

WATER QUALITY IMPROVEMENT AND CONSERVATION

PROJECT NUMBER 278-0288

JORDAN

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER

January 1993

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PROJECT AUTHORIZATION

Name of Country: Jordan

Name of Project: Water Quality Improvement and Conservation

Number of Project: 278-0288

1. Pursuant to Section 531 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Water Quality Improvement and Conservation Project for Jordan involving planned obligations of not to exceed \$25,000,000 in grant funds over a four year period from the date of Authorization subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. The planned life of the project is fifty-five (55) months from the date of initial obligation.

2. The project will assist the Government of Jordan in improving the management of water resources and increasing the quality and quantity of water available in the Zarga Basin System through improved wastewater treatment and water conservation.

3. The Project Agreement(s) which may be negotiated and executed by the officer(s) to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

a. Source and Origin of Commodities, Nationality of Services

(1) Commodities financed by A.I.D. under the project shall, except as provided below in subsection (2) or as A.I.D. may otherwise agree in writing, have their source and origin in the United States (A.I.D. Geographic Code 000). Except for ocean shipping and, in matters not pertaining to ocean shipping, except as provided below in subsection (2) or as A.I.D. may otherwise agree in writing, the suppliers of commodities or services shall have the United States as their place of nationality. Ocean shipping financed under the Grant shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

(2) The following goods and services required for the Project may have their source, and except as provided below or as A.I.D. may otherwise agree to in writing, their origin in Jordan:

(a) commodities of U.S. origin purchased in Jordan if the transaction value is equal to or less than \$100,000 or the local currency equivalent (exclusive of transportation costs);

(b) commodities of A.I.D. Geographic Code 935 origin if the transaction value is equal to or less than \$5,000 or local currency equivalent (exclusive of transportation costs);

(c) professional services contracts estimated not to exceed \$250,000 or local currency equivalent;

(d) construction services contracts estimated not to exceed \$5,000,000 or local currency equivalent;

(e) the following commodities and services which are available only locally: (i) utilities including fuel for heating and cooking, water disposal and trash collection; (ii) communications (telephone, telex, fax, postal and courier services); (iii) rental costs for housing and office space; (iv) petroleum, oils and lubricants for operating vehicles and equipment; and (v) newspapers, periodicals and books published in Jordan; and

(f) other commodities and services (and related expenses) that, by their nature or as a practical matter, can only be acquired, performed or incurred in Jordan, provided, however, that without the prior written consent of A.I.D., such other commodities and other services must fall into one of the following categories: (i) vehicle maintenance, and (ii) hotel accommodations.

b. Conditions Precedent to Initial Disbursement

Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(1) An opinion of counsel acceptable to A.I.D. that the Project Agreement has been duly authorized and/or ratified by, and executed on behalf of the Grantee, and that it constitutes a legally binding obligation of the Grantee in accordance with all its terms.

(2) A statement of the name of the person holding or acting in the office of the Grantee specified in the Project Agreement, and of the full-time Project Coordinator with delegated authority as representative of the Ministry of Water and Irrigation (MWI) for all implementation activities, and of any additional representatives, together with a specimen signature of each person.

c. Conditions Precedent to Disbursement for the As-Samra Wastewater Treatment Plant

Prior to any disbursement under the Grant (including the initial disbursement) for the As-Samra Wastewater Treatment Plant (WWTP), or to the issuance of documentation pursuant to which such disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D.:

- (1) an organization statement for the MWI Policy and Planning Unit;
- (2) evidence that a director for the MWI Policy and Planning Unit has been appointed;
- (3) evidence that the MWI has budgeted for the start-up, staffing, and operations of the MWI Policy and Planning Unit; and
- (4) a detailed time-phased Implementation Plan that the GOJ will use to ensure that appropriate mechanisms be put into place for the Amman slaughterhouse to collect the blood and offal generated by its operations.

The conditions precedent set forth in this paragraph c. shall not apply to disbursements for technical assistance for the As-Samra Wastewater Treatment Plant.

d. Covenants

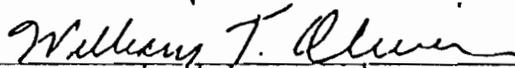
The GOJ covenants to:

- (1) Provide the electricity, civil works, and operations and maintenance required for the upgrading of the As-Samra WWTP.
- d

(2) Establish, staff, and provide the core operation budget for the MWI Policy and Planning Unit.

(3) Take action on cost recovery as agreed upon jointly with the World Bank and IMF.

(4) Implement the Implementation Plan for the Amman slaughterhouse to collect the blood and offal generated by its operations.



William T. Oliver
Director, USAID/Jordan

10 FEB 1993

Date

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(6) CONDITIONS AND COVENANTS 78
(7) EVALUATION ARRANGEMENTS 80

ANNEXES

A. PID Approval and Delegation of Authority
B. Log Frame Matrix
C. Statutory checklist
D. Government of Jordan Request for Assistance
E. FAA 611(e) Certification
F. Project Analyses
 1. Technical
 2. Financial
 3. Economic
 4. Social Soundness
 5. Administrative
G. Environmental Considerations

F

LIST OF ACRONYMS

AV Aids	Audio-Visual Aids
CIP	Commodity Import Program
CDM	Camp, Dresser and McKee
CL	Component Leader
DE	Department of Environment
EOPS	End of Project Status
ES	Engineering Science Inc.
FX	Foreign Exchange
FY	Fiscal Year
GOJ	Government of Jordan
GTZ	German Technical Assistance
HRD	Human Resources Development
IIMI	International Irrigation Management Inst.
IMS	Irrigation Management Services
IQC	Indefinite Quantity Commodity
JD	Jordanian Dinar
JVA	Jordan Valley Authority
JVFA	Jordan Valley Farmer's Association
KAC	King Abdullah Canal
KTR	King Talal Reservoir
LC	Local Currency
LGP	Loan Guarantee Program
MCM	Million Cubic Meters
MIS	Management Information System
MIT	Ministry of Industry and Trade
MMRAE	Ministry of Municipal and Rural Affairs and Environment
MOA	Ministry of Agriculture
MOE	Ministry of Education
MOH	Ministry of Health
MOI	Ministry of Information
MOP	Ministry of Planning
MWI	Ministry of Water and Irrigation
NGO	Non-Governmental Organization
PCR	Project Completion Report
PID	Project Identification Document
PFU	Policy and Planning Unit
PPWM	Pollution Prevention & Wastewater Minimization
PSC	Personal Services Contract
PSPWM	Private Sector Pollution Prevention & Wastewater Minimization
RSS	Royal Scientific Society
TA	Technical Assistance
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USEPA	U.S. Environmental Protection Agency
WAJ	Water Authority of Jordan
WEA	Office of Water, Environment and Agribusiness
WEC	World Environmental Center
WHO	World Health Organization
WUO	Water Users Organization
WWTF	Waste Water Treatment Facilities
WWTP	Waste Water Treatment Plant

WATER QUALITY IMPROVEMENT AND CONSERVATION

PROJECT SUMMARY

1. Project Goal

To improve the overall management and conservation of Jordan's water resources.

2. Purpose

To increase the quality and the quantity of the water available in the Zarqa River Basin System through water conservation.

3. Project Description

The Water Quality Improvement and Conservation Project will invest approximately \$31 million (\$25 million from AID and \$6 million from the Government of Jordan (GOJ) and the private sector) over a fifty-five month period to improve the quality and quantity of water from the Zarqa River Basin System for irrigated agriculture in the middle third of the Jordan Valley (the "Zarqa Triangle").

The King Talal Dam was built across the Zarqa River in 1968 to create the largest fresh water reservoir in Jordan to provide sufficient water for year-around irrigated agriculture in the Jordan Valley - the primary source of Jordan's agricultural exports (fruits and vegetables). Since that time the population of metropolitan Amman - including Zarqa - has more than doubled, far exceeding the capabilities of the two waste water treatment plants - Ain Ghazal which was largely replaced by As-Samra in 1980 - for the basin. The inadequately treated effluent is discharged into the Zarqa River and flows into the reservoir.

Nearly 100 industrial plants have also sprung up in the Basin half of which dump their untreated wastewater into the already overloaded As-Samra treatment plant and half dump directly into the river.

The end result is that the King Talal Reservoir has become seriously polluted and is a threat both to public health and the agriculture. This project will work with local industries to significantly reduce their polluted discharge into the river while it increases the capacity of the wastewater treatment facilities to adequately treat the effluent entering the river. Below the reservoir, the project will develop a plan to reduce water lost in conveyance to the Jordan Valley farmers from seepage and evaporation. Finally the project will work with (1) the water authorities to improve their ability to monitor water quality, develop water use policies, and share those policies with all water users, (2) the concerned GOJ and farmers organizations to plan water allocations and to increase the efficiency of water use, and (3) the general public to increase

their understanding of water conservation.

The project components, are: (1) water resources monitoring and management, (2) water pollution prevention and cleanup, (3) irrigation water management and (4) water management education. Although focused on the Zarqa Basin System, components (1) and (4) will strengthen programs which will serve national needs. Increasing the availability of water, through conservation and reuse by improving quality in the Zarqa River Basin System, will have a major impact on national development.

4. Expected Achievements/Accomplishments

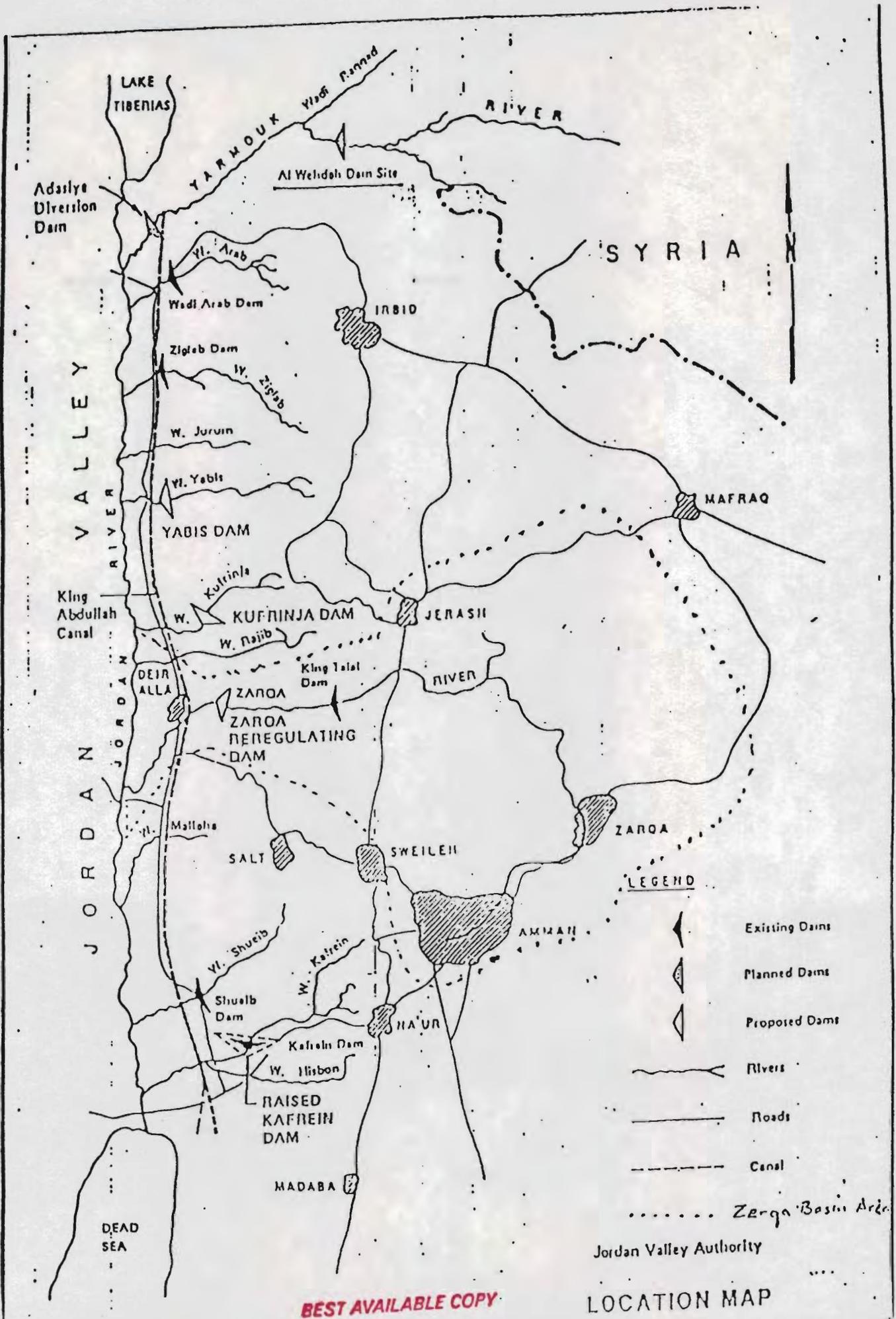
The End of Project Status (EOPS) includes:

- 4.A. More effective water monitoring and management program at the Ministry of Water and Irrigation (MWI).
- 4.B. Improved water quality from the As-Samra waste water treatment plant.
- 4.3 Improved water delivery system and more effective irrigation water management in the Zarqa triangle of the Jordan Valley.
- 4.4 Program in place to provide information and training on conservation and water resources management.
- 4.5 Industrial and private sector active in water conservation and pollution prevention and control.

5. Illustrative Project Budget (U.S. \$)

Component	USAID	GOJ*	OTHER	TOTAL
1. Water Resources Monitoring & Management	5,941,770	2,021,600	- 0 -	7,963,370
2. Water Pollution Prevention and Cleanup	11,504,750	1,500,000	345,000	13,349,750
3. Irrigation Water Management	3,109,000	474,750	- 0 -	3,583,750
4. Water Management Education	2,118,400	1,864,500	60,000	4,042,900
5. Evaluation	150,000	-0-		150,000
6. Audit	150,000	-0-		100,000
7. Contingency	2,026,000	150		2,076,230
TOTAL	25,000,000	5,861,000	405,000	31,266,000

* Exchange rate: JD 1 = \$1.50



LEGEND

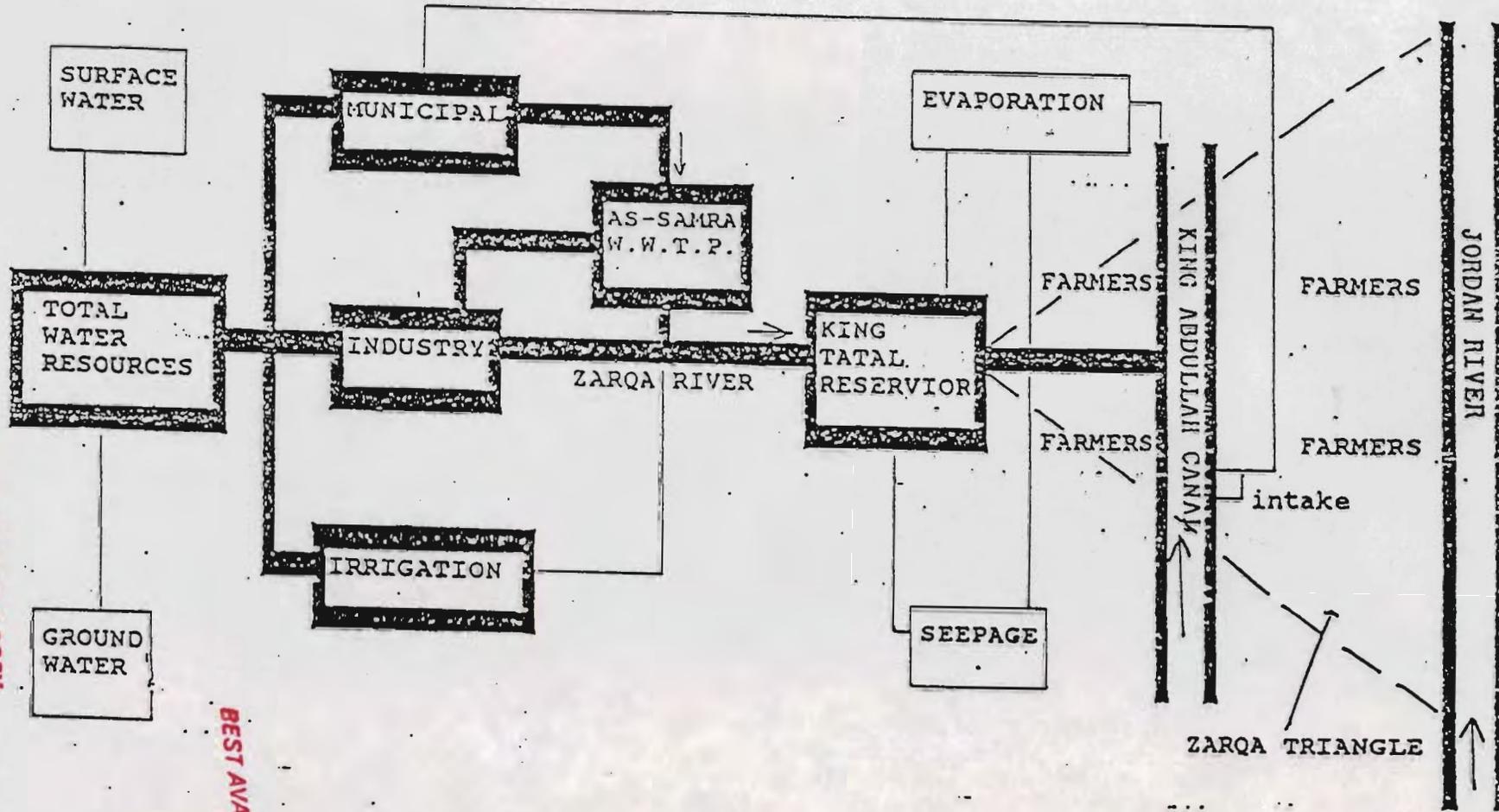
- Existing Dams
- Planned Dams
- Proposed Dams
- Rivers
- Roads
- Canal
- Zerga Basin Area

Jordan Valley Authority

LOCATION MAP

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ZARQA RIVER BASIN SYSTEM



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WATER QUALITY IMPROVEMENT AND CONSERVATION
PROJECT NUMBER 278-0288

(1) PROJECT RATIONALE AND DESCRIPTION

A. Background:

Water is critical to the future economic development of Jordan and is central to the life and well-being of every Jordanian. This project will directly benefit the approximately 70 percent of the population which is served by the Zarqa River Basin, and affect indirectly the remaining population through more efficient water use.

During 1992, the U.S. Agency for International Development (USAID) provided assistance to the Government of Jordan (GOJ) to develop a national water management program. The conclusion of the study was that Jordan's water deficit is more serious than most people realize and that it is moving toward a crisis situation. The report went on to say that Jordan has insufficient water for the kind of future it envisions. There is not enough water for its desired standard of living; nor for the additional jobs and income that should accompany the development of industry, services, and tourism; nor for more irrigation to expand food output for domestic consumption and export earnings.

The report, A Water Management Study for Jordan, dated August 1992, recommended giving priority to implementing a comprehensive program for increasing water supply and reducing water demand in the Zarqa River Basin. The principal focus of this project is on the Zarqa River Basin System, which covers the major water-use area and approximately 70 percent of Jordan's population.

This project is addressing the most serious problems identified in the national water management program, focusing on those which can be achieved in a fifty-five month project span and will show immediate results to improve water quality and conservation.

B. Overview of Project:

The availability of clean water is critical to the economic development of Jordan. Fresh water from ground sources and precipitation is used for human consumption, industrial manufacturing, and agricultural production.

The national water management study recommended that GOJ take four priority actions:

- Obtain all the water possible from all sources in a continuing effort. Reduce the demand by all feasible means. Make water conservation a part of everyday living, an issue of constant awareness throughout the society—among political, public, and private sector groups and firms, and all the adults and children in Jordan's homes.
- Create real incentives to encourage efficient water conservation and to discourage waste. Enforce fully the existing regulations on water use. Develop legislation to close gaps in the laws. Provide incentives to encourage support and cooperation.
- Strengthen the capability of the Ministry of Water and Irrigation (MWI), so it can develop and fully implement sound water programs for the Kingdom, and so it can provide water-related services to the people—its customers—more effectively, efficiently, and responsively.
- Establish a setting in which the organizations and persons affected can develop water policies. Build and maintain a public opinion setting in which knowledge of this vital resource and the means of conserving it stay on the agenda of groups and individuals throughout the land.
- The national water management study concluded that the Zarqa River Basin System provided the best focal point for a project which would have significant impact and would serve as a model for a future national program. Therefore, this project represents a multi-year commitment between USAID and the Government of Jordan to (1) improve the quality of water flowing into the King Talal Reservoir from the Zarqa River Basin and (2) increase the quantity of usable water delivered from the reservoir to agricultural producers for irrigation in the "Zarqa triangle" of the Jordan Valley, and conserving and managing water efficiently. The goal of the project is to improve the overall management and conservation of Jordan's water resources.

The Zarqa River Basin is the most complex water system in Jordan. Its 3,750 km² of land lie in five governorates: Amman, Balqa, Irbid, Mafraq, and Zarqa. The lower part of the basin includes the King Talal Reservoir (KTR), which receives runoff from the watershed and waste water from treatment plants. The KTR also controls water releases to the Jordan Valley, which are used for agriculture. Yarmouk River supplies are diverted into the King Abdullah Canal (KAC). Some Yarmouk River water is pumped from a diversion at Deir Alla back to the municipal water supply system for Amman.

Water supply sources include surface water, groundwater, and waste water. Surface supplies are used mainly for irrigation use. Groundwater is pumped for municipal uses and by industries and farmers with private wells. Effluent from the As-Samra Waste Water Treatment Plant (WWTP) accounts for nearly 40 percent of the runoff from the basin into KTR. Other waste water treatment plants and industries also discharge into the basin.

Surface waters are degraded by salts and contaminants associated with the municipal, industrial, and agricultural uses of the waters. Groundwater quality is declining in aquifers that supply the area, and recharge is insufficient to replenish the overdraft of the groundwater basins.

C. Perceived Problem:

Water resources in Jordan are critically limited. In the future the overall amount of water will most likely decrease because of over pumping and likely depletion of some aquifer systems. With continuing growth and development in the municipal, industrial and agricultural sectors, the anticipated increase demand for water beyond the year 2000 reveals a large gap between supply and projected demands. Therefore, Jordan must immediately initiate a program which addresses water conservation--using less water to do more--and enhancement of water quality to ensure availability for reuse.

The threat of inevitable large-scale water shortages poses, if immediate actions are not taken, a potentially severe problem for the government and, more importantly, the people of Jordan. The dimensions of this crisis are increasing and being exacerbated by continued deterioration of water quality, inefficient use of water and increasing demands for water by industry, agriculture and municipalities. In addition, frequent droughts and erratic recharge of both surface and groundwater resources bring added concern in meeting future water needs. The following are the major specific problems which this project will help address:

1. Water Quality in the Zarqa River Basin:

The Zarqa River basin plays a significant role in providing Jordan with municipal, industrial and irrigation water. At present, the renewable ground water available in Jordan is 280 MCM. About 30% of this amount is contained in the Zarqa River basin. The King Talal Reservoir (KTR), which holds approximately 85 MCM of water, is a very important source of irrigation water for the Jordan Valley, especially in the summer.

Currently, the KTR is severely polluted and the quality of the groundwater above the KTR in the Zarqa River basin is

believed to be deteriorating rapidly. Concentration levels of certain pollutants in KTR and Zarqa River Basin have surpassed national standards for various water uses.

2. As-Samra Waste Water Plant Capacity and Deficiencies:

One of the major pollution problems in Jordan is the hydraulic and organic overloading of domestic and industrial waste water discharges to the waste water treatment systems. This is especially true for the As-Samra facility which serves Amman and portions of the Zarqa basin.

The As-Samra Plant is a series of anaerobic, facultative and aerobic ponds. It was designed to handle and treat an average flow of 68,000 cubic meters per day, but recent data shows that the average flow exceeds 100,000 cubic meters per day. The runoff during the heavy 1991/92 winter rains increased the flow to three times the design capacity. The plant is not operating effectively and hence the effluent quality parameters far exceed the Jordanian guidelines for sewage treatment plants.

3. Industrial Discharges to Sewer Systems and Receiving Waters:

Most of Jordan's major industries--including power generation, fuel refining, textiles, paper production, leather tanning, steel fabrication, soap and detergent manufacturing, chemical manufacturing, and phosphate mining--are situated in the Zarqa River Basin. These industries are major contributors to the pollution of the Zarqa River Basin water resources. In addition to industrial organic wastes, heavy metals are being discharged into the water resources of the river basin and, subsequently, the KTR.

Approximately half of the industrial installations discharge directly to receiving waters in the basin. Although information about the impact of these industrial wastes is very limited, they appear to be concentrating in the KTR. Toxic and hazardous materials, likely of industrial origin, have been identified in the food chains and ground and surface waters (fish from the KTR, vegetables raised in the Zarqa and lower Jordan Valley, and ground waters in the Zarqa River basin). Industrial discharges to the As-Samra Waste Water Treatment Plant also contain pollutants not removed in the plant which reduce operational capacity of the plant.

A commonly stated reason for the present state of industrial pollution is the absence of capital for pollution control equipment and lack of experienced engineers and scientists in both governmental institutions and industrial firms. There is an urgent need for public and private sector groups

to gain hands-on experience in analyzing and solving industrial and municipal pollution problems.

4. Zarga Basin Ground Water Recharge:

Approximately 100 million cubic meters are pumped per year from the aquifers in the Amman and Zarga basin area. This is 11 million cubic meters, or 20%, more than the calculated sustainable yield. The possibility of lower yields, higher salt and total dissolved solids content, and the loss of individual wells is very high. While many studies have been conducted to look for ways to expand the water supply to the area there has been little serious attention paid to the possibility of in-basin aquifer recharge.

5. Inefficiencies in the Conveyance and Use of Water:

Gross inefficiencies in both the conveyance and utilization of water resources throughout Jordan lead to significant water losses which represent a substantial portion of the total available water supply. In Amman alone, it has been estimated that approximately 40% of the municipal and industrial sector water is lost in the distribution system. Leaks and other factors cause the losses.

The King Talal Reservoir (KTR) is a major source of irrigation water to the Jordan Valley. This water is conveyed to an extensive irrigation system down stream from the KTR. Due to the flow of KTR water along an open river channel for 17km, annual irrigation water losses from the KTR are extensive. In addition, saline springs along the river channel discharge into the water coming from the KTR resulting in increased salinity of these waters used for irrigation.

Water use inefficiencies are also evident in the industrial sector. Several Jordanian industries use more water than equivalent international industries. For example, a Jordanian paper company uses 115 CM of water per ton of paper produced, whereas a U.S. equivalent company uses 41.7 CM.

Water supplied for domestic purposes is also exploited and used with little concern for conservation or reuse.

Agriculture accounts for approximately 80% of total water demand in Jordan. The agriculture sector has invested considerable capital to improve application methods. Recent estimates indicate that drip irrigation has expanded to approximately 60% of irrigated areas in the Jordan Valley and that the overall efficiency of the water conveyance system and water use ranges from 50 to 75%. A substantive

increase of efficiency in agricultural water use and distribution is possible with the expansion of water saving methods and better crop selection. There is a need for training farmers in appropriate water application requirements for specific crops, timing of irrigation, use of fertilizers and pesticides, determining overall water needs on the farm and developing water budgets.

6. Lack of Understanding and Sensitivity to Water Issues:

Although water users--organizations and individuals--in all sectors of society are aware of the scarcity of water, most do not understand or appreciate the relationship between their water use habits and the sustainability of the overall supply and quality of Jordan's water resources. Many of the problems relating to water quality and supply that are outlined above are specifically related to poor management and decision-making at all levels of society. There is currently no coordinated campaign in Jordan to sensitize the general public, public and private sector institutions, or the farming community to the state of Jordan's water supply and its deteriorating quality nor to educate them on how they can contribute to alleviating these problems.

Maybe even more critical than the general public's awareness of water issues, is the lack of action on the part of public and private institutions to implement water conservation and quality programs. Part of this is due to lack of information on the problem being made available to concerned groups. There is a need of greater coordination between GOJ departments, non-governmental organizations and educational institutions in addressing environmental problems.

An associated problem is the lack of trained human resources in public and private sectors who can develop environmentally sound programs. Training needs to be developed for policy makers and senior managers, technical personnel, NGO leaders, private sector managers, and other groups.

7. Monitoring and Program Coordination:

The central lab and field sampling program in the MWI is currently unable to adequately monitor the quantity and quality of water. The information which is coming from this monitoring system needs to be properly packaged and provided to policy makers and managers in MWI and other ministries such as Health, Agriculture, Industry and Municipalities and Environment. Therefore, the planning activities of GOJ regarding water conservation and quality is not based on much analytical data. The lack of coordination is taxing the proper utilization of limited human, physical, and

financial resources as each unit is trying to do all the activities. Therefore, there is an urgent need to strengthen the capabilities of GOJ to monitor the water program and at the same time to ensure that the monitoring information is widely shared with other governmental and non-governmental organizations.

8. Central Policy and Planning Capabilities:

The national water management study analyzed the organizational structure and management of the Ministry of Water and Irrigation and concluded that because of a series of mergers there were some serious problems. At the current time MWI is two Authorities--WAJ and JVA--with no central capabilities in policy and planning. Therefore, the critical water sector in Jordan is without a unit which can take a long-term view of what is happening, plan for future emergencies, work with other government and non-government agencies in addressing these problems, and to link with donor agencies. Another problem the MWI faces is a oversized and unproductive staff. No manpower planning or overall management of human resources exist in the Ministry. A number of fragmented data collection programs have been initiated, but so far they have not produced outputs of information which senior management, technical specialist, and outside groups--such as universities, NGOs, mass media--can use.

D. Project Components:

The project goal is:

to improve the overall management and conservation of Jordan's water resources.

The overall project purpose is:

to increase the quality and the quantity of the water available in the Zarga River Basin System through water conservation.

The End of Project Status (EOPS) includes:

- a. more effective water resources monitoring and management program at the MWI;
- b. improved water quality from the As-Samra waste water treatment plant;
- c. improved water delivery system and more effective irrigation water management in the Zarga triangle of the Jordan Valley;

- d. program in place to provide information and training on conservation and improving quality of water resources; and
- e. industrial and private sector active in water conservation and pollution prevention and control

The project components are: (1) water resources monitoring and management; (2) water pollution prevention and cleanup; (3) irrigation water management; and (4) water management education. Although focused on the Zarqa Basin System, components (1) and (4) will strengthen programs that serve national needs. Increasing the availability of water, through conservation and reuse, and improving quality in the Zarqa River Basin System, will have a positive impact on national development.

The components listed above address specific program areas. While the components serve different groups and address widely differing problems, each contributes to making the Zarqa River Basin System a model for effective water management....the central theme of this project.

The Ministry of Water and Irrigation (MWI) will be the overall implementing GOJ unit for this project. However, the various project components will be linked to other government units, including the Department of Environment (DE) of the Ministry of Municipal and Rural Affairs and Environment (MMRAE), Ministry of Agriculture (MOA), Ministry of Health (MOH), and Ministry of Planning (MOP); with NGOs; and with private sector companies.

The following provides an overview of each component's objective, institutional framework, general activities and inputs, and other information:

1. Water Resources Monitoring and Management (\$5,941,770)

The MWI will be the primary implementing agency for this component, with links to the Department of Environment (MMRAE), which, as proposed in the new draft environmental law, is responsible for overseeing GOJ environmental policies and ensuring that pollution monitoring is maintained at accepted standards.

The central theme of this component is to strengthen MWI's capabilities to manage Jordan's water resources. The project will assist the Ministry of Water and Irrigation (MWI) to establish a Ministry-wide policy and planning Unit (PPU) which reports directly to the Minister and will be responsible for: (1) developing water use policies and strategic plans, (2) liaising with the MOP and international organizations and (3) strengthening human resources in the Ministry.

In order to obtain the information critical to fulfill these responsibilities under this component the MWI will develop a water management information system which will gather relevant information from sources within and without the government and disseminate that information to policy makers and interested water users. The component will also strengthen the Ministry's own capability to do field data collection and analyses, including the upgrading of the MWI's central laboratory which conducts the analyses. In addition, the project will fund the first study under the direction of the PPU to assess the feasibility of ground water/aquifer recharge.

This component will be carried out in the MWI under the direction of the PPU director, appointed by the Minister, and in coordination with the MWI project coordinator. Upon establishment of the PPU, the coordinator and the project-funded T.A. Chief of Party will also be located in this Unit. The Water Management Information system development will be under oversight of the PPU Coordinator of Information Systems; while laboratory upgrading and field data collection activities will be under the direction of the WAI Central Laboratory. Water quality monitoring will also be coordinated with the Department of Environment (DE) at the Ministry of Municipal and Rural Affairs and Environment (MMRAE) in its role as overseer of GOJ environmental policies and with the Ministry of Health (MOH) as overseer of health policies.

The following are descriptions of the major activities planned under this component:

1.a. Establishing MWI Policy and Planning Unit (\$2,607,500):

During the preparation of the Project Paper it became obvious that an additional intervention at the institutional level, not included in the Project Identification Paper (PID), was needed. This subcomponent emerged from internal reviews within the Ministry of Water and Irrigation, recommendations from A Water Management Study, and recommendations from USAID/Washington (during review of the PID).

Implementation of this component will be closely coordinated with GTZ (German Technical Assistance) which is planning to provide some advisory and commodity support to the PPU. Specific project inputs will be adjusted and modified to avoid duplication and ensure complementarity. Any savings from this project component will be allocated to policy and/or feasibility studies, such as the long-term feasibility for wastewater treatment, as mutually agreed between USAID and MWI.

The objective of this subcomponent is to establish within MWI a Policy and Planning Unit (PPU) which will be responsible for the following functions:

1. Policy Development and Strategic Planning
 - Formulate national priorities and policies for the water sector.
 - Long-term planning and strategy development.
 - Financial and cost studies.
 - Social and economic studies.
 - Water related environmental studies.
2. International Liaison
 - Review and help MWI units prepare proposals before submission to MOP.
 - When feasibility studies are required, will assist preparing terms of reference, provide data and information, and review the study upon completion.
 - Serve as MWI liaison with MOP and international organizations.
 - Oversee project progress reporting to MOP and donor agencies.
 - Project monitoring, evaluation, and follow up.
3. Human Resources Development (HRD) Policies in MWI
4. MWI Information Systems

This component will also serve as the base for overall project management for MWI and the USAID primary contractor.

The justification for this subcomponent includes the following items. The creation of the PPU is the result of work done focusing on several concerns. The Prime Minister's office has requested all ministries to streamline their operations and strengthen their management and HRD capabilities. Creating the PPU is one step in this process. The national water management study recommended strengthening policy, planning, international project coordination, HRD, and information functions at the central level in the MWI. During the past year, the MWI has conducted a thorough review of its organizational structure and functions. These activities have clearly led senior management in MWI to give priority to establishing PPU.

The MWI was created in 1988 with the Minister being Chairman of the Water Authority of Jordan (WAJ) and Jordan Valley Authority (JVA) Boards. Up to now little other restructuring has been done in the overall MWI operations. There is a need to integrate the functions listed above (para #1) into the overall operations of the Ministry. In

some cases, these functions--such as information programs--are currently being done independently by the two MWI Authorities, a duplication of efforts. In other cases, these efforts--such as policy formulation and HRD--are not being done within MWI, even though they are critically needed. The greatest gap in the current operation of MWI is the lack of long-term strategic planning--for program development and priority setting, and for strengthening overall management of the Ministry. The international liaison program is not currently being done and the MOP and donors have expressed interest in it being created. :

The institutional base for this component will be directly under the MWI Minister and will serve all units in the Ministry. To ensure sustainability of this program, it is essential that the GOJ commitment is reflected by establishing the key positions and recruiting the core staff for the PPU. The PPU will facilitate MWI communications with MOP, international donors, and other organizations. This unit will be in constant contact with the other MWI authorities and units, drawing upon staff and information as needed.

This subcomponent includes four groups of activities:

- a. MWI will establish the PPU and appoint the core staff which will include the PPU Director (who will also serve as head of the international liaison program), staff for the Policy and Strategic Planning Program, the HRD Coordinator, and Information Systems program staff. The Ministry will also provide facilities and operating budget in order to ensure sustainability of the program after this project is completed.
- b. The USAID project will provide four senior Jordanian advisors--policy, planning, HRD, and information systems--for up to 24 months each for the MWI to utilize in the PPU. These advisors will be used intermittently for specific tasks over the life of the project. The project will also provide computers and other office equipment for the PPU.
- c. The project will set aside up to \$300,000 for the PPU to draw upon for studies and special activities required for formulating water policies and for institutional reforms. These funds can be used for Jordanian and American consultants, studies, meetings, special briefing tours, information services, etc. It is envisioned that the first study will be on cost recovery.

- d. This subcomponent also includes the central management of the project. The primary contractor will provide the Senior Advisor to the Minister and Team Leader for the technical assistance program. This person will serve as the counterpart to the PPU Director. There will also be an Administrative Assistant, Accountant, and Project Secretary. This subcomponent will provide office equipment and supplies. Vehicles will be provided for the project TA team from this subcomponent. GOJ/MWI will designate a Project Coordinator to be the official MWI representative with delegated authority for all project implementation activity. The Administrative Assistant will serve as the counterpart to the Project Coordinator.
- e. Funding for a buy-in with a regional AID project will allow the GOJ and USAID to draw upon the necessary services for policy and implementation support.

The following is an illustrative list of the activities, inputs and outputs for this subcomponent;

ACTIVITIES	MWI INPUTS	USAID INPUTS *	OUTPUTS
Establishing the PPU core office	MWI PPU Director Office space Administrative support staff Office equipment & ops costs Five Year Counterpart Contribution: Prof. Staff Salaries-Est. JD420,000 Admin. Support Staff-Est. JD120,000 Facilities-Est. JD50,000 Operating Costs-Est. JD40,000	Sr. Advisor to Minister and counterpart to PPU Director (also Project Team Leader)--60PM Local Sr. Advisor--24PM Intermittently (\$72,000) Two computer systems (\$12,000) Office Equipment (\$30,000)	PPU established
Establishing Policy and Strategic Planning Program	Senior Planner Economist Financial analyst Engineer Office space & administrative support staff Operating costs (JD costs given above)	Local Sr. Advisor--24PM Intermittently (\$72,000) 6 computer systems (\$32,000)	PPU Program developed
Establishing International Liaison Program	These responsibilities will be handled by PPU Director in coordination with two Secretaries General 1 Prof. support staff Admin. support staff (JD costs given above)	1 computer system (\$6,000)	Operational liaison program
Establishing HRD Program (Linked to Component 4a(1))	HRD Program Coordinator Office space & administrative support staff Operating costs (JD costs given above)	Local Sr. Advisor--24PM Intermittently (\$72,000) (Other support will come from Component 4a(1))	HRD program established

ACTIVITIES	MWI INPUTS	USAID INPUTS *	OUTPUTS
Establishing Information Systems Program (Linked to Component 1b)	Info. Systems Coordinator Data Processing Specialist Office space & administrative support staff Operating costs (JD costs given above)	Local Sr. Advisor--24PM intermittently (\$72,000) (Other support will come from Component 1b)	Information systems program in place
Orientation/Study tours by staff (to be determined as program emerges)--estimate 4	Staff salaries International Travel (JD6,000)	Fees, in-country travel, and living allowance (\$40,000)	Training conducted
Policy Formulation and Institutional Development Studies (eg. Cost Recovery Study)--to be determined during project (A Reserve fund)	Staff	Short-term consultants (Jordanian & American); studies, meetings, training, etc. by mutual agreement (\$300,000)	Policy studies conducted
Managing the overall project	MWI provides a Project Coordinator Office space and office furniture Personnel (Est. JD60,000) Facilities (JD20,000) Operations cost (JD12,000)	Administrative Assistant (local hire American who will be counterpart to Project Coordinator)--60PM (\$125,000) Accountant--60PM (\$90,000) Secretary--60PM (\$45,000) 4 Computer Systems (\$22,000) Office equipment (\$50,000) 5 Project vehicles (\$112,500) Office supplies (\$50,000)	Project well managed
Buy-in for USAID Regional Project to provide policy support	Staff as required	Buy-in contract (\$250,000)	
ESTIMATED BUDGET	JD 728,000	US\$ 2,607,500	

* USAID Inputs will be closely coordinated with GIZ to ensure complementarity. Any savings from this project component will be reallocated to policy and/or feasibility studies as mutually agreed between USAID and MWI.

1.b. Water Management Information System (\$453,000):

The monitoring program and other data available to MWI are of little value unless they are packaged and disseminated as relevant information to groups that need them. These groups include policy makers and managers, technical specialists, teachers, mass media, private sector, NGOs, and the general public.

The objective of this subcomponent is to develop within MWI the capability to maintain a continuous flow of water information services to relevant policy-makers and action audiences, including: (1) MWI customers; (2) public and private sector industries; (3) municipalities; (4) agriculture; (5) managers of MWI's operations and services; (6) technical specialists working in the water sector; and (7) opinion leader groups (such as mass media, universities,

NGOs, etc.). Therefore, the objective is to identify a wide variety of sources of data/information inside and out of MWI, and then ensure it is properly packaged and disseminated to the various audience groups.

The justification is clear: Jordanians face a frightening future in terms of availability of water for their personal use, to permit economic development and growth, and to increase food output. Many audiences and organizations need or would gainfully use information about aspects of supply, demand, use, and quality of water in Jordan. Modern technology and information can do much to empower Jordanians to deal with their water situation. But the information must be disseminated and the technology diffused. At the current time there are data "islands" in MWI and almost no links with outside sources of information and, therefore, it is not possible to bring together this diffused information/data into meaningful and useful communications packages for the audience groups.

At the current time there are two donors involved in supporting data management activities in MWI. UNDP has supported WAJ in developing a computerized water data base which eventually is to provide policy makers, managers, and technical staff information on water availability and other information. Germany is assisting JVA to develop a management information system. Both of these activities are focusing on providing managers valuable information. However there is no focal point for the information output; while there is input of data into the system, it is not reaching the potential information users. Many of these audience groups are not being served by any unit in MWI. A single ministry-wide information unit can best meet these objectives. Therefore, the first activity is to take an inventory of all these information-related activities and determine how they can best be consolidated. Information involved covers a broad spectrum of water policy and user practices in Jordan. Neither WAJ nor JVA, on their own, has access to the full range of water-related information, which includes regional and international sources. Also, some key audiences are beyond the main focus of either branch; some are closely related to GOJ agencies outside of MWI. The collaborative role can function more effectively as a ministry activity, rather than as units under separate authorities.

This subcomponent will include the following activities:

- a. The MWI will appoint a small task-force to study, make recommendations and develop a plan of action for establishing a unified information unit for the MWI. The plan will include (1) description of information

programs to be implemented, (2) description of the systems to obtain, process and disseminate information, (3) analysis of staffing needs, (4) training plan, and (5) needed equipment. Short-term specialized technical assistance (3 PM) and training will be provided.

- b. In the second year, the MWI information unit will be established. The necessary equipment will be procured, including computer systems, audio-visuals and design equipment. The MWI will assign the core staff, and the contractor will provide the required short-term technical assistance.
- c. In the following years information programs will be implemented including: (1) developing water-user information services, (2) establishing information systems for mid-level and senior managers, (3) establishing mechanisms for collaborating with units of other GOJ agencies and NGOs, and (4) implementing training programs, including M.Sc. training for one participant in the U.S., short-term training for four participants in the U.S., and several in-country training programs. The contractor will provide the required short-term technical assistance (8 PM), purchase production services (estimated at \$90,000) and encourage production of water-related materials by other units (estimated "seed money" \$10,000).

The following is an illustrative list of the activities, inputs and outputs for this subcomponent:

ACTIVITIES	MWI INPUTS	USAID INPUTS	OTHER INPUTS	OUTPUTS
Prepare plan for a central MWI Information Unit (linking with UNDP, GIZ & other info. programs)	Establish task force to study situation and develop plan	TA Advisor assist task force: 3 PM	MWI, UNDP & GIZ Information programs	Information unit plan adopted by MWI
Establish MWI Information unit and program	5 prof staff and support staff and office facilities (JD364,000)	Advisory services: 2 PM Procure computer systems, audio-visual and design equipment (\$27,000)		Staff able to produce water-use information services
Develop water-use information services	Prof and support staff and facilities (shown above)	TA Advisor 6 PM; \$90,000 production costs		Briefings, reports; newsletters, training materials, etc.
Establish Information System for managers	Staff to operate a system for management information (JD 24,000)	TA Advisor (2 PM) to develop system and train operator		Information for managers: personnel, operations, and other areas
Establish mechanisms for improving collaboration with units of other GOJ agencies	Prof and support staff and facilities (shown above)	\$10,000 to "seed" production by other GOJ units	4 person-days per year by MOA, MMRAE, MOH, MOE, MOI, MIT	Fact sheets, publications, newsletters, audio-visuals, radio and television
Training for M.Sc. (one participant); short courses and tours for 4 others	Salaries and air fare for out-of-country courses and tours (4 persons); one M.Sc. (Est. JD10,000)	Course fees and living allowances (\$92,000)		Trained persons able to carry out water-use information services
In-country Training	20 person-weeks of staff time (1 week each year, 4 years; for 5 persons) (staff shown above)		MOI, MOA, MOH, MMRAE MIT: staff time for two weeks of training	Upgraded ability to in other units to provide water-use information services
BUDGET	JD398,000	\$453,000		

1.c. Strengthening Field Data Collection (\$1,225,000):

The strengthening of the MWI surface and groundwater data collection program is essential for establishing an effective monitoring program. Existing observation wells will provide the data for establishing baseline water quality. Additional wells and/or monitoring stations may be established as needed.

The objective for this subcomponent is to augment, strengthen, and upgrade the MWI surface and ground water data collection program so it can serve as a nationwide water quality monitoring program. This will involve creating additional collection stations, improving collection and analysis procedures, and ensuring that results are disseminated to appropriate groups.

The justification is that the overall monitoring component is dependent upon the accurate collection of samples from all necessary locations and providing timely transport to the laboratory. Currently, there is lack of resources, overlapping responsibilities, unclear aims and objectives, lack of equipment, and need for strengthening managerial skills. There is no nationwide water quality monitoring network to provide for the types of information and efficient transfer of data to fulfill the needs of all competing users of the waters and governmental agencies entrusted with the protection of these valuable resources.

The following is a brief description of this subcomponent:

- a. In the early stages of the monitoring-field data collection program, the Prime Contractor's consultant--24 months of time divided into four or five separate periods--will help MWI determine the current status of the nationwide monitoring program and assist in taking immediate steps for new stations and upgrading of old stations, including necessary repair and parts, and all the necessary steps to close the gaps in essential information needed. It is expected these needs will be firmly established after 3 months of first visit of the consultant.
- b. The project Prime Contractor will provide the consultant for the monitoring-field data collection project and funding for installation of wells and stations, and necessary sampling and support equipment. The consultant is expected to conduct training sessions and other related activities as regards field collection and proper handling of samples, proper field measurements, advice on acquisition and installation of additional field stations and equipment, necessary

coordination of analytical needs with the WAJ Central Laboratory, and advice and consultation on overall management of the nationwide water quality field data collection system.

- c. MWI will provide two key WAJ counterparts to work closely with the consultant and provide support on appraisal of current status of the water quality monitoring program in Jordan; information on training, equipment and personnel needs; field station installation and measurement; and field liaison logistics.
- d. The consultant in the first year will assist MWI to develop a long-term plan to carry the program through Year 5. It is important that the long-range plan will ensure that training by in-house staff will continue after the consultant departs. It is expected that the long-range plan will be supported by GOJ and/or by private donor funding.
- e. Starting in the third year of project, the trained MMRAE staff (described in Item 1.d.-Upgrading of the MWI Laboratory) are expected to be available to work with the field monitoring component, and are expected to provide technical guidance and oversight of the water quality monitoring program.
- f. It is essential that all additional samples collected by this field data collection program receive proper analysis by the WAJ-Central Laboratory on an equal basis as other routine, incoming samples. No costs shall be assessed to the USAID project because of these samples, which are the property of MWI-WAJ.

The following is an illustrative list of the activities, inputs and outputs for this subcomponent:

ACTIVITY	MWI INPUTS	USAID INPUTS	OTHER INPUTS	OUTPUTS
Coordination between Ministries, (MHRAE, MOH, MOP)	MWI is lead Ministry providing staff and support services. (Est. JD 2,900)	Consultant will serve in advisory role (0.5 PM)	Other GOJ units will participate in committee, ad-hoc groups, etc. (JD 3,600)	Mechanism for coordination established
Short-term training/ Study tour for one participant	Provide staff and airfare (Est. JD 1,500)	U.S. travel, fees and living allowance \$10,000		
Conduct on-the-job training on monitoring and field data collection methods	MWI provides office space and two key staff from Central Lab (Est. JD 21,900)	Advisory assistance to develop curriculum and train trainers (12 PM)		MWI staff trained
Determine current status of nationwide monitoring program; develop short and long range water quality monitoring plans	MWI provides staff and other support. (Est. JD 2,900)	Advisory assistance to design, develop and review study and work plans (1.5 PM)		Water monitoring plan developed
Installation and use of wells/ stations; procurement of field monitoring equipment; on-the-job training	MWI provides two key staff and others for field training. MWI also provides transport and other support. (Est. JD 14,400)	Advisory assistance finalizing and procuring equipment, and providing training as to installation and use (9.5 PM). Installation and upgrading of stations and sampling equipment= \$740,000		Water monitoring plan established
MHRAE Graduates work with MWI in oversight role		TA Advisor provides on-the-job training (0.5 PM)	MHRAE trained staff liaison and oversight (JD 17,900)	
Budget Estimate	JD 43,600	US \$1,225,000	JD 21,500	

1.d. Upgrading MWI Laboratory (856,270):

MWI is responsible by law for monitoring water quality. Therefore, MWI must have efficient laboratories to carry out this constitutional responsibility. The present facilities of MWI's Central Laboratories are not capable of meeting the demand for providing analytical services required for an effective water/waste water monitoring program.

The objective of this subcomponent is to upgrade and substantially increase the analytical capabilities of the MWI Central Laboratory, in the number of samples handled and analyses performed, and also strengthen the integrity of the results generated.

The justification for this subcomponent includes the fact that MWI must have efficient and capable laboratories to carry out this constitutional responsibility. The MWI's Central Laboratories are not presently capable of meeting the demand for providing analytical services for an effective water and waste water monitoring program, and their workload is expected to substantially increase in the future. Instrumentation now available can only meet 70 percent of the parameters regulated by national standards.

A description of this subcomponent is as follows:

- a. In the early stages of the Central Laboratory upgrading process, MWI will provide two key laboratory persons to work closely with the consultant to appraise status of the laboratory, its existing equipment and supporting services, and the prioritization of new equipment items to be purchased. After the arrival of the equipment, the TA consultant will return and, with assistance from the key MWI laboratory representatives, will develop and conduct the training programs on the use of both new and existing instrumentation, methodology, proper preservation and collection of all field samples incoming to the laboratory, chain-of-custody forms, proper receipt of samples, lab safety, proper handling and integrity of the results, better laboratory management, and other items indicated as necessary.
- b. The Prime Contractor will provide a consultant--total of 7 months--for the MWI Central Laboratory upgrading and training of staff. The consultant is expected to spend 2 months for the initial appraisal and feasibility study, finalizing the equipment list, and helping develop an action plan for the laboratory program. After the equipment arrives at the laboratory, the consultant will spend another 5 months helping install and adjust the new equipment and training the maximum number of people on all pieces of equipment and laboratory procedures and methodology.
- c. The consultant will assist in developing a long-term plan for the Central Laboratory so that training by in-house staff, with the assistance of the MWI Training Center, will continue after he/she departs. The consultant will also assist in creating a plan for the Laboratory to undergo continuous refurbishing and

modernization which will hopefully be supported by GOJ and/or donor funding.

- d. This subcomponent will support two MMRAE staff to study for MS degrees in water quality monitoring. Upon return they will serve as the liaison with the MWI, RSS, University of Jordan and other organizations involved in water quality monitoring. Their functions will be to ensure that water quality monitoring is being done correctly and that the information is being fed into the regulatory program of GOJ. Starting in the third year of the project, these graduate professionals from MMRAE are expected to be associated with the laboratory and the water quality monitoring program for technical guidance and oversight.

The following is an illustrative list of the activities, inputs and outputs for this subcomponent:

ACTIVITY	MWI INPUTS	USAID INPUTS	OUTPUTS
Review Lab Status and Develop Work Plan	MWI provides personnel (Est. JD 30,810), office space and other support (Est. JD 9,625).	1A advisor to assist with planning exercise (1 PM). 1A will also be working part time on water quality monitoring.	
Finalizing laboratory equipment needs and procurement	MWI provides office space and key MWI lab person, operating cost for equipment and maintenance (JD included above)	1A Advisor to help finalize list (1 PM); procure equipment (\$600,000)	Equipment procured
On-the-job training of MWI staff to use equipment and new programs	Provide staff and facilities for training (JD included above)	1A Advisor (5 PM)	MWI staff trained
Graduate Studies (upon return they will liaison with MWI Central Laboratory on the water quality monitoring program)	(MMRAE provide JD 3,000 for transport)	Placement of trainees and training fees and living allowances (\$117,672)	Water quality program established
Budget Estimate	JD 43,435	US \$856,270	

1.e. Ground Water/Aquifer Recharge Studies (\$800,000):

The national water management study recommended that all possible means be sought to increase the supply of water, including studying the potential for increasing recharge of ground water aquifers. This component is aimed at evaluating the opportunities for groundwater recharge in Jordan's aquifers. The goal of this subcomponent is to save Jordan's water resources by using storage available in selected aquifers. The objective is to (1) determine those areas in the country with the greatest potential for groundwater recharge and (2) conduct feasibility studies for groundwater recharge in those areas which show potential.

The justification is that the water resources of Jordan are inadequate to supply the current needs without exceeding the safe yield from groundwater.

The Water Management Study (draft, June 1992) estimates a current water deficit around 470 MCM in 1990 and 1040 MCM in 2015, depending on what mitigating measures are taken. Currently, this deficit has been met by over drafting the groundwater. As a consequence many of the aquifers are being depleted. Figure 1 shows the water level in a typical aquifer. The groundwater level in most aquifers are declining

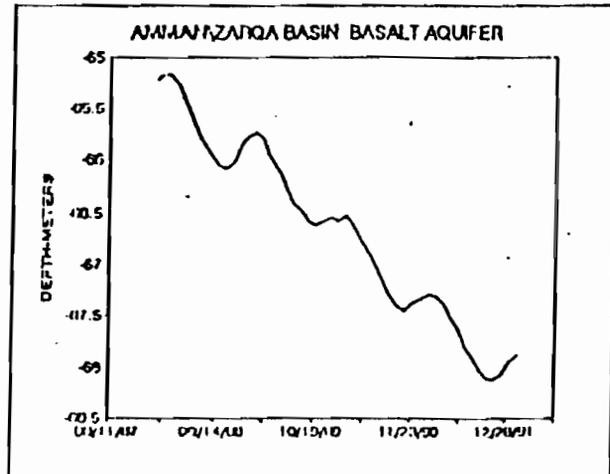


Figure 1 HALLABAT NO.1--TYPICAL GROUNDWATER LEVEL

since, nationwide, abstractions are about 150% greater than the natural recharge. At times some direct runoff is lost without being fully utilized. Potentially, both of these situations can be reduced by groundwater recharge. The potential benefits for groundwater recharge and storage are sufficient that the feasibility should be evaluated.

This subcomponent consists of a study in two parts to determine the feasibility of groundwater recharge in Jordan: first, to locate areas of potential recharge and second, to study the selected areas and, if feasible, develop a plan for recharging the aquifers; and then these areas will be studied in detail during the second phase. The first part of the study would use existing data and field trips to locate those areas have the most potential. The second phase will most likely entail drilling test wells, performing well tests to determine aquifer characteristics

and seismological investigations to determine the location and extent of aquifers and aquiclude. Approvals from the Ministry and USAID would be required before starting the second phase.

- a. This study will be subcontracted to a firm responsible to the prime contractor who, in coordination with the Ministry and USAID, will review the subcontractor's progress, results and reports and who will reimburse the subcontractor according to the terms of the contract between the contractor and subcontractor. The subcontractor will be responsible for providing all personnel, expertise, supplies and equipment, except those items shown to be provided by the Ministry, to successfully accomplish the studies. The subcontractor will be responsible for the timely completion of the studies and for the quality of the required reports.
- b. The subcontractor will provide a senior hydrogeologist to act as team leader and with assigned Ministry personnel (one senior and one junior hydrogeologist) conduct the required activities of Phase I of the study. The subcontractor will provide an additional staff member for Phase II to help gather and interpret data and test results.
- c. During Phase I, the subcontractor and Ministry staff will gather existing hydrological data and geological data and determine those locations throughout the country of Jordan showing technical and economic potential for groundwater recharge. These locations will then be checked by field visits. The subcontractor will prepare a report identifying those areas showing potential and provide a plan for conducting Phase II studies including drilling test wells and conducting seismologic studies, if needed.
- d. Phase II will consist of collecting field data, if needed, to determine those locations where groundwater recharge is feasible and to formulate a plan for implementing artificial groundwater plan. The plan should consider for each feasible location:
 - the location and quantity of water,
 - method of collecting waters for recharge,
 - the quality of the recharged waters,
 - the quality of the receiving waters,
 - any mitigating measures needed to protect the groundwater quality,
 - method of groundwater recharge (spreading, injection, etc.),
 - Location of recharge facilities,

- ground needed for recharge,
- special problems or considerations for implementing groundwater recharge,
- anticipated yield of each recharge area,
- method, location and cost of using the recharged water,
- losses of recharged water,
- equipment, personnel and operating criteria for operating the recharge facilities,
- social soundness,
- energy needs,
- environmental impacts and concerns,
- economic evaluation,
- a report containing the data, findings, plan formulations, recommendations, and study results (the number of reports will be specified by the prime contractor),
- a final presentation and donor conference.

e. It has been reported that the Zarga river below the diversion dam and above the canal has around 35% losses which indicates it is highly permeable. Water is available from the Zarga river and any water pumped from the groundwater could be discharged into the canal for use in this program. From outward appearances, this location has potential for artificial groundwater recharge. It has also been reported that a military camp in the Mafraq area also has potential for groundwater recharge.

The following is an illustrative list of the activities, inputs and outputs envisioned in this subcomponent:

ACTIVITIES	MWI INPUTS	USAID INPUTS	SUBCONTRACTOR	OUTPUTS
Conduct Phase I: Locate feasible areas (4 months)- Present written plan for Phase II	Office Space, Senior Hydro-geologist, Junior Hydro-geologist (JD 10,100)	Funding including 2 computers for the Study (\$84,000)	Copy Machine, Office supplies, Hydro-geologist/Team Leader	Areas located
Phase II: Field Investigation, Analyze Data and Prepare Report (7 months)	Office Space, Senior Hydro-geologist, Junior Hydro-geologist One Drill Rig and Crew (JD 100,600)	Funding for Phase II (\$716,000)	Copy Machine, Office supplies, Team Leader, Hydro-geologist Seismologic Equipment	Recharge study conducted
Prepare and Modify Final Report (1 month)	Office Space, Senior Hydro-geologist, Junior Hydro-geologist (JD 2,500)	Report Review	Team Leader	Report completed
Conduct Briefing Conference	Facilities and Organization		Make presentation on findings	
Budget Estimate	JD 113,200	US\$800,000		

2. Water Pollution Prevention and Cleanup (\$11,504,750):

This component supports the GOJ efforts to reduce environmental pollution and increase the quality of waste water for reuse, as strongly recommended in the national water management study.

Within the Zarga River Basin water pollution is a critically serious problem emanating from 2 sources: the incompletely treated effluent from the Ain Ghazal and As Samra wastewater treatment plants and from the nearly 100 industrial operations located in the basin which illegally dump their untreated wastes into the already seriously overloaded As Samra WWT system or directly into the river. This component supports two independent activities, coordinated by the MWI Project Coordinator:

- a. The first activity, which focuses on increasing the efficiency of the WWT system, will be executed over a three year period by a separate direct-AID contract team (independent of the prime contractor but under the direction of the MWI project coordinator), which will identify, procure, and install the necessary equipment to upgrade the Ain Ghazal and As Samra facilities and train personnel in operations and maintenance.

- b. The second activity, which will focus on pollution prevention and control, will be implemented through the Amman Chamber of Industries, which represents all industrial operators in Jordan with technical assistance and other inputs from the prime contractor.

The World Bank currently has a \$500,000 Industrial Pollution Central Project which focuses on audits, feasibility studies, and some demonstrations. The results of these studies will feed into this component. Other donors, including the Japanese and Canadians, have shown interest in industrial pollution control activities but specific projects have not yet been developed. Contact will be maintained to track progress and coordinate activities to assure that duplication is prevented.

2.a. Upgrading Waste Water Treatment Facilities
(\$9,950,000):

This project subcomponent involves upgrading the As-Samra treatment facilities and associated systems, including the Ain Ghazal headworks. Crucial to water quality management is effective pollution control and cleanup of waste waters. In Jordan, the most important waste water treatment facility is the As-Samra WWTP together with associated facilities including the Ain Ghazal headworks, a sewer-siphon (pipeline), and pumping stations. Improvements recommended for the As-Samra system by Engineering Science, Inc., consultant to the Water Authority of Jordan (WAJ), include aeration of the waste stabilization ponds of As-Samra; rehabilitation of the Ain Ghazal headworks which provides preliminary treatment of the waste waters delivered to As-Samra; a desludging program for the anaerobic ponds at As-Samra; inlet and distribution improvements for the headworks at As-Samra including hydrogen sulfide capture; and improvements of the chlorination facilities of As-Samra. These components are an important part of the total plan for rehabilitation and upgrading of the waste water treatment facilities.

The objective of this subcomponent is to upgrade the As-Samra treatment facilities and associated systems, including the Ain Ghazal headworks so as to improve the quality of waste water effluent, as expressed in measurements of BOD (<30 mg per liter) and fecal coliform (<1,000 per 100 ml).

The justification for this subcomponent is as follows. The As-Samra waste water treatment plant (WWTP) is the single, most important facility affecting surface and ground water, and the quality of water resources in the Zarqa river basin. Societal development in many areas (e.g., health, environmental protection, agricultural production) is significantly affected by the As-Samra WWTP:

As the largest waste water treatment plant in Jordan, As-Samra treats domestic, industrial and commercial waste waters. The plant is greatly overloaded hydraulically, organically, and also with respect to solids, as compared to design. Obnoxious odors emanate from the As-Samra WWTP due to the concentrated waste waters and anaerobic conditions at the site.

The As-Samra waste water effluent: (1) shares properties as to high BOD, suspended solids, and fecal coliforms similar to the effluent associated with the cholera epidemic of 1981; (2) does not always meet contact standards for fecal coliform bacteria (i.e., <2,000 per 100 ml); (3) the present effluent, at times, may be considered unsafe for agricultural workers and other persons exposed to the partially treated waste waters; (4) has increasing potential for causing health problems, ranging from intestinal disorders to major epidemics (e.g., cholera); (5) has use restrictions on agricultural products grown with the effluent because of water quality; and (6) likely is contributing to ground water contamination (i.e., ammonia, nitrates) in the vicinity of the waste stabilization ponds and the Zarga River watercourse.

As-Samra effluent is important for agricultural reuse, especially in times of sparse rainfall and drought (i.e., approximately a third of the irrigation waters used in the Middle Ghor is As-Samra effluent). As-Samra effluent constitutes an increasing proportion of waters used for irrigation in the Jordan Valley.

The 5 critical areas to be addressed by this activity are:

- a. Ain Ghazal Headworks. Rehabilitate and/or add new heavy-duty, higher capacity, mechanically-raked bar screen(s), comminutor(s), possible fine screen following the bar screen(s), and improvement and/or rehabilitation of aerated grit chamber(s). Improvement and/or rehabilitation of the odor venting system and associated support chemical scrubbing systems are included. The foregoing systems are currently inadequate to handle existing and anticipated short-term increases in hydraulic, organic, and solids loads. Urgent repairs and maintenance are required for the existing equipment. Installation of new high capacity equipment within the existing structures will allow older equipment to be removed, renovated, and to replace other identical systems.
- b. Desludging Program At As-Samra. A proper desludging program will be conducted on the anaerobic ponds, especially the first of the 2 anaerobic ponds in series

in each treatment train. A floating dredge with hydraulic cutter or mudcat-type sludge dredge has been proposed. Sludge drying beds will need to be added to handle the removed sludges, but it is imperative that full measures be taken so as not to create any new or additional odors at the site.

- c. Floating Or Fixed Aerators. The number of fixed or floating aerators has been estimated by ES to be, between 100 and 300 units. The estimate used in budgeting this subcomponent is 125. The size of aerators has been predicted to be between 50 and 100 HP, but the aerator size most often referred to is 50 KW or 67 HP. The number of 100 units seems to refer to a demonstration phase or may be somewhat synonymous to a first phase, say around 1995, but this is only an indication from the various ES reports. Since all the facultative and maturation ponds for 10 or more months of the year are completely devoid of oxygen i.e. 0.0 mg/l dissolved oxygen, incorporation of aerators into the ponds will have a tremendous effect on introducing aerobic conditions and converting the ponds from anaerobic units into true waste stabilization ponds in conformance with the design of the WWTP. The ponds currently are not functioning as anything close to waste stabilization ponds. The aerator studies at the onset of this subcomponent must evaluate the degree of foaming associated with various aerator configurations, and may need to develop reliable means of foam suppression and breakup.

The GOJ will be providing power for the aerators and the civil works for their installation. Generator sets may need to be provided for a temporary period before a power line supplying the additional energy demand for the aerators can be constructed for obtaining power from the Zarqa Al-Musseini Power Plant.

- d. Supervision of Construction. In addition to the procurement and installation of the equipment needed for the upgrading of these wastewater facilities, USAID will finance the services of a U.S. consulting firm to supervise the procurement and the installation of this equipment.
- e. Inlet and Distributor Improvements For the Headworks of As-Samra. The ES reports have recommended a covering, blower and venting structure for the headworks at the As-Samra site to minimize and control hydrogen sulfide odors at the point where presumably most of the obnoxious odors are said to be originating.

- f. Improvement In the Chlorination Facilities at As-Samra. ES has proposed 3 areas of improvement: that a residual chlorine monitoring system be initiated; rehabilitation of the chlorination system; and providing more chlorination for disinfection. Inspection of the As-Samra site by a PP preparation team engineer indicated a number of potential problems in proper and effective chlorine disinfection. It is already known there are many months when the final effluent of the WWTP greatly exceeds the required standard of <1,000 MPN fecal coliforms/100. The situation may be even worse because the WWTP uses a limited number of dilutions and replicates in its fecal coliform testing and as a result too many > values likely being obtained. This procedure will understate reported counts.

A U.S. firm under a USAID contract is currently conducting the design for the upgrading of the As-Samra wastewater treatment system. Activities, inputs and outputs for this subcomponent will be fully described in the design. The following is an illustrative list:

ACTIVITIES	MWI INPUTS	USAID INPUTS	OUTPUTS
Upgrading of WT system	Fund, oversee facilities, civil works, and equipment in support of As-Samra and Ain Ghazal upgrading (Est. JD 924,140); staff (& vehicles, offices) for liaison, implementation, and aerator maintenance and training (Est. JD 75,000)	Fund, negotiate and oversee contracts for equipment, installation, construction and the desludging program \$9,000,000	Equipment procured and installed
Supervision of Construction		Subcontract for the supervision of installation and construction \$500,000	
Operations and Maintenance (O&M) (Including O&M training, for As-Samra and Ain Ghazal)	Staff O&M training (cost included above)	(Training is part of the contract)	WWTP upgraded
Budget	JD 999,410	US \$9,950,000	

It should be noted that USAID funding applies to only a portion of the proposed overall upgrading of the treatment facilities, which includes a second syphon and other expansion-related activities. ES has provided a preliminary analysis of needs and costs for a new pipeline delivery system (syphon) and for upgrading and expansion of the remainder of the treatment works to carry As-Samra into the year 2005. Negotiations for financing the construction of the second syphon with German assistance are currently underway. A feasibility and design study to analyze long

term alternative solutions for wastewater treatment to meet the future demand in the Zarqa Basin, including Amman, will be conducted and financed under this project in coordination with the PPU.

To protect the As-Samra facility against further undue and unnecessary overloading and to increase treatment plant efficiency, the GOJ covenants to assure that the Amman slaughterhouse collect all the blood and offal generated by its operations, thus preventing entry into the sewer.

2.b. Industrial Waste Water Discharge Prevention
(\$1,554,750):

This project subcomponent will assist the industries in the Zarqa basin system to assess pollution problems and alternative solutions, will provide some incentives, and will help in identifying financing mechanisms to achieve the desired levels of pollution prevention, water conservation and waste water treatment. The objective is to (1) assist the water-using and waste-discharging manufacturing industry in the Zarqa basin system to adopt and practice pollution prevention and waste minimization and (2) develop, stimulate and strengthen the private sector environmental service and equipment supply sector.

The justification for this subcomponent is that it focuses on the first four of the five major problems, as identified in the Jordan National Environmental Strategy, which restrict industry's ability to address, prevent and/or solve inefficient water use and pollution problems:

- a lack of knowledge, skill and experience necessary to define, prevent and/or solve pollution problems;
- a limited private sector capability to provide pollution related consulting, equipment and O&M services to industry;
- a lack of examples of thorough and responsible leadership in industrial pollution prevention and control;
- limited funds and the very restricted financing options open to (1) industries to implement pollution prevention and treatment projects and (2) environmental businesses which are necessary to support and assist industry actions;
- a lack of routine monitoring, regulation and enforcement of waste discharge requirements;

The institutional focus is the major local organization which represents and deals with the industrial sector in Jordan--the Amman Chamber of Industry. The Chamber, established in 1962 as a non-profit organization, has as

members the major industrial, energy and mining sub-sectors of the Jordanian economy. The Chamber has recently (mid 1991) established a department to deal with environmental issues, focusing on industrial pollution prevention and control. The Chamber functions as an intermediary between Government and industry on environmental issues and provides both with technical and policy advice. This subcomponent will facilitate the relationship between the private sector and MWI central laboratory and monitoring unit which is responsible for measuring and enforcing industrial pollution by establishing a steering committee and other communication mechanisms. The project advisory team will work with USAID, the Central Bank of Jordan and a group of Commercial Banks in designing and implementing, if feasible, a loan guarantee mechanisms to facilitate private sector borrowing for PPWM activities.

The following are the major activities included in this subcomponent:

- a. During the first phase an office will be established in the Chamber and a Component Steering Committee will be organized by the contractor in cooperation with the Chamber and the GOJ. This steering committee made up of public and private sector representatives will provide guidance and advice to the contractor and Chamber. The Contractor will then prepare a workplan for the life of the project and the detailed annual plan, in cooperation with the Chamber. The Committee will review and comment on the life of project and annual work plan, advise the advisor on issues, suggest priorities for activities, review and comment on key outputs. The Steering Committee will meet at least twice a year.
- b. With contractor assistance the various component activities, including audits, studies, demonstrations, and training, will be implemented in cooperation with the industries and environmental businesses personnel. On-the-job experience transfer will be emphasized.
- c. The subcomponent will investigate, recommend and help with structuring of financing mechanisms for industrial and private sector water, energy, and pollution businesses. The contractor will work with the Central Bank and a group of Commercial Banks on this element of the subcomponent. The Chamber will be involved as an advisor on local industrial needs. This activity is necessary to assure that the minimum business support and incentives are in place to encourage action by private sector business and industry. The incentives of this subcomponent and the associated support are called

for in an environment of slowly developing GOJ regulation and enforcement, the lack of appropriate pricing for water and energy and the lack of a waste discharge charge system based on the quantity and quality of the industrial effluent. These incentives will also facilitate the development of cooperative and sustainable GOJ and private sector business and financing relationships.

- d. This subcomponent will also explore and develop funding mechanisms, such as loan guarantees, to assist selected industries in taking the necessary actions to address pollution problems.
- e. The use of the Commodity Import Program (CIP) facility will be highlighted when US equipment is being purchased. When the GOJ has decided upon an approach and a mechanism, assistance will be provided to design and implement the selected approach. The new funding required, if any, and the source of funds will be determined as a part of the design.
- f. The World Environmental Center (WEC), or similar NGO, will be contracted to provide 20 PM of assistance with industrial audits, training and technology transfer.
- g. Short-term specialized training will be offered by the contractor, in cooperation with the Chamber of Industries, MWI and other training institutions. The training will focus on practical measures to prevent and control industrial pollution. Two industrial PPWM internships (1-2 months) in the US will be arranged by WEC. Various in-country workshops, seminars and at least one National PPWM Conference will be conducted for managers, technical personnel and others.

The following is an illustrative list of the activities, inputs and outputs in this subcomponent:

ACTIVITIES	CHAMBER INPUTS	OTHER INPUTS	USAID INPUTS	OUTPUTS
Project start-up, establish Steering Committee, and Work Plan preparation	Assist with work plan, involve industries, provide office space; assign senior staff person (Est. JD 67,500)	Involve MWI and MIT in the work plan review and consult with MWI personnel on component strategy	Long-term advisor (30 PM) Office equipment at Chamber office (\$48,750)	Detailed work plan developed, office established in Chamber and staffed
PPWM technical assistance, 8 audits, 4 feasibility studies and 2 pilot projects	Staff and other assistance to help identify and establish contact with industry. Interested in participating in audits, studies, and demo projects (Est. JD 12,500)	Industry to contribute data, allow access to facilities, supply personnel, agree to operate & maintain demos & to buy equipment at end of project; Central Lab data to be collected for pollution prevention and control regulations enforced by MWI (Est. JD 150,000)	Short-term consultants (20 PM) 4 local subcontracts, Procure & install demo equipment & arrange equipment disposition at end of demo; transfer skills to Chamber; VEC to help with technical assistance (20 PM) Local Consultants (84 PM)	8 audits, 4 feasibility studies, and 2 demos; local consulting firms provided hands-on experience; Chamber strengthened; data organized and made available
Design and implement financial assistance mechanisms such as a loan guarantee program for PPWM activities and environmental business development	Assist in identifying companies to participate	Central and Commercial Bank with Loan Guarantee Program working with GOJ	In cooperation with Central Bank, GOJ and USAID, the contractor will design and assist with implementation of loan guarantee program	Program for PPWM activities and businesses established
Training and hands-on experience in PPWM	Help design training plan for in-country work shops and short-term training; the Chamber will work with other groups, such as Jordanian Engineers Association to assure selection of appropriate training courses and venues	VEC to advise about training and to secure in-U.S. Industrial Internships; other US and in-country training to be provided by primary contractor; Industry to pay some portion of costs for selected training	Fees for overseas training and in-country training costs (\$30,000)	Trained private sector environmental and industrial personnel
BUDGET	JD 80,000	JD 150,000	US \$1,554,750	

3. Irrigation Water Management (\$3,109,000):

Once the water of the Zarqa Basin System has been cleaned up through significantly reduced industrial pollution and more efficient wastewater treatment; the next step is to get this irrigation water to the farmers and to maximize their efficient use of it. In this component the project will provide primarily technical assistance to do a feasibility study and design a conveyance system to improve the flow of the water from the King Talal Reservoir, where the Zarqa Basin water is stored, to the farmers in the middle third of the Jordan Valley (referred to as the "Zarqa Triangle") and to improve irrigation water management through training, information flow, and cooperation between MWI, other GOJ units and farmers.

The prime contractor, either directly or through a subcontractor, in coordination with the MWI, will be responsible to conduct studies, develop water management plans, coordinate training programs, prepare information materials, in coordination with Jordanian Universities, the Ministry of Agriculture (extension program), farmers associations, international institutes, and local and international consultants with irrigation management capabilities.

While no other donors are involved in the water conveyance activity, the Germans are assisting JVA in developing an irrigation water information system which complements this component. USAID's National Agricultural Development Project also provides information to Jordan Valley farmers on more efficient irrigated agriculture.

3.a. Improve Water Conveyance System (\$1,880,000):

Water is released from the King Talal dam and flows down the Zarqa river 13 kilometers to the Deir Alla diversion weir where a portion of the water is diverted into two pipelines which carries the diversions to the Jordan Valley for irrigation. Losses between King Talal dam and the Deir Alla diversion dam are reported to be in the range of 10-20 percent. Some of the flow accretions in this reach of the river are from saline springs which increase the salinity of the river flows.

This activity will focus on recovery of most of the irrigation water currently being lost by seepage and evaporation during the conveyance of KTR water to the irrigation system downstream; reduction in the salinity load of the KTR water entering the irrigation system; and the feasibility of generating electric power in the system. The objective of this subcomponent is to (1) conduct a feasibility/design study for saving water losses and to improve water quality and/or power generation by installing

a pipeline from King Talal dam to a downstream diversion dam and alternatives of this project; (2) design the pipeline and oversee its construction if the study shows it is feasible; and/or (3) act upon alternative interventions as recommended in the feasibility study.

The justification revolves around the fact that the water resources of Jordan are inadequate to supply the current and anticipated future needs. Consequently, water resource losses need to be kept to a minimum. There are losses from water released from King Talal dam to the Jordan Valley. There are also saline springs that add to the salt concentrations causing quality problems. It should be pointed out the while the change of water quality is not excessive, the water released from King Talal reservoir is partially composed of sewage and may have a high salinity (Range 318-1470 ppm TDS, Average 850 ppm TDS). Starting with a high salinity, the salinity increase along the Zarga may limit the usefulness of the water. A pipeline is proposed to transport the water from King Talal dam to the Jordan Valley which could prevent the losses and quality problems. There is the potential for power generation from the piped water. A study is needed to evaluate the potential for water savings and power generation. If feasible, the pipeline should be constructed. Otherwise, other alternatives explored in the feasibility study report will be acted upon.

The proposed feasibility study should evaluate alternatives to the subcomponent. These alternatives should include:

- Maintaining acceptable water quality by mixing Zarga water with Yarmouk river water;
- Limiting the pipeline to either the upper or lower reach only or both;
- Including power generation in the project;
- Improving the river bed or constructing a canal as an alternative to the pipeline;
- Preventing the saline water from entering the river.
- Recharging aquifers;
- Combinations of alternatives.

Additional data on these alternatives is given in the Technical Analysis (Annex F.1).

This activity will be implemented in three phases:

- a. The prime contractor will subcontract for a feasibility study to determine if a conveyance system is justified and, if so, which is the best alternative.

- b. Base upon the feasibility study, the second phase will be initiated to do a detailed design of the agreed upon conveyance system.
- c. Depending upon the alternative selected, and if sufficient funds are available in this subcomponent, a further subcontract will be let to provide the supervision and assist with the construction of the conveyance system.

The following is an illustrative list of the activities, inputs and outputs in this subcomponent:

ACTIVITIES	MWI INPUTS	USAID INPUTS	SUBCONTRACTOR	OUTPUTS
Feasibility Study (3 months)	Office Space, Senior Engineer, (JD 6,100)	Prime contractor negotiate and oversee the sub-contract (\$160,000)	Office Equipment and supplies. Technical Expertise	Feasibility study conducted
If feasibility study is positive, develop the design for the agreed upon conveyance system (9 months)	Office Space, Senior Engineer, (JD 18,200)	Sub-contract (\$520,000)	Office Equipment and supplies. Technical Expertise, Field Exploration	Design completed
Based upon the design study, construct the system (12 months)	Office Space, Senior Engineer, Rights-of-way, funding for construction (JD 24,200)	Sub-contract (\$1200,000)	Office Equipment and supplies. Construction Supervision, Expertise	Conveyance system upgraded
Budget Estimate	JD 48,500	US\$1,880,000		

3.b. Irrigation Water Management (\$1,229,000):

This initiative is designed to improve communications between MWI and farmers by working through public and private sector groups in the Zarqa basin system, including MOA, farmers associations, private sector, NGOs, and other groups. The objective is to improve the efficiency of the transport of irrigation water to the farmers and to increase its effective use by providing water- and crop-management information to the farmers in the Zarqa River basin system.

The justification for this subcomponent revolves around the fact that Jordan faces continuing water shortages for its growing agricultural, industrial and municipal needs. Precipitation over the Kingdom is variable and not sufficient to justify large dams in the interior. Given the growing water demands from all segments of its population,

and the hydrologic realities, water conservation and its optimal use by agriculture is one of the few real options presently available to maximize existing water supplies.

This subcomponent includes the following activities:

- a. Prepare a quarterly water budget which will be presented to farmers so they know how much water they will receive and when.
- b. Develop and implement water delivery conservation plan which will ensure the system is working correctly and that there is a minimum of losses through evaporation and seepage.
- c. Develop and implement an on-farm water conservation plan which analyzes current practices and alternatives which farmers can profitably introduce.
- d. Study the potential for establishing a water user's organization (WUO) which would become the official group for MWI to interact with in addition to working with MOA, JVFA, private sector, and other groups.
- e. Conduct a water pricing study and potential for cost recovery. An important issue is determining with some precision the cost of water at the farm-gate.
- f. Working with the MWI information unit, MOA and other groups, develop an extensive training and communication program directed at all relevant groups working with farmers (extension workers, farmers associations, private sector, NGOs, etc.).

The primary contractor will provide both long-term (24 PM) and short-term (10 PM) technical assistance either directly or through a subcontractor to assist with the implementation of these activities. Short-term expertise will include: irrigation/agriculture engineer, agricultural economist, water-user organization and agricultural communications specialists.

The following is an illustrative list of the activities, inputs and outputs in this subcomponent:

ACTIVITY	MWI INPUTS	USAID INPUTS	OUTPUTS
Prepare quarterly water budgets and present to farmers	Designate planning staff (4 to 8) Personnel...JD200,000 Facilities...JD 9,000 Equip/Ops...JD 9,000 Training...salaries, facilities...JD50,000 (All costs in first cell)	Consultant (3 PM) to structure and train staff on preparation of seasonal water budget 1 PM follow up evaluation Tech. Asst...\$612,000 Subcontr....\$160,000 Equip/Supp..\$260,000 Training...\$162,000 (All costs in first cell)	Seasonal water availability forecasts for use by MWI in advising farmers
Develop a water delivery system water conservation plan	Designate operating staff	Consultant (4 PM) to evaluate water losses and recommend appropriate responses 2 PM follow up evaluation	Maximize agricultural water supply for two-crop seasons
On-farm water conservation plan (Coordinate with component 1.b. MWI information systems program)	In cooperation with MOA, farmers associations and other groups, select staff to receive training to establish an Irrigation Management Services program for farmers	Consultant (8 PM) to train and advise on water conservation plan. 2 PM follow up evaluation	Reduction in cubic meters/dunum/year/crop relative to present system (amount will be determined in the plan)
Study feasibility of establish a Water Users Organization (WUO)	Designate liaison officer(s) to work with contractor. Seek former committee inputs	Consultants (5 PM) to assist with analyses, creation of options, and evaluation	feasibility for establishing WUO conducted
Study of irrigation water pricing and cost recovery	Designate liaison officer(s) to work with consultants; Provide data requested in timely manner	consultants (5 PM) to assist with design and analyzing results.	Recommendations on irrigation water prices and cost recovery actions to be take by GOJ/MWI
Training of extension, farmers association, private sector and other groups	Subject matter specialists	TA (shown in other cells)	Training conducted
Production of information materials	Subject matter specialists and communication staff	\$5,000 per year for supporting materials	Information materials prepared
Update studies of farmers' information needs and media	Planning and supervision	\$30,000 for subcontractor	Valid information on farmers's needs and communication media
MWI Information liaison with MOA Information unit	1 prof staff and support	Consultant (4 PM)	Collaboration with MOA
BUDGET	JD268,000	US\$1,229,000	

4. Water Management Education (\$2,118,400):

The final component of the project supports the other three components by educating all sectors of society to conserve water and preserve and enhance the quality of water to permit its reuse for irrigation. The component will provide technical and financial assistance through the prime contractor to establish a Human Resources Development (HRD) section within the MWI/PPU. The HRD section will consist of one person who will develop a Ministry-wide manpower use plan, establish direct links with WAJ and JVA, the GOJ Civil Service Organization and the Jordan Public Administration Institute. In addition, an HRD oversight committee will be established to review policy issues related to human resources utilization and welfare. Upon approval of the manpower use plan, the HRD will develop an annual Master Training Plan for short-term technical training of MWI staff. At least initially this will be done through the WAJ Training Center while PPU/HRD examines other options including converting the WAJ training center into, or replacing it with a Ministry Training Center.

In addition to technical training for MWI technicians and managers, a public awareness program will be established hereby a local non-government organization (NGO) will be selected and trained to design and implement public awareness campaigns, which, though focused on the Amman-Zarqa area, should have nationwide applicability and impact.

No other donors are currently involved in this area.

4.a. Training/Human Resources Development (HRD) (\$1,064,400):

Training will be required for a wide variety of people from policy makers to field personnel. A major focus of the training program will be on management development. This subcomponent involves two elements: (1) addressing HRD policy concerns in MWI; and (2) strengthening MWI in-service training capabilities.

(1) Human Resources Development (HRD) in MWI

This element focuses on the policy aspects of managing human resources within MWI. The objective of this element is to institutionalize within MWI a focal point for HRD concerns, including manpower planning to achieve institutional goals, maintaining master training plans, overseeing the personnel record system, formulating staff incentive policies and programs, overseeing staff performance evaluation, and providing staff counseling.

The justification for this subcomponent is simple. People operate institutions: MWI is no exception. The greatest single cost in operating MWI is salaries and associated costs for personnel. There are no ministry-wide manpower planning and staff utilization efforts underway. Any restructuring or changes in role of MWI (such as decentralization) will require preparing the staff to do their new jobs. There is little recognition of the need for continuous training for personnel at all levels. At the present time, the personnel systems, performance evaluations, and incentives do not consider the need for in-service training. The heart of any significant change in the productivity of the MWI rests with the recruitment, training, promotions, incentive packages, performance evaluations, and management of personnel. A long term goal of this subcomponent will be to strengthen management capabilities at all levels.

The description of this element includes:

- a. Establish a HRD cell within the MWI Policy and Planning Unit.
- b. Review current human resources policies and procedures, needs and opportunities and prepare a phase I action plan for the MWI.
- c. Design and prepare a MWI manpower plan. Secure computer software and other equipment needed for the manpower planning exercise and other uses in the program.
- d. Based upon lessons learned in implementing phase I action plan, develop a long-term HRD program in MWI.

The following is illustrative of the activities, inputs and outputs in this subcomponent:

ACTIVITIES	MWI INPUTS	USAID INPUTS	OUTPUT
Establish the HRD Program as part of the Policy & Planning Unit (Linked with project Component 1.a)	HRD Coord. (provided in 1.a) 1 Support Staff JD 20,000 3 Other Staff JD 08,000 Facilities JD 30,000 Operations JD 30,000	Office equipment \$20,000	On-going HRD program in MWI
Review of HRD Needs & Opportunities in MWI-- Formulate Phase I Action Plan	Establish a Task Force Team Link with Public Administration Institute	Provide a consultant--3 one month assignments (with possible follow up visits if needed & requested)	HRD Phase I Action Plan with recommendations for organizational location, role, functions, staffing, budget, etc.
Developing a MWI Manpower Plan	Assign staff to develop plan	Consultant--2 one month assignments	Format for manpower plan and procedures for MWI team to prepare and update continuously
Procurement of equipment for Manpower Plan and other HRD Programs	Provide support staff and facilities for equipment	2 PC computer systems, personnel filing systems, copy machine, etc. (given above)	Equipment installed & Operating
Phase II of HRD Program	Staffing levels, organizational structural arrangements, physical facilities, operating budget	As determined in Phase I Plan	As determined in Phase I Plan
ESTIMATED BUDGET	JD 168,000	US\$110,000	

(2) Strengthening MWI In-Service Training Capabilities

This element focuses on the in-service training program within MWI. One output of the HRD program (described above) will be an annual Master Training Plan, which the training center would use as a base for its program. The objectives for this subcomponent is to increase the planning and management capabilities of the MWI training program from the 1991 level of 16 courses on 10 subjects for 377 trainees to 40 courses on 20 subjects for 600 trainees per year by 1997; to broaden the range of course offerings from 30 to 80; and to improve the quality and relevancy of training for MWI staff. Management skills development will be part of the new courses.

The justification is based upon the fact that the Ministry of Water and Irrigation has 8,646 staff. In 1991 377, or 4%, received in-service training--16 courses on 10 subjects were offered by WAI Training

Center. No JVA staff received in-service training from MWI training programs. The courses were directed at technicians (welders, pump mechanics, technicians, chlorinators, etc.). No professional staff, management, or administrative personnel received in-service training. Concern has been expressed from within MWI and by outside agencies that the efficiency of Ministry staff is low. Training needs assessments have not been conducted on the various groups within the Ministry. MWI is a public utility which must provide quality and efficient services to customers. If the overall efficiency and quality of services of MWI is to improve, much more effort needs to be devoted to in-service training. This will require a significant increase in training done by the MWI, as well as in outside training agencies (such as the Jordan Institute of Public Administration, vocational schools, universities, etc.). More training will be conducted on all aspects of management, based upon proper training needs assessments.

The description of this subcomponent includes;

- a. The primary contractor will provide a long-term Training Program Management advisor for 12 months initially followed by two one-month assignments in years 2 and 3, and one month each for years 4 and 5. Short-term consultants include: Water Course Development Specialist (6 PM spread over three years); Waste Water Course Development Specialist (6 PM spread over three years); and an Equipment & Facilities Design Consultant (3 PM).
- b. Three Training Center staff will be sent to short courses in the US: 2 for Training Planning and Management; and 1 for Management of Training Programs.
- c. Working with the HRD Coordinator in the Policy and Planning Unit, the advisor will assist in developing a Master Training Plan which will be up-dated each year. This will include a plan of action for the Training Center for all training courses (which will be conducted in the Center and outside training organizations).
- d. The two course development consultants will help the Training Center develop new courses in water and waste water, including preparing reference materials, teaching aids, and testing instruments.

- e. The equipment list which has been prepared with the Training Center should be finalized and equipment procured. It includes teaching materials (films, books, models, etc.), audio visual equipment, computers, office equipment, bus for carrying students to the field, and one mobile training van. The consultant will also assist in designing a remodeling plan for the facilities or help design a new training center.

The following is an illustrative list of the activities, inputs and outputs in this subcomponent:

ACTIVITIES	MWI INPUTS	USAID INPUTS	OUTPUTS
Develop a plan for upgrading the existing training center and developing a Ministry-wide program	Five year inputs include: 30 staff (Est. JD 300,000) Facilities (Est. JD 375,000) Operations (Est. JD 150,000) Training Costs (Est. JD 250,000) Establish a central training unit or link WAJ and JVA training activities	Provide one consultant for initially one year followed by 2 months (two one month assignments) for years 2 and 3 and one month each for years 4 and 5 (total of 18PM)	Training Program Developed
Upgrade capabilities of training staff	Provide 5 staff from Training Center and air transport to U.S. (Est. JD 4,500 for Training Costs) (Staff included Activity #1)	Short-term training in the U.S. for 3 participants (US\$32,200)	Training Staff upgraded
Development of MWI Master Training Plan (with Element #1) and Training Center Management Plan--This includes identifying training institutions in Jordan which can be used by MWI	Designate MWI training coordinators; provides staff; provide office, transport, and facilities for training staff and advisors. (Costs included in Activity #1)	TA Consultant to train staff and advise on training methods and curriculum development (from activity #1)	MWI master training plan developed
Development of new courses in water and waste water	Provide staff and facilities for new courses and development costs (training materials production, reference materials, trainers, etc.) (Costs included Activity #1)	--Consultant in Water Training (2 months each for years 1, 2 & 3) --Consultant in Waste Water Training (2 months each for years 1, 2, & 3) Total of 12 PM	New courses developed
Remodelling and Equipment Plan --three classrooms --one work shop training room	Counterpart staff (Cost estimates included in Activity #1)	--Provide training facilities and equipment consultant (one month in year 1) to help MWI staff to draw up remodelling plans and equipment	facilities improved
Procure equipment and operating materials (& remodeling) --Training Center management equipment (computer systems, etc.) --Audio-Visual equipment --Teaching materials (AV Aids) --Books & reference materials	Staff to operate and maintain equipment; operating costs (electricity, spare parts, operating materials) (Costs included in Activity #1)	Purchase equipment, spare parts and initial operating materials (for training staff on operating the equipment) \$328,200	equipment procured
Implement the in-country in-service training program	Select suitable trainees from MWI and other organizations to participate in on-going courses	Advisory assistance (included above)	
Design for new training building and residential facilities (if needed and requested)	Staff, land and funds for physical facilities construction	Consultant to assist in design (2 PM)	
ESTIMATED BUDGET	JD 1,075,000	US\$954,400	

4.b. Public Awareness Program (\$1,054,000):

Building awareness among the general public and specific groups is vital for increasing participation in water quality and conservation programs. This subcomponent will work through a non-government organization (NGO) to design and implement communications programs to create awareness among various target audiences.

The objective of this subcomponent is: (1) to develop the capability of a Jordanian NGO to plan, supervise production, and carry out information campaigns to increase public awareness of the need for and benefits of water conservation; and (2) to initiate and carry out a continuing water-awareness campaign involving where possible GOJ units concerned with water use by different population and economic sectors.

In terms of the justification, the report A Water Management Study made clear the crisis ahead. That view of the future is held by some critical thinkers, but it is not widely shared throughout the Kingdom. Most Jordanians have as yet had few instances where they did not have enough-and safe-water to use. Concern about either quantity or quality does not rank high on agendas of most people in Jordan. Yet their individual actions, in sum, determine quality and quantity factors of this resource.

The description of this subcomponent includes:

- a. Project development and management. USAID will enter into a grant agreement with an NGO to form an Awareness-Project-in-Water (APW) entity with staff to lead and manage this project. An external consultant, with established credentials in strategic communication programming, will be provided to support the APW staff.

The APW will employ a full-time professional as program leader; he/she must have demonstrated aptitude for planning and supervising strategic communication efforts.

A second professional will be employed as a program associate under the APW subcontract. This person will have qualifications for overseas M.Sc. studies-undertaken after one full year on the program. The APW will require that the course include some management training and that the student will devote at least two year's program service upon return.

In consultation with the contractor and adviser, the NGO will establish a program management structure within its organizational framework. This structure may include an advisory panel or steering committee for guidance and support.

- b. Study of water-use behaviors. A Jordanian behavioral science research group or firm will be subcontracted for a scientific study of Jordanians' knowledge, attitudes, and practices in water use and conservation. The purpose of the study is to gain understanding of peoples' water knowledge, attitudes, and practices as a base to develop strategies for programs to influence their water-use behaviors.
- c. Database of water-use practices. A Jordanian group or firm will be subcontracted to gather, devise, and field-test physical methods of water conservation for the several major categories of water users in Jordan. The purpose of this effort is to develop a base of knowledge and tested methods of water conservation that can be used to build specific communication messages.
- d. Water-use campaigns. The APW will plan and carry out large and varied water-use campaigns, many involving mass media to reach the public at large. It will also concentrate efforts by more direct means to inform policy-makers and administrators in government, industrial and public-sector leaders, and the intellectual communities.

The APW will be provided funding to cover its operations and the costs of producing its campaigns. At the same time, it will be expected to seek collaboration and support from public or private groups of similar interests.

- e. Equipment. The project will furnish equipment required for the functions of the APW, such as:
 - computers and programs for word processing, desktop publishing, graphic design, spreadsheet, communication, et al.
 - audio-visual equipment for training and interagency relations
 - office facilities
 - transport through purchase of vehicle (will be purchased through Component 1.a. and at the end of the project will be given to the NGO)

- f. Training. One candidate will be identified for M.Sc. study abroad in the field of strategic communication. Other training, either in-country or at external sites, may be done to qualify personnel within the APW and cooperating units to carry their assigned roles. The APW and prime contractor will conduct an annual workshop and design and implement short-term training programs for cooperating personnel.

The following is an illustrative list of the activities, inputs and outputs in this subcomponent:

ACTIVITY	NGO INPUTS	USAID INPUTS	OUTPUTS
Develop and manage the public awareness program	2 prof staff and office and support staff (employed under subcontract)	1A Advisor: 24 PM of technical assistance (subcontract of \$325,000 to lead and manage the project)	Ability to plan and produce public awareness programs
Design and Implement awareness programs	Support staff and facilities (JD40,000)	\$150,000 production costs and 6 PM advisory assistance	Briefings, special reports; mass media campaigns; school curricula materials
Conduct behavioral study of water users		\$50,000 subcontract	Scientific analysis of knowledge, attitude, practices in Jordan households
Establish a database and field tests of water-use devices and methods		\$25,000 subcontract	Evaluated methods and devices for saving water
Training: M.Sc. degree (1 participant)	Staff Member	Training fees and living allowances (\$62,000)	Trained person able to lead and manage public awareness programs
In-country training-- producing campaigns	Staff and facilities	Training costs and materials (\$10,000)	
BUDGET	JD40,000	US\$1,054,000	

1(2) COST ESTIMATE AND FINANCIAL PLAN

Table 1 provides a summary of the project budget by component

Table 1: Summary Project Budget by Component (U.S.\$)

Component	USAID	GOJ*	OTHER	TOTAL
1. Water Resources Monitoring & Management	5,941,770	2,021,600	-0-	7,963,370
a. MVI Policy and Planning Unit	2,607,500	1,092,000	-0-	3,699,500
b. Water Mngt. Information System	453,000	597,000	-0-	1,050,000
c. Field Data Collection	1,225,000	97,650	-0-	1,322,650
d. MVI Central Laboratory	856,270	65,150	-0-	921,420
e. Ground Water/Aquifer Recharge Studies	800,000	196,800	-0-	996,800
2. Water Pollution Prevention and Cleanup	11,504,750	1,500,000	345,000	13,349,750
a. Wastewater Treatment Facilities	9,950,000	1,500,000	-0-	11,450,000
b. Industrial Discharge Prevention	1,554,750	-0-	345,000	1,899,750
3. Irrigation Water Management	3,109,000	474,750	-0-	3,583,750
a. Water Conveyance System	1,080,000	72,750	-0-	1,952,750
b. Irrigation Water Management	1,229,000	402,000	-0-	1,631,000
4. Water Management Education	2,118,400	1,864,500	60,000	4,042,900
a. Training/Human Resource Development	1,064,400	1,864,500	-0-	2,928,900
b. Public Awareness Program	1,054,000	-0-	60,000	1,114,000
5. Evaluation	150,000	-0-	-0-	150,000
6. Audit	150,000	-0-	-0-	150,000
7. Contingency	2,026,000	150	-0-	2,076,230
TOTAL	25,000,000	5,861,000	405,000	31,316,000

* Exchange rate: JD 1 = \$1.50

The estimated costs and scheduled disbursement of project funds are summarized in table 2.

Table 2. Summary Budget and Projected Disbursement Schedule (U.S. \$000)

	GOJ* (LC-US\$)	USAID (FX)	Project Total	Year 1	Year 2	Year 3	Year 4	Year 5	X TOTAL	X USAID PROJECT CONTRIB.	X GOJ
Total IA		5,515	5,515	549	2,071	1,518	772	605	17X	22X	
LI		2,729	2,729	409	873	602	302	382	8X	11X	
SI		2,786	2,786	139	1,198	836	390	223	9X	11X	
Subcontractor		3,375	3,375	169	1,181	945	675	405	10X	14X	
Equipment, Supplies		12,781	12,781	3,195	0,307	767	256	256	40X	51X	
Training		556	556	100	122	122	128	83	2X	2X	
Misc		447	447	80	112	94	94	67	1X	2X	
Personnel	2,712		2,712	542	542	542	542	542	8X		37X
Facilities	909		909	182	182	182	182	182	3X		13X
Equip/Operations	2,160		2,160	325	759	434	325	325	7X		30X
Other	477		477	295	295	295	295	295	5X		20X
Component Totals	6,266	22,673	28,940	5,438	13,572	4,899	3,269	2,761	93X	91X	100X
Evaluation		150	150			75		75	0X		1X
Audit		150	100	20	20	20	20	20	0X		0X
Contingency		2,026	2,076	104	519	415	519	519	6X		8X
GRAND TOTAL	6,266	25,000	31,266	5,562	14,111	5,409	3,808	3,375	100X	100X	100X
PERCENT	18X	82X	100X	17X	44X	17X	12X	10X	100X	100X	100X
USAID TOTALS		25,000	25,000	4,217	12,333	3,956	2,464	2,030	77X		
GOJ TOTALS	6,266*		5,861	1,345	1,778	1,453	1,345	1,345	23X		
USAID PERCENT OF USAID TOTAL				17X	49X	16X	10X	8X	100X		
GOJ PERCENT OF GOJ TOTAL				19X	24X	20X	19X	19X	100X		

* Includes private sector contribution (est. \$405,000)

(3) IMPLEMENTATION PLAN

The nature of the project and its various components require that the implementation plan remain flexible and subject to close monitoring and control. The implementation schedule and the financial plan were carefully coordinated during the design phase of the project and resulted in a phased sequence to facilitate management of the various activities of the project.

The implementation of the project will be done through two major direct USAID contracts, a grant with a Jordanian NGO for the Public Awareness program, and buy-in with a regional AID/W project for policy and implementation support.

- The first contract will involve implementation of the project (except upgrading the wastewater treatment system); this contract will include the procurement of the following items: consultancy services, laboratory and water quality monitoring equipment, microcomputers, vehicles, communications and training equipment, other equipment and supplies, and appropriate training.
- The second contract will be for the upgrading of the waste water treatment plant system (Component 2.a); this contract will include the procurement of aerators and associated equipment of the upgrading of the WWTF and appropriate training and consultancy services.
- If a firm so wants, there will be no restrictions on bidding for both contracts.
- The grant to the Jordanian NGO will be tendered based upon a waiver for non-competitive procurement.
- The buy-in will be initiated with a procurement action in cooperation with the Near East Bureau, Office of Development Resources.

Upon signature of the Project Grant Agreement, Requests for Proposals (RFPs) and/or Invitation for Bids (IFBs) will be prepared to solicit offers from qualified US firms and/or consortia with local firms that will work together with the GOJ and local counterparts to carry out the activities described in the Project Agreement. The Project Agreement, as well as the RFPs and/or the IFBs, will provide descriptions of project components, the relationships of the participating public and private institutions, and the implementation plan.

Procurement of goods and services for all AID funded activities will conform to AID regulations for full and open competition. Full consideration has been given for the involvement of Gray Amendment entities in the provision of the required goods and services; A determination has been made that, due to the technical nature of the project and the large amount of the contracts, that full and open competition is appropriate.

Qualified U.S. firms will be encouraged to include to the maximum extent feasible Gray amendment entities as subcontractors for the provision of specific services.

The following is the proposed schedule for the plan for procurement of goods and services:

- | | |
|---|----------------|
| (a) Contract for All Project Components except WWT upgrading: | |
| Preparation of RFP | February 1993 |
| Submission of Proposals | March 1993 |
| Technical Review of Proposals | April 1993 |
| Contract Negotiations | May 1993 |
| Contractors Mobilization | June 1993 |
| (b) Contract for WWT Upgrading: | |
| Preparation of IFB | September 1993 |
| Submission of Bids | November 1993 |
| Review of Bids | December 1993 |
| Contract Negotiations | January 1994 |
| Contractor Mobilization | February 1994 |

NOTE: The preparation of the solicitation will be based upon the feasibility and design reports, being prepared by CDM under a USAID contract, which are expected to be completed on August 30, 1993.

- | | |
|----------------------------------|-----------|
| (c) Grant to Jordanian NGO | May 1993 |
| (d) Buy-in with Regional Project | June 1993 |

Project Implementation Schedule

Implementation of the project (except up-grading the wastewater treatment system) will be handled through a direct USAID contract with an American firm. It is envisioned that this firm will subcontract with Jordanian and American firms to provide the services required.

The four components in the project all focus on improving water quality and conservation. However, the tasks they address vary widely and are working with diverse clientele groups--eg. GOJ, NGOs and private sector. Each component, and subcomponent, can stand alone in that if it is not successful the overall project will not fail. However, if all the components are successful, then the overall impact of the project will be much greater.

Implementation of the wastewater treatment facilities upgrading component (component 2.a) will be executed by a separate U.S. contract. The terms of reference for this contract will be prepared and based on the feasibility study and design reports provided by CDM. It is envisioned that this \$9,500,000 activity will involve a U.S. primary contractor with local subcontractors. It is estimated that the actual work will be completed within three years.

The following is a summary of the illustrative implementation plan for the project components:

1. Illustrative Activity Schedule

1.a. Establishing MWI Policy & Planning Unit

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Establish Office & Hire Director	XXXXXX				
Establish Policy & Strategic Planning Program	XXXX				
Establish International Liaison Program	XXXX				
Establish HRD Program (Also see Component #4a (1))		XXXXXX			
Establish Information Systems Program (Also see Component #1b)		XXXXXX			
Policy Development & Institutional Development Studies		X X X X X X	X X X X X X	X X X X X X	X X X X X X
Project Management	XXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
Regional Project Buy-In	X X	X X	X X	X X	X X

1.b. Water Management Information System

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Equipment		XX			
Advisory services in organization/management		X	X	X	X
Technical assistance: information services		XX	XX	XX	
Technical assistance: management information system		XX	XX		
Training: M.Sc. abroad		XXXXXXXXXX	XXXXXXXXXX		
Training: workshops		X	X	X	X
Training: observational study tours		X	X	X	X

1.c. Monitoring--Strengthening Field Data Collection

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Coordination between Ministries	X	X	X	X	X
Assessment of national monitoring program	XXX	XX			
Procurement of field equipment		XXXXX		XXX	
Installation/upgrading of stations		XXXXX		XXX	
Development of field monitoring training		XXXXX	XXXXX	XXXX	
Graduate professionals from PHRAE made available				XXXXXXXXXXXX	XXXXXXXXXXXX

1.d. Monitoring--Upgrading MWI Laboratory

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Lab status assessment	XXX				
Graduate students abroad		XXXXXXXXXX	XXXXXXXXXXXX		
Lab equipment purchased		XXXXX			
Installation of lab equipment, training of various personnel		XXXXXX			
Long term plan development for Central Laboratory	X	XXX			
Graduate professionals return and provide liaison to Central Lab on water quality monitoring programs.				XXXXXXXXXXXX	XXXXXXXXXXXX

1.e. Ground Water/Aquifer Recharge Feasibility Studies

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Mobilization	XX				
Locate data	XX				
Evaluate Data	XX				
Field Check		XX			
Phase II Plan		XX			
Write Report		XX			
Approvals		XX			
Drill Test Wells		XX			
Well Tests		XX			
Selsmographic		XX			
Project Development		XX			
Economic Analysis		XX			
Environmental Analysis		XX			
Energy Analysis		XX			
Social Analysis		XX			
Prepare Final Report		XX			

2.a. Upgrading Waste Water Treatment Facilities

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Construction (including various equipment and instrumentation and aerator maintenance and repair training)		XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	
Operations and Maintenance (O&M)--by MWI (O&M training)			XXXXXXXXXX XX	XXXXXXXXXX XX	XXXXXXXXXX

2.b. Industrial Waste water Discharge Prevention

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Work Plan Preparation & Update	XX	X	X	X	
IA for: Audits Studies Demos	XXXX XX	XXXXXX XXXXXXXXXX XXX	XXXXXX XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
Financing Mechanisms: Design Implementation Operation		XXX XXXX/XXXX XX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
Training		XX XX	XX XX	XX XX	XX XX

3.a. Improve Water Conveyance System

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Feasibility Study	XXXX	XX			
Design and Construction Documents		XXXXXXXXXX			
Material Procurement			XXXXXX		
Construction Supervision			XXX	XXXXXXXXXX	

3.b. Irrigation Water Management

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Workplan preparation and update	XXXX		X	X	X
Water User Organization feasibility study		XXXX			
Cost Recovery Study		XXXX			
On-farm water budget and conservation programs		XX XX XX	XX XX XX	XX XX XX	XX XX XX
Irrigation Management Services		XXX	XXX	XXX	XXX
Training for MWI, extension personnel, and farmers		XX XX	XX XX	XX XX	XX

4.a.(1). Training/Human Resources Development HRD Policy Concerns

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Review HRD Needs & Opportunities	XXXX				
Develop MWI Workforce Plan		XXXXXX			
Establish HRD Program		XXXXXX			
Procure equipment for HRD Program		XXX	XXX		
Operate HRD			XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX

4.a.(2). Training/Human Resources Development Strengthening MWI In-Service Training Capabilities

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Develop Plan for Upgrading Training Program & Making Ministry Wide Program	XXXXXX	XXX			
Staff Participant Training		XX XX	XX XX	XX XX	XX XX
Develop Training Center Management Plan (& Revisions)	XXXX				
Remodeling & Equipment Plan		XXXX			
Develop New Courses		XX	XX	XX	XX
Procure Equipment & Supplies		XXXXXX			

4.b. Public Awareness Program

ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Develop plan and update	XXXXXX	X	X	X	X
Study water-use behaviors		XXXX		XXX	
Develop water-use database and update		XXXX	X	X	X
Gather, test devices and methods		XXXX	X	X	X
Conduct campaigns		XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
Training: M.Sc. abroad		XXXXXXXXXX	XXXXXXXXXX		
Short-term Training Programs	XX	XX	XX	XX	XX
Cooperation with GOJ	XX	XX	XX	XX	XX

2. Technical Assistance

The following table provides an illustrative list of the advisory assistance provided by the project:

TECHNICAL ASSISTANCE PERSON MONTHS (PM)

COMP #	POSITION	YR 1	YR 2	YR 3	YR 4	YR 5	TOTAL PM
1. LONG-TERM EXPATRIATE							
1.a.	Sr. Water Management Advisor & Team Leader	6 PM	12 PM	12 PM	12 PM	12 PM	54 PM
1.c.	Water Quality Monitoring		12	12			24
2.b.	Private Sector Program Leader	6	12	12			30
3.b.	Irrigation management Specialist		12	12			24
4.a.	Training Program Management	2	12	2	1	1	18
4.b.	Public Awareness/ Communications	6	12	4	2		24
2. SHORT-TERM EXPATRIATE							
1.a.	Consultants for Studies						To be determined during project
1.b.	Communication Systems		2	2	2		11
1.b.	Management Information Systems		1	1			2
1.d.	Water Quality Laboratory Chemist/Engineer		3	3	1		7
2.a.	Consultancies/ Supervisor/Training						To be determined
2.b.	Private Sector Consultants		10	6	4		20
2.b.	MEC or similar NGO Consultants		3	2	2		7
3.b.	Water User Organ. Manager		2	1			3
3.b.	Agricultural Economist		2	1			3
3.b.	Agricultural Communications		2	2			4

COMP #	POSITION	YR 1	YR 2	YR 3	YR 4	YR 5	TOTAL PM
4.o.	NRD Specialist		2	2	1		5
4.o.	Water Mgt. Advisor		2	2	2		6
4.o.	Waste Water Course Advisor		2	2	2		6
4.o.	Training Equipment and Facilities Specialist		1	2			3
4.b.	Public Awareness Consultants		2	2	2		6
3. JORDANIAN							
1.o.	Sr. Advisor--Policy	6	6	6	6		24
1.o.	Sr. Advisor--Planning	6	6	6	6		24
1.o.	Sr. Advisor--IIRD		6	6	6	6	24
1.o.	Sr. Advisor--Information Systems		6	6	6	6	24
1.o.	Consultants for Studies						N.A.
1.o.	Project Accountant	6	12	12	12	12	54
1.o.	Project Secretary	6	12	12	12	12	54
4. OTHER							
1.o.	Admin. Assistant (Local American hire)	6	12	12	12	12	54

The total number of people involved are:

Long-Term Expatriate	6
Short-Term Expatriate	14
Jordanian Consultants	7
Other	<u>1</u>
TOTAL	28

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3. Subcontracts

The following subcontracts are specified or are recommended:

COMP #	DESCRIPTION	START DATE	EST. \$	REMARKS
1.a.	Policy & Institutional Development Studies/ Activities	Throughout Project	Not Known	Funds for special studies which could be subcontracted
1.a.	Regional AID Project Buy-In	Throughout Project	\$300,000	For policy and implementation
1.d.	Recharge--Locating feasible Areas	1st year	\$84,000	
1.d.	Recharge--Field Investigation	2nd year	\$716,000	
2.a.	Upgrading Waste Water Treatment Facilities	2-3 years	\$9,500,000	A separate contract from TA (see section A)
2.b.	Private Sector audits, studies, etc.	Throughout Project	\$126,000	For local firms
3.a.	Conveyance System Feasibility Study	1st year	\$160,000	
3.a.	Design Study	2nd year	\$520,000	
3.a.	Construction	3rd year	\$1,200,000	Depends upon earlier phases
3.b.	Irrigation Management Training/Communication	2-3 year	\$160,000	Final T.O.R. determined during project
4.b.	Public Awareness Campaigns	Throughout Project	\$445,000	To an NGO
4.b.	Behavior Study	2nd year	\$50,000	To local organization
4.b.	Water Saving Devices & Methods Study	2nd year	\$25,000	To local organization

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4. Training

The following is a summary of the participant training program. It does not cover the on-the-job training provided by consultants.

Master Training Plan

COMP #	TRAINEES & SUBJECTS	TYPE OF TRAINING	LOCATION	AID INPUTS	COUNTERPART INPUTS
a.a.	4 PPU staff on subjects to be determined	Short-course/ study tours	USA	\$40,000	JD6,500
1.b.	1 Strategy, Management of Information Services	M.Sc.	USA	\$60,000	JD1,500
1.b.	1 Water Information Programs	Short course/ Study Tour	USA	\$6,500	JD1,500
1.b.	1 Writer-Editor	Short course/ Study Tour	USA	\$6,500	JD1,500
1.b.	1 Audio-Visual Design	Short course/ Study Tour	USA	\$6,500	JD1,500
1.b.	1 Management Information Systems	Short course Study Tour	USA	\$6,500	JD1,500
1.c.	Monitoring-Field Data Collection	Study Tour (Internship)	USA	\$10,000	JD1,500
1.d.	2 MHRAE/DE Staff-- Monitoring Oversight	MS Degree	USA	\$117,672	JD3,000
2.b.	Unknown number-- Industrialists & Environment Businessmen	Study Tours	USA	\$30,000	Unknown
3.b.	MVI Staff Implementing Water Budget	6 months In- Service Training	Jordan	\$81,000	
3.b.	MVI & Other (MOA, JWA, etc.) for becoming IMS Agents	6 months In- Service Training	Jordan	\$81,000	
4.a.	2 Training Planning & Management	Short Course	USA	\$21,467	JD3,000
4.a.	1 Management of Training Programs	Short Course	USA	\$10,733	JD1,500
4.b.	1 Communication Planning & Management	M.Sc.	USA	\$62,000	JD1,500
4.b.	MCO Staff & Cooperators--Producing Campaigns	In-Service Training	Jordan	\$10,000	

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5. Equipment

The following is a summary by component for equipment. In each case, the equipment lists were reviewed with counterparts and estimates given below were made on what appeared to be reasonable items for the project. More details of the actual equipment is included in the component description section (Section C above) and the Technical Analysis (Annex F.1). The counterparts (as well as the Project Paper files left with USAID) have detailed lists which were used to make these estimates. The total allocated for equipment is \$12,781,000 of which \$9,500,000 is for the As-Samra WWTF.

EQUIPMENT SUMMARY

COMPONENT	AMOUNT \$	REMARKS
1.a.--PPU	\$314,000	Includes office equipment for MWI/FPU and project vehicles & office equipment
1.b.--MWI Communication	\$27,000	Another \$100,000 is reserved for production of communication materials
1.c.--Monitor: Field	\$783,200	
1.d.--Monitor: Laboratory	\$612,600	
2.a. WWTF Upgrade	\$9,500,000	Handled as a separate contract to procure, install and train MWI staff
2.b.--Industrial	\$448,750	
3.b.--Irrigation Management	\$260,134	
4.a.--Training (1) & (2)	\$348,200	
4.b.--Public Awareness	\$30,000	Additional funds will be included in subcontract for production of materials

(4) PROJECT MANAGEMENT

The Project combines four components, which are inter-related, but independent activities. Some of the components have different implementing units. For this reason, a program of focused and continuous monitoring is a must. The MWI, through its new Policy and Planning Unit, will be the official project counterpart unit implementing the overall project for GOJ. The MWI Project Coordinator will be an authorized GOJ representative for all project implementation activities. The USAID project office in the Jordan Mission will be the Office of Water, Environment and Agribusiness (WEA). This Office will be responsible to monitor and oversee project activities. An individual will be contracted on a PSC basis to serve as the Project Officer and report to the Director of the WEA office. The size and complexity of the project requires a full-time project officer who will see that each component is running well and that the GOJ and USAID are kept informed about the progress of the project and of any problems which may arise. The Prime Contractor will have a Senior Advisor/Team Leader in Amman, Jordan for the duration of the project. This Prime Contractor Team Leader will report to the Project Officer and to the WEA Director.

In addition to this day-to-day monitoring, several other monitoring activities will be instituted:

- a. Life of Project (LOP) and Annual Work Plans: The LOP work plan for each component will be prepared by the contractor within the first three months after signing the contract. These Work Plans will include specific benchmarks and will be approved by the GOJ and USAID, and will be the basis for monitoring performance and accomplishment.
- b. Quarterly Progress Reports: Brief tabular reports on activities, progress, issues and planned activities for the next quarter will be delivered to the Project Officer and GOJ Project Coordinator.
- c. Project Activity Completion Reports (PCR): The Prime Contractor will prepare and deliver to the Project Officer and Project Coordinator a PCR within thirty (30) days of completion of major project and component activities as identified in the LOP and Annual Work Plans.
- d. Other routine monitoring activities: The Project Officer will work with the Prime Contractor and MWI to develop and deliver specific progress reports which will assist him/her and the GOJ to assess progress and accomplishments.

(5) SUMMARIES OF ANALYSIS

A. Technical:

Among the four components there is a wide range of activities focusing on a variety of technical subjects. Because of this, it is impossible to technically assess the project as a whole; rather the individual components are assessed separately for technical feasibility. The details are presented in Appendix F.1.

In general terms there are two purposes of this section: to determine that what is proposed is technically feasible and that the proposed action is the best alternative. Some of the subcomponents had no technical elements--such as human resources development, public awareness--and therefore were only briefly mentioned. Two subcomponents address subjects where the technical outcome cannot be predicted--water recharge and conveyance system--and therefore the action being taken are feasibility studies to determine technically and economically the best action to take, if any. The upgrading of the waste water treatment facility is technically straight forward process, but determining the best alternative is a very complex and technically sophisticated process which has been and still is a task being carried out by Engineering Sciences, Inc. The PP Design Team studied the available documentation, made site visits and talked with water, health, agricultural and other specialists to seek information to determine if there were any problems in the approach being recommended. The other subcomponents involve technical processes--such as upgrading the monitoring laboratory and irrigation management--which are very straight forward, with no real alternatives to consider, and present no problems, technically speaking, in implementation. Several of the subcomponents may technically be straight forward, but other factors--particularly institutional and management issues--make their successful implementation difficult.

The analysis is broken down by project component:

1. Water Resources Monitoring and Management

1.a. Establishing MWI Policy and Planning Unit:

There are no technical elements to this subcomponent nor are their any technical constraints.

1.b. Water Management Information System:

This subcomponent relies upon technical inputs from other components of this project to provide information to policy makers, managers, technical personnel, non-governmental organizations and the general public. This subcomponent thus has no technical constraints other than those which may effect the flow of information to it.

1.c. Strengthening Field Data Collection:

Further clarification is needed on precisely who is responsible for which aspects of the Kingdom's water quality monitoring program. The levels of competence, sample collection procedures, maintaining the integrity of the samples, registering them at the appropriate laboratory, and performing the required analyses within standard procedures as to time and methodology can be more effectively addressed when the institutional responsibilities are clarified.

Two years ago, WAJ was sampling about 20 to 25 industries, and they are now sampling over 110 industries. The intended frequency of sampling of industries is once every 2 weeks but MWI is falling behind in number and frequency of samples, and the number of parameters on each sample. The governorates of Amman and Zarqa collect and bring to the Central Laboratory a number of the samples for analysis. However the procedures of correctly taking and preserving the samples is believed to less than adequately controlled.

Jordan has the basic laws in place, and ready access to the WHO and USEPA standards. The thrust of the current problem is in the uneven or lacking enforcement of those applicable laws as they relate to water supply, pollution prevention, and waste water management measures. The problem with this component is not technical, which is a very straight forward issue to address. However, the institutional and human resources aspects must be addressed (which they are in the project).

1.d. Upgrading MWI Laboratory:

The WAJ Central Laboratory is the primary laboratory with MWI and carries a commensurate workload. It is headed by a capable director with limited number and under-trained staff, and the lack of critical modern equipment. This laboratory cannot cope with the present demands, much less respond in a satisfactory manner to anticipated future work loads.

The Central Laboratory has 65 persons divided into various departments including: the Monitoring Department; the Information Section (which logs in all samples and distributes these to the respective laboratories); the Chemical Laboratory which is divided into the Inorganics and Organic Sections; the Bacteriological Laboratory divided into the Biochemical and Biological Sections; and the Isotopes Laboratory. The Central Laboratory conducts analyses (but many times cannot because of shortage of money, manpower and training), for samples incoming from across the entire country of Jordan. In April, 1992 around 2,000 samples were analyzed consisting of a total of around 8,325 total parameters. In May, 1992, 785 samples for bacteriological analyses were received from some 113 different sources.

The GOJ has not been able to adequately fund the laboratory especially in the way of equipment and instrumentation, and furthermore there has been the absence of donors for this necessary work. The Laboratory has equipment which is quite outdated and old, some was no longer functioning, and the lab lacks some critical instrumentation and equipment. Procedures needed to be updated in a number of areas and training was very much necessary throughout the laboratory. The Biochemical Laboratory was housed in a non-insulated, temporary outlying building which had extremely cramped space for the 7 persons inside. The Organics Laboratory does not have the capability to run the range of volatile or purgeable organics, base-neutral organics, acids organics, pesticides and PCB's which are on EPA's priority pollutant list.

Due to the level of staff training and inadequacies in equipment, the WAJ Central Laboratory cannot now consistently meet the analytical standards required under Jordanian laws or comparable standards set by WHO or the USEPA. Specific training and equipment needed are described in detail in Appendix F.1.

1.e. Groundwater/Aquifer Recharge Studies:

Water resources available to Jordan are limited by geography and precipitation. Most of the surface water base flow has been developed for agriculture, municipal, or industrial use. There is still water which could be developed with additional storage. This subcomponent looks at the groundwater aquifers as opportunities for storage of storm waters not now captured and adequately treated waste water for recharge into such aquifers.

Possible methodology includes injection wells and infiltration galleries. The latter have been in use in the Middle East from at least 2000 B.C. while the former represents modern technologic advances.

This subcomponent calls for field examinations to identify potential sites and the selective testing of those sites to verify both capacity and recoverability of invested water. The recommended step is the approval of a feasibility study with terms of reference applicable to the objective and to Jordan's geology and excess water opportunities. No technical constraints exist relative to such a study; some may arise as findings of the study.

2. Water Pollution Prevention and Cleanup

2.a Upgrading Waste Water Treatment Facilities:

Effluent from the As-Samra WWTP is the single most important facility affecting surface water and ground water and the quality of these water resources, especially in the Zarqa river basin. The As-Samra WWTP provides treatment of large quantities of domestic waste water, and to a lesser extent, industrial and commercial waste waters. As compared to its design, the As-Samra WWTP is currently greatly overloaded hydraulically, organically (as measured by BOD), and with respect to solids. The WWTP effluent has high BOD, TSS, and COD levels, and fecal coliform counts.

Obnoxious and dangerous hydrogen sulfide odors emanate as a result of the anaerobic conditions in the sewer-siphon, the inlet works at As-Samra, and the WWTP lagoons. The As-Samra effluent does not meet the criteria under which the WWTP was designed, the standards for discharge under Jordan Law, and the standards of the World Health Organization (WHO). The partially treated discharge from As-Samra has the potential for causing high risk to the health, safety and welfare of the citizens of Jordan; has created use restrictions for agricultural products grown; and is adding significant pollution to the ground water aquifers of the Region. Reuse of the As-Samra treated sewage is necessary.

Major sources of information for this subcomponent review include the Engineering Science, Inc. (ES) reports of January, 1992 and April, 1992 on As-Samra, respectively the Draft Conceptual Report and Survey of the Existing Systems; observations of the As-Samra site, discussions with the superintendent of the WWTP, and discussions with others in MWI and outside organizations. The PP Design Team was restricted to the information that was available and found it necessary to assume that the directions, conclusions, and selection of alternatives were correct. Cross-checking was not possible. The USAID project must cross-correlate and validate the process when the feasibility study and design study reports are presented. However, nothing in the information available indicated that the conclusions related to this subcomponent from the survey and conceptual reports were faulty.

The USAID project dealing with As-Samra focuses on the short-term or almost emergency steps that should be taken in the next 1 to 5 years to ensure there is not an almost complete breakdown of the Amman-Zarqa/As-Samra waste water treatment system. This component is being done in an attempt to avert a crisis situation that could occur in human health and welfare over the short term, and provide some breathing room for Amman-Zarqa to cope with their enormous sewage treatment needs by the Year 2005. The USAID project is a relatively small part of the overall project being proposed: the full-scale rehabilitation of the waste

water treatment facilities for the year 2005. The USAID action is absolutely critical to address immediate problems with the facility and will buy time to allow the long-term action to be successfully done. The USAID monies represent \$9.5 million out of an estimated total of \$67 million for the full 2005 As-Samra expansion project.

The As-Samra project should not be considered in isolation. The Amman slaughterhouse should be required to completely collect all the blood and offal generated by its operations, and virtually none should be allowed entry to the sewer. The removal of illegal sewer connections should be enforced. The effect of salts passing through the WWTP and impact on downstream users should be included. Also, the treated waste waters of As-Samra should be considered as a valuable resource and be included in any comprehensive plans that may be developed regarding water reuse in the future.

2.b. Industrial Waste Water Discharge Prevention:

At present, there are approximately 93 industrial installations within the Zarqa River Basin. Forty-four of these discharge directly to receiving waters of the basin. This practice must be stopped; either through connection to the treatment facility or by adequate, approved in-plant treatment.

There are five major impediments which restrict industry's ability to address and solve their part of the water pollution problem. These include:

- a lack of knowledge, skill and experience necessary to define, prevent and resolve pollution problems;
- a limited private sector capability to provide pollution related consulting, equipment or practical services to industry;
- a lack of examples of thorough and responsible leadership in industrial pollution prevention and control;
- limited funds and very restricted financing options available to either industry or environmental services business;
- a lack of routine monitoring, regulation and enforcement of waste water discharge requirements.

This subcomponent addresses these issues through a plan of action which encourages the progressive involvement of the private sector while recognizing the role for GOJ in protecting the water resources of Jordan. It includes a financing element intended to be seed-money for purchases of equipment and expertise.

While there are many institutional, enforcement, financial, and manageable issues which this subcomponent must successfully address, there are no unusual technical constraints to its implementation as the audits and other technical actions are constantly being done throughout the world.

3. Irrigation Water Management

3.a. Improve Water Conveyance System:

Water is released from the King Talal Dam and flows down the Zarqa River channel 13 Kilometers to the diversion weir above Deir Alla where a portion of the water is diverted into two pipelines. These two pipelines transmit their flows into the Jordan Valley for irrigation use. Losses in the river channel and the presence of saline springs tends to reduce the available water and increase its salinity. This subcomponent addresses both the loss and quality degradation aspects and their options for solution. Losses between King Talal dam and the Deir Alla diversion dam are reported to be in the range of 10-20 percent. Some of the flow accretions in this reach of the river are from saline springs which increase the salinity of the river flows--the exact amount is unknown.

Installing a pipeline from KTD to the Zeighan diversion would eliminate the losses due to evaporation and seepage and exclude the inclusion of saline spring flows; however, a pipeline would also exclude the inflows from the watershed between KTD and the Zeighan diversion.

This subcomponent will conduct a feasibility study to identify and quantify the problem--about which little is still known--and determine the best alternative which will resolve this problem, if it can technically and economically be resolved. While there are no technical constraints to carrying out such a study, as it has been done in many countries before, there may be technical problems in solving the problem.

3.b. Irrigation Water Management:

To realize any potential water savings, MWI and the farmers must establish effective communication channels. This will involve MWI staff working with the MOA, farmers associations, private sector organizations dealing with farmers, and other groups.

This subcomponent proposes parallel actions, utilizing existing JVA employees and training them to two new tasks. First, personnel from the planning unit will be trained to develop a popularized version of MWI's technical water budget for the Jordan Valley. This becomes the focus

document for re-establishing farmer committees to meet and discuss what the water supply picture is and how it can be better managed to provide water for their two-crop year.

Second, personnel from the MWI operating unit will be trained to provide Irrigation Management Services (IMS) to the farmers on-farm and other groups. This will include crop-water budgeting, fertilization and weed control practices, and the flow of information on water allocation adequacies and delivery policies.

The major technical constraints are the inertia of MWI to revise its thinking as to the value of active dialogue with farmers, and the lack of any consistent, uniform enforcement of Jordan's water laws. These laws are clear on the points of equal standing among water users and against the unauthorized diversion of water. These provisions must be fairly and swiftly enforced.

Two feasibility studies are also a part of this subcomponent; one will examine the creation of a water user organization (WUO), while the second will consider the parameters of a cost recovery plan relative to irrigation water service.

There are no technical constraints to this component.

4. Water Management Education

4.a. Training/Human Resources Development:

There is no technical aspect to this subcomponent. The new Policy and Planning Unit in MWI intended to conduct an extensive strategic planning exercise which will focus on the roles, responsibilities and missions of the various operating units in the Ministry. This will lead to the preparation of a detailed manpower plan justifying the staffing of each unit. The assessment done for the national water management study and this PP indicated that MWI has too many staff but has the technical expertise to do the job required. The greatest weakness in staffing was managerial. Of course, there is always a need to up-date the technical qualifications of the staff which is the plan for the in-service training program.

4.b. Public Awareness Program:

This component consists of formulating and implementing a program to inform the public of the existing and future water problems facing the Kingdom. The thrust of this program will be to increase the awareness of the people to the part they can play in resolving the quantity and quality problems.

There is no technical constraint in this subcomponent with the exception of testing some proposed water savings devices in the Jordanian setting. Low volume flush toilets are manufactured in Jordan; flow restricters in shower heads should be tested and their availability determined. This subcomponent also includes a study of water use behavior by the general public.

B. Financial:

The project consists of 4 components and 11 subcomponents with an overall--USAID and GOJ--budget of US\$32 million. The USAID budget of \$25 million for the project breaks down as follows: technical assistance, 22 percent; subcontracts, 14 percent; equipment and supplies, 51 percent; training, 2 percent; miscellaneous items such as gasoline and local supplies, 2 percent; and evaluation, audit, and contingency the remaining 9 percent.

The counterpart contribution aggregates to the equivalent of US \$7.2 million and includes about \$400,000 private sector contribution, which is about 23 percent of the total project budget. The GOJ contribution is distributed as follows: personnel, 37 percent; facilities, 13 percent; equipment/operations 30 percent; and other costs, 20 percent.

The Project is financed by a USAID grant of approximately US\$25 million to support the four project components. About one-half of the USAID contribution, \$12.8 million, will be spent on equipment and supplies, mainly \$9.5 million for upgrading the waste water treatment facilities. USAID will also contribute \$5.5 million in technical assistance.

The principal financial concern of this project is the ability of the MWI to pay for parts of the water quality and management project that will require capital expenditures for construction materials, supplies, labor and civil works and equipment associated with upgrade of the waste water treatment plant. The magnitude of these costs will add a substantial burden on the Ministry's current large debt.

A more serious concern, in terms of sustainability, is the annual gap between current expenditures and annual revenues, since the GOJ will contribute \$1.5 million in construction/equipment costs and \$26 million in O&M costs (over the expected 14 year life of the investment) for upgrading the waste water treatment facilities. Neither WAJ nor the Jordan Valley Authority were able to cover their current expenses with annual revenues in 1991, when the WAJ had an annual deficit of JD 37 million on revenues of JD 24 million. Both agencies have recurring annual deficits. High operational costs, exceptionally low water prices, and other reasons account for the serious financial situation at MWI. Neither organization is achieving cost recovery of its operations or capital investments.

Significant opportunities for cost recovery exist in the water quality improvement and conservation project. A project investment period of 14 years is used to analyze debt service and O&M obligations, in order to provide a basis for comparison with other MWI cost analyses. Although USAID is contributing \$9.5 million to the upgrading of the waste water treatment facilities, the MWI should collect not only the amortized cost of GOJ capital contributions to the project, \$1.5 million, and the full cost of O&M, \$26 million, but should also collect charges equal to the USAID contribution for a sinking fund to replace the investment at the end of the investment period.

The results of the financial analysis indicate that annual debt service charges will increase from \$ 0.6 million in year 1, to \$1.3 million in year 2, then remaining constant at \$1.6 million for years 3 through 14. Annual O&M costs rise from \$0.5 million in year 1, to \$1.5 million in year 2, then remaining constant at \$2 million for years 3 through 14. Therefore, total costs will rise from \$1.1 million in year 1, to \$2.8 million in year 2, then remaining constant at \$3.6 million for years 3 through 14, or approximately 10 percent of the WAJ's total revenues in 1991.

On an incremental basis, these costs are a reasonable burden to shift to the waste water producers. Overall, the WAJ will have to raise revenues by more than 150 percent to balance the 1991 operating budget, then anticipate future increases in sewerage charges to offset rapidly rising waste water treatment requirements.

METHODS OF IMPLEMENTATION AND FINANCING

METHOD OF IMPLEMENTATION	METHOD OF FINANCING	APPROXIMATE AMT IN \$000
Technical Assistance		
L.T.	U.S. Contractor-Direct Pay	2,729
S.T.	U.S. Contractor-Direct Pay	2,786
Sub Contractors	U.S. Contractor-Direct Reimb.	3,375
Equipment, Supplies	U.S. Contractor-Direct L/Comm.	12,780
Training	AID Direct Contract - Direct Pay	556
Misc.	Unknown-May be-Direct Reimb.	448
Evaluation	U.S. Contractor-Direct Pay	150
Audit	U.S. Contractor-Direct Pay	150
Contingency	Unknown-will be determined later	2,026

C. Economic:

The waste water treatment plant upgrade component of the project will require \$11.4 million in USAID and GOJ funds over the life of the five year project, plus \$26 million in MWI O&M costs over the project 14 year life of the capital investment, which is the expected life of the aerators and other equipment installed. This component comprises about one-third of the total project budget and has significant potential for cost recovery and contribution to a more effective national water management program.

The economic assessment of the component involves a benefit-costs analysis that incorporates the following major categories of benefits: savings of perishable agricultural products that are threatened by contaminated irrigation with untreated waste water; and savings of medical costs and losses of income from water-borne diseases arising from untreated waste water. In addition a rough assessment is made of the additional irrigation of fruit trees and vines in upland areas made possible by re-use and diversion of the As-Samra effluent. On the cost side, the capital costs of waste water treatment upgrade equipment and associated engineering, and O&M costs associated with efficient operation of the upgraded plants are used.

Technical analyses indicate that five critical areas should be addressed by the waste water treatment upgrade subcomponent:

- improvement of Ain Ghazal headworks,
- a desludging program at the As-Samra plant,
- improvement of As-Samra headworks,
- improvement of As-Samra chlorination facilities,
- installation of approximately 125 aerators at As-Samra.

Important benefits of As-Samra and Ain Ghazal pertain to the main purpose for which the plants were built--health and environmental protection through waste water treatment. A 1981 cholera outbreak in the Zarqa Valley may have been due in part to inadequate waste water treatment. In recent years, water-borne diseases have increased sharply and further increases might take place if the waste water treatment plant upgrade subcomponent of the project is not implemented.

The economic benefits of improved health resulting from the waste water treatment upgrade were estimated under the general assumption that the upgrade will improve waste water quality in the Zarqa Valley to the extent that illnesses arising from serious water-borne contamination will decline.

Without the upgrade, the public health risk of untreated waste water will soon rise to cause \$900,000 in medical treatment costs annually and \$150,000 in lifetime income losses from deaths.

Substantial agricultural losses were incurred during the 1981 cholera outbreak as contaminated irrigation water spread the disease through perishable agricultural commodities and resulted in the quarantine of perishable fresh agricultural products and led to the loss of several JD million in market value. The economic benefits of reduced crop losses resulting from the waste water treatment upgrade were estimated to be at least \$4 million per year.

Other plausible benefits of the upgrade exist, but are not included in this analysis. For example, Jordan's growing tourism industry would be devastated by the outbreak of serious illnesses.

Construction and equipment costs will require about \$11 million over the first three years of the project. After the upgraded facilities reach full operation in the third project year, annual O&M costs are estimated at \$2 million through the next 12 years of the life of the capital investment.

The benefit-cost analysis estimated the internal rate of return to be 18 percent, well above the current social cost of capital. A sensitivity analysis strongly suggests that the net benefits are far greater than estimated in this analysis and support the conclusion that the waste water treatment plant upgrade is a very productive social investment.

While no specific analysis was undertaken of other non-capital components of the project, it is quite common for such investments to produce economic rates of return of 20-100 percent.

D. Social Soundness:

The goal for development and protection of Jordan's water resources is social welfare. While difficult to measure, most actions taken in the development of water resources have social implications.

The themes and motivations for this project come from the supply-demand crisis stated dramatically in A Water Management Study for Jordan. While most points in that report were stated in physical, technical, or economic terms, social concerns stood behind most of them.

Hydrologists point out a stark challenge to social welfare, the over-drafting of groundwater resources. For each two liters of water pumped from the ground, little more than one is replaced by the rains. The need for more and more water for Jordanian people motivates this policy of borrowing against a limited future. It spurs efforts to expand supplies and to limit demand. The level of motivation that justifies the policies stems from strong socioeconomic forces: population growth, low per capita use of water, increasing industrial activity, and pressure for more production from agriculture.

More than half the Kingdom's population lives in the Zarqa Basin, the focus of this project. All the socioeconomic categories are represented. Municipal water usage--which is largely proportional to numbers of people--in the Basin overshadows all the other areas. Jordan's industry--to which the population looks for employment--develops most rapidly in the Amman-Zarqa area. A significant part of all of Jordan's food products grows in the Basin, including those in a middle section of the Jordan Valley irrigated from Basin waters.

The Zarqa River Basin includes an area that falls within five governorates. The social data noted here includes land and people beyond the boundaries of the river basin, simply because the statisticians gather the figures in these cases by governorates.

Still the numbers give substance to the nature and power of factors related to social needs for water.

Population

Governorate	Projected population: in millions			
	1995	2000	2005	2010
Amman	1.9	2.2	2.7	3.1
Zarqa	.6	.8	.9	1.1
Irbid	1.1	1.3	1.5	1.8
Mafraq	.2	.2	.2	.2
Balqa	.3	.4	.4	.5
Jordan total	4.1	4.9	5.7	6.8

Municipal use of water: The present estimate is that Amman residents use 112 liters of water per person per day in normal living. (Residents in the rest of Jordan use less: 92 liters in Zarqa; 88 liters in Irbid; 60 liters in towns between 3,000 and 15,000 population; 48 liters in towns under 3,000.) Jordanians' per capita use of water is one of the lowest in the world--within the region, for example, Turkey uses 125, Tunis 134, and Israel 190 per person. Without an increase in the amount of water available, population growth means a sharp drop in water's contribution to social welfare of people in the Basin. As incomes rise, use of water goes up, which makes the situation more grim. For Jordan as a whole, municipal uses will total about 300 MCM per year by 1995. And then will rise rapidly in following years--to 500 MCM by 2010.

Industrial use of water: Industrialization is increasing in Jordan, especially in the Zarqa Basin. And pressure is on for more rapid growth; the Kingdom needs economic growth for the social benefit of employment for its people, and to provide the goods and services they need. By 2020, industry will need more than double the present amount of water.

Agriculture, the biggest user: Jordan's largest category of water use is for irrigation in agriculture. Much land is not irrigated because of too little water available. Farmers' record on efficiency is good. They have widely adopted the most efficient method, drip irrigation, but some areas still use less efficient methods.

The water management study cited above made clear that, in its water policy, Jordan should (1) use every potential means to add to its supply of water and (2) practice conservation in as many areas as possible to limit the demand. Even then, the report argued, Jordan will find water to be a constraining factor in all areas of economic activity. And the effects will spread socially throughout the Kingdom and its people.

The MWI is a public utility providing water and sewage services to the public, to industry, and to farmers. A concern has been expressed that some functions performed by MWI might better be done by other governmental units, municipalities, or the private sector. MWI has emerged from a number of largely independent organizations that performed specific roles in the water sector. One of the first such bodies was the Jordan River Tributaries Regional Corporation. Others included the Water and Natural Resources Authority, Amman Water and Sewage Authority, and the Water Supply Corporation. Municipalities had their own water and waste water bodies. Most of these bodies were created with donor supported projects. Beginning in the 1980s a series of mergers were begun which eventually resulted in two semi-autonomous bodies--the Water Authority of Jordan (WAJ) which is responsible for municipal and industrial water supplies and waste water; and the Jordan Valley Authority (JVA) which is responsible for irrigation water, municipal and industrial water supply, and other developmental activities in its geographic area. Until 1988 both of these authorities were independent with their own operating procedures and personnel systems.

In early 1988, MWI was created bringing WAJ and JVA under one umbrella. Laws Nos. 18 (Water Authority Law) and 19 (Jordan Valley Development) were enacted creating MWI with a minister who is Chairman of the Board of Directors for WAJ and JVA. However, few other changes were made in the operations and responsibilities of the two authorities. Since the merger, the MWI has been studying the roles and functions of various programs to determine which should be ministry-wide and which should remain with the authorities, and whether to create a new structure integrating the two authorities within the ministry. This process has been intensified while this project paper was being prepared because of the request from the Prime Minister's Office to reorganize all government units. The JVA has been restructured (creating three directorates, each serving a third of the Jordan Valley) and it is expected that WAJ restructuring will be done soon (the PP Design Team was unable to find out what restructuring may be done).

The MWI, and its two Authorities--Water Authority of Jordan (WAJ) and the Jordan Valley Authority (JVA)--have long had experience working with donors and implementing projects. This capability is going to be strengthened as part of this project, through the creation of the Policy and Planning Unit which will serve as a focal point for donor supported projects. At the current time MWI is involved or has in the pipeline more than 60 donor assisted projects. At the current time MWI has a total of 8,646 staff--6,489 in WAJ, 2,152 in JVA, and the remaining in the Minister's office.

This project is providing assistance to create a central Policy and Planning Unit directly under the MWI Minister. This unit, working in close association with WAJ and JVA, is being charged with providing leadership in long-term policy formulation,

strategic planning, international agency liaison (through the MOP), human resources development policies, and overseeing the development and operations of information systems.

The intent of the emerging PPU is to conduct a comprehensive strategic planning exercise covering the entire MWI to focus on roles, responsibilities, management practices and procedures, and organizational structure. This will serve as a base for clarifying many of the institutional issues related to some of the subcomponents--such as the information systems, in-service training and monitoring. It will serve as a base for a follow up action of developing a manpower plan and eventually--as part of the project implementation plan--a master training plan.

The A Water Management Study report goes into detail on the current organizational structure and management problems which MWI faces, many due to the complex series of mergers. The study makes it clear that the team, as outsiders, could not prescribe specific changes of organizational structure or a management system. These types of changes must fit the specific situation in the country and particularly the cultural, political, and social factors. Therefore, that report and this PP focus on a process which GOJ and associated agencies can follow in making decisions to change and strengthen the institutions and management systems to best serve Jordan's water sector. The senior management of MWI agree that organizational structural and management system changes are needed to achieve more efficient and economic services to consumers of water. The creation of the PPU is one step on the part of MWI in introducing these changes. Many of the project subcomponents--such as the PPU, information systems, NRD and irrigation management--have a primary focus on helping MWI make significant organizational and managerial changes. Given the approach being taken, it is impossible to predict with precision what the new system will be, but the impact should be measurable.

The Ministry of Water and Irrigation, through its new Policy and Planning Unit, is the overall implementing agency for the project. However, specific project components will be assigned to appropriate MWI units, and in two cases with outside organizations:

- 1.a. Establishing MWI Policy and Planning Unit (PPU) -- The MWI PPU will be the counterpart for this component and the entire project. A Project Coordinator will be designated by MWI and the Primary Contractor will provide a Senior Water Management Advisor and Team Leader. Both will be housed in the PPU.
- 1.b. Water Management Information -- The exact location of this program will have to be resolved during the early stages of the project. The PPU will appoint an Information Systems Coordinator who will oversee the development of this program. It is not anticipated that this program will become part of PPU.

- 1.c. Monitoring--Field Data Collection -- The implementing agency for this component will be MWI/WAJ through its Central Laboratory.
- 1.d. Monitoring--Upgrading MWI Laboratory -- The implementing agency for this component is also the MWI/WAJ Central Laboratory. The project subcomponent will also facilitate linkages with the MMRAE Department of Environment (DE) as both units will be involved in monitoring and enforcement activities. Links will also be maintained with RSS and University of Jordan laboratories.
- 1.e. Groundwater Recharge/Aquifer Studies -- MWI will be the implementing agency with both WAJ and JVA involved.
- 2.a. Upgrading Waste Water Treatment Facilities -- The operations of the As-Samra and Ain Ghazal are under the Central Operations Department of WAJ; A waste water engineer supervises the As-Samra facility and its 38 employees.
- 2.b. Industrial and Private Sector Pollution Prevention Management -- This component will be managed by the project contractor in association with Amman Chamber of Industries. A component steering committee will be established to help guide the activities. It is intended by the end of the project that either the Chamber or some other suitable agency will take over the functions included in this component.
- 3.a. Improving the Water Conveyance System -- The MWI/JVA will be the implementing agency for this component. JVA has long experience in construction projects. It is not currently clear which unit within JVA will be responsible for this subcomponent because of recent reorganization and the actual roles and responsibilities are currently being worked out.
- 3.b. Irrigation Management -- MWI through JVA will be the focal point for this component. However, the overall goal of this component is to facilitate communication between JVA and farmers by working closely with MOA, farmers associations, agribusinesses, NGOs, and other groups who are working with farmers. The component will also study the feasibility of establishing a Water Users Organization (WUO).
- 4.a. Training/Human Resources Development -- The PPU will appoint a HRD Coordinator who will provide the oversight for this component. The in-service training element will be with the Training Center, which is currently located in WAJ. The exact location of the Center will be worked out during the project, so that it will serve the entire ministry. It is not expected

that the Training Center will be part of PPU (which is a policy unit, not operations).

- 4.b. Public Awareness -- This component will be subcontracted to a Jordanian NGO. Advisory assistance, training and equipment will be provided to the NGO so that it will be able to continue the public awareness program after the project is completed. The NGO will maintain liaison with MWI, especially the PPU Information Systems Coordinator and the new information unit.

While the administrative structure for the project is complex, the implementing units are carefully selected and are capable of successfully carrying out the activities envisioned. The PPU will provide the focal point for this project and the programs initiated or strengthened by this project.

F. Environmental Considerations:

The project components are: (1) Water resources monitoring and management; (2) Water pollution prevention and clean up; (3) Irrigation water management; and (4) Water management education.

Some of the grant funds provided by AID (approximately \$13 million) will be used to finance technical assistance, training, computers, laboratory and water quality monitoring equipment, audio-visual equipment, reports and publication. These items are categorically excluded from detailed environmental procedure under Section 216.2(c)(2)(i) and (iii), Regulation 16. The Bureau Environmental Coordinator has concurred with the recommendation that the above mentioned components of the project are categorically exempted from environmental review.

Another part of the grant fund (approximately \$10 million) will be used to finance the upgrading of the As-Samra Wastewater treatment facilities, and associated systems, including the Ain Ghazal headworks under component 2. This project activity will have beneficial environmental impact on the existing hydraulically and biologically overloaded facilities. The upgrading of As-Samra Wastewater Treatment Plant and Ain Ghazal headwork is in itself an immediate measure to mitigate the existing adverse public health situation caused by the overloaded conditions of the existing treatment facilities. The upgrading will reduce odors, improve the biological parameters of the effluent and provide safe disposal of the sludge and protect public health. However it will increase energy consumption.

Engineering Science Inc. (ES) prepared an environmental scoping statement for this project component. NE/DR reviewed the environmental scoping statement and found it complete in outlining the issues which have been addressed in the draft environmental assessment prepared by ES. The environmental scoping statement identified potentially significant concerns: Maintenance and protection of public health, protection of

surface and groundwater, sludge disposal, improvement of water quality of King Talal Reservoir (KTR), control and minimization of metals, salts, boron and foam causing chemicals in the effluent, preservation and protection of antiquities, conservation of water and power, reduction of risks and protection of biotic resources and many others.

The mission prepared an Initial Environmental Examination to this project component and determined that a full environmental Assessment should be prepared for the upgrading of As-Samra and Ain-Ghazal plant. This IEE is contained in Annex G. CDM under its current AID contract, is required to review the environmental assessment prepared by ES and to prepare a separate environmental assessment report to cover the short term emergency program, design the system to minimize potential environmental issues.

The remaining funds (approximately \$2 million) will be used to conduct a feasibility study/design for improving the water conveyance system from King Talal Reservoir (KTR) to the irrigation system down stream under component 3. This activity will reduce water losses caused by evaporation and seepage, decrease water salinity caused by saline water springs, and it might help in generating power by the system. It may have negative environmental impact on the ecosystem of Zarga River down stream of KTR. The Mission prepared an IEE to this activity and determined that an environmental assessment will be prepared as an integral part of the feasibility study. This IEE is contained in Annex G.

G. Women in Development:

While the project is not directed specifically towards women, its impact on the population at large is great in terms of health and water quality improvement benefits, particularly for women and their families. Approximately 10-15 percent of the trainees will be women in the project. Consultants will make special effort to give in-service training to women.

Although the number of women in the agricultural work force in the Zarga triangle is small, these women will also be direct beneficiaries of improved irrigation water practices. The public awareness campaign will have a major focus directed at women with the purpose being increased conservation and efficient use of water in their homes.

(6) CONDITIONS AND COVENANTS

A. Conditions Precedent to Initial Disbursement

Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

1. An opinion of counsel acceptable to A.I.D. that the Project Agreement has been duly authorized and/or ratified by, and executed on behalf of the Grantee, and that it constitutes a legally binding obligation of the Grantee in accordance with all its terms.
2. A statement of the name of the person holding or acting in the office of the Grantee specified in the Project Agreement, and of the full-time Project Coordinator with delegated authority as MWI representative for all implementation activities, and of any additional representatives, together with a specimen signature of each person.

B. Conditions Precedent to Disbursement for the As-Samra Wastewater Treatment Plant

Prior to any disbursement under the Grant (including the initial disbursement) for the As-Samra Wastewater Treatment Plant (WWTP), or to the issuance of documentation pursuant to which such disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D. The conditions precedent set forth in this paragraph c. shall not apply to disbursements for technical assistance for the As-Samra Wastewater Treatment Plant.:

1. an organization statement for the MWI Policy and Planning Unit;
2. evidence that a director for the MWI Policy and Planning Unit has been appointed;
3. evidence that the MWI has budgeted for the start-up, staffing, and operations of the MWI Policy and Planning Unit; and
4. a detailed time-phased Implementation Plan that the GOJ will use to ensure that appropriate mechanisms be put into place for the Amman slaughterhouse to collect the blood and offal generated by its operations.

C. Covenants:

The GOJ to:

1. Provide the electricity, civil works, and operations and maintenance required for the upgrading of the As-Samra WWTP.
2. Establish, staff, and provide the core operation budget for the MWI Policy and Planning Unit.
3. Take action on cost recovery as agreed upon jointly with the World Bank and IMF.

4. Implement the Implementation Plan for the Amman slaughterhouse to collect the blood and offal generated by its operations.

(7) EVALUATION AND AUDIT ARRANGEMENTS

The GOJ and USAID agree to establish an Evaluation Program as an integral part of this Project, which will include two formal external evaluations of the Project. These evaluations will be performed with the participation of USAID, GOJ, and implementing agencies with the support of external short-term consultants. The formal evaluations in the second quarter of year three of the Project and on the second quarter of year five (the final evaluation).

The baseline undertaken in the early years of the project will provide comparison data for the formal evaluations, supplemented by additional information gathered from periodic monitoring of project implementation and assessments of performance of individual components.

The first formal evaluation will assess the course of the Project and compare actual project accomplishments to statements of anticipated achievements contained in the PP and the project work plans. The evaluation will recommend revisions of emphasis in the Project and future orientation of project efforts. It will also make recommendations as to how to overcome obstacles to effective implementation.

The final evaluation will sum up what the Project has accomplished over its lifetime and will provide the GOJ and USAID with information and recommendations to assist in decisions about future activities in the water sector.

The Project budget includes funding for annual audits of project finances. The USAID Controller's Office will supervise and use the audits to ensure conformity with sound fiscal management practices.

The Mission will complement the audits and evaluations noted above with periodic Project reviews chaired by the Mission Director or his/her designee.