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The Hashemite Kingdom of Jordan
Water Sector Review Update
Main Report

February 15, 2001

Rural Development, Water and Environment Group &
Infrastructure Development Group
Middle East and North Africa Region

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CURRENCY EQUIVALENTS

Currency Unit: Jordanian Dinar (JD) = 1,000 fils
Exchange Rate: February 15, 2001: JD 0.7 = US$1

WEIGHTS AND MEASURES

The metric system is used throughout this report.

ABBREVIATIONS AND ACRONYMS

BOT	Build-Operate-Transfer
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
GOJ	Government of Jordan
JD	Jordanian Dinars
JVA	Jordan Valley Authority
KAC	King Abdallah Canal
KTR	King Talal Reservoir
M&I	Municipal and Industrial
MCM	Million Cubic Meters
MOH	Ministry of Health
MOP	Ministry of Planning
MOWI	Ministry of Water and Irrigation
O&M	Operation and Maintenance
PSP	Private Sector Participation
SR97	Water Sector Review, 1997
WAJ	Water Authority of Jordan

FISCAL YEAR

January 1 - December 31

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THE HASHEMITE KINGDOM OF JORDAN

WATER SECTOR REVIEW UPDATE

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Foreword

In 2000, the Ministry of Water and Irrigation of the Hashemite Kingdom of Jordan invited the Bank to assist the government in updating the Water Sector Review (1997) to be then used to prepare a five-year action plan and investment program.

This Report presents the summary findings of the Update work carried out in 2000. Two missions specific to the Update were carried out in February and September 2000. In addition, the Update Team members continued their dialogue and communication throughout 2000 by mail and by meetings during other project missions in Jordan. Six Discussion Papers on agreed themes provided the background and basis for the dialogue and discussions: (i) Water balance and investment program; (ii) Groundwater management; (iii) Water quality management; (iv) Jordan Valley Authority; (v) Urban water and sanitation sector - A financial perspective; and (vi) Regulatory reform.

A team of more than a dozen experts ably led by H.E. Dr. Hazim El Naser, Secretary general, MOWI worked as an active counterpart team under the auspices of H.E. Dr Kamal Mahadin, former Minister of Water and Irrigation and H.E. Eng. Hatim Al Halawani, current Minister of Water and Irrigation. The counterpart team's unstinting cooperation and dedication are acknowledged with appreciation. For this, and for his personal contributions, H.E. Dr. Hazim El Naser deserves special recognition. The Ministers' interest offered motivation and support for the Update exercise. The participation of senior officers of the Ministries of Planning and Finance in reviewing the Update is also recognized with appreciation.

The Update task was carried out by a joint Water/Rural Development and Infrastructure Department team within the Bank's MNA region. Salah Darghouth and Jamal Saghir, Sector Managers provided valuable guidance and active support throughout the exercise. The team is grateful to Inder Sud, Country Director, Jean-Claude Villiard and Doris Koehn, Sector Directors for their whole-hearted support to the task. Messrs/Mme. Walter Stottman, Jan Janssen, Fernando Gonzales, Karin Kemper, and Vahid Alavian provided valuable peer reviews and comments.

THE HASHEMITE KINGDOM OF JORDAN
WATER SECTOR REVIEW UPDATE

MAIN REPORT

I. INTRODUCTION

1. The Ministry of Water and Irrigation (MOWI), Hashemite Kingdom of Jordan, invited the Bank to assist in updating the Water Sector Review of 1997 as an input into the formulation of a five-year action plan for the water sector. In response, the Bank's Team:

(i) prepared a set of six Discussion Papers on selected themes jointly agreed upon between the Bank and the MOWI. These Discussion Papers are on: (1) Water Balance and Investment Program; (2) Groundwater Management; (3) Water Quality; (4) Jordan Valley Authority; (5) Urban W&S Utility Sector-- A Financial Perspective; and (6) Considerations for Regulatory reforms in the Urban W&S Sector.[1]

(ii) carried out extensive discussions on the papers with key officials of MOWI. In addition, Discussion Paper 5 on Urban Utility was reviewed and discussed with the Ministry of Finance;

(iii) finally prepared this Main Report based on the salient conclusions of the Discussion Papers.

Throughout the Update process, the emphasis was on a participatory review of experiences in the water sector and identification of emerging issues since the Water Sector Review, Report No. 17095-JO, October 15, 1997 (SR97).

2. There has been significant progress in implementation of policy reforms following SR97. Progress was achieved despite severe drought, a wavering economic environment, especially in the recent past, and continuing political uncertainty in the region on water issues. Yet much remains to be done in the sector, and there is little room for complacency. In sum, Jordan faces three critical challenges:

The Resource Challenge

Despite ongoing projects and plans to mobilize additional water resources, current projections of water balance are that the neck-and-neck race between supply and requirements will continue. Policies and practice with respect to irrigated agriculture are crucial, given the national priority accorded to requirements of drinking water and environmental uses such as leaching. Capping expansion of irrigation and improving efficiency of water use in agriculture will be a high priority. Current efforts to enhance the operating efficiency of urban water supply through the Amman management contract should be expanded and strengthened.

The challenge of water deficits is compounded by the need to ensure water quality and environmental protection. Thus the laudable initiatives to reduce groundwater abstraction in the

[1] The circulation of the discussion papers is limited. They are thus not included in this Water Sector Review Update.

highlands in terms of permits, metering, and volumetric pricing should be consolidated and strengthened through enabling legal provisions and user participation in monitoring and management.

In addition to the efforts at increasing wastewater treatment capacity, a systematic action plan for reuse of treated wastewater needs to be formulated in view of the projected increase in the quantity of treated wastewater available for use in the JordanValley. Such a plan will include public information campaigns, integration of quality parameters in the water management system in the Valley, institutional strengthening for water quality management, and investigation of alternatives for distribution of treated wastewater in the Valley.

The Financial Challenge

Concerted measures have been taken to mobilize funding for new investments. These measures are beginning to bear fruit (Al Wahdeh dam; Al Samra treatment plant), yet several investment proposals are at discussion or negotiation stage. In view of the significant size of investment needs (up to 5 per cent of GDP in some years), and the pace of mobilization of donors and investments, Jordan will have to redouble its efforts at generating significant additional operating income from drinking water supply and irrigation services. Urban water and irrigation tariffs have not increased since 1997. Urgent action is needed on tariffs to ensure full recovery of operating costs and periodic adjustments for inflation. Successful initiatives in reducing unaccounted-for-water and improving efficiencies should be continued and replicated in other governorates. Self-financing of water supply and irrigation services must be a high priority.

The Institutional Challenge

Improving the management of water services is a strategic necessity in facing the above resource and financial challenges. Globally, reliable services trigger higher levels of customer satisfaction and tariff payments. In this regard, private sector participation (PSP) in Amman's water management has been the single most radical reform program attempted in the sector. Broadening and deepening PSP in Amman and in other cities is the next challenge. Alongside, consideration of options for strengthening regulatory measures is critical. Reforming WAJ and JVA to focus on essential strategic and bulk water management tasks while divesting retail water services to user or private sector entities is a high priority. Thus, user and private sector participation in the management of irrigation services must be promoted to enhance accountability and reliability of services.

These observations are elaborated in the following sections in terms of (i) The Resource Challenge; (ii) The Financing Challenge; and (iii) The Institutional Challenge.

II. THE RESOURCE CHALLENGE: KEEPING UP WITH DEMAND

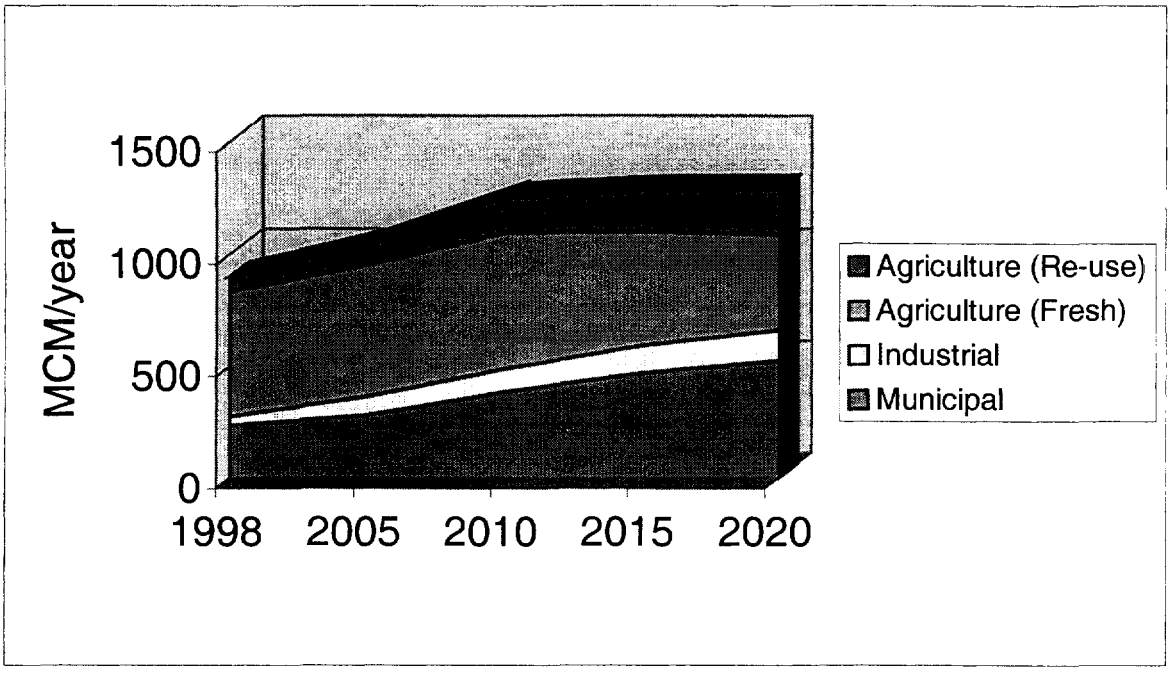
3. SR97 recommended a comprehensive Master Plan for water and wastewater. It emphasized the need for a focus on augmentation of M&I supplies in view of the rising urban demand and a consolidated program of priority investment projects to achieve such augmentation. MOWI has initiated a Master Plan exercise with assistance from GTZ and JICA. Despite the difficult drought years, MOWI has pursued a number of strategies to add to urban supplies, and several of the projects are still under design, contracting, or construction. Their impact will be felt only in the next 3 to 5 years. However, these additional supplies will not be able to keep pace with increasing requirements. Indeed, estimates done for the present report indicate that, even under the best of assumptions, efforts to increase supply will be in a neck-to-neck race with increasing requirements and will fall short of them throughout the period from now to 2020. The implications are that, MOWI must relentlessly pursue planned investment projects, and focus, at the same time, on efficiency improvements that will help water conservation.

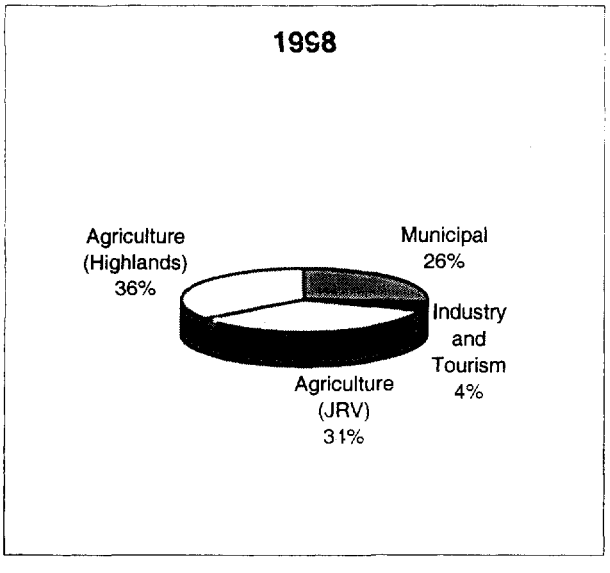
Demand-Supply Balance: A Tight Race

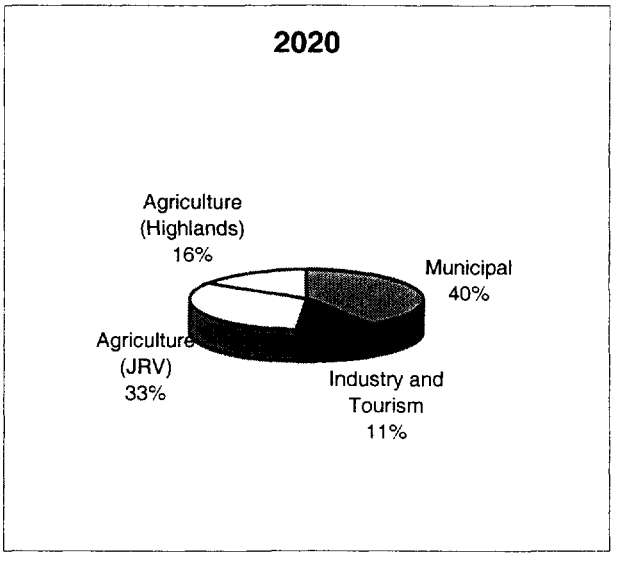
4. MOWI and Bank staff have jointly developed and calibrated a model projecting future water requirements and water supply in Jordan until 2020. The model indicates that requirements will continue to increase due to increasing population, including the impact of past refugee inflows into the country, rising living standards, an expected strong increase in industrial water use, and an increase towards the targeted cropping intensity and area in the Jordan Valley. In the model "water requirements" is defined as the amount of water needed, based on target levels for per capita water use, irrigated area and cropping intensity determined by planners. Requirements are different from demand, which is an economic concept and whose level is determined by price. "Water Supply " is defined as the actual amount of water delivered for use, which may be lower than requirements, and which may be higher or lower than the renewable groundwater and surface water availability. The future water supply figures in the model are linked to the investment timing projected in the Investment Program for the period 2000-2010 as well as to estimates about further investments thereafter. As will be detailed further below, delays in the Investment Program would reduce the projected supply figures calculated in the model. All tables and figures on water requirements and water supply shown below are derived from the base case of the model based on the timely implementation of the Investment Program.

5. In Jordan, total supplies are estimated to increase from 898 MCM in 1998 to 1,287 MCM in 2020 (Figures 1, 2 and 3 and Table 1), based on the assumption that all projects included in the Investment Program 2000-2010 will be implemented without delays (See Discussion Paper 1a: Investment Program). The increase in total actual water supply would be for municipal and industrial (M&I) use, which is expected to more than double from 275 MCM in 1998 to 660 MCM in 2020. Its relative share would increase from 30 percent of total water use in 1998 to 52 percent in 2020.

Figure 1: Projected Water Supply in Jordan by Sectors 1998-2020







Figures 2 and 3: Water Supply in Jordan by Sectors in 1998 and 2020

Table 1: Summary of Water Supply (MCM/year)

Year	M&I Supply	Agriculture Supply	Total Supply
1998	275	623	898
2005	363	679	1042
2010	486	764	1250
2015	589	693	1283
2020	660	627	1287

As shown in Table 2, the increased net supply for M&I uses of 193 MCM/year until 2010 and 380 MCM/year until 2020 would be made possible by:

- tapping the Disi aquifer for Amman;
- exchanges of freshwater from the Yarmouk River as well as from wadis and springs against treated wastewater between Highland cities and agriculture (about 136 MCM/year until 2020);
- additional water from the Wahdeh Dam and the Wadi Mujib transferred directly for M&I use (about 50 MCM/year until 2020);
- the Wadi Mujib dam and conveyor;
- the Al-Wehdah dam;
- brackish water desalination in Hisban/Zara Main;
- additional water expected to become available under the Peace Treaty;
- additional water from rehabilitation and system improvements in Greater Amman and other cities (not shown in Table 2).

Table 2: Sources for Changes in M&I Bulk Water Supply (MCM/year)

	1998-2010	1998-2020
Disi	75	102
Wadis and Springs (partly used in JRV)	33	88
Yarmouk	34	80
Hisban	30	30
New Peace Water	25	25
Peace Water used in JRV	25	25
Mukhaiba wells (used in JRV)	0	15
Wastewater Reuse by Industry	20	30
Seawater Desalination	5	15
Gross Change	247	410
Groundwater Reduction	-36	-25
Net Change	**211**	**385**

Moreover, wastewater reuse is expected to increase from 67 MCM 1998 to 232 MCM in 2020. Reuse is expected to occur mainly in the Jordan Valley, with some reuse in Highland industry, landscaping and agriculture as well (see Table 5 and Figure 5). In the same period, renewable groundwater abstraction for all uses would be reduced by 122 MCM/year, necessary to reduce/eliminate the current overdraft and to protect Highland aquifers from salinization. Under

the assumption that all projects will be completed as planned, until 2020 the net increase of available supplies by 385 MCM/year would not keep pace with the increase in water requirements by 442 MCM/year (see Table 3).

Table 3: Water Requirements (MCM/year)

Year	M&I Requirements	Agriculture Requirements	Total Requirement
1998	342	863	1205
2005	463	858	1321
2010	533	904	1436
2015	639	897	1536
2020	757	890	1647

6. Against the estimates of total actual water use (1287 MCM in 2020 as shown in Table 1), total water requirements are estimated to increase from 1,205 MCM in 1998 to 1,647 MCM in 2020, as shown in Table 3. The requirements will increase mainly due to increased M&I requirements from 342 MCM to 757 MCM. This increase is triggered by population growth (from 4.7 million in 1998 to an estimated 9.2 million in 2020) and higher municipal water requirements per capita due to higher living standards (from a target of 130 l/c/d in 1998 to a target of 155 l/c/d in 2020). In agriculture, overall water requirements are expected to slightly increase from 863 MCM in 1998 to 890 MCM in 2020. This is mainly due to planned higher cropping intensity in the JRV, an extension of the equipped irrigated area in the JRV to achieve planning targets[2]; planned reduction of the irrigated area in the Highlands and efficiency gains (Discussion Paper 1b: Water Balance).

Table 4: Water Supply and Requirements (MCM/year)

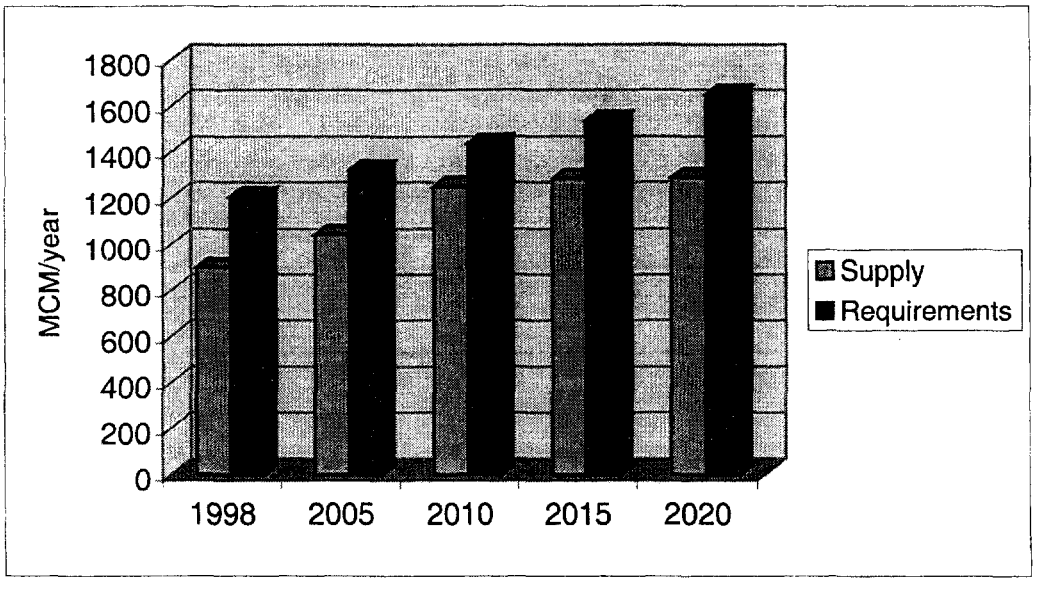
Year	Total Requirements	Total Supply	Deficit
1998	1205	898	-307
2005	1321	1042	-279
2010	1436	1250	-186
2015	1536	1283	-254
2020	1647	1287	-360

7. The difference between supply and requirements is likely to decrease in the current decade, assuming that all planned projects go on stream as conceived. Thereafter, it is expected to increase. Thus, the water deficit in Jordan will continue to be a nagging issue. Furthermore, the assumption that all projects will be implemented as planned may be unrealistic, as donor financing has yet been secured for only about 42 percent of the total volume of the Investment Program and government and private sector financing is unlikely to make up for the remaining gap. If some of the major bulk supply projects mentioned above are delayed, the water deficit is bound to increase beyond the projected values, placing additional stress on all uses. Drinking

[2] SR97 gave in one of its tables a total planned equipped area of 39,000 ha. The planning target had been 42,600 ha, which has been taken into account in the current Sector Review. Whether it is recommendable or not to increase the irrigated area beyond 39,000 ha given the country's precarious water balance is being discussed further below.

water needs will face shortfalls, but since such needs are given top priority in the government's policy, water availability for agricultural use could face the maximum constraints.

Figure 4: Water Balance 1998-2020



Water Use in Irrigation : Towards Maximum Productivity

8. SR97 recommended concerted efforts to improve water use efficiency in irrigated agriculture. Some pilot projects are underway to improve on-farm efficiencies with external assistance (USAID, France, Germany). A project in support of system and on-farm improvements is under preparation for submission to the Bank. However, tariffs were last increased in 1995 from 6 fils/cum (US$0.01/cum) to 15 fils/cum (US$0.02/cum) as part of the Agriculture Sector Adjustment Loan conditions. The goal of O&M cost recovery has yet to be met (more on this in Section III). There remains the crucial question of expected expansion of irrigated area in the Valley, proposed to be capped at 39000 ha in SR97.

9. About 39000 ha are now equipped for irrigated agriculture in the Valley. There have been discussions about maintaining the same size of irrigated area or expansion should water be available. For the time being, the designed cropping intensity of 130 percent has not been reached on the existing equipped area (it is currently about 100 percent) mainly due to lack of water. Expansion of the equipped irrigated area is not only likely to be economically inefficient, but it is also risky in the face of the insecurity of additional supplies and of the likelihood of droughts, during which the water allocation to the existing equipped area has to be reduced. Moreover, such an expansion would be in contradiction with the stated government policy to prioritize municipal and industrial water supply in allocating scarce water resources. Additional supplies are expected to become available as a result of the fulfillment of Israel's obligations under the Peace Treaty, from the Wehdah dam on the Yarmouk River (currently under construction), and from increased treated wastewater flows from Amman and Irbid. However, even the regulated flow of the Yarmouk will be subject to variations between dry and wet years, and its most reliable flow will be allocated to municipal and industrial uses. Moreover, current

allocations for leaching requirements must be maintained to ensure environmental health. The timing of additional supplies from Israel is uncertain. And the expected increased wastewater flow depends on the availability of new bulk supply to urban areas, including mainly the completion of the Disi-Amman conveyor. If any of these new supply projects is delayed, there may not be enough water to attain the designed cropping intensity on the existing equipped area, not to speak of reliable water supplies to newly equipped areas. In sum, any additional water must be made available for M&I (except in cases where this is not physically possible). In such cases, the water could be used for more reliable services for existing areas or for increasing cropping intensity rather than for expansion of irrigated area.

10. A second implication is that SR97's recommendation of improving system and on-farm efficiency continues to be valid today. The overall water distribution system in the Valley is relatively efficient in the order of about 80 percent conveyance efficiency. In order to achieve further efficiencies, user-driven on-farm efficiency improvements (increased "crop per drop"), and pricing/institutional reforms for sustainable irrigation management are critical. The pilot steps taken so far must be consolidated into an integrated program under the proposed Jordan Rift Valley Improvement Project (Discussion Paper 4: JVA).

Groundwater Management : Towards Elimination of Overdraft

11. SR97 recommended reduction in groundwater abstractions and improved water quality monitoring of groundwater. Irrigation use of Disi groundwater was to be reduced. The possibility of a resource tax on resources mined in excess of licenses was to be studied. Results on-the-ground in terms of impact on overdraft are not yet visible, but there have been significant accomplishments with regard to establishment of monitoring and institutional arrangements:

- About 90 per cent of the wells are metered.
- A charge for abstractions of groundwater in excess of licensed amounts had earlier been announced, but current thinking is to charge volumetrically for water for all abstractions, not just abstractions in excess of licensed quantity. The WAJ Law and By-laws are being revised to accommodate these new realities.
- The responsibility for groundwater monitoring has been transferred from WAJ to the Ministry, together with close monitoring of the work of the groundwater inspection field unit.
- A project has been launched with USAID support to identify specific measures for implementing a groundwater management program including stakeholder participation in the Zarqa basin. The project will carry out a socio-economic survey to assess the dependence on groundwater and the social and economic consequences of reduced abstractions.

12. Government policy calls for a massive reduction in abstractions by highlands pumpers. The bulk of the projected reduction in abstraction of renewable groundwater -- by 86 MCM/year until 2010 and by a further 36 MCM/year until 2020 – will have to come from reduced abstraction for Highland agriculture. If this reduction does not materialize, there is a risk of completely losing some aquifers due to almost irreversible salinization of the groundwater stocks. Continued effort at metering, ensuring operational performance of the meters, enforcement of licensed quantities, volumetric tariffs, together with stakeholder participation should be the thrust forward. Lessons from the above Zarqa basin project on socio-economic

strategies with respect to agricultural users should be incorporated into a medium term program of action.

Wastewater Treatment and Reuse: Towards Action On-the-ground

13. SR97 proposed a national program of wastewater treatment and reuse, including specific strategies for both treatment and reuse. A consolidated program of investments for treatment has been formulated for the major cities. Progress in formulating a reuse strategy for urban and agricultural purposes has been relatively slower.

14. The share of treated wastewater reuse in the Valley is projected to increase from 18 per cent in 1998 to about 34 per cent in 2020 and its quantity is projected to increase by 165 MCM/year. In the same period, the capacity for bulk fresh water transfers from the Jordan and Yarmouk Valleys to the Highlands may increase by at least 95 MCM/year through the construction of three new conveyors until 2020. These new conveyors include the Deir Alla-Amman II conveyor (45 MCM/year – under construction), a Wehdah-Irbid carrier (20 MCM/year), and a Zara Main/Mujib carrier (30 MCM/year). Moreover, a "Peace Carrier" with a capacity of up to 60 MCM/year may be built before the year 2010. Under any circumstances, the next decades are bound to witness a substantial amount of fresh water being pumped from the Valley to the Highlands in exchange for a similar quantity of treated wastewater being returned to the Valley. The reason for these two quantities matching each other despite network and other losses will be the import of fossil groundwater from the Disi aquifer to the Greater Amman area. The investment program includes specific proposals for treatment. It is clear that the focus for the next 3 to 5 years will be on close monitoring of the investment program as far as treatment is concerned. At the same time, a strategy for reuse of treated wastewater in agriculture needs to be formulated.

Figure 5: Wastewater and Freshwater Used for Irrigation in the Jordan Rift Valley

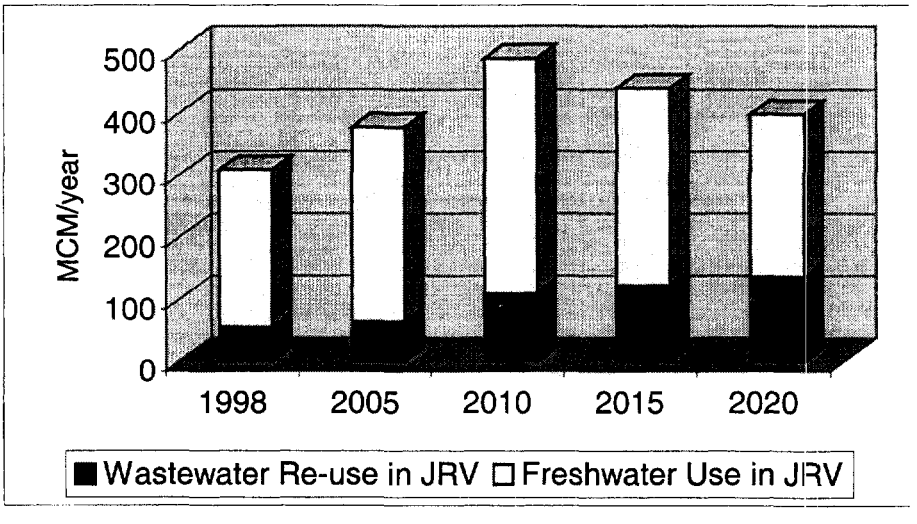


Table 5: Projected Water Re-use in the JRV and the Highlands

	In the Jordan Rift Valley	In Highlands	Total
1998	56	11	67
2005	65	43	108
2010	110	66	176
2015	123	84	207
2020	137	95	232

Water Quality: Towards Consolidation and Integrated Management

15. SR97 recommended a survey of non-pollution sources and monitoring and regulation of on-site sanitation systems. In addition, SR97 urged permits for hazardous waste, upgrading of landfills and control of industrial pollution. EIAs were to be mandatory for all water projects. SR97 drew attention to the disparity in test data of MOWI and MOH and asked for guidelines for irrigation use of marginal water quality. It called for an increase in capacity at the As Samra wastewater treatment plant.

16. There has been progress made since SR97, especially in the last two years. Existing water quality standards have been re-assessed and some joint monitoring mechanisms between MOWI and MOH have been established. External monitoring through the Royal Scientific Society is a welcome measure in quality assurance. Laboratories have been upgraded and an Early Warning System is now in place. A priority five year wastewater treatment investment program has been prepared. The wastewater treatment plant in As Samra is being expanded and modernized with a private sector BOT project. Stricter targets for BOD and total nitrogen will be adopted in the new facility. A Wastewater Policy is in place since 1998, but an Action Plan for reuse of treated wastewater in irrigated agriculture is very much needed. Permits for discharge have been issued to industries, and are being enforced. However, solid waste disposal still needs action and monitoring -- a high level committee is looking at options for disposal sites and landfills.

17. **Water Quality in the Jordan Valley**. Mixing of treated wastewater with freshwater in the King Talal Reservoir (KTR) is expected to improve water quality. While this objective is achieved, the potential for re-contamination downstream of KTR from poor rural sanitation measures remains, because a significant proportion of rural households lacks sewer connections. An environmental assessment to understand and mitigate the impact of current rural sanitation practices in the Valley is recommended. It is also recommended that options for separate delivery of marginal quality water and freshwater for a variety of agricultural and non-agricultural uses throughout the Valley be examined. The separation of the two would allow for distinct distribution and use strategies associated with waters of different quality. Moreover, blending fresh and treated wastewater at the distribution system level reduces the flexibility for farmers to manage the quality of the blend to suit the type of crop at the farm level. There are ongoing studies and pilots (supported by the USAID, GTZ, French Aid, CIDA) to examine options for the on-farm reuse of marginal quality water in the Valley, including salt tolerant crops and on-farm water management practices. These studies and pilots need to be supported and lessons learnt must be used in designing a treated waste water reuse program for the entire Valley. At present, the Wastewater Reuse Policy (1998) calls for unrestricted use of treated

wastewater in agriculture. However, Jordanian standards 893/95 and 202/91 do not support the use of treated wastewater for irrigating crops likely to be eaten raw. Thus, guidelines for reuse of treated wastewater in irrigated agriculture are needed. In sum: a comprehensive Reuse Action Plan for the Valley, incorporating all of the above elements (mixing or separate delivery at distribution level; mixing freshwater and marginal quality water at on-farm level; guidelines for reuse in irrigated agriculture) should be prepared. The preparation and implementation of such a Plan could be supported by the upcoming Jordan Rift Valley Improvement Project. In addition, a rural sanitation program is critical to controlling surface and groundwater pollution.

18. Significant improvements have been made in the management of the King Abdallah Canal water management system. State-of-the art real time operating systems are in use. However, at present, water quality information (e.g., salinity data is available by zones) is not integrated into operations management. To aim for optimal management, it is recommended that water quality data be also integrated with quantity information for management decisions.

19. **Urban Water Quality.** The basic thrust of the government is to continue with the present system of assessment, regulations and enforcement. On the industry side, and as mentioned in para 18, there has been some progress with respect to control of industrial effluent discharge into sewers through permits. However, less than half of the industries discharge wastewater into a municipal sewer. Hence, regulations need to be expanded to cover waste not discharged into sewers. Incentives for adoption of clean production processes need to be examined. As for urban water , storage tanks in households and transport of water through tankers continue to be a source of pollution. Also, regulations and guidelines for drinking water supply through proper use of private tankers and household storage should continue to be strengthened, including through increased public awareness.

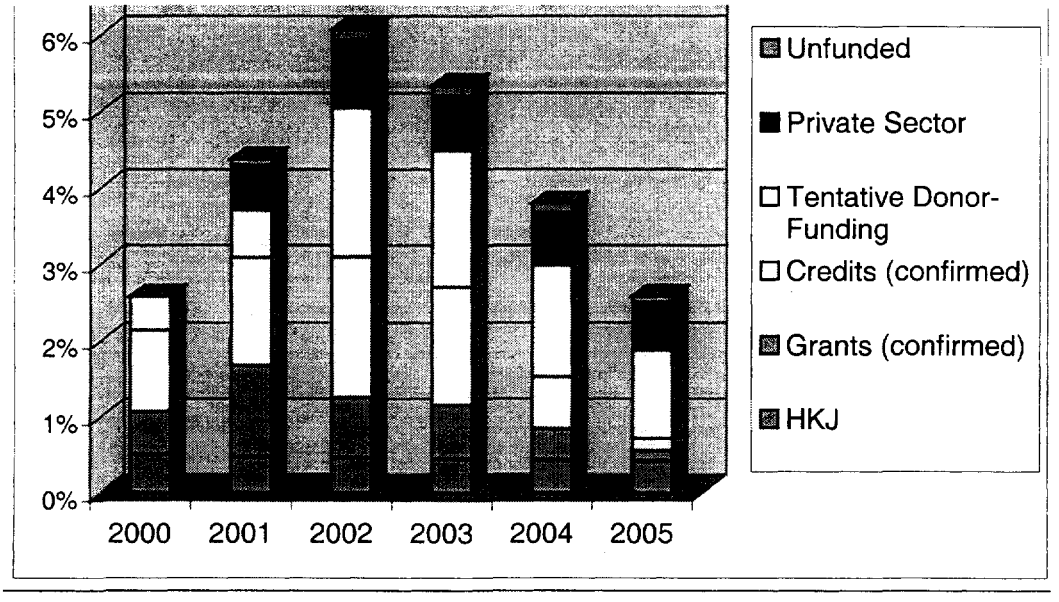
III. THE FINANCING CHALLENGE: THE IMPORTANCE OF GENERATING ADDITIONAL INCOME

20. SR97 proposed that the public investment program be prioritized in favor of M&I and loss reduction interventions across sectors. It also suggested the consolidation of the investment program by focusing on economically justified large projects. By and large, these recommendations have been implemented. In terms of internal financing, SR97 recommended a concerted effort to generate revenues from operations through tariff increases and reduction of subsidies to WAJ and JVA, including automatic annual adjustments to urban water and sewerage tariffs. Although urban water and sanitation tariffs have increased and cover O&M, in general, progress with respect to tariff policy and operating income has been less satisfactory. Hence MOWI needs to redouble efforts in self-financing of urban water supply operations and irrigation services.

Investment Needs

21. A substantial volume of investment is required for planned projects in the next few years, totaling some JD 1.6 billion during 2000-2005 and amounting to a high 4.2 percent of GDP. The expected investment would be front-loaded, accounting for more than 5 percent of GDP in 2002-2003 (Discussion Paper 1b: Investment Program).

Figure 6: Planned Investments in the Jordanian Water Sector 2000-2005
(JD million)



These investment projections are much higher than the level of historic investment in this sector in Jordan (about 2 percent) and the level of investment in comparable countries such as Morocco and Tunisia (about 2 percent as well). Such a high level reflects a concerted response to unusual challenges, such as water scarcity, rugged topography and settlement patterns (most of the population lives in the Central and Northern Highlands, while most water resources are captured in the Jordan and Yarmouk valleys or are stored in the Disi aquifer in the less densely populated South), making it necessary to pump water from the Valley to the highlands and from the South to the North. Given the projections of significant investments in the investment program, annual review and adjustments are critical to ensure that the program reflects current realities on an ongoing basis.

Sources of Financing

22. About 80 percent of the investments is concentrated in urban water and sanitation and reflects government policy to give priority to M&I use, thus following up on a major recommendation in SR97. Donor financing has been secured for about 42 percent of the anticipated projects. An additional 31 percent of funding has been tentatively identified from donors. For the remainder, financing will have to be identified mostly through the private sector, whose contribution is estimated at about 14 percent,and through government funding estimated at 11percent. About 2 percent of the investment program is unfunded with no donors even tentatively identified yet.

23. Investments unlikely to be financed by donors will have to be financed by the private sector, by budgetary transfers and by cash surpluses from tariff revenues. The contribution of the private sector to investment is likely to increase, but investors may wait for the outcomes of the first BOT project in the Jordanian water sector – the Samra wastewater treatment plant – which is just about to be tendered. As for budgetary transfers to the water sector, it is unlikely to

increase due to continuing difficult fiscal situation in Jordan. The only remaining source of finance thus is tariff revenues. However, since the last increase of urban water tariffs in 1997 by 12.5 percent, there has been no further increase, leading to a decline in the real value of water revenues. Sewerage tariffs for Amman and Zarqa have been increased by 12 percent (decree of 12/1999, effective 01/2000). Further action with regard to tariff is clearly indicated as elaborated below.

WAJ: Financial Viability

24. During the last decade, the low level of tariffs has made it impossible for MOWI to come closer to the long-term objective of the Urban Water and Sanitation sector to finance its operating expenses, borrowing and capital investments from its own revenue stream. In fact, WAJ operations have generated annual deficits in excess of JD 35 million (US$50 million) from 1990 and, in the process, have reduced WAJ's net worth from JD 124 million in 1990 to zero in 1995. WAJ's inability to generate sufficient surplus to finance its investment program has resulted in incurring large debt obligations. In 1998, WAJ's long debt was JD 320 million. Overdue interest payments on this debt were also mounting. Total outstanding debt and its overdue interest payments became a big burden on the economy as a whole, representing close to 10 percent of GDP in 1998. This prompted the Government to provide significant direct assistance (of nearly JD 500 million by the year 1999/2000) to bail out WAJ from its debt burden. However, debt relief is not the only resource that the Government has been providing to WAJ. The other transfers include investments and transfers to cover operating shortfalls. Such transfers from the Ministry of Finance averaged JD 40 million per year from 1997 to 1999. The income of WAJ in 1990-99 is shown in Table 6 below (Discussion Paper 5: Urban Water and Sanitation Utility Sector – A Financial Perspective).

Table 6: WAJ Historical Financial Performance (JD 000)

	1990	1992	1995	1997	1998	1999
A. Income Before Depreciation (Operating Revenues less Operating Expenses)	(3,586)	(5,133)	(7,344)	(2,860)	10,310	15,540
B. Net Operating Income (A above less annual depreciation)	(18,965)	(27,465)	(36,797)	(38,900)	(25,860)	(25,281)
C. Net Income (B above less annual interest expenses)	(35,944)	(42,373)	(58,780)	(56,160)	(45,600)	(48,039)
Working Ratio(Operating Expenses/Operating Revenues)	1.17	1.19	1.19	1.06	0.84	0.76
Operating Ratio(Operating Expenses including depreciation/Operating Revenues)	1.89	1.99	1.93	1.79	1.39	1.39

Source: WAJ

25. The level and structure of tariffs, and perhaps even more important, a review of the tariff-setting mechanism, should be a major focus of MOWI during the next two years. The current increasing-block tariff, including changes in 1997 increasing the degree of progressivity, have succeeded in generating additional revenues from large-volume consumers. However, the bulk of medium volume consumers still pays very low water bills that make up only for a small share of their income. This is attributable to a large extent to the current tariff structure. A

revised tariff structure should cover operating costs. According to the Bank, options for a revised tariff structure are:

- Uniform, volumetric pricing with a rebate could succeed in generating higher revenues from a broader range of consumers, while still protecting poor consumers who use low volumes of water.
- Tariffs could be indexed to inflation with automatic annual increases.
- If indexing is not possible, then real further substantial tariff increases would have to be implemented during 2000-5.

JVA: Financial Viability

26. SR97 also recommended that JVA would at least finance its O&M expenditures through cost recovery. Currently, JVA's operating expenditure is over JD 5 million. Based on recent estimates, on an average, JVA charges 15 fils per cu.m. of water delivered and collects, on an average 12 fils. The actual average operating and maintenance (O&M) cost excluding depreciation is 18 fils per cu.m. Thus, current estimates are that bills reflect only 80 percent of O&M costs and user payments reflect only 66 percent of costs of delivering irrigation water services to farmers. These O&M costs do not provide for asset replacement. Thus JVA is reliant on budgetary subsidies for financing its O&M costs. Its internal accounts are not organized along enterprise lines, and therefore do not lend themselves easily for easy analysis by service categories. This situation is being corrected and efforts are under way to streamline the information system to better estimate the extent of costs and revenues. However, a rational tariff policy to at least recover O&M costs is urgent if government burdens are to be reduced. Following a study with USAID-assistance, a new tariff system with tariffs for water of different quality has been proposed (by JVA/MOWI to the cabinet in August 2000). Implementing this new tariff, with higher tariffs at least for good-quality water, should be an urgent priority. For more details see Discussion Paper 4: Jordan Valley Authority.

IV. THE INSTITUTIONAL CHALLENGE: STRENGTHENING PUBLIC SECTOR CAPACITY AND EXPANDING PRIVATE SECTOR PARTICIPATION

27. How can MOWI face the twin challenges of resource and financial constraints? The financial challenge can be eased by allowing the private sector to compete in identifying the most cost-effective design for infrastructure, to increase operating efficiency, as well as by tapping private sector resources to partly plug the financing gap. In the irrigation sector, transfer of management to water users can reduce the financial burden on JVA as well as improve service delivery. SR97 proposed several measures to mobilize private sector participation in urban operations and the promotion of users management in irrigation. Accordingly, the Amman Management Contract of 1998 has signaled a radical departure from business as usual for MOWI and WAJ. In irrigation, a pilot project to involve water users in operating the farm units was implemented in 1997-98, but this initiative has not been expanded into a large-scale program.

Restructuring WAJ

28. WAJ has taken important first steps in Water and Sanitation sector reforms since 1997, following up on a major recommendation of SR97. The award of a management contract in Amman is a good first step. Under the management contract, a private company has been made responsible for the operation of the water supply and sanitation system in the Amman governorate under a 4-year contract. The operator collects bills, employs staff, but does not invest in the system; remuneration is through a base fee and a portion of incremental profits earned, thus providing an incentive to improve performance. Early results are already positive. The initial reform needs to be broadened (to other cities) and deepened through further intensive work in Amman.

29. Amman is a good start, but operational efficiency has to increase across the country, for the sector as a whole to become viable. The volume of Unaccounted-for-Water has to go down, billings and fee collections have to improve, and accounts receivable have to decrease. The best way for this to happen is through greater and optimal Private Sector Participation (PSP) in other Governorates across the country. To start with, the GOJ needs to actively consider a lease or concession contract in the Northern Governorates and Aqaba.

30. The future of WAJ in the context of greater PSP has to be addressed. This has important social implications, as WAJ is already currently overstaffed, and its functions will be reduced with every new private sector contract. There is a danger that WAJ is left with a substantial staff operating only small and less lucrative systems that are left over after signing private sector contracts for the major cities. Such a situation has to be avoided by appropriately designing the areas to be covered by private sector contracts, as well as by providing a future perspective for WAJ staff. Such perspectives include transfer to private operators, re-training and transfer of some selected staff to a newly established regulator, and retrenchment under an adequate compensation package.

A Regulatory Framework for PSP in Water and Sanitation

31. As MOWI moves to expanding PSP, it is necessary to start developing a sound legal and regulatory framework that will specify the roles and functions of various actors in the sector and provide for effective performance. This issue is important based on the experience of other countries who have promoted private participation in infrastructure, and the 1997 Water Sector Review devoted only scant attention to this area. The challenge is to develop the administrative and regulatory framework for developing the water and sanitation sector (W&S) in which:

- the private sector plays the major role and competition is maximized to raise efficiency, expand services, and improve quality;
- the consumer will be protected through increased competition;
- incentives exist to encourage efficient provision of W&S services; and
- efficient price-setting mechanisms are introduced.

32. Planning PSP is more than choosing the type of private sector involvement and the area to be covered. The effectiveness and consequences of PSP depend on the regulatory mechanisms used to influence private sector decision making and on how they are implemented. The objective of regulating private sector operators in the water sector is to both protect

consumers (from excessive tariffs and low service quality) and investors (from receiving insufficient incentives to sustain their involvement), while ensuring that certain well-specified environmental and social objectives set by the government are met. The establishment of autonomous regulatory agencies can insulate decision-making from such short-term considerations and increase the confidence of private investors. This is especially the case if decision-making is made in a transparent manner and clearly based on professional judgment. However, in many cases Ministries want to retain final decision-making powers, while the competency of regulatory agencies is constrained to advising the government. MOWI should review various options of designing regulatory institutions including that of converting WAJ into a regulatory body in conformity with local needs and select an appropriate regulatory arrangement (the options are discussed in detail in Discussion Paper 6: Considerations for Regulatory Reforms in the Urban Water and Sanitation Sector).

Restructuring JVA

33. SR97 foresaw a grater role for water users in irrigation operations and a modernization of JVA through better information systems, downsizing and manpower development. Steps have been taken with respect to a pilot project in user participation; water management in the Valley remains JVA's burden. Initiatives are under way (with USAID help) to upgrade internal systems. However, JVA is yet to move away strategically from functions for which it no longer has any comparative advantage.

34. JVA continues to perform a range of functions from strategic management of water resources and bulk water handling to retail irrigation services up to the farm turnout. It continues to be engaged in a variety of land and rural development related functions -- mandated some decades ago when the Valley was still being developed. In the recent past, JVA has started divesting some of the old functions. It has also initiated experiments in irrigation and irrigated agriculture. JVA reforms and pilots include proposals to change the JVA law to disengage from land transactions, divest irrigation services, and to introduce modern accounting systems.

35. A pilot project has been initiated to test Participatory Irrigation Management with water users operating the farm turnouts and agreeing on their turns. Other pilots support improving the efficiency of water application through extension education and water measurements (supported by USAID), a trial farm layout with modern on-farm systems (with French assistance), and an R&D project to test the use of treated brackish water for irrigation (with German assistance).

36. We have earlier observed the water supplies to irrigation could face serious constraints. It is necessary for JVA to focus even more on the strategic aspects of water management and on bulk water management in the Valley. At the same time, it should now implement a systematic program of : (i) divesting retail irrigation services below the pumping stations to private entrepreneurs or to water user organizations; and (ii) hand over the "old" regional development functions to new public institutions that have emerged. JVA also wishes to pursue new challenges: support investment promotion activities in the Valley related to tourism development. The preparation phase of the Bank-assisted Jordan Valley Improvement Project and the USAID-supported Strategic Planning exercise would offer the opportunity to reflect on the strategic choices, consult with stakeholders, and decide on a future course of action.

37. The JVA law needs to be changed in line with future needs. Strategic functions have to be clearly identified. Modern accounting systems have to be introduced for efficiency and transparency. Staff numbers and composition would have to reviewed to identify scope for reduction, and training and development needs to face new challenges (Discussion Paper 4: Jordan Valley Authority). Again, the proposed Jordan Valley Improvement Project offers the opportunity for a thorough restructuring of JVA.

The Ministry of Water and Irrigation

38. SR97 recommended several streamlining measures for overall coordination of the water sector. By and large, these recommendations have been implemented. The MOWI is the only public sector agency at present in the region that integrates the management of different user sectors (irrigation, M&I), thus allowing for a cross-sectoral perspective in water allocation and management. This integration provides MOWI the chance to coordinate water resources allocation and management, taking a cross-sectoral perspective taking into account irrigation, municipal, and industrial needs. In particular, the integrated approach has proven beneficial during times of drought so efficient allocation could be achieved considering all needs within a national policy framework. Moreover, within MOWI, Water Resources Monitoring and Studies and Project Financing are now integrated into the Ministry strengthening the coordination function.

39. To further ensure inter-sectoral coordination, SR97 advised that MOWI establish a Water Council representing the wider interests if the sector. A National Security Council for Water has been set up under the chairmanship of the Prime Minister, with the Minister, MOWI as the Deputy Chairman. MOWI has also established five advisory committees on selected technical themes: water policy; water quality; irrigation; dams; and wastewater. Overall, there has been an increasing participation of stakeholders in MOWI decision-making.

40. While the planning and regulatory functions are being enhanced within MOWI (e.g., Regional Master Plans with Japanese assistance; groundwater enforcement unit within the Ministry), overall capacity in terms of senior managers available to MOWI is limited and induces considerable stress on existing senior staff and managers. There is erosion of technical expertise, critical to the success of the ambitious investment program. There is the danger that institutional capacity does not keep up with policy reforms being introduced. Facing future challenges will require a careful review of the senior management needs and implementation of a management enhancement program.

V. RECOMMENDATIONS FOR 2001-2005

40. The table below summarizes the set of recommendations made in the text.

RESOURCE MANAGEMENT ASPECTS	
Short-term (until the end of 2002)	*The pilot steps taken so far to improve efficiencies in Jordan Valley irrigation should be consolidated into an integrated program under the proposed Jordan Rift Valley Improvement Project.* *Continued effort at metering of groundwater abstraction in the Highlands, ensuring operational performance of the meters, enforcement of licensed quantities, volumetric tariffs, together with stakeholder participation should be the thrust forward. Reduced abstraction in the highlands and in Disi should be monitored.* *Close monitoring of the investment program is needed as far as wastewater treatment is concerned. At the same time, a comprehensive action plan for reuse of treated water in agriculture needs to be formulated, incorporating lessons of the ongoing pilot projects; results of studies of mixing freshwater with treated wastewater. Options for separate delivery of marginal quality water and freshwater for a variety of agricultural and nonagricultural uses should be examined.* *The operations of the KAC and related systems should be based on water quality parameters as well.* *Regulations need to be expanded to cover industrial waste not discharged into sewers. Incentives for adoption of clean production process in industry need to be examined. Regulations and guidelines for proper use of private tankers and household storage of water should continue to be strengthened. A rural sanitation program in the Valley is recommended.* *Present efforts at enhancing awareness of communities and the private sector on water quality issues, in general, and acceptable standards of transport and storage, in particular, should be strengthened.*
Medium-term (until the end of 2005)	*Lessons from the Zarqa basin project on socio-economic strategies with respect to agricultural users should be incorporated into a medium term program of action for groundwater management.* *Any additional water must be made available for M&I, except in cases where this is not physically possible. In such cases, the water could be used for more reliable services for existing areas or for increasing cropping intensity rather than for expansion of irrigated area.*

FINANCIAL MANAGEMENT ASPECTS	
Short-term	*Given the ambitious projections in the investment program, annual review and updates to the program are critical to ensure that the program reflects current realities on an ongoing basis.* *The level and structure of tariffs should be a major focus of MOWI during the next two years. An optimal tariff package should be selected to ensure coverage of operating costs of urban water supply and sewerage* *A rational tariff policy to at least recover JVA's O&M costs is urgent if government burdens are to be reduced. Implementing this new tariff, with higher tariffs at least for good-quality water, should be an urgent priority.*
INSTITUTIONAL ASPECTS	
Short-term	*The initial reform in private sector participation needs to be broadened (to other cities) and deepened through further intensive work in Amman and through greater and optimal PSP in other Governorates across the country. To start with, the GOJ needs to actively consider a lease or concession contract in the Northern Governorates and Aqaba.* *It is necessary for JVA to focus even more on the strategic aspects of water management and on bulk water management in the Valley. At the same time, it should now implement a systematic program of: (i) divesting retail irrigation services below the pumping stations to private entrepreneurs or to water user organizations; and (ii) hand over the "old" regional development functions to new public institutions that have emerged.* *The JVA law needs to be changed in line with future needs. Strategic functions have to be clearly identified. Modern accounting systems have to be introduced for efficiency and transparency. Staff numbers and composition would have to reviewed to identify scope for reduction, and training and development needs to face new challenges.*
Medium-term	*Facing future challenges will require a careful review of the senior management needs and implementation of a management enhancement program.* *MOWI should review various options of designing Regulatory institutions in conformity with local needs and select an appropriate regulatory arrangement.*