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MENA REGIONAL WATER GOVERNANCE BENCHMARKING PROJECT

COUNTRY PROFILE – EGYPT

October 2010

This report was produced for review by the United States Agency for International Development (USAID). It was prepared by International Resources Group (IRG) in association with International Water Management Institute, Institute of Water and Watersheds at Oregon State University, Computer Assisted Development Incorporated, Nile Consultants, and ECO Consult.

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ACRONYMS

ARC	Agricultural Research Center
BCWUA	Branch Canal Water Users Association
CDIAS	Central Directorate for Irrigation Advisory Service
DM	Decision-Making
EBA	Expert-Based Assessment
EEAA	Egyptian Environmental Affairs Agency
ENCID	Egyptian National Committee on Irrigation and Drainage
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GIS	Geographic Information System
GOFI	General Organization for Industrialization
GOI	General Organization for Industrialization
HCWW	Holding Company for Water and Wastewater
ICID	International Commission on Irrigation and Drainage
IIIMP	Integrated Irrigation Improvement and Management Project
IIP	Irrigation Improvement Project
IMF	International Monetary Fund
IO	International Organization
IRU	Institutional Reform Unit
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
KFW	Kreditanstalt für Wiederaufbau
MALR	Ministry of Agriculture and Land Reclamation
MENA	Middle East North Africa
MHUUD	Ministry of Housing, Utilities and Urban Development
MOH	Ministry of Health
MOI	Ministry of Industry
MSEA	Ministry of State for Environmental Affairs

MWRI	Ministry of Water Resources and Irrigation
NBI	Nile Basin Initiative
NDC	National Drilling Company
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organization
NWRC	National Water Research Center
NWRP	National Water Resources Plan
O&F	Organizations and Functions
OSU	Oregon State University
P&L	Policy and Legal
PPP	Purchasing Power Parity
ReWaB	MENA Regional Water Governance Benchmarking Project
USAID	United States Agency for International Development
WUA	Water Users Association

FOREWORD

The MENA Regional Water Governance Benchmarking Project (ReWaB) aimed to characterize water governance regimes in five Middle Eastern countries to allow comparisons both across countries and over time. In doing this, information on a variety of aspects of water governance was generated, including the country context, policies and laws, organizations, and expert-based ratings of performance. This information has been consolidated into a profile for each country in a common format.

The Egypt profile was drafted by Lucia De Stefano, Bridget Brown, Jonathan Lautze and Luke Sanford, with contributions from Majed Atwi Saab, Michael Campbell, Gamal Elkassar and Erika Wolters. It also drew from a great many other inputs – other project team members, national collaborators, and workshop and rating session participants.

Mark Svendsen, Ph.D.
International Resources Group
Team Leader
Regional Water Governance Benchmarking Project

SUMMARY

COUNTRY PROFILE – EGYPT

HIGHLIGHTS

OVERALL FINDINGS OF INTEREST

High Capacity

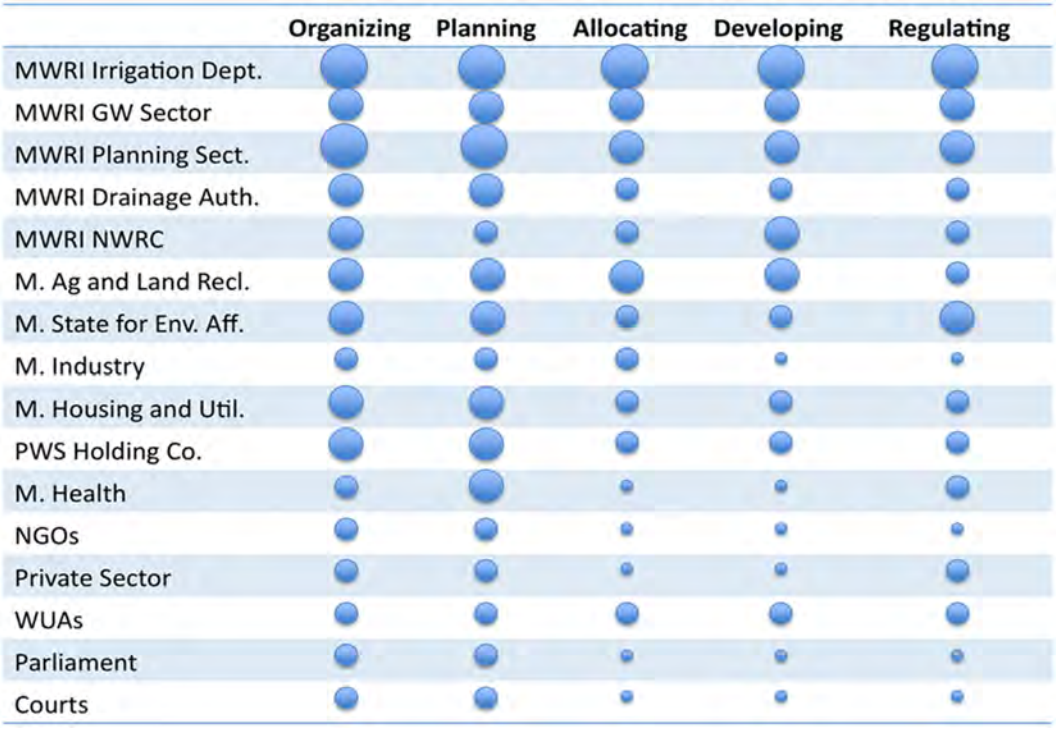
- Comprehensive water sector policies
- Strong leading Ministry with broad overall responsibilities
- Organizing the water sector; assigning revised roles and responsibilities at both central and sub-national levels within new decentralized structure
- Water resource development planning
- Developing and managing water conveyance and distribution systems

Potential Challenges

- Absence of a system for assigning and revising access to water
- Regulating water quality and protecting aquatic ecosystems
- Intra-ministry coordination of activities
- Creation and use of realistic long-term supply and demand projections in policy and planning
- Lack of legal provisions to implement some policy priorities
- Transparency of decision-making processes
- Integrity and accountability in decision-making

WATER SECTOR ORGANIZATIONS

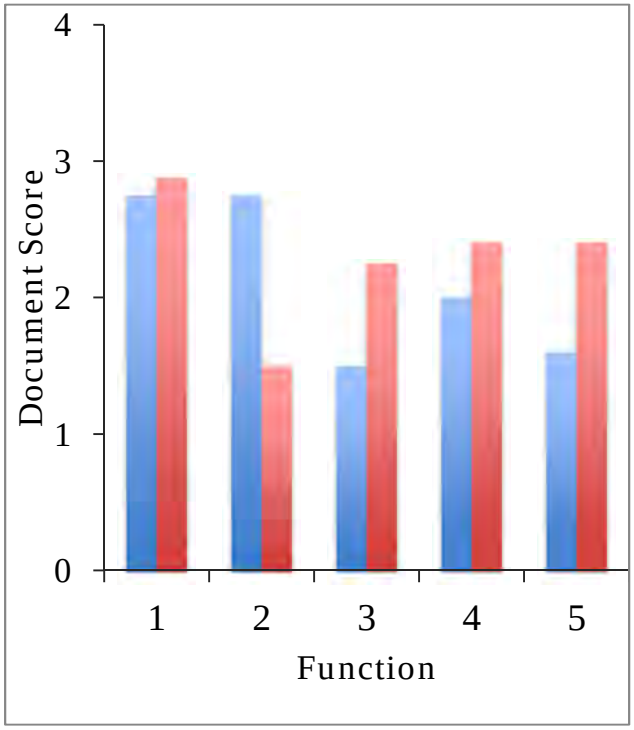
RELATIVE INFLUENCE ON WATER GOVERNANCE FUNCTIONS

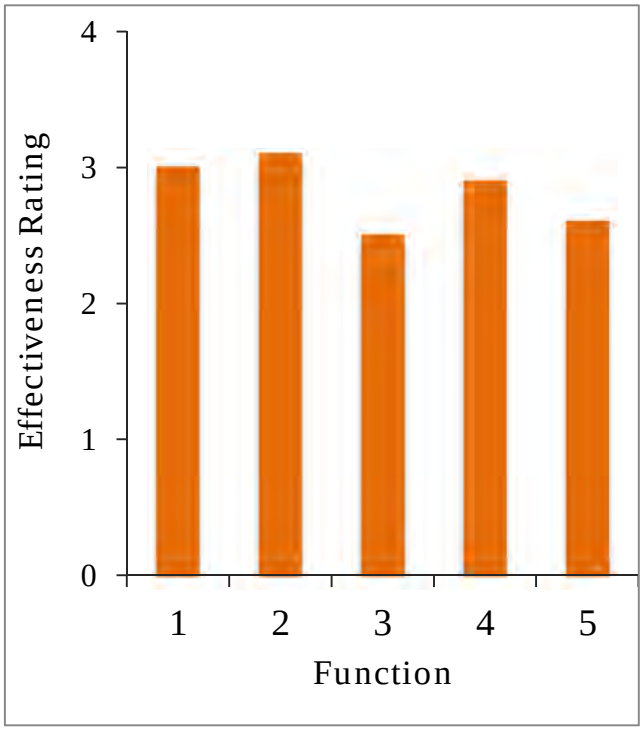


STANDARD WATER GOVERNANCE FUNCTIONS

(1) Organizing & Building Capacity – (2) Planning Strategically – (3) Allocating
(4) Developing & Managing – (5) Regulating

Policy Score Legal Score Expert Rating

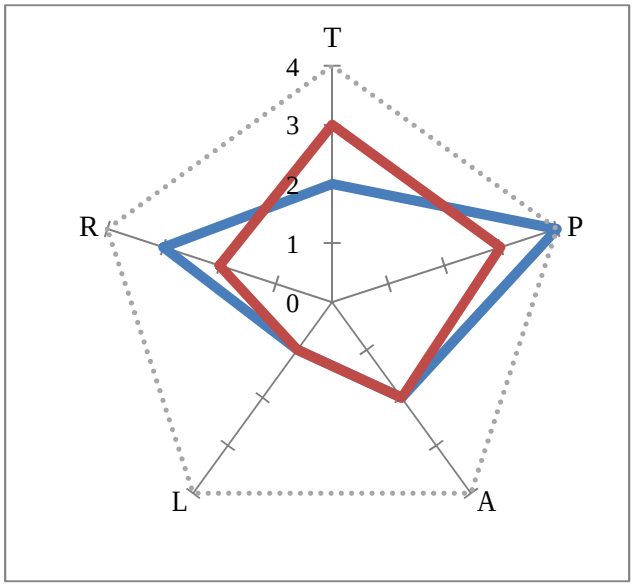


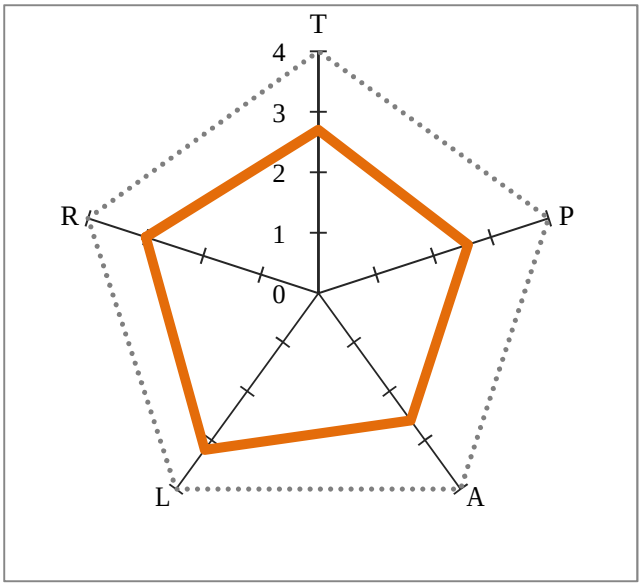


GOOD GOVERNANCE PROCESS FEATURES

(T) Transparency – (P) Participation – (A) Accountability – (L) Rule of Law – (R) Responsiveness

Policy Score Legal Score Expert Rating Highest Possible





1. INTRODUCTION

Most countries of the Middle East are chronically water stressed. Population growth and climate change impacts will exacerbate that stress. Most of the region's countries have already constructed significant water resource infrastructure, but the effectiveness of water governance and management has often lagged behind. Clearly, hardware solutions to these formidable challenges are not, by themselves, sufficient. Water governance shortcomings also hamper the achievement of durable solutions to water stress.

In order to tackle water governance weaknesses it is necessary to assess the present situation and its evolution over time. The Regional Water Governance Benchmarking Project [1] (ReWaB) aims at establishing a system of water governance capacity and performance benchmarking for Middle East and North Africa (MENA) countries. After analyzing the state of the art on the subject, the project team defined concepts of *governance*, *policy*, *management*, and others and designed a strategy for assessing *de facto* water governance based on essential water governance functions and characteristics of good governance decision-making. It also suggested a three-tiered framework defining the structural capacity for effective water governance comprising policies, laws, and organizations. Based on these concepts, it defined an approach to measuring and assessing water governance and tested it in six countries in the MENA region (Egypt, Jordan, Morocco, Oman, Turkey, and Yemen).

This report summarizes the results of the ReWaB assessment for Egypt. After this Introduction, Section 2 briefly describes the project's approach to water governance benchmarking. Section 3 provides a brief overview of the political, economic, and social situation in Egypt; looks at water availability; broadly outlines the main users and managers of Egypt's limited water resources; and identifies relevant transboundary issues. Section 4 describes the main actors in Egypt's water governance and their influence on functional performance, as shown by the Organizational and Functions (O&F) Matrix. Section 5 presents and discusses the main findings of the Policy and Legal (P&L) Analysis. Section 6 presents and discusses the results obtained in the expert-based assessment (EBA), which gauged the functional effectiveness of the Egyptian water sector and the application of good governance processes in water-related decision making. Section 7 concludes the profile, highlighting areas of high capacity and areas where significant potential for improvement exists.

[1] www.rewab.net

2. THE REWAB APPROACH

2.1 CONCEPTS[2]

After critically reviewing the variety of existing definitions of water governance, ReWaB defined water governance as *the manner in which authority is acquired and exercised on behalf of the public in developing, utilizing, and protecting a nation's water resources*.

For analytical purposes, governance structures can be divided into three groups: policies, laws, and organizations (Saleth and Dinar, 2004). In this context, policies are purposive courses of action giving overall direction to governance, while laws are codified and informal "rules of the game". Finally, organizations are groups of individuals engaged in purposive activity.

The observation that, while there are large differences in organizational structures across different countries there is substantial consistency in the core functions that water sectors perform, led to the identification of a set of core functions, called standard water governance functions (functions), that must be performed by any effective national water sector (Table 1).

Table 1. Standard water governance functions and sub-functions

1. Organizing and building capacity in the water sector
1.1 Creating and modifying an organizational structure
1.2 Assigning roles and responsibilities
1.3 Setting national water policy
1.4 Coordinating and integrating among sub-sectors, levels, and national sub-regions
1.5 Establishing linkages with neighboring riparian countries
1.6 Building public and political awareness of water sector issues
1.7 Securing and allocating funding for the sector
1.8 Developing and utilizing well-trained water sector professionals
2. Planning strategically
2.1 Collecting, managing, storing and utilizing water-relevant data
2.2 Projecting future supply and demand for water
2.3 Designing strategies for matching expected long-term water supply and demand and dealing with shortfalls (including drought mitigation strategies)
2.4 Developing planning and management tools to support decision-making
3. Allocating water
3.1 Awarding and recording water rights and corollary responsibilities
3.2 Establishing water and water rights transfer mechanisms
3.3 Adjudicating disputes
3.4 Assessing and managing third party impacts of water and water rights transactions

[2] More details on the project approach and framework can be found in the document "MENA Regional Water Governance Benchmarking Project Concept and Approach Framework" (Part I) (2009), available at www.rewab.net.

4. Developing and managing water resources
4.1 Constructing public infrastructure and authorizing private infrastructure development
4.2 Forecasting seasonal supply and demand and matching the two
4.3 Operating and maintaining public infrastructure according to established plans and strategic priorities
4.4 Applying incentives and sanctions to achieve long and short term supply/demand matching (including water pricing)
4.5 Forecasting and managing floods and flood impacts
5. Regulating water resources and services
5.1 Issuing and monitoring operating concessions to water service providers
5.2 Enforcing withdrawal limits associated with water rights
5.3 Regulating water quality in waterways, water bodies, and aquifers (includingenforcement)
5.4 Protecting aquatic ecosystems
5.5 Monitoring and enforcing water service standards

Water governance is, in essence, a series of interlinked decisions. The way in which decisions are made can be an important determinant of the quality and content of the decisions actually reached. After reviewing the literature on the subject and critically discussing the decision-making features characteristic of "good governance," ReWaB posited a set of five decision process dimensions for use in assessing water governance (Table 2).

Table 2. Decision-making process features characteristic of good water governance

1. Transparency. Information should flow freely within a society. The various processes and decisions should be open to scrutiny by the public.
2. Participation. All citizens, both men and women, should have a voice, directly or through intermediate organizations representing their interests, throughout water governance policy formulation and decision-making.
3. Accountability and Integrity. Governments, the private sector and civil society organizations should be accountable to the public or the interests they represent.
4. Rule of law. Legal frameworks should be fair and enforced impartially.
5. Responsiveness. Institutions and processes should serve all stakeholders and respond properly to changes in demand and preferences, or other new circumstances.

In the resulting framework policies, laws, and organizations provide the institutional structure in which water governance takes place. Effectiveness in water governance stems from effective performance of a set of standard functions. Finally, the characteristics of governance decision making provide a way of assessing the degree to which governance reflects the will of the public, its fairness, and its self-awareness and ability to adjust to changing conditions.

2.2 ANALYTIC TOOLS

In the ReWaB approach, water governance capacity is evaluated by a combination of policy, legal, and organizational analyses. The way in which capacity is employed to reach decisions, and the processes and values used in making those decisions, are assessed by expert-based in-country assessments.

ORGANIZATIONAL ANALYSIS

During preliminary interactions with local informants, significant water governance-related organizations in each country, both public and private, were identified and their roles, based on their official mandates, were outlined. These organizations were then examined, relative to the standard water sector functions, to map the *de facto* organizational coverage of the functions.

This analysis employs a matrix-based assessment tool in which a panel of water-experts in the country rated the degree of *de facto* involvement of particular organizations in carrying out the water functions in that country[3]. Participants assign scores assessing the degree to which particular organizations influence decisions relating to each of the five standard water governance functions. During the process, participants discuss in groups, and then evaluate individually, the roles of the various organizations. The resulting O&F Matrix is presented and discussed in Section 4.2 of this document and in the Summary at the beginning of the profile.

POLICY AND LEGAL ANALYSIS

The policy and legal analysis provides document-based information on the policy and legal context for water governance decision-making in the subject country. This analytic component is a desk study consisting of a systematic analysis of a set of water-related policy and legal documents retrieved during the assessment process[4]. The documents considered include national policy papers and laws that either are specifically aimed at water, or are focused on other issues but have a direct impact on water management and governance, such as environmental or human health regulations.

The document analysis considers the water governance functions that deliver available water to the water-depending uses, including environmental uses, and the formally mandated characteristics of the decision-making processes used in making water governance decisions. The policy and legal assessment includes independent analysis based on three groups of criteria: (1) functions, (2) process features, and (3) cross-cutting categories (water types and water uses). Each of the three sets of criteria is applied to policy and legal material separately. The analysis produces a qualitative assessment of the policy and legal documentation and two sets of scores that characterize each set of materials using numerical values.

To produce the numerical scorings, a team of three analysts evaluates "tags" for each framework element to assess its extent of coverage, and assigned two scores – one for policy and one for law – between 1 (framework element is not covered in the provided documentation) and 4 (extensive documental coverage). The three analysts assign their scores independently and then reach consensus on the assigned scores through one or more iterative deliberation meetings. The results of the policy and legal analysis are summarized in Section 5 and in the Summary.

EXPERT-BASED WATER GOVERNANCE RATING

The expert-based assessment evaluates the overall level of effectiveness in performing the five standard water governance functions (functional effectiveness rating) and the extent of application of five characteristics of good governance decision-making (process features rating)[5]. Both ratings are derived from questionnaires completed by national water experts at a Rating Session in the country. To assess functional effectiveness, participants in the Rating Session are asked to complete the questionnaire using a 4-value rating scale. Respondents discuss the scoring in groups and then complete the questionnaire individually.

A second questionnaire is used to rate the degree of application of the five good governance decision-making features defined in the ReWaB framework. Country performance was assessed against the highest conceivable level of each of the five features while considering a common set of five water-related challenges that are used in all countries in which the assessment is conducted. These challenges

[3] See *Fieldwork Protocol* at www.rewab.net for detailed description of methodology employed.

[4] See *Desk Study Protocol* at www.rewab.net for detailed description of methodology employed.

[5] See *Fieldwork Protocol* at www.rewab.net for detailed description of methodology employed.

are: (1) increasing demand for drinking water; (2) decreasing groundwater levels; (3) strategic planning for a national water policy; (4) regulating water quality in rivers, aquifers and waterways; and (5) matching supply and demand in agriculture. For each challenge, participants are asked to use a 4-value scale to score two to five statements related to the five decision-making features. Participants discuss the scoring in groups and then complete the questionnaire individually.

The resulting scores of both ratings together with their analysis are presented in Section 6 and in the Summary.

3. WATER RESOURCES CONTEXT

This section gives a brief overview of the political, economic, and social situation in Egypt to provide a context for Egyptian water resource governance and management. In addition, it outlines water availability and the main water users in Egypt and addresses relevant transboundary issues involving Nile River Basin countries.

3.1 POLITICAL STRUCTURE

Egypt's current regime, a state-centered republic, is a result of the 1952 Revolution that overthrew Egypt's traditional monarchy. As of 2005, the President is elected by popular vote (previously being elected by popular referendum) held every five years. The current president of Egypt, Hosni Mubarak, has been in power since 1981 and serves as both head of state and head of government, presiding over most Egyptian affairs and appointing all heads of government offices, including Vice President, Prime Minister, Cabinet Minister, Judiciary, and key officials of government agencies. In addition, the President appoints 10 of the 454 members of the People's Assembly and 88 of the 264 members of the Shura (a consultative council). Together, the People's Assembly (serving five-year-terms) and the Shura (serving six-year-terms) constitute Egypt's bi-cameral parliament (CIA World Factbook, 2009). Voting is compulsory with fines or possible imprisonment for not voting. However, lack of enforcement and limits on political activity has resulted in low voter registration and turnout that is well under 50% of the population (Blaydes, 2006).

3.2 ECONOMY

The Egyptian economy is the 27th largest in the world, with a GDP of US$ 442 billion (World Bank, 2008). Between 2007 and 2008, the Egyptian economy grew by over 7%, but dropped during 2009 to a rate just over 5% (CIA World Factbook, 2009). Since 2004, Egypt has demonstrated potential for strong economic growth in response to market-based reforms such as reductions in tariffs and taxes and increased transparency of the national budget (U.S. Department of State, 2010) that has helped accelerate economic growth through increased exports and foreign investment. However, Egypt has the largest population of any MENA country and wide income disparities require government intervention in the form of substantial subsidies for food, housing, and energy (U.S. Department of State, 2010). This results in a relatively low Purchasing Power Parity (PPP) per-capita GDP of about US $5425 (World Bank, 2008). The service sector accounts for half of the Egyptian economy, with industry providing 37% of economic activity and the agricultural sector roughly 14% (World Bank, 2008). However, agriculture is the second largest employer in the country.

3.3 GEOGRAPHY AND POPULATION

Egypt spans just over a million square kilometers, most of which is arid desert. The country is bordered by the Mediterranean Sea on the north and the Red Sea on the east. Egypt's geographical position and large population establish it as the lynchpin of the MENA region, while its position as the last riparian on the Nile makes it vulnerable to water-related actions of upstream countries. The history of Egypt is written in the Nile Basin. The fertile Nile Valley transects Egypt providing, habitable land and agricultural possibilities. Egypt is the 16th most populous country in the world (World Bank, 2008) with

80 million residents and an annual growth rate of over 2%. The Nile Valley is home to the vast majority of Egyptians and most major cities. Currently, 43% of the population lives in cities, and that proportion is growing. Life expectancy has increased from 52 years in 1960 to 72 years today.

3.4 WATER AVAILABILITY

Renewable freshwater per capita in Egypt is 923 cubic meters (FAO Aquastat, 2009), which, according to international standards, falls in the category of chronic water scarcity. Egypt is almost entirely dependent on the Nile for its water supply. Currently 99% of the population has access to safe drinking water (Gleick 2004). However, the Egyptian population is predicted to double by 2050, putting immense pressure on Egypt's already densely-packed population centers and reducing per capita water availability to around 500 cubic meters per year (absolute scarcity) by the year 2025 (Hefny & El-Din Amer, 2005: 43).

Egypt's largest water user is the agricultural sector, accounting for 86% of water withdrawals (Kundell, 2008). The irrigation systems utilizing Nile water cover about 3.2 million hectares. While using the largest share of water, agriculture produces just 14% of Egypt's income but employs 32% of the labor force (World Bank, 2008: 1). Egypt imports around $6 billion worth of food a year, while producing about 60% of its cereal requirements (Economist, 2010: 8). Municipal and industrial water use constitute only about 15% of Egypt's total water withdrawals. However industrial use is expected to increase substantially in coming years.

3.5 TECHNOLOGY AND INFRASTRUCTURE

The face of agriculture in Egypt today reflects the construction of the Aswan High Dam in the late 1960s and early 1970s. Prior to the building of the dam, Egypt benefited from the deposit of enriching silt from the annual flooding of the Nile, but only about 3% of the land was cultivated. Cultivation tripled after the dam's construction and, with more irrigation, yields also increased dramatically (Leonard, 2006). The Aswan dam also generates significant amounts of hydroelectric power, stabilizes crop production, and provides flood control, enabling more people to reside in the Nile Valley.

The dam has produced negative impacts as well. Primary problems include rising water tables, increased soil salinization and decreased overall soil quality, increased need for chemical fertilizers, and sediment accumulation in Lake Nasser, resulting in coastal erosion and diminished nutrient discharge to Mediterranean coastal waters. Tile drainage has largely mitigated the problem of high water tables. However soil salinization affects more than 25% of Egypt's farmland (World Bank, 2008).

3.6 TRANSBOUNDARY ISSUES

In 1959 Egypt and Sudan signed *The Agreement for the Full Utilization of the Nile Waters*, which stipulated that Egypt would receive 55.5 km^3/year of the Nile flow (FAO, 2009). The agreement fixed an allocation for both countries, but contained no flexibility to accommodate future demands. Other countries, particularly Ethiopia, are now asserting their own demands for Nile water, but accommodating significantly increased water use from other countries will generally result in a reduction in Egypt's current share. This dilemma makes water a politically precarious issue in the region. The Nile Basin Initiative (NBI), comprises nine Basin states (Eritrea has observer status) was created to navigate water concerns among the Nile Basin states. NBI's vision – *to achieve sustainable socio-economic development through the equitable utilization of and benefit from the common Nile Basin water resources* – is endorsed by all riparian states (NBI, 2001). In May 2010, the NBI proposed a draft agreement that would divert more water from Egypt and Sudan to other Basin states. Four countries – Uganda, Rwanda, Tanzania, and Ethiopia – have signed the agreement, but both Egypt and Sudan insist that they will not sign any agreement that affects the current water allocation.

4. ORGANIZATIONAL ANALYSIS

This section describes the prominent organizations involved in water management in Egypt and their roles in the water sector. Then, it assesses the level of *de facto* influence of these organizations in decision-making related to the five standard water governance functions using an Organizations and Functions (O&F) Matrix.

4.1 MAIN ORGANIZATIONS IN THE WATER SECTOR

With current water use at full capacity, a growing population and more resources needed for social and economic development, Egypt is at a critical point with respect to water allocation and availability. In order to meet current and future needs, the Egyptian government has centralized much of the responsibility for the water sector in the Ministry of Water Resources and Irrigation (MWRI), with other agencies such as the Ministry of Agriculture and Land Reclamation (MALR), the Holding Company for Water and Wastewater (HCWW), and the Egyptian Environmental Affairs Agency (EEAA) playing key roles in agricultural water management, urban water supply, and environmental protection. In addition, Water Users Associations (WUAs), parliament, courts, and universities can influence water sector policy through research, lobbying, legislative action, and judicial rulings.

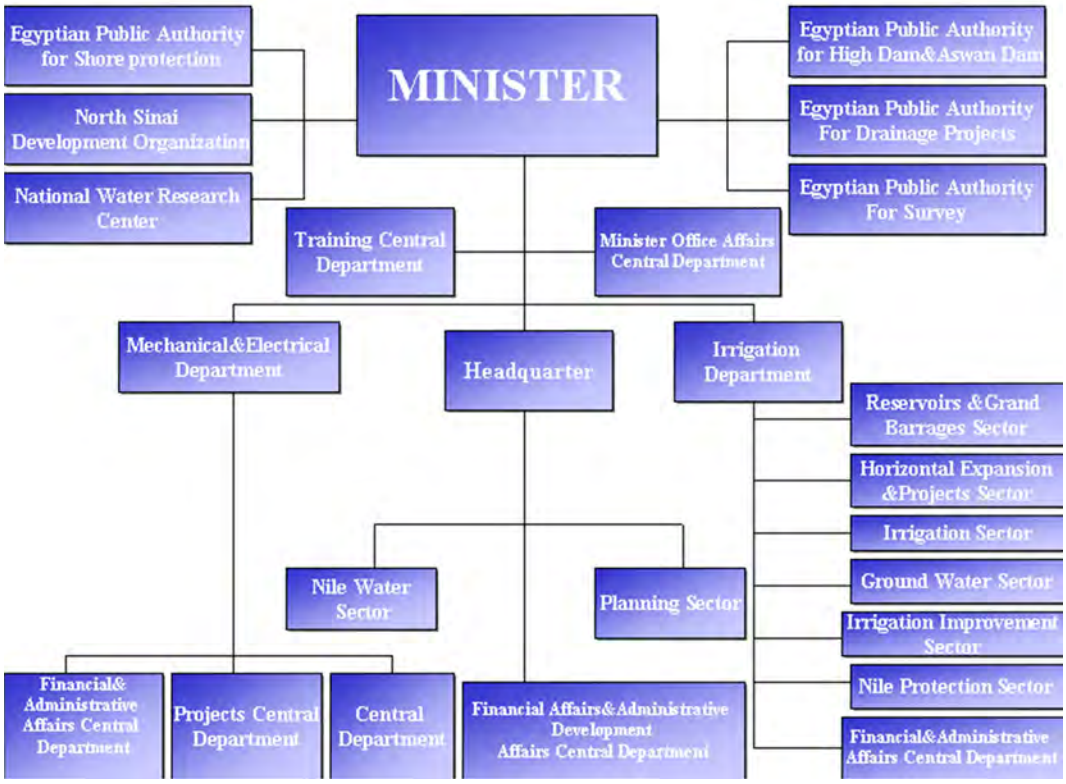
Ministry of Water Resources and Irrigation. The MWRI is the primary State water agency and coordinates Egypt's water management and governance by providing oversight to more than 20 other water-related agencies. These agencies fulfill tasks ranging from surveying new projects to conducting water research. While the MWRI was originally tasked primarily with providing timely water to all users (Viala, 2008), increased demand and functional challenges (particularly pertaining to drainage, water quality, and agricultural needs) has caused the MWRI expand its scope and goals to meet expanding and changing needs.

The MWRI has established four areas of concentration for policy development: (1) improved irrigation policy assessment and planning processes, (2) improved irrigation system management, (3) greater private sector participation in policy change, and (4) improved capacity to manage the policy process (MWRI, 2002). Policy priorities include water demand management, resource development, and environmental protection (Hefny and El-Din, 2005). The private sector has influence on the water sector through the few water-related industries that are privately owned but publicly regulated, and through industries owned by public holding companies.

The MWRI has adopted the concept of integrated water resource management (IWRM) to develop comprehensive plans for meeting water objectives. However, the many departments within the MWRI often work in isolation, making integration of research, knowledge, and processes difficult to attain (Viala, 2008). Thus, while the centralized nature of MWRI consolidates decision-making in one entity, the lack of coordination among departments within MWRI hinders collaborative and comprehensive planning and execution of water strategies.

The chart below indicates the scope of MWRI's work and the organizational structure through which it operates (Viala, 2008).

Figure 1. Ministry of Water Resources and Irrigation organizational chart



Ministry of Agriculture and Land Reclamation (MALR). The Ministry of Agriculture and Land Reclamation has corollary responsibilities for water used in agriculture. With over 80% of water going to the agricultural sector, the MALR plays a key role in framing and implementing policies related to agricultural production and the development of new agricultural land. The MALR interacts with the MWRI regarding water quantity and quality, particularly as it relates to regulating the effects of fertilizer and pesticide use. In addition, the MALR oversees fisheries and aquaculture industries in Egypt and monitors their effects on water quality. The Agriculture Research Center (ARC) also operates under the MALR. Overall, the water-related goal of the MALR is to work with agriculture to improve water management, reduce effects of pollution, and maintain adequate water quantity.

Ministry of State for Environmental Affairs (MSEA). The MSEA coordinates all environmental monitoring in the country, and is the lead Ministry responsible for environmental impact assessments of new projects. As such, the MSEA is in charge of enforcing pollution regulations, with except of fresh water resources, which are regulated by the MWRI. The MSEA currently cooperates with the MWRI on a project to reduce industrial pollution in the Nile River. The MSEA also coordinates with international organizations on general environmental protection goals, monitors environmental data, works to preserves Egyptian natural resources, and conducts public environmental education programs. The executive branch of the MSEA is the Egyptian Environmental Affairs Agency (EEAA), which provides oversight and guidance to the numerous MSEA programs and objectives.

Holding Company for Water and Wastewater (HCWW). Approximately 20% of children under 5 in Egypt suffer from diarrheal diseases (UNICEF, 2010), much of which is brought about by unsanitary water conditions. In response, in 2004 the Egyptian government created the Holding Company for

Water and Wastewater. The goals of the HCWW are to purify and distill water; transport, distribute, and sell drinking water; and collect, treat and provide safe drainage of wastewater. The HCWW seeks out new technologies, with input from the private sector, to achieve its mission of providing clean, safe water for Egyptian citizens (Abdel-Gawad, 2007). In 2010, the HCWW teamed up with UNICEF on a "Clean water = Healthy Life" campaign to expand safe, drinkable water to rural communities and to expand sanitation services to all Egyptians (UNICEF, 2010).

Ministry of Industry (MOI). The Ministry of Industry is responsible for managing government-owned industries in Egypt, through the General Organization for Industrialization (GOFI). The Government has owned the majority of industry in Egypt for several decades. Currently, the MOI is attempting to privatize more of the industrial sector, but the GOFI still manages over 300 industrial facilities. In addition, the MOI manages industrial water use in the country, which accounts for about 6% of total water withdrawals (CIA World Factbook, 2009).

Ministry of Housing, Utilities, and Urban Development (MHUUD). The MHUUD is concerned with all spatial development in Egypt, including urban, social and economic (MHUUD, 2010). Specifically, the MHUUD oversees organizations that facilitate and provide water supply and sanitation, including the HCWW, which is responsible for municipal water supply. This involves planning and construction of infrastructure including distribution systems and water purification plants, as well as sewage systems and wastewater treatment facilities.

Ministry of Health (MOH). The MOH is responsible for public health, which includes monitoring drinking water quality and wastewater discharges. It collaborates both with the MHUUD and the MWRI in doing this. The MOH samples and analyzes outflows from water purification facilities, and monitors the potability of water resources, including the Nile and canals. It also tests drinking water from wells and notifies MWRI of contamination sites for clean-up.

NGOs, International Organizations, and Donors. Donors play an important role in funding infrastructure development and providing policy and technical support. Significant ones active in the water sector include the World Bank, USAID, the Dutch government, the German government, and the Japanese International Cooperation Agency (JICA). The Egyptian National Committee on Irrigation and Drainage (ENCID), an affiliate of the International Commission on Irrigation and Drainage (ICID), facilitates the transfer of water management technologies internationally in order to improve water productivity.

Water Users Associations (WUAs). There are approximately 2500 Water Users Associations in Egypt (IRDC, 2010). In 1984, the Irrigation Improvement Project (IIP), implemented by the MWRI and supported by the World Bank, USAID, and others, began to establish WUAs at the mesqa, or tertiary, level. The goal of the these tertiary-level WUAs is to maintain equitable and fair water distribution, to help settle disputes, and to provide the MWRI with suggestions for improving water problems (IDRC, 2010).

Beginning in 2004, the USAID-funded Integrated Water Resource Management Project developed and streamlined a process for establishing Branch Canal Water Users Associations (BCWUAs) at the secondary level and ultimately established BCWUAs covering about 10% of the irrigated area in the country. BCWUAs are now being set up in an additional area roughly twice that size under a follow-on project and are included as an important institutional reform component in a new World Bank-supported project as well.

The history of WUAs in Egypt is relatively short, but WUAs are playing an increasingly important role in water management at both tertiary and secondary levels. They work with the MWRI to resolve conflicts and increase equity of water distribution, align water deliveries with needs, perform small-scale

maintenance, and, with MALR, coordinate cropping patterns. To date, WUAs have had relatively little input to water policy. However, the Egyptian government has indicated a desire for a more participatory water policy process.

Parliament, Courts, and Universities. The Parliament's role in the water sector consists of considering and passing legislation governing the water sector. The parliament sometimes hosts contentious debates over water topics when such legislation is considered. Egypt's courts do not have a separate facility for dealing with water-related issues and disputes, and their interactions with the water sector are not frequent. Universities are important in training new water engineers and other professionals. Some water research also takes place at universities, but the majority of water-related research is carried out by the research institutes of the National Water Research Center (NWRC) under the MWRI.

4.2 ORGANIZATION AND FUNCTION MATRIX

This section presents the results of a Rating Session held in Egypt in November 2009 and attended by 21 national water experts active in the Egyptian water sector and representing a range of backgrounds and institutional affiliations (Annex 1). Participants in the workshop evaluated the roles of different organizations by assigning a score assessing the degree to which an organization influences decision-making related to each of the five standard functions. They first discussed in groups, and then evaluated individually, the roles of the various organizations. Their scores were then averaged to yield the value shown in Table 3. Listed vertically are the assessed organizations. Listed horizontally are the five standard water governance functions.

Each cell in the interior of the table provides a score that reflects the degree to which a particular organization influences decisions about a particular function. The scale ranged from 1 to 5, where 5 indicated the highest level of influence. To give a quick visual picture of the relative magnitude of the scores, individual cells have been shaded such that darker cells indicate stronger influence and lighter cells indicate less influence.

Table 3: Organizations influencing decision-making in the Egyptian water sector; grey tones correspond to the following scoring intervals, from lighter to darker levels of shading: 1.0-1.9, 2.0-2.9, 3.0-3.9, 4.0-5.0.

	Organizing	Planning	Allocating	Developing	Regulating	Average
Irrigation Department (MWRI)	4.5	4.0	4.6	4.7	4.2	4.4
Groundwater Sector (MWRI)	3.2	3.7	3.8	3.4	3.8	3.6
Planning Sector (MWRI)	4.1	4.1	3.3	3.1	3.4	3.6
Drainage Authority (MWRI)	3.4	3.5	2.5	2.6	2.8	3.0
NWRC (MWRI)	3.8	2.9	2.5	3.0	2.7	3.0
Ministry of Agriculture and Land Reclamation	3.5	3.6	3.3	3.2	2.8	3.3
Ministry of State for Environmental Affairs	3.2	3.1	2.2	2.0	3.0	2.7
Ministry of Industry	2.9	2.8	1.6	1.6	1.7	2.1
Ministry of Housing, Utilities and Urban Development	3.6	3.5	2.7	2.4	2.7	3.0
Holding Company for Water and Wastewater	3.7	3.0	2.6	2.1	2.7	2.8
Ministry of Health	2.7	3.0	1.9	1.9	2.2	2.3
NGOs	2.5	2.1	1.9	1.5	1.8	2.0
Private Sector	2.2	2.1	1.6	1.6	2.0	1.9
Water User Associations	2.6	2.5	2.8	2.1	2.5	2.5
Parliament	2.4	2.1	1.8	1.3	1.7	1.9
Courts	2.7	2.0	1.5	1.5	1.8	1.9
Average	3.2	3.0	2.5	2.4	2.6	

Organizing *and* Planning *have highest collective organizational influence. Organizing* and *Planning* have the highest average involvement of any of the functions, with nine different organizations scoring at least 3. The MWRI agencies most often have the greatest influence, followed closely by the Ministry of Agriculture and Land Reclamation; Ministry of State for Environmental Affairs; Ministry of Housing, Utilities and Urban Development; and the Holding Company for Water and Wastewater. As with other functions, NGOs, the private sector, courts, and parliament are more peripherally involved.

Allocating, Developing, and Regulating have lower collective organizational influence. While the MWRI, particularly the Irrigation Department and the Groundwater Sector, maintained similar levels of influence as in the first two functions, the level of influence of other organizations in *Developing*, *Allocating*, and *Regulating* is generally smaller. The order of organizational involvement appears roughly similar, with WUAs assuming a relatively large role after MWRI agencies.

MWRI is the most influential organization in the water sector in Egypt. The MWRI on the whole shows high influence across the board. This confirms that the MWRI is as central to the water sector as it appears to be from the institutional descriptions provided earlier. The Groundwater Sector showed high influence in each functional area. The Planning Sector of MWRI showed that it had much more influence over *Planning* than *Allocating*, *Developing*, and *Regulating*. The Drainage Authority showed highest levels of involvement in *Organizing* and *Planning*, and lower (but still substantial) involvement in *Allocating*, *Developing*, and *Regulating*. The NWRC showed relatively high levels of influence as well.

Other government ministries demonstrated moderate levels of involvement in virtually all areas. Each ministry was more involved with *Organizing* and *Planning*, and each ministry scored above a 2.5 in most areas. The one ministry that scored lower than this was the Ministry of Industry. This is likely because of the low level of involvement of industry in the water sector as a whole (industry accounts for less than 7% of Egypt's water usage). However, this ministry has a potentially large role as an owner or regulator of industries which make substantial contributions to pollutant loads in the Nile and greater involvement might be expected if water quality concerns gain prominence in the Government's agenda. The Ministry of Health has a similarly defined role, yet it has a surprisingly big role in *Planning* and a relatively small role in *Regulating*.

WUAs have a surprisingly large role in the water sector. WUAs are a fairly recent development in Egypt, and as a result one would expect them to have little influence or involvement in water governance. Instead, WUAs appear to have more influence than either NGOs or the private sector, and almost as much as several government ministries. This indicates that WUAs are a growing influence in Egypt and will likely play a larger role in the future. This is especially true because agriculture claims over 85% of water used in Egypt.

NGOs, universities, and the private sector show low levels of involvement. None of these organizations play a very large role in Egypt's water sector. NGOs are primarily involved in helping to fund projects. Likewise, the private sector is not very involved in water issues because there are so few private companies that deal with water. The few private industries that do are heavily regulated by the government. Universities[6] showed the lowest levels of involvement of any of the organizations examined, probably because the role that they might play is covered by the ministry's own research institutions housed in the NWRC. Finally, the Courts and Parliament are minimally involved in water issues.

Summing up. It appears that Egypt's water management system covers most of the necessary functions through at least one of the organizations present in the country. There is significant overlap in many of the functions, but this is likely because of the overarching role in virtually every water-related decision played by the MWRI. While *Organizing* and *Planning* tend to have high influence spread among many organizations, the functions *Allocating*, *Developing*, and *Regulating* are all dominated by a few organizations, mainly ministries. This means that though many different organizations appear to be influential, division of influence among organizations may be tailored to specific functional needs. Water Users Associations appear to have relatively strong across-the-board influence on water governance decisions. Overall, the MWRI is the leading influence on Egyptian water governance, with input from a variety of organizations that have high levels significant influence with respect to particular functions.

[6] Universities was not included in the original matrix, but was added by several of the working groups at the rating session. While not included in the table, the scores assigned by these three groups were generally very low.

5. POLICY AND LEGAL ANALYSIS

This section summarizes the analysis of water governance capacity for Egypt using available policy and legal documents. All documents analyzed originate from MWRI, EEAA, or a former ministry that has been incorporated into one of these. A total of 11 English-translated documents were available for analysis (Annex 2). Though the documents themselves are all official, a few of the translations are unofficial, where official translations were unavailable. Two of the documents are policy documents, one each originating from the MWRI and the EEAA. Nine legal documents were obtained, dated from 1982 to 1999.[7]

This section presents a brief analysis of the document coverage and the numerical scores assigned to such coverage.

5.1 FUNCTIONS

Table 4 summarizes the results of the policy and legal scoring, showing the averages of the scores for the individual sub-functions. The sub-function scores are broken out and presented in separate tables at the beginning of each subsection below.

Table 4. Policy and legal scores by function; grey tones correspond to the following scoring intervals, from lighter to darker levels of shading: 1.0-1.9, 2.0-2.9, 3.0-4.0.

Functions	Policy Score	Legal Score
1. Organizing and building capacity in the water sector	2.8	2.9
2. Planning strategically	2.8	1.5
3. Allocating water	1.5	2.3
4. Developing and managing water resources	2.0	2.4
5. Regulating water resources and services	1.6	2.4

ORGANIZING AND BUILDING CAPACITY IN THE WATER SECTOR

Within the Egyptian documents, all eight sub-functions are covered, with Sub-function 1.2 (assigning roles and responsibilities) receiving the most attention, reflecting a reorganization of the water sector,

[7] The extended version of this analysis, along with all 11 provided documents are available at www.rewab.net. A query tool is also available at the site to search for evidence of functions, process features, and cross-cutting categories within the documents.

which required assigning new responsibilities. Sub-function 1.3 (setting national water policy) is also addressed extensively.

Table 5. Policy and legal scores for Function 1, by sub-function; grey tones correspond to the following scoring intervals, from lighter to darker levels of shading: 1.0-1.9, 2.0-2.9, 3.0-4.0.

Sub-Functions	Policy Score	Legal Score
1.1 Creating and modifying an organizational structure	3	3
1.2 Assigning roles and responsibilities	3	4
1.3 Setting national water policy	3	2
1.4 Coordinating among sub-sectors, levels, and sub-regions	3	3
1.5 Establishing linkages with neighboring riparian countries	2	2
1.6 Building public and political awareness of water sector issues	3	2
1.7 Securing and allocating funding for the sector	2	4
1.8 Developing and utilizing well-trained water sector professionals	3	3
Average Function 1	2.8	2.9

Sub-function 1.1 (creating and modifying an organizational structure) is apparent through emphasis on reorganizing and updating the water sector. According to the documents, the reforms mainly aim to establish appropriate institutional structures with clear mandates and adequate infrastructure to execute the mandates and emphasize the need to incorporate environmental and social aspects into planning alongside economic considerations. The policy documents outline these goals and plans, while the legal documents create and give authority to the MWRI and the EEAA.

Through Sub-function 1.2, roles and responsibilities are assigned to the reorganized institutions, with a shared focus on centralized and decentralized roles. The legal documents award extensive attention to this topic, considering roles of the MWRI, EEAA, and NGOs, while the role of the private sector and local stakeholders is treated less comprehensively in both policy and legal documents.

Sub-function 1.3 (setting national water policy) appears through three major themes that are consistent among Egypt's policy documents – optimal use of available freshwater resources, development of new water resources, and protection of water quality. One legal document prioritizes water quality, through pollution and wastewater regulations.

Sub-function 1.4 (establishing linkages among sub-sectors, levels, and national sub-regions) is evident in the policy documents. Both policy documents emphasize integrated water resources management, which requires both vertical and horizontal coordination. Legally, vertical coordination at the central level is outlined.

Sub-function 1.5 (establishing linkages with neighboring riparian countries) reflects Egypt's desire to obtain a greater water supply from the Nile, or at least to retain the share it currently has. The policy documents describe cooperative regional plans, such as the Nile Basin Initiative, while the legal documents are more procedure-oriented.

Sub-function 1.6 (building public and political awareness of water sector issues) is evident in both policy and legal material, reflecting many institutions that have programs designed to change behavior and perceptions. Water quality is a major focus.

Sub-function 1.7 (securing and allocating funding for the sector) is covered in the policy framework in their emphasis on soliciting funds and outlining funding opportunities. The legal framework provides opportunities for funding specific projects or sectors, primarily through cost recovery and taxes.

Sub-function 1.8 (developing and utilizing well-trained water sector professionals) is found in both policy and legal material. Training programs are authorized in both water and environmental ministries. Topical focus includes the environment, water quality, drinking water, sanitation, farmers, and desertification.

PLANNING STRATEGICALLY

Within Function 2, Sub-functions 2.1 (collecting, managing, storing, and utilizing water-relevant data) and 2.3 (designing strategies for matching expected long-term water supply and demand and dealing with shortfalls) are covered the most extensively, with the bulk of coverage being found in the policy rather than the legal documents. The policy documents indicate that Egypt views data and decision-making tools as avenues to solving some of the nation's major water resource issues, in particular, water quality. Overall, Sub-function 2.4 (developing planning and management tools to support decision making) is covered the least. The legal documents cover Sub-functions 2.1 and 2.3 and do not address Sub-functions 2.2 (projecting future supply and demand for water) or 2.4.

Table 6. Policy and legal scores for Function 2, by sub-function; grey tones correspond to the following scoring intervals, from lighter to darker levels of shading: 1.0-1.9, 2.0-2.9, 3.0-4.0.

Sub-functions	Policy Score	Legal Score
2.1 Collecting, managing, storing and utilizing water-relevant data	3	2
2.2 Projecting future supply and demand for water	2	1
2.3 Designing strategies for matching expected long-term water supply and demand and dealing with shortfalls	3	2
2.4 Developing planning and management tools to support decision-making	3	1
Average Function 2	2.8	1.5

Sub-function 2.1 (collecting, managing, storing, and utilizing water-relevant data) is well established throughout the documentation. The policy documents discuss a lack of data consistency, and outline several projects and programs that must compile and process information, knowledge, and data from the various sources to improve consistency. Monitoring Nile water quality receives much attention throughout the material.

Sub-function 2.2 (projecting future supply and demand for water) is extensively addressed in the policy material, and not present in the legal material. Projections of future water availability and water demands

are shown, and stresses to the system, including population growth, agriculture, and industry, are outlined.

Sub-function 2.3 (designing strategies for matching expected long-term water supply and demand and dealing with shortfalls, including drought mitigation strategies), receives significant attention in the policy material. The broad policy goal to manage from the demand side is evident through several outlined strategies. Providing less detail, the legal material offers innovative strategies that target the agricultural sector.

Though none of the legal documents cover Sub-function 2.4 (developing planning and management tools to support decision making) the policies reflect plans to utilize decision support systems, including Geographic Information Systems, for assessments and strategic planning.

ALLOCATING WATER

Function 3 receives little attention overall within the documentation, with Sub-functions 3.2 (establishing water and water rights transfer mechanisms) and 3.4 (assessing and managing third party impacts of water and water rights transactions) not covered at all. In the policy documents, water user association disputes are addressed minimally. Conversely, the legal documents award a lot of attention to dispute resolution.

Table 7. Policy and legal scores for Function 3, by sub-function; grey tones correspond to the following scoring intervals, from lighter to darker levels of shading: 1.0-1.9, 2.0-2.9, 3.0-4.0.

Sub-functions	Policy Score	Legal Score
3.1 Awarding and recording water rights and corollary responsibilities	2	3
3.2 Establishing water and water rights transfer mechanisms	1	1
3.3 Adjudicating disputes	2	3
3.4 Assessing and managing third party impacts of water and water rights transactions	1	2
Average Function 3	1.5	2.3

More prevalent in the legal documents than the policy documents, Sub-function 3.1 (awarding and recording water rights and corollary responsibilities) focuses on the legal responsibilities of government agencies, individual landowners, and establishments. The agricultural sector receives the most attention.

Sub-function 3.2 (establishing water and water rights transfer mechanisms) is not addressed by either of the policy documents nor the legal material.

Sub-function 3.3 (adjudicating disputes) focuses on dispute-resolution responsibilities. Individuals within WUAs and association councils, as well as Inspectors, are assigned dispute resolution responsibility and authority.

Sub-function 3.4 (assessing and managing third party impacts of water and water rights transactions) is not addressed in the policy or legal material.

DEVELOPING AND MANAGING WATER RESOURCES

Overall, Function 4 is covered extensively in certain documents and minimally, if at all, in others. Development, management, and infrastructure are addressed within the policy framework. Legally, irrigation is emphasized. Sub-function 4.2 (forecasting seasonal supply and demand and matching the two) is not addressed in any of the material, and while Sub-sections 4.1 (constructing public infrastructure and authorizing private infrastructure development), 4.3 (operating and maintaining public infrastructure according to established plans and strategic priorities) and 4.4 (applying incentives and sanctions to achieve long and short term supply/demand matching) all receive notable attention. Overall, Sub-function 4.1 receives the most detailed treatment.

Table 8. Policy and legal scores for Function 4, by sub-function; grey tones correspond to the following scoring intervals, from lighter to darker levels of shading: 1.0-1.9, 2.0-2.9, 3.0-4.0.

Sub-functions	Policy Score	Legal Score
4.1 Constructing public infrastructure and authorizing private infrastructure development	2	3
4.2 Forecasting seasonal supply and demand and matching the two	1	1
4.3 Operating and maintaining public infrastructure according to established plans and strategic priorities	2	3
4.4 Applying incentives and sanctions to achieve long and short term supply/demand matching	3	3
4.4 Forecasting and managing floods and flood impacts	2	2
Average Function 4	2.0	2.4

Sub-function 4.1 (constructing public infrastructure and authorizing private infrastructure development) occurs throughout the documents. The MWRI has primary responsibility for water infrastructure within the public sector. Drinking water plants, distribution systems, sewage treatment works, and irrigation canals are focuses.

Sub-function 4.2 (forecasting seasonal supply and demand and matching the two) occurs in a single legal document. Winter water delivery interruptions are discussed.

Sub-function 4.3 (operating and maintaining public infrastructure according to established plans and strategic priorities) is found in the policy documents as efforts to improve existing infrastructure and shift some responsibilities to the private sector to improve efficiencies. The legal framework outlines specifications for operation and maintenance by dividing responsibilities between the MWRI and water users.

Sub-function 4.4 (applying incentives and sanctions to achieve long and short term supply/demand matching, including water pricing) addresses water pricing that will reflect water's "true social value." Both "user pays" and "polluter pays" are advocated. The MWRI and EEAA are granted authority to employ sanctions and incentives.

Forecasting of floods and their impacts (Sub-function 4.5) is addressed in one policy and one legal document. Egypt has undertaken flood management studies to explore the harvest of flash flood water. Procedures are outlined for dealing with dangerous floods.

REGULATING WATER RESOURCES AND SERVICES

Function 5 addresses the regulatory mechanisms in place for achieving goals related to water delivery, protection, and services. Sub-function 5.3 (regulating water quality in waterways, water bodies, and aquifers) is covered the most extensively overall, as there is currently a strong push for more stringent environmental protection amid Egypt's policy goals. Sub-function 5.1 (issuing and monitoring operating concessions to water service providers) is covered the least within function 5, in a single legal document.

Table 9. Policy and legal scores for Function 5, by sub-function; grey tones correspond to the following scoring intervals, from lighter to darker levels of shading: 1.0-1.9, 2.0-2.9, 3.0-4.0.

Sub-functions	Policy Score	Legal Score
5.1 Issuing and monitoring operating concessions to water service providers	1	2
5.2 Enforcing withdrawal limits associated with water rights	1	3
5.3 Regulating water quality in waterways, water bodies, and aquifers (including enforcement)	2	3
5.4 Protecting aquatic ecosystems	2	3
5.5 Monitoring and enforcing water service standards	2	1
Average Function 5	1.6	2.4

Sub-function 5.1 (issuing and monitoring operating concessions to water service providers) is not addressed in either of the policy documents. In a single legal document, allowable concession-granting initiatives, on behalf of the MWRI, are stated.

Sub-function 5.2 (enforcing withdrawal limits associated with water rights) is not communicated in the policy documents. The MWRI's authority to cancel licenses is evident in the legal material.

Sub-function 5.3 (regulating water quality in waterways, water bodies and aquifers, including enforcement) receives the vast majority of attention. The current MWRI water policy (NWRP) attempts to achieve this objective by reducing water-related health problems. The EEAA is granted significant responsibility, and authority, to inspect operations and prohibit harmful activities. Urban conveyance, wastewater treatment, and the overall quality of Nile and aquifer waters are addressed.

Sub-function 5.4 (protecting aquatic ecosystems), and the protection of the environment in general, is recognized as a priority in policy material and certain activities are prohibited in legal documents toward this end. Pesticides, herbicides, and other toxic substances are regulated by the EEAA.

Sub-function 5.5 (monitoring and enforcing water service standards) is specific to service providers. Goals of improving water coverage and service quality are evident, and mechanisms for monitoring and enforcement are specified.

5.3 PROCESS FEATURES

Table 10 shows the results of the policy and legal scorings, expressed on a 1-4 scale (4 maximum value).

Table 10. Policy and legal scores for the five process features; grey tones correspond to the following scoring intervals, from lighter to darker levels of shading: 1.0-1.9, 2.0-2.9, 3.0-4.0.

	Policy Score	Legal Score
Transparency	2	3
Participation	4	3
Accountability & Integrity	2	2
Rule of Law	1	1
Responsiveness	3	2

TRANSPARENCY

Among the policy documents, language that indicates some intent for transparency is present. A national Master Plan is advocated, through which information on environmental and water pollution would be available to stakeholders, NGOs and other interested parties. Within the legal documentation, there is frequent reference to mandating transparent actions. Record keeping of financial expenditures and water use quantities, as well as accessibility of published reports, including environmental health and pollution indicators, is mandated.

PARTICIPATION

There is a strong emphasis on participation in Egypt's policy documents, and less so in the legal material. Though Egypt continues to govern water centrally, the policy documents clearly advocate a shift toward decentralization; this shift involves increasing the role of WUAs, other stakeholders, women, and indigenous groups. New reforms have enhanced community participation in environmental issues and have developed institutional changes to enhance the role of both private and public sector stakeholders. Though legal coverage is less comprehensive, WUA input to meetings, voting, and usage costs are addressed.

ACCOUNTABILITY AND INTEGRITY

In both the policy and legal documents, accountability and integrity is covered quite comprehensively. Consideration of social and environmental factors, by conducting impact assessments and monitoring procedures, is a clear goal within the policy documents. Legally, a strong focus is on environmental impact assessments, anti-corruption measures, and periodic compliance inspections. In addition, anti-corruption measures are in place, including multiple signature requirements for fund disbursements, appropriate and inappropriate uses of funding, periodic financial audits, and decision-making by majority vote.

RULE OF LAW

Rule of law is minimally addressed in both policy and legal documents.

RESPONSIVENESS

Responsiveness receives extensive attention in both legal and policy material. Egypt recognizes the need to respond to deteriorating water quality by employing more stringent environmental regulation. Additionally, improving infrastructure in response to societal demands is addressed. In an effort to apply IWRM, which incorporates both universal measures and Egypt-specific ones, a task force has

recommended that health and safe reuse of wastewater be top priorities for Egypt. Responsibilities associated with preparing for and responding to environmental disasters are outlined in the legal material.

5.4 CROSS-CUTTING CATEGORIES

WATER SOURCES

There is a heavy focus on surface water supplies among documents that reference specific sources, in comparison to ground and derivative[8] sources. Most water-related issues in Egypt revolve around the availability, accessibility, and quality of surface water, particular in the Nile. However, the documents do also reflect and discuss the complexities involved with utilizing and protecting aquifers, and minimizing the potentially harmful effects of reusing derivative water.

WATER USES

Of all the water uses, irrigation receives the most attention overall, with environmental uses not addressed at all. The need for adequate water supplies for agriculture is stressed, as well as the need to avoid over-irrigating the land, simultaneously addressing the topic of conservation. The use of water for drinking is also relevant given that Egypt's population is still growing exponentially. Lastly, tourism is important in Egypt's economy, and its potential to boost the economy exemplifies the need to strike a balance among water users – agriculture, human consumption, the environment, and industry.

5.5 SUMMARY

The three-pronged analysis approach implemented above offers insight into Egypt's water governance capacity at the national level.

Egypt has recently published two separate national policy documents, the National Environmental Action Plan (NEAP) and the National Water Resources Plan (NWRP), which clearly outline goals associated with most of the functional responsibilities and process features discussed above. The legal backing for these policies is less evident, at least in available legal documents. A notable observation related to this is that regulatory mechanisms (Function 5) do not come through as strongly as other functional areas such as organization and capacity building (Function 1). Egypt clearly seeks a stronger, more effective, and more efficient water sector, as evidenced by the heavy focus on reorganization and capacity building. In order to plan for meeting water demands in the coming decades – recognized as a daunting task in the documentation – the government is planning and putting in place a variety of measures, aimed at both water quality and water quantity, attempting to divide responsibilities for such tasks among the central government, decentralized authorities, stakeholders (including farmers), NGOs, and the private sector. It is unclear from the documents alone whether or not Egypt has access to necessary human, organizational, and financial resources to carry out its plans, or whether or not these ambitious initiatives are implementable. It is clear, though, that Egypt recognizes the importance of appropriate planning, training, and technology to see its plans through.

Because Egypt relies so heavily on the Nile for its water, the documents also have a heavy focus on this water source. Concern for water quality has triggered pollution mitigation measures, as well as a greater focus on the accountability of industry for waste disposal. To increase supplies, Egypt would like to increase its share of the Nile, though this may not be realistic given the growing demands for Nile water from other riparians, and plans to explore alternative strategies such as desalination, wastewater

[8] Agricultural and wastewater return flows.

treatment and reuse, rainwater and flashflood harvesting, and additional exploitation of fossil groundwater. Agricultural practices and irrigation regimes also receive significant attention as areas where conservation could lead to increased available supplies. One approach not addressed, however, is a codified system of water use rights, and water markets or other mechanisms to facilitate water use rights transfers.

Egypt is attempting to improve the accountability of water users, including those in industry and agriculture, to public regulatory authorities. As such, licensing focuses not only on the quantity of withdrawals, but also the responsibility of water users to comply with environmental regulations. While the environment itself is not awarded water rights in any of the documents, pollution mitigation goals are evident. These goals appear geared toward achieving a higher quality of water for drinking and agriculture to optimize health and safety of Egypt's citizens rather than toward environmental health. While goals for ensuring water quality and regulating permitted withdrawals are expressed extensively, enforcement mechanisms are less well specified.

It is unclear how participatory water govrnance currently is in Egypt, but involving a greater number of actors in the process is clearly advocated. This appears to be partially in response to changing environmental and social conditions, and population pressures, which has prompted Egypt to outline plans for "combating desertification" and improving water quality, both of which will require greater input from the private sector and NGOs.

As a caveat, this analysis has explored Egypt's policy and legal framework for governing water, solely by assessing published documents at the national level. As national legal and policy documents are revised, they should be added to the database and incorporated into this analysis so that it reflects an evolving policy and legal framework.

6. EXPERT-BASED WATER GOVERNANCE RATING

This section presents the results of an Expert Based Assessment of water governance, undertaken in a Rating Session held in Egypt in November 2009. The Rating Session was attended by 21 Egyptian experts affiliated with different sub-sectors and different water-related organizations. The analysis considers the experts' perceptions of effectiveness of the Egyptian water sector in the current (2009) and past (2000) performance of the five standard water governance functions. Also assessed is the extent to which five good governance decision-making features are present in actual decision-making related to key water challenges.

6.1 FUNCTIONAL EFFECTIVENESS RATING

Table 11 presents averaged participant responses aggregated by function for the functional effectiveness exercise.[9] Table 12 contains average scores drawn from the 20 questions in the exercise. Standard deviations are shown in Annex 3.

Table 11. Aggregated responses to the functional effectiveness exercise; grey tones correspond to the following scoring intervals, from lighter to darker levels of shading: 1.0-1.9, 2.0-2.9, 3.0-4.0.

	2000	2009
F1: Organizing and building capacity in the water sector	2.2	3.0
F2: Planning strategically	2.4	3.1
F3: Allocating water rights	1.9	2.5
F4: Developing and managing water resources	2.1	2.9
F5: Regulating water resources and services	2.1	2.6

Effectiveness with which Organizing, Planning, and Developing are performed is strongest. Performance in these three functions was rated 2.9 to 3.1 out of 4, revealing a good degree of parity in the strongest of Egypt's five water resources functions. By contrast, *Allocating* and *Regulating* scored lower (2.5 to 2.6 out of 4).

Egypt has seen an across-the-board improvement in water functions since 2000. The consulted experts perceived that Egypt has improved in the effectiveness with which water functions are performed in the last 10 years. The effectiveness with which each function is performed increased by at

[9] Values shown for each function are weighted averages, with equal weights applied to each participant strata (see Fieldwork Protocol at www.rewab.net).

least 40 percent[10]. The greatest improvement (by some 73 percent) is evidenced in the function of *Developing and Managing.*

Table 12. Averaged ratings of functional effectiveness; grey tones correspond to the following scoring intervals, from lighter to darker levels of shading: 1.0-1.9, 2.0-2.9, 3.0-4.0.

Question		2000	2009
F 1	1. Roles and responsibilities of each department or agency are clearly defined	2.4	3.4
	2. Policy goals for the water sector are clearly defined	2.4	3.5
	3. The water sector is provided with sufficient funds to function properly	2.4	2.7
	4. National governmental agencies consult each other when taking decisions that impact multiple sectors	2.0	3.0
	5. National governmental agencies cooperate in the implementation of their policies where appropriate	2.0	2.9
	6. Regional governmental agencies are consulted when decisions that affect their region are taken	2.1	3.0
	7. Governmental agencies are staffed with sufficient and trained personnel to perform the assigned tasks	2.3	2.9
F 2	8. Future water supply and demand forecasts are based on good quality data	2.0	2.9
	9. Water resources data are collected regularly, continuously throughout the country	2.5	3.2
	10. Current strategies for long-term matching of supply and demand have been effective at matching supply and demand	2.6	3.1
F 3	11. Rules and procedures for assigning and recording water rights are clearly defined and functioning	2.0	2.4
	12. Rules and procedures for transferring water rights are clearly defined and functioning	1.7	2.1
	13. Disputes among water users are resolved effectively	2.0	2.9
F 4	14. Government agencies are effective at forecasting seasonal supply and demand and matching the two	2.4	3.1
	15. Government agencies effectively operate public water infrastructure	2.6	3.3
	16. Government agencies effectively maintain public water infrastructure	2.2	2.9
	17. Current incentives and sanctions (including water pricing) are effective at achieving long and short term supply/demand matching	1.7	2.3
F 5	18. Government agencies are effective at enforcing withdrawal limits that are established	2.2	2.9
	19. Official water quality standards in waterways are met	2.2	2.5
	20. Aquatic ecosystems are protected to the level specified by the government	1.9	2.4
	AVERAGE	2.2	2.9

Planning strategically and organizing and building capacity. As mentioned earlier, *Planning* and *Organizing* both scored 3 or greater out of 4, indicating a high functional effectiveness. The performance of both functions also improved noticeably from 2000 levels. Concerning *Planning*, Egypt continues to improve this function despite a`lready high levels of effectiveness in 2000. The quality of data collection

[10] Since possible scores range from 1.0 to 4.0, the devisor in the percentage calculation has been reduced by 1.0 in calculating percent change.

programs has improved most markedly, with a current rating of 3.2 out of 4 (Table 12, question 9). The effectiveness with which *Organizing* was performed also appeared strong. "Roles and responsibilities of each department or agency are clearly defined" and "Policy goals for the water sector are clearly defined" are the two strongest question areas, helping to pull the aggregated functional score upward (Table 12). By contrast, "the water sector is provided with sufficient funds to function properly" scored the lowest, highlighting that the role of funding constraints on improving water sector governance and management in the country. The improvement in the effectiveness of *Organizing* was noticeable in all the question areas related to this function (Table 12, questions 1-7).

Developing and managing water resources. The *Developing and Managing* function is executed only slightly less effectively than *Organizing* and *Planning*. Effectiveness here also increased substantially across specific question areas – from forecasting supply to operating and maintaining public infrastructure (Table 12, questions 14-17).

Regulating water resources and services. *Regulating* improved by more than 20 percent, and is performed slightly more effectively than *Allocating* at present. Current effectiveness in setting water standards and ecosystem protection were relatively low, and showed only minimal improvement over 2000 levels (Table 12). The only sub-functional area reflecting substantial improvement within the *Regulating* function is government enforcement of withdrawal regulations (Table 12, question 18).

Allocating water. *Allocating* was the function in which performance was least effective in 2000, and remains in this position today. "Rules and procedures for assigning and recording water rights are clearly defined and functioning" was rated poorly, indicating a key challenge area for improving water governance in Egypt (Table 12). On the other hand, "Disputes among water users are resolved effectively" improved substantially since 2000. This may reflect the effectiveness of the many BCWUAs which have been established over the 10-year period in resolving disputes locally without involving MWRI staff.

6.2 RATING OF PROCESS FEATURES

At the Rating Session, participants were also asked to consider the extent to which five key features were present in decision-making in response to five key water sector challenges (see Section 2).

The aggregated values of the averaged answers by challenge and process feature are shown in Table 13. The scale ranged from 1 to 4. A score of 1 indicates that the strength of a particular governance feature is low, and 4 indicates that the strength of a particular governance feature is high.

Table 13. Averaged ratings of decision process features; grey tones correspond to the following scoring intervals, from lighter to darker levels of shading: 1.0-1.9, 2.0-2.9, 3.0-4.0.

Challenge	Decision Process Feature					
	Transparency	Participation	Integrity and Accountability	Rule of Law	Responsiveness	Average
1. Drinking Water	2.3	2,7	2.9	3.2	2.7	2.8
2. Ground Water	2.4	2.8	2.6	3.1	3.1	2.8
3. National Water Policy	2.9	2.8	2.6	3.3	3.4	3.0
4. Water Quality	2.4	2.6	2.5	3.1	2.9	2.7
5. Matching supply-demand	2.8	2.8	2.5	3.1	3.0	2.9
Average	2.6	2.7	2.6	3.2	3.0	

Rule of Law and Responsiveness are strongest features of decision-making in Egypt. Evidenced by the averages in Table 13, *Rule of Law* and *Responsiveness* were the strongest governance features, each scoring at least 3 out of 4 in nearly every challenge. The highest rating is *Responsiveness* in the context of *National Water Policy*. Scores assigned to *Rule of Law* in the *National Water Policy* challenge were also high.

Participation, Transparency, and Integrity are somewhat weaker decision-making features in Egypt. *Participation*, *Transparency*, and *Integrity* averaged 2.6 or 2.7, substantially less than *Rule of Law* and *Responsiveness*. *Participation* in each of the challenge areas was fairly consistent, with the least participation in the context of *Water Quality*. *Transparency* showed larger internal variation, with the least transparency in the area of *Drinking Water*, and the most transparency in the challenge of *National Water Policy*. The latter may be associated with the high level of definition of water sector goals, as reported in the functional effectiveness exercise above.

Strength of governance processes across challenge areas showed minor variation. Evidenced in the far right column of Table 13, strength of governance features were highest for the *National Water Policy* challenge. While decisions related to *National Water Policy* had low scores in *Integrity*, they had the highest level of *Transparency*, and tied for the highest level of *Participation*. *Matching Supply and Demand* had the second strongest governance features of any challenge. It is interesting to note that, in the functional effectiveness questions, participants rated forecasting and matching seasonal supply and demand (Table 12, question 14) 3.1 out of 4 (a large improvement since 2000).

6.3 SUMMARY

According to the results of the expert-based assessment, Egypt performs the functions of *Organizing*, *Planning*, and *Developing* most effectively. While *Allocating* and *Regulating* are performed somewhat less effectively, the Egyptian water sector appears reasonably effective on balance. Further, Egypt seems to have experienced strong improvement in its functional effectiveness in the last 10 years. The greatest improvement was recorded in defining roles and responsibilities of organizations in the sector, and establishing clear goals for the sector as a whole, while the least improvement was in regulating water quality in waterways. There was significant variation both across governance features and across challenge areas. Egypt appears to be strong in *Rule of Law* and *Responsiveness*, but only average in the other governance process features. Notably, the functional effectiveness improvements appear

somewhat at odds with mediocre scores in *Participation*, *Transparency*, and *Integrity*, suggesting that in Egypt, these features may not be a primary determinant of effectiveness of the water sector. Indeed, despite low *Participation*, *Transparency*, and *Integrity*, the water sector still appears to be reasonably effective in performing the needed water functions.

7. DISCUSSION AND CONCLUSION

The analysis presented in this report strives to give an overview of water governance in Egypt using a rigorously-developed conceptual framework. When combining the results of the different analytic tools within the framework, interesting trends emerge. These observations do not purport to provide detailed diagnoses of the causes of problems identified, or "recipes" for change. Instead, they aim at (a) spurring discussion of problem drivers based on a standardized assessment of current water governance practices, and (b) aiding decision makers in identifying ways to improve water governance in Egypt.

7.1 AREAS WITH HIGH CAPACITY

Function 1 (Organizing and Building Capacity) stands out as a strong feature of the Egyptian water sector, especially in terms of setting policy goals and assigning responsibilities among the different water actors. This function appears well developed in the P&L document analysis (2.7 and 2.8 average scores) and also received high EBA scores (3.0 average score). Most of the sub-functions are extensively considered in the policy and legal documents. It is worth noting that while there are many legal provisions to provide a sufficient level of funding for the water sector, this does not find an explicit correspondence in the policy documentation. Moreover, the consulted experts rated performance of that sub-function lower that the others, suggesting that there may be a need to increase the funding provided to the sector or improve the efficiency with which it uses its funds in practice. In terms of organizational coverage, a large number of organizations – mainly MWRI agencies and other ministries – have significant influence on decisions related to this function.

Function 2 (Planning Strategically) is well covered in the policy documents (score of 2.8 on average), and received high ratings in the EBA (score of 3.1). This contrasts with the limited number of legal provisions mandating and describing strategic planning in the documentation (score of 1.5). Both the policy documents and the effectiveness assessment suggest that the water data-gathering programs and the strategies to match long-term water supply and demand are a strong element of water governance in Egypt. It is interesting to observe, however, that little attention is paid in the policy documents to the actual projection of future demand and supply, which seems at odds with designing good strategies which deal with those demands. In terms of organizational involvement, a variety of actors influence decisions taken for this function, including not only MWRI agencies but also sector ministries for agriculture, housing, urban water supply, environment, and health.

Developing and Managing Water Resources (Function 4), is a moderately strong function overall (policy score 2.0, legal 2.4, EBA 2.9). The operation of public infrastructure to provide water is the best-covered area, with good policy and legal backing and satisfactory performance in practice. Relatedly, forecasting seasonal supply and demand, an essential step in effective irrigation service delivery, scored a relatively strong 3.1. Nevertheless, no reference to matching supply and demand could be found in the examined policy and legal documents. An area that is extensively treated in the P&L documents relates to incentives and sanctions to achieve balance between water demand and supply. Indeed, in the documentation, the "user pays" and "polluter pays" principles are advocated. This, however, is at odds with the low EBA results for this issue (2.3), which suggest some disconnection between what is

prescribed on paper and what actually happens on the ground. Most of the influence on decisions related to this function is exercised by various MWRI agencies and MALR.

When considering the quality of decision-making processes, experts perceived Rule of Law and Responsiveness as the strongest governance features (3.2 and 3.0 respectively). The strong Responsiveness result finds correspondence in the high coverage in the available water-related policy material (policy score of 3). Rule of Law has a small presence in the documents. This is likely due to the intrinsic nature of this process feature, which is not easily reflected in official documentation.

7.2 POTENTIAL CHALLENGES

Function 3 (Allocating Water) and Function 5 (Regulating Water and Water Services) seem to present the greatest challenges for Egypt's water sector. Both functions show similar trends in the assessment, with low policy scores (1.5 and 1.4 respectively), moderate legal scores (2.2 and 2.4), and relatively low EBA scores (2.5 and 2.6 respectively).

With respect to Function 3, the document analysis and experts' perceptions suggest that allocating water use rights is only moderately developed in the legal texts and is of limited importance in practice. This may help to explain another feature that has been highlighted by both the P&L analysis and the expert-based assessment, i.e. the lack of water use rights transfer systems. Indeed, this is a mechanism meant to reassign water among existing or new users, which undoubtedly requires a well-developed legal water rights system to function effectively. As a positive aspect within this function, water-related dispute resolution instruments are treated extensively in the legal documents and also rated as relatively effective in practice. The main actors in this function are the Irrigation Department, the Planning Sector, the Groundwater Sector, and the MALR. WUAs appear to play a relatively large role in dispute resolution also. The dominance of agriculture-related organizations in this function is consistent with the emphasis on water allocation to irrigation in the documents reviewed.

Under Function 5, both the regulation of water quality and the protection of aquatic ecosystems are emphasized in policy and legal documents. Nevertheless, the performance of the Egyptian water sector in these two areas appears to require additional effort to be satisfactory in practice. The strongest area within this function is the enforcement of withdrawal limits associated with water rights. Even though not emphasized in the policy documents, this activity has good legal support and appears to be effective on the ground. The organizations that have a major influence on decisions related to this function are the Irrigation Department, the Groundwater Sector, the Planning Sector, and the Ministry of State for Environmental Affairs. Interestingly, neither the Ministry of Health nor NGOs stand out as influential on decisions related to this function.

Another area that seems to present challenges relates to some features of the decision-making processes. Participation, Transparency, and Accountability/Integrity scored substantially lower in the EBA (scores of 2.7, 2.6 and 2.6) than Rule of Law and Responsiveness. There is a strong emphasis on participation in Egypt's policy documents (score of 4), and less so in the legal material (score of 3), which may be one of the causes for the detected disconnection between policy goals and experts' perceptions. Language that indicates some intent for transparency is present among the policy documents (score of 2), while within the legal documentation, there is frequent reference to mandating transparent actions (score of 3). In both the policy and legal documentation, accountability is covered quite comprehensively (scores of 2 and 3 respectively), which is at odds with the relatively low EBA score. This discrepancy merits further consideration, as it suggests that the existing legal provisions and organizational arrangements for pursuing accountability and integrity may not fully adequate or satisfactorily implemented in practice.

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ANNEX 1. WORKSHOP AND RATING SESSION: LIST OF PARTICIPANTS

Participant Name	Organization
Dr. Hussein El-Atfy	Irrigation Department, MWRI
Prof. Mohamed Abdel Motaleb	Planning Sector, MWRI
Prof. Madiha Mostafa	Groundwater Sector, MWRI
Eng. Ibrahim Harhash	Drainage Authority, MWRI
Dr. Amal Khalid	Drainage Authority, MWRI
Eng. Abdel Shakour Abdallah	Irrigation Sector, MWRI
Eng. Mohamed El-Beltagy	Irrigation Department, MWRI
Dr. Mohamed Abdel Moniem	Irrigation Department, MWRI
Mr. Abdel Wahab Hadidi	Ministry of Agriculture
Dr. Abd El-Ghany El-Gendy	Agro-Economic Research Institute, MWRI
Dr. Mos'ad Kotb	CIAC
Dr. Ahmed Essa	Soil and Water Research Institute, MWRI
Eng. Abdallah Domah	Irrigation Advisory Service, MWRI
Eng. Ibrahim Mahmoud	IIIMP, MWRI
Eng. Mohamed El-Alfy	WSSRA, MHUNC
Eng. Adel Al-Madbouly	Irrigation Improvement Sector, MWRI
Eng. Atef El-Kashef	CDIAS, MWRI
Dr. Tarek Kotb	IIIMP, MWRI
Dr. Hamdy Khalifa	Agricultural Research Center, MALR
Eng. Mohamed Ghaniem	Technical Office, MWRI
Dr. Mohamed Anwar	West Delta Project, MWRI
Dr. Akram El Ganzoury	Environmental Research Institute, MWRI
Dr. Mohsen El-Arabawy	IRU, MWRI
Dr. Essam Khalifa	MWRI
Eng. Mamdouh Raslan	HCWSS, MHUNC
Dr. Ikhlas Gamal El-Deen	Central Department for Water Quality

Mr. Yehia Sa'ed El Said	Freshwater Quality Section
Eng. Nabila Bahaa	Irrigation Department
Prof. Mohamed Nour El-Din	Ein Shams University
Dr Ahmed Abou El-Soud	MOEA, MOE
Prof. Sameh Abdel Gawad	Cairo University
Prof. Baha El-Din Saad	MWRI
Mohamed Seddik	MHUNC
Dr. Mostafa Ghaith	IWRU, MWRI
Eng. Khalid Bekhat	IIIMP, MWRI
Eng. Ahmed Sqil	Ministry of Agriculture
Dr. Reda Abdelhandy Rady	MWRI
Dr. Ashraf Saleh Mohamed Amin	Ministry of Interior
Dr. Ragab Abdel Azim	Irrigation Sector, MWRI

ANNEX 2. POLICY AND LEGAL DOCUMENTS

Document Type and Title
Policy National Water Resources Plan (2005) National Environmental Action Plan (2001)
Legal Ministerial Decree No. 143 (1999) Ministerial Decree No. 277 (MPWWR, 1999) Environmental Pollution and Legislative Regulations for Law No. 48 & Decree No. 8 (1995) Implementation Procedures for Law No. 213 & Decree No. 14900 (1995) Executive Regulation for Law No. 4 (1994) Environmental Law No. 4 (1994) Irrigation and Drainage Law No. 213 (1994) Irrigation and Drainage Law No. 12 (1984) Law No. 48, Pollution of River Nile Water Channels (1982)

ANNEX 3. STANDARD DEVIATIONS OF THE EXPERT-BASED ASSESSMENT SCORES

Question		2000	*SD*	2009	*SD*
F 1	1. Roles and responsibilities of each department or agency are clearly defined	2.4	0.76	3.4	0.57
	2. Policy goals for the water sector are clearly defined	2.4	0.76	3.5	0.51
	3. The water sector is provided with sufficient funds to function properly	2.4	0.81	2.7	0.74
	4. National governmental agencies consult each other when taking decisions that impact multiple sectors	2.0	0.76	3.0	0.60
	5. National governmental agencies cooperate in the implementation of their policies where appropriate	2.0	0.45	2.9	0.65
	6. Regional governmental agencies are consulted when decisions that affect their region are taken	2.1	0.53	3.0	0.69
	7. Governmental agencies are staffed with sufficient and trained personnel to perform the assigned tasks	2.3	0.74	2.9	0.70
F 2	8. Future water supply and demand forecasts are based on good quality data	2.0	0.62	2.9	0.66
	9. Water resources data are collected regularly, continuously throughout the country	2.52	0.65	3.2	0.90
	10. Current strategies for long-term matching of supply and demand have been effective at matching supply and demand	2.6	0.82	3.1	0.77
F 3	11. Rules and procedures for assigning and recording water rights are clearly defined and functioning	2.0	0.95	2.4	1.02
	12. Rules and procedures for transferring water rights are clearly defined and functioning	1.7	0.86	2.1	1.06
	13. Disputes among water users are resolved effectively	2.0	0.58	2.9	0.80
F 4	14. Government agencies are effective at forecasting seasonal supply and demand and matching the two	2.4	0.65	3.1	0.59
	15. Government agencies effectively operate public water infrastructure	2.6	0.82	3.3	0.55
	16. Government agencies effectively maintain public water infrastructure	2.2	0.75	2.9	0.73
	17. Current incentives and sanctions (including water pricing) are effective at achieving long and short term supply/demand matching	1.7	0.49	2.3	0.60
F 5	18. Government agencies are effective at enforcing withdrawal limits that are established	2.2	0.6	2.9	0.69
	19. Official water quality standards in waterways are met	2.2	0.72	2.5	0.71
	20. Aquatic ecosystems are protected to the level specified by the government	1.9	0.68	2.4	0.92

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1300 Pennsylvania Avenue, NW
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