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A National Water Demand Management Policy in Jordan

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Abstract

Assessments and forecasts of water demand in Jordan show that demand already exceeds the capacity of available water resources. Therefore, careful consideration and control of water demand is an important component of integrated water resources management in the Kingdom. Water demand management includes planning and controlling water uses using social, economic and technical measures in an attempt to reach equilibrium between limited water resources and demand. In order to facilitate water demand management activities at the national level a Water Demand Management Unit (WDMU) has been established at the Jordan's Ministry of Water and Irrigation. The current and future water demand management activities in Jordan represent a serious attempt at reducing the demand on fresh water resources to match it with the available water before embarking on the development of additional supplies. The Water Demand Management Policy described in this paper addresses the need to bring greater efficiency to all sectors, including municipal, tourism, industrial and agricultural users of water.

Keywords: Water demand management, national water policies, water conservation, policy statements.

INTRODUCTION

Jordan is a semi arid country with very limited freshwater resources. The availability of water is classified very low on the Water Stress Index, which indicates the degree of water shortage. Water Stress Index is the value of annual rainfall divided by the total population (m³/capita/year). Countries with less than 1,700 m³/capita/year are regarded as countries with “existing stress”, while countries with less than 1,000 m³/capita/year are regarded as having “scarcity” and countries with less than 500 m³/capita/year are regarded as having “absolute scarcity” according to this index. With 167 m³/capita/year Jordan falls into the category of “absolute scarcity.” In 2002 the total use of water in Jordan was 809.8 million cubic meters (MCM) or 159 m³/capita/year at the total 2002 population of 5.1 million people. This usage included 88.8 MCM of nonrenewable groundwater (groundwater mining) and 72.4 MCM of treated wastewater. The total renewable freshwater resources in Jordan are estimated at 850 MCM or 167 m³/capita/year. Table 1 shows the most recent statistical data on water use in Jordan.

Table 1. Sources of Sectoral Water Use in Jordan in 2002
(In Million Cubic Meters per Year, MCM/year)

<i>Sector</i>	<i>Surface Water</i>	<i>Groundwater</i>	<i>Treated Wastewater</i>	<i>Total Use</i>
Municipal	50.540	198.685	0.000	249.225
Industrial	1.863	34.971	0.000	36.384
Irrigation	156.950	287.556	72.365	516.871
Livestock	6.000	0.835	0.000	6.835
Total	215.353	522.047	72.365	809.765

The Kingdom of Jordan is facing an unremitting imbalance between the total sectoral water demands and the available supply of freshwater. By 2020, the total demand for water is expected to increase to 1,685 MCM because of the large increases in population, improvements in living standards and growth in economic activity. While the new sources of water supply are expected to increase the available water from the current level of 850 MCM per year to 1,289 MCM per year by 2020, a shortfall of 396 MCM representing 24 percent of total demand will remain and will have to be managed through appropriate demand-reduction programs.

Current approaches towards water resources management tend to be “supply driven”; meaning that whenever there is a shortage, the solution usually involves the capital investment in new water supply projects. A shift from the traditional supply orientated approach towards one of water conservation and demand management is essential for the sustainability of water resources and the environment, as well as economic efficiency and social development. However, the move towards more integrated demand and supply approach takes a great deal of time, effort and

commitment and is currently backed by key players at many levels in the institutional and political spectra (WMO/DIFD/UNISCO, 1999).

Demand management approach differs from supply-oriented approach by placing more emphasis on social and economic uses of the water. When used with current water supply management approaches, water demand management offers the prospect of greatly improved water management in comparison to its present status. Water demand management policy for Jordan needs to be developed to provide a framework for water demand management programs.

In order to address some of Jordan's water problems, a National Water Strategy was developed and approved in 1997. Water demand management is currently a part of the Water Strategy for Jordan (Hashmite Kingdom of Jordan,1997), which states that "resource management shall continually aim at achieving the highest possible efficiency in the conveyance, distribution, application and use" of water resources. Among the 47 recommendations contained in the Strategy were the following:

- Priority of 100 liters per capita per day for basic human needs
- Creation of a national water data bank
- Full utilization of all wastewater for irrigation purposes
- Full but sustainable development of aquifer resources
- Adoption of a five-year resource development plan

In the demand management and conservation area, the Water Strategy cites the following:

- Achievement of the "highest possible efficiency" in water conveyance, distribution and use
- Adoption of measures to "maximize the net benefit from the use of a unit flow of water."
- Definition and assignment of roles in water conservation to be played by the different sectors of society.
- Promotion of water saving systems and devices.

Although the Strategy does not identify any specific demand management programs, it is clear that the Ministry of Water and Irrigation supports the implementation of demand management efforts as a necessary part of the long-term solution.

A Water Resources Management Plan has been developed for Jordan in 2001, which examined conventional and non-conventional water resources and discussed quantitative management and qualitative management issues, as well as institutional and regulatory issues. The plan concluded that the gap between demand and the available water supplies will continue to exist, even after implanting the plan for enhancing and expanding supplies.

The urban water demand management policy includes, a program to promote a recognized industry for water efficient products; setting national product standards and information; modifying building codes to increase water use efficiency; a training program for managers and operators, a program for peak demand reduction; a national

program of audits for large consumers, an arid landscaping program; a program to promote rainwater use, a gray water reuse program for areas with no sewerage; a public awareness program to achieve long term awareness and change in attitudes of water users.; In addition, there are policies for reduction of unaccounted for water.

The industrial water demand management policy includes the use of economic instruments for pollution control and technological changes. The policy also recommends using public education as a way to increase understanding about water scarcity. Additionally, comprehensive research activities and data collection programs are of critical importance to support all policies. Other programs include improving equitability of accesses through a financial assistance program. Policies for irrigated agriculture, which is the largest user of water in Jordan, are being formulated by the Ministry of Agriculture and are not reviewed in this paper.

A PROPOSED WATER DEMAND MANAGEMENT POLICY FOR JORDAN

The Ministry of Water and Irrigation developed a Water Strategy for Jordan and several specific policies, which include:

- Water Utility Policy.
- Irrigation Water Policy
- Wastewater Management Policy, and
- Groundwater Management Policy,

The suggested Water Demand Management Policy is developed to supplement the already existing policies. It format follows the format as the existing four policies which are published on the website of the Ministry of Water and Irrigation.

Policy Statement

The long-term National Water Demand Management Policy of Jordan is aimed at influencing and controlling water demand and water usage to achieve a better utilization of the available water resources while meeting the objectives of social and economic development of the country and creating positive environmental impacts. The National WDM Policy is consistent with the Water Strategy of the Kingdom and conforms to its long-term objectives. While the policy is national, it is being implemented by Governmental agencies with the primary responsibilities being vested in the Ministry of Water and Irrigation.

Specific Policy Considerations

The Water Demand Management Policy of the Hashemite Kingdom of Jordan addresses the management of water demands in all sectors of the Jordan's economy including municipalities, industry, tourism, agriculture and other activities of national importance. Many provisions of this policy are already in practice. Specific policy statements address the following ten specific considerations:

1. **Universal Water Metering and Loss Control** (involving tracking of water flows throughout water transmission, treatment and distribution systems with a goal to identify and repair water leaks and increase the proportion of water that is metered and billed to residential, commercial, industrial and public sector users of water).
2. **Fulfilling “Unserved” Water Demands** (e.g., with a near-term goal to satisfy the presently unmet demands in municipal and industrial uses including the additional water needs of educational institutions and water that is required to support tourism. This goal will be accomplished not only by using the new sources of water, but also by using water savings that are achieved through the ongoing water demand management and water conservation and loss reduction programs, in addition to water recycling).
3. **National Plumbing Standards and Water Conservation Codes** (primarily the development of a National Plumbing Code including the implementation of National Plumbing Standards with acceptable safety and quality requirements to ensure that all plumbing products are certified thus preventing the inferior products that quickly deteriorate and cause leaks, or products that are made of inferior materials but are sold as high grade from entering the market in Jordan).
4. **Water Pricing and Cost Recovery** (e.g., structuring the municipal water and wastewater tariffs to include price incentives for water conservation and setting the price levels to recover the cost of operation and maintenance and the costs of the ongoing necessary capital improvements in water supply systems).
5. **Comprehensive Water-Use Information Program** (e.g., development and maintenance of a comprehensive national inventory of all water withdrawals and uses, which is essential for understanding the effects of spatial and temporal patterns of water use on the quality, availability and sustainable use of existing water resources).
6. **Public Awareness and Education** (that is consistent with the Water Strategy for Jordan; an ongoing public information and education program is needed to increase and maintain high levels of public awareness of the importance of water for the well-being of the country and its future economic and social development).
7. **Best Management Conservation Practices** (e.g., establish a list of water demand best management practices, or BMPs, to be coordinated and implemented by the WDMU at the Ministry of Water and Irrigation).
8. **Public Buildings Efficiency Improvement Program** (e.g., retrofit of non-conserving plumbing fixtures in all the military, the civil defense, intelligence services, military hospitals, royal palaces and other governmental and public buildings).
9. **Water Demand Management Research and Development** (e.g., special studies on water use in the municipal, industrial, agricultural and other sectors).

to support and guide the ongoing water demand management policies and programs).

10. Recognition of Individuals, Institutions and Industry for Advancement in Water Efficiency (with an aim to establish an Annual Water Drop Award to recognize individuals, institutions and other entities for their contribution to the improvements in water-use efficiency in Jordan).

Other aspects of WDM policy will need to address a number of legislative initiatives and institutional arrangements for the development and implementation of water demand management policies and programs. The proposed WDM Policy for Jordan will be disseminated among the water management organizations and the general population of the Kingdom by developing a number of specific Policy Statements. The following section defines some of the statements on specific issues in water demand management.

POLICY STATEMENTS

In terms of its main objective, the National Water Demand Management Policy aims at a maximum utilization of water and diminishing water waste and promoting water use efficiency and water conservation, while maintaining the social and economic benefits of water use, and creating positive environmental impacts.

The National WDM Policy includes the following statements, which provide guidance for the development and implementation of demand management measures and programs in all sectors and regions of the country.

On the Role of Water Demand Management

1. The idea of water conservation is not new to Jordan because in this region of low rainfall the people had to survive by harvesting rainwater and minimizing their water usage. This behavior has continued until modern times as the recent survey data indicate that nearly two thirds of the households in Amman and one third in rural areas of Jordan reuse water within the household (IDRC study).
2. Given the general scarcity of freshwater in the region, water demand management and water conservation will continue to play an important role in achieving sustainable use of freshwater resources in Jordan.

On the Unserved Water Demand

3. Because of the chronic shortages of water and the low efficiency of water supply and distribution systems, the actual use of water by many users in the urban and rural areas of the country is below the internationally established targets of daily per capita usage. On average, the residential water demand may be 30 to 50 percent below the total demand, which includes the actual use and the “unserved” demand. Water savings that will be achieved through the implementation of water conservation programs will be an important source of additional water to meet the unserved demands.

On Codes and Standards.

4. The new Codes for buildings in Jordan include standards for showerheads, faucets, and water closets. These standards specify the maximum water use in liters per minute or liters per flush for all plumbing fixtures that are installed in newly constructed buildings. The water-efficient plumbing fixtures mandated by the Jordan's Plumbing Code will reduce national water demand and wastewater flows over time due to the installation of these fixtures in new construction and also a gradual voluntary replacement of the older less efficient fixtures with the Plumbing Code-compliant models.

5. Updating and adjusting current building codes to increase water use efficiency is an important activity of the National water demand management program.

6. The availability and consumer adoption of water efficient fixtures and water-efficient appliances such as dishwashers and washing machines will also have a significant impact on future water use without requiring any significant changes in water-using behavior or diminishing the basic functions of this equipment. The resultant water savings will provide monetary savings in the necessary investments on water supply and wastewater disposal. The adoption of water-efficient appliances will also achieve savings in energy use.

7. At present, plumbing products sold and used in Jordan (such as pipes, valves, tools, and other materials) do not have to go through a certification for product quality standards. In some cases, inferior products that quickly deteriorate and cause leaks, or products that are made of inferior materials and sold as high grade. A Plumbing Product Certification Program through Daman at the Jordan Institute for Standards and Measures (JISM) could potentially save large quantities of water by eliminating water leakage in households if the quality of plumbing and plumbing products was improved. Once the certification program is approved then there will be need to remove non-compliant sanitary ware from the market possibly after a one-year grace period.

8. An important activity of water demand management is to promote recognized industry for water efficient products and water saving devices.

On Universal Water Metering and Loss Control

9. Given the water situation in the Kingdom, it is important to increase the proportion of municipal water that is metered and billed to residential, commercial, industrial, and public sector users. Universal metering of water use is part of the National Water Strategy. It is also important to identify and repair all water leaks in the distribution system.

10. Reduction of non-revenue water and water loss is of critical importance. This can be achieved through investment in leak detection and repair programs and replacement of old transmission and distribution pipelines.

On Peak Demand Reduction

11. Previous experiences in other countries showed that demand reduction programs could reduce peak day demand by 20 percent. The reduction of peak demands will become more important as more urban areas in Jordan receive continuous supply of water.

On Water Pricing and Cost Recovery

12. The municipal water and wastewater tariffs in Jordan provide important economic incentives for water conservation. The tariffs are structured to discourage high water use by charging higher prices at higher quantities of water use. Also by setting the price levels to recover the cost of operation and maintenance and also the costs of the ongoing capital improvements in water supply systems provides an additional incentive for efficient use of water. Further development and evaluation of conservation-oriented water tariffs for both municipal and agricultural uses of water is being undertaken by the MWI

On Water Supply Augmentation using Rainwater Harvesting and/or Grey Water or Other Recycled Water

13. Rainwater harvesting for domestic purposes in urban and rural areas can provide a non-potable water source that can augment the existing water supplies.

14. Certain potable water may be replaced with recycled water. Home gardens in rural areas with no sewerage systems can be irrigated with gray water, which is collected from water used in sinks, showers, bathtubs, floor drains, washing machine, and dish washing machines. Although lower in quality the gray water is less contaminated than toilet water. It can be easily treated on site and reused for non-potable uses such as garden irrigation. This will help reduce house demand on fresh water. Regulations need to be developed in this regard to examine any health hazards that can be associated with gray water reuse.

On Comprehensive Water-Use Information Program

15. The WDMU at the MWI has begun the development and maintenance of a comprehensive national inventory of water withdrawals and uses. The National data on water use are needed for the protection and monitoring of freshwater resources of the Kingdom (especially to assess stress on rivers and aquifers) and to assess the availability of water resources to support the population and economic growth of the country. Reliable estimates of water use are essential for understanding the effects of spatial and temporal patterns of water use on the quality, availability and sustainable use of existing water resources.

On Public Awareness and Education

16. Consistent with the Water Strategy for Jordan, an ongoing public information and school education program is needed to increase and maintain high levels of public awareness of the importance of water for the well-being of the country and its economic and social development. The WDM Policy ensures that public education continues through a fixed program that uses a variety of measures including the relevant messages and media. Periodic survey of public opinion on adoption of water

conservation measures will be conducted to assess and enhance the educational program.

On Implementation of Water Demand Management Programs

17. The Ministry of Water and Irrigation will continue to play a leading role in the development and implementation of WDM programs and appropriate water efficiency measures. The WDM Unit at the Ministry is undertaking some nationwide demand-reduction programs. These include audits of large water consumers and the Public Buildings Efficiency Improvement Program (i.e., retrofit of non-conserving plumbing fixtures in buildings), in addition to an arid landscaping program and the Best Management Conservation Practices Program, which establishes a list of water demand management practices BMPs to be coordinated by the WDMU

On Industrial Water Demands

18. The industrial sector is gaining more importance in Jordan with the Government working on creating an investment environment favorable to increase the contribution of this sector to national economy. To meet the growing industrial water demands, industries are encouraged to recycle water within the industrial facility, use of lower quality water wherever possible, reuse of treated wastewater in the industrial process wherever possible and adopt technology that uses less quantities of water for the same industrial product. Economic instruments for pollution control are important in this regard.

On Touristic Water Demands

19. Tourism is also gaining importance in Jordan and contributing significantly to the national economy. Programs for the Hotel Industry about water scarcity are important; parallel with water audits are retrofits of hotel buildings with water saving technologies. Awareness programs that target tourists should also be considered.

On Improving Equitability of Access through Financial Assistance

20. To promote and affect a transition towards water demand management, financial assistance program shall be continued to less privileged communities. This is important because this transition will have some cost on water users that might be prohibitive.

On Training and Capacity Building

21. A water demand management-training program for all stakeholders at the water sector forms an integral part for a water demand management strategy.

On Water Demand Management Research and Development

22. The WDM Unit and the MWI is undertaking special studies of water use in the municipal, industrial, agricultural and other sectors. The purpose of these studies is to support and guide the ongoing water demand management policies and programs in the country.

23. A competitive long-term research program on water demand management needs to be undertaken by the Ministry in collaboration with the major universities and research institutes in Jordan.

On National Recognition of WDM Accomplishments

24. The importance of WDM in Jordan justifies the establishment of annual awards to industrial firms, institutions and individuals for their accomplishments in achieving greater efficiency of water use or making notable contributions to the scientific underpinnings and practical implementation of water demand management.

CONCLUSIONS

This preliminary policy presented here will need to be reviewed by a higher committee at the Ministry of Water and Irrigation. If approved, it will be forwarded to the Council of Ministers to be debated and approved as part of the national water policies. However, in Jordan, there is no alternative to demand management and conditions will dictate what water demand management programs will be needed until added supplies, can be identified and used.

This proposed demand management measures will focus on water conservation practices to make better use of limited supplies, but do not mean a decline in quality of service provided but rather on a more efficient approach to satisfying water demands. However, to be accepted easily by the public, water demand management measures should arise from good planning rather than water shortage crisis management situation.

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