PN-AAR-253

36804

WATER/WASTEWATER PRICING AND FINANCIAL PRACTICES IN THE NEAR EAST

"Unclassified, but not for dissemination outside U.S. Government channels."

Technical Report 2
MMI 19-83

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October 11, 1983

Table of Contents

		Page
Foreword		v
EXECUTIVE SUMMARY		vi
SECTION 1	WATER/WASTEWATER SECTOR IN THE NEAR EAST	1.1
1.1	Program and Financial Objectives	1.1
1.2	Organization and Administration	1.2
1.2.1	Algeria	1.5
1.2.2	Egypt (Alexandria)	1.5
1.2.3	Egypt (Beheira)	1.5
1.2.4	Jordan (Amman)	1.6
1.2.5	Jordan (Zarqa/Ruseifa)	1.7
1.2.6	Morocco	1.7
1.2.7	Syria (Damascus)	1.7
1.2.8	Tunisia	1.8
1.2.9	Turkey (Istanbul)	1.8
1.2.10	A.R. Yemen (Sana'a)	1.8
1.2.11	Israel	1.9
1.3	Scope of Current Services and Projected Development	1.9
1.3.1	Algeria	1.9
1.3.2	Jordan	1.13
1.3.3	Morocco	1.15
1.3.4	Tunisia	1.16
1.3.5	Turkey	1.17
1.3.6	A.R. Yemen	1.17
1.4	Urban Poor	1.17
1.4.1	Egypt (Beheira)	1.17
1.4.2	Jordan	1.18
1.4.3	Morocco	1.18
1.4.4	Turkey (Istanbul)	1.19
SECTION 2	WATER/WASTEWATER TARIFFS	2.1
2.1	Pricing Alternatives	2.2
2.1.1	Flat Rates: Algeria; Beheira, Egypt; Istanbul, Turkey	2.3
2.1.2	Block Rates: Alexandria, Egypt; Amman, Jordan; Morocco; Damascus, Syria; Tunisia; A.R. Yemen	2.3
2.1.3	Uniform Rates: A.R. Yemen	2.4
2.1.4	Lot Size, Distance and Connection Fees: Morocco; Jordan; Israel	2.4
2.1.5	Payment by User Groups: All Countries	2.5
2.1.6	Pricing Combination: All Countries	2.5
2.2	Wastewater Charges	2.6

Table of Contents
(Continued)

		Page
SECTION 2	WATER/WASTEWATER TARIFFS (Continued)	
2.3	Tariff Policies and Structure By Country	2.6
2.3.1	Algeria	2.11
2.3.2	Egypt (Alexandria)	2.12
2.3.3	Egypt (Beheira)	2.13
2.3.4	Jordan (Amman)	2.14
2.3.5	Jordan (Zarqa/Ruseifa)	2.17
2.3.6	Morocco	2.18
2.3.7	Syria (Damascus)	2.20
2.3.8	Tunisia	2.24
2.3.9	Turkey (Istanbul)	2.26
2.3.10	A.R. Yemen (Sana'a)	2.27
2.3.11	A.R. Yemen (Hodeida)	2.28
2.3.12	Israel	2.29
SECTION 3	FINANCIAL PRACTICES	3.1
3.1	Project Financing	3.1
3.1.1	Rate of Return and Cash Generation	3.4
3.1.2	Inadequate Tariffs	3.5
3.1.3	Loan Agreements and Covenants	3.5
3.2	Billing and Collection	3.6
3.2.1	Algeria	3.7
3.2.2	Egypt (Alexandria)	3.8
3.2.3	Egypt (Beheira)	3.8
3.2.4	Jordan (Zarqa/Ruseifa)	3.8
3.2.5	Morocco	3.8
3.2.6	Syria (Damascus)	3.9
3.2.7	Tunisia	3.9
3.2.8	Turkey (Istanbul)	3.10
3.2.9	A.R. Yemen (Sana'a)	3.10
3.2.10	A.R. Yemen (Hodeida)	3.10
3.3	Meters and Unaccounted for Water	3.11
3.3.1	Egypt (Alexandria)	3.12
3.3.2	Egypt (Beheira)	3.12
3.3.3	Jordan (Amman)	3.12
3.3.4	Jordan (Zarqa/Ruseifa)	3.13
3.3.5	Syria (Damascus)	3.13
3.3.6	Tunisia	3.13
3.3.7	Turkey (Istanbul)	3.13
3.3.8	A.R. Yemen (Sana'a)	3.13
3.3.9	A.R. Yemen (Hodeida)	3.14

Table of Contents
(Continued)

		Page
SECTION 4	LESSONS AND CONCLUSIONS	4.1
4.1	Tariffs	4.2
4.2	Financial Performance	4.3
4.3	Subsidies	4.4
4.4	Metering	4.5
4.5	Additional Study Recommendations	4.6

SELECTED BIBLIOGRAPHY

Foreword

The Near East Bureau of the Agency for International Development contracted with MetaMetrics Inc. to conduct a review of pricing and financial practices in the water/wastewater sector. This volume addresses practices in the Near East. A companion volume addresses pricing and financial practices in the United States. Specific subject areas of the study included:

- Background on populations served and historical development of water/wastewater projects
- Tariff or rate policies of operating utilities
- Sources of other operating and maintenance funds
- Financial arrangements for capital investments
- Administrative relationships between funding and operating agencies

The study utilized reports on water/wastewater programs funded by the International Bank for Reconstruction and Development (IBRD) and, unless otherwise noted, the source for all data and tables was IBRD reports and documents. The World Bank's experience in the water/wastewater sector is extensive and ongoing. The majority of the country programs examined were initiated in 1977-1978. Emphasis was placed on issues bearing on the financial viability of the water/wastewater entity.

Mr. A.H. Winter is the principal author of the study. He was assisted by Ms. Sally M. Kane. Mr. Leo T. Surla, Jr. organized the report and conducted the final editing. Ms. Sandra M. Horner was responsible for the production and typing of the report.

EXECUTIVE SUMMARY

The Agency for International Development and the Government of Egypt are developing the principles and conditions for U.S. financial assistance in the water/wastewater sector in Cairo, Alexandria and the Canal Cities. Major pricing policy and financial practices issues affecting efficiency of sector operations that are being reviewed include usage of meters, types of rate structures, level of revenues, organization of utilities and the utilization of subsidies. MetaMetrics Inc., under a work order issued by the Near East Bureau of AID, conducted a study of pricing and financial practices in the Near East and the United States as background for water/wastewater policy development.

MetaMetrics Technical Report 2 addresses practices in the Near East and is based on a review of reports and studies on water/wastewater programs funded by the International Bank for Reconstruction and Development. The Near East Bureau countries included in the study were Algeria, Egypt, Jordan, Morocco, Syria, Tunisia, Turkey, A.R. Yemen and Israel. The companion volume of the study, Technical Report 1, addresses pricing and financial practices in the United States.

This report is based on existing data in IBRD files and detailed financial data such as income and expenditure statements were not available for all countries. Current information was often lacking and details on revenues and expenditures were limited or unavailable.

THE WATER/WASTEWATER SECTOR IN THE NEAR EAST

World Bank financed water/wastewater systems serving populations of over 50,000 persons were reviewed. Eight of the nine countries had water supply programs and eight countries had wastewater programs. In Egypt, Jordan, Morocco and A.R. Yemen, water or wastewater services were provided at two or more locations. Counting the national water program of Tunisia as a single project, the study includes eleven water projects and nine wastewater projects financed in part by the IBRD. All systems were operational.

The largest system reviewed was Istanbul, Turkey with a service population of 4.7 million in 1982. The smallest system was Hodeida, A.R. Yemen at 76,000 population served. The lowest per capita consumption of water was 7.5 liters per day for standpipes in Tunisia. At the upper range was Damascus, Syria at 168 liters per day and Greater Tunis at 139 liters per day. Average urban per capita usage in the United States is approximately 670 liters per day.

Water/wastewater utilities in the Near East were agencies or corporations of local, regional or national governments. Of the eleven water projects, six were organized and operated at the local level and five were operated by national agencies. Of the nine wastewater projects, six were organized and operated at the local level.

In all of the case studies there was a high level of unaccounted for water which represented a substantial loss of revenue. The countries with the major losses of over 47% (A.R. Yemen, Syria, Jordan and Egypt) had as their principal problems a high percentage of unbilled consumption and illegal taps, inoperative meters, system leakage, inaccurate production metering, and usage of water for public taps, mosques and municipal gardens. The high percentage of unaccounted for water not only reduces the quantity of available water for the use of the customer, but also increases the unit cost of water sold. The acceptable range for unaccounted for water in developed countries according to IBRD documents for new systems is 2% to 15% and 10% to 15% for old systems, as in contrast to the studied projects which averaged over 30%.

FINANCING PRACTICES

Proposed sources for investment funds for water and wastewater programs included internal cash generation from revenues, borrowings from the World Bank and other institutions, and government loans or contributions. The Tunisia financing plan provided approximately 50% of capital requirements from revenues and Turkey was second highest at 24%. All of the programs relied on government contributions or loans. Government equity contribution of capital funds was highest for Syria at 71%. To the extent that these government contributions are not repaid from revenues, they constituted subsidies. IBRD documentation indicated that revenues consistently exceeded operations and maintenance costs only in Tunisia.

Water supply revenues were derived from user charges for all countries. All wastewater programs except Syria collected user charges. The water/wastewater systems, except for Tunisia, Jordan and Israel, did not collect sufficient revenues to cover operating and maintenance costs. Costs have been rising steadily due to inflation, overstaffing, antiquated plants, obsolete equipment, inadequate operations and distribution systems, and a lack of trained personnel. Revenues have been principally affected by low rates. Lower than anticipated population growth, low demands, high unaccounted for water, droughts, and delays in distribution system expansion have also resulted in low revenues.

By the standards of financial viability (the collection of revenues to cover operating and maintenance costs and ability to expand services), most of the countries demonstrated inadequate financial performance. The notable exception for water supply is Tunisia. The Amman, Jordan water/wastewater sector had an excess of revenues over operating and maintenance costs for 1982 and in previous years revenues did not cover these costs. The Israel national wastewater program has instituted sewerage rates that exceed the annual inflation rate (tied to cost-of-living increases) and is meeting operating and maintenance costs.

SUBSIDIES

All of the water/wastewater projects received explicit subsidies for financing new projects. These subsidies were in the form of government contributions and, in two cases, included government loans. The repayment of World Bank loans was guaranteed by the national government even in cases where the systems were operated by local jurisdictions.

All of the water/wastewater agencies were local or national government entities and operated with annual budgets paid from general funds. Where water/wastewater revenues did not meet operating costs (all cases except Tunisia, Jordan and Israel), the difference was met from these general funds and constituted a subsidy. To the extent that government agency users of water/wastewater services, a major category of users in many cases, did not pay for services, a reverse subsidy was provided by the water/wastewater agencies. Similarly, the provision of planning and other technical services by national water/wastewater agencies to local or regional agencies constituted a subsidy.

WATER SUPPLY TARIFFS

With the encouragement of the World Bank, all of the water supply projects were planned and developed with meters for most users. For several of the programs, there were some categories of users that were excluded from metering such as community standpipes, religious institutions and public agencies. Meter reading and billing periods ranged from monthly to quarterly.

A combination of charges were used in all cases. A connection charge was levied in all but two countries. Meter rentals, maintenance and installation charges were used. Rates were different for categories of users with domestic use rates being lower than commercial and government agency rates. Domestic use flat rates were in evidence for four countries. The rest had increasing block rates for domestic users. The average rate per cubic meter ranged from US $.03 for Beheira, Egypt to US $1.00 for Amman, Jordan. The comparable rate for the United States is US $.20 per cubic meter.

WASTEWATER TARIFFS

More than half of the wastewater projects collected user charges based on metered water consumption. Other types of charges included application fees, connections, property taxes and meter rentals. A combination of charges was generally used. Water consumption was the basic charge with a surcharge added to the water supply rate. Syria had no charges for wastewater services. The monthly domestic use wastewater charges ranged from zero for Syria to US $6.80 for Amman, Jordan. The comparable residential charge paid in the United States is $6.95.

BILLING AND COLLECTION

Of the countries studied, the minimum accounts receivable was in Tunisia where private customer arrears equaled two months of sales. Government agency user arrears were equal to four months of sales. With the assistance of the Tunisian Government, strong action had been taken and collections were made directly from budget allocations to the Government agencies. Syria, Egypt and Algeria had the highest accounts receivable ranging from ten months of water sales in Syria and eighteen months in Egypt to two years in Algeria.

TARIFF POLICY

Of the country water supply programs studied, only the local operating agency in Turkey was empowered to set tariffs. For the remaining countries, the national or local operating agency recommended tariff increases. Approval rested with higher government levels. In several instances, the country's chief executive reviewed tariff recommendations and rescinded or delayed suggested increases.

Of the country studies on wastewater, Israel and Turkey were empowered by the local municipality to set tariffs. The remaining countries permitted either the national or local operating agency to recommend tariff increases. Approval rested with higher government levels.

To meet current operations and maintenance costs, almost all countries needed to increase the average level of tariffs. World Bank economic analyses on several countries recommended gradual increases in price levels to above what was adequate to insure the financial viability of the entity. This level would address the increasing cost of water over the long-term. In all of the countries, rate increases were recommended by the World Bank.

FINDINGS AND CONCLUSIONS

The financial performance of water/wastewater entities can be determined only by the stated goals in the water/wastewater sector. In the United States, water utilities are expected to collect sufficient revenues to cover all operating costs and, for government-owned utilities, the average excess of revenue over operating expense is 37%. Wastewater utilities, all government-owned in the United States, generate an excess of revenue over operating expense of only 5% and require substantial subsidies to meet capital requirements. In the Near East, using the criterion of meeting operating expenses from revenues results in an inadequate financial performance for most programs.

The water/wastewater sector in the Near East has potentially conflicting goals of redistribution of income, cost recovery, efficient allocation of resources, provision of water/wastewater services, administrative simplicity and assistance to the poor. These goals may be accomplished by a combination of pricing alternatives and the use of subsidies. A variety of pricing and/or subsidy combinations is possible for the recovery of the costs for providing water/wastewater services and the combination of pricing policy alternatives chosen by each utility must be based on government priorities. Subsidization of capital needs and operating expenses in the Near East is an established practice as indicated by the cases studied. The World Bank has encouraged accountability, the provision of water/wastewater services, extension of services and viability of the operating entities. The following findings and recommendations reflect this approach of the World Bank.

Tariffs

Consideration should be given to building into tariff policies an automatic adjustment mechanism, such as cost-of-living, which would make decisions on tariff changes less subject to political influences. Additionally, consumer resistance to tariff increases and the consequent political pressures on Government might be

reduced by public information campaigns to inform consumers on the need for tariff increases.

A tariff increase accompanied by changes in the tariff structure can lead to a change in the consumption pattern, and hence to a lower than expected increase in average revenues. The government may be required to provide financial assistance to meet the cost of connections in special cases where property owners are unable to meet costs.

As water is a basic need, the price of drinking water, which was low in most of the countries, could be increased at levels of consumption above the lifeline. Even low-income families are prepared to pay higher prices to some extent for safe and available drinking water. Provided that delivery and service is good, the price of drinking water could be increased to raise additional funds to meet operating costs and possibly contribute to future expansion of the system. Average water rates have been increased in several countries. These include Jordan, Tunisia and Turkey. Wastewater fees in Israel are adjusted every six months according to the consumer price index, operations and maintenance costs, and debt charges.

Average water prices ideally could be set at levels which would recover the full cost of service. The average price scheme can incorporate differential rates with higher rates for the industry and commercial sector and higher income domestic users which would provide some subsidy for low income domestic users. If free water is supplied to the lowest income group via standpipes, some costs could be recovered through a system of charges to be paid by the municipal or national government rather than through subsidization by the water supply agency.

Financial Practices

The case experience in the Near East indicates that the financial performance of a water/wastewater entity requires ongoing monitoring. Internal mechanisms for the review of financial performance can detect problems to be brought to the attention of the agencies and the financing institution. If such a mechanism is lacking, its development is of primary importance.

The ability to establish and revise tariffs is central to the continuing financial viability of water supply and wastewater programs. The channels through which a proposed increase must proceed can be examined early in the project development cycle and the results of past proposed increases can be evaluated. In order to minimize the complexity of the tariff revision process, the lender might find it beneficial to negotiate directly with those responsible for final approval of tariff increases, as long as no authority is undermined. Additionally, specific tariff covenants can be mutually agreed upon and included in loan agreements.

Government agency and municipality arrears in payments to the utility should be cleared. The entire billing and collection system should be examined at the outset, and recommendations for changes be implemented early in the project development process. Past due arrears should be collected and future ones prevented by the billing and collection system.

All countries included in the study subsidize new construction of urban water supply and wastewater systems. Most provide direct subsidies for operating costs through municipal and national operating agency budgets. In view of the increasing

need for future water/wastewater investments and limited available resources, public funds should not be used, if at all possible, to subsidize current operation and maintenance costs as this will decrease investment capacity. Moreover, recovery of past investment expenditures would aid the process of system development and loans could be repaid in part from income. Taking these factors into consideration, the objectives of Governments could include recovery of the full current cost of water supply/wastewater services from beneficiaries, as well as some portion of investments and interest. An emphasis on such financial practices would make the costs of water/wastewater services explicit and assist in providing vital information for subsequent decisions for system expansion and financing.

Capital investment in water/wastewater programs and the annual operating and maintenance costs are real demands on the resources of the operating agency, the government and the citizens. Some form of subsidy was in effect for all of the case countries. In the interest of providing water/wastewater services efficiently and basing system development decisions on real costs, the level and source of subsidies should be explicitly noted. Considerations can then be given to the amount of costs to be met through payments from consumers.

Tunisia has a dynamic and financially viable water/wastewater program. Water pressure and quality are satisfactory. Approximately 40,000 new customers are connected to water supply each year. Wastewater plants have been developed and rehabilitated resulting in the possibility that Lake Tunis may become relatively free of pollution after centuries of dumping of waste. Staff per 1,000 people served is low at 1.06. The tariff includes a low lifeline rate for low income consumers. Credit and a five-year payment period is extended to low income consumers to cover the connection charge. In addition to meeting operating and maintenance costs through collected revenues, the national water company, SONEDE, levies and collects a tax on water sales and service for the national government. The arrears in collection are low at two months of sales for private customers and four months of sales for government agencies and municipalities. In contrast to the other countries studied, Tunisia is addressing social and financial objectives while providing expanding water/wastewater services.

The lending agency can have an impact on the operations and development of water/wastewater services. The area of pricing and financial practices is dynamic and complex and requires a high level of technical expertise and managerial attention. Appropriate technical assistance to water/wastewater agencies - in the planning, development and operational phases - can affect their financial viability and assist in establishing agency self-sufficiency.

SECTION 1

WATER/WASTEWATER SECTOR IN THE NEAR EAST

The one characteristic that unites most developing countries is a relatively low average level of income. This fact is reflected in the general deficiency of water/wastewater services and the relative inability of low-income consumers to pay for capital, operating and maintenance costs. In addition to low average incomes, income distribution is generally so skewed that a large proportion of the total population is often living without access to the basic requirements of a healthy life including safe water, adequate nutrition and sanitation facilities. The number of uses for water in such developing countries is likely to be small and there are relatively few commercial and industrial customers on urban systems.

In many developing countries this problem is reinforced by rapid population growth rates that increase demands for service on the one hand while eroding the growth of per capita income (and therefore the ability to pay) on the other. These critical constraints leave little room for flexibility in financial practices and pricing policy, as the usual tendency is to take a long term approach in establishing water/wastewater tariffs in developing countries.

The World Bank has played a major role in developing the water/wastewater sector in the Near East over the past decade. The experience has been cumulative and has included addressing planning, implementation, technical and administrative issues. This study draws from that experience as provided through IBRD documents on water/wastewater projects. The information in the text and tables presents comparisons as available from the documentation. In some instances there were omissions for some countries and information is not presented in these cases.

1.1 PROGRAM AND FINANCIAL OBJECTIVES

The financial viability of a water/wastewater utility is generally the key to its quality of service and ability to meet increasing demands for services. In the United States the yardstick by which financial performance is measured is the rate of return earned on assets employed. When compared with the cost of borrowing in local capital markets, this provides a reasonably good measure of the enterprise's

performance. In developing countries, local capital markets are often non-existent, regulated, or subsidized so that the quoted yields bear little relationship to the actual availability of funds and productivity of capital. Furthermore, most water utilities are government or quasi-government enterprises and thus obtain much of their funding directly from public sources. With the shortcomings of tax structures and collection rates in many developing countries and the shortage of funds for public sector investment, this often makes it difficult to determine the target rate of return. However, the internal rate of return on new investment is, in many cases, the only objective measure available by which to judge a utility's financial performance. Since the IRR is highly dependent upon the price charged for water, this exerts additional pressure on the utility to set the price of water at or near its average incremental cost.

Social goals are the province of the national governments in the Near East. To build progressivity into a tax system requires an expensive and sophisticated machinery which is often lacking in developing countries. As an alternative, the prices at which public services are offered to various groups of consumers have in general been designed to achieve some redistribution of income. This is true for the water/wastewater sector in the Near East.

The objective of covering operating costs and capital requirements, simply stated, can be met by making sure the average tariff level is high enough to yield the necessary rate of return. The social objectives, in contrast, may require that even the poorest members of the community have access to safe water. For a water/wastewater entity to be viable (provide required services and address expanding needs for services), explicit financial resources are required to meet costs of replacement of capital, new construction, and ongoing operations.

1.2 ORGANIZATION AND ADMINISTRATION

This section identifies the operating agencies, jurisdictional level, and staffing ratio of the eleven countries and their water/wastewater programs. The administrative relationships between the funding agencies and the operating utilities are also reviewed.

Table 1-1 summarizes the staffing per 1,000 population served. Most of the countries had low staffing ratios. Turkey and Algeria had the lowest number of employees (1.0) per 1,000 served. If the service provided is adequate or meets

standards, a low figure indicates a high level of employee effectiveness. Egypt, in contrast, required more staff to achieve services and this level could reflect under-employment of staff.

Table 1-1

Number of Employees per 1,000 People Served

Algeria	1.0	(1980)
Egypt	4.3	(1981)
Jordan - Amman	1.3	(1982)
Tunisia	1.1	(1981)
Turkey	1.0	(1982)
A.R. Yemen	1.4	(1980)

Table 1-2 presents organization, jurisdictional level, and ability to set tariffs for water and wastewater projects. Of the country studies on water supply, the operating agency in Turkey is empowered to set tariffs. For the remaining countries, either the national agency or local municipality recommended tariff increases. Approval, in several cases, rested with higher government levels. In several instances, the country's chief executive reviewed tariff recommendations and rescinded or delayed suggested increases.

Of the country studies on wastewater, the operating agencies in Israel and Turkey were empowered by the local municipality to set tariffs. The remaining countries permitted either the national agency or local municipality to recommend tariff increases. Approval rested with higher government levels.

Selected information on each water/wastewater project was drawn from IBRD reports and documents. This Section draws from selected information from IBRD reports and documents where such data is available to permit cross-country comparisons for program characteristics and issues. Countries and/or projects are discussed in accordance with the availability of data.

Table 1-2

Organization and Ability to Set Tariffs

Countries	Water					Wastewater				
	Organi-zation	Local	National	Free to Set Tariff	Recom-mend Tariff	Organi-zation	Local	National	Free to Set Tariff	Recom-mend Tariff
Algeria	SONADE		X		X	SEDAL	X			X
Egypt	AWGA	X								
	BWC	X			X					
Jordan	AWSA	X			X	AWSA	X			X
	WSC	X			X	WSC	X			X
Morocco	ONEP		X		X	___[2]	X			X
Syria	EPEF	X			X	NSA		X		X
Tunisia	SONEDE		X		X	ONAS		X		X
Turkey	ISKI	X		X		ISKI	X		X	
A.R. Yemen	NWSA(1)		X		X	NWSA[1]		X		X
Israel						local authorities	X		X	

[1] Two separate projects in A.R. Yemen operated by NWSA.

[2] Project under consideration for financing by IBRD in Casablanca.

1.2.1 Algeria

The Ministry of Hydraulics, Land Improvement and Environment (MHLIE) is responsible for the development and conservation of the country's water resources. An Agency of this Ministry, "Societe Nationale de Distribution d'Eau Potable et Industrielle" (SONADE) is in charge of planning, construction, and operation of water supply production facilities. Water distribution and sewage collection in the cities are managed by municipal entities (Regies) which are controlled by the local administrations - Assemblee Populaire de Wilaya (APWs) and Assemblee Populaire Communale (APCs). The Ministries of Interior, Planning, Health, Agriculture and Industries also participate in the sector.

The project facilities are operated by SEDAL, a Wilaya company formed by decree of the Wali of Algiers (1977) to be responsible within Greater Algiers for the provision of drinking and industrial water and the collection and treatment of waste-water. The staff of SEDAL represents 1.0 employees per 1,000 people served.

1.2.2 Egypt (Alexandria)

The Alexandria Water General Authority (AWGA) was constituted in 1968 with responsibility for the provision of potable water to consumers in the city, Governorate of Alexandria and parts of the Governorate of Behere and Mirsa Matruh. The approval of AWGA's capital expenditure plans and tariff proposals fall within the responsibility of the legislative authority of the Alexandria Governorate, i.e. the Local Council. Employees per 1,000 connections were 33.3 in 1977 and 31.3 in 1981.

1.2.3 Egypt (Beheira)

The General Organization for Potable Water (GOPW) was formed in 1968 with broad objectives of planning, designing, building and operating potable water supplies throughout Egypt with the exception of major cities. Against a background of shortage of trained staff, overcentralization, ineffective responsibility for operations at local level, financial instability, failure to maintain equipment, failure to reduce excessive water losses (50%), the Government decentralized water supply with local systems responsible for their own maintenance and operations.

The General Organization for Sewerage and Sanitary Drainage (GOSSD) operated under the same framework as the GOPW in wastewater collection and disposal. However, it collects no revenues for the service it provides and recovers all of its operating costs from the Government. With the reshaping of the GOPW and GOSSD, the Government created a National Organization for Potable Water and Sanitary Drainage (NOPWASD). After 17 months of existence NOPWASD was reportedly not able to function in accordance with the decree by which it was created.

The Beheira Water Company (BWC), a new Governorate-owned company, is responsible for the production and distribution of potable water (1981). The BWC is under the authority of the Governor of Beheira. The BWC was expected to be in full operation by 1983.

1.2.4 Jordan (Amman)

All development activities including the water supply and sewerage sector are coordinated at the national level by the National Planning Council (NPC). The National Resource Authority (NRA) has overall responsibility for water resource studies and planning throughout Jordan. Responsibility for community water supply and sewerage is at present divided between the Water Supply Corporation (WSC), the Amman Water and Sewerage Authority (AWSA), and the Jordan Valley Authority (JVA), all three of which were created in 1973. Eight municipalities still operate their own water systems with independent groundwater sources. AWSA is responsible for water supply, sewerage and stormwater drainage in the City of Amman where in 1981 it served some 650,000 people. JVA is responsible for water supply development and operation in the Jordan Valley. WSC provides bulk water supply to some 432 communities and also operates the distribution systems for about 350 communities; in these communities WSC also operates the sewerage system.

The Amman Water and Sewerage Authority (AWSA) was established in 1973 as an autonomous authority to operate all water supply, sanitary sewerage and stormwater drainage functions. The salary structure of its employees is competitive with the private sector, however, the turnover is high, due mainly to higher salaries being offered in neighboring Arab countries.

In 1984, the number of water staff per 1,000 served is projected to be 1.2, a decrease from the 1.3 for 1982. In 1984, staff per 1,000 served in sewerage is projected to be 0.5. This would be a dramatic decrease from the 1.0 for 1982.

1.2.5 Jordan (Zarqa/Ruseifa)

The Water Supply Corporation (WSC) supplies and operates the water system in some 350 large and small communities and provides bulk water supply to some 432 communities which operate their own systems.

For the operation of the Zarqa/Ruseifa system, the WSC plans a separate management unit reporting to the regional office for Amman Governorate, to be upgraded to regional office status at a later date.

The staff of WSC numbered about 1,200 in 1981 corresponding to about 20.8 employees per thousand connections. It is expected that the employee/connection served ratio for water supply should fall to about 12.4 employees per thousand by 1985. For the future sewerage operation (1980) the employee/connections served ratio should be about 4.1.

1.2.6 Morocco

The water project for Morocco is a bulk water (wholesaling) supply system. The study and development of water resources is the responsibility of the Hydraulic Department of the Ministry of Equipment. Production and distribution of potable water is carried out by different agencies. Most prominent is the Office National de l'Eau Potable (ONEP) responsible for development, production and transmission of water to the urban centers. The Regie (local organization) distributes the water supply as supplied by ONEP. Sewage collection and disposal is the responsibility of municipal services.

1.2.7 Syria (Damascus)

The Ministry of Housing and Utilities (MHU) is responsible for general guidelines and assistance to municipalities which are in charge of the operational and maintenance functions of existing sewerage systems. The MHU sewerage unit is severely understaffed and unable to discharge its responsibilities properly. The sewerage units of the municipalities lack proper organization, qualified staff, and adequate budget allocations which adversely affects the standard of operation and maintenance. The Government has made a decision to establish a National Sewerage Authority (NSA).

The Damascus Water Authority (EPEF) is a public authority created by the Government in 1958. Although administratively attached to the Ministry of Municipal and Rural Affairs, EPEF operates autonomously in day-to-day operation, has identifiable assets, and prepares budgets.

1.2.8 Tunisia

The National Water Program 1968-1973, giving high priority to improving supply in areas of high population density and tourist areas, together with the introduction of a realistic tariff, created an autonomous national water company - Societe Nationale d'Exploitation et de Distribution des Eaux (SONEDE). Some seven years later similar action was taken to reorganize the sewerage and sewage disposal subsector. The Office Nationale de l'Assainisement (ONAS), a parallel national agency, was created with the objective of eliminating the imbalance between water supply and wastewater treatment capacity by the mid-1980's. The staff per 1,000 people served in SONEDE in 1981 was 1.1.

1.2.9 Turkey (Istanbul)

In 1981, the Istanbul Water Supply and Sewerage General Directorate (ISKI) was formed as an autonomous entity responsible for the planning, design, construction, operation and maintenance of all water supply and sewerage facilities in the Greater Istanbul Municipality. ISKI's General Council has the freedom to set water tariffs and sewerage charges without, as in the past, having to seek prior approval of the Municipality or the Central Government. The staff per 1,000 connections in 1982 was approximately 1.0. In 1986, it is projected to be 0.7.

1.2.10 A.R. Yemen (Sana'a)

In 1973 the government established the National Water and Sewerage Authority (NWSA, an autonomous organization) to be responsible for planning, execution and operation of those water supply and sewer systems in urban centers designated by the Government. The staff per 1,000 population served in 1978 was 1.4 and in 1980 onward was 1.0.

1.2.11 Israel

Implementation of sewerage works under the jurisdiction of local authorities is supervised by the Ministry of the Interior. However, because of the potential effects on the activities of other Ministries, the supervision and planning of sewerage works is controlled and coordinated by an Inter-Ministerial Committee, consisting of the Director/ General of the Ministries of the Interior, Agriculture, Health, Housing and Finance, and the Water Commissioner.

1.3 SCOPE OF CURRENT SERVICES AND PROJECTED DEVELOPMENT

Historical data on growth in population served and household connections to water and sewerage systems are presented. Tables 1-3, 1-4 and 1-5 summarize connections, population served, per capita income and water consumption.

1.3.1 Algeria

The sewerage system consists of intercepting the discharge of wastewaters into the El Harrach River and treating them by the activated-sludge process so that the water can be reused in irrigation or the groundwater acquifer recharged.

There was little progress in the water supply sector between 1971 and 1977. Few new projects were carried out and the maintenance of existing facilities was erratic. Of the budget included in the two Four-Year Plans (1970-77), only some 25% was actually spent during the period. Those investments made under the Urban Modernization Plans (PMUs) and the Commune Development Plans (PCDs) were on a case-by-case basis and never integrated into the master development plans. Moreover, the facilities were put in by the wilayate water departments and have never been incorporated into the assets of the operating agencies.

Cumulative delays in the sector's development have led to severe water shortages in the big cities and have also held back expansion of the irrigated areas. The cities' water systems have remained largely unchanged over the past ten years, whereas their populations have doubled.

Table 1-3

Populations and Per Capita Income

	Per Capita Income (1982)[1]	Population
Algeria	$2,382	
Algiers		2.5 million (1980)
Egypt	$650	
Beheira		2.75 million (1980)
Alexandria		2.72 million (1982)
Jordan	$1,620	
Amman		850,000 (1982)
Zarqa/Roseifa		302,000 (1981)
Morocco	$860	
Casablanca-Kenitra		2.9 million (1979)
Greater Agadir		250,000 (1979)
Syria	$1,570	
Damascus		1.77 million (1984)
Tunisia	$1,420	3.4 million-urban 1982)
Turkey	$1,540	
Istanbul		4.7 million (1982)
A.R. Yemen	$460	
Sana'a		226,000 (1985)
Hodeida		76,000 (1984)
Israel	$5,160	3.5 million (1985)
Tel Aviv		850,000 (1980)

[1] World Development Report, 1983.

Table 1-4

Connections and Percentage
of Populations Served

	Actual	Projected
Egypt		
Urban Population Served	80% (1982)	
Alexandria		
Water Connections	115,946 (1982)	
Jordan		
Amman		
Water Connections	41,607 (1976)	60,000 (1984)
Urban Population Served		87%
Sewer Connections	7,900 (1976)	40,000 (1984)
Syria		
Damascus		
Water Connections	165,000 (1978)	258,000 (1984)
Population Served	68% (1980)	80% (1990)
Tunisia		
Water Connections		
Urban Areas	440,000 (1981)	
Rural Areas	25,000 (1981)	
Total Population Served	42% (1981)	
Total Population Connected	2,764,000	
Sewer Connections		
Urban Population Served	30% (1981)	
Total Population Connected	1,054,000	
Turkey		
Istanbul		
Water Connections	4,022,000 (1982)	
Population Served	88% (1982)	
Sewer Connections	2,329,000 (1982)	3,461,000 (1987)
Population Served	51% (1982)	61% (1987)
A.R. Yemen		
Sana'a		
Water Connections		
Population Served	38% (1976)	89% (1985)
Hodeida		
Sewer Connections	425 (1978)	4,435 (1984)

Table 1-5

Consumption in Liters per Capita per Day

	Actual (lpcd)	Projected (lpcd)
Algeria		
Algiers	130 (1980)	
Egypt		
Alexandria	110 (1977)	
Beheira	45 (1980)	
Jordan		
Amman		58 (1984)
Zarqa		98 (1986)
Ruseifa		71 (1986)
Syria		
Damascus	160 (1976)	168 (1984)
Tunisia		
Greater Tunis	139 (1982)	
Outlying Areas	42 (1982)	
Public Taps	7.5 (1982)	
A.R. Yemen		
Sana'a	9.3 (1977)	15.5 (1985)

In addition to the internal political problems in the Ministere de l'Hydraulique prior to 1977, the relative lack of success of the two Four-Year Plans is attributable to the following three causes. The current status of the sector is not known and sectoral priorities could not be established. Owing to a lack of data, development plans and specific projects could not be prepared and budget allocations remained unused. The sector has suffered from a lack of organization in recent years. Most water supply systems have been run by municipal agencies without either the technical and financial means or the human resources to do the job properly.

The Five-Year Plan recognizes these problems and aims at solving them. In particular, it notes the need for work on existing installations so that greater benefit can be derived from them.

1.3.2 Jordan

The facilities that were in place prior to the IBRD project consisted of a water distribution system serving over 80% of the Amman population through house connections, and the sewage collection system serving about 25% through service connections. Approximately 75% of the water supply system and 100% of the sewerage system had been constructed since 1962.

The existing sewerage and sewage disposal system within Greater Amman area can briefly be described as follows: (1) the municipality of Amman is provided with a sewerage system covering about 40% of its population or about 20% of the Greater Amman population; (2) the remaining population is mainly provided with cesspool arrangements with varying degrees of operational performance; and (3) the bulk of the sewage is treated in a heavily overloaded treatment plant, partly due to the high strength sewage influent.

In Zarqa and Ruseifa, the project calls for 135 km of new distribution mains, 250 km of sanitary sewers, wastewater pumping station, sewage treatment plant, and 12,000 water meters. All sewage in the two cities is at present disposed of in cesspools, which by nature of the terrain and density of population give rise to serious health problems. There are approximately 32,000 cesspools. Forty private and 8 municipal owned tankers make about a total of 87,500 tanker trips per year, with a charge of JD 2.5 to JD 3.0 for municipal owned tankers and a charge of JD 3.0 to JD 5.0 to private tankers.

Under the five year plan (1976-1980) emphasis was given to the expansion of public water supply services to all communities. By the end of 1980, it is estimated that 66% of the total urban population have water connections and 25% have sewerage system connections. The high cost of distribution combined with the natural scarcity of water is reflected in the low national per capita water consumption, estimated at 28 lpcd and expected to rise to 38 lpcd in 1985. On-going water supply and sanitation programs have been in part financed by the United Kingdom, West Germany, and the United States. International investment is expected to continue to play an important role in future water supply and sewerage projects.

The East Ghor Main Carrier Project (part of a 5 year plan, 1981-1985) is designed to convey water to the Amman Water Basin. From the Amman Water Basin, the treated effluent will flow downstream in the Jordan Valley where it will be used for irrigation of crops. As such, the Project constitutes the first major step in promoting water conservation and recycling.

With the completion of the East Ghor Project, sufficient quantities of water, though quite expensive (related in part to high pumping costs), should be available in the Amman water basin up to the year 2000. Other water projects under implementation or design in other parts of the country should also contribute to alleviating shortages in the meantime. However, in the long run other water schemes will have to be developed. Because of the scarcity of water and the requirements for wastewater treatment, the costs for water supply and sewerage services are high and will probably increase significantly as new projects are implemented. The sector is not financially self-supporting. While this is acceptable for rural areas, the objective of full cost recovery for urban areas is being considered. The investments for the East Ghor Project give an indication of the water tariffs that would have to be charged to achieve full cost recovery. Although the Government is fully aware of the impact of a proper pricing policy on water conservation and cost recovery, the policy has in the past been eroded by inflation. In this context, recent increases in water tariffs were a significant step towards improving the financial situation of the sector.

Considerable progress has been made in the past to connect the urban populations to piped water (87%). While the supply is sometimes intermittent, actions are being taken to secure a continuous water supply. Only 26% of the urban households are connected to the sewerage system. Future investments will have to increase the connection rate in those areas where usage of seepage pits is no longer viable due to either the high costs of emptying or because of health hazards.

The coverage of the sewage system is planned to be extended as follows: (1) in the Amman municipality 78% of the population will be provided with sewer connections by 1990, and 96% by 2000; and (2) in other municipalities in the Greater Amman area about 59% of the population would be provided with sewer connections by 1990 and 62% by 2000.

1.3.3 Morocco

The IBRD financial project consists of expansion of bulk water production and transmission facilities to four cities on the Mid-Atlantic coast. The 1980-1984 investments include projects from previous programs that have yet to be implemented. New expenditures of DA 18 billion are therefore envisaged over a period that extends beyond 1984. The specific investments during the Plan period (1980-84) are estimated at DA 12.1 billion.

On the basis of the current status of preparation of the projects to be executed during the Five-Year Plan, it is estimated that not more than 20% of the funds allocated will be invested during the period. Of the six regional studies envisaged in the Plan, only that on the Mitidja-Sebaou region is under way. Part of the Keddara project will be carried out during the Plan period. Preparation of additional specific projects cannot be started until these regional master plans are ready. Once the studies included in the Five-Year Plan have been completed, the development of the sector can be stepped up.

In 1971, according to the population census, 64% of the urban households had water available in their homes, either piped (52%) or from a well or spring (11%). At the present time, given the system of street standpipes, the urban population in general has access to potable water. In the bidonvilles (shantytowns), however, the number of these standpipes is still very small, with often more than 2,000 users per standpipe. In rural areas, 5% of the population has access to house connections and 10% to standpipes; ten percent use community wells. The remaining 75% of the rural population is dependent on traditional water sources.

The main sources of potable water are at a distance from the major urban areas, so that it has been necessary to build costly storage and transmission systems. The Government has decided to give priority to the water supply needs of the urban centers, where the concentration of the population permits a lower average water-distribution cost per user. A number of institutional constraints

exist. The majority of the poorest urban households live in bidonvilles that have grown up spontaneously. Although certain bidonvilles are long-established, most of the dwellings are illegal. The distribution network for potable water may not be extended to these areas by connecting individual dwellings to the main system.

The 2nd and 3rd Water Supply Projects cover the Mid-Atlantic Coast comprising four cities: Casablanca, Rabat, Sale, and Kenitra with a combined population of 2.9 million in 1979. In addition, the project area covers Greater Agadir with a population estimate of 250,000.

1.3.4 Tunisia

SONEDE has successfully developed its program of connecting new consumers, from about 11,000 a year initially to between 30,000 and 40,000 annually in recent years. This program has helped counter-balance a declining trend in per capita consumption which is attributable to a number of causes. These include extension of service to low income areas and relatively high price elasticity of demand in face of the sharply progressive tariff. As a result, it was possible to quadruple the number of customers in twelve years with only a doubling of production capacity.

SONEDE has an ongoing program to install new house connections and is expected to install about 35,000 house connections per year during the Sixth Plan Period (1982-1986). Records show that about 75% of all connections are made on credit.

ONAS has rehabilitated and expanded sewerage plants in Tunis, so that after centuries, Lake Tunis is becoming free from pollution. Sewers in other systems are being renewed and extended as they are progressively taken over by ONAS. A national program of works, in order of priority, has been established, covering some 60 towns, in addition to the ongoing projects. Total expenditures in the period 1976-81 was TD 93 million (compared with only TD 9 million 1962-1971). ONAS had planned to provide service by 1981 to all inhabitants having water connections, but this target has proved too optimistic. Regular preventive maintenance is now in operation, a steady program of new connections is under way, and effluent quality is monitored routinely.

1.3.5 Turkey

The goal for the Instanbul Sewerage Project is to increase the population served by sewer connections from 52% (1982) to approximately 60% (1990). For lower income households, the population served by sewer collections is planned to increase from 50% (1982) to 70% (1990).

1.3.6 A.R. Yemen

The Water Supply and Sewerage Project in Sana'a is designed to increase the water supply through house connections to 81% of the expected 1980 population and sewerage service to 50% of the population. The remaining population will be served with water standpipes and individual sewage disposal systems. The plant and equipment required to meet specified levels of water supply service includes 10 wells, transmission pipelines, pumping stations, reservoirs, distribution system, 18,000 house connections and 50 public taps. Additions to the sewerage system include sewerage collectors, 8,700 house connections, and stabilizing ponds.

In 1981, the sewerage service was to become operative serving 50% of the population through 8,700 house connections. By 1985, individual house and building connections are projected to increase to 11,700 representing 55% of the population. The NWSA will be extending credit to low income customers for payment of the sewer connection fee.

1.4 URBAN POOR

A major portion of the beneficiary population for water/wastewater service is the urban poor. To the extent that the service population is poor, the utility has to consider the impact of tariff policies and the need to obtain additional sources of revenue.

1.4.1 Egypt (Beheira)

With the unsatisfactory water supply, the poorer inhabitants who rely on standpipes are usually the first to do without when water system pressure drops. Standpipes supply water to 605,000 low income rural inhabitants. The tariff pro-

posals which allow standpipe users to receive free water for life-line supplies should encourage public use.

1.4.2 Jordan

AWSA work program for Amman for the four years 1977-1980, of which the IDA project is a part, gives high priority to water and sewerage system construction in urban poor areas. Direct water service to the urban poor increased from 34% in 1977 to 84% in 1981, and sewer connections from 18% to 74%. The estimated number of urban poor provided with improved water service increased from 40,000 to 51,000. Sewerage service will benefit 37,000 users as compared with an initially served urban poor population of 11,000. Approximately 20% of the project cost for water and 19% of the project cost for sewerage is allocated to the urban poor and is expected to have a significant impact. Per capita expenditures on the urban poor in this project will be approximately US $175 for water supplies and US $157 for sewerage.

For the Zarqa/Ruseifa project, a family in the 20th percentile income level is currently paying an existing water tariff (assuming 30 lpcd) of about 0.9% of household income. Based on calculated sewerage charges of 2.1% of household income, the total of 3.0% is considered to be able to afford the services.

1.4.3 Morocco

About 1 million of the 2.9 million inhabitants of the Mid-Atlantic Coast live at income levels below the 1978 urban povery threshold of DH 692 (US $181) per family per month. They constitute the urban poor. The majority, 750,000, live in shanty towns, and 250,000 in densely populated districts. The dwellings are arranged in such a way rendering the installation of a distribution system impracticable.

Practically no house connections exist in those areas and the population depends on standpipes for their water supply. About half of the 345 multiple faucet standpipes in Casablanca, Rabat, Sale and Kenitra are in squatter areas and have to serve 750,000 inhabitants, which translates into more than 4,000 inhabitants per standpipe. Walking distance to these standpipes often exceeds 500 meters, which together with queing, is such a hardship that only the minimal water demand is satisfied.

The standpipes are the property of the municipalities which are also responsible for their operation. The water is distributed free to users, metered and paid for by the municipality according to the highest tariff bracket.

In contrast to the squatter areas, service standards of the other 250,000 urban poor can be upgraded through the installation of individual house connections. Improvement in the service level by standpipes depends on sufficient budget allocations, so that water charges are met from the operational budget of the municipalities.

A revolving fund has been established to finance house connections of low income customers. Installment payments of up to five years for the cost of installing the house connections and related charges would be affordable. As several families would share such a connection, the related charges would be within 1.6% and 3.3% of their incomes. In the small number of cases, where a connection would serve only one family and the contribution towards extending the distribution system would have to be paid, the total charge would correspond to 6.6% of their income.

1.4.4 Turkey (Istanbul)

As a result of the IBRD project the water supply and sewerage charges will increase significantly and the beneficiaries will have to pay for connection costs and for one-third of the extension costs for a secondary sewerage system. For the latter item, short-term local bank loans are being provided. An affordability analysis for the lower income population shows the following results:

- An average monthly household income for family of four would amount to about TL 10,000 (US $77).
- An average water consumption would be about 10 m^3/month, which implies a combined water supply and sewerage charge of TL 370 or 3.7% of monthly income.
- The cost of the secondary sewerage system per household would be about TL 125 as a monthly annuity payment.
- The average cost for a sewer connection is TL 6000 per household. A total monthly cost would thus not exceed 4 to 5% of a monthly household income.
- The lowest income bracket of 0-999 TL/month is approximately 25% of the population.

SECTION 2

WATER/WASTEWATER TARIFFS

A viable utility providing water and/or wastewater services must obtain revenues to cover the costs of construction, operation and maintenance, and replacement of capital. In addition to a governmental subsidy, the following pricing methods were used by the case countries: lump sum payment, periodic fixed payment, or periodic payment determined by metered water consumption.

The single fixed (lump sum) payment is collected at the time a consumer is connected to the system. The size of the fee is determined by a few factors among which are the cost and the size of the connection, consumer characteristics directly relevant to the amount of water to be used and type of sewage generated (i.e. number of taps and/or quality of effluent), and consumer characteristics not directly related to water use and sewage generated (i.e. property value or type of customer).

The size of the flat payment collected periodically by a utility is determined by the characteristics of the consumer, both related and unrelated to the amount of water to be used and type of sewage generated. The first type of characteristics include meter inlet size, number of taps, presence of a garden, or type of industrial process. The second type of characteristics, not directly related, include type of consumer and property value.

Lastly, utilities charged a periodic payment based on metered water consumption. Single rate and block rates were used. This pricing method adhers most closely to the fundamentals of economic theory. The rates can vary by type of consumer, property value, strength of sewage, and between areas.

Four objectives guide water/wastewater decisionmakers in their choices among the pricing alternatives discussed above and the appropriate levels to be used. The objectives are raising a target level of total revenue (administrative simplicity and efficiency), providing for the burden to be shared fairly between the different users of the system, and influencing consumer behavior.

Water and wastewater project managers and government administrators may wish to raise a target level of total revenue. The utility can use the revenue to service its debt and maintain the degree of financial independence necessary for it to

be an efficient organization. The strength of the consideration of administrative simplicity and efficiency will vary according to the managerial ability of the agency and the diversity of users.

The equity objective, that is for different users of the system to share the burden fairly, requires a clear formulation of what is deemed to be "fair." If the ability to pay as roughly measured by property values is a "fair" basis for charging prices, then non-domestic consumers would be affected by the policy; the burden of high charges upon a firm may be borne not by its owners but by its customers. In addition subsidies to poor consumers may be provided from general taxation or from user charges.

It is possible to influence consumer behavior by inducing consumers to economize when there is a drought or when capacity is inadequate or to increase their water usage for health and sanitation considerations. Since the demand varies according to the price charged, as confirmed by the country programs reviewed, different standards of service could be offered to different groups of consumers. Providing only for house connections usually excludes the poorer people from service unless other consumers are willing and able to subsidize their connection and use. Even where a tariff structure with cross-subsidies exists, the poor are often unable to afford the cost of household connections. The alternative most seen in the countries studied was public standpipes.

A typical tariff structure consists of a "life-line block" which is sufficient to meet basic sanitation needs, supplied either free (in two countries) or at a very low price per cubic meter (in five countries), and one or more larger consumption blocks where unit prices approach or equal the incremental supply cost. Increasing block water supply tariffs were adopted by seven of the nine of the develping countries in this study.

2.1 PRICING ALTERNATIVES

Urban water supply systems have several types of pricing methods from which to choose. These include a fixed service charge per billing period, minimum charges, installation charges, charges linked to lot size, ad valorem taxes, and water and sewerage charges that vary with the quantity of water used. Any arrangement of charges that does not vary with the quantity of water used is generally referred to as a flat rate charge. Charges varying with the quantity of water used are frequently

referred to as commodity charges.

The systems varied with respect to user categories and charged fees. Tunisia was the most complex with increasing block rates for domestic, agricultural and industrial connections and flat rates for standpipes, hotels and government agencies. Water flat rates ranged from $.03 per cubic meter in Beheira, Egypt to $.23 per cubic meter in Algeria. Some of the most common systems of charging for water, as well as some which have recently been advocated, are presented below for the projects reviewed.

2.1.1 Flat Rates: Algeria; Beheira, Egypt; Istanbul, Turkey

Flat rates include any set of charges which are unrelated to the volume of water used. They generally include a specified installation charge and a fixed service charge per billing period, no matter how much water is used. Flat rates tend to encourage wasteful consumption. Maximum daily usage and peak hour usage are much higher in areas that use flat rates than in metered areas. Flat rates are only justified where there is an abundant supply of water and where the cost of metering is greater than the cost of supplying the excess demand.

2.1.2 Block Rates: Alexandria, Egypt; Amman, Jordan; Morocco; Damascus, Syria; Tunisia; A.R. Yemen

Rising block rates include both a nominal charge for a minimum quantity used, as well as increasing rates within discrete ranges. It is a relatively new concept and has come into widespread use in developing countries and areas that encourage the socially-favoured ability to pay criterion.

Generally the initial quantity sold at concessionary rates is determined at a basic needs level — that quantity of water needed for consumption by a large low-income family. For example, the first cubic meter per month could be supplied free of charge.

Increasing block tariffs have been adopted by 21 of the 36 developing countries in a study carried out by the World Bank.[1] Small customers are favoured and

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[1] IBRD, Public Utility Bulletin No. 11 - Urban Water Supply and Sewerage Pricing Policy, 1974.

the rationale is for income redistribution. Extension of service to the poor and avoidance of wasteful consumption tend to command a greater priority in the developing countries than in the more affluent ones. One disadvantage of this system is that it has no economic justification where there is excess capacity in the system.

Greater usage of "progressive" block rates or systems with low-priced quotas and progressive penalties for using more than one's quota is expected to spread throughout the developing world. More affluent countries may increasingly realize the advantages of such a system.

Declining block rate structures are strictly promotional. They are the result of an era when water utilities were making large but unavoidable investments in capacity and had excess water to sell. They are now an anachronism in the face of increasing long-run marginal costs. Today, nearly all of the economies from large-scale systems have been exploited and expansion, through competition for new dam sites and already over-used rivers, is more expensive. None of the Near East countries studied had declining block rates.

2.1.3 Uniform Rates: A.R. Yemen

Uniform rates refer to a constant charge per unit of water consumed, without regard to quantity. It is based on the average cost concept, i.e. total system costs divided by number of units consumed. The same price is charged over a given area, over a given time and for a given user group, even though the costs of supplying different groups vary considerably over time and space. The main advantage of this method is the ease of collection; the main disadvantage is that it does not reflect the marginal costs of delivering the water.

2.1.4 Lot Size, Distance and Connection Fees: Morocco; Jordan; Israel

The length of water and sewer main lines to users is influenced by the size of the housing lots, topography and layout. The smaller the lots, the lower will be the cost of the major trunk lines. One-time-only fees based on the size of the lot are sometimes charged for connections to the water and sewerage system.

Distance fees represent the cost of local service lines, while connection fees represent the cost of the meter plus labor and equipment for making the connec-

tion. Some locales charge different "distance" fees for those living inside and outside the city limits. Distance or "zonal" charges could be added to service connection fees to cover added fixed costs of main lines and to cover volumetric water rates in order to recover the extra costs of pumping and maintaining longer lines. Ideally, the full cost of the pipeline should be charged to the customers served along the line and even to the owners who do not request water services. The rationale is that property owners should pay for the availability of the service.

2.1.5 Payment By User Groups: All Countries

Discrimination among users, where different categories of customers are charged different rates per unit of water, is a very common feature of Near East urban water pricing systems. Sample categories include institutions such as schools, churches (temples) and hospitals; private houses; government offices; international organizations; and commercial and industrial users.

In Tunisia the tariff system distinguished between five classes of consumers: domestic; ordinary (including commercial); preferential (welfare, education, hospitals); tourism (hotels); and government. Different tariff rates were imposed on each class based on the capacity to pay and the volume used. A rising block-rate system was used within each class with a basic low minimum payment to cover the essential needs of a large family. The Tunisian experiment emphasized social equity. The charges to some commercial customers were higher than the actual costs of water supply.

2.1.6 Pricing Combination: All Countries

Combinations of the preceding pricing policies have been recommended by various observers as optimum, in terms of revenue generation, efficiency and equity goals. All of the Near East countries studied used pricing combinations. A pricing combination could offer higher revenue while holding rationing requirements to a minimum and rewarding low consumption users with lower average rates. In Tunisia, for example, the water utility charges a combination low minimum rate with rising block rates and a uniform rate above a certain level.

2.2 WASTEWATER CHARGES

Wastewater systems provide a service and not a commodity as in the case of water supply systems. Wastewater systems rely on water systems to provide the necessary medium to carry effluent. All of the wastewater projects studied except Syria charged users for services. The following outlines methods of charging for wastewater services:

- One Time Fee: Algeria, Jordan, Morocco, Yemen: A one time fee based on connection costs and/or application fees can be charged with the option to pay a small amount initially with the rest annuitized. In Morocco, a 20% surcharge was placed on the connection cost.

- Water Surcharge: All Countries: A surcharge fee per cubic meter of water use can be charged. Costs can be recovered if the fee is equal to the added incremental costs of sewerage. In Morocco, an increasing block rate was applied. In Algeria, the water tariff included wastewater services.

- Flat Fee: Tunisia, Turkey: Periodic flat fees charged included annual connection fees (Tunisia) and meter rentals (Turkey).

- Property Tax: Algeria, Jordan, Morocco, Tunisia, Israel: A tax can be levied on property as a land value increment tax based on the increase of property value as a result of the provided service. The property tax charged in Jordan and Morocco was based on the rental value of the property.

2.3 TARIFF POLICIES AND STRUCTURE BY COUNTRY

This section presents a description of the rate policies in the Near East countries. Tables 2-1 and 2-2 summarize the structure of water and wastewater tariffs. Wherever possible, financial performance is reviewed. The tariff policy recommendations were drawn from the IBRD country reports.

Table 2-1
Water Tariff ($US)

	ALGERIA[1]	EGYPT Alexandria	EGYPT Beheira	JORDAN Amman	JORDAN Zarqa/Ruseifa	MOROCCO
Free						
Domestic - Flat Rate	0.23/m^3	Monthly	Monthly	Monthly	Monthly	Quarterly
Block Rate		0-10m^3=.014 11-30m^3=.022 30+m^3=.022	.03/m^3	0-3m^3=0.46 4-20m^3=0.76 21-40m^3=1.22 41-100m^3=1.53	0-5m^3=0.30 6-15m^3=0.37 16-25m^3=0.92 26+m^3=1.22	1-30m^3=0.21 30+m^3=0.49
Standpipes		Free		None		Paid by community at highest tariff bracket
Agriculture						
Industry	0.46/m^3	.143/m^3	0.03/m^3			0.33/m^3
Hotels & Tourism	0.46/m^3		0.03/m^3			0.33/m^3
Government	0.46/m^3	.143/m^3	0.015/m^3			0.33/m^3
Bulk Sales		Harbor 1.43/m^3				0.17/m^3
Meter Rental & Maint.						11.25% tax
Connection	Cost	Cost	Inspection Fee Cost + 0.72	Cost plus 6.12	Cost plus 6.12	Cost plus interest over 5 years-paid qtr
Taxes	% of National Property Tax					6.38%
Credit Interest						
Deposit (New Connection)						
Fixed Charge						
Minimum Charge						
Subscription Fee						
Meter Installation Fee						
Meter Deposit					15.30	
Capital Contribution (New Connection)						
Water Right Purchase[2]						
Maintenance Contribution				0.69/qtr	1.15/qtr	
Average Rate	0.32/m^3	0.04/m^3	0.03/m^3	1.00/m^3	.65/m^3	0.30/m^3

[1] Combined tariff for water and wastewater.

[2] Applicants with premises over 100m^2 (public and religious exempt).

Table 2-1 (Continued)
Water Tariff ($US)

	SYRIA Damascus	TUNISIA	TURKEY Istanbul	A.R. YEMEN Hodeida/Sana'a
	Quarterly		Monthly	
Free		Quarterly		Monthly
Domestic - Flat Rate	0.05/m^3		0.14/m^3	0-20m^3=0.88
Block Rate	135+m^3=0.13	0-20m^3=0.136 21-40m^3=0.17 41-70m^3=0.30 71+m^3=0.50		21+m^3=1.76
Standpipes		Paid by community .30/m^3		
Agriculture		0-20m^3=0.136 21-40m^3=0.17 41-70m^3=0.30 71+m^3=0.50		
Industry	0.51/m^3	0-20m^3=0.136 21-40m^3=0.17 41-70m^3=0.30 71+m^3=0.50	0.28/m^3	
Hotels & Tourism		.60/m^3	0.28/m^3	
Government	0.255/m^3	.30/m^3	0.28/m^3	
Bulk Sales			0.105/m^3	
Meter Rental & Maint.	0.19/mo.	1.00/mo.	12-60mm=0.25/mo. 60+mm=0.625/mo.	
Connection	Cost plus 20%	Cost plus interest over 5 years-pd.qtr	Cost plus interest	
Taxes		Gov't 4.3% on water sales plus 7.5% on serv.		
Credit Interest		11%		
Deposit (New Connection)	Consumption deposit plus value of meter	Equal to 3 mo. service		
Fixed Charge	59.16/yr.			8.32/mo.
Minimum Charge				0.55
Subscription Fee	1.28			
Meter Installation Fee	1.28			
Meter Deposit				
Capital Contribution (New Connection)	19.13 minimum			
Water Right Purchase[1]	510/m^3/day[2]			
Maintenance Contribution	13.67/yr.			
Average Rate	0.20/m^3	0.356/m^3	0.195/m^3	0.67/m^3

[1] Applicants with premises over 100m^2 (public and religious exempt).

[2] Allowance purchased depends upon size of premises.

Table 2-2

Wastewater Tariff ($US)[1]

	ALGERIA	JORDAN Amman	JORDAN Zarqa/Ruseifa	MOROCCO
Subsidy				
Property Taxes	Level not specified	4% rental value over 20 per year (15% of revenue)	4% of rental value over 20 year	1.5% based on rental value
Water Consumption	Combined with water tariff			$2.52/qtr 0-30m^3/qtr=$0.027 31-60m^3/qtr=0.055 61+m^3/qtr=$0.098
Domestic		0.092/m^3 (61% of revenue)	0.20/m^3	
Building				
Land				
Credit charge for Connection-households				$109.62/linear meter of frontage
Credit charge for tourist premises				
Credit charge for industry-effluent quality				
Miscellaneous				
Industry				$0.219
Government				$0.098m^3
Meter Rentals				
Connections	Cost plus	Costs plus 25% of rental value (19% of revenue)	25% of rental value plus cost	20% surcharge on cost
Application Fee		(5% of revenue)	Housing A=30.60 Housing B=15.30 Housing C,D=9.18 Industrial=76.50	

[1] No tariff was established for Syria at the time of the study.

Table 2-2 (Continued)

Wastewater Tariff ($US)[1]

	TUNISIA	TURKEY Istanbul	A.R. YEMEN	ISRAEL (Average)
Subsidy	0.008m^3/yr (42% of revenue)			
Property Taxes	(30% of revenue)			
Water Consumption	0.004m^3/qtr (25% of revenue)		$.63/m^3	$0.196/m^3
Domestic		.025/m^3		
Building				$13.93m^2
Land				$3.18m^2
Credit charge for Connection-households	6.00/yr			
Credit charge for tourist premises	0.02m^3/yr			
Credit charge for industry-effluent quality	.007m^3/yr 0.12m^3/yr			
Miscellaneous	(3% of revenue)			
Industry		.050/m^3		$0.285m^3
Government		.050/m^3		
Meter Rentals		12-60mm/mo=.025 60+mm/mo=.0625		
Connections		Cost	Cost plus	
Application Fee				

[1] No tariff was established for Syria at the time of the study.

2.3.1 Algeria

A flat rate of DA 1.00/m^3 has been in effect (and still exists) for water supply services and sewerage services combined. A tariff study completed in 1979, yet to be implemented, calls for a combined water supply and sewerage service rate, modified by a progressive rate schedule for domestic use, with a minimum charge to be established to service the urban poor.

Apart from the connection charges, the only income of the sewerage service was the yield of the sewer tax. This tax represents a portion of the national property tax which is handed over to communes which are responsible for providing sewerage service. Publicly-owned buildings (about 80% of properties in Algiers) do not pay the tax; and so the yield has not covered the cost of the services. In 1976, it covered only about 10% of the costs. In 1980 SEDAL was to institute the new tariffs recommended by the tariff study with an increase in rates sufficient to generate income to cover operating and maintenance costs, including depreciation. The implementation of a water supply and sewerage rate of DA 2.61/m^3 is now scheduled for 1985. Officials of the Ministry of Finance have yet to agree to SEDAL's financial policies and objectives.

The present average rate of DA 1.00/m^3 was to be adjusted to DA 1.40/m^3 and then adjusted progressively according to inflation. This new average rate (DA 1.40/m^3) was to become effective in 1983.

The proposed rate increase was obtained by doubling the present tariff for industrial, commercial and public consumption (to DA 2.00/m^3). The tariff schedule for domestic consumption is to remain the same. SEDAL's objective is to apply a progressive rate schedule for domestic consumption.

SEDAL's financial situation has remained relatively good, to the extent that sewerage facilities are not included in calculations of SEDAL's fixed assets. Current Algerian policy requires that public enterprises finance their investments principally by long-term loans, and eventually develop a self-financing capability. It is therefore intended that SEDAL should reimburse government for part of the investment in the project.

2.3.2 Egypt (Alexandria)

Approximately 98% of AWGA's subscribers are supplied through meters. The overall effectiveness of the metering is in question and adversely affects the collection of revenue.

In Alexandria Governorate, domestic consumers are charged a preferential rate of 100 millimes for the first 10 m^3 per month (U.S. $0.26 for 2,600 US gallons). Domestic consumption above this level, and all non-domestic consumption is charged at higher rates. Arbitrary discounts are awarded to various classes of consumers, including clubs, charities and places of worship. All consumers pay connection charges based on cost of connections, and a monthly meter rental. As the tariff rate has been inadequate to cover operating costs and depreciation, a condition of the loan was to increase the average tariff revenue to not less than 30 millimes/m^3 by 1982 to meet construction costs.

The AWGA agreed that for each fiscal year it will set its tariff rates for water supply so that revenues from operations will provide:

- expenses of operation and maintenance (excluding depreciation), debt service and adequate increase in working capital, and
- a minimum contribution from internal funds toward capital expenditure to a percentage of the gross value of fixed assets in operation and under construction of 5% until 1980 and 2% thereafter.

A tariff increase was made in 1981 structured to yield an average of 30 millimes/m^3 and meet the loan effectiveness condition. At the end of 1982, AWGA was urged to implement new tariffs. Even though a net surplus was expected in 1982, projections showed that this surplus would not be sufficient to meet AWGA's financial objectives for 1982. The overall average tariff increase required was estimated at 17%.

AWGA incurred operating losses (after depreciation) for the years 1973-75. Internally generated cash flow was insufficient to finance working capital and debt service. Funds to meet AWGA's cash deficits have been provided by Government in the form of loans. No formal loan agreements had been executed and no repayment schedule had been determined; interest has, however, been charged at 5% on all loans with an exception of one interest-free loan of LE 1.3 million. The debt:equity ratio of 75:25, in view of operating losses was seen as an unsatisfactory starting point.

The government converted AWGA's total loan debt into equity and contributed additional sums to bring AWGA's total equity capital to a debt:equity ratio (1977) of 0:100.

Table 2-3

Alexandria, Egypt
Water Supply Tariff

	1977	1981
Public stand pipes	free	
Fire hydrants	annual fee/hydrant	
Unmetered domestic premises (less than 2%)	based on rental value	
Domestic	millimes m^3	
1st 10 m^3/mo (minimum charge)	10	10
11-40 m^3/mo	15.2	
11-30 m^3/mo		15.2
succeeding	(5 2)	
above 30		15.2
Industrial	14	100
Government	40	100
Barges supply to shipping	550	1,000
Free Zone and Joint Venture	-	150
Weighted average	21	51.8

2.3.3 Egypt (Beheira)

Progress toward helping BWC reach financial viability may necessitate a gradual increase in overall rate levels to connected customers. About half the water consumed in the Governorate is supplied free at standpipes. Arrangements for charging for standpipe supplies in the future without disturbing the social considerations of present policies. are being considered.

Progress toward financial viability of BWC will require periodic increases in average tariffs over the next few years. Based on financial projections, the BWC plans to cover all expenditures for operation, maintenance and administration from

its revenues starting 1983 until 1986. In 1984, revenues are expected to cover operating costs plus a part of depreciation, or debt service, whichever is higher. By 1987 BWC plans to recover all operating costs as well as debt service, which is not covered by depreciation.

Recovery of revenues for standpipe usage is expected to be achieved by phases:

- Local authorities contribute for standpipe usage on the basis of an annual charge per standpipe.
- After the service areas are completely metered, local authorities may continue to pay for life-line supplies. They should consider procedures for charging consumers for excess amounts to discourage waste and help spread the cost of providing water more equitably.
- A new tariff increasing the present average of 20 millimes/m^3 to 70 millimes/m^3 has been agreed to be implemented in late 1983.

Table 2-4

Beheira, Egypt
Water Supply Tariff (1961-1980)

Inspection Fee for new installation - LE 0.500
Standpipes - Free
Households - LE 0.02.0/m^3 ($0.11/1,000 US gallons)
Non-households - LE 0.02.0/m^3 ($0.11/1,000 US gallons)
Government - LE 0.01.0/m^3 ($US .05/1,000 US gallons)
Religious Buildings - Free
City Council - LE .0.008/m^3 ($ .04/1,000 US gallons)

2.3.4 Jordan (Amman)

AWSA's financial performance in the water supply sector during the three years prior to the project (1974-1976) resulted in operating losses each year. High inflation, overstaffing and severe drought in 1976 were the major causes of these losses. However, AWSA adhered to the financial covenants of the previous Bank Credit of not charging less than 75 fils/m^3 for water sold during that period. AWSA achieved a small profit on the sewerage sector in 1982.

Table 2-5

Amman, Jordan
Wastewater Costs and Revenue

	1976	%	1982	Proj. 1984	%
Operating Costs					
Salary and Wages	222	45		560	30
Fuel and Power	26	5		230	12
Chemicals	5	1		51	3
Maintenance Materials	20	4		184	10
Other Expenses	75	15		218	12
Depreciation	144	30		609	33
	492	100	1,327	1,852	100
Revenue					
Surcharge on Water	67	14		1,152	61
Connection Fee	101	22		369	19
Sewerage Tax	233	50		275	15
Other Revenue	65	14		102	5
	466	100	1,487	1,898	100
Surplus Before Interest	(26)		160	46	
Interest	22		125	201	
Net Surplus (deficit)	(48)		35	(155)	

Table 2-6

Amman, Jordan
Water Costs and Revenues (JD 000)

	1976	%	1982	Proj. 1984	%
Operating Costs					
Salaries and Wages	499	42		1,393	27
Fuel and Power	182	15		1,745	33
Chemicals	8	1		29	1
Maintenance Materials	184	15		543	10
Other Expenses	184	15		238	5
Depreciation	141	12		1,273	24
	1,198	100	3,677	5,221	100
Revenues					
Water Sales	659	86		6,816	95
Meter Rent	-	-		54	1
Other Charges	111	14		293	4
	770	100	3,930	7,163	100
Surplus before Interest	(428)		253	1,942	
Interest	81		1	1,361	
Net Surplus (Deficit)	(509)		254	581	
Rate of Return on Average Net Fixed Assets				6.4	

The cost of water supply and sewerage services to about 20% of AWSA's poorest customers represented about 1% of the estimated urban household income of those at the poverty line. By 1981 the water surcharge was projected to yield 52% of AWSA's sewerage income as sewerage tax is fixed by law at 4% of the rental value of all property in Amman. The average water supply rate (1982) was JD .330/m^3, an increase of 60%. Sewerage tariff (1982) was JD 0.30/m^3 + 4% rental value of property (no change since 1974). Revenues did not cover cash operating expenses in spite of a tariff increase.

A 60% increase of water rates went into effect in April 1982. An assessment of whether the tariff increase and other revenue enhancing measures (replacement of incorrect water meters, rotation of meter readers) will allow AWSA to meet its cash generation covenant in the future will only be determined when its results for 1983 are known.

Table 2-7

Amman, Jordan
Water Tariff (Quarterly)

	JD
1-3 m^3	.150
4-20 m^3	.250
21-40 m^3	.400
41-100 m^3	.500
101 - up	.500
Average rate	.330

Water maintenance fee JD .225/quarter

AWSA sewage tariff is the same as in 1974 (JD .030/m^3 + 4% per annum of rental value over 20 years). A proposed increase to JD .050/m^3, approved by AWSA's Board in January 1978, was later rejected by the Government.

2.3.5 Jordan (Zarqa/Ruseifa)

A tariff study, as requested by the IBRD, is to be made which proposes alternative approaches (combination of tariffs, taxes and other levees on the increased land value due to sewerage, and customer contributions) with the objective that full cost recovery be achieved for the system. The objective addresses coverage of operating and maintenance expenses and debt service through user charges (including tariffs). The proceeds from user charges in excess of cost recovery - including those levees on increased land values due to the project - collected by government, would be passed on to the WSC as revenue to be applied toward expenses and debt service. The tariff study would determine estimates of increases in land value specifically related to water and sewerage improvements. The study would also establish operational and financial procedures for a revenue earning public entity.

WSC tariffs are subject to approval by the Council of Ministers. WSC agreed and will for its urban water services maintain or adjust water tariffs that:

- Would in each fiscal year through the end of fiscal year 1985 produce revenues sufficient to cover operating and maintenance costs as well as debt service or depreciation on properly valued assets whichever is higher; and

- Would from fiscal year 1986 provide revenues sufficient to cover operating and maintenance expenses (excluding depreciation), debt service and increased working capital, and to finance not less than 10% of the average investment cost in each consecutive three-year period comprising an actual and two-year forecast years.

Table 2-8

Zarqa/Ruseifa, Jordan
Water/Wastewater Tariffs

Water - metered retail consumption per month

0 - 5/m^3	JD .100
6-15/m^3	JD .120
16-25/m^3	JD .300
26-up	JD .400
universities	JD. 300

Monthly maintenance fee JD .125
Connection Fee JD 2.00 + actual cost of connection
Deposit for meters
household JD 5.000
industry JD 50.00

Sewerage
Sewer surcharge JD .065/m^3
Contribution toward construction = 4% per annun of rental value over 20 years
Connection Fee: 25% of rental value-plus actual cost of connection plus application fee depending on location.
Housing Zone A. JD 10
Housing Zone B JD 5
Housing Zone C,D JD 3
Industrial Zone JD 25

2.3.6 Morocco

Present tariff levels went into effect in 1977. Whereas the bulk tariff is uniform, the retail tariff distinguishes between residential, commercial and industrial usage. The residential tariff provides a quarterly maximum consumption of 30 m^3 at a concessionary rate. This quantity is regarded sufficient to meet the basic water needs of an average-sized family. The highest tariff bracket applies to residential and commercial use in excess of 30 m^3 per quarter.

A tariff adjustment for inflationary increases was not imposed since ONEP instituted an austerity program in 1979 to reduce its operating costs accordingly. Future tariff increases used primarily for adjustments of operating costs may be necessary. ONEP agreed to achieve a 2% rate of return on its net fixed assets in operation until 1981 and 7% thereafter.

An interim tariff adjustment of 20% was decreed in April 1982. This tariff adjustment is expected to impact only on the financial results of ONEP and not on the distributing regies, which by adjustment pass ONEP's increase onto the consumers. In order to encourage water conservation, the tariff structure has been modified and, instead of the two steps (0-30 m^3/quarter, more than 30 m^3/quarter), a third step was introduced (0-30 m^3, 30-60 m^3, more than 60 m^3/quarter).

Table 2-9

Morocco
Water Supply Tariff

Oct 1977, DH/m^3	Bulk Water Tariff/m^3	Residential 1st 30 m^3/quarter	Exceeding 30 m^3/quarter	Industrial/m^3
Casablanca	.55	.69	1.62	1.10
Rabat	.55	.60	1.13	.90
Kenitra	.55	.50	.59	.90
1982, DH/m^3				
Casablanca	.66	.83	1.94	1.32
Rabat	.66	.72	1.35	1.1
Kenitra	.66	.60	.71	1.1

The 4th Regional Water Project (1983) being considered by the World Bank addresses the existing problems. A study on additional tariff adjustments which would apply to ONEP's and the Regies water tariff, presently under review by the Ministry of Industry, ONEP and the Regies, will be completed to ensure that ONEP and the regies financial position remains healthy. ONEP has been requested to comply with the existing financial covenant (working ratio) and action by the government on tariff adjustment (bulk rate, margin for regies and retail rate).

Due to ONEP's non-water activities, ONEP has a considerable cash balance which provided it with the necessary safety cushion. Existing cash balances, as well as their future forecast levels, are adequate.

The new Sewerage Department of Casablanca will have a policy similar to the one applied in the water supply sector, i.e. a financially self-supporting institution with the beneficiaries covering all charges, with cross-subsidization from the large to the small water consumers. This policy would have a beneficial impact on the government budget as it could lead in the long run to a sector which would be neutral vis-a-vis public finance. It is expected that these objectives will be implemented gradually over a period of 5 to 8 years.

Table 2-10

Sewerage Department at Casablanca
Wastewater Tariff

A surcharge of DH 10.0 per quarter on water consumption for all consumers.

Plus: for domestic consumers under 30 m^3 per quarter - DH 0.11/m^3,
for domestic consumers from 30 m^3 to 60 m^3 per quater - DH .22/m^3,
for domestic consumption above 60 m^3 per quarter - DH 0.39/m^3,
for administrative consumption - DH 0.39/m^3 (flat rate), and
for industrial consumption - DH 0.87/m^3 (flat rate).

An installation tax of DH 435 per linear meter of frontage.

A 20% surcharge on house connection construction cost.

A 1.5% municipal tax (tax d'edilite) based on rental value of the premises.

2.3.7 Syria (Damascus)

The water rate for metered consumption in Damascus is LS 0.20 per m^3 (US $0.20 per 1,000 gallons). This 1976 rate which applied to all consumers is low compared to water rates in the Near East and indeed is one of the lowest in the developing countries.

EPEF recognized the need for increasing tariffs. There are strong arguments for the introduction of a progressive tariff structure for Damascus. Water is scarce and its conservation should be encouraged. A progressive tariff structure can be a useful instrument for assisting low income consumers and ensuring equitable distribution of the burden of EPEF's capital requirements. This would be consistent with the Government's social policies which are strongly oriented toward ensuring that essential services be provided to all citizens at a cost within their means.

Although the original projection of average tariff requirements summarized below had been suggested by the World Bank and in principle accepted by the Government, the only change has been to bill private customers for the first 135 m^3/quarter at S.P./m^3 .20 (reduced rate) and above 135 m^3/quarter - S.P./m^3 .50.

Table 2-11

Syria
Proposed Average Tariff Requirements
(LS/m^3)

1976	.50
1978	.60
1981	.65
1982	.80
1983	1.05
1984	1.25

The annual fee charged for the right to purchase water is linked to the tariff and will increase proportionately for typical water right holders (0.5 m^3/day). The annual fee will increase from its present level of S.P. 7 (US $1.89) to S.P. 79 (21.52) in 1980. The new water tariff and tariff structure as of 1983 has not been imposed.

Table 2-12

EPEF - Present Tariff

Description	Payable by	Amount
Non-Recurring Charges		
Right to Purchase Water	Applicants[1] with premises over 100 m^2	LS 2000 per m^3/day[2]
Capital Contribution	All applicants	Minimum LS 75
Connection Fee	All applicants	Cost plus 20%
Subscription Fee	All applicants	LS 5
Meter Installation Fee	All applicants	LS 5
Deposit	All applicants	Consumption deposit plus value of meter depending on size of connection and type of consumption.
Recurring Charges		
Metered Supply	Water right holder-excessive	LS 0.20/m^3
	Others - all consumption[3]	
Annual Fee	Water right holders	LS 14 per m^3/day of water right
Meter Rent and Maintenance	Consumers who do not own meters	Varies (Basic = LS 9 per year)
Meter Maintenance Only	Consumers who own their meters	Varies (Basic = LS 4.8 per year)
Contribution to Distribution System Maintenance	Consumers who own their meters	LS 3.60 year
Contribution to Distribution System Maintenance (Temporary Supplies)	As appropriate	LS 50 year

(1) Public, religious and certain other types of premises are exempt.

(2) The allowance which must be purchased depends on the size of the premises.

(3) Although EPEF may charge for public standpipes and religious buildings there has been no charge in the past.

Table 2-12 (Continued)

EPEF - Present Tariff

<u>Incidental Charges</u>		
Transfer of Water Right	All consumers	LS 15
Name Correction	All consumers	LS 5
Reconnection Charge	All consumers	LS 3
Meter Testing	All consumers	LS 5
Meter Relocating	All consumers	Not less than LS 15
Meter Destruction	All consumers	Cost of repair or replacement plus 20%. Minimum LS 15
Meter Reading Requested by Consumer	All consumers	LS 5

2.3.8 Tunisia

Successive changes in the tariff structure from 1967 to 1982 are summarized in the table below and constitute an example of how water rates can be adapted to meet social and economic objectives. Under the present structure, higher rates are charged for higher consumption levels while a "life line" rate for small consumers has been maintained unchanged since 1968. From 1974 onwards, the tariff structure was changed to address the disproportionate cost of providing capacity to meet the high peak demand of the tourist industry. Despite the comparatively high average cost of water, the lower income groups have been estimated to spend a high proportion of their income on water.

Table 2-13

Tunisia
Water Supply Tariff, 1967-1984
(millimes/m^3)

	1967	1968	1974	1978	1982	1984
Domestic: 0-20 m^3/quarter	40	68	68	68	68	68
21-40 m^3/quarter	40	68	68	68	75	85
41-70 m^3/quarter	40	68	90	110	130	150
over 70 m^3/quarter	40	68	90	150	220	250
Public (including standpipes)	8	30	*	110**	130**	150
Agriculture	16	34	*	*	*	*
Industry	***	45	70	*	*	*
Hotels and Tourist Facilities	40	68	150	220	300	300
Average Rate				125	185	275

* As domestic rate.
** Standpipes only; thereafter, other public supplies pay the domestic rate.
*** Negotiable.

While the water supply subsector is intended to be financially self-supporting, the Government takes the view that sewerage services should not be financed entire-

ly by those connected to the mains, since there are externalities - the indirect benefits accrue to all citizens through improved health, a cleaner environment, and benefits to tourism and fishing. The Government objective is to bring into use land long rendered unusable by pollution; the increase in value of that land was intended to be captured by the State. Accordingly, an annual subsidy, reviewed every five years, is paid to ONAS at a rate per m^3 (1982 rate is 40 millimes per m^3) of water supplied by SONEDE in the areas where ONAS operates. To this is added a share of the yield of property taxes collected by the municipalities. Apart from miscellaneous minor revenues, the balance of ONAS' current expenses is met by a user charge, based on water consumption over 40 m^3 per quarter (rate currently is 20 millimes per m^3); thus, low income families pay no sewerage charges. There are exceptions for connection costs, for which credit is available, and for a fixed annual charge of D 3, paid by all customers to cover the clearing of blocked drains. Tourist premises pay a higher rate (85 millimes per m^3) and industry is charged between 35 and 60 millimes per m^3, according to effluent quality.

ONAS is presently reviewing its tariffs, to meet the growing burden of interest charges, expenditures for operations and new connections, and salary increases. The average tariff proposed will rise from 33 to 68 millimes per m^3 and eventually to 103, with a view to eliminating the government subsidy by 1987.

ONAS derived its revenues from the following sources in 1980.

Table 2-14

Tunisia
Revenue Sources, 1980

	D million	Percent
Water consumers	2.0	25
Municipal taxpayers	2.4	30
Government subsidy	3.4	42
Miscellaneous	0.2	3
	8.0	100

SONEDE derives its revenues essentially from water sales through connections which are practically all metered, and from charges for meter rentals and

connection maintenance. Water consumed through standpipes is paid for by the communities. In addition, new customers pay the cost of their connections plus a contribution toward the capital cost of the distribution network in addition to a deposit covering at least three months of service.

SONEDE levies for the government a tax of 4.3% on water sales, and of 7.5% on services. SONEDE accords credit facilities to the new low income customers for payment of the connection costs and contribution to the cost of the distribution networks. Credit plus interest is repaid over a five-year period with installments added to customers water invoices billed quarterly. Up to the end of 1981, customers were charged interest on these credits at 8% per year; effective January 1982 this rate was increased to 11% per year.

2.3.9 Turkey (Istanbul)

ISKI has revised its water supply and sewerage tariffs (1982). In view of the high inflation rates in Turkey, ISKI will propose tariff revisions, most likely on a semi-annual basis. This approach is also believed to be more acceptable politically.

Table 2-15

Turkey
Water/Wastewater Tariff

	Prior to 1982	Tariff eff. Oct. 1982
Water Supply/m^3		
Domestic		28.0
Industry/Government		56.0
Wholesale		21.0
Islands		93.0
Domestic	57	
Government/Industry	63	
	Average 28.0	
Sewerage/m^3		
Domestic		5.0
Industry/Government		10.0
Meter Rent		
12-60 mm		TL 50/month
Over 60 mm		TL 125/month

Prior to ISKI's formation, water tariffs were created by the municipal councils and had to be approved by the Ministry of Energy and Natural Resources. The tariffs were not adequate to properly maintain existing plant and to service the debt. In 1981, the average tariff yield of TL 21/m^3 (US $0.16) for water was only 56% of the level required to cover its operating costs. As in the past, for each class of consumers, there is only one rate per m^3 regardless of quantity of water used.

2.3.10 A.R. Yemen (Sana'a)

In 1976 the minimum monthly charge for water supply services was YRIs 15 per connection. This was equivalent to about YRIs 1.5/m^3 assuring a minimum consumption of about 10 m^3 per connection. The tariff to be implemented in 1977 called for the first 10 m^3 of monthly consumption at YRIs 2.0/m^3, the next 10 m^3 at YRIs 2.50/m^3 and above 20 m^3 at YRIs 4.0/m^3. As of 1977, this tariff, average water rate of US $1.26/1,000 gallons, is quite high compared to tariffs in other neighboring countries; it is one of the highest in the developing countries. The high rate is due in part to the high operating cost of the system which requires two stages of pumping.

The rate was increased in 1978 by 50%. Another increase took place in 1979 when the flat rate was raised to YRIs 50 and YRIs 100 per month, depending on the size of the dwelling. At the same time, a tariff for metered consumption was introduced at YRIs 5/m^3 for the first 10 m^3 per month, and YRIs 10 for each exceeding m^3, with a minimum charge of YRIs 50 per month. By Presidential Decree of March 1981, this tariff was reduced to YRIs 4/m^3 for the first 20 m^3 per month and YRIs 8 per each additional m^3 with a minimum charge of YRIs 25 per month. The flat rate was also reduced from YRIs 50 to YRIs 37.5.

Table 2-16

Sana'a, A.R. Yemen
Water/Wastewater Tariff

	YRIs/m^3 Water	YRIs/m^3 Wastewater
1978	2.00	
1979	2.20	
1980	2.40	
1981	2.60	2.40
1982	2.80	2.60
1983	3.05	2.85
1984	3.35	3.10

2.3.11 A.R. Yemen (Hodeida)

NWSA's present tariff structure, as of 1983, consists of 3 blocks with rates increasing from YRIs 4/m^3 up to 8/m^3 for metered consumption. Non-metered consumption is assessed a flat rate varying according to the likely water use, as indicated by the plumbing installations. The initial flat rate of YRIs 15 and YRIs 20 per month was initially increased in 1978 by 50%. With the introduction of the tariff for metered consumption in 1979, the flat rate was raised to YRIs 50 and YRIs 100 per month. The tariff structure for metered consumption consisted of 2 blocks: YRIs 5/m^3 for the first 10/m^3 per month and to YRIs 10/m^3 for each cubic meter exceeding the first block. This was reduced by Presidential Decree as noted for Sana'a, Yemen. At present no sewerage tariff exists.

The financial performance of NWSA during the period 1978-1980 generally exceeded appraisal expectations. In other years unforeseen influences affected financial operation. Inflation and extremely high price increases were such that, even though water tariffs were increased significantly, operating costs exceeded revenues. Substantial cost overruns and lower than anticipated cash generation during project execution were made up by substantial equity contributions from the Government.

2.3.12 Israel

In the past, sewerage tariffs were set with little regard to costs and were not revised to reflect rising costs. Revenues were not specifically earmarked for sewerage. The law requires local authorities to make a sewerage charge based on land area and flood area to be paid as a connection charge to cover the cost of installing a sewer system and permits local authorities to levy a sewerage fee to cover maintenance costs.

Debt charges arising from installation costs are generally recovered from connection charges. To the extent that the debt charges are not covered by connection charges, they are expected to be recovered from fees or other revenues. A policy decision was made to recover outstanding debt charges on existing systems together with expenses of operation and maintenance from annual fees to spread the burden over all users.

The whole of the debt charges on the project is to be recovered annually from connection charges by 1997. A total of 25% of total debt charges will be recovered from connection charges on plots and 75% from connection charges on buildings. Connection charges from plots will be collected in single sums, while charges on buildings will be collected in installments over 15 years. The charges determined will be reviewed periodically to take account of:

- Increased construction costs or additional construction resulting in additional debt charges; and
- Changes in the pace and size of building construction.

Operation and maintenance expenditures and any debt charges not covered by sewer connection charges will be covered from annual sewerage fees levied upon water consumption.

Sewerage fees have been introduced for every authority where none existed before. Charges and fees are being continually updated under the control of the government. Tariffs are automatically linked to the consumer price index, automatically adjusted every six months. Uncollected debts have been linked by law to

Table 2-17

Israel
Wastewater Tariff (1982)

	Shekels/m^3 of water consumed		Shekels/m^2	
	Business & Industry	Residential	Building	Land
CAT A (9 communities inclusive of Nazaret, Tiberias, etc.	average 0.79	.42	45.35	10.98
CAT B (10 communities including Haifa)	1.02	.84	69.1	22.97
CAT C (14 communities including Lod. Renovat)	1.45	.94	67.83	10.82
CAT D (6 communities including Tel-Aviv, Jaffa)	2.15	1.44	59.3	10.43
CAT E (9 communities including Elat, Bersheva)	.87	.65	33.1	10.87
CAT F (2 communities including Gadma, Yavna)	.53	.50	100	10.82
AVERAGE	1.188	.817	58.05	13.24

SECTION 3

FINANCIAL PRACTICES

Most of the systems did not collect sufficient revenues to cover all operating and maintenance costs and the difference was made up through governmental general revenues. Costs have been rising steadily due to inflation, overstaffing, antiquated plants, obsolete equipment, inadequate operations and distribution systems, and a lack of trained personnel. Revenues have been affected by lower than anticipated consumer population growth, low demands, arrears in collections, unexpected high unaccounted for water, droughts, and delays in distribution system expansion.

3.1 PROJECT FINANCING

Table 3-1 presents the terms of IBRD loans. Loan amounts ranged from US $8.1 million for Hodeida, A.R. Yemen to US $88.1 million for Turkey. Interest rates ranged from 6.0% for Hodeida, A.R. Yemen and Syria to 11.6% for Turkey. The maximum settlement period was 25 years and most loans had a grace period before payments began.

Table 3-2 shows the capital source of funds by major categories. Borrowings include IBRD and other lenders. A variety of sources is utilized. Planned internal cash generation was highest in Tunisia at 40% as compared to the lowest, Egypt at 1%. Government contribution was highest in Syria at 71%. Borrowing was highest for Israel at 70%.

Table 3-1

Terms of IBRD Loans

	Loan Amount $US Million	Rate of Interest	Year	Settlement Period (Years)	Grace Period (Years)	Project Rate of Return at Appraisal
Algeria	82.0					
Egypt						
Alexandria	56.0	8.5%	1978	20	4.5	
Beheira	53.0					
Jordan						
Amman	14.0	8.0%	1979	25		2.0%
Zarqa/Ruseifa	17.0			17	4.0	
Morocco	49.0	7.9%	1978	20	4.0	
Syria	35.0	6.0%	1976	25	5.0	
Tunisia V	25.0		1979			
Turkey	88.1	11.6%	1981	17	4.0	
A.R. Yemen						
Sanaa	10.0	8.7%	1977	20	5.0	5.0-7.5%
Hodeida	8.1	6.0%	1976	20	5.0	
Israel	30.0	7.3%	1977	25	5.0	

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Table 3-2

Source of Capital Funds

	Type of Project	Internal Cash Generation	Customer Contribution	Government Contribution	Borrowings	Government Loan
Algeria	Wastewater			47%	53%	
Egypt						
Alexandria	Water	22%		8%	31%	39%
Beheira	Water	1%		56%	43%	
Jordan						
Amman	Water/Wastewater	11%			41%	48%
Zarqa/Ruseifa	Water/Wastewater		6%	27%	56%	11%
Morocco	Water			50%	50%	
Syria	Water/Wastewater	12%		71%	17%	
Tunisia	Water/Wastewater	40%	10%	16%	34%	
Turkey	Water/Wastewater	21%	3%	42%	34%	
A.R. Yemen						
Sanaa	Water/Wastewater	2%	1%	64%	33%	
Hodeida	Water/Wastewater		1%	69%	30%	
Israel	Wastewater			30%	70%	

3.1.1 Rate of Return and Cash Generation

The calculation of rates of return in water supply and sewerage projects requires the quantification of benefits and the estimation of values. An incremental financial rate of return is normally calculated using the increased revenues accruing from the project as a minimum measure of project benefits. Consumers may value the service by more than they have to pay for it. In addition, there are external benefits that are not easily quantified. The incremental financial rate of return provides more information about the adequacy of prices than about the overall economic value of the investment.

Problems have been associated with the revaluation of fixed assets for calculating the rate of return. Assets have either been improperly revalued or the absence of asset registers and adequate accounting systems have prevented revaluation.

The financial plans of all the studied projects have proposed positive rates of return. These rates are dependent upon the collection of proposed tariffs. The case experience, generally, is that positive rates of return are not realized. The relevance of rates of return based on projected revenues is questionable, as policies are often not implemented to achieve financial objectives.

The ability of water/wastewater agencies to generate cash to be used for depreciation or system expansion is an issue. One contention is that capital improvements should be loan or grant financed at the time they are required rather than financed from a reserve account. In the U.S., for example, wastewater utilities receive substantial grant financing.

Of the country projects reviewed, Tunisia generated a cash surplus above operating and maintenance costs. Ideally, water and wastewater systems should have revenues sufficient to cover operating and maintenance costs and contribute to a depreciation reserve. In the interests of financial accountability and viability, the ability of the water/wastewater agency to contribute in some measure to capital for expansion and upgrading of its facilities would be desirable.

Internal cash generation was a proposed source of capital funds for most of the projects. For most of the countries, the realization of this objective would require the implementation and collection of increased tariffs for water/wastewater services.

3.1.2 Inadequate Tariffs

The most serious financial problem identified was inadequate tariffs. Tariffs have either not been increased at all or tariff increases have not kept pace with escalating operating costs and inflation. Even in cases where tariffs have reached appropriate levels, other factors, such as lower than expected sales and higher operating costs, prevented entities from meeting rate of return covenants.

The water system in Turkey was authorized to set tariffs. The wastewater systems in Turkey and Israel were authorized to set tariffs. All other water/wastewater agencies could only recommend tariffs. Financial viability also varied among the systems. The best systems were Tunisia, Jordan and Israel. Those systems experiencing severe financial problems were Egypt and Syria.

3.1.3 Loan Agreements and Covenants

Financial covenants to IBRD loan agreements almost always addressed tariff rates. In most cases, these covenants were not strictly accomplished. It is World Bank policy to obtain a high level of agreement on policy objectives which can lessen the need for written covenants.

The Bank also encouraged Borrowers to institute reform actions in organization, management, training, fiscal responsibility, tariffs, operation, maintenance, billing and collection of arrears. Areas addressed included:

- Improving system operations;
- Providing higher job satisfaction and better promotion opportunities for staff;
- Establishing cross-subsidies between rural and urban subsectors as well as within urban programs;
- Setting of tariff rates that address financial viability of the institution; and
- Increasing the cash generation capability.

3.2 BILLING AND COLLECTION

Of the countries studied, the minimum accounts receivable was for Tunisia where private customers' arrears were equal to two months of sales and Government arrears were equal to four months of sales with both progressing downward. With the assistance of the Tunisian Government strong action had been taken and collections were made directly from budget allocations to the Government agencies. Syria, Algeria and Egypt have high accounts receivable from ten months of water sales in Syria and eighteen months in Egypt to two years in Algeria. Computerization of billing is expected to alleviate some of the problem in Syria and Algeria, as well as the addition of collection centers. Billings, collections and arrears are summarized in Tables 3-3 and 3-4.

Table 3-3

Frequency and Method of Billing

Algeria -	Billing backlog is one year; 300,000 bills are drawn up by hand.
Egypt (Beheira) -	Billings quarterly.
Jordan -	Large volume consumers billed monthly, others on 2 month cycle, computerized.
Morocco -	Government is billed monthly, all others are billed quarterly.
Syria -	Preparation of billing is 3 months after meter reading.
Tunisia -	On a rotating basis every 3 months - automated.
A.R. Yemen -	Billed monthly - manually prepared.

Table 3-4

Arrears in Collection

Algeria -	Receivables amount to more than 2 years of water sales.
Egypt (Beheira) -	Receivables about 18 months in arrears. Large debts by Government agencies.
Jordan -	Bills normally settled within 4 months.
Morocco -	Collection from Government is main problem.
Syria -	Collection cycle is 10 months. Accounts receivable represent about 85% of the value of annual sales. Expected to improve to collection cycle of 6 months of reading by creating additional collection centers and computerization.
Tunisia -	Private customers arrears equal to 2 months of sales. Government arrears equal to 4 months of sales.
A.R. Yemen -	Accounts receivable represents 3½ months of annual water sales.

3.2.1 Algeria

Until the formation of SEDAL, three companies engaged in water supply operated separate billing and collection systems which differed considerably in detail. The Sewerage Service carried out no billing apart from connection charges, since its revenues were derived from an apportionment of property taxes, assessed and collected centrally.

The backlog in water billing was about one year and receivables for water sales amounted to more than two years of billings. Approximately 300,000 bills are drawn up by hand every year and is a time-consuming operation. The administrative staff, as a result, are unable to pay sufficient attention to collection of arrears. Until billing operations are computerized, it is doubtful that water sales will be efficiently recorded and collection of arrears will be improved.

3.2.2 Egypt (Alexandria)

A major cause of concern is the high amount of government accounts receivable which represented over two years arrears in billings and collections to Government departments. AWGA had to secure the assistance of the Ministry of Finance to attempt to recover amounts outstanding of Government agencies by direct deduction from debtors accounts at the Central Bank. AWGA has adopted the practice of advising the various administrations of their recorded annual water use in the past year one month before the time of budget submission to ensure that an adequate amount will be provided in the budget under preparation.

3.2.3 Egypt (Beheira)

Meters are read quarterly and many are not working. Consumption figures are mostly estimated and inaccurate. Accounts receivable in 1978 were almost 18 months in arrears and included large debts by Government agencies. The BWC is to be provided with a completely updated accounting, billing and tariff system, as well as a financial management reporting system and procedures.

3.2.4 Jordan (Zarqa/Ruseifa)

Billing and collection is carried out by the WSC. Industries and large volume consumers are billed on a monthly basis. Others are on a two-month cycle. WSC had an agreement with a computer service bureau, a subsidiary of a large bank, to perform all transactions affecting the billing cycle including file maintenance.

Collections from private customers pose no difficulty. Bills for services provided to governmental agencies are also settled within a reasonable time. In the event that bills become overdue, either the Minister of Rural Affairs and Municipalities for agencies under his supervision or the Minister of Finance for all other agencies can authorize payments from the operating budgets accounts of these agencies. Bills are normally settled within the 120 days.

3.2.5 Morocco

ONEP bills the government every month for the volume of water consumed.

All other customers are billed quarterly for the volume of water consumed and for a fixed fee covering meter rental and maintenance of connection. Bills are considered overdue after 45 days. Billing of individual customers is on a rotating basis every three months. Meter reading and collecting is to be performed by different individuals in order to avoid collusion.

Collection from individual customers has been good partly because of the possibility of water cut-off, and partly because of collection through the judicial system. Collections from government agencies and municipalities have, over the years, deteriorated. Arrears for water sold to government agencies and regies are building up. Considerable delays in payment for services rendered affect all public enterprises in Morocco.

3.2.6 Syria (Damascus)

Billings and collections are unsatisfactory due to lack of control over meter readings and to the billing and collection cycle. Accounts receivable, defined by EPEF to include sales for which bills have been prepared and handed over to the collectors, represent about 85% of the value of annual water sales or ten months of sales.

Implementation of a computerized billing system in 1982 reduced billing time to three months after water meter reading. To clear up the backlog, collection procedures have improved by the creation of additional collection centers (17) installed throughout Damascus which are equipped with electronic cash registers connected to the computer. It is expected that by 1984 water bills can be collected within six months of reading.

3.2.7 Tunisia

SONEDE bills its customers on a rotating basis every three months for the volume of water consumed and for a fixed charge covering meter rent and connection maintenance. Collection from private customers is efficient; accounts receivable from these customers stood at about two months of sales, while accounts receivable from the Government offices and muricipalities were at about four months of sales. The existing agreement between the Government and the Bank commit the former to take all necessary steps to enable SONEDE to receive full

payment for water consumed by all national, regional and municipal entities within 120 days of billing. Such payment is made through budgetary allocations which usually become available only during the first half of a fiscal year. SONEDE has requested that the level of arrears be monitored twice a year.

3.2.8 Turkey (Istanbul)

ISKI has separated its accounts receivable by categories of consumers and has started doing the same for accounts payable by creditor groups. A substantial portion of accounts receivable are amounts owed to ISKI by Government Departments by way of water charges. Most of the accounts payable are amounts owed to the Government by ISKI for social security and employment insurance. ISKI is now considering approaching the Government with a view to cancelling the amounts owed to each other.

3.2.9 A.R. Yemen (Sana'a)

In 1976, NWSA's customers were billed monthly for a fixed charge. There were frequent interruptions of service and consumption was not accurately metered. Different charges for domestic or commercial usage were levied on the connections. The customers paid their bills at branch cashiers. If a bill was unpaid for three months, the service was disconnected. Accounts receivable in 1976 represented 3½ months of water sales. New customers to be connected to the new water distribution network are required to pay a deposit equal to three months of service.

3.2.10 A.R. Yemen (Hodeida)

NWSA bills its customers on a monthly basis. Because of the changeover from unmetered connections to metered connections following the provision of continuous water supply, two billing systems exist. Unmetered connections are billed at a flat rate. To ensure that meters are read correctly and promptly, NWSA embarked on a campaign to ensure that reading lists are sequential and that readers properly transcribe Arabic figures into Persian figures. All bills for metered consumption are prepared manually.

3.3 METERS AND UNACCOUNTED FOR WATER

In all of the case studies the unaccounted for water represents a significant loss of revenue. The countries with the major losses (A.R. Yemen, Syria, Jordan and Egypt, all over 45%) have as their principal problems a high percentage of unbilled consumption (illegal taps, Jordan - 21%), inoperative meters (45% in Syria, 70% in Egypt), system leakage, inaccurate production metering, and usage of water for public taps, mosques and municipal gardens. Morocco bulk sales have the least amount of unaccounted for water (approximately 10%). Table 3-5 summarizes the level of unaccounted for water.

The high percentage of unaccounted for water not only reduces the quantity of available water for the use of the customer, but also increases the unit cost of water sold. The acceptable range in developed countries for new systems is 2% to 15% and 10% to 15% for old systems, according to IBRD documents, as in contrast to the studied projects which averaged over 30%. These losses were not only in main pipe lines and distribution networks, but included wastage and illegal connections.

Table 3-5

Unaccounted For Water

Country	Cities	Unaccounted for Water (%)	
Egypt	Beheira	50	(1980)
Jordan	Amman	45	(1982)
	Zarqua/Ruseifa	35	(1986)
Morocco	Casablanca	10	(1982)
Syria	Damascus	49	(1982)
Tunisia		30	(1982)
Turkey	Istanbul	38	(1982)
A.R. Yemen	Sana'a	30	(1980)
	Hodeida	45	(1982)

3.3.1 Egypt (Alexandria)

Unaccounted for water was 39% in 1976, 48% in 1982, and estimated at 29% by 1985. It is estimated that about (1976) 39% of total water production is unaccounted for mainly due to inaccurate or inoperative meters, theft and unquantified system loss. Water meters of Egyptian manufacture have been installed, but are of poor quality. A leak detection and waste reduction study has been undertaken by AWGA.

3.3.2 Egypt (Beheira)

Up to 70% of meters on private connections are inoperative (56,000). The program plans to meter all standpipe service to enable revenues to be raised from this service. Unaccounted for water was 50% in 1980 and is projected to be 30% by 1985.

3.3.3 Jordan (Amman)

A great determinant of unaccounted for water is the large number of consumer owned meters on house services. Since these are generally velocity meters, registration of low flow is inaccurate, particularly in view of the equalizing effect induced by the roof tanks. It had been estimated that there is an annual discrepancy of 27% of production through unmetered flows. A meter replacement program has been implemented to reduce the level of unaccounted for water from 64% in 1972 to 38% in 1977. In 1977 AWSA was authorized compulsory acquisition of customer meters and to charge meter rent.

A leakage survey conducted by AWSA estimated an annual loss of 1.9 Mm^3/year, approximately 12% of production, through leakage, above ground defects, and sub-standard repair methods. In 1975 more than 3,000 leaks were reported and properly repaired.

Unaccounted for water in 1982 was 44.6%. In 1976 the unaccounted for water was 41% and was attributed to system leakage (10%), inaccurate production metering (10%) and underregistration of consumer meters (21%).

3.3.4 Jordan (Zarqa/Ruseifa)

Unaccounted for water was 46% in 1979. It is projected to decline to 35% by 1986.

3.3.5 Syria (Damascus)

Unaccounted for water, previously reported at 49% of production of which one-half would represent unbilled consumption, was reduced to 42% in 1981. This included free water distributed to religious places (6%). Consumers with inoperative meters, about 45% of total customers, are charged with the minimum charge which is generally far below their actual consumption.

3.3.6 Tunisia

One problem that SONEDE has been unable to overcome is that of unaccounted for water, which continues to hover around an unsatisfactory 30% of production. Unaccounted for water in 1977 was 32% and is projected in 1984 to be 27%. According to SONEDE, the problem is caused by difficulties in the accurate metering of supplies and by the influence of very long supply lines on network efficiency. A continuous campaign is waged to reduce losses and new meters are being purchased.

3.3.7 Turkey (Istanbul)

Unaccounted for water was 38% in 1982. All water connections, including public hydrants, are to be metered. The high percentage of unaccounted for water has been due primarily to inadequate operating practices and illegal connections.

3.3.8 A.R. Yemen (Sana'a)

All water connections are to be metered. Since the distribution system is new, unaccounted for water is projected to reach no more than 20% of water produced.

3.3.9 A.R. Yemen (Hodeida)

Although water sales surpassed the levels anticipated, the percentage of unaccounted for water considerably exceeded projections (a constant 20% from 1977 onwards). The percentage of unaccounted for water stood at 40% in 1977, increased to 49% by 1981, and dropped to 45% in 1982. Unmetered house connections constituted an important area of unaccountability. The installation of 9,500 meters in the system instead of the 4,000 planned could improve this condition. Bulk sales of water to the Port facility, which were not metered, resulted in unreckoned volumes of water produced and not sold. A study of this segment of the market recommended metering the Port water supply. Usage of water for public taps, mosques and municipal gardens added to the unaccounted for water totals in the form of unreported sales.

SECTION 4

LESSONS AND CONCLUSIONS

The collective experience in water/wastewater programs of the nine countries provided a valuable data base on pricing and financial practices. A major conclusion is that there are no absolute methods to assure financial viability or to establish tariffs for new water/wastewater programs. Each case must be addressed separately to determine the appropriate financial, administrative and economic dimensions.

The financial performance of water/wastewater entities can be determined only by the stated goals in the water/wastewater sector. In the United States, water utilities are expected to collect sufficient revenues to cover all operating costs and, for government-owned utilities, the average excess of revenue over operating expense is 37%. Wastewater utilities, all government-owned in the United States, generate an excess of revenue over operating expense of only 5% and require substantial subsidies to meet capital requirements. In the Near East, using the criterion of meeting operating expenses from revenues results in an inadequate financial performance for most programs.

The water/wastewater sector in the Near East has potentially conflicting goals of redistribution of income, cost recovery, efficient allocation of resources, provision of water/wastewater services, adminitrative simplicity and assistance to the poor. These goals may be accomplished by a combination of pricing alternatives and the use of subsidies. A variety of pricing and/or subsidy combinations is possible for the recovery of the costs for providing water/wastewater services and the combination of pricing policy alternatives chosen by each utility must be based on government priorities. Subsidization of capital needs and operating expenses in the Near East is an established practice as indicated by the cases studied. The World Bank has encouraged accountability, the provision of water/wastewater services, extension of services and viability of the operating entities. The following findings and recommendations reflect this approach of the World Bank.

4.1 TARIFFS

A review of the case country tariffs indicated that almost all needed to increase the average level of tariffs to make the rate of return slightly positive to meet operations and maintenance costs. World Bank economic analyses on several countries recommended gradual increases in price levels to above what was adequate to assure the financial viability of the entity. This reflects the increasing cost of water over the long-term. In all of the nine countries, rate increases were either recommended or initiated at the encouragement of the World Bank.

Consideration should be given to building into tariff policies an automatic adjustment mechanism, such as cost-of-living, which would make decisions on tariff changes less subject to political influences. Additionally, consumer resistance to tariff increases and the consequent political pressures on Government might be reduced by public information campaigns to inform consumers on the need for tariff increases.

A tariff increase accompanied by changes in the tariff structure can lead to a change in the consumption pattern, and hence to a lower than expected increase in average revenues. The government may be required to provide financial assistance to meet the cost of connections in special cases where property owners are unable to meet costs.

As water is a basic need, the price of drinking water, which was low in most of the countries, can be increased at levels of consumption above the lifeline. Even low-income families are prepared to pay higher rates to some extent for safe and available drinking water. Provided that delivery and service is good, the water tariff could be increased to raise needed funds for operating costs and future system expansion. Average water rates have been increased in several countries. These include Jordan, Tunisia and Turkey. Wastewater fees in Israel are adjusted every six months according to the consumer price index, operations and maintenance costs, and debt charges.

The principal considerations which must be taken into account in designing the tariff structure are equity, capacity to pay, conservation, price elasticity of demand, cost of the system and the service, and the cost of developing an alternative water supply. Large commercial or industrial users may develop alternative sources of water supply such as ground water and there is a limit to which the tariff of water can be raised. The cost of water from such alternative sources is the maximum at

which agencies theoretically can set rates. The tariff level ideally should be set to:

- Promote efficient water use and water conservation;
- Provide an adequate return to cover operation and maintenance costs and to recover capital cost to the extent possible;
- Be within the capacity of the consumers to pay for the services;
- Minimize the burden on the urban poor;
- Be simple to administer;
- Be based on a consistent and uniform policy applicable to various agencies;
- Be consistent with and promote the economic and social development objectives of the country; and
- Be established after consultation with consumers.

Average water rates ideally should be set at levels which recover the full cost of service. The tariff should incorporate differential rates with higher rates for the industry and commercial sector which would provide some subsidy for low income domestic users. If free water is supplied to the lowest income group via standpipes, the costs could be recovered through a system of charges to be paid by the municipal or national government rather than through subsidization by the water supply agency.

4.2 FINANCIAL PERFORMANCE

The case experience in the Near East indicates that the financial performance of a water/wastewater entity requires ongoing monitoring. Internal mechanisms for the review of financial performance can detect problems to be brought to the attention of the agencies and the financing institution. If such a mechanism is lacking, its development is of primary importance.

An administrative layer (Ministry of Water) may be placed between the lending agency and water/wastewater borrowing agency. Direct grants or loans to the operating agency and repayment directly to the lending agency may be preferable. Monitoring may be facilitated and emerging financial problems may be identified earlier.

The ability to establish and revise tariffs is central to the continuing viability of water/wastewater programs. The channels through which a proposed increase must proceed can be examined early in the project development cycle, and the

results of past proposed increases can be evaluated. In order to minimize the complexity of the tariff revision process, the lender may find it beneficial to negotiate directly with those responsible for final approval of tariff increases, as long as no authority is undermined. Additionally, specific tariff covenants can be mutually agreed upon and included in loan agreements.

The borrower and the lending agency should be in clear agreement on a specific method for revaluation of assets for determining the cost of capital and establishing tariffs. The true value of assets should be determined and upgraded periodically. In order to ascertain that the project is feasible, the lender may require such a revaluation as a precondition to loan approval.

The lender should be insistent that Government agency and municipality arrears in payments for water/wastewater services be cleared. The entire billing and collection system should be examined at the outset, and recommendations for changes be implemented early in the project development process. It is imperative that not only past due arrears be collected, but future ones be prevented.

The lending agency can have an impact on the operations and development of water/wastewater services. The area of pricing and financial practices is dynamic and complex and requires a high level of technical expertise and managerial attention. Appropriated technical assistance to water/wastewater agencies - in the planning, development and operational phases - can affect their financial viability and assist in establishing self-sufficiency.

4.3 SUBSIDIES

Subsidies, in addition to meeting necessary capital, operating and maintenance expenditures, can be instituted to accomplish other aims. Subsidies can influence consumer behavior and encourage the use of a service. If water tariffs are set beyond the ability and willingness of consumers, less water may be consumed or alternative[1] water supplies, if available, may be utilized. A subsidy, in this case, may result in sufficient benefits to consumers and society at large to justify its use. In addition, safe and abundant water supplies can effectively and directly promote

[1] River, stream or lake surface waters; private wells or aquifers; bottled water.

good health.

A subsidy can result in a reduction of user charges and a transfer of income to designated consumer groups. In this case, "fairness" may be addressed and benefiting consumers have more money to spend for other purposes.

A subsidy can increase administrative efficiency and/or reduce operating costs. The costs incurred in charging for water from standpipes or water utilized by communal waste facilities may outweigh the benefits of collecting revenues. In this case, administrative simplicity may be achieved by charging the local jurisdiction for standpipes or having the operating agency absorb the costs.

All countries in the region included in the study subsidized new construction of urban water supply and wastewater systems. Most provide direct subsidies for operating costs through municipal and national operating agency budgets. In view of the increasing need for future water/wastewater investments and limited available resources, public funds should not be used, if at all possible, to subsidize current operation and maintenance costs as this will decrease investment capacity. Moreover, recovery of past investment expenditures would aid the process of system development and loans could be repaid in part from income. Taking these factors into consideration, the objectives of Governments could include recovery of the full current cost of water supply/wastewater services from beneficiaries, as well as some portion of investments and interest. An emphasis on such financial practices would make the costs of water/wastewater services explicit and assist in providing vital information for subsequent decisions for system expansion and financing.

Capital investment in water/wastewater programs and the annual operating and maintenance costs are real demands on the resources of the operating agency, the government and the citizens. Some form of subsidy was in effect for all of the case countries. In the interest of providing water/wastewater services efficiently and basing system development decisions on real costs, the level and source of subsidies should be explicitly noted. Considerations can then be given to the amount of costs to be met through payments from consumers.

did not materially decreased.

The type of meters utilized, in some instances, generated problems. A slow trickle type flow through most meters does not register. Meter readers were unable to transcribe Arabic figures of meters of foreign manufacture into local Persian figures (A.R. Yemen). Poor maintenance of meters, and slow replacement of inoperative meters all contribute to the high cost and low effectiveness of a metering program.

Metering of water usage is a means to influence consumption behavior, account for water usage, and charge for services. Tradeoffs exist between influencing behavior and administrative simplicity. The more complex a metering system is, the more it costs to initiate and operate without any increase in fraud. The decision to meter a particular group of consumers should be related to the minimum reduction in unaccounted for water or reduction in the annual average water consumption. It is that reduction which could make the saving in water and sewerage expansion costs as large as the cost of metering that should affect the decision to use metering. Factors to be considered include:

- Capital cost of procurring and installing meters;
- Annual cost of meter reading maintenance and billing;
- Future cost of expanding the water supply and distribution system, plus the corresponding operation and maintenance costs;
- Relationship between decrements of water use and rate of flow of sewage; and
- Future cost of expanding sewage collection, treatment and disposal of system, plus the corresponding operation and maintenance costs.

Metering may turn out to be of little value in the case of low income consumers. Even if metering is on balance cheaper than unrestricted supply, the installation of some flow-limiting device may be preferable. A valve limiting the amount of water each consumer can use and so keep down the cost of the reticulation system as well as provide savings on source costs may be utilized. Cost is less than a water meter and the consumers can pay a simple periodic charge.

4.5 ADDITIONAL STUDY RECOMMENDATIONS

The case experience of IBRD-financed water/wastewater projects in the Near

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