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MENA REGIONAL WATER GOVERNANCE BENCHMARKING PROJECT

DESK STUDY PROTOCOL

September 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

DDA	Digital Database Assistant
DOC	MS Word document format
IRG	International Resources Group
OSU	Oregon State University
P&L	Policy and Legal
PDF	Portable Document Format
ReWaB	MENA Regional Water Governance Benchmarking Project
USAID	United States Agency for International Development

FOREWORD

One important purpose of this project was to develop a structured process for profiling national policy and legal frameworks. This Protocol represents a distillation of the process that has emerged into a form that can guide others in applying it. Because changes, adaptations, and improvements to it should and, it is hoped, will occur, it also serves to document the present "state of play" and to serve as a foundation for those improvements.

The protocol was drafted by Dr. Lucia De Stefano of International Resources Group (IRG) and Ms. Bridget Brown of Oregon State University (OSU). In addition, the development of the process described benefitted greatly from contributions from other team members at OSU and members of the project team at other institutions. Special thanks are due to Prof. Aaron Wolf who directed the work at OSU.

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Team Leader
Regional Water Governance Benchmarking Project

1. INTRODUCTION

1.1. PURPOSE

The purpose of this protocol is to document the Regional Water Governance Benchmarking (ReWaB) project's approach to implementing document-based policy and legal analyses[1]. These analyses, in turn, are intended to provide insight into the policy and legal context for water governance decision-making in the target country. The policy and legal analysis, together with field-based data, helps characterize the country's water governance regime. Final outputs of this activity are (1) a searchable online database of water-related policy and legal documents, (2) a set of country reports assessing the extent to which five water resources standard functions and five water governance decision-making process features are addressed in those documents, and (3) a score sheet reporting quantitatively the extent to which each of the standard functions and process features are supported in the documents reviewed. This protocol describes the process followed collecting and analyzing relevant documents for each country.

The documents considered include (1) policy papers that are either specifically aimed at water, or are focused on other issues but have a direct impact on water governance and management and (2) national water-related laws, together with important implementing regulations[2]. The document set that provides the basis for the assessment is collected with the support and advice of local partners in each target country. The subsequent analysis is a desk study, based only on the written documents collected. As such, it does not assess actual performance but rather the framework of policies and laws that organize and guide water sector governance and management. This approach makes the analysis relatively easy to update, in comparison with field studies. On the other hand, it does not reflect unwritten laws, intangibles, social values, and traditions that contribute in a unique way to shaping water governance in the country, unless these influences are also captured in the official texts. In a similar way, government initiatives that are not explicitly mandated or mentioned in legal or policy documents are not captured by the analysis. Therefore, this analytic component of the governance assessment process provides a picture of the "enabling conditions" for good water governance, but only integration with field-based data can show the results of their implementation.

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[1] A description of the project and other project material is available at the project website www.rewab.net.

[2] The ReWaB database, available at www.rewab.net, contains the full set of documents used in these analyses.

1.2. STRUCTURE

The desk study work includes the following steps (1) document collection, (2) document tagging[3], (3) uploading of documents to an online document database, and (4) country by country policy and legal analysis (elaboration and scoring).

1.3. STAFFING

Four project staff members, at minimum, are needed to conduct the policy and legal (P&L) desk study. These include three trained staff members who will act first as document coders (taggers) and then as analysts[4] and one digital database assistant (DDA) familiar with Adobe Acrobat Professional 9.0 software. In addition to these four project staff members, the support of an online database manager is required to update and maintain the document database. A local organization or contact in the target country is also required to advise on the selection of the documents and to help retrieve physical and electronic copies of those not available online (see Section 2 for details).

The three coders first manually tag the documents and then subsequently conduct the policy and legal analysis and scoring exercises. The DDA keeps an inventory of incoming documents, checks the provided metadata for completeness, uploads digital documents to the online database, and transfers document tags to the digital versions of the documents. If documents are also to be tagged electronically in the original language (in addition to English), a DDA fluent in that language performs this task.

1.4. LEVEL OF EFFORT

No minimum or maximum number of documents is required for the Desk Study, since the main criteria for selection is their relevance and the main constraint for collection is their actual availability. For the five initial study countries, total number of documents per country ranged from 11 to 41. Likewise, the length and content of the documents will vary, depending on their formats. For example, Egypt has a lengthy National Water Resources Plan, which discusses water policy across several dimensions of supply and demand, while Jordan has several shorter policy documents specific to different sectors, such as agriculture, and sources, such as groundwater. Thus, what constitutes completeness in the collection of documents will vary substantially by country.

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[3] As it will explained in Section 3, "Tagging" here means indexing relevant passages of documents and linking them to specified key words, or "tag terms". The tag terms reflect the water resource standard functions, decision-making process features, and cross-cutting categories listed in Annex 2.

[4] If circumstances require, document coders and analysts can be different staff, though some efficiency will be lost.

Time required for the analysis is also strongly influenced by the specific circumstances of the country. Ideally, local partners are given about 3 months to identify and provide documents. However, in the focal countries this process has sometimes required numerous interactions between the project team and the local partner, significantly prolonging the document retrieval process. Where translation from another language into English is required, the time required for this must also be considered. As a point of reference, a professional translator needed approximately 34 working days to translate about 62,000 French words in Moroccan policy and legal documents into English. An additional initial period of about four weeks was required to identify providers and contract for translation services.

The duration of the document tagging and analysis also varies significantly, depending on the number and length of the documents to be analyzed. As a reference, for Egypt tagging 11 documents took approximately 15 days[5], the elaboration of the country profiles spanned about 30 days, and the scoring required an additional 21 days.

[5] These times refer to the number of calendar days spent by three coders/analysts working 20 hours per week. These are not person-days of effort.

2. DOCUMENT COLLECTION

When starting the P&L desk study in a new country, the project team follows the steps below to retrieve and organize the documents relevant to the analysis:

1. The project team identifies a consulting firm or partner organization in the country that knows the water sector well and is familiar with existing water-related laws and policies.

2. The local partner is given a timeframe to locate and provide digital copies (*pdf* or *doc* files) of official water-relevant policy and legal documents. Policy documents are strategies, master plans, or guidelines in which the government defines water-related goals and outlines means of achieving those goals, often within a specified period of time. Legal documents include basic water laws, irrigation and water supply laws, and laws that relate to water quality, water in the environment, and water in other uses. These documents must meet two simple tests to be included: (a) they must be "official" in that they have been approved by the relevant authority and are in effect, (b) they must be the most recent existing version of the law or policy, incorporating all amendments and changes which have been made and formally approved to date. If possible, the documents are obtained in both the country's official language and in English. Ideally, the English version is an official translation. If no English translation is available, a translation into English is arranged, preferably using a native English-speaking translator with a strong working knowledge of the second language and a familiarity with water-related issues.

3. The local partner is responsible also for collecting and providing metadata for each document, using the form shown in Annex 1. The metadata describe and classify the document and are entered with the document into the online database. It is important that the metadata are accurate and complete from the beginning to avoid repeated revisions and edits in the database. The DDA on the analysis team keeps a record of all received documents and checks the metadata of each for completeness.

4. The analysis team complements the work of the local partner by independently searching websites of national ministries of water, environment, agriculture, and so on for downloadable documents. Two general sites that contain useful legal document collections for many countries

are also searched[6]. When such documents are located, the local partner is asked to confirm the relevance of the retrieved documents and complete the metadata sheets for them.

[6] http://faolex.fao.org/, http://www.emwis.net/countries

3. ONLINE DATABASE

All the received documents are uploaded (in *pdf* format) into an online searchable database, with each document supported by the document metadata. Once the project team has completed the tagging process – described in Section 4 of this document – the tagged versions of the original documents are included into the online database as well.

The purpose of the database is twofold. First, it helps to store, in a structured way, the documents used by the project team for the P&L analysis. Second, the document database is freely available online, serving as a documented repository of water-related policy and legal documents for the target countries. Professionals in the water field as well as researchers can access these documents in their original form or, alternatively, search for how various aspects of water governance manifest in national policies and laws. The latter feature enables users to read the language in various passages related to the five water governance functions and five water governance process features, offering a unique and useful approach to examining the context of specific aspects of water governance within a single country or across several countries.

The following three menus are available at the database interface for online users to choose from:

1. Document List. This menu contains a list, with links to online files, of the documents included in the database. The documents are sorted by country, and all available languages are indicated and retrievable.

2. Document Query. This menu allows users to search for the original, untagged, versions of available documents. Available search criteria include country name, language, and information provided in the metadata, such as the sector from which the document originated.

3. Tagged Document Query. This menu allows for searches based on tags, discussed in detail in Section 4. It allows users to search for documents containing material relevant to the various tag terms that reflect the five water governance functions and five water governance process features. Queries in this menu can be implemented for one or more countries, as well as for one or more water governance topics. The query returns a list of documents in order of relevance, defined by the number and length of passages associated with specified criteria.

4. DOCUMENT TAGGING

Once the document collection is complete for a given country, each document is tagged, which means that relevant passages are indexed and linked to specified key words, or tag terms. The tag terms reflect the water resource Standard Functions (functions), Decision Making Process features (processes), and Cross-Cutting Categories (categories). It should be remembered that *Standard Functions*, *Decision Making Process Features*, and *Cross-Cutting Categories* are terms that have specific meanings in the context of this project and are defined in the project framework paper[7]. The complete list of tag terms can be found in Annex 2. The purpose of the tagging process is to allow project analysts, or any online user of the database, to easily locate and access passages related to particular aspects of water governance within the set of available documents. The tagging process consists of two steps – manual tagging and electronic tagging.

4.1. MANUAL TAGGING

During manual tagging, coders read carefully through each document and tag relevant portions of it using the list of tag terms described above. In practice, coders read each document slowly, sentence by sentence, looking for language that reflects one or more of the 42 tag terms. Where relevant language is identified, coders indicate the associated term(s) by writing it (them) adjacent to the relevant passage. In addition to writing in the relevant tag terms, coders must also indicate the extent of the content to which each tag refers. This can be achieved by drawing brackets around the relevant passage or by some other consistently-used process. This is done to communicate the extent of the relevant passage to the DDA, so that during the electronic tagging he/she can indicate on the tagged text spreadsheet (described below) how much content is relevant to each tag.

In tagging for functions, each document is tagged for occurrences of the sub-function terms, but not for the broader function categories. For processes, each document is referenced for each of the five decision-making process features. A limitation of the process features tagging is that processes can sometimes be indicated by the mere existence of a document, which is difficult to tag. For instance, passing a series of environmental protection statutes may be a sign in and of itself that the government is responsive, but this may not be indicated in the language of the individual documents, and therefore this

[7] www.rewab.net

process may not be appropriately identified. Where this is the case, researchers mention, in the final report, that certain process features may be better-covered than the individual tags indicate. Additionally, each document is assessed in terms of the sub-elements of the two cross-cutting categories pertaining to the various sources and uses of water. Using the cross-cutting tag terms during the analysis, analysts can observe which sources receive the most attention and which water use sectors are emphasized.

A minimum of two, but ideally three, coders tag each document independently and then revise their assessments jointly, reaching consensus on each tag. As complete objectivity is impossible to achieve in a content analysis such as this, the approach of utilizing more than one coder helps ensure that the resulting tags reflect a range of interpretations of meaning within the texts. Tags are thus associated with content that without question refers to a given tag term, but also associated with content that is more ambiguous. Through this process, all content that is at least marginally relevant is tagged. Eventually, a final tagged hard copy is handed to the DDA for electronic tagging[8] (See a sample of manually tagged document in Annex 3).

4.2. ELECTRONIC TAGGING

Once a document is manually tagged, the DDA transfers the tags to the digital form of the document in *pdf* format. The DDA first appends the two-page list of tag terms (Annex 2) to the beginning of the document using the "combine: merge documents" tool in Adobe Acrobat Professional 9.0. Next, the DDA scans through the manual tags in the document and numbers and letters them (0 to 99, then A to Z, then AA to ZZ) according to the order of occurrence in the tag terms list. This means that the DDA starts by numbering, in sequential order, all the tags that refer to the first sub-function, and then continues the numbering with each sub-function, process and cross-cutting category. Then, for each passage that had been previously tagged manually and that has now been numbered, the DDA (1) inserts the assigned number/letter as closely as possible to the passage within the electronic document[9] and (2) adds that number/letter combination to the tag term list now attached to the beginning of the document. The numbers/letters in the tag term list thus correspond to the numbers/letters inserted into relevant passages within the document. Tags are placed so that they demonstrate the extent of coverage. For example, a tag placed next to the document title indicates that the entire document reflects the tag term. Likewise, a tag placed adjacent to a paragraph indicates that relevant information may be found anywhere within the associated paragraph. These are set up as hot links and provide a two-way clickable

[8] This could also be a digital Word document, with the tags typed in a contrasting color or inserted as comments.

[9] This is done using the Adobe Professional 9.0 "bookmark" and "typewriter" tools.

connection between the tag term list at the beginning of the document and tagged passages in the body of the document. This allows an analyst, or user of the online database, to select and jump from the tag term list to the relevant material within a document associated with a particular tag term, and vice versa. Annex 4 provides an example of an electronically tagged document.

During the electronic tagging process, the DDA creates a spreadsheet of tags for the country (see a sample tagged text spreadsheet in Annex 5). The spreadsheet includes four columns of relevant information, which are used to return documents in order of relevance in the *Tagged Document Query* described in Section 3 above. The first column in the spreadsheet contains the document title. In the second column, adjacent to the document title, is the series of tag numbers/letters inserted into the document, beginning with the first tag for sub-function 1.1 (1, 2, 3, 4…. and so on). Adjacent to each tag in the third column is an abbreviated code for each tag. Sub-functions are referenced using the letter "A" and the sub-function decimal number (e.g. sub-function 1.1 is inserted into the spreadsheet as "A1.1"). Process features use the letter "B" and the number associated with each feature (e.g. transparency is "B1"), and cross-cutting categories the letter "C" and the associated decimal number (e.g. surface water is "C1.1"). Finally, in the fourth column is a code reflecting the amount of relevant content associated with each tag. There are four different categories for amount of content, listed in order of least to most associated content: paragraph (P), article (A), section (S), and document (D). Each spreadsheet is delivered to the manager of the online database, who integrates it into the database to facilitate the "Tagged Document Query" feature.

5. POLICY AND LEGAL ANALYSIS

Policy and legal documents are analyzed separately using two different methodologies, both of which are applied to each set of documents. The first approach is a qualitative textual analysis, and the second is a quantitative analysis based on a scoring process.

Policies and laws are analyzed separately because they tell two different stories and can consequently be compared to one another. As explained in Section 2, policies here are defined as strategies, master plans, or guidelines in which the government defines water-related goals and outlines instruments to achieve those goals, often within a specified time period. Therefore, the coverage of water governance functions and processes within policy material reveals which topics are emphasized and prioritized, and which topics the government plans to legitimize through mandates and regulations in the future. Legal documents create implementation and enforcement mechanisms for policies and include basic water laws, irrigation and water supply laws, and laws that relate to water quality, water in the environment, and water in other uses. Coverage of particular water governance functions and processes within the legal material designates the topics the government can legitimately implement and enforce. Comparing the two can reveal discrepancies and consistencies, information that may prove useful in writing and revising policies and laws.

5.1. QUALITATIVE ANALYSIS

The qualitative analysis utilizes the tagged policy and legal documents described in the previous section. Preferably three, but a minimum of two, analysts review the tags within the water-related documents with the purpose of assessing "how" and to what extent functions and process features are incorporated into policies and laws. Moreover, analysts evaluate whether existing policy documents and laws emphasize particular sources and/or uses of water.

These issues are addressed in a write-up that begins by analyzing the policy and legal treatment of function one and its sub-functions and proceeds in order through function five. A similar analysis is then undertaken for the five good governance decision-making features and the cross-cutting categories. Throughout the analysis, the consistency (or lack of it) between the policy guidelines referring to a specific function/feature/category and the corresponding legal provisions is highlighted. Each topic is discussed in enough detail to provide an accurate summary description of its manifestation in the text, and to highlight important details such as document titles and relevant organizations. While there is no minimum or maximum page length for the document, previous write-ups have ranged in length from 28

pages to 45 pages. The result of this process is a *Country Policy and Legal Profile*. An example of such a profile is provided in Annex 6.

5.2. POLICY AND LEGAL FRAMEWORK SCORING

For each country, documents are also numerically scored, based on the level of detail in the language describing sub-functions and process features. These scores are intended to present a snapshot depiction of how extensively various criteria are included in the documents, with the previously-described qualitative analysis serving as the in-depth analysis. While the five water governance functions and five water governance process features can be considered universal assessment criteria, sources and uses of water vary so extensively from country to country that scoring the cross-cutting categories was determined not to be useful.

As in the qualitative analysis, policy documents are assessed independently of the legal documents. The result is two separate sets of numeric scores – one for policies and one for laws – at the level of sub-function and process feature. Once these numeric scores have been determined, numeric scores for sub-functions are aggregated by function through arithmetic averaging. Aggregate scores are obtained by averaging all functions together and all process features together. A sample score sheet is shown in Annex 7.

Three analysts implement the scoring process independently to reduce subjectivity and bias in scoring. This process is based on the concept of "inter-rater reliability", a validation technique that enhances the repeatability of a content rating methodology. Because the analysts must assign scores for "latent" content (e.g. underlying meaning or intent), consensus among analysis team members is crucial.

5.2.1. KEY DOCUMENT IDENTIFICATION

Prior to assessment, key policy documents and key legal documents for the country are singled out by the analysis team. A key policy document is a master plan, a water resources strategy, or other comprehensive water-specific policy document. A key legal document is a comprehensive water law or a source- or use-specific water law. There may be several key documents for a given country, or none at all. The purpose of this step is to determine which document(s) the analysis team should begin the assessment with, since they are likely to contain the bulk of the coverage. If key documents are identified, analysts assess those documents first and then move on to the remaining documents. The purpose of this step is to limit time invested in this process. As scores are comprehensive, a single key document may contain enough language to warrant scoring a "4" for a framework element, thus eliminating the need to exhaustively review the remaining tags.

5.2.2. INITIAL SCORING

At least three analysts independently review each group of documents and assign scores between 1 and 4, based on the criteria below representing how extensively the policy or legal documents, taken together, cover the framework element in question.

Table 1. Criteria for assigning whole-number numerical scores to documents.

4	The framework element (sub-function/process feature/cross-cutting sub-category) is covered extensively in the documentation, and is **specific to the water sector**. Language is rich, detailed, and/or abundant, and clearly refers to the framework element in question. The framework element may present as a section or article heading, or appear consistently across the documentation. There is marginal, if any, doubt that the framework element is a clear priority within the documentation.
3	The framework element is covered to a lesser degree than above in the documentation; language is **specific to the water sector** but less detailed and/or less abundant, but still clearly refers to the framework element in question. Language is somewhat ambiguous when referring to the framework element, lost among other topics, or included substantially but not as a main point. Alternatively, language is rich, detailed, and/or abundant and clearly refers to the framework element in question, but **refers to the broader environmental (or a related) sector** rather than directly to the water sector. There is some doubt that the framework element is a priority.
2	The framework element is covered marginally in the documentation. Language is present but unclear, not detailed, or not abundant. If any evidence of the framework element is present, a "2" must be assigned rather than a "1".
1	The framework element is not covered in the provided material. No evidence of the framework element is present whatsoever, unless it is through a tag that has since been determined to be not relevant to the framework element.

During the scoring, each analyst keeps detailed notes describing why he/she assigned a particular score, pointing to specific documents and language within the documents. Analysts do not confer with one another during this phase, and each applies precisely the same methodology, implementing the following process to assign initial scores.

1. Numerically score policy documents

    a. Beginning with sub-function 1.1 in the key documents, then moving through all additional policy documents, review and record language associated with all relevant 1.1 tags. This is done in a Word document, in a spreadsheet, or by hand, as long as all of the recording is done in a single location and is readily accessible (i.e. not next to the tags in the documents). As some documents may have been over-tagged, resulting in irrelevant tags, some tags may be disregarded for the scoring. If the analyst feels that this is the

case, he/she notes reasons for the deletions. If deliberation is necessary because independent deletions are not unanimous, tags deemed irrelevant must be discussed and all team members must concur on the decision.

b. Review the notes for sub-function 1.1, comparing language to the specific language in the framework element. When the word "and" is included in the framework element, there must be sufficient evidence of both sides of the conjunction. For example, sub-function 3.1 is "awarding and recording water rights and corollary responsibilities". In order to earn a "4", language clearly indicates awarding/recording rights and also awarding/recording corollary responsibilities.

c. Determine, based on the detail of language and using the rubric in Table 1, an initial numeric score between 1 and 4. Record this score.

d. Repeat for all sub-functions, process features, and cross-cutting sub-categories, in consecutive order.

2. Numerically score legal documents, following the same methodology laid out for policy documents above. Assign separate scores.

5.2.3. DELIBERATION TO CONSENSUS

The analysis team periodically convenes to determine the final scores to be assigned for each framework element. It is useful to convene frequently, breaking up the independent assessment process. For example, the team initially scores Function 1, and then convenes before moving onto Function 2. During this meeting a spreadsheet (see Annex 7) is produced containing the score assigned by each analyst in order to determine the variation, if any, among the scores. Elements scored identically by all team members during the initial scoring process receive that value as a final score.

Elements with varying scores are assigned a final score by implementing at least two additional steps. First, the analysis team discusses the initial scores, each providing justification as to why each assigned his/her respective scores. After listening to the justifications, each analyst then has the opportunity to alter his/her score. If consensus is reached at this point, this becomes the final score for the element. If consensus is not reached, the analysts revisit their original analyses independently and repeat the scoring process. They then reconvene and deliberate to consensus once again. This process is repeated until consensus is reached among the analysts. Where initial scores are not identical (i.e. the deliberation to consensus process is necessary) the final score is marked with a "C" to indicate the process of consensus. Where initial scores are identical, a "U" is recorded, indicating unanimity. The final products are two sets

of scores rating the comprehensiveness of policy documents and legal documents in addressing sub-functions, functions and process features.

ANNEX 1: DOCUMENT METADATA FORM

ANNEX 2: WATER GOVERNANCE BENCHMARKING CRITERIA

ANNEX 3: EXAMPLE OF A MANUALLY TAGGED DOCUMENT

ANNEX 4: EXAMPLE OF AN ELECTRONICALLY TAGGED DOCUMENT

ANNEX 5: EXAMPLE OF TAGGED TEXT SPREADSHEET

ANNEX 6: EXAMPLE OF COUNTRY POLICY AND LEGAL PROFILE

ANNEX 7: EXAMPLE OF COUNTRY SCORE SHEET

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Document Data Form - ReWaB

Document Title	
Country	
Geographic area covered	
Type a. plan, strategy b. law, statute, act c. decree, order, regulation d. academic or other supporting literature e. other (specify)	
Sector a. water resources b. irrigation c. environment d. municipal and industrial e. hydropower f. navigation g. waste and desalinated water h. social esthetic and religious use i. other (specify)	
Description (brief description of the document)	
Date signed	
Date effective	
Language of document	
Official translation? (If a translation, is it an offical one?)	
Other languages (in which document is available)	
Number of pages	
Official source? (Who is the formal keeper of this document?)	
Collector (Who obained this document)	
File name	
File format (doc, pdf)	
File size (MB)	
Available on line? (yes/no)	
Web address for online access	

Water Governance Benchmarking Criteria

Click on each red number in order to link to the corresponding paragraph.
Click again on the red number in order to return to criteria page.
Numbers found next to an article or item title correspond to the entire article or item.
Numbers found next to document title correspond to the entire document.

A. GOVERNANCE 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 Establishing linkages 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 an 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
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 (including enforcement)
   - 5.4 Protecting aquatic ecosystems
   - 5.5 Monitoring and enforcing water service standards

B. GOVERNANCE PROCESS CHARACTERISTICS

1. **Transparency.**

2. **Participation.**

3. **Accountability and Integrity**.

4. **Rule of law.**

5. **Coherency and Integration.**

6. **Responsiveness.**

C. CROSS CUTTING CATEGORIES

1. **Water Sources**
   - 1.1 Surface water
   - 1.2 Groundwater
   - 1.3 Derivative water (reclaimed, reused, desalinated)

2. **Water Uses**
   - 2.1 Irrigation
   - 2.2 Municipal
   - 2.3 Industrial
   - 2.4 Environmental
   - 2.5 Hydropower
   - 2.6 Fisheries, navigation, recreation
   - 2.7 Other uses (including social, esthetic, and religious uses)

Ministerial Decision 192/2000
Determination of the Dhahira Region Water Supply Wellfield Protection Zones 1.3

- In accordance with the Law for Conservation of the Environment and Prevention of Pollution issued By Royal Decree 114/2001.
- and the Law for Protection of Water Resources issued by royal Decree 29/2000 L
- and the Royal Decree 47/2001 for Ministerial Amendments
- and in accordance with the public interest

It is decided:

Article 1. 5.3

Determining Dhahira Region Water Supply Wellfield Protection Zones in Wilayats Al-Buraimi, Madha, (Wadi Madha and Wadi Safowan) Ibri and Dhank (Al-Masarat Basin) as per the attached maps in Annex 1, to develop the water resources as well as protecting water resources and public water supply wellfields against pollution, exhaustion and intrusion of saline water.
Each Region is to be divided into three areas each determined according to the co-ordinates given in Annex 2.

Article 2. 4.1

Determines the extent of permission to practice activities and works in the protected Regions mentioned in Article 1 and in accordance with Annex 3. These activities and works should be carried out in accordance with the Regulations and as given in Annex 4.

Article 3. 1.2

The Ministry of Regional Municipalities, Environment and Water Resources is to manage Al-Dhahira Region water supply wellfields in co-ordination with all concerned parties in order to achieve the requirements given in Article 1.

Article 4. 1.2, 4.1, 1.4, P

The Minister of Regional Municipalities, Environment and Water Resources shall issue Decisions to form a Working Committee to carry out the necessary work to achieve the aims of determination in the protected areas mentioned in Article 1.
This committee is to co-ordinate with all government parties and take all necessary action to remove any obstacles which may affect the safety of the groundwater and to fulfill the conditions of protecting water resources in the determined Regions. The committee may form sub-committees to carry out specific works. The committee is to raise a report to the Minister every four months.

Article 5. T

This Decision shall be published in the Official Gazette and shall be effective from the date of publication.

Issued on 24/3/1422H ct 16/6/2001 Dr. Khamis Bin Mubarak Bin Essa Al-Alawi
Minister of Regional Municipalities, Environment and Water Resources

Water Governance Benchmarking Criteria

Click on each red number in order to link to the corresponding paragraph.
Click again on the red number in order to return to criteria page.
Numbers found next to an article or item title correspond to the entire article or item.
Numbers found next to document title correspond to the entire document.

A. GOVERNANCE 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, 2
- 1.3 Setting national water policy 3
- 1.4 Establishing linkages among sub-sectors, levels, and national sub-regions 4
- 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 an 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

4. Developing and managing water resources
- 4.1 Constructing public infrastructure and authorizing private infrastructure development 5, 6
- 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 (including enforcement) 7
- 5.4 Protecting aquatic ecosystems
- 5.5 Monitoring and enforcing water service standards

B. GOVERNANCE PROCESS CHARACTERISTICS

1. **Transparency.** 8

2. **Participation.** 9

3. **Accountability and Integrity**.

4. **Rule of law.** 10

5. **Coherency and Integration.**

6. **Responsiveness.**

C. CROSS CUTTING CATEGORIES

1. **Water Sources**
   - 1.1 Surface water
   - 1.2 Groundwater
   - 1.3 Derivative water (reclaimed, reused, desalinated)

2. **Water Uses**
   - 2.1 Irrigation
   - 2.2 Municipal
   - 2.3 Industrial
   - 2.4 Environmental
   - 2.5 Hydropower
   - 2.6 Fisheries, navigation, recreation
   - 2.7 Other uses (including social, esthetic, and religious uses)

Ministerial Decision 192/2000

Determination of the Dhahira Region Water Supply Wellfield Protection Zones 3

- In accordance with the Law for Conservation of the Environment and Prevention of Pollution issued By Royal Decree 114/2001.

- and the Law for Protection of Water Resources issued by royal Decree 29/2000 10

- and the Royal Decree 47/2001 for Ministerial Amendments

- and in accordance with the public interest

It is decided:

Article 1. 7
Determining Dhahira Region Water Supply Wellfield Protection Zones in Wilayats Al-Buraimi, Madha, (Wadi Madha and Wadi Safowan) Ibri and Dhank (Al-Masarat Basin) as per the attached maps in Annex 1, to develop the water resources as well as protecting water resources and public water supply wellfields against pollution, exhaustion and intrusion of saline water.
Each Region is to be divided into three areas each determined according to the co-ordinates given in Annex 2.

Article 2. 5
Determines the extent of permission to practice activities and works in the protected Regions mentioned in Article 1 and in accordance with Annex 3. These activities and works should be carried out in accordance with the Regulations and as given in Annex 4.

Article 3. 1
The Ministry of Regional Municipalities, Environment and Water Resources is to manage Al-Dhahira Region water supply wellfields in co-ordination with all concerned parties in order to achieve the requirements given in Article 1.

Article 4. 2, 4, 6, 9
The Minister of Regional Municipalities, Environment and Water Resources shall issue Decisions to form a Working Committee to carry out the necessary work to achieve the aims of determination in the protected areas mentioned in Article 1.
This committee is to co-ordinate with all government parties and take all necessary action to remove any obstacles which may affect the safety of the groundwater and to fulfill the conditions of protecting water resources in the determined Regions. The committee may form sub-committees to carry out specific works. The committee is to raise a report to the Minister every four months.

Article 5. 8
This Decision shall be published in the Official Gazette and shall be effective from the date of publication.

Issued on 24/3/1422H
ct 16/6/2001

Dr. Khamis Bin Mubarak Bin Essa Al-Alawi
Minister of Regional Municipalities,
Environment and Water Resources

Title/Document File Name (with extension)	Tag Number	Rewab ID#	Keyword Code	Tagged Portion Type: d=document, s=section, a=article, p=paragraph
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	2	170	A 1.2	p
	3	170	A 1.2	p
	4	170	A 1.2	p
	5	170	A 1.7	p
	6	170	A 1.7	p
	7	170	A 1.7	p
	8	170	A 2.1	p
	9	170	A 2.1	p
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	37	170	B 1	p
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	42	170	B 4	p
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	22	162	A 2.1	p
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	25	162	A 2.1	s
	26	162	A 2.1	s

Water Governance Capacity in the Middle East North Africa Region: Policy and Legal Document Analysis for Egypt

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Introduction

This paper's focus is an analysis of water governance capacity in the country of Egypt using available policy and legal documentation. Egypt's geo-political and hydro-climatic factors combine to place it in a unique position in terms of freshwater resources: 96 percent of Egypt's freshwater is derived from the Nile River, which flows through Uganda, Sudan and Ethiopia before reaching Egypt. Additionally, because the Nile River is the only significant surface water source, the majority of residence, agriculture, and industry are located on its banks making water quality degradation water quantity depletion concerns.

Egypt, officially entitled the Arab Republic of Egypt, has been a republic since the 23rd July 1952 Revolution replaced its traditional monarchy (Wolters, 2009). The Ministry of Water Resources and Irrigation (MWRI)—formally the Ministry of Public Works and Water Resources (MPWWR) and the Ministry of Irrigation (MI)—is the main central water governing entity. Because water is so closely tied to other sectors, additional entities also have important roles in water management, most notably the Egyptian Environmental Affairs Agency (EEAA) under the Minister of Environmental Affairs (MEA) (see Box 1). All provided documents originated in the MWRI, EEAA, or a former ministry that has been phased into either the MWRI or EEAA.

Box 1. Major governing institutions in Egypt's water sector:

Ministry of Water Resources and Irrigation (MWRI)—responsible for the quality and quantity of Egypt's water resources; covers all uses and sources of water, but primarily focuses on irrigation and surface water.

Egyptian Environmental Affairs Agency (EEAA)—responsible for environmental quality in Egypt, including water pollution abatement. Overseen by the Minster of Environmental Affairs.

Methods

RELEVANT DOCUMENTS

A total of 11 English-translated documents provided the data for this analysis (Box 2). Though the documents themselves are all official, a small percentage of the translations are unofficial (where official translations were unavailable). Two of the documents are policy documents. One policy document is specific to the water sector, the National Water Resources Plan (NWRP), and the other covers more broad environmental concerns, the National Environmental Action Plan (NEAP). The remaining nine documents are legal in nature, consisting of laws both specific to the water sector, particularly irrigation, as well as those relevant to the greater environmental sector.

Box 2. Egyptian documents provided for the analysis.

Document Type and Title (Entity, Date) – *Abbreviation*

Policy

National Water Resources Plan (MWRI, 2005) – *NWRP*

National Environmental Action Plan (EEAA, 2001) – *NEAP*

Legal

Environmental Law No. 4 (1994, MEA) – *Law No. 4*

Environmental Pollution and Legislative Regulations for Law No. 48 & Decree No. 8 (MPWWR, 1995) – *EPLR 48/8*

Executive Regulation for Law No. 4 (1994, MEA) – *Law No. 4 Executive Regulation*

Implementation Procedures for Law No. 213 & Decree No. 14900 (MPWWR, 1995) – *IP 213/14900*

Irrigation and Drainage Law No. 12 (MI, 1984) – *Law No. 12*

Irrigation and Drainage Law No. 213 (MPWWR, 1994) – *Law No. 213*

Law No. 48, Pollution of River Nile Water Channels (MI, 1982) – *Law No. 48*

Ministerial Decree No. 143 (MPWWR, 1999) – *MD No. 143*

Ministerial Decree No. 277 (MPWWR, 1999) – *MD No. 277*

ANALYTICAL FRAMEWORK

The analytical framework applied in the evaluation utilizes a three-pronged approach, which includes independent analysis of the following three groups of criteria: *functions*, *process features* and *cross-cutting categories* (Box 3). These "yardsticks" were developed using good governance criteria described by the World Bank, United Nations, and other knowledgeable institutions as a baseline. Each criterion is applied to document analysis through "tagging," a method of criteria identification and recording used for all available policy and legal documents. The policy and legal analyses are conducted separately, and therefore the main features of each are first discussed individually (usually as two separate paragraphs). Results for each are compared against one another to identify consistencies and discrepancies. This method is applied for each "prong."

BOX 3: Explanation of the 3-pronged analysis approach

The 3-pronged approach assesses water governance capacity by "yardsticks" that measure national water governance performance, grouped in the following manner:

***Functions**: Specific and deliberate governmental actions. Routinely carried out to achieve specified ends, which any well-functioning water sector must perform.*

***Process Features:** Desirable features of decision making processes related to water management and governance.*

***Cross-cutting Categories:** Descriptive terms, highlighting the extent to which different sources and uses of water receive focus in laws and policies.*

Listed below is the analytical framework ("yardsticks") and their corresponding sub-categories (Box 4); the sub-functions for each function can be found at the beginning of each respective analysis, and a complete explanation of the process features is located in Annex 1. Through the analysis we cover the development of functions, as well as sub-functions, noting their prevalence and level of coverage. The governance process features are identified if relevant within both the policy and legal material. An over-all assessment of these occurrences and context is included in an effort to address elements of good water governance as it exists within water law and policy in Egypt. The focus on cross-cutting categories of the water sector sheds light on water uses and allocation distribution within the sector.

BOX 4: Outline of the analytical framework applied to policy and legal documents.

Governance Functions:	**Governance Process Features:**
1. Organizing and Building	**1.** Transparency
Capacity in the Water Sector	**2.** Accountability
2. Planning Strategically	**3.** Integrity
3. Allocating Water	**4.** Responsiveness
4. Developing and Managing	**5.** [Rule of Law]
Water Resources	**Cross-Cutting Categories:**
5. Regulating Water Resources	**1.** Water Sources
and Services	**2.** Water Uses

Results

FUNCTIONS

The following report discusses the extent of use for each function and sub-function, which provides insight into Egypt's focal strategies for the water sector.

1 *Organizing and Building Capacity in the Water Sector*

Within the Egyptian documents, function one (Table 1) is used to assess the nation's organization and capacity building in the water sector. Eight sub-criteria are used to evaluate the relevant documents (Table 1). Under function one, all sub-functions are covered to some extent. Sub-function 1.2 is addressed the most frequently in the policy and legal material, reflecting the recent reorganization of the water sector, which requires adjudicating new responsibilities. Sub-function 1.5 is addressed frequently, but the focus is narrow in that international relations appear somewhat confined to efforts to increase Egypt's supply of water from the Nile. Transboundary aquifers are not approached, and discussion of regional strategies is limited. These points aside, it appears that Egypt is taking measures to build water-sector capacity, by including most of the sub-functions in its plans;

for example, where positions are created, roles are defined, training is addressed, awareness is advocated, and funding is sought. The overall comprehensiveness of Egypt's plans is less clear.

Table 1. Function 1 and its eight sub-functions used for analysis.

	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	Establishing linkages 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

1.1

The documents indicate a goal of moving toward a more effective overall environmental policy in Egypt since the 1990's. Egypt has evolved in the last two decades by upgrading environmental institutions so they can respond adequately to emerging environmental concerns. Among these concerns is the quality of natural fresh water resources originating from the Nile. In this direction, sub-function 1.1 addresses the main reforms related to creating and modifying the organizational structure in 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, emphasizing the need to incorporate environmental and social aspects into planning alongside economic considerations.

A great deal of detail is awarded to this sub-function in the policy documentation. The NEAP and the NWRP reflect various institutional measures intended to meet water challenges at the organizational structure level within the water sector. To address these challenges, and in particular population growth and environmental quality, Egypt has embarked upon incorporating cooperation, decentralization and privatization into its plans. Sectors such as agriculture, lakes, and groundwater are targeted responsibilities for new institutions and the private

sector. According to the NWRP, the MWRI has established *Water Boards* and has transferred water management responsibilities to them. In addition, the NWRP emphasizes the restructuring of the role of MWRI by establishing *Integrated Districts* at the local level. Regional and municipal units, created to decentralize, democratize and coordinate water management, are also discussed. To effectively integrate water policies the NWRP proposes the creation of a *National Water Council* on the national level and *Regional Management Committees* on the local level.

The NEAP addresses protection of groundwater resources, through establishment of a new Groundwater Sector. Additionally, reforming production and delivery of drinking water, as well as executing planned activities to manage wastewater through specialized central authorities and local administrations is advocated. The new institutional reform policy in water management related to irrigation and drainage systems is intended to transfer public competencies to the private sector. However, the government should remain fully responsible for the main part of the system while the private sector should be involved in the lower parts of the system. Water quality is also awarded attention in the NEAP, as an MWRI-initiated Water Quality Management Unit is outlined. In addition to water sector reform, the broader environmental sector is granted significant attention in the NEAP; based on this document, integration of environmental considerations is prioritized. Accordingly, many Egyptian ministries have begun to establish environmental units within their ministries.

Legal coverage of this sub-function centers mainly on the reorganization of the water sector, namely in creating the EEAA and the MWRI. Additionally, more localized management units are created. Law No. 213 and IP 213/14900 mandate the establishment and execution of *Water User Unions* (WUUs); for the first time in Egypt, the law has now established a legal basis for the participation of farmers in irrigation water management, albeit primarily at the Mesqa level. Additionally, the establishment of WUAs is also mandated, but legal entity is not given to the WUAs as it has for the WUUs.

1.2

Sub-function 1.2, assigning roles and responsibilities, is addressed in both policy documents, though the majority of coverage is legal in nature. The NWRP

focuses on decentralized roles, such as that of the private sector in irrigation, and WUUs/WUAs in local water management. Conversely, the NEAP takes a more centralized approach, outlining roles of the MWRI, which essentially involve control of all freshwater in Egypt, as well as the Groundwater Sector. The NEAP has involved several stakeholders in the shaping, implementing and monitoring of environmental policy. It particular, the NEAP acknowledges the "big brother" role of NGOs, which are among the civil society organizations that play a major environmental protection role in Egyptian society.

The legal documents cover this sub-function very extensively; seven of the nine legal documents include coverage. The primary purpose of several is to outline institutional responsibilities and procedures in conjunction with the implementation of laws. The roles for the MWRI and EEAA are most commonly and explicitly covered. The major focus is centered on the development and protection of the Nile Basin and serving the public interest. Conflict resolution is also a recurring theme. The MWRI is mandated to control and manage all fresh water resources in Egypt. Other mandates include constructing, supervising, operating, and maintaining all the irrigation structures and drainage networks. The MWRI is also responsible for providing other sectors with their fresh water needs in a timely manner. The MWRI, through its Research Institute for Groundwater, is also responsible for managing water quality within the National Water Quality Monitoring Network. Finally the MWRI is responsible for the operating budget, system maintenance, and rehabilitating the irrigation and drainage systems. As previously mentioned, other ministries, such as the Ministry of Health, Ministry of Interior, and Ministry of Housing have roles in water management and environmental issues as well. The EEAA is considered the highest environmental authority in Egypt, having responsibility for promoting and protecting the environment, in addition to coordinating adequate responses in close collaboration with the national and international development partners to surfacing issues. The agency has a public juridical personality and it has several branches in the Governorates of Egypt.

The new reforms and restructurings aimed at sustainable development have included additional actors in water and environmental policy. For example, Law No. 4 expands the environmental protection role of NGOs. According to this law, the *Board of Directors* of the EEAA includes three members representing NGOs.

Moreover, the Egyptian Environmental NGO Steering Committee is established, comprised of 15 NGO representatives.

Despite the forward progress with reforms and the establishment of new institutional agencies, the main competences and responsibilities are still in the hands of the central government. None of the laws cover the decentralized roles addressed by the NEAP, such as local management entities. Documents reflect that new institutional roles are more oriented toward coordinating cross-sectoral environmental issues rather than transferring competences to the local governments. Yes, the Egyptian government does encourage stakeholder participation in defining problems, implementing solutions, and monitoring environmental progress, but the competences at the local level lack wide ranging power.

1.3

Establishing a national water policy, sub-function 1.3, is identified in three of the documents – the NWRP, the NEAP and the Law No. 4. Despite limited coverage, the Egyptian government, through the MWRI, appears to be committed to establishing a national water policy. With this in mind, the NWRP addresses the need for institutional and social settings that support a national water policy. Additionally, this plan proposes that the issue of water resources be placed at the top of the political agenda to ensure water resource management development and sustainability practices are adequately addressed. Within the framework of updating the NEAP, Egypt's agenda for environmental actions during this fifteen year period, the government through the MWRI has prepared a National Water Policy until the year 2017, which includes three main themes: (i) optimal use of available water resources; (ii) development of water resources; and (iii) protection of water quality and pollution abatement.

In conjunction, the need for a national water policy to address the sufficient supply of quality water, in particular, to urban areas is addressed by the documents. Hence, the government is making an effort to ensure that both rural and urban water-deprived areas are provided with access to piped water. However, the coverage areas for sanitation and wastewater services are less prominent than those for water supply. Sanitation and wastewater services are primarily limited to the main urban centers. Since implementing Egypt's water

policy was a joint effort between ministries such as the Ministry of Environment, the Ministry of Health, and the Ministry of Housing, it will take a multi-agency coordinated effort to carry out future plans.

Law No. 4 offers a legal perspective, albeit minimally. Pollution and wastewater regulations confirm the priority of high water quality on Egypt's agenda. Municipal drinking supplies are seldom addressed in the legal documents, as the focus is more on irrigation and environmental protection.

1.4

Sub-function 1.4, establishing domestic linkages, is addressed in both policy documents. Emphasis is on decentralization and cooperation among sub-sectors, as well as coordination between the MWRI and various other ministries. The NWRP discusses a shift away from supply-driven resource development toward a comprehensive policy planning process, which requires coherency among sub-sectors. Similarly, the NEAP addresses implementation and research coordination as a core focus. Both vertical (central government, de-central local public administrations) and horizontal (across ministerial departments) coordination are addressed. The documents underline that the new Egyptian water and environment policies need to shift toward new linkage and coordination efforts at many levels due to the cross-sectoral nature of water and environmental issues. Hence, institutional water reforms have shifted and aim to establish new linkages and new ways for decision making between involved actors in water management issues at many levels and scales. A coordinated approach in managing water and environmental issues appears to be an important goal. The documents demonstrate the efforts being made by Egypt in the last two decades to establish an effective coordination between the government and the major participating actors.

The current water policy of the MWRI focuses on the IWRM approach, which requires vertical and horizontal coordination across multiple institutions and stakeholders for effective implementation. Vertically, implementation and coordination responsibilities of water policy and strategies are distributed among three levels of government in collaboration with major stakeholders, such as farmers, NGOs, the private sector, and numerous governmental agencies (GOFI, GOPP, etc). The first level, the central government, is primarily represented

through the MWRI; while the second and the third levels, local public administrative units, are formed by Governorates and *Markaz* (local administrative level comprised of small districts and cities). MWRI at the de-central level distinguishes 22 irrigation directorates subdivided into 62 inspectorates and about 206 districts. An inspectorate covers 4 districts. It should be noted that there are other organizational units used in the management of irrigation such as the Feeder Canal Level, the Branch Canal Level, and the Mesqa Level. These organizations are structured according to irrigated areas and farmers' numbers.

Horizontally speaking, given that the MWRI has operational and strategic tasks, coordination of these activities, such as implementation and operation of Nile-related infrastructure, the irrigation and drainage canals and the coastal lakes, take place at the central level between various departments and sectors of the MWRI. Other ministries, which are also involved in water management tasks, coordinate at the national level with MWRI by participating in the preparation of the NWRP, albeit each with a specific interest.

Egypt's legal framework addresses coordination among the competent institutions and their assigned responsibilities. In Law No. 4, coordination is mandated numerous times, through language such as *connect, collaborate, participate,* and *in conjunction with*. With respect to environmental issues, the administrative structure was outlined in Law No. 4, which defines a hierarchy of authority and responsibility that commences at the central government level. Horizontal coordination is addressed in terms of creating boards and committees with decision-making power comprised of delegates from multiple ministries and other entities. In this context, coordination at the highest level takes place at the Cabinet of Ministers. Ministries have established environmental units within their ministries in order to mainstream environmental issues into national policy making. At the level of local administration, multiple subsidiary organizations and agencies have environmental responsibilities. However, Environmental Management Units (27 EMUs) within the Governorate offices are still defining a role for themselves in most instances. At the working level, coordination is largely a matter of persuasion by the MSEA-EEAA through cross-sectoral forums on specific issues.

IP 213/14900 requires vertical *coordination* and *integration* in regards to irrigation projects, between the directorate and various governates. While the aforementioned legal documents contain several references to coordination, the trend is not ubiquitous among the legal material.

1.5

Establishing regional and riparian linkages, sub-function 1.5, is addressed several times in Egypt's policy documents, particularly in regards to the Nile. The major policy agenda, from Egypt's perspective, is to increase Egypt's water supply from the Nile by decreasing losses. Currently, based on the 1959 agreement between Egypt and Sudan, 55.5 BCM/yr goes to Egypt, while 18.5 BCM/yr goes to Sudan. Potential cooperative regional plans include joint canal and dam projects, involving project planning, as well as funding and investments. Three identifiable projects are the Jongli Canal, Bahr El-Ghazal, and Mashar Marshes projects. In addition, the Nile countries, including Egypt, established the Nile Basin Initiative in 1999. The mission of the Nile Basin Initiative was to promote socio-economic development in the region. The Nile countries seek to realize their shared vision through a Strategic Action Program, comprising basin-wide projects, as well as sub-basin joint investment projects. In addition to plans for the Nile Basin, the NEAP outlines plans for regional initiatives for marine protection, pollution reduction, and overall environmental conservation and protection, drawing upon donor support. Likewise, cooperating to regionally combat desertification is briefly discussed, primarily in terms of information exchange between Arab states and knowledgeable foreign institutions. In these contexts, Egypt acknowledges that the coordination of environmental issues and water management is not only applicable at the national level, but regionally and internationally, as well.

Legal coverage is limited to two documents. According to Law No. 4, the EEAA is the national authority responsible for strengthening environmental relations between Egypt and other countries, in addition to regional and international organizations. The EEAA shall recommend the necessary legal procedures for adherence to regional and international conventions that relate to environment and the drafting of laws and decrees required for the implementation of such conventions. The EEAA coordinates with the Ministry for International Cooperation to ensure that projects funded by international donors are congruent

with environmental safety considerations. Additionally, MD No. 143 requires the reorganized water sector to "confer" with international parties.

1.6

The documents, both policy and legal, reflect many institutions that have several programs designed to change behavior and perceptions, related to building public and political awareness of water sector issues, sub-function 1.6. In the NEAP document, major emphasis is given to changing attitudes and behavior related to environmental issues. For example, among the preventive measures addressed by the MWRI Water Quality Management Unit is the objective of protecting water resources from pollution, which include public awareness campaigns, directed to other governmental sectors, stakeholders and the public. An obvious focus is the rollout of campaigns designed to increase overall awareness of various targeted demographic groups. Likewise, a plan for protecting the environment and public health by promoting changes in attitude and behavior—which includes acceptance of the increasing participation by women—is accordingly in place. In addition, political awareness with the goal of bettering policy and program development, as well as enhancing pressure for action, is briefly addressed by both policy documents. The central theme is an overall increase of awareness with environment protection from pollution and water usage.

Legal coverage is less concrete, but nonetheless evident in several documents.
IP 213/14900 requires engineers and others to increase farmer awareness by meeting with them regularly. A stated objective of this document is also to expand overall awareness of water usage. The EEAA, as documented in Law No. 4, prepares programs for the environmental education of the public, assists with implementation, and participates with the Ministry of Education in the preparation of training programs for the protection of the environment. An objective behind the establishment of the Revolving Fund in Law No. 213 is increased awareness of the uses facing a variety of water uses; this is stated in MD No. 277.

1.7

Sub-function 1.7, securing and allocating funding for the water sector, varies in focus between the policy and legal documents. A goal of NEAP is to secure funding by attracting financial support from donor agencies and/or creating

partnerships, in order to achieve goals outlined in the document. Additionally, "investment packages" have been prepared, aimed at privatizing proposed projects; two such projects have been finalized, according to the NEAP. However, aside from the two aforementioned projects, language in the document focuses on soliciting funding sources, rather than securing concrete funds. Part 7: Financing the NEAP, discusses various funding opportunities. Egypt depends on many types of mechanisms (conventional and non-conventional) for financing the environmental projects that constitute NEAP, for example conventional loans originated by banks and other financial institutions, the capital markets, Environmental Protection Fund, Social Fund for Development, and NGOs. Complementing traditional incentives such as custom duties, taxes, tariffs, etc. are a number of new financial tools that can be used to raise revenues needed to finance environmental projects; these tools include affinity merchandising, land donations, ecotourism, emissions trading, clean development mechanism projects, environmental revolving funds, green credit cards, individual and corporate donations, and the returns obtained from experimental projects undertaken by the EEAA. The NWRP does not cover this sub-function.

The legal documents focus on securing funds for specific projects or sectors. IP 213/14900 by far contains the most frequent use of this sub-function, as it outlines the means for implementing both Law No. 213 and MD No. 14900. Indeed, the title page states three overall purposes for the document, two of which are cost recovery and revolving fund. Coverage of 1.7 within this document therefore focuses on these two points. Cost recovery for various irrigation and Mesqa activities are outlined, in addition to taxes, fees and additional appropriations to the revolving fund. In fact, according to Law No. 213, the establishment of the revolving fund was done in part to finance Mesqa improvement projects, cleaning, maintenance and reconstruction of the Mesqa, and the implementation of irrigation improvement nets. The EEAA, as stipulated in the Law No. 4, has a special, independent fund entitled the Environment Protection Fund, which received funding from different sources, both national and international: 1) subsidies from the state budget and grants and donations from national organizations, and 2) funding from agencies of donor countries and international financial institutions and organizations whose purpose was to protect and promote the environment. Additionally, Law No. 48 discusses a special budget, from which spending was targeted at research and technology

development; funds will originate from law violations and associated fines.

1.8

Developing and using well-trained water sector professionals, sub-function 1.8, was presented in both policy and legal documents. Overall, the documents reflect that training programs are implemented in various ministries, targeting personnel of environmental and water sectors; these programs cover a broad spectrum – environmental training, water quality, drinking water, sanitation, farmers and desertification, to name a few. In regard to the policy documents, once again, the NEAP covers this sub-function far more comprehensively than the NWRP, and thus the focus tends to be on the broader environmental sector rather than specific to the water sector, though in a few instances the NEAP directly addresses the water sector. Evidence in the NWRP is limited to a description of training geared toward explaining the IWRM perspective and why it should supersede the supply-dominated management perspective.

Language in the NEAP emphasizes capacity building and subsequent training. According to this document, the EEAA has a plan addressing the environmental training and supervising needs of policy and decision makers within the environmental sector, as well as in water and wastewater management. Additionally, in the process of preparing the updated NEAP, experts were consulted on the particulars of implementing NEAP and the main environmental sectors discussed in the Profile. Among the MWRI activities within the National Water Quality and Availability Management Project is the development of the professional capacity of the organizations working on water quality issues, effective preparation of policy options, making of operational decisions based on improved "national level" data, and the incorporation of environmental analysis. In addition, the Water Quality Management Unit at MWRI develops and executes training packages. It has developed, in particular, training programs to improve the quality of drinking water, on operation, maintenance, analysis and record keeping, to name a few. Also included in the NEAP, the Sanitation Management Program prepares training packages for engineers, chemists, technical operators, and workers associated with wastewater management activities.

Four legal documents address this sub-function. According to Law No. 4, the Board of Directors of the EEAA includes many representatives and experts on

environmental issues. There are two experts in the field of environmental affairs and a high-ranking employee of the EEAA, two representatives from universities and scientific research centers, three representatives from NGOs concerned with the environment, and representatives of the concerned ministries. When considering special issues the Board of Directors may solicit the assistance of other experts whom have no voting power within the deliberations. It may also form advisory committees of experts to study certain subjects and may entrust one or more of its members with a specific task. Suggested (rather than mandated) in IP 213/14900 was training of personnel in the irrigation sector; required by this law is the training of Mesqa heads. MD No. 143 requires training of project engineers and technicians, and WUA members, to ensure work is implemented by competent and qualified persons.

2 *Planning Strategically*

Within function two, sub-functions 2.1 and 2.3 are covered the most extensively, with the bulk of coverage being found in the policy rather than the legal documents. The two national policy documents indicate that Egypt views data and decision making tools as an avenue to solving some of the nation's major water resource issues; in particular, water quality. Overall, sub-function 2.4 is covered the least. The legal documents cover sub-functions 2.1 and 2.3 and do not address 2.2 or 2.4.

Table 2. Function 2 and its four sub-functions used for analysis.

	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

2.1

Sub-function 2.1, collecting, managing, storing and utilizing water-relevant data, is covered in approximately 50 percent of the documents, with the NEAP containing the most extensive coverage. The documents demonstrate that there are many Egyptian government and academic bodies collecting data, resulting in a lack of data consistency, thus limiting Egypt's ability to make well-informed decisions and effectively monitor the environment. Outlined in the documents are many water projects and programs, which are designed for a variety of purposes, including water quality, desertification, irrigation, environmental issues, and a coordinated national system of sustainable water resource management practices. A primary task is the compiling and processing of information, knowledge, and data from the various sources. For example, some data locales have established tools such as databases of pollution sources, GIS based information systems for project analyses, and modality of compiled data acting as a support system for decision making, monitoring and actionable planning for the combat and mitigation of pollution. However, the multiple data sources make an objective comparison among them a difficult task given the problem of data inconsistency. Recognizing this flaw, the NEAP comments on the need for a consistent national database in order to facilitate the process of data cross comparisons.

Egypt's strong emphasis on water quality, particularly of the precious Nile waters, is also evident. Water quality monitoring programs are frequently mentioned in the NEAP in conjunction with pollution prevention programs applying to surface and ground water sources and drinking water. Specifically, the National Water Quality Monitoring Network, a component of the National Water Quality and Availability Management Project, has been given the task of obtaining data on the quality of various water bodies – the Nile River from Aswan to Cairo, the Damietta and Rosetta Branches, irrigation canals, agriculture drains, groundwater, and Lake Nasser. In addition to obtaining data on several parameters they have also created and calculated a water quality index. Similar water quality strategies are discussed in the NWRP, but with fewer details.

Monitoring the Nile's waters is addressed in both Law No. 48 and Law No. 4 Executive Regulation. Here, the Ministry of Health is called upon to conduct periodic analyses on samples of treated liquid waste originating from permitted

sources that enter the channels of the Nile. In terms of broader environmental studies, the EEAA's roles are defined in Law No. 4. According to the law, the EEAA participates in the preparation and implementation of the national program for environmental monitoring, prepares studies on the state of the environment, and formulates the national plan including the projects needed to protect the environment. In addition, environmental monitoring networks along with their stations and working units are important sources of data for EEAA, which makes the results available to additional concerned authorities. The networks may request assistance from research centers and competent authorities, which shall furnish the networks with their research results and any other requested information. And finally, irrigation monitoring receives some attention in the IP 213/14900.

2.2

Projecting future supply and demand for water, sub-function 2.2, is discussed in both policy documents but is not present in the legal material. The NWRP provides an assessment of potential water availability and water demand projections through 2017. The increase in the natural population growth rate, improvements in living standards, as well as the government's policy to reclaim new land and encourage industrialization, have put extraordinary pressures on the environment and, in particular, on the limited water resources in Egypt. Thus, new strategies are needed. Regarding new strategies, Egypt advocates for the optimizing of freshwater usage and exploring the potential uses of new non-conventional sources of freshwater, such as desalination. Yet, it is expected that water usage will only increase in manufacturing industries as a result of government-encouraged industrial growth. There is also an expected increase in the future demands for groundwater due to agricultural development of desert areas. In addition, these areas will be the basis for initiating new communities that can absorb part of the highly concentrated population in the Nile valley and Delta.

The NEAP also addresses the increasing gap between supply and demand, focusing on population growth and pressures on the resources from various sectors of the economy, such as industry and agriculture. In addition, the NEAP discusses the Nile, groundwater, and the effects pollution can have on viable supplies.

2.3

Sub-function 2.3, designing strategies for matching expected long-term water supply and demand and dealing with shortfalls (including drought mitigation strategies), is covered comprehensively in the policy material. With an objective of confronting challenges and moving toward sustainable development, the NEAP and NWRP have been updated as a result of new paradigms that integrate environmental dimensions into development processes. The aim is to achieve economic growth that promotes social equity, but doesn't negatively affect environmental resources. Thus, given the objective to reduce the gap between the limited water resources and the increasing demand on such resources, along with ensuring sustainable water practices, Egypt is designing and implementing many new strategies in this direction. The broad goal to manage from the demand side is evident through many strategies; examples include shifting cropping patterns and incorporating new crop varieties, improving irrigation efficiency by minimizing water losses, and improving and rehabilitating existing infrastructure. Another strategy aims to optimize the use of conventional freshwater resources, while also exploring the potential of non-conventional sources, such as desalination, to augment supplies. Strategies to protect water quality are also presented, and include national water quality monitoring programs and the effective treatment of solid and sewage waste. Finally, a strategy to adequately prepare for disasters, such as flash floods is described.

Three of the legal documents address this sub-function, though once again, detailed discussions are not present. The focus is on irrigation, including irrigation efficiency, specifications for planting water-thirsty rice crops, and adjusting water diversions to match land needs with supply (Law No. 12 and IP 213/14900). Law No. 4 also contains a statement pertaining to disaster preparedness.

2.4

Sub-function 2.4, developing planning and management tools to support decision making, is primarily addressed in the NEAP. The updated NEAP demonstrates that Egypt is improving the quality and availability of data by compiling data and information, establishing new electronic databases, creating thematic maps, and using modern technology such as GIS for decision-making support. Egypt plans

to use these decision support systems (DSSs) for flash flood risk and water-quality impact assessments. Additionally, various DSSs will be used to display the major areas prone to various degradation processes. This serves as the foundational pieces for medium- and long-term desertification monitoring and establishing a GIS data system that utilizes the available basic equipment and facilities. The Master Plan for combating desertification also includes a GIS containing water, air and land pollution information, which will serve as a DSS in combating and mitigating pollution processes that emanate from industrial activities.

Additionally, and according to the NWRP, the Task Force on Water Qualities Priorities and Strategies of MWRI has prepared geographical maps to areas of groundwater, irrigation water, Nile water, and drainage water, along with pollution level contact mechanisms. Combining the geographic distribution of both pollution and contact mechanisms facilitates identification of areas where there is an acute problem and the presence of risk.

None of the legal documents cover this sub-function.

3 ***Allocating Water***

Function three receives little attention in the two policy documents overall. Sub-function 3.1 is only addressed briefly by the NEAP and sub-function 3.3 is only addressed by the NWRP, which explains the responsibilities of WUAs and, in particular, their responsibilities for conflict resolution. Neither of the policy documents addresses any portion of sub-function 3.2 or sub-function 3.4.

Conversely, the legal documents are largely aimed at sub-function 3.3. The legal documents addressing sub-functions 3.3 provide legal remedies for disputes that arise from water violations and public and private projects that impede upon both land owner and third party rights. Sub-functions 3.2 and 3.4 are not covered at all. It is thus apparent that no formal arrangements are in place for managing water transfers.

Table 3. Function 3 and its four sub-functions used for analysis.

	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

3.1

Sub-function 3.1, awarding and recording water rights and corollary responsibilities, occurs minimally in the NEAP, as well as in several legal documents. The NEAP, through the MWRI's Water Quality Management Program, aims to increase safe drinking water supplies to uncovered areas. It is suggested that the private sector and NGOs play leading roles in realizing this goal.

More legal documents address this sub-function versus policy documents. The legal documents primarily address the legal responsibilities of government agencies, individual landowners, and establishments. Law No. 213 addresses the authorization for irrigation of new lands and assigns this responsibility to the Irrigation Department. This law also states that the Ministry has the right to develop the irrigation network on new lands at the expense of the landowner(s) if landowners are negligent in their responsibilities. Additional government responsibilities are found in Law No. 12. This law states that the Ministry of Irrigation is responsible for the distribution of irrigation water from public waterways and may modify the irrigation and drainage system according to the needs of the agricultural land.

Land owners dependent on irrigation water are regulated by Law No. 12, which addresses the responsible water usage by land owners who benefit from water ducts owned by multiple land owners. In sum, they are responsible for using water that is in proportion to the area of land owned by each of them, though the lands through which a private duct or a private drain passes receive allocation priority. Landowners are responsible for requesting permission to utilize

groundwater or drainage water for irrigation purposes; the duration of such permission is not to exceed ten years and may be renewed.

3.2

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

3.3

Sub-function 3.3, adjudicating disputes, is addressed by the NWRP policy document, but not the NEAP policy document. The NWRP explains the responsibilities of WUAs and, in particular, their responsibility for conflict resolution.

Legal coverage is more abundant. Law No. 4 mandates that the Association Council manages the affairs of WUAs. The Association Council is responsible, amongst other things, for resolving disputes among the farmers regarding any tap or irrigation canal. It is the responsibility of the association's board of directors to solve problems arising among its union's members. This law also addresses disputes associated with protection of the marine environment. Unlike the binding and final dispute resolution decisions of the Association Council, any party charged with a violation from a judicial officer can object to the charges before the appeals committee.

The regional irrigation inspector's decision-making authority is granted by way of the Law No. 12. The inspector can make independent decisions to resolve disputes that arise from duct or drain use between landowners, unlawful use of private ducts and drains by land owners, or maintenance responsibilities. Complaints stemming from the decisions of the regional irrigation inspectors are submitted to the general director of irrigation. The general director can issue temporary decrees to parties involved in disputes until such dispute is resolved. To effectively resolve a dispute the Law requires that the department conducting the investigation obtain maps and documents necessary for the investigation within two weeks from the date of the request. The regional irrigation inspector undertakes the investigation at the site of the dispute. The investigative results must be submitted to the irrigation general director for acceptance or refusal. The decision of the irrigation general director is final.

According to IP 213/14900, the Sheik is responsible, among other things, for representing the assembly before third parties. The Sheik is assisted by irrigation canal and tap operators in resolving disputes with third parties by submitting any problems to the assembly's association. If a dispute arises as a result of public utilities work, Law No. 12 offers remedies. For example, if a public utilities work project alters or obstructs land irrigation or drainage ways then the irrigation general director, at the expense of the authority undertaking the project, must issue a decree for the construction of another irrigation or drainage way. If the dispute is not related to a public project, but rather the result of the actions of a private party, then the irrigation general department has the authority by way of this law to halt any further work or issue a temporary decree while the dispute is being investigated. The law requires that work being conducted on another landowner's property must be documented with a written permission. But, if the work will be conducted on private irrigation ducts or private drains of common utility the permission is issued on condition that the licensee would not breach the rights of the other beneficiaries. The granting of permission does not excuse the licensee from any behavior or action which may cause harm to a third party.

3.4

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.

4 *Developing and Managing Water Resources*

Overall, function four is covered extensively in a select number of documents and minimally, if at all, in others. Within the policy framework, the NEAP outlines many specific plans related to the broad task of water management and development goals, including new policies geared toward conservation, improved water quality and infrastructure, and innovative harnessing of flood waters. Conversely, the NWRP focuses solely on infrastructure related goals. Law No. 12 appears to be the key legal document related to this function and in light of the importance of irrigation and agriculture in Egypt, this is not surprising. While several legal documents do not address function four, the IP 213/14900 and Law No. 4 documents contain substantial coverage. Sub-function 4.2 is not addressed in any of the material, and while sub-

sections 4.1, 4.3 and 4.4 all receive notable attention overall, sub-function 4.1 is the most detailed.

Table 4. Function 4 and its five sub-functions used for analysis.

	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

4.1

Sub-function 4.1, constructing public infrastructure and authorizing private infrastructure development, is addressed in both policy and legal documents, with Law No. 12 containing the most relevant content. The MWRI has primary responsibility for water infrastructure within the public sector. Given the three main policy themes of the updated NWRP through the year 2017, the MWRI, which manages all fresh water resources in Egypt, is also responsible for constructing, supervising, operating, and maintaining all irrigation structures and drainage networks. To implement these policy themes the MWRI has created several programs. Examples of which are outlined in the NEAP. One such program is the Water Quality Management Program that aims to improve the quality of drinking water by developing, among other things, appropriate systems for the removal of iron, manganese and micro-pollutants.

A challenge in securing water for people is infrastructure such as drinking water plants and distribution systems. In recognition of this challenge the NEAP has proposed some solutions. Examples include the improvement of the irrigation and canal systems on the old land which covers an approximate 400,000 acre area and the installation of the Nile drainage system which covers approximately five million acres. Additionally, is the rehabilitation of an old drainage network consisting of another 1.5 million acre area. Other notable programs are the rehabilitation of irrigation and drainage pumping stations and the replacement

and rehabilitation of existing grand barrages and structures on the Nile and main canals. Despite the limitations in agricultural water supplies, Egypt has given priority to industrial and service sector water needs. But, as mentioned earlier, a challenge to securing water for industry, services and employment is adequate water supply and sewage water infrastructure. Within these sectors a higher priority has been given to water *quality* more so than water *quantity* and has thus prompted Egypt to embark on providing the necessary facilities, e.g. drinking water plants, distribution systems, and sewage water plants.

In the legal framework, according to Law No. 12, the competent authority overseeing public infrastructure and the authorization of new private infrastructure is the MWRI. The MWRI is responsible for issuing licenses for irrigation and drainage works on public properties, issuing licenses for the construction of irrigation water intakes in the Nile embankments and/or public canal banks, granting permission to dig wells for groundwater in public lands, grants permission for the construction of water pumping machines for irrigation or drainage purposes, issuing licenses for private works, and for the construction of the main and secondary public drains network. The MWRI, in collaboration with local associations, implements rules for farmer irrigation management and establishes irrigation schedules. Furthermore, the Minister of Irrigation has the right to issue a decree to expropriate the lands necessary for the construction of the main and secondary public drains network, the facilities required for its ongoing maintenance and security, and to temporarily possess the lands necessary for the construction of open and tiled drains. Licenses from the MI (now the MWRI) are required for digging wells, constructing private irrigation and drainage works on public property, construction and reconstruction in desert lands, extracting water from the Nile or any shared water source and for water intakes into Nile embankments. In addition, maintenance responsibilities associated with private drains and ducts are addressed in Law No. 12.

As outlined in Law No. 4, Article 15, the owners of projects and establishments must adhere to the criteria and conditions established by the EEAA prior to commencing and during the operation of construction.

4.2

Sub-function 4.2, forecasting seasonal supply and demand and matching the two, is not covered in the policy documents. Law No. 12 addresses seasonal changes in water distribution. According to this law, the MI (MWRI) determines dates for winter interruptions.

4.3

Sub-function 4.3, operating and maintaining public infrastructure according to established plans and strategic priorities is primarily covered within two legal documents – Law No. 12 and IP 213/14900. Policy documents are less comprehensive. As previously mentioned, the main competencies, functions and responsibilities of water management in Egypt are still in the hands of the government. The last institutional reforms carried out in the public sector by the government indicate an important shift in its water policy toward the involvement and participation of many private sector entities. Transfer of some competencies and responsibilities to the private sector, in an effort to improve performance, is addressed in the NWRP. Government responsibilities will still include the main components of the irrigation system; however, the private sector will be responsible for branch canals and district canals. According to the NEAP, the MWRI has embarked on a program for the improvement of the irrigation systems on the level of branch and field canals in an effort to conserve irrigation water by 5-10 percent. Furthermore, the MWRI is installing Nile drainage systems and rehabilitating an old drainage network, with the intent of improving soil fertility by leaching unwanted salts from the soil profile. Other examples are the rehabilitation of irrigation and drainage pumping stations and replacing and rehabilitating the existing grand barrages and structures on the Nile and main canals.

The legal framework outlines specifications for operation and maintenance, particularly by dividing responsibilities between the MWRI and water users. According to Law No. 12, periodic maintenance of tiled drains is the responsibility of the MWRI, while maintenance (including dredging) of open field drains must be undertaken by beneficiaries. Law No. 4 places responsibility on the MWRI for providing the necessary facilities to receive wastewater, polluted water, and refuse from ships, as well as, proper maintenance, upkeep and cleaning of these facilities. According to IP 213/14900 there is a specified

protocol for operation and maintenance of Mesqas, which involves the establishment of an association. The association is responsible for executing operating and maintenance tasks for water pumps, irrigation canals and private irrigation equipment. It is also responsible for water rotation and determining pump operator responsibilities. Various individuals within the association have specified responsibilities as well, including the repair and supervision of water distribution. Expenses are also associated with all the aforementioned responsibilities.

Additionally, Law No. 12 focuses heavily on prohibited actions that interfere with the MWRI's operation of the public infrastructure. Examples of these actions include:

- Illegal drainage into public canals.
- Passing heavy loads over banks, bridges or public industrial works.
- Damaging public irrigation systems by fastening nets.
- Obstructing water flow in public canals.
- Opening or closing any regulation device.
- Planting vegetation on Nile banks (public areas) or within irrigation canals or drains.

These actions are prohibited so that the MWRI can competently operate the existing infrastructure and ensure the delivery of water. The government and authorized agencies have a variety of rights that serve to protect water supplies. For example, the irrigation general director may decide at any time to prohibit water extraction from one or more of the public canals in order to ensure the justly distribution of water.

4.4

Sub-function 4.4, applying incentives and sanctions to achieve long- and short-term supply/demand matching, occurs frequently within both the policy and legal frameworks. This sub-function includes water pricing, which is advocated several times within the NEAP. In the newer Egyptian policies there is a shift toward establishing cost recovery mechanisms for environmental services with the aim of becoming self-sustaining. A challenge, however, is achieving social equity without impacting environmental resources. To address this challenge,

Egypt's new policies state that natural resources need to be priced for their social value and not for their market value. Currently, prices are sub-estimated and, therefore, need to be revised. Thus, the government of Egypt expects programs and projects developed at the local and community level to be self-sustaining through the implementation of these cost recovery pricing mechanisms. Furthermore, policy encourages the participation of the private sector in financing environmental projects and for the management of the water system. The water pricing policy also includes drinking water and other domestic uses. Egypt emphasizes that water is not a free resource and should be priced to avoid inefficient use and to raise government revenues to help cover water service costs to the uncovered areas in Egypt. Adopting a "user pays" principle will allow Egypt to develop an alternative drinking water production and distribution system. Through this system, water would be priced accordingly to prevent inefficient use for such things as car washes, swimming pools and garden irrigation. Water fees to cover government maintenance expenses and expansion costs are part of this pricing plan, too.

The NEAP also outlines many new policies to encourage environmentally safe production processes and environmentally friendly technologies, with the goal of improving overall surface water quality (including lakes). To discourage industrial waste discharge and encourage the adoption of clean production technologies, Egypt intends to adopt the "polluter pays" principle, through which pollution charges, taxes, per-unit permits, and other associated pollution fees will be invoked. Wastewater discharge fees will be assessed against households and businesses based on water consumption as well. Higher charges will be an incentive for large industrial facilities to reduce the toxicity load of their discharged water and consequently reduce water pollution. Additionally, Egypt aims to encourage private sector participation in environmental management through financial packages for industrial compliance in an effort to reduce fresh water pollution that results from the discharge of industrial effluents through such mechanisms as effluent charges, soft loans, and grants to finance the purchase of wastewater treatment equipment and tradable emission permits.

In order to protect water quality, quantity and promote its effective use, the legal documents establish incentives, sanctions and water pricing mechanisms though less extensively than the NEAP. Several of the legal documents contain provisions

outlining consequences for noncompliance, including fines and imprisonment, demonstrating that the rule of law will be upheld. Law No. 12 and Law No. 4 contain additional language surrounding this sub-function. For example, according to Law No. 12, drainage and irrigation prices are a regulatory responsibility of the MWRI. Cost of irrigation will be determined by crop type, hourly pumping rate or another manner agreed upon by the competent authorities, which will remove the cost burden from the government and society.

Through Law No. 4, the EEAA is granted authority to propose both economic mechanisms to encourage different water related activities and procedures for the prevention of water pollution. Additionally, it may establish a system of incentives that can be presented to others for their environmental protection activities or projects, but with the caveat that consideration be given to investments, customs, industry, etc. Permits will not be granted for projects on certain public lands and lands abutting the sea that can discharge polluting substances, unless the applicant provides waste treatment solutions. Penalties for noncompliance, including fines and imprisonment, can be found in several of the legal documents.

4.5

Forecasting and managing floods and flood impacts, sub-function 4.5, is discussed in Law No. 12 and in the NEAP. In the NEAP, the focus is on mitigating desertification by reducing the damaging effects of flash flooding on the land and associated flora and preventing damage to infrastructure and socioeconomics. The "strategic spreading" of flash flood water was introduced as a viable solution. Egypt has undertaken many flood management studies that involved mechanisms to harvest flash flood water. Engineers have designed mechanical devices to trap and contain flash flood water making it available for future water needs.

Law No. 12 outlines emergency procedures in the wake of flooding events, in order to protect irrigation, navigation and riverbanks. The minister of irrigation can decree a state of emergency when waterways rise to unnatural levels. He determines when and which urgent protection measures are necessary. A hierarchy of authority is described, whereby regional and local officials may act to prevent flooding if necessary, as well as, engineers.

5 *Regulating Water Resources and Services*

Function five addresses the regulatory mechanisms in place for achieving goals related to water delivery, protection and services. Sub-function 5.3 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 is covered the least within function five, in a single legal document. While some components receive much attention and clear step-by-step guidelines, others are awarded less official verbiage. It therefore becomes unclear from time-to-time if Egypt relies on written laws and policies to guide regulation and enforcement or some alternate mechanism.

Table 5. Function Five and its five sub-functions used for analysis.

	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 (including enforcement)
5.4	Protecting aquatic ecosystems
5.5	Monitoring and enforcing water service standards

5.1

Sub-function 5.1, issuing and monitoring operating concessions to water service providers, is not addressed in either of the policy. It does occur in Law No. 12. According to this law, the MWRI issues licenses to construct or operate water-pumping machines for the purposes of irrigation or drainage. Certain machinery might be allowed in public utilities or in the banks of public canals and public drains. The responsibility for decisions surrounding this rests with the MWRI. It has the right, at any time, to issue an order for transference of any machinery, which might be found in the certain utilities or banks. The ministry also has the right to order its removal, if an alternative methodology is found to better serve the purpose of irrigating or draining the land.

5.2

Sub-function 5.2, enforcing withdrawal limits associated with water rights, is the regulatory component that complements sub-function 3.1. The policy documents focus on transboundary allocations per sub-function 3.1, but sub-function 5.2 is not addressed within these same documents.

Within the legal documentation, Law No. 12 and IP 213/14900 contain a few regulation provisions. According to Law No. 12, a license for private irrigation and drainage works located within public properties can be cancelled if any of the licensing conditions are violated. Regarding the division of water, the MWRI may prohibit anyone at any time from taking water from one or more of the public canals in order to ensure the justly distribution of water, that land owner water needs aren't exceeded, and that adequate emergency water is available to serve the public's needs. It is also entitled to stop, by administrative methods, the flow of water into one of the ducts or branches if the beneficiaries do not respect times of turns and the dates of the winter interruption as established by the MWRI. In regards to groundwater and drainage water, it is a violation of the license agreement to exploit water wells or exceed the water rates and quantities licensed to be pumped. IP 213/14900 adjudicates responsibilities for dividing water, which also includes managing water rotation time tables and verifying that each member receives his share of the irrigation water according to these time tables and fixed dates.

5.3

Sub-function 5.3, regulating water quality in waterways, water bodies and aquifers (including enforcement), receives the vast majority of attention. As we have seen, Egypt recognizes that securing water for its people will require pollution mitigation and water quality improvement; a sound regulatory framework may be necessary to achieve ambitious goals related to this priority. Hence, several documents address this sub-function. The current MWRI water policy (NWRP) attempts to achieve its objectives by reducing water health issues and protecting the environment. In the context of water quality protection and pollution abatement, Egypt takes a preventive approach to its long-term policies, which includes the enforcement of laws that protect water resources from pollution. While many initiatives to improve water quality are outlined in this document and the NEAP, specific regulatory provisions are left to the statutes. In

regards to surface water quality, major water quality enhancement initiatives, as read in the policy documentation, are summarized as follows:

- Forming the MWRI Task Force on Water Quality Priorities and Strategies; the Task force has identified priority issues, areas and actions on water quality taking into account groundwater, Nile water, irrigation water, as well as, drainage water.
- Measuring and assessing major parameters of water quality in several points along the Nile system.
- Converting open conveyance system that pass through urban systems to closed conduits.
- Coordinating with other concerned ministries priorities for wastewater treatment plants given budget limitations.
- Introducing environmentally safe weed control methods and banning the use of chemical herbicides; subsidies on fertilizers and pesticides were removed and some agricultural chemicals with long lasting effects were also banned.

The EEAA is given significant responsibility for protecting water quality, as evidenced in Law No. 4. The EEAA is responsible for monitoring the rates and percentages necessary to ensure that permissible levels of pollutants are not exceeded. With respect to establishments, the EEAA is authorized to follow-up on entries in the owner's register to ensure that they conform to the facts, take samples as required, and conduct appropriate tests to determine the impact of the establishment's activities on the environment and the extent of its compliance with laws protecting the environment. The Law states that land and establishment owners are responsible for properly applying for a license, valid for a maximum of five years, to handle hazardous substances and waste; it also requires establishment owners to maintain a written record of environmental impacts his establishment has had.

In addition, this law mandates that establishments authorized to discharge degradable polluting substances must first treat the discharge so as to conform to specifications and criteria prescribed within. In the event of nonconformity the establishment owner or his representative are responsible for immediately notifying the EEAA. The Law No. 4 Executive Regulations define the type of

written record, record retention timelines, and the data of such record. The EEAA is authorized to audit these records and conduct tests using samples to determine environmental impacts. The EEAA will notify the appropriate authority if a violation has occurred and the establishment's owner will be required to rectify the violation.

Additionally, a sanitation management program helps with areas that lack sanitation. This program also addresses the existing institutional and financial constraints, which enhances the inspection authority of the EEAA. The law also protects Nile waters and navigation, by prohibiting dumping. Indeed, many provisions with respect to pollution from ships (oil, harmful substances, sewage and garbage) and from land based sources are included. Detail on floating vessels and ships can be found in Article 50. The owner and employees of ships transporting oil within the port areas, territorial sea, or the economic zone of the ARE, as well as, the companies working in the field of oil extraction are required to immediately notify the appropriate authorities with details of any spillage incidents. Without exception the authorities are required to notify the EEAA with all the accident details, enabling the EEAA to perform its responsibilities as prescribed in this Law.

Directly addressing industrial waste, the Executive Regulations of this law define the specifications and criteria to be observed by the industrial establishments that are allowed to discharge treated and degradable polluted substances. Violators shall be granted a one month grace period to treat the waste and render it compatible with regulations. If the violation is not rectified within the grace period or if the tests indicate that continued discharge would result in severe harm to the water environment, then discharge shall be halted by administrative means and the establishment's license shall be revoked without prejudice to the penalties prescribed.

Regulating water quality is addressed in two additional legal documents. According to Law No. 12, and in order to protect public water bodies, it is not permitted unless licensed by the MWRI to undertake activities that can ultimately damage water banks and other lands or constructions. The discharging of solid, liquid or gaseous waste from various sources into the waterways is prohibited by EPLR 48/8, unless a license is acquired from the MPWWR.

Standards set are based on those proposed by the Ministry of Health.

5.4

Egypt's aquatic ecosystems are also under serious threat by water quality deterioration, and thus sub-function 5.4, protecting aquatic ecosystems, is referred to in the documentation. The current water policy (NWRP) of MWRI acknowledges the interconnectedness of water quality, human health and ecological viability. Though environmental protection is strongly advocated, we must turn to the legal framework for specified tasks toward achieving this objective.

The law prohibits the use of certain pesticides and herbicides. Specifically, EPLR 48/8 prohibits storing, dumping or throwing of toxic substances onto a shore line. EPLR 48/8 also requires that licensed industrial liquid discharged into waterways should not include any chemical pesticides, radio-active substance, which would be suspended in waterways or any substance harmful to human beings, animals, plants, fish, or birds. And EPLR 48/8 prohibits the discharge of any raw industrial liquid effluent or industrial cooling water into fresh water bodies or ground water reservoirs. When the Ministry of Agriculture grants exceptions to the law, it is required to exercise care when selecting pesticides to abate pests, so as not to pollute water channels and to avoid the washing of pesticide equipment in the water channels. The EEAA's role in the protection of the water environment from pollution is carried out through pilot studies and mitigation measures.

5.5

Sub-function 5.5, monitoring and enforcing water service standards, is addressed through the NEAP and Law No. 4. While implementing the proposed tasks of the Water Quality Management Program, one anticipated outcome according to the NEAP, was improved water services. In direct support, the Five-Year Plan includes the goals of improving water coverage and service quality.

Law No. 4 demonstrates that there are mechanisms through which competent authorities (primarily the MSEA, EEAA and MWRI) can enforce and monitor the standards and specifications of water services. Indeed, an Enforcement Unit that is responsible for monitoring compliance, performing inspections, and generally

enforcing Law No. 4 of 1994 and Law No. 102 of 1983, has been created at the EEAA. Approximately 40 inspectors have been trained and are working as of 2001. Therefore, EEAA conducts field work following-up on compliance with the criteria and conditions that are binding to agencies and establishments. Monitoring and enforcing activities consists primarily of examining water service standards and specifying allowable levels of treated and untreated industrial and sewage effluents to be discharged into water supplies.

PROCESS FEATURES

The Global Water Partnership (GWP) identified ten criteria elements for "effective" water governance (Rogers and Hall, 2003). These ten principles were further refined by the United Nations (UN) and the World Water Assessment Program (WWAP), producing a list of eight basic features of "good governance" (see Concept and Framework Part II, p. 13). These were all assessed, integrated and some adapted, resulting in five key process features (see Box 5 for abbreviated explanation; see Appendix 1 for full description). For our analysis we used only four of the five features as one, the rule of law, proved to be a feature that, for its intrinsic nature, is rarely if ever mentioned in an explicit manner in the policy or legal documents. The following analysis offers insights into the degree that these process features are present in Egypt. However, it is important to note that they are more abstract than the functions and, therefore, an analysis of their occurrences is inherently more subjective.

Box 5. Governance Process Features:

Transparency. *Information should flow freely within a society. Governance processes and decisions should be open to scrutiny by the public.*

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.*

Accountability and Integrity. *Governments, the private sector and civil society organizations should be accountable to the public or the interests they represent.*

Responsiveness. *Institutions and processes should serve all stakeholders and respond properly to changes in demand and preferences, or other new circumstances.*

Rule of Law. *Legal frameworks should be fair and enforced impartially.*

1 *Transparency*

Water governance transparency, or the willingness of governing institutions to share water-relevant information with the public, can be found in Egypt's policy and legal documents. Language that indicates some intent for transparency is present within four of the provided documents. The NEAP states that water pollution indicators, such as E-coli and other organics, on the Nile River were published in a report by the MOHP in 1999. Additionally, a national Master Plan is advocated in this document, through which information on environmental and water pollution would be available to stakeholders, NGOs and other interested parties. The NWRP does not contain evidence of this process feature.

Within the legal documentation, there is frequent reference to mandating transparent actions. In Law No. 4 and within IP 213/14900 there is an emphasis on the record keeping of financial expenditures and water use quantities, particularly in regards to WUAs and WUUs. In addition to keeping these records on the premises, it is stated that they must also remain accessible. Another emphasis is on the accessibility of published reports, including environmental health and pollution indicators, as well as minutes from WUA meetings. It is also stated that certain information must be published in the Egyptian Gazette, including Decrees. Law No. 12 specifies that seasonal changes in water distribution must also be published in the Gazette.

2 *Participation*

There is a strong emphasis on participation in Egypt's policy documents, and less so in the legal material. Both the NEAP and the NWRP cover this process feature. Though Egypt continues to govern water centrally, the policy documents clearly advocate a shift toward decentralization. This shift, involving the increasing role of WUA and stakeholder involvement, is representative of intent to integrate participation, and the term "participation" is itself utilized specifically several times in these two documents. According to the documents, the new reforms have enhanced community participation in environmental issues and have developed institutional changes that have enhanced the role of both private and public sector stakeholders; for example, at the center of the NEAP updating process is the engagement of stakeholders. The NEAP strongly focuses

on stakeholder engagement, including creating partnerships and working groups, as well as initiating collaborative processes for dealing with major environmental concerns. Furthermore, the initiative to combat desertification calls upon all stakeholders for their participatory involvement. It is stated directly that future decisions should involve input from key actors, as well as the pre-existing information that's been gathered from various interest groups. In terms of irrigation water management, farmer involvement is advocated, as is the incorporation of the private sector.

The NWRP advocates decentralization, specifically in regards to input from the WUA and community development associations. In fact, broadening the role of the WUAs, by increasing the scope of their responsibilities beyond the Mesqa level, is suggested here. The role of women is addressed in both of these documents, as well. As women participate in farming activities and typically manage household sanitation, their voices in water planning are becoming increasingly important. Additionally, indigenous practices for managing wastewater will be incorporated into future sanitation management programs.

Though legal coverage is less comprehensive, two of the documents acknowledge participation. Law No. 4 states that each citizen of Egypt has an interest in the environment and, therefore, has the right to report violations. IP 213/14900 states that one purpose of creating WUUs was specifically to increase farmer participation. This includes participation in meetings, voting, and contesting established costs.

3 ***Accountability and Integrity***

In both the policy and legal documentation, accountability is covered quite comprehensively. The two policy documents suggest that social and environmental factors be considered in decision making, as well as economic factors. This will ensure that impacts upon future generations are mitigated. The NEAP emphasizes environmental impact assessments and on-going monitoring, as well as training to ensure projects are being appropriately implemented. Key to this process is the policy goal to decrease mortality rates associated with the lack of safe drinking water. Egypt claims it will select projects that are likely to favor this goal. Lastly, the inclusion of indigenous practices in sanitation management indicates consideration of diverse interests.

Three legal documents contain coverage of this process feature: EPLR 48/8, IP 213/14900, and Law No. 4. A strong focus is on environmental impact assessments (EIAs), anti-corruption measures, and periodic compliance inspections. IP 213/14900 emphasizes anti-corruption measures aimed at such things as WUU funds, multiple signature requirements for disbursements, appropriate and inappropriate uses of funding, and periodic financial audits. Decision-making, through majority vote, requires that at least half of the members are present, and those with a vested interest in the outcome of a vote may not participate in the voting process. Additionally, WUUs must be registered and the implementation of WUU projects must be supervised. Law No. 4 requires EIAs prior to licensing new establishments, through criteria listed by the EEAA, though the EEAA may revise its requirements at any time. The EEAA will subsequently evaluate establishments for compliance with environmental regulations and record results of evaluations in writing.

4 ***Responsiveness***

This process feature is also covered comprehensively in both policy and legal material. Addressed in both of the policy documents is the necessity to consider the needs of various sectors, and take into account social and environmental impacts. The NEAP addresses the need to respond to deteriorating water quality and plan appropriately for the future so that further degradation does not occur. For example, long term plans to control pollution include innovative strategies such as closing off open conveyance systems. Additionally, wastewater infrastructure and sewerage connections should be improved and increased. Protecting fisheries and recreation resorts—two large economic enterprises in Egypt—is also advocated, through mitigation of lake water pollution. The NEAP also addresses water quantity concerns. For example, Egypt recognizes the need to shift toward demand management. Also, a current initiative is to allocate available water resources based on needs and demands that are economically feasible, as well as, gain social acceptance and political support. Wastewater treatment and reuse are integrated into plans as well, to augment limited surface supplies. The NEAP also acknowledges the necessary training required to implement their strategic goals, which will involve variation based on stakeholder needs, and will also target women. The NWRP clearly pushes for Egypt-specific water plans. A task force, which assessed Egypt's needs, concluded that health and safe re-use of wastewater are top priorities for Egypt.

Integrated Water Resource Management (IWRM) is advocated, because it enables consideration of conditions specific to Egypt, thus responding to the needs of the country rather than a generic template. Additionally, there is a call to Egyptian law makers to avoid laws that are not implementable.

Legal coverage of this process feature was covered thoroughly in Law No. 4 and was also found within IP 213/14900. Law No. 4 specifically states that changes should be made based on results of environmental impact assessments. There is also a comprehensive provision addressing disaster preparedness, which stresses the importance of assessing which areas may experience impact and to what extent, then evaluating scientific information to prepare a plan for how to deal with disasters when and if they occur. This provision also specifies which governing bodies will be responsible for said disasters and it creates a central call center from which the appropriate authorities may be dispatched in times of disaster. IP 213/14900 also refers to WUU issues and describes how union concerns will be responded to by the general assembly. The assembly is required to meet at least annually to address financial and other concerns of the union.

CROSS-CUTTING CATEGORIES

To add to the richness of our analysis, we incorporated an assessment of two broad cross-cutting categories – water sources and water uses. These two categories dissect the broad term "water" into more specific terms. Examined in conjunction with the function and process analyses, this cross-cutting analysis can shed light on which "types" of water Egypt values, uses, prioritizes, and more. When assessing these cross-cutting categories we looked primarily for overarching themes that were contained within the documents.

1 *Water Sources*

Cross-cutting category one describes the origin of water resources (Box 6). Surface, ground and derivative water are managed and addressed as autonomous water sources. Management and conservation strategies do not explicitly consider the hydrologic connection between surface and groundwater, whereas co-management of these sources is considered optimal for long-term resource conservation.

Table 6. Cross-cutting category 1 and its three descriptors.

	Water Sources
1.1	Surface water (rivers, lakes, precipitation flow)
1.2	Groundwater (aquifers, base flow)
1.3	Derivative Water (wastewater, gray water)

To begin, approximately half of the legal and policy documents do not specifically address a particular water source. A list of these documents is as follows:

- Environmental Law No. 4 of 1994
- Implementation Procedures for Law 213 of 1994
- Decree 14900 of 1995
- Ministerial Decree 143 of 1999
- Ministerial Decree 277 of 1999
- Irrigation Drainage Law 213

There is a heavy focus on surface water supplies among the documentation that references specific sources, in comparison to ground and derivative sources. As examples, the NEAP of Egypt addresses all three subsections, but gives surface water most of the attention as does the NWRP. Most water-related issues in Egypt revolve around the availability, accessibility and quality of surface water. While the Nile is the source of the vast majority of Egypt's water resources, minimal contributions from additional sources exist as well, including the deserts' aquifers, Sinai's aquifers, flash floods and rainfall. The latter assists in replenishing supplies in Lake Nasser, the major storage reservoir on the Nile.

With the Nile being the primary source of Egypt's water there are a number of concerns being addressed. The documents address Nile's branches and canals, Nile water resources from Lake Nasser, the construction of and uses of mechanical devices that extract water from the Nile, and the sources of pollution entering the Nile system. The policy documents, NWRP and NEAP, speak to these concerns in great detail. Rainfall and flash floods can serve as a potential source of useable water, and also deposit sediment and other pollutants into the Nile and surrounding deltas and lakes; this fact has prompted some to harness this water source. The NEAP states that harnessing this source of water also

simultaneously addresses ground water contamination. Furthermore, this same document focuses much attention on the need to protect the quality of water in lakes and not just for the sake of having safe drinking water, but to also protect the natural habitats of these lakes – namely fish.

The legal documents are richer in content in regards to ground and derivative waters. These documents reflect and discuss the complexities involved with utilizing and protecting aquifers and minimizing the effects of derivative water. The complexity arises from socio-economic impacts, technology impacts, multi-disciplinary institutional impacts, and the regulatory climate, too. But despite the increased complexities Egypt has made great strides since the early 1990s to enact and enforce its new and expanded water laws. Most simply, this is reflected in the number of legal documents versus the number of policy documents. The most notable areas that are given attention by both the legal and policy documents include the aquifer systems, water quality, and pollution. In fact, the EPLR 48/8 emphasizes the need to reduce or eliminate water pollution so as to protect the chain food supply. The legal documents give teeth to the policies by describing the government agency responsible for monitoring and enforcement, as well as the consequences of non-compliance.

2 ***Water Uses***

Cross-cutting category two describes the use or sub-sector focal point of the water resource. Seven terms describe the range of uses of water (Table 7), with 2.7 accounting for any uses left undefined within the first six descriptors.

Table 7. Cross-cutting category 2 and its seven descriptors.

	Water Uses
2.1	Irrigation
2.2	Municipal
2.3	Industrial
2.4	Environmental
2.5	Hydropower
2.6	Fisheries, Navigation, Recreation
2.7	Other (including Social, Aesthetic, Religious)

Water uses are more clearly represented by the policy and legal documents than water sources. Yet, there are several documents that don't specifically address a particular use:

- Environmental Pollution and Legislative Regulations Law 48 of 1982
- Pollution of River Nile Water Channels Law 48
- Ministerial Decree 143 of 1999
- Ministerial Decree 277 of 1999

The policy documents, though overall coverage was minimal in comparison to the legal documents, address irrigation the most. In a generally broad sweeping manner these two policy documents take aim at the water needs of agriculture, water quality, hydropower, industry and household water needs, habitats that depend on the availability of clean water, and the tourism industry's needs. All other uses are covered to some extent, with 2.4, the environment, only addressed by the NEAP. The NEAP addresses how Egypt's water should be utilized. This speaks to the necessity of adequate water supplies for the needs of agriculture, but also stresses not to over-irrigate the land, thus simultaneously addressing the topic of conservation, too. Planting and harvesting agricultural lands within desert areas using groundwater is encouraged. This helps relieve the pressure off the Nile for its water, but transfers these pressures to aquifers. Development strategies are underway to decide how best to confront this issue, too. In addition, the NEAP explains the environmental consequences of non-compliance with water laws, namely the loss of biodiversity. However, to date, there are no clear statistics that quantify the rate of biodiversity loss in Egypt.

The legal documents address similar areas, but in greater detail than the policy documents. By far the most prominent sub-categories being discussed were irrigation, fisheries, navigation, and recreation, with environmental uses not addressed at all. Irrigation garners the attention of IP 213/14900 and Law No. 12. Despite the single focus, these documents in particular provide the needed legal framework by which individuals, landowners, industries, and government agencies are bound to operate by. The discussions weave among how to obtain a license for water related projects, record keeping requirements, inspections, violations, remedies, and the consequences for non-compliance.

The use of water for drinking is highly salient on the agenda given that Egypt's

population is growing exponentially. On the positive of this issue is the fact that more and more Egyptians have access to clean and safe drinking water. Right along with human water consumption needs are the needs of industry. In particular, the industry of tourism and its economic benefits exemplifies the need to strike a delicate balance between all water users – agriculture, human consumption, environmental and natural habitat, and industry.

The other dominantly represented sub-section – fisheries, navigation, and recreation – is extensively addressed by Law No. 4. Here we find a significant focus on the sources of pollution. For example, shipping vessels are forbidden to discharge oil, untreated substances, waste, and liquids directly into the Nile and other waterways. To help ensure compliance the authority figure, Minister of Maritime Transport, can issue and revoke ship pollution prevention certificates. In sum, these examples generally point to how *not* to use Egypt's water resources and the associated risks and consequences.

Summary and Conclusions

The three-pronged analysis approach implemented above offers insight into Egypt's water governance capacity at the national level. While assessment of on-the-ground criteria is crucial for a more thorough evaluation, the document analysis provides a benchmark for determining gaps in governance as well as an enriched understanding of national priorities.

Egypt has recently published two separate national policy documents, the NEAP and the NWRP, which clearly outline goals associated with the majority of the functional responsibilities and process features discussed above. The legal backing for these policies is less evident, at least in terms of content of the provided legal documents. A notable observation related to this is that the regulatory mechanisms (function five) do not resonate as strongly as other functional areas, such as capacity building (function one). Further research ought to be carried out to explore Egypt's regulation process in detail. For example, does a regulation have to be codified in law in order to be enforced? With this in mind, a few additional observations from the analysis are summarized here.

Egypt clearly seeks a stronger, more effective, and more efficient water sector,

evidenced by the heavy focus on reorganization and capacity building. In order to plan for supplying its people with water demands in the coming decades—a daunting task acknowledged as such within the documentation—the government is taking a variety of measures aimed at both water quality and water quantity, attempting to divide responsibilities for such tasks appropriately among the central government, decentralized authorities, stakeholders (including farmers), NGOs and the private sector. It is unclear from assessing the documents alone whether or not Egypt has access to necessary funds 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 on the Nile for such a large proportion of its water, the documents also have a heavy focus on this water source. Concerns for water quality have triggered pollution mitigation measures, as well as a greater focus on industry accountability for waste disposal. To increase supplies, Egypt has plans to increase its share of the Nile, as well as to explore alternative strategies to river withdrawals, such as desalination, wastewater treatment and reuse, harvesting rainwater and flashfloods, and exploring groundwater potential. Agricultural practices and irrigation regimes also receive significant attention as areas where conservation could lead to increased water yields. One approach not considered here, however, is water markets or a comparable plan to facilitate water rights transfers.

Egypt is attempting to improve the accountability of water users, including in industry and agriculture, to one another. 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 documentation, 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. While goals for both ensuring quality water and regulating adjudicated withdrawals are expressed extensively, as stated above, the enforcement mechanisms are less clear.

It is unclear how participatory water management currently is in Egypt, but

involving a greater number of actors in the process is advocated. This appears to be partially in response to changing environmental and social conditions, 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 solely explored Egypt's policy and legal framework for governing water, by assessing published documents at the national level. As many other dimensions are important to consider in assessing overall water governance capacity, this analysis should be read in conjunction with the two complementing analyses. Additionally, as national legal and policy documents are updated in the future, they should be incorporated into this analysis so that it reflects Egypt's *current* legal framework, thus offering the most accurate and useful insight.

Appendix 1: Governance Process Features

1. **Transparency.** *Information should flow freely within a society. Governance processes and decisions should be open to scrutiny by the public.* In practice, this requires demonstrated willingness by governments to share information related to water sector policy, legal, and regulatory changes, development plans, water allocation decisions, water resources status and uses, and the like**.**

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*. In practice this requires the demonstrated willingness by the government to solicit and consider input from stakeholders in civil society and elected legislators. It also requires the demonstrated willingness of government leaders to make changes and adjustments to proposals on the basis of input received.

3. **Accountability and Integrity**. *Governments, the private sector and civil society organizations should be accountable to the public or the interests they represent*. In practice, governments and other organizations active in water governance should openly disclose their actions and the results of governance decision making and should practice subsidiary, mandating that decisions be taken at the lowest competent level. Governments should also undertake actions to reduce corruption and illicit personal gain in water sector decision making.

4. **Rule of law.** *Legal frameworks should be fair and enforced impartially*. In practice, decisions should be made in conformity with specified laws, practices, and procedures.

5. **Responsiveness.** *Institutions and processes should serve all stakeholders and respond properly to changes in demand and preferences, or other new circumstances*. In practice governments should monitor and note changing conditions of water supply and demand and respond appropriately. Governments should also regularly review and assess their water-related policies, structure, programs, and the resulting outcomes and make appropriate revisions.

Criteria	Score									
	Policy					Legal				
	R1	R2	R3	Final	Meth.	R1	R2	R3	Final	Meth.
1.1	3	4	3	**3**	C	4	4	4	**4**	U
1.2	4	4	3	**4**	C	4	4	4	**4**	U
1.3	4	3	4	**4**	C	2	3	2	**2**	C
1.4	3	3	3	**3**	U	2	3	3	**3**	C
1.5	2	4	3	**3**	C	2	3	2	**2**	C
1.6	3	4	4	**4**	C	2	3	2	**2**	C
1.7	2	3	3	**3**	C	3	4	3	**3**	C
1.8	3	4	3	**3**	C	2	2	2	**2**	U
F1	3	3.63	3.25	**3.38**		2.63	3.25	2.75	**2.75**	
2.1	4	4	4	**4**	U	3	4	3	**3**	C
2.2	4	4	4	**4**	U	1	1	1	**1**	U
2.3	4	4	4	**4**	U	2	2	2	**2**	U
2.4	4	4	4	**4**	U	1	2	1	**1**	C
F2	4	4	4	**4**		1.75	2.25	1.75	**1.75**	
3.1	2	2	3	**2**	C	3	2	3	**3**	C
3.2	2	2	2	**2**	U	2	2	3	**2**	C
3.3	1	1	1	**1**	U	2	3	3	**3**	C
3.4	1	2	1	**1**	C	1	1	2	**2**	C
F3	1.5	1.75	1.75	**1.5**		2	2	2.75	**2.5**	
4.1	3	4	4	**4**	C	4	2	3	**3**	C
4.2	2	2	3	**2**	C	2	1	1	**1**	C
4.3	4	2	4	**4**	C	3	2	4	**3**	C
4.4	4	4	4	**4**	U	2	2	3	**3**	C
4.5	1	1	2	**1**	C	2	2	2	**2**	U
F4	2.8	2.6	3.4	**3**		2.6	1.8	2.6	**2.4**	
5.1	2	2	2	**2**	U	1	2	1	**1**	C
5.2	4	3	4	**4**	C	4	3	3	**3**	C
5.3	4	4	3	**4**	C	4	4	4	**4**	U
5.4	2	2	1	**2**	C	1	2	2	**2**	C
5.5	2	2	3	**2**	C	3	1	2	**2**	C
F5	2.8	2.6	2.6	**2.8**		2.6	2.4	2.4	**2.4**	
Functions	2.84	2.99	3.03	**2.99**		2.37	2.44	2.49	**2.41**	
P1 - T	2	3	3	**3**	C	3	3	3	**3**	U
P2 - P	4	4	4	**4**	U	1	1	1	**1**	U
P3 - A	2	3	3	**2**	C	2	3	1	**2**	C
P4 - L	2	2	2	**2**	U	1	1	1	**1**	U
P5 - R	4	4	4	**4**	U	2	2	2	**2**	U
Processes	2.8	3.2	3.2	**3**		1.8	2	1.6	**1.8**	