

Jordan's Water Strategy
2008-2022

Eng. Maysoon Zoubi
Secretary General

Jordan's Water Strategy 2008-2022

Introduction:

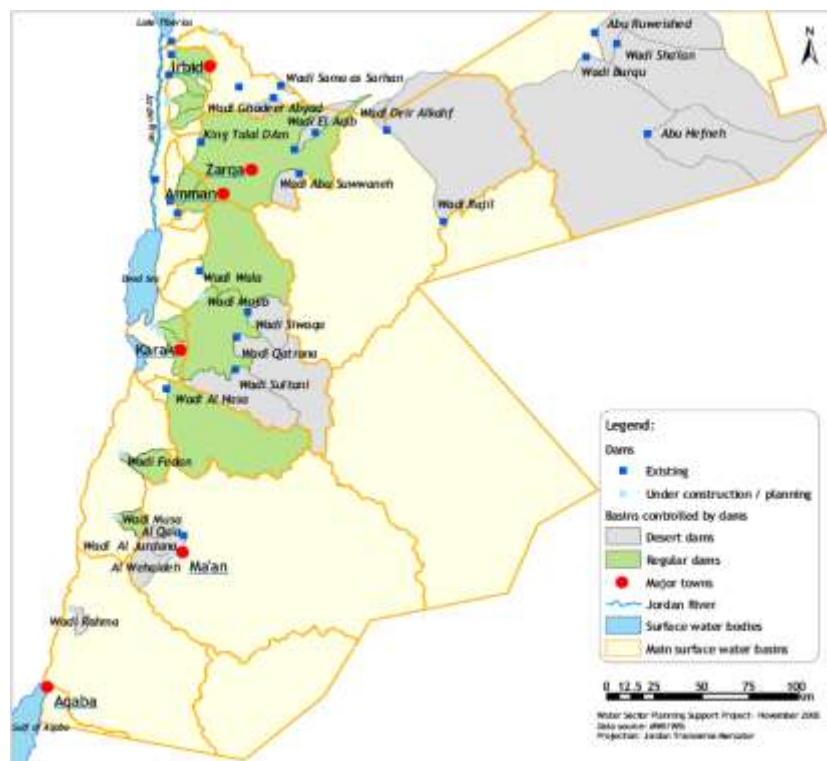
- Jordan is perceived a focus of the Arab countries, a state of stability in the region of the Near and Middle East. It provides a secure basis for economic and human activities of industrialised westerly countries, as well as its Arab neighbours in Lebanon, or countries around the Gulf of Arabia.
- Jordan is categorized between the arid and semi arid countries, and can be considered one of the most four stressed countries in the world, with less than 150 cubic meters per capita of fresh water resources, while the World poverty line is 1000 CM.
- Jordan is divided into 15 surface water basins and 12 groundwater basins, some of which extended to neighbouring countries.

- Water resources depend on rainfall which varies in quantities, intensity and distribution from year to year. Rainfall intensities vary from 600mm in the North West to less than 130mm in the eastern and southern deserts, which forms about 91% of the surface area.
- Water is an indispensable input for any social or economic activity. Its scarcity may impede development, threaten standards of living and even jeopardize survival itself. Despite scarcity, water use is not efficient, with high level of Non Revenue Water (NRW) in the average of 43%.
- The population increase that exceeded the natural growth rates due to the sudden influx of refugees and displaced persons further hampered the planning efforts to provide the population with water and wastewater service.
- The renewable water resources within Jordan fall short of meeting actual demand. The water deficit is further manifested in the rationing of the municipal and agricultural water supplies.

The Structure of the Water Sector:

- The Ministry of Water and Irrigation (MWI) was formed in 1988, became the highest authority in the water sector. Mandate is to develop policies, bylaws and procedures in this sector.
- Control, management and development of the water sector is vested in the Water Authority of Jordan (WAJ).
- Irrigation water in the Jordan Valley (dams, irrigation canals and distribution systems) is managed and controlled by the Jordan Valley Authority (JVA).

Water Resources – Water Basins:



Water Resources – Surface Water:

The three major surface water systems in Jordan are the Jordan, Zarqa, and Yarmouk Rivers, but all have become highly undependable.

The King Talal Dam is Jordan's largest aboveground reservoir, but it faces two problems: erratic surface water levels often reduce trapped levels to below the total capacity of 86 MCM, also pollution from factories that dump untreated waste into tributaries leading to the dam is rising salinity, chemicals, and metal levels.

Surface Water Basins:

No.	Basin	Annual Discharge (MCM)
1.	Yarmouk	166
2.	Zarqa	84
3.	Northern Side Wadis	58
4.	Southern Side Wadis	58
5.	Jordan Valley	8
6.	Mujib & Wala	102
7.	Dead Sea Side Wadis	43
8.	Hasa	43
9.	Azraq	41
10.	Hammad	24
11.	Sarhan	18

No.	Basin	Annual Discharge (MCM)
12.	Jafr	13
13.	Southern Desert	1
14.	Wadi Araba – North	46
15.	Wadi Araba - South	8

Water Resources – Groundwater:

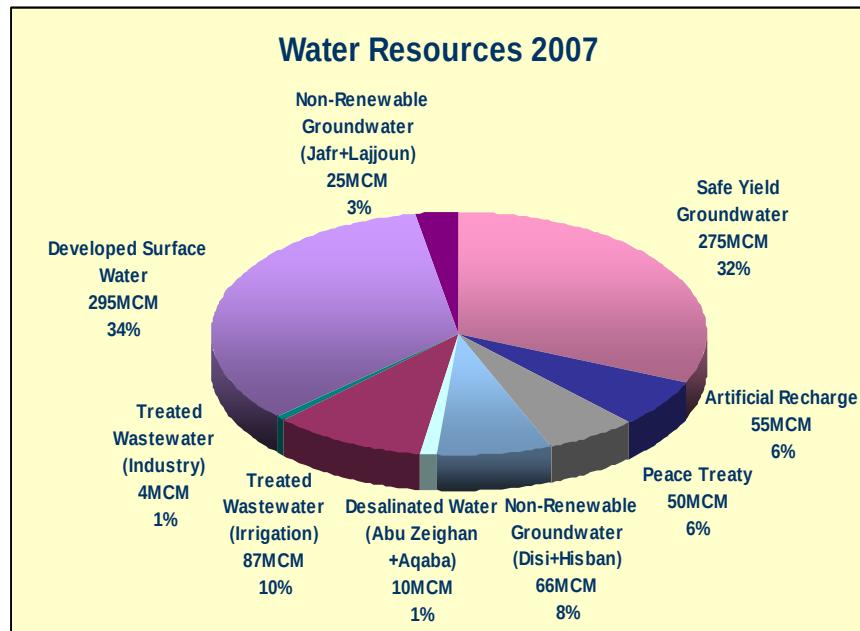
- Groundwater is considered to be the major source of water in Jordan, and the only source of water in some areas in the country.
- The long term safe yield of renewable groundwater resources has been estimated at 275 MCM/yr.
- The main non-renewable groundwater resource in Jordan exists in the Disi aquifer in the South, with a safe yield of 125 MCM/Yr for 50 years.

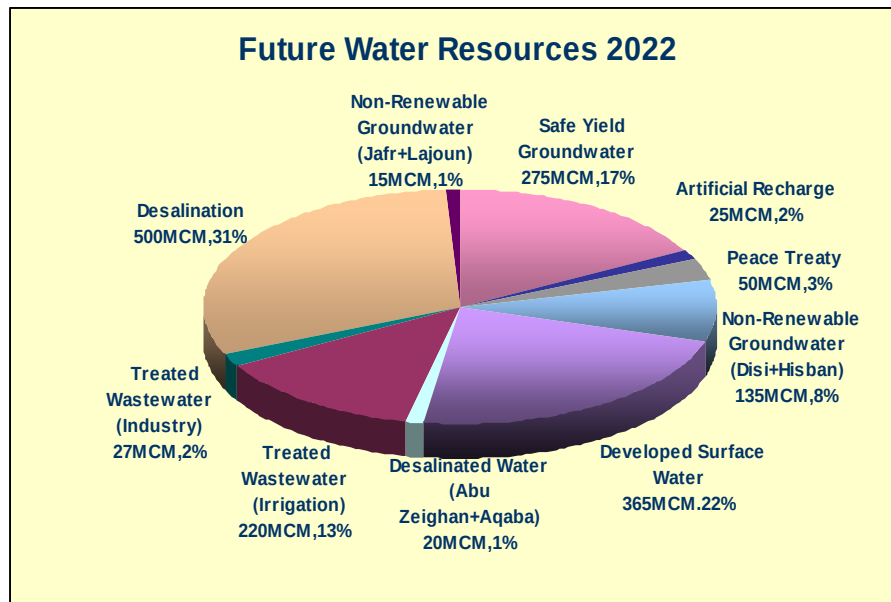
Groundwater Basins:

No.	Aquifer	Safe yield (MCM/yr)
1.	Amman - Zarqa	60 – 70
2.	Zarqa	30 – 35

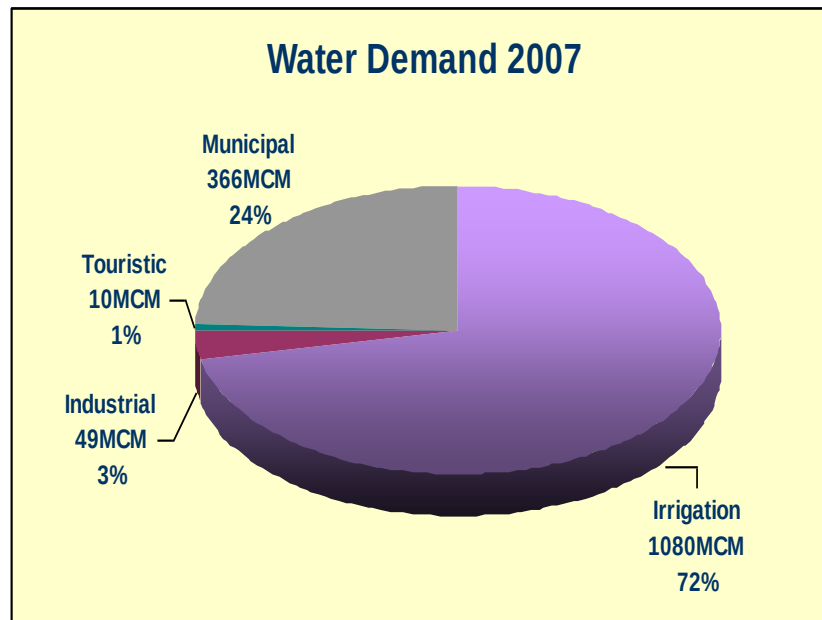
No.	Aquifer	Safe yield (MCM/yr)
3.	Yarmouk	30 – 35
4.	Jordan River Side Wadis	28 – 32
5.	Jordan River	15 – 20
6.	Dead Sea	40 – 50
7.	Hammad	11 – 12
8.	Sarhan	7 – 10
9.	Jafr	7 – 10
10.	Disi - Mudawwara	2 – 3
11.	Wadi Araba - North	5 – 7
12.	Wadi Arab - South	4 - 6

Water Resources 2007-2022:

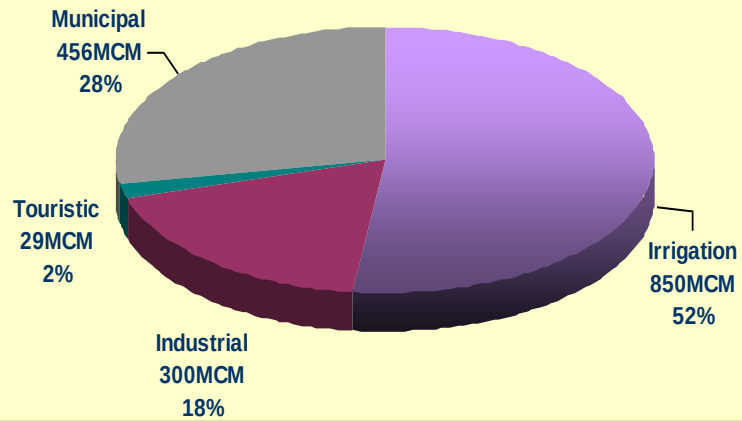




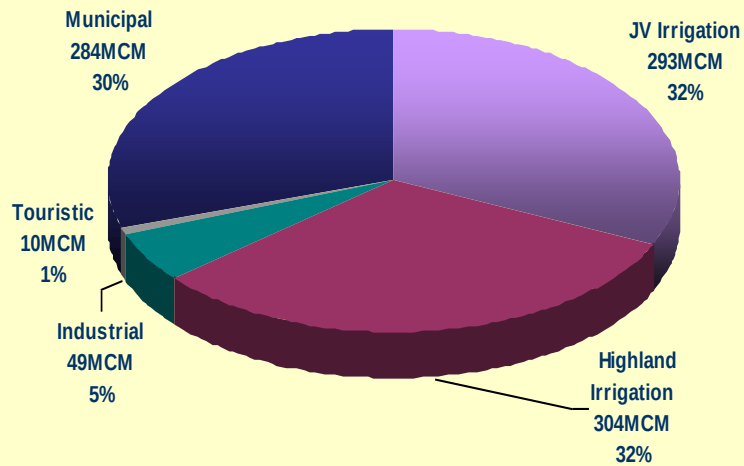
Water Demand and Allocations 2007-2022:

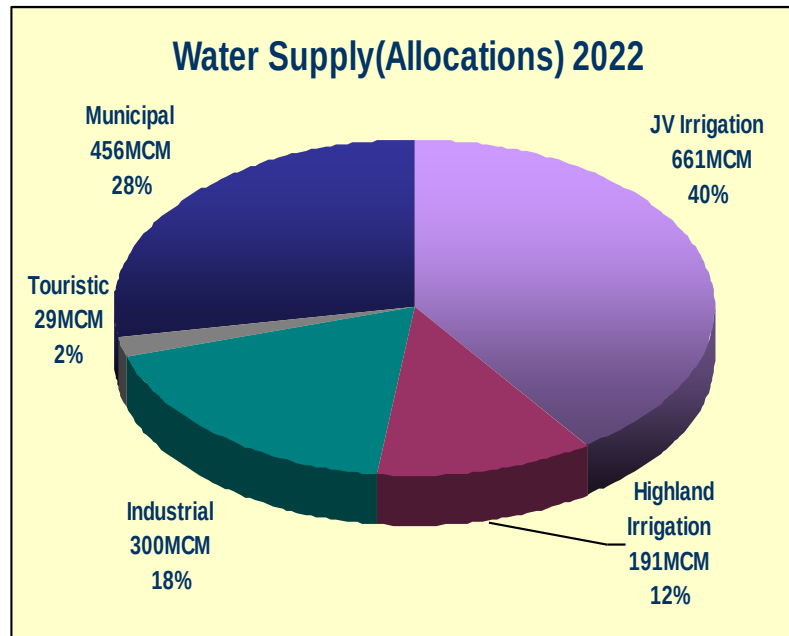


Projected Water Demand 2022

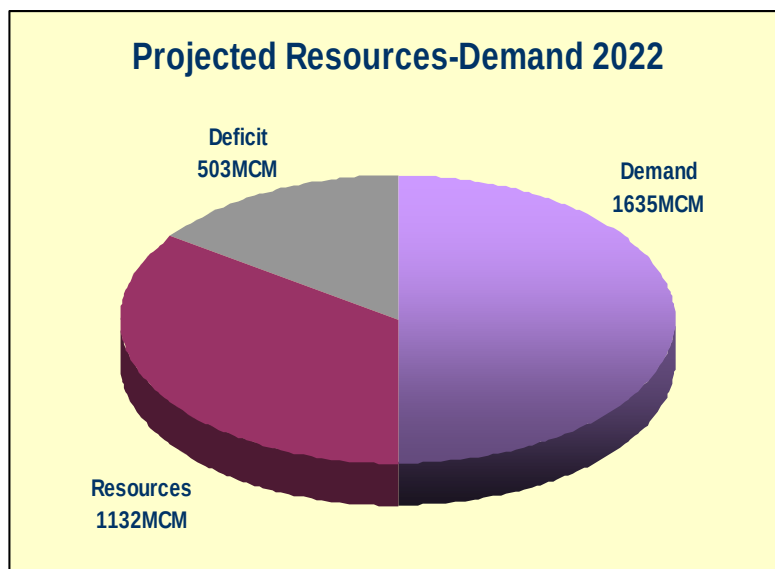


Water Supply(Allocations) 2007



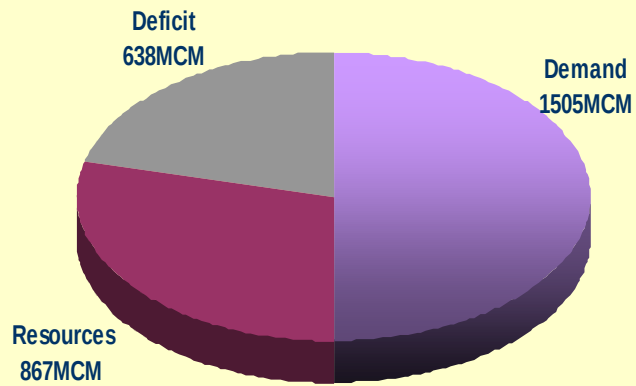


Resources vs Demand 2007-2022:



Without Red-Dead Sea Conveyor

Resources vs Demand 2007



Projected Resources vs Demand 2022



With Red-Dead Sea Conveyor

Additional Challenge: Climate Change:

- Global warming affects the water balance (increasing evaporation, changing increasing variability of rain and more extreme events), as well as subsequent changes in soil moisture, runoff and groundwater recharge;
- Globally, droughts are predicted to significantly increase in frequency and in duration (IPCC 2007;
- Most global climate models agree on a temperature increase larger than the global average and significantly decreasing precipitation to take place inside the MENA region (Giorgi et al, 2007).

IPCC: Intergovernmental Panel on Climate Change

Climate Change: Three main messages

- Climate change (CC) impacts add to already difficult water;
- Management challenges in the Arab world;
- CC increases the urgency for more sustainable water policy and, Investment choices;

- Political focus on CC offers new opportunities to reduce;
- Uncertainty and improve results in water management.

Water Sector Strategic Planning:

- **Reduce the percentage of the Non-Revenue Water:**
 - Rehabilitation of water network systems;
 - Enhance the performance of irrigation network;
 - Improve performance efficiency in utilities and human resources;
 - Limit un-planned expansion of water networks.
- **Reduce Water Consumption:**
 - Public Awareness Campaigns;
 - Upgrade irrigation systems;
 - Adjust Cropping pattern.
- **Secure new water resources:**

Traditional Sources

 - Disi Water;

- Dams and Ditches;
- Investigation wells;

Non-Conventional Sources

- Desalination of brackish water;
- Desalination of sea water;
- Reclaimed water.

- **Measures on the national level:**

- Regulate population growth;
- Organize land use;
- Preservation of groundwater;
- Water use policies.

- **Water and energy policy need to be interlinked:**

- Provide reliable climate change risk data, models and analysis tools;
- Integrate water and energy efficiency in measurement tools and policy;
- Ensure institutional capacities, education and awareness rising;

- Integrate and value ecosystem services into trans-boundary decision making;
- Encourage best practice through innovation, appropriate solutions and community engagement.

National Water Strategy – Water for Life:

His Majesty King Abdullah II, in February 2008, issued a directive to form a Royal water committee, chaired by HRH Prince Faisal Bin Al Hussein, to upgrade the Kingdom's water strategy and to develop policies and programmes in light of scarce water resources.

The strategy should also include a long-term agricultural policy and provide for an organised and streamlined water sector.

The National Water Strategy and its Investment Plan were prepared by the Royal Water Committee and approved by His Majesty King Abdullah II in 12th of May 2009, and the Council of Ministers in 19th of May 2009.

Jordan's vision for a water strategy is one whereby 2022, we have:

- Adequate, safe and secure drinking water supply ;
- Greater understanding and more effective management of groundwater and surface water;
- Healthy aquatic ecosystems;
- A sustainable use of water resources, and implemented fair, affordable and cost - reflective water charges;
- Adaptation to increased population growth and economic development across the water sector and water users.

The National Water Strategy 2008 – 2022 Selected actions:

- **Restructuring the Water Sector:**
 - Development of comprehensive water law and establishment of Water Council;
 - WAJ and JVA to become bulk suppliers;

- Retail functions through Distribution Companies (household, commercial customers) and Water User Associations (irrigation water);
- Establishment of regulator;
- A Water Council is operational allowing for broad stakeholder input into water management.

- **Increase water efficiency in**

- water supply (water loss reduction, energy efficiency, cost reduction);
- industrial water use;
- irrigated agriculture (more crop per drop);
- Appropriate water tariffs and incentives will be introduced in order to promote water efficiency in irrigation and higher economic returns for irrigated agricultural products.

- **Full use of all alternative water resources where-ever possible:**

- Rainwater harvesting;
- Greywater use inside the house and for irrigation;

- Treated wastewater for agriculture;
- Infrastructure for desalination of sea and brackish water is sufficient;
- An alternative energy source to keep the cost of desalination as low as possible is available.

- **Introduce Water Demand Management Measures in all sub-sectors.**

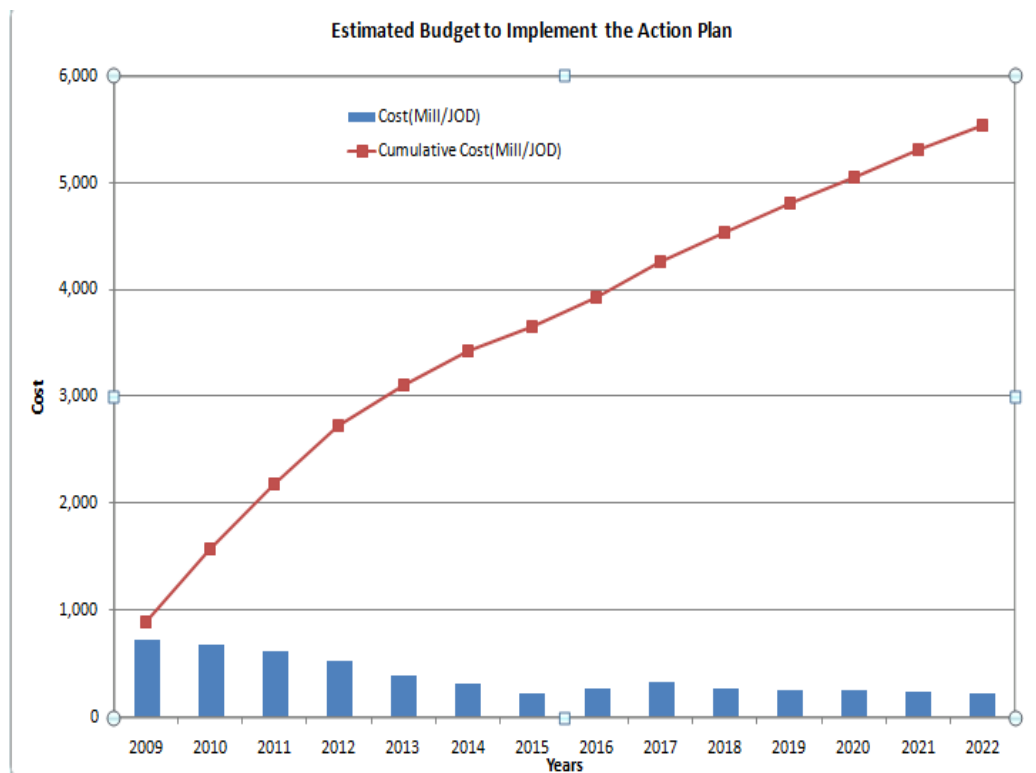
- **Improve resources management :**

- Surface water is efficiently stored and utilized;
- Groundwater management plans to ensure safe yield are operational;
- Continuous updating of the National Water Master Plan;
- Establish protection zones for groundwater and surface water;
- Define cap on groundwater abstraction for farming in the highlands;

- Jordanians are well aware of water scarcity and the importance of conserving and protecting our limited water resources;
- Our shared water rights are protected.

The Strategy Investment Plan: Investment Plan of the

Estimated Cost:



Budget's Estimates:

- Total Estimated Budget 5.86 Billion JD
- Average Yearly Budget = 419 Million JD including Jordan's share in PSP (BOT), evenly distributed over the Plan span

Strategic Projects

- Jordan Red Sea Development Project – Phase I 2009 - 2014
- Disi Water Conveyance 2009 - 2013
- Rehabilitation Projects 2009 - 2015

Overview - Selected Current Initiatives

- **Creating Water Distribution Utilities – Restructuring Middle**

Governorates:

Status:

- Concept about future Institutional Structure developed and approved by Cabinet;
- Outsourcing;

- Management Information Systems (GIS, Financial management) partially developed;
- Commercialization Concept for Balqa and Zarqa in development.

Next Steps:

- Prepare Draft Assignment Agreement and have it approved by decision makers;
- Prepare Management Contract documents;
- Collect financial and technical data as baseline;
- Start of new model during 2010.

- **Water Demand Management Program:**

- Instituted water demand management within the water sector through the development of 28 WDM functions; development of a Strategic Business Plan for the WDM Unit at MWI; development of a WDM policy. These were

developed through a participatory process that involved all stakeholders (more than 17 institutions);

- On-going process to prepare six Best Management Practices guides for: hospitals, offices, residential, park landscape, public information, and a guide for water use and reuse efficiency for high-rise and high density buildings. Most will be ready before the end of this year;
- Prepared code recommendations for high rise buildings. Recommendations are in final format available in English and Arabic;
- On-going effort with JISM to develop technical standards for plumbing appliances and fixtures.
- Support for the establishment of a water testing facility at RSS;
- On-going support to establish and institute a certified Master Plumber Vocational program through the International Association of Plumbing and Mechanical Officials (IAPMO);

- Promoted water wise parks in Jordan through several initiatives such as: completed a survey that tested the public's reaction to water-wise parks; trained engineers from 60 municipalities on water-wise landscaping; working with Jordanian universities to incorporate this concept within the curriculum for horticulture and landscape architecture degrees.

- **Community-Based Initiative for Water Demand Management:**

- 135 CBOs from all over Jordan received grants to establish revolving loan funds to benefit their local communities;
- 2,028 loans have been dispersed to rural residents to implement water savings/efficiency projects in their homes, as a consequence indirectly benefiting more than 10,950 individuals;
- 75,838 cubic meters of water was harvested by the rainwater harvesting cisterns built.
- 28,347 cubic meters of water was saved due to the residential network maintenance projects.

- **Reuse of Treated Wastewater:**

Status:

- Guidelines for use of treated wastewater, and brackish water are developed;
- More than 600 farmers and 40 extension workers were trained on safe and sustainable use of treated wastewater, including adapted use of nutrients;
- State monitoring program for vegetable produced on treated wastewater to secure product safety is established. JFDA is currently the Jordanian institution responsible sampling and analyzing vegetables for any biological or chemical contaminants.

Next Steps:

- Develop risk management system to ensure safe and sound waste water use from treatment plant to consumer;

- Train more farmers;
- Revise guidelines according to new international standards.

- **Greywater recycling:**

Status:

- Introduction of first modern greywater treatment plants for internal reuse in households and hotels in Jordan;
- Financial and technical monitoring system developed to enable scaling up of the approach.

Next Steps:

- Introducing greywater technology also in curricula of universities;
- Develop concepts for greywater reuse in urban households for external reuse and for low-income housing schemes;
- Involvement in revising of construction codes for high-rise buildings.

- **Water User Communities in the Jordan Valley**

Status:

- 21 Water User Communities (WUCs) which cover more than 70% of the JV;
- 6 WUCs received authority for water distribution from JVA; JVA only in charge for bulk supply up to the pumping station;
- 11 WUCs participate in water management on voluntary bases.

Next Steps:

- Establishing WUCs federation as representing WUCs;
- Preparing a WUC bylaw;
- Increasing the WUC coverage to 80% and the task transfer areas to 10 by 2010;
- Extending the transferred task to include the retail maintenance

- **Stakeholder Dialogue in the Highlands on Sustainable Groundwater Management**

Status:

- Studies undertaken;
- Stakeholder and Network Analysis initiated;
- Integrative workshop on Stakeholder Analysis on June 22;
- Interview process of key actors in the Highlands started.

Next Steps:

- Finalizing Interview process (July/ August 2009);
- Finalizing Stakeholder and Network Analysis;
- Develop recommendations for Stakeholder Dialogue which forms the base for sustainable solution concerning groundwater management in the Highlands;
- Develop potential pilot projects.

What we have already achieved

- Introduction of private sector expertise and commercial principles:
 - Management Contract for Amman 1999-2006;
 - BOT for Khirbet As Samra WWTP (Amman/Zarqa);
 - BOT for Disi conveyor project;
 - Set-up of two water companies owned by WAJ but working under private law and commercial principles;
 - Outsourcing of specific tasks to the private sector (e.g. Madaba: billing and revenue collection, planned: pumping stations operations);
 - Potential other PSP contracts discussed in various governorates;
 - Set-up of water sector audit unit to monitor the performance of the water service providers.
- Reduction of financial operational losses by 40% in the Northern Governorates from 2001-2005.

- GIS-based customer data base in most governorates.
- Improvements in Non-revenue water.
- Establishment of groundwater by-law.
- Handing over of distribution tasks in parts of Jordan Valley from JVA to Water Users.

Conclusion:

Water scarcity is a looming issue that will affect nearly half the world's population by 2030. This Strategy highlights the importance to tie water supply and sanitation to social protection, industry and trade, law, economic management, and public policy. Continuous assessment of community change and necessary policies is important to make certain a smooth transition to an equitable society as a result of cultural changes. Integrations among sectors to ensure stability after political and cultural reform is central to achieve the overarching goal of the strategy, which is maintaining sustainable water resources to achieve the national water security and to serve the overall development objectives.

References:

1. Ministry of Water and Irrigation, Water for Life – Jordan's Water Strategy (2008-2022); 2009.
2. Ministry of Water and Irrigation, National Water Master Plan; 2004.
3. Ministry of Water and Irrigation, Water Demand Management Policy, 2008.
4. USAID, 2007. Responding to the Water Crisis in Jordan.
5. USAID-KAF'AA, 2006, Final Report
6. USAID-WEPIA, 2005. Final Report
7. Hashemite Kingdom of Jordan. Joint Approach of Jordanian – German Co-operation in the Water Sector and Related Environmental Aspects; 2001.

8.