

**WATER AND SANITATION
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**REVIEW
OF INSTITUTIONS IN THE
WATER AND SANITATION SECTOR
IN THE NEAR EAST**

WASH FIELD REPORT NO. 119

JULY 1984

The WASH Project is managed by Camp Dresser & McKee Incorporated. Principal Cooperating Institutions and subcontractors are: International Science and Technology Institute; Research Triangle Institute; University of North Carolina at Chapel Hill; Georgia Institute of Technology—Engineering Experiment Station.

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Prepared for the Near East Bureau
Agency for International Development
Under OTD 159

Prepared by:
David Laredo, P.E.
James A. McCaffery, Ph.D.

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EXECUTIVE SUMMARY

Background and Purpose

Investments in the water and sanitation sector in the Middle East increased substantially in the 1970s and will continue to expand in the 1980s. For the most part, these investments focused on developing infrastructure in urban areas, and although there has been some work in the organizational and training area there has been little sustained effort to strengthen the overall management capability of the institutions involved in the sector. This raises the possibility that institutions in the sector are not developing at a rate that will allow them to manage and operate the hardware being installed.

As future investments are contemplated, it is clear that the issue of institutional development needs to be addressed in order to assure wise utilization of limited development funds and to enhance the possibility of projects achieving self-reliance.

This issue is important throughout the world in the water and sanitation sector, but nowhere is it more important than in the Middle East, given the planned AID sector investments (especially in Egypt). Yet, although this issue has risen in prominence, no systematic attempt has been made to describe capabilities of water-sector institutions in the Middle East.

In order to help meet this need, the Near East Bureau of AID asked the Water and Sanitation for Health (WASH) Project to prepare a report which would review the institutional setting and identify key institutional issues within the water and sanitation sector. The report's limited scope allowed selected countries to be surveyed, and Egypt, Jordan, Tunisia, and the Yemen Arab Republic were chosen. The report was prepared under the guidance of the Subcommittee on Institutional Development of the Water Resources Committee of the Bureau and it includes the following:

- a description of the institutional setting of the country's water and sanitation sector, including the significant institutions, their organizational makeup, activities, responsibilities, and inter-linkages;
- a discussion of sector trends in terms of programs, investments, and coverage by the institutions responsible for service delivery;
- identification of problems, constraints and other issues affecting the sector and the provision of water and wastewater service;
- a general framework for examining the status of institutional development in each country;
- an indication of limitations of the data and identification of areas where there is little or no data available.

The document provides an overview of institutions and institutional development in the countries studied. It does not go into any one institution in depth, but rather gives a sense of the overall institutional environment.

Institutional Development Framework

Soon after beginning the research for this report, it became apparent that there was little clarity or agreement on how to define "institutional development." A framework was needed within which documents or parts of documents could be chosen and reviewed and which could help organize the data related to the analyses of institutional capabilities. Without such a framework, "institutional development" would imply different things to different people.

The framework chosen was based on the AID Policy Paper on Institutional Development. This paper provides a basic framework for institutional development analysis and its principles are consistent with those cited by the World Bank as necessary for successful water supply and waste disposal programs.

There are a number of "areas of concern of institutional development" cited in the AID document which were adopted and reorganized into the following six basic categories:

1. Policy Environment
2. Appropriate Organizational Structures
3. Internal Effectiveness (includes several subcategories)
4. External Effectiveness
5. Transfer of Technology
6. Capitalizing on Local Capacity/Participation

In each country chapter, analytic data (where available) is included under each category.

General Findings

Egypt

There are some important general findings to be noted about each country. Although Egypt is in the enviable position of having abundant supplies of surface and groundwater, there is limited access to potable water and a lack of proper sanitation facilities. Every report and study concerning either facilities design or evaluation of Egypt's water and sanitation sector cited three factors as the biggest constraints: (1) the lack of trained manpower for operating the facilities, (2) institutions which lack the proper technical and managerial personnel, and 3) weak management systems.

Each of these constraints relates directly to institutional development. At present, it means that operations of the existing water supply and sewerage facilities in Egypt are substandard. Urban facilities, in particular, do not perform as designed and lack acceptable levels of quality control. This finding raises the possibility that the rather large investments planned by AID and the Government of Egypt might not be fully effective in the future unless institutional development is given a high priority.

Jordan

Jordan, unlike Egypt, does not have either adequate groundwater or surface water. The average consumption (in 1980) is estimated at ten gallons per person daily (one of the lowest levels in the Middle East). In addition, as in most countries, sewerage has lagged behind water, indicating, therefore, that what underground water does exist is being polluted (particularly the aquifers under Amman).

The shortage of water was exacerbated somewhat by the lack of centralization for water policy and implementation. Because there was no formal coordinating mechanism, there had been some conflict among the major sector agencies, especially over the primacy of water sources. Jordan, however, now has a national water agency whose ambitious sector programs will require more sophisticated technological input which, in turn, will require more highly trained people to manage the operation. Staff turnover, caused by more attractive salaries in some of the Gulf states, makes this situation difficult. As in the case of Egypt, these are important issues of institutional development.

Tunisia

Tunisia appears to be the Middle East's water and sanitation success story. Two powerful agencies to direct the provision of water supply and wastewater--one responsible for water and one for sewerage--were established by the government to extend the benefits of water supply and waste disposal services to as great a portion of the population as possible. The national strategy has concentrated on providing service to urban areas and the marginal population concentrations surrounding these areas. It was intended that these agencies would then extend their jurisdictions to the smaller cities and finally to rural areas.

The Government has been highly successful in upgrading water supply systems serving urban areas. Despite limited water resources and little surface water availability near the coastal areas, where the majority of the population is concentrated, water service extends to approximately 97 percent of the urban population through piped water supplies, with 80 percent of those served through private house connections. Approximately 40 percent of the urban population is directly connected to sewers, while that part of the population that has adequate water supply but is not connected to sewers uses seepage pits for sewage disposal.

The World Bank has stated that "there have been few examples of the Bank's involvement in the water supply and waste disposal sector as successful as the Tunisian experience." The Bank's investment focus in Tunisia, however, as well as that of most foreign donors, has been almost exclusively concerned with urban infrastructure development. The Government intends to focus on the rural areas and the problem of dispersed populations in the future. It may be that a different kind of institutional approach will be needed to deal with the rural Tunisian population.

Yemen Arab Republic

In Yemen, one of the least developed countries in the world, the outlook is quite complicated. Water is scarce, mostly groundwater from springs or deep drilled wells, and 85 percent of the population is rural and spread over 30,000 settlements in 15,000 villages. At this time, only about 14 percent of rural inhabitants have access to water, and there is no piped sewerage at all, nor are there any sanitation services. Thus, it will be a very large task indeed to increase services in the sector in rural Yemen. For example, the agency most directly responsible for rural water concerns is only a department in the Ministry of Public Works, has hardly any trained Yemen staff, is largely dependent on expatriate help, and has no operational authority. Yet, plans call for a five-fold increase in the number of projects in the rural water sector between 1982-86. This raises the strong possibility that rural water development objectives may not be fully achieved, as there is little significant institutional development activity planned to support the infrastructure development.

The urban picture in Yemen is brighter. There is an ambitious agency in charge of water supply and sanitation and it projects coverage of approximately 75 percent of the population in the five largest urban centers with water supplies by 1986 service and 60 percent with sewerage. While its record is one of positive accomplishment, the urban water and sewerage agency's on-going construction program coupled with its levels of material and human resources is severely strained in its ability to concentrate effectively on the daily problems of system operation.

Conclusion

It is clear that the one dominant theme in the water and sanitation sector in the four countries surveyed is expanded investment. New facilities are to be built, new hardware installed, old facilities rehabilitated, and new project areas considered. To construct, operate, and maintain all of these will require an increase in the level and numbers of skilled human resources, both at the technical and managerial levels. Moreover, it requires a long-term commitment to the kind of institutional development which is needed to insure appropriate management of investment in the short run and the effective and efficient delivery of services in the long run.

This review should contribute to discussions of the issues related to institutional development. It is limited in that it is related to the water supply and sanitation sector in each country and is only a review of literature available in Washington. It is hoped, however, that this review and analysis will provide a good overview of the four countries and that the modest amount of analytic data related to institutional development will provide a starting point for concerted efforts leading to improvements in institutional development for the water supply and sanitation sector in the Near East.

Chapter 1

INTRODUCTION

1.1 Need for this Review

The ultimate goal of development is self-reliance. Serious investment in hardware can only be justified if it is operated effectively and maintained over the long term by the system's owners. Yet, there is unease in the water and sanitation sector (as in other sectors) that the lack of focused and substantive effort to develop the capacity of local institutions to manage newly installed hardware may be burdening development investments unnecessarily.

Investments in the water and sanitation sector in the Middle East increased substantially in the 1970s, and--perhaps pushed a bit by the Water Decade goals and activities--expanded investments in the sector will probably continue in the 1980s. For the most part, these investments have gone into water and sewerage infrastructure. Many of these projects have included organizational and training efforts primarily directed towards operation and maintenance improvements, and these efforts have had mixed results. However, there has been little sustained effort to strengthen the overall management capability of the institutions involved in the sector and projects or parts of projects concentrating on institutional development have either been omitted or given low priority.

As future investments are being contemplated, the fact that insufficient serious attention has been paid to institutional development has become more important. Project planning rarely has considered the long-term effect on sector investments if institutions responsible for managing and operating the systems are not strengthened.

This issue is important throughout the world in the water and sanitation sector, but nowhere is it more important than in the Middle East, given the planned AID sector investments (especially in Egypt). Yet, although this issue has risen in prominence, the institutional capabilities in the Middle East are difficult to determine and rarely are adequate descriptions found in a single document.

1.2 Purpose

This report is intended to partially fulfill that need by providing a comprehensive description of institutional capabilities in the water and sanitation sector in selected Middle East countries.

The Water and Sanitation for Health (WASH) Project was requested by the Near East Bureau of AID to prepare a report which would review the institutional setting and identify key institutional issues within the water and sanitation sector. Countries selected to be surveyed were Egypt, Jordan, the Yemen Arab Republic, and Tunisia. The report was prepared under the guidance of the Subcommittee on Institutional Development of the Water Resources Committee of the Near East Bureau.

This report:

- provides a description of the water and sanitation sector's institutional setting, including the significant institutions, their organizational makeup, activities, responsibilities, and inter-linkages;
- discusses sector trends in terms of programs, investments, and coverage by the institutions responsible for service delivery;
- identifies problems, constraints and other issues affecting the sector and the provision of water and wastewater service;
- provides a general framework for examining the status of institutional development in each country;
- indicates the limitations of the data.

The document, thus, provides an overview of institutions and institutional development in the countries studied. It does not evaluate any one institution in depth, but rather gives a sense of the institutional environment.

1.3 Methodology and Sources of Data

The major method used to collect data involved a review of available literature. The report is based on and limited by the available documents and, as such, turns out to be as much an analysis of the state of the institutional development literature as it does the institutions studied. Wherever possible, contradictions in the literature are pointed out, as are places where information was unavailable. It is important to note that no field work was carried out in preparing this report; rather it is based mostly on documents prepared by others such as AID and World Bank reports and sector memoranda, consultants' reports, and analyses by other donors.

In addition to the documents reviewed, other sources of data included:

- A selected number of interviews with staff of donor organizations (i.e., AID and World Bank) and with consultants who had worked in the area. These interviews provided a valuable perception of actual conditions and sharpened information found in the literature.
- A briefing given to AID personnel by engineering and training consultants to Egypt's Canal Cities Water Supply and Wastewater Project.
- A review of aspects of the manpower and training problems in Egypt's Canal Cities Sector with consultants who had firsthand experience with this project.
- A briefing for staff and consultants who conducted a comprehensive evaluation of AID's on-going rural water supply program in Yemen.

- Reviews of drafts of this report by AID's subcommittee on Institutional Development and by Camp Dresser & McKee (CDM) personnel in its WASH and Boston offices.

The documents and reports reviewed and the individuals interviewed are listed in Appendix A.

Generally, the data and descriptions presented in the report exclude specific and detailed descriptions of facilities and endless streams of statistics. The text concentrates on the organizational arrangements, responsibilities, and programs of various sector institutions and their linkages. Statistics are included only for the purpose of defining the major impact of programs and activities on the population served and/or to indicate problems or trends in the institutions, their programs, and the sector as a whole.

1.4 Institutional Development Framework

Soon after beginning the research for this report, it became apparent that there was little clarity or agreement on how to define "institutional development." A framework was needed within which documents or parts of documents could be chosen and reviewed and which could help organize the data related to the analyses of institutional capabilities. Without such a framework, "institutional development" would imply different things to different people.

The framework chosen was based on the AID Policy Paper on Institutional Development(1).^{*} This paper provides a basic framework for institutional development analysis, and its principles are consistent with those cited by the World Bank as necessary for successful water supply and waste disposal programs.

The AID policy paper stated that the following were "the most critical areas of concern in institutional development today":

- the host country policy environment
- the potential of various alternative forms of organization
- the problem of transferring knowledge and technology
- the importance of institutional learning capacity
- improvements of coordination and linkage among institutions
- provision of training
- the role of local initiative and participation

In order to provide an analytic framework, these "areas of concern" were adapted and reorganized by the consultants into six basic categories, one of which has several sub-categories.

* Numbers in parentheses refer to the list of References, which follows Chapter 6.

In order also to provide a framework within which the status of institutional development might be assessed, characteristics of high and low performance (related to the water and sanitation sector) were developed for each category. This framework can then be used as a means to analyze and interpret data and to provide an overall snapshot of institutional development progress in a particular country. The categories, a short definition of each, and characteristics of high and low performance are as follows:

1.4.1 Policy Environment

Definition: An effective institution must be able to influence policies or to formulate and set policies that are favorable to its development. An effective institution also has the requisite charters and/or other legal bases, administrative and political tools to implement and maintain policy objectives.

Characteristics of Low Performance

Impedes institutional development by having contradictory policies in same sector or a policy in one part of the sector that shifts burden to another.

Does not have a clear legal basis or charter to implement policy or has charter but no political backing or administrative incentives to enforce policy implementation.

Characteristics of High Performance

Facilitates institutional development by complementary policy; aims towards long term as well as short.

Has and uses its charter to support policy implementation; engenders appropriate political support and uses it; has and applies administrative incentives to carry out policy.

1.4.2. Appropriate Organizational Structures

Definition: For an organization to be effective, its structure and procedures must be suited to the organization's environment, national administrative and political traditions, the technology around which it is organized, and its intended functions.

Characteristics of Low Performance

Inflexible organization; same structure in place regardless of function or has a structure which contradicts its function.

Characteristics of High Performance

Open to organizational alternatives based on function; autonomously makes changes based on changed policies, failing procedures, or new functions.

1.4.3 Internal Operational Effectiveness

Definition: Organizations rarely are effective externally if they are weak internally. The critical factors which determine the internal effectiveness of an organization include capitalizing and making changes based on institutional learning; having effective management systems in place; having clearly defined roles, responsibilities and decision-making procedures and communication patterns; and providing necessary skills and training; and having clearly defined personnel procedures.

Characteristics of Low Performance

Characteristics of High Performance

(a) Institutional Learning Capacity

Few mechanisms or adaptations; appears to continue to work the same way regardless of environment changes or new interventions.

Open, mechanics for learning and making changes evident based on feedback; capitalizes on training, new technology, new capital improvements.

(b) Management Systems

Weak; few ongoing efforts to strengthen; organizational practices which reinforce weak system(s); little or no planning or plan implementation.

Strong systems, i.e., fiscal, personnel; organizational practices researched/reviewed/revised; planning and plan implementation actively undertaken.

(c) Provision of Skills and Training

Training generally unavailable; available only to privileged few; unorganized/uncoordinated, irrelevant; unsupported by organizational practices.

Training available; actively planned; post-training results used/monitored; organizational practices support training results.

(d) Roles and Responsibilities

Unclear, overlapping, conflicting; seen as imposed/unchangeable.

Clearly spelled out; change according to needs; people perceive they are "in control."

(e) Decision-Making

Inappropriately centralized or decentralized; little participation; decisions made by people furthest from those actually doing work.

Appropriately centralized/decentralized; sensibly participatory; decisions made by those closest to work points.

(f) Personnel Management/Compensation

Little effort to provide performance feedback (in culturally relevant ways) or appraisal (formal/informal); few incentives/disincentives; ineffective hiring procedures.

Active systems in place for feedback, hiring, incentives/disincentives, etc.

(g) Communication

Confused; too formal and unsystematic; prone to rumors.

Clear; systematic; appropriate information communicated at level needed; informal/formal systems congruent.

1.4.4 External Operational Effectiveness

Definition: In the water and sanitation sector, an effective organization must relate to other organizations in two ways. First, it must be active in coordinating with other agencies in the same sector as well as those in other sectors having complementary objectives (e.g., health, housing). Secondly, an effective organization must be able to compete appropriately with other organizations for resources, policy input, and autonomy.

Characteristics of
Low Performance

Establishes few linkages with other organizations; little coordination; does not see itself as autonomous; has trouble obtaining resources and/or appropriate budget allocations.

Characteristics of
High Performance

Actively pursues interorganizational linkages; pushes for coordination and insures it exists; exerts proper pressure for autonomy and resources it needs to do job; is perceived as autonomous by other organizations.

1.4.5 Transfer of Technology

Definition: An effective organization in the water and sanitation sector makes certain that knowledge of technology is made available to appropriate levels within the organization and it influences research units to provide data relevant to sector needs in that country.

Characteristics of
Low Performance

Unsystematic approach to transfer of technology; does not do it; distributes to wrong targets; keeps it hidden; values impractical research or research not relevant to country's own needs.

Characteristics of
High Performance

Generates, adapts and disseminates technology practically, and at appropriate level; influences research units to develop useful data.

1.4.6 Capitalizing on Local Capacity/Participation

Definition: Organizations in the sector have a responsibility to constituents which differs in urban and rural areas. Service organizations must be responsive and accountable to the people served. In rural areas, however, experience has shown it is almost imperative to involve or create a local capacity so that the population served will participate in operating and maintaining systems in a manner appropriate to their environment.

Characteristics of
Low Performance

In rural areas, does not allow participation; it sees itself as "holder" of knowledge; overvalues "expert" role; creates dependency; urban areas, does not see itself accountable to anyone outside agency; creates roadblocks for people trying to make changes.

Characteristics of
High Performance

In rural areas, encourages participation; incorporates local input in its decisions; believes in/uses input; in urban areas, makes efforts to be accountable to policy makers, technicians and users.

1.5 Limitations

This study basically was a review of the literature. There were some data sources of high quality for each country which presented good sector-wide information. While material which allowed the consultants to describe institutional responsibilities, programs, and inter-relationships was plentiful, however, there were no diagnostic critiques or analyses available describing how the service delivery institutions actually functioned or operated on a day-to-day basis.

The reason for this was clear--none of the documents reviewed had as its central purpose the description and/or analysis of institutional capabilities in the sector. Many of the documents had institutional analysis sections, but these were often short and very general. Thus, although it was relatively easy to get general descriptive data, it was much more difficult, and sometimes impossible, to find specific analytic data related to some of the categories in the institutional assessment. This then limited the scope of the institutional development analysis sections for each country in this report.

1.6 Organization of the Report

This report is organized into six chapters. Chapters 2, 3, 4, and 5 include country specific reports, each of which contains both descriptive and analytic data. Wherever possible, significant gaps in the data have been identified, as have places where documentary evidence was contradictory. Chapter 6 briefly summarizes the general findings of the review.

Chapter 2

ARAB REPUBLIC OF EGYPT

2.1 Sector Overview

The Arab Republic of Egypt has an area of some 385,000 square miles, and the World Bank estimated the mid-1981 population at approximately 43 million with a per capita GNP of US\$1,650. The country is divided into 26 governorates, with the largest population concentrated in the five "urban governorates"* including the cities of Cairo, Alexandria, Port Said, Suez and Ismailia. The remaining 21 governorates, collectively known as Provincial Egypt, have a dominant rural population, although some governorates, especially those in the Nile River Delta contain many urbanized areas and in many rural regions there are areas of high population density. The urban population is estimated at 50 percent of the total population and is expected to reach 55 to 60 percent by the year 2000 (3)(15)(17).

Egypt is in the enviable position of having abundant supplies of surface and groundwater. The nation's main source of water supply, the Nile River, provides a plentiful source for over 95% of the nation's population either directly, through irrigation channels, or through wells. The remaining population is served by other groundwater supplies. Problems exist, however, in the distribution of these supplies and with water quality levels.

Egypt's water and sanitation sector has been the beneficiary of enormous foreign donor support, with AID being by far the largest contributor. From 1977 to late 1982 AID has obligated US\$600 million in water and sanitation alone. The Government of Egypt, after decades of neglect, has made the upgrading and improvements of the sector one of its highest priorities. Investments from 1977 to 1981 are estimated at over one billion dollars, with the operations and maintenance (O&M) budget for Fiscal Year (FY) 1982-1983 estimated at US\$100 million. Egypt's announced investment levels for the 1983-1987 period would be more than triple that of the previous five-year period.

Egypt's water and sanitation sector is beset with problems of great proportion:

- About 90 percent of Egypt's population resides in areas served by public water supplies. The five largest urban areas, representing about 30 percent of the national population, are served by either separate water authorities or systems operated by the Suez Canal Company, and the overall production of the urban systems is estimated at 40 to 50 gallons per day per person. Rural water production is estimated at 20 gallons per day per person. Urban

* The definitions of "urban" and "rural" are not the same in Egypt as in the other three countries. However, they were never defined clearly in the literature on Egypt.

supplies, however, are hampered due to insufficient treatment capacity, undersized leaky mains and generally deteriorating infrastructure. Most urban systems cannot supply 24-hour service, and 8 to 12 hours for rural systems is the rule (17).

- From 80 to 98 percent of the population served with water in Cairo and Alexandria have house connections. In the other urban areas those served via house connections range from 40 to 80 percent. These are substantial proportions of the population. Water at the tap, however, is often low in quality and exhibits high bacterial levels due to unsatisfactory chlorination practices, plant over-loadings, or plant failure (often caused by operator negligence).
- World Bank reports indicate that approximately 40 percent of the nation's population (almost all residing in Provincial Egypt) rely wholly or in part on water supplies which are highly polluted (14)(15)(16)(17).
- Sewerage infrastructure in urban areas suffers from deterioration and neglect due to improper maintenance; incidents of overflows and flooding, sometimes numbering in the hundreds are everyday occurrences. Thirty percent of the urban population resorts to "dry disposal" methods for wastewater. Generally there are no piped sewerage systems in rural communities, and only a small proportion of the rural population utilizes private wastewater facilities (pit latrines, septic tanks, soakaways, etc.). Often, sullage water is emptied into the streets, and the fields are used for defecation (10)(17).
- Limited access to potable water and lack of proper sanitation facilities, especially in crowded urban areas and many rural areas, have led to prevalent parasitic and infectious diseases. Typhoid/para-typhoid and infectious hepatitis are endemic to the country, and evidence indicates that the potential risk of contracting waterborne or water-caused disease is very high (11).

Every report and study concerning either facilities design or evaluation of Egypt's water and sanitation sector cited three factors as the biggest constraints:

- (1) the lack of trained manpower for facilities' operation,
- (2) institutions which are bereft of the proper technical and managerial personnel, and
- (3) weak management systems.

The numbers of staff are not the problem. In fact, the staff levels at most facilities have been cited as 20 to 40 percent too high. Overall staff quality throughout the sector, however, has generally been cited as deficient, especially at the technical level. (Alexandria's institutions generally are rated somewhat higher than the others.)

Thus, there are strong indications that the operations of the existing water supply and sewerage facilities in Egypt are substandard by any generally accepted engineering measure. Urban facilities, in particular, do not perform as designed and lack acceptable levels of quality control (7). This raises the possibility that AID assisted facilities, instead of providing public health benefits, will quickly deteriorate to substandard levels of performance and become inoperative.

In addition to being the prime foreign donor contributing to the massive construction programs in Egypt's water and sanitation sector, AID has sponsored many studies and programs devoted exclusively to attempts to bolster the management and operational capacity of the institutions in the sector. (In addition, almost every construction project involving AID participation has had elements devoted to training.) The reports were extremely comprehensive and covered all national and urban sector organizations and included reviews of and recommendations for almost every area of responsibility in these organizations. (The World Bank financed several reports covering Provincial Egypt, i.e., the governorates' needs outside the urban areas.)

AID's 1982 Water and Wastewater Sector Assessment provides an excellent summary of all AID and selected World Bank financed reports. Few recommendations given by these studies have been implemented (7). However, some significant sector-wide progress has been made, namely:

- The National Organization for Potable Water and Sanitary Drainage (NOPWASD) was formed representing a reorganization on the national level.
- A policy to decentralize provincial services has been adopted, and the Beheira Water Company has been formed as a World Bank demonstration project.
- Discussions on sector financing and progressive tariff structures for water and wastewater services and proper incentives for sector personnel have become prominent in the People's Assembly (1982-1983).

The significant institutions in Egypt's water and sanitation sector are shown in Tables 1, 2, and 3. The individual institutions, in theory, appear to have clear cut responsibilities. However, tables 2 and 3, indicate the intricate and extremely complex relationships between the individual agencies and the National Government Ministries.

These tables presented for Egypt are more extensive than those shown for the other three countries in this report for two reasons. First, the number of institutions involved is very large (10 for the five largest cities alone). Second, the inter-relationship between operating agencies and the National Ministries providing capital financing and operational budgets are numerous and make the inter-relationships in Egypt more complex than in the other countries.

The institutions cited in the tables are the result of the government's restructuring of the sector in 1980-1981. The restructuring was intended to streamline administration and to decentralize service delivery by making

Table 1

EGYPT

WATER AND WASTEWATER SECTOR INSTITUTIONS

<u>ORGANIZATION</u>	<u>MINISTRY</u>	<u>CHARACTERISTICS</u>	<u>RESPONSIBILITIES</u>	<u>ACTIVITIES</u>	<u>REMARKS</u>
National Organization for Potable Water and Sanitary Drainage (NOPWASD)	Ministry of Housing Development and Land Reclamation	Nationwide organization for sector activities in provincial Egypt.	Formulates policies and implements planning for capital investments for potable water and sanitation for provincial Egypt.	Plans on national level; provides guidance to governorates for development of potable water supply and sanitary drainage systems; plans, designs and constructs systems and then turns them over to local governorates. Should establish and enforce sector policies concerning tariff structures, objectives, sector development, operational goals, and manpower development. It should also coordinate sector financing by acting as advocate between local governorates and national ministries involved in sector funding, provide input to 5-year plans, provide technical services to local governorates (planning, engineering, O&M) on a fee basis if local manpower unavailable, and provide training programs to develop managerial technical and skilled workers for local governorates.	Established August 1981; not fully operational. Early activities were not being carried out as described because its development from an operating agency to one providing policy and services has been slow. May require significant strengthening of managerial and technical professional staff before it is fully operational.
Department of Environmental Health	Ministry of Health	Carries out most environmental health activities countrywide through its Divisions of Water Quality Control, Wastewater Control and General Sanitation.	Sets environmental health standards including water and wastewater quality standards; monitors all water and sewerage facilities (has no enforcement power. Enforcement normally rests with governorates).	Collects samples and performs laboratory analyses; provides control for food handling and vectors, provides advice to governorates on water, wastewater, solid wastes, food handling.	Lacks trained staff and budget. Equipment and staff levels are low and unmotivated to allow it to function as an effective regulatory body.

Table 1 (Cont'd)

EGYPT

WATER AND WASTEWATER SECTOR INSTITUTIONS

<u>ORGANIZATION</u>	<u>MINISTRY</u>	<u>CHARACTERISTICS</u>	<u>RESPONSIBILITIES</u>	<u>ACTIVITIES</u>	<u>REMARKS</u>
Cairo Wastewater Organization (CWO)		Service agency which plans, designs and constructs all foreign financed facilities. Derives budget from Ministry of Development.	Acts as investment and contracting arm for Cairo/GOSD	Plans, designs, constructs most wastewater infrastructure funded by foreign sources.	Funding by Ministry of Finance
Cairo General Organization for Sanitary Drainage (C/GOSD)		Operating agency, funded by Ministry of Finance.	Operates wastewater infrastructure in greater Cairo.	Operates and maintains all sewers, pumping stations, and treatment plants in greater Cairo. Plans small projects involving laterals and connectors.	Funding arrangements shown on Table 3
General Organization for Greater Cairo Water Supply (GOGCWS)		Integrated water supply agency. Capital funds provided by Ministry of Development; O&M funds from Ministry of Finance.	Development and operation of water supply infrastructure.	Plans, designs, constructs, operates, and maintains all water supply facilities in greater Cairo.	Funding arrangements shown on Table 2
Alexandria General Water Authority (AGWA)		Integrated water supply agency. Capital funds provided by Ministry of Planning; Operation and Maintenance funds from Ministry of Finance.	Development and operation of water supply infrastructure.	Same as for General Organization for Greater Cairo Water Supply (GOGCWS) above, but for entire Alexandria governorate.	Funding arrangements shown on Table 2
Alexandria General Organization for Sanitary Drainage (A/GOSD)		Integrated wastewater Agency. Capital and O&M funds similar to Alexandria General Water Authority (AGWA).	Development and operation of wastewater infrastructure.	Same as Alexandria's General Water Authority, but for wastewater facilities.	Funding arrangements shown on Table 3
Suez Canal Authority (SCA)		General local authority part of which provides integrated water supply services. Funded through own internal budget.	Development and operation of water supply infrastructure.	Plans, designs, constructs, operates and maintains all water supply infrastructure for the three canal cities of Suez; Ismailia and Port Said.	Capital requirements for water supply activities outside Ismailia. City and all wastewater activities in cities handled by NOPWASD. O&M for these facilities handled by governorates. Has reputation of being a well-run organization.

Table 1 (Cont'd)

EGYPT

WATER AND WASTEWATER SECTOR INSTITUTIONS

<u>ORGANIZATION</u>	<u>MINISTRY</u>	<u>CHARACTERISTICS</u>	<u>RESPONSIBILITIES</u>	<u>ACTIVITIES</u>	<u>REMARKS</u>
Governorates	N/A	Twenty-one governorates (excluding urban governorates)	Provision of the water supply and sanitation services.	Operate and maintain all water supply, wastewater and other environmental health facilities not provided by central government or special authorities. O&M funds required for water supply and wastewater facilities from governorate budget, which is provided by the Ministry of Finance. All capital funds from NOPWASD.	Egyptian government policy requires decentralized operations, planning and decision-making. This will require the governorates to assume responsibility for planning and implementing projects for water supply and wastewater within their territory and operating and maintaining any new facilities as well as those given to them by the former central government operating agency. The organization through which the governorates will carry out these new responsibilities have not been prescribed by the central government. Thus, each governorate is free to devise its own institutions.
Beheira Water Co.	N/A	Public Corporation	Provision of water supplies throughout governorate.	(See above.)	First governorate to assume responsibility for water supply service.

Table 2
EGYPT
SECTOR RESPONSIBILITIES FOR WATER SUPPLY*

	Ministry of Development	Ministry of Planning	Ministry of Finance	Ministry of Health	NOPWASD ⁽³⁾	GOGWCS	AGWA	SCA	Governorates
<u>URBAN WATER SUPPLY⁽¹⁾</u>									
A. <u>Policy/Coordination</u>	x								
B. <u>Capital Construction</u>									
- Planning/Implementation						x	x	x	
- Funding		x							
C. <u>Operation and Maintenance</u>									
- Execution						x	x	x	
- Funding (Budgets)			x						
D. <u>Regulatory Enforcement</u>				x					
<u>PROVINCIAL WATER SUPPLY⁽²⁾</u>									
A. <u>Policy/Coordination</u>	x				x				
B. <u>Capital Construction</u>									
- Execution					x				
- Funding		x							
C. <u>Operation and Maintenance</u>									
- Execution									x
- Funding (Budgets)			x						x

* This table is included to show the complex nature of the relationship of development and land reconstruction investment and operating responsibilities among the national ministries and and operating entities.

(1) Five largest cities

(2) Remainder of Country. Governorates thus provide urban and rural services within their governorates.

(3) NOPWASD attached to Ministry of Housing and Reconstruction.

Table 3

EGYPT

SECTOR RESPONSIBILITIES FOR WASTEWATER*

<u>URBAN WASTEWATER</u> ⁽¹⁾	<u>Ministry of Development</u>	<u>Ministry of Planning</u>	<u>Ministry of Finance</u>	<u>Ministry of Health</u>	<u>NOPWASD</u> ⁽⁴⁾	<u>CWO</u>	<u>A/GOSD</u>	<u>SCA</u>	<u>C/GOSD</u>	<u>Governorates</u>
A. <u>Policy/Coordination</u>	x									
B. <u>Capital Construction</u>										
- Planning/Implementation					x ⁽³⁾	x	x	x	x	x ⁽³⁾
- Funding		x				x	x			
C. <u>Operation and Maintenance</u>										
- Execution						x	x	x		
- Funding (Budgets)			x						x	
D. <u>Regulatory Enforcement</u> ⁽⁵⁾				x						
<u>PROVINCIAL WASTEWATER</u> ⁽²⁾										
A. <u>Policy/Coordination</u>	x				x					
B. <u>Capital Construction</u>										
- Execution		x			x					
- Funding		x								
C. <u>Operation and Maintenance</u>										
- Execution										x
- Funding (Budgets)			x							

* This table is included to show the complex nature of the relationship of development and land reconstruction investment and operating responsibilities among the ministries and operating entities.

(1) 5 Largest Cities

(2) Remainder of Country-governorates thus provide urban and rural service within their governorates.

(3) Canal cities only.

(4) NOPWASD attached to Ministry of Housing and Reconstruction.

(5) Ministry of Health ostensibly has regulatory enforcement responsibilities for provincial wastewater as well as urban wastewater. The Ministry of Irrigation also performs a regulatory function nationwide, as they have authority over all agricultural drains. Most wastewater (domestic and industrial) is discharged into these drains prior to their emptying into the Nile River.

service provision the responsibility of the governorates (or the agencies providing service to the five larger urban areas). Prior to this restructuring, two national organizations together with dozens of municipalities and the agencies servicing the five urban areas all shared operating responsibility.

The National Organization for Potable Water and Sanitary Drainage (NOPWASD) was formed by combining two National agencies (one water and one wastewater) which had major responsibilities for facility development and operation. It inherited these agencies' personnel and other resources, although it excluded their physical assets. NOPWASD has no direct operating responsibilities. It is, in effect, an "umbrella agency" created to formulate policy, monitor the governorates' activities, and act as a resource agency for them. The governorates (outside the five urban ones) will be responsible for the development and operation of all facilities within their boundaries.

Since NOPWASD's organization in 1981, only one governorate, Beheira, has organized its water sector activities to furnish water supply services through the newly organized public corporation, the Beheira Water Company. World Bank funded studies are scheduled to begin in late 1983 to determine the optimum organizational design for provisions of water and wastewater service in the three remaining governorates in the Nile Delta area and the Beheira governorate's wastewater subsector (13).

NOPWASD became operational in 1981 and has been in the process of turning over the facilities it formerly developed and operated to the various governorates. There was no information in the documents reviewed pertinent to NOPWASD's adopted systems and procedures or to the extent that they have implemented their coordinating role.

Tables 2 and 3 indicate that no institution has complete control over its budget. Rather, their level of operations and capital programs are dictated by the government's decisions in establishing their budgetary funds. Tariffs for water service are in effect. However, the proceeds are not retained by the individual agencies but sent on to the national treasury. Moreover, the tariff levels have been cited as being totally insufficient to cover even operations and maintenance costs and must be increased if these services are to be provided without requiring massive government subsidies (13)(17). This centralization of budgeting and revenue development appears to contradict the stated policy of decentralization.

The institutions in Cairo and Alexandria provide wastewater services outside their cities. (The greater Cairo service area covers portions of three governorates.) Therefore, they are responsible to the governors of the respective governorates for provision of services.

2.2 Sector Institutions

2.2.1 Cairo Water Supply System

The General Organization for Greater Cairo Water Supply (GOGCWS) is responsible for designing and implementing the water supply projects in the area of Greater Cairo, and for operating and maintaining Cairo's potable and non-potable water systems.

Greater Cairo's water supply is mainly from the Nile, and groundwater is used less extensively. The supply is adequate. However, while the surface water quality is generally good, domestic wastewater discharges, irrigation return flows, discharges from industrial plants, and river traffic have degraded the quality of the water of the Nile and the Ismailia Canal.

The Cairo Water System currently produces about 540 million gallons of water per day. Approximately 75 percent of the production comes from 11 filtration plants and six separate well fields. The eleven treatment plants have been built and expanded over the last 80 years, and all are being operated at a rate that exceeds their design capacity by 25 to 50 percent. Nine of the plants are along the Nile and two are adjacent to the Ismailia Sweetwater Canal.

Water is distributed to seven service areas in several pressure zones. The transmission and distribution system contains about 2,000 miles of pipelines, less than 10 percent of which are major transmission lines, and on-line storage provides only about two hours supply at average rates. Because of the high percentage of old and weakened pipelines, low design operating pressures are used to avoid ruptures and leaks. The low operating pressures and meager storage contribute to inadequate service in many parts of the service area.

About 85 percent of the population having access to the public water system are served through house connections and 15 percent use public fountains, which are mostly concentrated outside the city proper. Those not served use canals, agricultural drains, wells, and streams.

Projects underway include the expansion of one water treatment plant and the construction of two new plants. Together these plants will add approximately 300 million gallons of daily supply capacity to the system by the 1986-1988 period. Another project to provide plant expansion and additions of approximately 220 miles of transmission and secondary pipelines is expected to be under way shortly.

2.2.2 Cairo Sewerage System

The Cairo Waste Organization (CWO) is responsible for financing and constructing the rehabilitation and expansion program for Cairo's wastewater system. Cairo's General Organization for Sanitary Drainage (C/GOSD) has the responsibility to operate and maintain the system.

Cairo's combined sewer system for the collection of sanitary and surface water is approximately 70 years old and covers approximately 65 percent of greater Cairo's population. The principal facilities include six pumping stations

which deliver wastewater to four treatment work sites (Gabel el Asfar, Kossous, Nyhya and Zenein), while a fifth site, Abu Rawash, at present is used only for treatment of sludge. There are some 150 lift stations on the sewer system. Greater Cairo's sewerage system is badly overloaded. The sewer collectors are designed for a population of less than two million, but not close to the five and a half million they now serve. As a consequence, sewage flooding occurs daily. In most cases, pumping capacity is insufficient to handle present flows and stand-by pumping capacity is inadequate. The existing wastewater treatment plants are overloaded and provide wholly inadequate treatment. Only about half the wastewater collected receives any treatment at all.

Improvements to Cairo's sewerage system are being made according to a master plan developed in the late 1970s (and subsequently updated). The program combines a massive effort of rehabilitation and new construction for system expansion and includes provisions for over 100 miles of additional sewers and tunnels, two new treatment plants plus two renovated ones and rehabilitation to most major pump stations and some 100 ejector stations. Most of these works are expected on line by late 1988.

2.2.3 Alexandria Water Supply System

The Alexandria Water General Authority (AWGA) is responsible for the planning, implementation and operation of the water supply serving about three million inhabitants living in Alexandria and a portion of the Beheira Governorate.

Surface waters of the Nile River, carried mainly by canals, are the main water source. Canal capacity is adequate for the water supply needs estimated for the year 2000. Raw water is treated at six treatment plants with a total rated capacity of approximately 200 million gallons per day. Almost all of the plants are being operated at rates 30 to 50 percent above their design rates. Treated water capacity is most acute in the warmer summer months when the demand increases to over one and a half times the rated capacity due to the massive influx of tourists.

The distribution system (connected to the Beheira system at several locations) includes about 1,200 km of pipeline, 40 booster pumping stations, and on-line storage facilities. Most of the transmission main lines are more than 50 years old. About 98 percent of the population has access to the public water system and are served by house connections; the remaining two percent use public fountains.

Construction is underway to implement the recommendations of AWGA's 1978 Master Plan. Current projects include the expansion and/or rehabilitation of three water treatment plants (to provide approximately 120 million gallons per day of additional supply) and the construction of approximately 100 miles of distribution system pipelines, pumping stations, and on-line storage. Most of these facilities are expected on line by the end of 1985. Future projects to address the demands by the year 2000 call for improvements to three existing water treatment plants plus construction of two new plants and additional distribution and transmission piping.

2.2.4 Alexandria Sewerage System

A/GOSD, established in late 1979, is responsible for the design, construction, and operation of the sewerage system in Alexandria. The collection system has over 1,000 miles of major interceptors, secondary and force main sewers, and some 35 on-line pump stations. About 40 percent of the city is sewered and there are many instances of flooding in both the sewered and unsewered areas. Treatment is ostensibly provided through two plants with a combined capacity of approximately 34 million gallons/day. (Treatment is marginal at best.) The city's sewage flows are estimated at almost 160 million gallons per day; thus plant capacity is available for just over 20 percent of the total discharged. Sewage (treated and untreated) is discharged into the Bay, the Mediterranean Sea, and Lake Maryiout south of the city.

Alexandria's sewerage Master Plan was formulated in 1979, the treatment options re-evaluated in the early 1980s, and the first contracts for the long term improvements let in 1981. The first phase improvements, expected on line by the end of 1985, will improve the existing collection and treatment facilities and provide new sewers to the more critical portions of the service area. Phase II, now under design and scheduled to be on line in 1990, will provide for complete treatment and disposal.

2.2.5 Canal Cities

The Suez Canal Authority (SCA) is responsible for the design, construction and operation of the water systems in the three Canal Cities (Port Said, Isamilia and Suez). NOPWASD has similar development responsibility for wastewater. The Governorates of Port Said, Ismailia and Suez operate and maintain these sewerage systems in the cities in their respective governorates.

All three cities have their own treatment facilities to treat water which is obtained from raw water from the Nile via the Ismailia-Port Said Sweetwater Canal System. About 70 percent of the population have water service through house connections while the remainder are served by public fountains or private wells.

The Canal Cities' sewage collection systems are overloaded and there are frequent incidents of sewage overflows. Due to the flat topography, the collection systems contain many pumping stations and force mains which deliver the sewage to treatment plants, surface drains, or adjacent water bodies. The treatment plants in the individual cities are also overloaded and thus provide only partial treatment. Approximately 55 percent of the population is connected to the sewer system. Construction of improvements to the water supply and sewage systems are under way and are expected to be fully on line by 1986. (Details of the facilities to be provided are described in the AID Project Papers.)

2.2.6 Beheira (Governorate) Water Company

The Beheira Water Company was organized in 1981 under Egypt's Public Corporation Act. It represents the first significant attempt in Egypt's water and sanitation sector to decentralize operational responsibilities from the

national government to the governorates. Little specific data were available in the documents reviewed pertaining to the detailed organization and activities of the Company. Through financing provided by NOPWASD (including a World Bank credit), the Company has begun the construction of preliminary works and final design for a governorate-wide potable water project estimated at US\$100 million. The project includes renovation of the existing water treatment facilities and almost 700 miles of distribution pipeline. New works include four new water treatment plants, storage facilities, and over 400 miles of distribution pipeline.

2.3 Sector Investment Trends

Since 1977, AID has provided the bulk of external assistance to Egypt's water and sanitation sector. From 1977 to late 1983 AID has obligated approximately US\$600 million for water and wastewater infrastructure development in the principal urban areas and additional investments have been made for industrial pollution control. Additional AID investments in this period include approximately US\$75 million for infrastructure in other cities and between US\$300 and 400 million for rural water supply and drainage under AID's Basic Village Services Project. Through 1981 other donors have provided some US\$159 million and the Government of Egypt has provided approximately US\$1 billion.

AID is considering authorization of approximately one billion dollars (mid-1983 level) for the 1983-1987 period for urban infrastructure projects in the sector. The Egyptian government's projections for total sector investments are approximately two-and-one-half times this amount. Except for Beheira, projects for investments in governorate water and wastewater projects have not been estimated. Beheira Governorate's water supply improvements program described heretofore are estimated at about US\$100 million. An added burden on the government will be providing funds for operation and maintenance of the completed facilities.

2.4 Institutional Development Analysis

In this section, information which is more analytic in nature is given under the relevant categories which have been adopted from the AID policy paper. The definitions of each category are in Chapter 1.

2.4.1 Policy Environment

- The Government of Egypt's objectives for the water and wastewater sub-sectors are "infrastructure bound." (The government sets targets for levels of service and the institution responsible for the respective services is left to provide the physical infrastructure to meet them).
- NOPWASD does have a clearly defined charter and clear legislation to set policy. However, there is no evidence that they are acting on this mandate (11).

- While NOPWASD is under the Ministry of Housing, Development and Land Reclamation, the Ministry of Health has major responsibility for environmental health. (However, the MOH is represented on the NOPWASD board.) The MOH does not have sufficient staff or sufficiently trained personnel to allow it to be an effective policy-making body (11)(13).
- All other institutions do not have sufficient legal authority to define policies and set standards. Staff and operating boards are generally unaware of what authority they do and do not have (interview).
- The financial policy that service agencies do not control their own budgets or receive revenue directly is somewhat in contradiction to the government's own decentralization policy.

2.4.2 Appropriate Organizational Structures

- All organizations within the sector have organizational structures which have not demonstrated the flexibility required to meet emerging needs. NOPWASD has not staffed large functional areas such as training, planning, or manpower planning.
- Within the Ministry of Health there are divisions which are set up to provide overall advisory services in water quality control, wastewater control, and general sanitation. This capability does not exist on the local or operational level (11).
- There is insufficient staff at the national level (NOPWASD) to develop policies and monitor implementation. There is insufficient staff at governorate and local levels to operate and monitor systems (11).
- Local boards do not have sufficient internal management authority to reorganize their operation, and tend to focus on expansion of systems rather than proper operation of existing systems (13).

2.4.3 Internal Operational Effectiveness

(a) Institutional Learning Capacity

- The data indicate that there are almost no mechanisms (records, information systems, etc.) to promote institutional learning. The current conditions related to equipment in plant operation and maintenance is a good illustration of this: over many years the lack of control has resulted in a hodge-podge of pumps, machinery, fittings with no standardization, and no system for proper stores or inventory control (interview).

- The lack of coordination among entities (and within specific institutions) which build systems and those who operate them means that records, designs, and as-built drawings are not available and cannot be used for improvements in the future (13).

(b) Management Systems

- Water distribution systems have excessive losses ranging from 40 to 60 percent of water lost and unaccounted for (11).
- In the realm of operation, "drinking water and sewage treatment plants... do not consistently produce safe outputs" (11).
- Although NOPWASD is currently charged with responsibilities for training, technical services, manpower development, etc., it has failed to perform them adequately to date. This is due, in part, a lack of qualified staff, but primarily it is a problem of management's "not making the transition from two former organizations to a new policy and services organization" (13).
- Almost no experienced, trained managers exist in the systems. The few highly qualified are overburdened and/or leave for higher pay in the Gulf states.
- Overall lack of planning, management control, and supervision exists in all systems.

(c) Provision of Skills and Training

- In almost all agencies, there is a lack of institutionalized and operational training departments, skilled training professionals, and sufficient resources allocated to training in the sector.
- Currently most training is conducted on the job by passing on the practices from one skilled or unskilled worker to another.
- Any other training comes from two year technical schools.
- In general there are no training programs in-house within any of the institutions reviewed and "there is an acute shortage of trained operational personnel in the water supply and sanitation organizations...There are recurrent personnel problems...Professional staff are generally inexperienced and lacking in professional motivation, while technical personnel have almost no opportunities for formal training" (11).
- AID and the Egyptian government, as part of their overall sector program, have spent millions of dollars studying management and training needs. However, very few programs have been implemented to recruit, train, and retain quality personnel.

(d) Roles and Responsibilities

There are few specific data which describe the roles and responsibilities within the institutions reviewed. An exception is the Stanley Consultants Report, Reference No. 7. However, indications are that it is doubtful that these institutions have well defined job descriptions, clear lines of authority, and a sense of coherent internal control. If the sector is generally confused about authority to make decisions and the lack of delegation it is likely that roles and responsibilities are unclear.

(e) Decision-Making

- There is a great deal of evidence that all agencies have neither appropriately centralized nor appropriately decentralized decision making processes. A recurrent theme through all the documents is that decisions are made consistently far away from the point where information resides in the systems.
- There is a pervasive lack of budgetary control in all agencies (13); agencies have no authority to reorganize to meet needs (13), and decisions are pushed up the system because of lack of delegation, generally.

(f) Personnel Management

The data indicate that incentives and disincentives are minimal in all institutions:

- Government policy guarantees a job for each university graduate. This causes the water sector institutions to be overloaded with large groups of high- and mid-level managers, while badly needed technicians are few in number. This government policy has also caused bad morale problems among the small cadre of dedicated professionals which is operating whatever physical plant is available.
- There are no rewards for good performance, pay is very low, and skilled professionals are syphoned off for better pay elsewhere. Managers and technicians may hold as many as three jobs and absenteeism is common (interview).
- The low pay and inadequate incentive packages exist particularly at the skilled craftsman and professional levels. The AID 1983 Sector Assessment (13) recommends that:

"Since base pay levels are regulated by government service salary scales, which must apply to all government workers, the incentive component of compensation must be increased for all workers in the sector. Incentives of no less than 300% of base pay should be provided for all skilled workers and technical

staff. Additional incentives of up to a total of 500% of base pay should be paid to skilled workers and technical staff [where shortages exist]."

(g) Communication

The sources of data do not indicate the manner in which communication takes place within the institutions reviewed. One can infer from the data on decision-making that information probably does not flow smoothly up and down nor horizontally within agencies.

2.4.4 External Operational Effectiveness

- There is almost a total lack of coordination between water and wastewater institutions and those implementing environmental health policy.
- Even where water suppliers and wastewater agencies in the same city (Cairo or Alexandria) are mutually interdependent, there is an apparent lack of coordination.
- "Institutionally the sector lacks direction. There is no coherent set of goals and aims...Organizations and authorities are poorly coordinated...(13), and "the balanced interministerial effort needed to protect and improve environmental health conditions does not occur except in the most minimal way" (11).
- NOPWASD, which is the organization set up to coordinate water supply and sanitation activities, has yet to establish the necessary linkages to do this coordination and the other organizations are unclear about their responsibilities.

2.4.5 Transfer of Technology

No specific information was available in the literature reviewed. Interviews indicated that institutions often opt for levels of technology that cannot be effectively utilized due to lack of sufficiently trained personnel.

2.4.6 Capitalizing on Local Capacity/Participation

No specific information was available in the literature reviewed. Interviews indicated that there is a very limited tradition of public participation in public projects in Egypt.

Chapter 3

HASHEMITE KINGDOM OF JORDAN

3.1 Sector Overview

Jordan is a semidesert country covering approximately 31,000 square miles. The mid-1981 population is approximately 2.4 million, and the mid-1981 per capita GNP was estimated at approximately US\$1,600 (3). Jordan's population is significantly urban; more than 75 percent of the population resides in communities of more than 5,000 persons. The national population growth rate is estimated at approximately four percent annually with many urban centers growing at considerably higher rates. Much of the country's land area is uninhabitable desert. Approximately 90 percent of the nation's population resides in the country's northwest section, which includes the country's principal cities: Amman (the capital), Irbid, Zarqa, Salt, Ruseifa, Jarash, Ramtha, and Mafraq. The combined population of these cities is approximately 1.2 million, including some 700,000 in Amman (24)(27).

Ninety percent of Jordan's developed water supply is used for irrigation. The remainder allows an average of 13 to 14 gallons per person daily for the total population. The World Bank estimated that the 1980 average consumption was approximately 10 gallons per person daily (one of the lowest levels in the Middle East), and if development plans in the water sector fully materialize, this will increase to approximately 23 gallons by 1990, which is still considered low. Inadequate water supply has been cited in several reports as a major constraint to Jordan's national development (24)(27).

After Tunisia (see Chapter 4), Jordan's water and sanitation sectors appear to be the second best organized of the four countries reviewed.

Jordan's water and sanitation sector institutions and their functions are summarized in Table 4 (23)(24)(30)(31). Table 4's text reflects the late 1983 situation prior to many of the responsibilities and activities being taken over by the Water Authority of Jordan (WAJ). The WAJ was established by legislation passed in late 1983 and represents Jordan's desire to establish a single agency formally responsible for water policy, resource allocation, and service delivery. (For years, the USAID and World Bank have been urging Jordan to take such action.)

The WAJ commenced operation in mid-January 1984, assuming the functions and responsibilities of the Amman Water and Sewerage Authority (AWSA), Water Supply Corporation (WSC), and parts of the National Resources Authority (NRA) and Jordan Valley Authority (JVA). The Authority will be part of the Prime Minister's office directed by a Board chaired by the Prime Minister. The

Note: Because of its recent establishment, little published material on the management systems and day-to-day modus operandi of the WAJ was available prior to finalizing this report. The following text assumes that the functions and activities of the significant sector institutions will be similar to those in the past and that the general service areas will remain the same.

Table 4

KINGDOM OF JORDAN
WATER SECTOR INSTITUTIONS

<u>ORGANIZATION</u>	<u>MINISTRY</u>	<u>ORGANIZATION CHARACTERISTICS</u>	<u>RESPONSIBILITIES</u>	<u>ACTIVITIES</u>	<u>REMARKS</u>
Water Authority of Jordan	Prime Minister's Office	Primary national agency in the water and sanitation sector	Makes national water policy and resource allocations and delivers services. Is taking over functions of AWSA, WSC, and part of those of NRA and JVA	Those indicated below for AWSA, WSC and part of those indicated for NRA and JVA	Began operation January 1984. Absorbed the responsibilities of the agencies indicated.
National Resources Authority (NRA)		Partly independent agency and partly under WAJ	Water source investigations; control of private groundwater drilling; development of irrigation schemes	Collects all hydrological and hydrogeological data; drills wells for exploratory, domestic and irrigation use; designs, constructs and operates small irrigation dams; develops, maintains springs, pools and cisterns. (Note: all NRA activities are outside JVA jurisdiction (see below).	Ostensibly the agency having overall responsibility for water resources planning for Kingdom. However, NRA has been hampered by low staff levels, losing many technical staff in "brain drain" to higher paying positions in Gulf. It originally was organized to act as the primary water resources agency establishing water policy and controlling water resources. These activities were stripped via legislation in 1973 which created the JVA and WSC (see below). It is now a relatively "low level" agency and has no involvement with domestic water supply.

Table 4 (Cont'd)

KINGDOM OF JORDAN

WATER SECTOR INSTITUTIONS

<u>ORGANIZATION</u>	<u>MINISTRY</u>	<u>ORGANIZATION CHARACTERISTICS</u>	<u>RESPONSIBILITIES</u>	<u>ACTIVITIES</u>	<u>REMARKS</u>
Jordan Valley Authority (JVA)		Independent agency, but some activities absorbed by WAJ	Integrated development agency empowered to develop the Jordan Valley and carry out all works necessary to achieve development goals. Its primary emphasis is in developing water resources to foster irrigation. All works (excluding those involving water resources) are turned over to local town councils (or the appropriate ministry) for operation.	Undertakes studies to evaluate needs, especially with regard to water resources development; operates hydrological network; provides irrigation water and hydropower through design, construction and operation of facilities; organizes and directs construction of public and private wells; settles disputes involving water rights.	The JVA controls all water resources in the Jordan Valley and is the policy-making group for this area. Ostensibly, NPC concurrence is required prior to making capital investments. Its status has allowed JVA to establish a higher wage structure, and attract and retain a high quality professional staff.
Amman Water and Sewerage Authority (AWSA)		Under WAJ	Provides water supply, wastewater and storm drainage services to the greater Amman area. (Greater Amman comprises the City of Amman, 11 surrounding municipalities and two refugee camps).	Plans, designs, constructs, operates water supply, sewage treatment and drainage facilities. Presently operates one wastewater treatment facility which is under expansion. Two others are expected on line by 1985. Water is untreated due to its high quality.	Manpower requirements may be critical as new waste treatment facilities and expanded water supply and drainage are provided.
Water Supply Corporation (WSC)	Ministry of Municipalities and Rural Affairs and the Environment	Under WAJ	Provides water supply and wastewater services to all areas of the Kingdom outside the JVA and AWSA jurisdictions.	For 1981 WSC supplied and operated water systems in some 350 large and small communities throughout Jordan. In addition, bulk water supply was provided to some 432 other communities which operated their own systems. WSC has recently assumed responsibility for the operation of eight municipal systems previously operated by their respective municipalities. Further, some 10 wastewater treatment plants are now scheduled for design and construction and are expected to be on line by 1986.	WSC's expanded responsibilities for existing and future facilities will exacerbate their manpower needs. Additional training of existing staff is also required.

Table 4 (Cont'd)

KINGDOM OF JORDAN

WATER SECTOR INSTITUTIONS

<u>ORGANIZATION</u>	<u>MINISTRY</u>	<u>ORGANIZATION CHARACTERISTICS</u>	<u>RESPONSIBILITIES</u>	<u>ACTIVITIES</u>	<u>REMARKS</u>
Ministry of Health		Government Ministry	Monitors bacteria levels in water supply.	Laboratory analysis of water samples	Low level of staff and budget make the Ministry's activities relating to the water sector negligible.
Ministry of Municipalities and Rural Affairs and the Environment		Government Ministry	Provides services related to city, village and regional planning and provides infrastructure. Coordinates environmental policy and programs.	Provides technical assistance to local councils for construction, including water supply and wastewater disposal facilities. Administers municipal and village loan fund for municipalities over 1,000 population. Loans amounting to about \$400,000 per year for water sector related projects are made. Coordinates environmental policy and programs with Jordanian and international organizations.	Low staff levels make tech assistance weak. However, does provide a source of funds for smaller areas. Has potential for major role in the water and wastewater sector. However, overall organization is still in the developmental stage.

Board will select the President of the Authority who will have the rank of minister. The WAJ will also establish national water policy and make resource allocations. Its headquarters will be in Amman, and the various regional headquarters will be located throughout the Kingdom. WAJ will take over the WSC's regional headquarters.

Prior to the establishment of the WAJ, the JVA, AWSA and WSC were autonomous agencies responsible for both water and wastewater service within their defined service areas. The AWSA and the WSC were organized as service delivery based organizations, while the JVA was established as an integrated development agency with responsibility for implementing all projects necessary for the social and economic development of the Jordan Valley. The AWSA had responsibility for water and wastewater service in greater Amman (the area with the greatest population density). The WSC had this responsibility for all other areas outside the JVA's service area, including cities, towns, villages, and rural and desert areas (23).

The JVA has had responsibility for all infrastructure development in the Jordan Valley and control over the water resources of the Jordan River between Lake Tiberias and the Dead Sea and the water resources of the Southern Ghor and Wadi Araba Basins, south of the Dead Sea. The JVA's domestic water supply role is small and is confined to supplying water to some 36 settlements in the Jordan Valley, with a total population of fewer than 100,000. It is, however, the only significant institution in the country's irrigation sector, and its activities are immeasurably intertwined in the national water sector. Recognizing that the groundwater sources used to supply the densely populated areas in the country's northwest were rapidly being developed to their limits, the government took steps to integrate the water supply needs of the northern population centers, especially greater Amman, into JVA's overall development schemes (24)(27).

The key JVA projects in Jordan's water supply development strategy are the Maqarin Dam and the East Ghor Main Canal. The Maqarin Dam site is on the Yarmouk River, forming Jordan's northern border with Syria. This project was designed to provide water for irrigation and domestic uses. If constructed as planned, the project would have furnished an enormous additional volume of supply, equal to approximately one half the total now available for all water uses in Jordan. Construction has not begun, however, due to political conflicts, and its commencement is uncertain.

The East Ghor Main Canal (EGMC) is the country's main agricultural aqueduct, and runs from the Yarmouk River southward some 55 miles. The EGMC is being fed through diversions from the Yarmouk River. A conduit to supply drinking water to the greater Amman area from the EGMC is close to being completed (some 35 miles long with the water being lifted approximately 3,000 feet from the valley floor) (20)(27)(30).

JVA has taken steps to redesign other projects (completed or under construction) in an effort to make up for potential storage that has been lost due to the Maqarin Dam's suspension. These revisions, however, should produce approximately 10 percent of the water expected from the Maqarin project and represent only a stop gap measure in Jordan's long-range water planning efforts (32). Suspending the Maqarin Dam's construction has intensified the

need for new efforts in national water supply planning. These efforts are likely to be high on the priority list of the newly formed Authority.

AWSA's sewerage service area has covered the Greater Amman Area, which is everything inside a 15-mile radius from Amman's center. This includes the City of Amman, 11 surrounding villages, 2 refugee camps, and a few minor villages. The 1980 population of this area was estimated to be approximately 1.5 million, and it is projected to grow to approximately two million by 1990.

The City of Amman is the only entity within greater Amman served with a piped sewerage system. Approximately 40 percent of the city's population (270,000) is served, and the bulk of the collected sewage is treated at the Ain Ghazal Treatment Plant. This facility is heavily overloaded with a high strength influent and produces an effluent of extremely poor quality which is unfit for irrigation use. This situation poses a potential health hazard for the downstream population. The unsewered population relies mainly on cesspools which have varying degrees of operational performance. There has been evidence of groundwater pollution due to cesspools leaching into shallow groundwater aquifers (27). In 1984, 150 miles of sewers are scheduled for construction in Amman. In 1985, much of the flow to the Ain Ghazal plant will have been diverted, through a 25-mile pipeline, passing through Zarga to waste stabilization plants now under construction.

AWSA's water supply in the Amman municipality is primarily groundwater from local wells and a well field at Azraq. Most of the served are receiving water under pressure 24 hours a day. Approximately 80 percent of the population is connected to piped systems. There is also a high level of unaccounted for water loss (27)(30).

AWSA has estimated (on an entire population basis) the daily volume of water supplied to Amman averages about 20 gallons per person daily. Outside the city, but within the greater Amman area, estimates of supplies are about half that much (27)(30).

Construction of a conduit connecting Amman's distribution system to the East Ghor Main Canal is scheduled to be on line in 1984. This project will deliver Yarmouk River water to Amman and was designed to satisfy the municipality's water demands, albeit in the range of the modest levels now being supplied, until the year 2000. The effect of delaying construction on the Maqarin Dam on these planned supply levels is unknown.

The WSC, which provided water supply and wastewater services to all areas outside the JVA and AWSA jurisdictions, was organized in 1973 as a government corporation having an independent financial and administrative status. The water supply services provided by the WSC were formerly furnished by the National Resources Authority (NRA). Thus, the WSC inherited a large staff and assumed operations for an established network of wells, springs, cisterns, pumping stations, distribution systems, and desert wells covering a large portion of the populated areas throughout Jordan's five governorates. These systems have been expanded during the last ten years, and the WSC has supplied and operated water systems in some 350 large and small communities and provided bulk supplies to approximately 430 additional communities which operate their own systems (27).

Sewerage has been slower to develop. In 1981, however, the government made WSC responsible for the operations of all municipally operated wastewater systems outside the AWSA and JVA services areas. Since that time, WSC has assumed operation of the water systems of Irbid, Madaba, Tafila, Zarqa, and Ruseifa in addition to the water and wastewater systems of Salt, Aqaba and Jarash (27). The WSC's major development effort over the next several years aimed at providing adequate water supply and sewage collection and treatment and drainage services for some 500,000 people in 12 of the nation's largest urban areas (and one refugee camp) outside of Amman. Most of these projects already have assurance of foreign donor support and are expected to be under construction in the next two years and on line by the end of 1986 or early 1987 (24)(29)(30).

3.2 Sector Institutions

3.2.1 Water Authority of Jordan

The Water Authority of Jordan (WAJ) was formally established on January 15, 1984. The establishment of the WAJ represents the successful conclusion of dialogue by donor agencies, particularly the World Bank and AID, to strengthen Jordan's institutional mechanism for formulating water policy and coordinating investment planning. The WAJ will be a financially and administratively autonomous organization. It will have full responsibility for all water and sewerage affairs, including water policy; water sources identification; design, execution and operation of all projects; regulation of private water systems; and the allocation of water use (33A).

The WAJ has a 12-member Board of Directors, chaired by the Prime Minister. The authority is managed by a President and a Secretary General, both appointed by the Council of Ministers. The WAJ is gradually taking over the functions and staff of all the water agencies in Jordan. The headquarters in Amman has the following departments: Water Supply Operations, Sewerage Operations, Finance and Accounting, Administration, Water Resources Management, and Planning and Project Implementation. Operation and maintenance will be carried out in three regional offices, which will be controlled by water councils (33D).

As of this writing, the WAJ has taken over the AWSA, the WSC, and the Jordan Valley and water resources branch of the NRA. In the future, the water department of the JVA and 400 community operated water systems will also be taken over by the WAJ. At present, WAJ staff number 2,850, mostly from the WSC and AWSA. By mid-1989, WAJ staff is expected to number approximately 5,000. As expected with the creation of a new organization, the WAJ is eliminating overlapping functions and forming new work units and staff from existing agencies. Because the WAJ has been established only recently, little literature is available regarding its operations. To describe the functions that the WAJ is taking over and to provide a historical perspective, the AWSA and WSC, the two former principal water supply and wastewater services agencies, will be discussed. As noted earlier, the WAJ is taking over the functions of these agencies.

3.2.2 The Amman Water and Sewerage Authority (AWSA)

The AWSA, now under the jurisdiction of the Water Authority of Jordan, was established in 1973 as an autonomous authority to take over and operate all water supply, sanitary sewerage, and storm water drainage facilities formerly under the purview of the Amman Municipality. The General Manager formerly was appointed by the Prime Minister to direct the day-to-day operations (23)(27).

The AWSA has benefited from considerable aid from foreign donors (primarily the World Bank and AID) as well as governmental contributions. Activities in the next few years will concentrate on further improvements to the water supply and sewerage infrastructure. Other than increasing the water distribution network into newly sewered areas, there are no specific projects planned by the AWSA in its water supply activities. There may, however, be rehabilitation requirements necessary when the AWSA takes over the water supply facilities outside the municipality.

An AWSA wastewater master plan was completed in early 1982, (financed by AID), and calls for extension of the AWSA system to serve 75 to 80 percent of the city's population by 1990 and more than 95 percent by 2000. For the remaining Greater Amman Area, it will serve approximately 60 percent by 1990 and 60 to 65 percent by the year 2000. Phase one of the master plan was estimated (1980 prices) at US\$150 million. A project to implement part of the first phase is being prepared by AWSA and includes new treatment works, trunk mains, sewers, operational equipment, training, and water distribution works in the newly sewered areas. The project will provide piped water and sewer connections to some 100,000 to 120,000 previously unserved people. A rough estimate of this project's cost is approximately US\$110 million, and the NPC has indicated that prospects for co-financing are promising. The design work is expected to start in 1984, and the facilities should be on line by late 1987 or 1988 (31).

Few data were available on either the specific organizational structure or the functional system employed by AWSA. Its staffing level in late 1981 numbered approximately 930. This level included some 20 top and middle managers, 35 engineering and technical professionals, and approximately 200 operators and technicians involved in the operation and maintenance of the wastewater and water systems. An AID-sponsored study estimated the 1982 staff needs at approximately 1,070 persons with most of the increase being attributed to personnel required for system operation and maintenance (26).

Disagreement exists between AID and World Bank reports (see Section 3.4.1 below for details) regarding whether or not AWSA's salary structure has been competitive with the Jordanian private sector. It is clear, however, that neighboring Arab countries offer higher salaries than either the public or private sector in Jordan, and this has resulted in high turnover in the sector (15 to 20 percent in the late 1970's). The AWSA has organized training activities at the Ain Ghazal treatment plant and is actively seeking support, both Jordanian and foreign, to increase and expand the coverage of these activities. Institutions exist in Jordan to provide training and are described in detail in the AID report (26) mentioned in the previous paragraph. This same report outlined a strategy to implement short- and long-term training studies and programs to furnish the needed manpower skills with a minimum of expatriate involvement (26)(27).

While no firm estimates of the number and type of personnel required past 1982 exist, the AWSA's staff (now WAJ's) will undoubtedly have to be increased and its overall skills upgraded as their program expands into greater Amman.

Separate tariff schedules for water and sewerage services have existed in AWSA's service areas. The water tariff is a progressive block rate structure (lower rates charged for lower levels of consumption) and has been substantially increased in a series of steps over the last ten years. Tariff charges for sewerage service are based upon surcharges on water consumed, and additional revenue is raised through connection charges and one-time contributions required from property owners. Increased revenue to finance the future expansion of projects and increased operational levels will most probably be provided through increased tariffs (27)(33).

3.2.3 Water Supply Corporation (WSC)

The WSC is now under the jurisdiction of the WAJ. Formerly, it had the status of a governmental corporation having an independent financing and administrative status. The WSC was headquartered in Amman and conducted its operations through five regional (or district) offices, one in each governorate capital. The heads of these offices reported directly to the Director General and informally reported to the Governor of the respective governorate on matters relating to provision of services. Eight departments were located in Amman (Administration, Finance, Design, Follow-up, Operation and Maintenance, Legal, General Inspection, and Planning), and their chiefs also reported to the Director General. In addition, the Director General directly supervised the heads of project implementation units established to supervise large projects (23)(30).

The District Offices have had four main sections reporting to the district manager: Administration, Water, Sewerage, and Technical. The Water and Sewerage sections have been primarily concerned with operation and have been subdivided into production, distribution, and collection/treatment units, respectively. Engineering design and inspection services have been the responsibility of the Technical section (30).

WSC's staff numbered approximately 1,200. Estimates made by the WSC and various lending agencies expected this level to increase to approximately 1,700 by 1986 when most of the larger urban wastewater treatment systems will be fully operational. The major staff needs were in the areas of managerial, engineering (including operations), and accounting skills. These skills are difficult to find in Jordan because of the competition from neighboring Arab States (26).

WSC has had a well-developed tariff structure for urban water services, where charges are in line with the cost of services. Water service in rural and desert areas serving approximately 150,000 people are provided free of charge, but these costs have been reimbursed to WSC through government subsidies. Tariffs for sewerage services have also been assessed. These charges, however, would not be adequate if full-scale services, including treatment, were provided. This lack of cost recovery has not severely affected the WSC's operations because their wastewater service has been limited to date. As greater development and operation of sewerage works occur (now under WAJ),

however, the tariffs will require an upward revision. World Bank-funded studies are under way to determine the combination of rate charges and contributions necessary to support the expanded program of water and sewage services (30).

3.3 Sector Investment Trends

The approximate value of Jordan's water investments during the 1976-1981 period is shown below:

	Approximate Totals (US\$ Millions)	Approximate % of Total From <u>Foreign Donors</u>
AWSA	100	65%
WSC	60	60%
JVA	10	-- (Excluding major projects in the Jordan Valley)
Total	<hr/> \$170	

These figures were extracted from various reports and are shown to be indicative of the approximate size of the national program. The government's serious commitment can be further viewed by considering that the value of domestic water and sewerage projects completed, under way, or planned for the 1980-1987 period will reach approximately US\$434 million.

Major future projects in the planning or implementation stages include:

- Expansion of the AWSA's (now WAJ's) system in Amman, including wastewater system expansion and renovation and new construction of treatment facilities (World Bank, approximate cost US\$110 million)
- Water distribution and wastewater collection and treatment facilities for 13 cities (World Bank and AID, approximate cost US\$200 million)
- Institutional Building for GOJ organizations involved in the water sector (AID, approximate cost US\$2 million).

The suspension--and possible cancellation--of the Maqarin Dam project may cause the scope and direction of Jordan's investment pattern in the sector to be re-evaluated. The planned sewerage projects will, however, probably be implemented. They are well justified on the basis of improving public health in the urban areas. Further, if domestic water availability is increased by releasing water now used in the irrigation sector, the sewage treatment plants planned could possibly provide a high-quality treated effluent for reuse as irrigation water.

In addition to the projects mentioned above, considerable effort is to be made in the training and educational sector. Institutions to provide the required educational and training base exist in Jordan, although there is little coordination between them and little overall planning. An AID study (26) presented a detailed description of the comprehensive group of institutions and facilities available in Jordan to meet these needs. The Water Systems and Services Management Project (WSSM) authorized by AID in mid-1983 provides the expatriate services and commodities required to implement a large portion of the training program described in the 1982 AID Report. This project is expected to start in late 1983 and should help the WAJ provide many of its training needs for the next five to six years, with a minimum of expatriate participation.

The USAID-funded WSSM Project will have as one of its prime purposes the development and improvement of the institutional capability of public and private-sector organizations in Jordan to conserve and manage water resources. This Project originally focused on the water agencies existing at the time the project was developed. It will now focus on the WAJ. The institution-building activities include the strengthening of contracting, contract administration, and various technical specialties; strengthening the coordination of water management; training and retraining of water sector personnel; institutionalization of a training capacity to determine long-term training needs and to conduct appropriate training programs; and the development of training courses (33C). Another institutional development focus of the WSSM Project is the strengthening of the capability of Jordanian engineering firms to design and supervise the construction of water and wastewater systems with a corresponding reduced role for expatriate engineering firms (33C).

Recognizing at the time that WSC's increasing responsibilities required organizational growth, the World Bank and AID funded studies by engineering and management consultants to assist in this task. Most of the recommendations expected from these studies should be valid for the WAJ. The studies were to provide recommendations for an organizational structure based upon WSC's redefined water and wastewater mission, determined staffing needs, and personnel policies. They were also to develop operation and maintenance procedures and include improvement to WSC's accounting and financial systems, management information systems, and contract administration activities. These studies should be completed by the end of 1985. Various components, especially a new organizational structure for WSC's headquarters and branch offices, however, were planned for implementation by the end of 1984 (30).

3.4 Institutional Development Analysis

In this section, information which is more analytic in nature is displayed under the relevant categories which have been adopted from the AID policy paper cited in Chapter 1. The definition of each of these categories is also in Chapter 1. (Note that the effect of new or modified policies instituted by WAJ has not been completely factored into the following analysis because of the lack of available literature.)

3.4.1 Policy Environment

- Up until late 1983, there was no central agency in existence for the development of policy and control of water resources. Now there exists a national-level organization appropriately positioned with enabling legislation to plan policy and control water resources, although the exact form the agency will take was unavailable to the authors at the time this report was prepared (interviews).
- The policy which made the sector institutions part of the civil service system and noncompetitive with the Gulf states has resulted in turnover (although this has also been true in the private sector in Jordan).

3.4.2 Appropriate Organizational Structures

- The NRA, although originally chartered to plan policy and control water resources, has basically turned into an agency which offers drilling services and technical assistance consulting (23).
- The JVA, AWSA, and WSC all have had charters which are different geographically and functionally, and there is little coordination among them. The WAJ is expected to address this potential coordination problem as a first priority.
- In the past, centralized management was a problem, with everything being operated from Amman. This structure created a heavy burden for top management by decreasing the efficiency of the agencies and acting as a retarding and demotivating factor (23).

3.4.3 Internal Operational Effectiveness

(a) Institutional Learning Capacity

No information was available in the literature reviewed.

(b) Management Systems

- Past personnel policies rewarded employees for length of service rather than quality of performance or improved knowledge/ skills. This policy, of course, also exists in many other organizations (including many in the U.S.) The extent to which this policy may be changed under the WAJ is unknown (26).
- Continuing efforts are under way to improve financial management in AWSA and WSC (interview). These effects will now benefit the WAJ.
- Further, people are not given clear job descriptions and institutional goals and objectives are sometimes unclear (interview).

(c) Provision of Training

- Given the increasing rate of investment and sophisticated technological input in the water sector, especially in the wastewater treatment area, training becomes especially critical. The Water Systems and Services Management Contract (funded by AID) recognizes this need.
- At present, there are three sewage treatment plants in operation staffed with personnel with limited training, with no back-up for normal attrition. Within five years, under current projections, there will be 15 sewage plants (26).
- There is a need for training in treatment process control, since most of the proposed plants will use process control techniques that are completely new to Jordan (26).
- If each of the 15 organizations involved in water-sector training continues to take an independent course of action, there will be much duplication of effort, establishment of redundant training facilities, and lower quality training carried out than might be the case with collaboration (26).
- Training is at present uncoordinated and largely unplanned beyond the individual agency level. Little communication exists between those who need training and those who provide it. There is little coordination and collaboration among the providers of training, and this results in ineffectiveness and inefficiency. The training needs, given increased activity in the sector, are increasing quickly (26).
- There are 40 community colleges, half of them privately owned. Of the 20 public ones, only 11 are under the Ministry of Education. Standards of quality of the other 29 can vary greatly. There are at present no set standards or testing programs (26).
- There is a dependence on consultants/contractors to provide the bulk of the training but consulting engineers tend to vary in their approach to training and their interest in it. Some are interested, view it as important, know something about adult education, and approach it systematically. Others are not interested and/or use ineffective training methods. In any event, methods often simply differ.
- There is no single organization in the country responsible for coordinating training; nor is there a training coordinator in any of the specific organizations (26).

(d) Roles and Responsibilities

No information was available in the literature reviewed.

(e) Decision-Making

No information was available in the literature reviewed.

(f) Personnel Management/Compensation

Some contradictions are apparent in the literature regarding wage scales.

- For example, an AID report states the following: "Virtually all government wage scales...[are] far below levels of comparability with the private sector...[resulting in] constant talent drains from public service and the inability to attract enough qualified applicants" (24).
- On the other hand, the World Bank states that wage scales in the sector are comparable with the private sector within Jordan. They are, however, comparable with the other oil-rich Gulf states, and that is where talent goes.

(g) Communication

No information was available in the literature reviewed.

3.4.4 External Operational Effectiveness

Few data also are available on the authorities' strengths when dealing with each other and with other organizations.

- From interviews, it was learned the the National Planning Council did an excellent job coordinating development assistance of the then three authorities. For example, AWSA was doing its own planning, and when it concerned others, NPC helped.
- Weak health-sector institutions have prevented full and effective support in the areas of health services and health education (24).
- There is no formal coordination with Health and Agriculture. The Ministry of Municipalities and Rural Affairs and the Environment has potential to provide a role in coordination. The Ministry's Environmental Affairs Directorate is new and can provide coordination.

3.4.5 Transfer of Technology

No information was available in the documents reviewed.

3.4.6 Capitalizing on Local Capacity/Participation

No information was available in the documents reviewed.

Chapter 4

REPUBLIC OF TUNISIA

4.1 Sector Overview

Tunisia is located on the North African coast midway between Morocco and Egypt. It has an area of some 100,000 square miles and in 1981 had a population of 6.5 million and a per capita GNP of approximately \$US1,400 (3). Population growth rates are estimated at 2.4 percent with the rate for urban centers about twice as much (40). Administratively, Tunisia is divided into 20 governates, 136 counties, and 162 communes. Most of the population resides along the coast and in the northern part of the country. The population in the interior of the country is much less dense than that along the coast (34)(40).

Approximately half of the total population (3.4 million) is considered urban--that is, residing in population centers of more than 5,000. This percentage is expected to increase to approximately 60 percent by 1990. Just over one-third of this urban population is concentrated in the country's two largest metropolitan areas--Tunis, the nation's capital, and Sfax. The dispersed nature of the rural population and the fact that it is spread over large areas, rather than clustered in hamlets or villages, make rapid implementation of rural water supply and sanitation systems extremely difficult.

The sector's significant institutions are summarized in Table 5. The two main agencies, Societe Nationale d'Exploitation et de Distribution des Eaux (SONEDE) established in 1968 and Office National de l'Assainissement (ONAS) established in 1975, are autonomous agencies reporting to different government ministries. These agencies are responsible for the development and operation of water and sewerage systems respectively, and have had great success in performing their missions. They represent the best examples of service delivery groups in the four countries reviewed in this report (40)(41)(43).

The establishment of powerful agencies to direct the provision of water supply and wastewater services was prompted by the government's strong desire to extend the benefits of water supply and waste disposal services to as great a portion of the population as possible. The national strategy has concentrated on providing SONEDE's and ONAS' service to urban areas and the marginal population concentrations and villages surrounding these areas. It was intended that these agencies would then extend their jurisdictions to the smaller cities and finally to rural areas (41).

SONEDE has been highly successful in upgrading water supply systems serving urban areas. Despite limited water resources and little surface water availability near the coastal areas where the majority of the population is concentrated, SONEDE's service extends to approximately 97 percent of the urban population through piped water supplies with 80 percent of those served through private house connections. The average urban service level is approximately 35 gallons (approximately 135 liters) per person daily. In small towns, about 25 percent of the rural population has access to piped water supplies with one-fifth of this total having direct connections.

Table 5

TUNISIA

WATER SECTOR INSTITUTIONS

<u>GOVERNMENT ENTITY</u>	<u>MINISTRY</u>	<u>CHARACTERISTICS OF ORGANIZATION</u>	<u>RESPONSIBILITIES</u>	<u>REMARKS</u>
Societe Nationale d'Exploitation et de Distribution des Eaux (SONEDE)	Ministry of Agriculture	Autonomous Agency	Develops and operates water supply facilities, acts as an integrated development agency and a water supply service agency for nation's urbanized areas.	Organized with World Bank Support; Bank has cited this agency as outstanding. SONEDE has assumed almost all facility operation in urban areas.
Office National de l'Assainissement (ONAS)	Ministry of Equipment	Autonomous Agency	Similar to SONEDE, except for wastewater and drainage.	Has a reputation as a high quality organization. ONAS in the process of assuming all facility operation in urban areas for wastewater.
La Direction du Genie Rural (DGR)	Ministry of Agriculture	Department in Ministry	Responsible for construction of small water systems (including wells and hand-pumps for villages of under 500 people)	
Local Government ⁽¹⁾	Ministry of Interior	Municipal (Commune) Governments	Own/Operate facilities within Municipality	

(1) The governorates also have a role in the provision of rural water supply and sanitation. However the literature reviewed made no reference to the scope of governorate activity in program development or specific service delivery.

Dispersed populations are served through public fountains and larger groupings through wells and boreholes (40)(41). The seven years of SONEDE's successful operation prior to ONAS' start has caused the sanitation sector to lag behind the water sector. SONEDE provided service to some 4.1 million people (1981 estimate) compared to approximately 1.7 million for ONAS. This large difference in served populations has caused many urban areas to have potentially serious environmental problems caused by the lack of proper sanitation and the generally large volumes of sewage treated by water supply provision. ONAS' program is directed toward closing this gap as rapidly as possible. ONAS has successfully taken over sewerage operations in 26 municipalities and is planning to extend its jurisdiction to 34 additional municipalities. AID assistance has been requested for this project (39).

Approximately 40 percent of the urban population is directly connected to sewers. The population receiving adequate water supply and not connected to sewers uses seepage pits for sewage disposal. Latrines and sullage ditches are used in other areas. Many of these individual systems are inadequate due to poor soil capacity or improper pit design, and these facilities often overflow, thereby causing unsanitary conditions, especially in most of the smaller urban areas. Virtually no public sewerage facilities exist in rural areas, and various forms of private systems are utilized with differing degrees of effectiveness. The overall sanitary conditions tend to be poor in these rural areas, especially those not served with some type of public water supply system (41)(42).

Coordination between SONEDE and ONAS has been defined by administrative decree, as is coordination between these agencies and the governmental agencies providing housing sites and actual construction of dwellings. Coordination is most evident, however, at the project level and minimally apparent at the planning level. Each agency develops its own strategy, but ONAS' plans are largely defined in response to servicing areas served by SONEDE. Local government involvement in the sector concerns only the facilities within their jurisdictions. These water and wastewater systems, in effect, are in a holding pattern as SONEDE and ONAS are in the process of assuming the assets and responsibilities of these urban systems.

The World Bank and many other foreign donors have been involved in Tunisia's water and sanitation sector for a long time. Both SONEDE and ONAS were established under sponsorship of the World Bank (39). The Bank has co-financed several sector projects since 1969 as well as several tourism improvement and urban projects with significant water and sewerage components. In 11 instances, the Bank has provided funds totaling approximately US\$920 million. All other foreign donors contributed just under US\$180 million during this period (41).

Water and sanitation programs in urban areas in Tunisia are exceptionally effective when compared to most North African and Middle Eastern nations, including the others considered in this report. The World Bank has stated that "there have been few examples of the Bank's involvement in the water supply and waste disposal sector as successful as the Tunisian experience." The Bank's investment focus in Tunisia, however, as well as that of most foreign donors, has been almost exclusively concerned with urban infrastructure development. This fact has been noted in the Bank's Sector Operation Review which stated that one-third of Tunisia's population appears

to be "almost untouched by the Bank's activities." The rural needs for potable water and sanitary services are no less urgent than those of the urban population (41). The problem is further complicated by the fact that the institutions providing services for the rural populations are less well staffed and managed than SONEDE and ONAS and have inadequate budget and personnel for operation and maintenance.

Projects for the provision of water supply and basic sanitation in Tunisia's rural sector are relatively small in scope compared to those in the urban areas. The literature reviewed did not identify any major projects devoted exclusively to the water and/or sanitation sector. Since 1975, however, AID has invested approximately US\$25 million in several village water supply (some projects administered by private voluntary organizations) and has portions of integrated rural development projects which provide many village water supply systems. AID also plans to invest approximately US\$35 million in ONAS' 1982-1986 program for Tunis and the wastewater systems of secondary cities.

The Government of Tunisia's increased concern over the urban/rural service dichotomy in the water sector has led it to explore World Bank financing for several hundred small rural systems. This exploration was in the preliminary planning stages at the time this report was prepared and details should be available by early to mid-1984 (35)(36)(41).

4.2 Sector Institutions

4.2.1 Societe Nationale d'Exploitation et de Distribution des Eaux (SONEDE)

All water resources in Tunisia are managed by the Ministry of Agriculture (MOA). SONEDE was created in 1968 to act as the water supply service delivery organization of the Ministry. SONEDE replaced Regie des Eaux (RDE), a former section of the Ministry of Agriculture that was responsible for coordinating the then-fragmented water supply subsector. RDE was a weak, almost obscure, agency with little power and a low level of technical expertise. Although SONEDE is under the Ministry of Agriculture, its charter establishes it as an autonomous public enterprise responsible for the production and distribution of potable water for all population centers of more than 500 inhabitants (40) (41). La Direction du Genie Rural (DGR), a department in the MOA, is responsible for water and sanitation systems not covered by SONEDE or ONAS (see Table 5).

SONEDE is managed by a 12-member board comprised of 9 members who represent ministries and agencies involved in water resources and three members appointed by the Minister of Agriculture who represent the private sector and SONEDE's customers. The government exercises control over SONEDE by appointing the board and having approval power over its investment program borrowings and tariff levels.

The agency's General Manager is appointed by the Minister of Agriculture. SONEDE's organization consists of five main departments, and the department heads report to the General Manager. Two departments handle all facilities operations. One is concerned with the greater Tunis area and has a central section plus a district group. The area outside Tunis is administered by the Interior Department and has three regional groups (northern, southern, and

central) concerned with total facilities operations. These regional offices are further subdivided into 18 district groups. An Engineering Department handles all design work and has statistics and hydrology groups. Finance and Administration is in a single department. The Department of New Works provides internal auditing and operational control for all projects by the special groups (40).

SONEDE's staff numbers some 3,800, approximately double the size of the staff inherited from RDE. It has been flexible in expanding its capabilities as its service area and responsibilities have expanded. Its recruiting has been facilitated by the quality of Tunisia's educational system, the reputation it has gained as a well-managed utility, and the comprehensive staff benefits instituted (with the encouragement of the government) in the early 1970s. Staff shortages have been eliminated as has overstaffing in certain categories, which was inherited from RDE (40)(41).

SONEDE has instituted an overall training program for its technical personnel and sends engineers overseas on training scholarships. It has also put in place a system of in-house seminars and short courses for various levels of its staff. Much of this program is conducted in conjunction with the government's Department of Employment and Professional Development (40)(41).

Operationally, SONEDE has been successful in maintaining rates of connection to its water systems, which has allowed it to remain financially viable while maintaining adequate service levels throughout its service area. Long-term programs have been instituted to reduce unaccounted for water losses (estimated at 30 percent). These programs consist of distribution system rehabilitation to reduce main breaks and leakage, a re-metering program, and improved maintenance to reduce leakage at public fountains (40)(41).

The SONEDE rate structure is set to allow it to be financially self-sufficient and features a progressive tariff (increasing block rates so larger users pay more per unit of demand) that provides cross-subsidization to lower income groups. The agency plans to continue improving its system through further rehabilitation efforts and is taking steps to institute a long-range program to decrease its level of unaccountable water loss (40)(41).

The government has maintained its commitment to the sector through the provisions of capital funds, actively seeking funds from foreign donors and allowing the establishment of tariff policies that would provide sufficient operating revenues while allowing the lowest income groups to obtain service. The government has also encouraged SONEDE (and ONAS) to establish employment practices and pay scales to attract and keep quality staff members.

SONEDE exhibits all of the attributes of a well-run public utility, and its reputation appears to be well deserved. It may be useful to examine further the basis for SONEDE's success as it may well serve as a model for urban water organizations in other North African and Near East nations.

4.2.2 Office National de l'Assainissement (ONAS)

ONAS was established in 1975, with the support of the World Bank. The Government of Tunisia's objective (obviously influenced by SONEDE's accomplishments)

was to create an agency solely responsible for urban sewerage and drainage. ONAS is under the Ministry of Equipment, the government agency responsible for large public works projects. ONAS has the status of an autonomous public enterprise and is managed by a 15-member board appointed by the government. Nine board members represent ministries and public agencies in the water and sewerage sector, and six members represent municipalities served by ONAS. The government has approval power over ONAS' investment program, borrowing, and tariff levels, and monitors its operations through a technical controller and financial controller (42).

The agency's General Manager is appointed by the Minister of Equipment. The day-to-day operations are handled by two departments of New Works, one for Tunis and another for the rest of the country. Facilities operations are carried out through the Department of Operations and Maintenance (O&M), which directs six regionalized organizations from Tunis. The Departments of Administration and Finance, Planning Studies, and the Office of Project Implementation are located in Tunis. All Department heads report to the General Director who is assisted by an internal audit group and another group responsible for operational and resources control (42).

ONAS's charter requires it to acquire assets and operational responsibility for existing sewerage systems. A master plan completed in 1977 and revised in 1982 has led to an ambitious investment program of approximately US\$150 million from 1976 to 1981 and approximately US\$215-300 million for the 1982-1986 period. This 1982-1986 program level has been revised downward to some US\$200 million. Thus far, ONAS has assumed operational control of the wastewater systems in 26 municipalities, including 13 comprising the greater Tunis area, 3 in Sfax, and 6 in tourist zones. The house connection rate for sewers in greater Tunis has reached more than 70 percent, and is at a level of approximately 65 percent of all ONAS run systems. Some 34 additional municipal systems are planned for takeover, rehabilitation, improvements, and extensions by 1989. This project is designed to serve some 60 percent of the 1990 projected population of 700,000 in these 34 systems. In general, the ONAS program aims to narrow the gap between water and wastewater services and is focusing its attention on the needs of smaller towns (39)(40)(41).

ONAS' activities include the design and construction of house connections, collector and trunk sewers, pump stations, and sewage treatment plants. Private contractors selected through competitive bidding implement the actual construction and ONAS' field engineers supervise construction to assure compliance with the specifications and the overall quality of work. Operation and maintenance of the collection systems and treatment plants is performed by ONAS personnel. ONAS is also supervising the construction of sanitary landfill sites in the greater Tunis area. (This program is part of the World Bank's Second Urban Project.) In Tunis, as well as in the rest of the country, however, collection and disposal of solid wastes is a local municipal responsibility (39).

Tunisia's policy dictated that ONAS' tariffs for sewerage service need not make it financially self-sufficient. The government felt that sewerage provides benefits to all citizens and to other sectors as well. Thus, ONAS benefits from government subsidies, based upon a rate per unit volume of water supplied by SONEDE in the service areas where ONAS operates. ONAS also collects part of the property taxes in its service areas based upon the

increases in land values attributable to sewerage facilities. The balance of ONAS's operating revenue is derived from a uniform nationwide tariff and collection of a small fixed annual charge per customer to cover the costs of clearing blocked drains. The tariff structure is based upon surcharging water bills of the water consumers using over approximately 100 gallons per day per connection. Because water tariffs are progressive for domestic consumption, the charges for wastewater facilities are also progressive and provide cross subsidies to low volume consumers (that is, usually the urban poor) who, in fact, may escape all but minimum charges for sewerage service (40)(41).

Reflecting a government policy change, ONAS is reviewing its tariff structure with the objective of ending the need for government subsidies by 1987 while meeting its growing burden of operating expenditures and interest charges. Preliminary estimates indicate that these revised tariffs may almost double (in real terms) by 1990.

ONAS has a staff of some 1,600. Expatriate consultants are sometimes used for technical engineering and management assistance. A training program, based on a 1978 training master plan is in effect, and some 30 seminars have been held on a range of technical and administrative topics over the past six years. Extensive staff training has been conducted with the help of German government and ECC aid, and extensive on-the-job training activities are provided through supervisory personnel. ONAS states that this program has worked well, especially in sewage treatment operations. ONAS admits to staff shortages (in number and quality), however, especially at the technician level and is working to correct this deficiency (40)(41).

The agency, according to the World Bank, enjoys a good reputation and has maintained a reasonable level of operating efficiency. ONAS is planning to revise parts of its accounting system and to use a new in-house computer for its financial reporting system. Planning and control systems have recently been instituted to upgrade the agency's administrative capacity. ONAS recognizes that its growing responsibilities, especially as they move into smaller urban areas, will make it imperative for them to continue the commitment to institution building, including vigorous recruitment and training programs. Further, the phasing out of the government's subsidy and the concurrent increase in tariffs will make it necessary for ONAS to exert even greater vigilance in its financial affairs (40)(41).

4.3 Sector Investment Trends

Tunisia's water sector investment in large measure can be determined through an examination of SONEDE and ONAS programs.

SONEDE's Fifth Development Plan (1977-1981) represented an investment of some US\$464 million, with approximately 75 percent of this total planned for 1979 through 1981. This program is almost completed, and no specific details on future investment levels were available in the literature reviewed for this report. It is significant to note, however, that SONEDE's projects for major urban areas are completed. Several hundred small towns--albeit those with the larger populations and close to urban areas--have been included in SONEDE's past projects. SONEDE's trend toward rehabilitating and generally expanding local systems, as well as the continuous takeover of smaller systems is

expected to continue (40)(41). If SONEDE's annual capital investment programs continue at levels even close to those from 1977-81, more and more rural areas should begin to receive service from SONEDE over the next two decades.

The planned expenditures of ONAS's Sixth Plan (1982-1986) were approximately US\$200 million. This investment will allow ONAS to complete continuing work, including the takeover (started in the 1977-1981 period) of wastewater systems in 17 medium-sized towns, conduct studies for future takeovers, acquire additional operating equipment, and construct additional offices and workshops. New projects, expected to start in the 1982-1986 period and extend into the next five-year period, include: a phased takeover and rehabilitation of 34 additional towns, and improvements to the wastewater systems of 11 towns to protect the Sidi Salem reservoir from urban and industrial pollution. Investments are expected to continue through the 1987-1991 period at a minimum US\$200 million (39)(42).

The investment levels indicated above represent the government's continued strong commitment to the sector. However, there is little in the planned programs which specifically address the needs of approximately one-third of the nation's population residing in rural areas. Given the widely dispersed nature of the rural population, the provision of infrastructure will be expensive in these areas and may offer few long-range public health benefits if not accompanied by environmental health and basic hygiene programs.

4.4 Institutional Development Analysis

In this section, information which is more analytic in nature is presented under the relevant categories which have been adopted from the AID policy paper cited in Chapter 1. The definition of each category also appears in Chapter 1.

4.4.1 Policy Environment

- There have been clear, detailed, and coherent policy objectives in the water sector, and the technical, financial, and economic implications of policy have been explicitly recognized. Commitment to these objectives has continued in the long run (41).
- The policies that SONEDE and ONAS have developed regarding recruitment, training, management, physical development, and rate structures have been developed explicitly and have not been ad hoc. For example, SONEDE was designed to be self-sufficient economically, and tariffs were structured in such a way that that goal was achieved without deleterious social affects. ONAS, on the other hand, was not intended to be self-sufficient because benefits of sewerage and sewage disposal would accrue to all citizens. Thus, the government provides a yearly subsidy to ONAS.
- Policy seems to be well coordinated, and SONEDE and ONAS work well together (41).

- There are no other significant water or sewerage agencies, and thus there is little overlap, duplication of effort, and competition.
- Personnel/compensation policy has resulted in SONEDE and ONAS being able to recruit and maintain competent personnel. There is no significant talent drain in this sector.
- Policy objectives have been concentrated in the urban sector. Tunisia's rural population is dispersed throughout several thousand villages, many with little access to safe public water supplies and hardly any sewerage service at all. Governmental policy seems to be turning its attention to rural needs and making them a priority, however, in the future (41).

4.4.2 Appropriate Organizational Structures

- SONEDE was created as a public commercial enterprise with corporate status and financial autonomy, although it still answers to the Ministry of Agriculture and the Government retains control of tariff and salary levels.
- In SONEDE, the new division for statistics, organization and methods, cost accounting, and internal audit has begun to aid in improving performance and in streamlining billing and collection (41).
- ONAS was established in 1974 and began operations in 1975. It is in general structured similarly to SONEDE, and it has comparable service conditions for its staff. It has depended on subsidies from government for 34 percent of its revenues. These subsidies, however, are scheduled to be phased out.

4.4.3 Internal Operational Effectiveness

(a) Institutional Learning Capacity

No information was available in the literature reviewed.

(b) Management Systems

- "SONEDE has managed its finances prudently." The only problem it seems to have is, ironically, slow payment from government and municipalities (41).
- SONEDE was meant to recover costs through tariffs and be self-sufficient. Although there have been a few problems, the agency has been self-sustaining and the Bank reports that "the tariff represents a commendable attempt to combine financial, economic and social objectives" (41).

- Although there are still some financial problems with ONAS, accounting has improved and annual accounts are produced much more quickly than before, and efforts to improve further are continuing.
- Consumer billing, up to this point, through SONEDE is satisfactory.
- ONAS has a new computer-based accounting system that is expected to be operational by mid-1983.

(c) Provision of Training

- In collaboration with the Government's Department of Employment and Professional Training, SONEDE maintains a continuous training program for its technical personnel. It also sends engineers overseas on training scholarships and arranges regular in-house seminars and short training programs. These arrangements appear to be adequate and appropriate.
- ONAS has a staff of 1,500, all Tunisian (with some expatriate consultants). Faced with technical requirements for the sewage disposal that were lacking in Tunisia, ONAS made major training efforts. Shortly after formation, training needs were assessed and a detailed master plan was formulated in 1978. A training and professional development commission was created in ONAS to draw up training programs, establish priorities and a timetable, and select the modes of training to be pursued. Training activities have included:
 - An EEC expert who advises on and conducts training
 - Thirty seminars arranged since 1976 focusing on a wide range of administration and technical topics
 - Study visits to sewerage authorities in foreign countries
 - On-the-job training. Every supervisor trains his subordinates, and ONAS believes this has been the essential element in establishing an effective sewage treatment system
 - ONAS is also considering creating its own training center. Discussions with EEC have started
 - A comprehensive training strategy has been developed looking ahead to 1990 when an additional 1,280 employees will be needed.

(d) Roles and Responsibilities

- A World Bank Evaluation report indicates that efficient and stable institutions have been established with adequate managerial and skilled and well-motivated staff (41).

- The same World Bank report also states realistic sector goals have been formulated with well-placed priorities to which the government and sector agencies are committed and that the goals have been incorporated in investment programs and national plans covering periods of several years.

(e) Decision-Making

- A team assessing the Tunisian wastewater subsector under WASH auspices also, of necessity, covered the water subsector and reported the existence of local networks available to petition the government for provision of service. The impression given was that the system worked well and SONEDE and ONAS are held in high regard by the population served.

(f) Personnel Management/Compensation

- SONEDE's personnel in 1981 numbered approximately 3,800, that is, about 8 per 1,000 connections compared with 18 per 1,000 in 1968. Recruitment has been facilitated by the quality of the national educational system, by SONEDE's reputation as a well-managed and expanding enterprise, and by comprehensive staff benefits introduced in 1972. Staff shortages have been eliminated, as has earlier over-staffing in certain categories.
- "Satisfactory conditions of employment have gradually produced a contented, dedicated, and performance-oriented staff" (41).

(g) Communications

No information was available in the literature reviewed.

4.4.4 External Operational Effectiveness

This category is covered by material presented above in Section 4.4.1, "Policy Environment."

4.4.5 Transfer of Technology

No information was available in the literature reviewed.

4.4.6 Capitalizing on Local Capacity/Participation

This category is covered by material presented above in category 4.3.3, "Decision-Making."

Chapter 5

YEMEN ARAB REPUBLIC

5.1 Sector Overview

The Yemen Arab Republic (YAR) ranks among the least developed countries in the world. In the last several years, the nation has benefited from an unprecedented increase in remittances from the estimated 1.4 million Yemenis working abroad, mainly in oil-producing nations. The 1981 in-country population was estimated by the World Bank as 7.3 million, with a per capita GNP of about US \$430. Approximately 85 percent of the population is rural and it is spread over 30,000 settlements organized around 15,000 villages. Urban centers (population over 2,000 persons) number 106, including all 11 governorate capitals. The estimated 1981 population in the five largest urban centers of Sana'a (the capital), Hodeidah, Taiz, Ibb, and Dhamar was approximately 600,000. National population growth rates are estimated at approximately 3 percent with rates for urban areas of 4 to 6 percent (3)(48)(51).

The administrative characteristics of YAR's central government are somewhat different from those in the other three countries reviewed. In effect, the country is still in the early stages of development, and the central government's institutions are somewhat ephemeral in nature. The wide expanses of rough terrain between settlements outside the bigger cites weaken the Central Government's control, which is still incipient in many sections of the country.

There are two major agencies responsible for water and sewerage: The National Water Supply and Sewerage Authority and The Rural Water Supply Division. In addition to these two institutions, there are numerous other institutions involved in the YAR water and sanitation sector (summarized in Tables 6 and 7). Table 7 indicates the sector's fragmented nature and often overlapping responsibilities of the sector's institutions. Resources for sector activities (including those related to public health) are primarily provided through the central government. Although the documentation reviewed makes no mention of present cooperative efforts or coordination of activities among the organizations in the sector, the government has begun to centralize data collection, water sector policy-making, and resource allocation activities.

The Department of Hydrology was created in late 1978 within the Yemen Oil and Mineral Corporation (YOMINCO), with support of AID and the Government of the Netherlands. While it is responsible for organizing and carrying out water-related studies and collecting hydrogeological data through its own resources and through the work of other agencies, it does not have the power to control license drilling operations. The High Council for Water Resources, begun in early 1982, is expected to establish national water policy and allocate water resources. Little documentation is readily available on the status of the activities of these two organizations. In addition, the Central Planning Organization (CPO), because of its national planning function, appears to be the only organization with overall information pertaining to the sector (48).

Table 6

YEMEN ARAB REPUBLIC

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WATER SECTOR INSTITUTIONS

<u>GOVERNMENTAL ENTITY</u>	<u>MINISTRY</u>	<u>CHARACTERISTICS OF ORGANIZATION</u>	<u>RESPONSIBILITIES</u>	<u>ACTIVITIES</u>	<u>REMARKS</u>
High Council for Water Resources	Prime Minister's Office (Prime Minister is Chairman of Council)	Interministerial Group with representation from agencies involved with water sector	Development of water code and allocation of water resources	Long range plan is expected to control all water resources	Established January 1982
Central Planning Organization (CPO)	Ministry of Development	National Planning Organization (Chaired by Minister of Development)	Policy making body relating to national development	Responsible for social and economic policy. Reviews development projects and sets national priorities; tracks project implementation; coordinates and supervises assistance from all multi-lateral and bi-lateral sources; conducts national census and acts as official statistical data office for the country	
National Water and Sewerage Authority (NWSA)	Ministry of Power and Water Supply	Autonomous agency providing water and wastewater services for urban areas; governed by seven-member board	Provides and operates water and wastewater systems to provide full services for country's urban areas	Owns/operates urban water and wastewater systems; plans and supervises facilities construction, collects for operations and debt service costs. Branch offices in various cities directed from headquarters in Sana'a	Established in 1973 with wastewater facilities in six major urban cities in operation as of 1983
Rural Water Supply Division (RWSD)	Ministry of Public Works	Division of Ministry Governed by Civil Service Regulations	Development of Rural Water Supplies	Drills wells and constructs water systems in rural areas; has no responsibility for system after construction, turning them over to LDA's (see below); operations severely limited due to lack of staff	Relies heavily on UNDP/WHO project assistance which provides 10 positions. No integrated rural water supply master plan exists. Program appears ad-hoc, based upon request of Local Development Associations

Table 6 (Cont'd)

YEMEN ARAB REPUBLIC

WATER SECTOR INSTITUTIONS

<u>GOVERNMENTAL ENTITY</u>	<u>MINISTRY</u>	<u>CHARACTERISTICS OF ORGANIZATION</u>	<u>RESPONSIBILITIES</u>	<u>ACTIVITIES</u>	<u>REMARKS</u>
Local Development Associations (LDA)	Ministry of Social Affairs and Labor	Local Development Associations (LDA) organized in villages on a district basis. Approximately 200 in operation in mid-81. Relate to central government ministries through governate coordinating councils (GCC's). Nationally activities are coordinated through Confederation of Yemeni Development Associations (CYDA)	Responsibilities for development of roads, water supply systems, schools and sanitation. CYDA coordinates activities nationally and provides limited technical assistance.	Operate and maintain water supply systems (constructed under their aegis or those turned over by RWSD). Receive 75% of Zakat (religious tax) collected, to finance operations together with 25% collected locally via taxation.	
-55- Ministry of Health		Government Ministry	Rural Sanitation, air pollution, noise, occupational health. <u>Secondary responsibility</u> for water quality, food hygiene and insect and rodent control.	Monitors activities of primary responsibility; trains sanitarians (environmental health workers); provides technical advice to LDA's.	MOH has no environmental health unit; rural sanitation activities cited as negligible by WHO in 1981 report. Given low priority by government which does not feature environmental health as a development objective.
Ministry of Municipalities and Housing		Government Ministry	Environmental activities (in close liaison w/DOH) for 106 municipalities. Includes physical planning for land use, rural sanitation, solid waste water disposal, quality, food hygiene, industrial wastes, insect and rodent control, housing, parks and recreation, and urban planning.	Solid waste services for Sana'a (Taiz and Hodeidah under study) constructs public wash houses and latrines, provides slum clearance and (limited) low cost housing; provides services for vector and insect control; constructs slaughter-houses and markets; provides limited health education services; coordinates urban planning.	
Tahima Development Authority (TDA)	Ministry of Agriculture	Sub-unit in Ministry	Irrigation and potable systems development for regional (rural) area.	Provides rural water supplies as part of overall plan. Construction of dams, wells and irrigation schemes.	Special project administered by Department of Agriculture.

Table 6 (Cont'd)

YEMEN ARAB REPUBLIC

WATER SECTOR INSTITUTIONS

<u>GOVERNMENTAL ENTITY</u>	<u>MINISTRY</u>	<u>CHARACTERISTICS OF ORGANIZATION</u>	<u>RESPONSIBILITIES</u>	<u>ACTIVITIES</u>	<u>REMARKS</u>
Southern Upland Rural Development (SURDU)	Ministry of Agriculture	Sub-unit in Ministry	Integrated rural development project includes provision of 90 wells for Ibb and Taiz governates.	Provides rural water supplies as part of overall plan. Construction of dams, wells and irrigation schemes.	(As above for TDA)

Table 7

YEMEN ARAB REPUBLIC

MINISTRY RESPONSIBILITIES AFFECTING WATER SECTOR *

Sub-Sector	High Council for Water Res.(1)	Ministry of Power and Water Supply(2)	Ministry of Public Works(3)	Ministry of Health	Ministry of Municipalities and Housing(4)	Ministry of Agriculture	Ministry of Social Affairs and Labor(6)
Urban Water Supply and Wastewater							
Rural Water Supply		x	x			0(5)	x
Rural Sanitation				x(4)	x(4)		0
Water Quality		x	x	0	x		0
Water Resources Planning	x						
Environmental (7) Health				x,0(8)	x,0(8)		
Irrigation						x	

KEY

x = Primary Responsibility
0 = Secondary Responsibility

* This table is included to show the complex and fragmented responsibilities in the Sector.

NOTES

- (1) Interministerial group chaired by Prime Minister (created 1982).
- (2) Services provided through National Water and Sewerage Authority.
- (3) Services provided through Rural Water Supply Division. Systems turned over to Local Development Authorities (LDA's).
- (4) Ministry of Health has primary role; but activity negligible. Ministry of Municipalities and Housing has secondary role and provides minimal service as part of other functions.
- (5) Rural water supply is a component of two projects administered by the Department of Agriculture, the Tahima Development Authority's (TDA) irrigation scheme and the Southern Upland Rural Development Unit's (SERDU) integrated rural development project.
- (6) Actual service is provided through activities of LDA's.
- (7) Includes (a) food hygiene, (b) industrial wastes, (c) insect and rodent control (d) air pollution, (e) noise, (f) occupational health, and (g) solid waste disposal (3 urban areas).
- (8) Ministry of Health has primary responsibility for areas denoted as (d), (e), and (f) in note 7 and secondary in others except for (g). Ministry of Municipalities and Housing has primary responsibility for areas denoted in Note 7 as (a), (c) and (g).

Water is a scarce commodity in Yemen, and the population relies on groundwater from springs, deep drilled and shallow dug wells, and surface runoff collected in cisterns for its drinking water supply.

In theory, WHO drinking water quality standards have been adopted. Primary responsibility to ensure that these standards are met and to monitor sources rests with the Ministry of Municipalities and Housing (MOMH) and secondarily with the Ministry of Health (MOH). These activities appear to be lacking, perhaps due to budget constraints and shortages of staff and equipment. There is no environmental health unit in the MOH and programs to foster improvement of environmental sanitation have had low priority and do not appear as development objectives in governmental planning (48)(51)(53).

General levels of sanitation are extremely low in urban areas and even worse in rural areas. Dry disposal methods are used almost exclusively in rural areas. There are no piped sewerage systems in rural Yemen, and sanitation services do not exist. Little information is transferred to the populace concerning even the most basic public health practices and/or hygiene. It is doubtful that many Yemeni households now using dry disposal methods would readily abandon this traditional method. In such a case, water delivery directly to the household may in fact increase the potential for waterborne diseases and exacerbate drainage problems (54).

Primary health care, however, is expected to receive increased attention during the next several years. UNICEF plans to support the establishment of 165 primary health care (PHC) facilities throughout YAR. WHO has indicated that this project could be an effective vehicle for disseminating health education information at the village level (54).

Urban water supply and sewerage is the responsibility of the Ministry of Power and Water Supply (MPWS). The Ministry executes these responsibilities through the National Water Supply and Sewerage Authority (NWSA). The NWSA was formed in 1973 with the responsibility for planning, execution, and operation of water supply and waste disposal facilities in the country's largest urban areas. The NWSA, established with World Bank support, represented the government's high priority and commitment to provide water supply and wastewater facilities in the nation's urban areas. Foreign donors, especially the IBRD and AID, supported these priorities recognizing that investments in these densely populated areas would act to abate waterborne diseases (and thus lessen the risk of epidemic) and provide Yemen with the opportunity to create institutional and operational capabilities in urban areas (48).

The NWSA provides water in Sana'a, Hodeida and Taiz. These systems have recently been expanded, and facilities serving the urban centers of Ibb and Dhamar are currently being redesigned with completion scheduled for 1986. NWSA operates wastewater systems in Hodeida and Taiz, and facilities to serve Sana'a are under construction. Expansion of these systems is included in the Second Five-Year Plan (1982-1986) (48)(51).

NWSA projections indicate that by 1986 water supply and wastewater systems will serve, or be under construction to serve, approximately 600,000 and 450,000 people, respectively, in the nation's five largest urban areas. These levels roughly represent coverage of approximately 75 percent of the population in these five large urban centers with water supply service and 60

percent with sewerage service. By 1982, approximately US\$400 million will have been invested in these systems, with an additional US\$206 million of investments scheduled for 1982-1986 (48)(51).

The NWSA has exhibited great zeal in pursuit of its mission. It has exerted pressure for adequate funds and necessary expatriate consultants and has received them. The NWSA enjoys a national reputation commensurate with its achievements during the First Five-Year Plan, and the World Bank has indicated that NWSA is "one of the most efficient organizations in the country, with decreasing reliance on foreign experts and consultants" (48). While its record is one of positive accomplishment, the NWSA's ongoing construction program, coupled with its level of material and human resources, severely strains its ability to concentrate effectively on the daily problems of system operation. This point was succinctly described in the 1981 evaluation of AID's technical assistance project to NWSA (45).

Rural water supply responsibility is shared on a national scale between the Rural Water Supply Division (RWSD) of the Ministry of Public Works (MPW) and Local Development Associations (LDAs). The RWSD was formed in 1972 and has responsibility for designing and constructing rural systems outside the country's main urban areas. An important characteristic of the RWSD's function is the restriction of its mission to facilities development, the operation of which is turned over to the villages after they come on line. This transfer is facilitated through the approximately 150 LDA's in Yemen. These groups have the responsibility for developing local infrastructure and they coordinate their activities through an elaborate mechanism of interlocking representative councils and governate coordinating committees (46)(48).

The RWSD is really a development agency and has no operating responsibilities. It has the difficult mission of designing, constructing and inspecting systems throughout the country from its headquarters in Sana'a with about 70 people, including the 13 furnished under WHO/UNDP assistance. Thus, RWSD's facilities must eventually serve approximately 85 percent of the nation's total population (estimated at about 6.4 million of the total 7.3 million in 1981) spread over 30,000 settlements in 15,000 villages. The number of rural dwellers having access to water supply by the end of the First Five-Year Plan (1981) is estimated at 800,000 or roughly 14 percent of the total. Even if many villages shared particular facilities, the construction of many thousands of rural water systems would be required (48).

The Second Five-Year Plan calls for some 1,150 RWSD projects benefiting some 2.2 million people. (Estimates of LDA activities in the Second Five-Year Plan were unavailable). This ambitious program represents a fivefold increase over the First Five-Year Plan (214 projects), which involved some 13 programs of bilateral or multilateral assistance (48).

The RWSD's efforts in rural water supply development are hampered by several constraints. There is a lack of a national master plan for development which means that activities are almost entirely ad hoc (possibly determined by which LDA has the most influence). The unit cost for rural water supply in Yemen is very high because of extremely rough terrain and difficulty of access to

villages at high elevations. Often water must be pumped long distances and to high elevations, which contributes to these high costs (48)(51).

Further, it is interesting to note that villagers desire and are willing to pay for private connections. Since the RWSD has little to say as to how the system is operated, their typical designs are based upon per capita allowances including a small provision for watering of animals. (Meager water sources offer only standpost systems to be installed.) Because, however, private connections are most desired, the RWSD is often pushed towards higher source capacity development (51).

RWSD also faces some institutional constraints. Although RWSD is responsible for the basic water supply needs of 85 percent of the nation's population, it is merely a division in the Ministry of Public Works. On the other hand, the NWSA, responsible for Urban Water Supply and Sewerage, is an autonomous agency.

What makes the difference between the two agencies even more striking is that some 500 additional positions are planned for the NWSA staff over the next four or five years, while RWSD estimates it will require a minimum of 130 additional personnel over the same period. The manpower pool in Yemen is so limited that it is extremely doubtful that the RWSD could effectively compete with the NWSA for the required personnel. These harsh comparisons appear even worse considering RWSD's targets in the Second Five-Year Plan (1982-1986). These manpower problems--present and future--mean that RWSD appears unlikely to attain its targets in the Second Five-Year Plan, even with a great infusion of expatriate help in terms of personnel and funds.

Further, assuming the RWSD could be staffed to adequate levels, rural system operation is outside its purview. The RWSD, the Confederation of Yemen Development Associations (CYDA), or LDAs have no significant programs to train rural water supply operators and there was no indication that this critical issue is being addressed (53)(54).

As a final constraint hampering rural development in the sector, the available data on Yemen's rural water supply program strongly indicate that provision of physical infrastructure will not provide the intended public health benefits if not accompanied by other programs. Such programs include popularizing low-cost improved facilities for excreta disposal and, perhaps more importantly, a vigorous and sustained effort directed at educating the villagers in basic hygiene and sanitation. This will require interministerial cooperation (RWSD, Ministry of Health, Ministry of Housing and Municipalities) if public health benefits from the rural water supply program are to be realized. No such indications of cooperation were cited, however, in the literature reviewed (46)(51)(53)(54).

The enormity of the task of providing water in rural areas, combined with RWSD's manpower problems, are the major reasons cited by WHO in stating that it is highly improbable that Yemen will reach the targets set for the International Drinking Water and Sanitation Decade (53)(55).

5.2 Sector Institutions

5.2.1 National Water and Sewerage Authority (NWSA)

The NWSA was established in later 1973 and given responsibility to locate, exploit, and distribute water for domestic, commercial, and industrial use and to provide sewage disposal services in accordance with public health requirements for the nation's five largest urban areas. The law established NWSA as an autonomous agency allowing it to design and operate public facilities, fix, impose, and collect fees for services and undertake activities necessary to protect its underground water sources against pollution.

The NWSA was established as an autonomous agency on a commercial (self-sustaining) basis. Its personnel system is independent of the national civil service system, and it appears to offer attractive terms of service with salary levels adequate to attract and keep competent employees (its staff now has more than 40 Yemeni engineers and only 3 expatriates). The Authority's charter is adequate for it to carry out its mission. Although its tariff structure is ultimately controlled by the National Cabinet, its overall revenues have been adequate over the past several years to provide sufficient funds for operation and maintenance (48).

NWSA is managed by a seven-member board responsible to the Council of Ministers. The Board is chaired by the Minister of Power and Water Supply (MPWS). The NWSA Director-General is the Deputy Chairman, and other members represent the Ministry of the Treasury, the Ministry of Housing and Municipalities, the CPO, the Rural Water Supply Division (of the Ministry of Public Works), and one member appointed from the private sector (48).

The NWSA is headquartered in Sana'a and has district offices in Taiz and Hodeidah. District offices are planned for Ibb and Dhamar as facilities to serve these cities come on line.

NWSA's organization features three departments (Finance, Technical, and Administration) reporting to a Deputy Director General (who also acts as Technical Manager) who in turn reports to the Director General. The Director General reports to the Board of Directors and has a Secretariat and public relations group as staff. The branch offices are organized similarly with a Director, Deputy Director, and three main departments (48).

Estimates by the NWSA indicate that its overall staff size will increase to some 1,000 persons by 1984-1985 (approximately twice its 1982 level). Additional employees will be necessary for NWSA's expanding role in five urban areas, and plans call for an increase in staff for its headquarters and existing district offices, as well as completely staffing two new district offices. These large manpower increases will be extremely difficult to fill, as the people with the necessary skills are not ordinarily available in the labor pool (48)(51).

The large manpower requirements will increase further when the NWSA assumes water supply responsibilities for the next seven largest urban areas in Yemen. The NWSA is preparing a project for the design and construction of water supply systems for these seven cities having a total population of approximately 100,000 (Intermediate Cities Water Supply Project). The World Bank has

indicated its willingness to provide funding for the project and a World Bank/YAR agreement is expected so that the project can begin in 1985. The NWSA will probably follow up on this water supply project with construction of wastewater systems for these seven cities. The World Bank, in its preliminary project papers, has indicated that this may be the case and suggests studies to determine alternative methods of sewerage service to keep NWSA's program at a feasible level and keep NWSA manpower requirements to a minimum in these somewhat more remote urban centers (48)(51).

5.2.2 Rural Water Supply Division (RWSD)

The RWSD directs all operations through its headquarters in Sana'a. The Department is organized into four main sections responsible to the Deputy Director General, who, in turn, is responsible to the Director General. The four main sections are Drilling, Workshop, Technical, and Administration and Finance. A planning group reports to the Deputy Director, who is also responsible for coordinating all bilateral and multilateral assistance projects (48)(48).

The RWSD has benefited from substantial support from bilateral and multi-lateral agencies. Of major importance is the staffing assistance afforded the technical section through a continuing UNDP/WHO project. This project was initiated in 1974 and is scheduled to continue until 1984. It provides the RWSD the full-time services of a project engineer, a design engineer, a construction engineer, a hydrologist, ten UN volunteer engineers, supporting staff, equipment, and commodities. The project engineer furnished by WHO/UNDP has assumed responsibility for the operation of the technical department. The remaining RWSD staff numbers 56, of whom 22 are well-drillers or general purpose drivers. WHO and World Bank have indicated that the RWSD has relied heavily on assistance provided by the WHO/ UNDP project (46)(48)(53).

RWSD operations are carried out in conjunction with the activities of Local Development Associations (LDAs). LDAs are essentially voluntary community type organizations and were established in the early 1960s to focus on socio-economic development in rural areas. The LDAs represent a self-reliant, decentralized mechanism for meeting basic infrastructure needs according to priorities set at the local level. Water supply systems and feeder roads represent the largest portion of LDA investment. Funds for capital works are cooperatively financed with contributions from the local beneficiaries, the LDAs and the central government (usually on a 50-25-25 percent basis). LDAs secure their funds mainly through receipt of a portion of Yemen's religious tax (Zakat), other taxes, and local contributions. The LDAs also collect monthly fees for water service to allow for operation and maintenance coverage. The WHO and World Bank indicate these fees average about US\$3 to \$4 per month (1981 prices) per connection. Approximately 150 LDA's exist in Yemen, and are coordinated on a governate level by the governate coordinating committee and on a national level by the CYDA (48).

The LDAs have no planning or design capacity and often turn to the RWSD to provide these services, especially for projects involving large (for Yemen) population groups. The LDAs often hire contractors who, in turn, are supervised by the RWSD. Other projects use RWSD drilling rigs and combinations of locally supplied labor and material. Hand-dug wells and improvements

to existing systems are often accomplished with no input from the RSWD (48). The completed projects are turned over to local village development committees (VDCs) for operation and maintenance. Thus, no matter how involved the RSWD is in a project, after completion they have no voice in how the systems are operated. Documentation reviewed for this report indicated that maintenance levels throughout the country were poor and in many areas could be classified as extremely poor (48). This is probably caused by an almost total lack of technical and/or mechanical skills in many rural areas.

RWSD has no system in place to monitor the water supply systems installed under their aegis or of those installed by the LDAs with no RWSD participation. Water quality monitoring is virtually nonexistent and evidence indicates that many of the supplies from hand dug wells or cisterns are polluted.

5.3 Sector Investment Trends

YAR water and sanitation sector investments for the First Five-Year Plan (1977-1981) are shown in Table 8. Projected activities in the Sector for the Second Five-Year Plan (1982-1986) were not precisely defined in the literature reviewed for this report. The Water Supply and Sanitation Sector Supply study prepared under the WHO and World Bank Cooperative Program (51) which is summarized in the World Bank's Water Supply/Sanitation Sector Memorandum (50), however, presents the following data collected from discussions with the NWSA and RWSD.

The estimated investment levels for the 1982-1986 period are quite ambitious. All urban projects will require large portions of financing from foreign donors, and/or multilateral lending agencies. The scope of the rural water supply program, in terms of coverage and number of projects, represents a substantial increase in the level of RWSD activity above that in the First Five-Year Plan.

5.4 Institutional Development Analysis

In this section, information which is more analytic in nature is presented under the relevant categories which have been adopted from the AID policy paper cited in Chapter 1. The definition of each of these categories is also in Chapter 1.

5.4.1 Policy Environment

There is a wide range of opinion on the NWSA depending on whether one relies on World Bank or AID and WASH sources. The Bank sources state the following:

- One of the stated aims of the First Five-Year Plan (1976-81) was gradual development of self-reliant capability. The overall rate of implementation has been high. Projects have reached more than 75 percent of achievement. (Thus, it appears that the policy was set and the mechanisms worked so that "75 percent achievement" was reached.) (48)

Table 8

PART ONE

Estimated Investment Data for the 1982-1986 Period

<u>Sector Components</u>	<u>First Five-Year Plan</u> (1976 - 1981)	<u>Sector Investments</u>	
	<u>Area Served</u> (Year, Millions)	<u>Approx. Investment</u> Total \$US Million	<u>% by Foreign</u> Donors (1)
Urban Water Supply and Sewerage	Sana'a Hodeidah Taiz	306	44%
Rural Water Supply RWS LDA's	Nationwide (2)(3)	38 21	41% -
Totals		US\$365	

- (1) Including IBRD, USAID, WHO, Japan, Germany, the Netherlands, Saudi Arabia, Kuwait, and the Arab Fund for Economic and Social Development.
- (2) Not including water supply components of agricultural development projects.
- (3) Investments for 214 RWS projects and more than 2,000 wells, boreholes, cisterns, tanks, dams, and catchments.

PART TWO

Estimated Sector Investments
(1982-1986)

<u>Subsector</u>	<u>No. of Projects</u> <u>Planned</u>	<u>Estimated</u> <u>Population</u> <u>Covered</u>	<u>Estimated</u> <u>Investment</u> <u>(US\$ Million)</u>
Urban Water Supply	6	147,000	77
Urban Sewerage	8	247,000	223
Rural Water Supply (RWS) LDA's	1,150* NA**	2,200,000 NA	109 NA

* Includes - 250 completely new systems to serve 0.5 million people, 400 new wells to serve 1.2 million, 500 improvements to existing projects to serve 0.5 million, and 2 district offices to ease logistical problems.

** NA = Not available.

- NWSA has 40 Yemeni engineers and only 3 expatriates, thereby indicating that its policy of training local engineers has been carried out (48).
- NWSA was set up as an autonomous agency and functions as such. Although there are certain policy control points (for example, tariffs must be approved by the cabinet), they do have an adequate charter to carry out their responsibilities effectively and they appear to do so with sufficient cost recovery.
- NWSA was given authority to operate a personnel system not bound by civil service regulations. The agency evidently implemented the policy effectively, thereby creating a system of recruitment and compensation which allows it to hold competent engineers. "It's a good place to work," said one interviewee.

AID/WASH Sources, on the other hand, indicate the following:

- An AID project evaluation revealed that the General policy set by the Director General negated, to a degree, the institutional development goal in the project paper by using the consultant staff to deal with daily operations (45).
- In terms of carrying out NWSA training policy, it was found that despite much available help from AID, only two individuals were in training, and the prospects of their graduating were dubious. No one had started in the nonacademic AID-funded training cycle. (45)

Regarding RWSD:

- RWSD relies on expatriates--UNDP, UN volunteer, Dutch and others. The rural nature of the work together with unattractive conditions of service when compared with the private sector or NWSA make it hard to recruit Yemenis.
- Although rural water supplies enjoy the highest priority in the LDA development programs, the RWSD simply helps set them up. Then they are operated by others.
- One interviewee said that without foreign consultant help, the RWSD would be almost nonoperative.

5.4.2 Appropriate Organizational Structures

- Water monitoring laboratories for bacterial/chemical testing are in Sana'a and Taiz. The highest frequency of waterborne disease is elsewhere but it is difficult to test because of the lack of testing facilities. This is indicative of what might constitute an inappropriately centralized testing mechanism (48).
- Administratively, the branches of NWSA are smaller replicas of NWSA headquarters. That is, they are highly centralized. Petitioners and information seekers bypass the entire hierarchy and insist on

seeing the boss. Interviews are constantly interrupted. Within Yemen, this may or may not constitute an appropriate organizational structure (45).

- Government and local agency commitment to the sector is fragmented, and there is little systematic communication between them (48).
- It appears that NWSA is organized appropriately for urban conditions and that the RWSD is only one of many organizations working in uncoordinated patterns in the rural area. It is, of course, difficult to determine whether the latter condition is more of a problem for national planners and donor agency evaluators than it is for local people. It is mentioned several times that the LDAs, in cooperation with the RWSD, have created successful, locally "owned" water systems with high community participation. At the same time, it is recognized that local determination has not fit neatly into national planning activities. And, of course, there is the reality of each donor agency pushing its own programs and priorities.

5.4.3 Internal Operational Effectiveness

(a) Institutional Learning Capacity

No information was available in the literature reviewed.

(b) Management Systems

- NWSA appears to have a sound computerized financial management system in place. The Agency seems to be able to recruit, manage, and keep Yemeni engineers and to coordinate donor aid generally. Several problems exist, however, at the branch level with planning and plan implementation and there are indications of communication breakdowns among donors, consultants, and NWSA (45).
- Part of creating management systems is the development of a management information system. As yet, there appear to be few hydrological data in country; therefore, the Department of Hydrology was created in 1978. It is unclear how well it is doing. Inquiry yielded no health statistics. Improvement in quality and quantity of potable water could not be measured.
- Neither one of the information problems is the fault of NWSA, but both will continue to limit the effectiveness of the input to whatever management information system it has.

(c) Provision of Skills and Training

As mentioned earlier, there is disagreement between World Bank and AID sources concerning training for NWSA:

- The World Bank analysis (48)
 - * At least 20 operational employees were trained through Sana'a's vocational school.
 - * At least 19 have been trained under the Arab fund, mostly in the Sudan and Egypt.
 - * Approximately 50 people have been trained at the German vocational school.
 - * An AID program had funds for 24 people to be trained for a total of 474 person months, yet only two were in training (in 1981), and it was unlikely that either one of them would succeed (45).
 - * There was no one office or person in charge of training in NWSA up to 1981, and there seemed to be no one pushing it, planning for it, or coordinating it (45).
- The RWSD is largely a project staffed by expatriates and run by WHO.
- There is a lack of coordinated central policy governing training for the rural water sector. Thus, there is a lack of definition of who needs to be trained for what and where. There is a shortage of Arabic instructors and a shortage of proper candidates for training abroad.
- It appears that almost all of the training discussed was to be technical training.

(d) Roles and Responsibilities

No information was available in the literature reviewed.

(e) Decision-making

No information was available in the literature reviewed.

(f) Personnel Management

- RWSD is essentially a nonautonomous development agency which does not have personnel management and compensation systems attractive enough to recruit and hold Yemenis. NWSA, on the other hand, has an autonomous, commercial structure (watched over closely by the cabinet) which is able to offer very attractive terms of service for Yemenis. Thus, it is relatively well staffed.

(g) Communication

No information was available in the literature reviewed.

5.4.4 External Operational Effectiveness

- In the Taiz branch there appears to be a breakdown in planning the operation of new facilities among NWSA headquarters, Taiz branch, a consulting company, and AID (45).
- AID has assigned three successive staff members as liaison in two years, while NWSA communication with AID is "random and intermittent" (45).
- There is a rapid rise in bilharzia and dysentery. Bilharzia is becoming a major problem in areas under irrigation as there are no control methods. The Ministries of Health and Agriculture and NWSA are all involved, but there is little or no coordination or linkage (48).
- Although the problems in these examples are by no means solely the fault of NWSA, the agency does not seem to be assertive in its efforts to coordinate and link with other agencies in integrated development projects (45).
- On the other hand, NWSA is autonomous and is perceived as such, has its own cost recovery financial management system, and seems to push for and receive resources it needs.
- RWSD is apparently able to work successfully with LDAs in creating local water supply projects.

5.4.5 Transfer of Technology and Knowledge

No information is available in the literature reviewed.

5.4.6 Capitalizing on Local Capacity/Participation

- No information was available on the NWSA.
- In rural areas, RWSD and the LDAs share development of self-help projects. These projects are implemented in response to village requests. In many instances the level of village contribution to the development cost (in cash or in kind) is quite significant, and operation/maintenance of completed projects becomes a village responsibility. Full participation of the community is evident throughout the project cycle.

Chapter 6

CONCLUSION

Following are the dominant themes that emerged in studying the water and sanitation systems of the Arab Republic of Egypt, Jordan, Tunisia, and Yemen.

- Water and sanitation sector investments are accorded prominent positions in the four countries' development strategies.
- The needs appear so great that indications are that the tendency will be to focus the bulk of water supply and sanitation development funds on the provision of infrastructure.
- Except in the case of Tunisia and to a lesser extent, Jordan, past strategies rarely took into consideration the importance of institutional development, either in the short run to assure appropriate management of investments or in the long run to provide effective efficient services.
- Effective institutional development will require the participation of many disciplines that will often cut across the responsibilities of several ministries. Indications are rare, however, that this fact is recognized or that necessary coordination mechanisms exist.
- Donor agencies often became so caught up in the myriad activities of project and program implementation that their efforts to foster institution building and necessary coordination are dissipated, thereby causing institutional development efforts to suffer further loss of impetus.

On the basis of this review, however, there are strong indications that the importance of institutional development is increasingly being recognized. Recognition of its importance as a criterion in program and project conception and in the development of strong institutions as part of overall program implementation has grown enormously in the last few years. AID and the World Bank efforts are fostering this trend to a greater degree than previously. Further, the many instances of rapid deterioration of facilities and accompanying decrease in the quality of service has blatantly illustrated to many governments the necessity of strong institutions as a development objective.

The prime examples of strong and effective institutions in the four countries reviewed are SONEDE and ONAS in Tunisia. Jordan's institutions, while not at the level of those in Tunisia, are other good examples. The basic, necessary ingredients required to develop strong institutions include:

- A strong commitment on the part of the Central Government to realistic sector strategies over a period of years
- Establishment of well-defined objectives and responsibilities for sector institutions which are based upon a solid legal foundation

- Existence of effective coordinating mechanisms between institutions involved in national development in general and service delivery in particular.

Without these basic building blocks, internal mechanisms that foster institutional growth (e.g., proper management practices and personnel policies that reward merit and allow professionals to be recruited, retained, and continually upgraded through training) will not be attained.

This review is but one aid in helping to identify issues related to institutional development. It is limited in that it is related to the water and sanitation sector in each country and is only a review of literature available in Washington. It is hoped that this review and analysis will provide a good overview of these facets of development in the four countries and that the modest amount of analytic data related to institutional development will provide a starting point for concerted efforts leading to improvements in institutional development for the water supply and sanitation sector in the Near East.

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U.S. Agency for International Development

J. Austin, S&T/HEA
J. Habron, NE/PD
P. Johnson, NE/TECH/HPN
S. Lintner, NE/PDENV
F. Montanari, NE/PDENG
M. Sinding, NE/PD

World Bank

A. Churchill, Director, Water Supply and Urban Development
J. Freedman, Operations and Support Unit, Water Supply and Urban Development
J. Huang, Water Supply and Sewerage Division (Egypt, Jordan)
S. Serdehaly, Office of the Director, Water Supply and Urban Development
(Yemen, Jordan)

Camp Dresser & McKee

D. Donaldson, WASH Project
W. Callahan, Sr., Vice President (recently in Jordan)
R. Kachinsky, Vice President (experience in Egypt)
W. Moir, Vice President (has spent extensive time in Egypt and Jordan over
past several years)
R. Preble, CDM Associate (experience in Yemen)
R. Thomas, Vice President (experience in Egypt)

Other Consultants

W. Rappoldt, Training Consultant, Canal Cities Project, Egypt
D. Walrath, Hazen and Sawyer Engineers, New York, N.Y.

Other Individuals

T. Dichter, Former Director, U.S. Peace Corps, Yemen
J. Haratani, Former AID employee with experience in Egypt, Tunisia and Yemen
J. Tomaro, Member, WASH Project, Tunisia Wastewater Sector Assessment Team