdel Moaty	Technician of GW District, Zifta
13. Mr. Mohamed Gaber	Technician of Irrig. District, Zifta
14. Eng. Moghmaed Elwarraki	Undersecretary of Irrigation, Sharkia
15. Eng. Gamil Farahat Sharkia	General Director of Irrigation, West Sharkia
16. Eng. Ghoneim Abdel Meguid	General Director Drainage, South Sharkia
17. Dr. Khaled Wasif Zagazig	Field coordinator, Water Boards in Zagazig
18. Eng. Abdel Fattah Elbaz	District Engineer for Irrigation, Ibrahimia
19. Eng. Ibrahim Tolba	District Engineer for Drainage, Ibrahimia
20. Eng. Ibrahim Ezzat	Director of Works of Drainage, Sharkia
21. Ag. Eng. Mohamed Abou Elseoud District	Ag. Extensioinst, Ibrahimia Drainage District
22. Mr. Said Abdel Latif	Irrigation District Administrator, Ibrahimia

Appendix B

(Details on South Zifta District)

Appendix C

(Details on Ibrahimaya District)

Appendix D

Appendix E