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INSTITUTING WATER DEMAND MANAGEMENT IN JORDAN (IDARA) EVALUATION



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EVALUATION OF INSTITUTING WATER DEMAND MANAGEMENT (IDARA) PROJECT IN JORDAN

Final Report

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LIST OF ABBREVIATIONS

ANSI	American National Standards Institute
ASEZA	Aqaba Special Economic Zone Authority
AWC	Aqaba Water Company
AWE	Alliance for Water Efficiency
BMP	Best Management Practices
CBI	Community Based Initiative
CBI WDM	Community-Based Initiative for Water Demand Management Project
CBO	Community Based Organization
CIS	Customer Information System
DAI	Development Alternatives Incorporated
EIS	Executive Information System
E-TVET	Employment – Technical and Vocational Education and Training
EU	European Union
GAM	Greater Amman Municipality
GDA	Global Development Alliance
GIS	Geographic Information System
GIZ	German International Cooperation (formerly GTZ)
HSBC	One of the international banks in Jordan
HUDC	Housing and Urban Development Corporation
ICI	Industrial, Commercial and Institutional
ICTU	Information and Communications Technology Unit
IDARA	Instituting Water Demand Management in Jordan
ISO	International Standards Org
ISSP	Institutional Support and Strengthening Program
IT	Information Technology
ITMP	Information Technology Master Plan
IWA	International Water Association
JAA	Jordan Architect Association
JCA	Jordan Contractors Association
JEA	Jordan Engineers Association
JHA	Jordan Hotel Association
JICA	Japanese International Cooperation Agency
JNBC	Jordan National Building Council
JOHUD	The Jordanian Hashemite Fund for Human Development
JRA	Jordan Restaurant Association
JSMO	Jordan Standards and Metrology Organization (formerly JISM)
KACE	King Abdullah II Center for Excellence
KAFA ‘A	Education/Information Program to Improve Irrigation Water Use Efficiency
KPI	Key Performance Indicator
M&E	Monitoring and Evaluation
MCA	Millennium Challenge Account
ME&A	Mendez England & Associates
MoENV	Ministry of Environment
MoIT	Ministry of Industry and Trade
MoMA	Ministry of Municipal Affairs

MoPIC	Ministry of Planning and International Cooperation
MoPWH	Ministry of Public Works and Housing
MoTA	Ministry of Tourism and Antiquities
MOU	Memorandum of Understanding
MoWI	Ministry of Water & Irrigation
NET	National Employment Training
NRW	Nonrevenue Water
O&M	Operation and Maintenance
PAP	Public Action Project
PMU	Project Management Unit
RIAL	Reuse of Industrial and Agricultural Landscape
RSS	Royal Scientific Society
SOW	Scope of Work (or Statement of Work)
UFW	Unaccounted for Water
ToT	Training of Trainers
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
UPC	Uniform Plumbing Code
USA	United States of America
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
VTC	Vocational Training Center
WAJ	Water Authority of Jordan
WDM	Water Demand Management
WDMS	Water Demand Management System
WDMU	Water Demand Management Unit
WEAP	Water Evaluation and Planning
WEPIA	Water Efficiency and Public Information for Action
WIS	Water Information System GIS
WOCAT	Water Organization Capacity Assessment Tool
WREC	Water Reuse and Environmental Conservation
WSD	Water Saving Devices
WU	Water Utilities
WUE	Water Utility Efficiency
YWC	Yarmouk Water Company

EXECUTIVE SUMMARY

The following report is the result of the findings of a mission to Jordan by the independent external evaluation team commissioned by Mendez England & Associates (ME&A) on behalf of the United States Agency for International Development (USAID)/Jordan pursuant to Task Order AID-278-TO-11-0000100001 under the Evaluation Indefinite Quantity Contract, No: RAN-I-00-09-00018. The report is an end-of-project review of the USAID-funded Instituting Water Demand Management (IDARA) project in Jordan, implemented by Development Alternative Inc. (DAI) between 2007 and 2011.

The main beneficiaries of IDARA interventions were the Ministry of Water and Irrigation (MoWI) and the three major water utilities in Jordan: Miyahuna Water Company, Aqaba Water Company, and Yarmouk Water Company. Additional recipients of IDARA support were four other ministries – Ministry of Tourism and Antiquities (MoTA), Ministry of Public Works and Housing (MoPWH), Ministry of Environment (MoENV), and Ministry of Industry and Trade (MoIT) - who collaboratively participated in the development of Water Demand Management (WDM) action plans for their respective ministry.

The primary focus of IDARA interventions was: 1) the establishment of a functioning and well trained Water Demand Management Unit (WDMU) within the MoWI; and 2) the development of a Water Demand Management System (WDMS) that captures utility customers' water usage and water savings data. The WDMS also has a forecasting module and a tracking module to assist the utilities in planning and managing their customers' water demands.

Implementation of the IDARA project focused on three main objectives:

- 1) Building institutional capacity for WDM
- 2) Creating the institutional and legal environment to promote WDM, and
- 3) Demonstrating selected WDM initiatives to the public

For each objective, overall targets were established in terms of expected outcomes for the end of the project. Some targets were quantifiable and others were more intangible. The results are detailed in Table 3, Overall Monitoring and Evaluation Matrix, in Chapter 2 of this report.

From the material gathered through a review of relevant documents and interviews with key project staff in Jordan, representatives from the various official government bodies, which were either directly or indirectly involved with IDARA, as well as local consultants employed on a short term basis for specific assignments, it is possible to conclude that IDARA largely met all of its targets both quantitatively and qualitatively. This is supported by the project's monitoring and evaluation reports depicting annual milestones achieved. It is further supported by the beneficiary organizations interviewed and from comments by the above-mentioned respondents.

The most noteworthy accomplishments of IDARA are listed in the Table 1, below, in order of importance for establishing sustainable WDM programs.

Table 1: Description of Achievements

Descriptions of Achievements	
1	A national WDM policy was developed and approved by the Council of Ministers.
2	Action plans were developed for the implementation of WDM policy in the MoTA, MoPWH, MoENV, and MoIT.
3	Water Use Efficiency Plans were developed for the three water utilities: Miyahuna Water Company, Yarmouk Water Company, and Aqaba Water Company.
4	A water-use efficiency tracking tool and demand forecasting model was developed for Miyahuna Water Company, Yarmouk Water Company, and Aqaba Water Company.
5	Technical standards were developed for efficient fixtures and equipment. So far, standards for lavatory and kitchen flow regulators, bidets, and toilets have been approved by Jordan Standards and Metrology Organization's Board, and technical regulations have been adopted.
6	The capacity of WDMU staff in a broad range of policy, institutional and technical aspects was strengthened.
7	Drafting of a new Water and Sanitation Plumbing Code for Jordan.
8	Retrofit of faucets and showerheads for approximately 3,450 houses in Amman, 700 in the Northern Governorates, and 300 in Aqaba as part of the baseline survey in the three utilities, Miyahuna-HSBC residential retrofit program, and Abu Nusseir pilot program.
9	More than 200 houses were provided with plumbing maintenance and retrofit services in the neighborhood of seven community-based organizations (CBOs) in Zarqa and Mafraq Governorates. Grants were provided to the seven CBOs to be used as revolving loans by their beneficiaries for the implementation of water-use efficiency projects.
10	Water-wise landscaping was integrated into the curriculums of German Jordan University, Jordan University, and Jordan University for Science and Technology.
11	A certified Master Plumbing program was established at the Vocational Training Corporation (VTC). Training of Trainers (TOT) on the Master Plumber program for 17 participants from VTC, United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), National Employment Training (NET), Ministry of Education, Royal Scientific Society (RSS), Jordan Standards and Metrology Organization (JSMO), and WDMU, was provided.
12	A laboratory was established at the RSS for testing residential plumbing fixtures and appliances.
13	Water and energy efficiency was integrated into the sub-criteria of King Abdullah II Center for Excellence (KACE) award for public and private sectors.
14	Abu Alanda Housing Competition for the design of a model water and energy efficient low-income housing apartment building was completed.
15	Engineers from 66 municipalities were trained on principles of water-wise landscaping, drought tolerant plant materials, and planting design. In addition, six water-wise landscaping parks were proposed for demonstration purposes; five have been fully constructed and are completed, the sixth one is currently under construction.

The evaluation team has drawn several conclusions from its findings and observations and has provided a number of recommendations related to specific WDM issues. Both conclusions and recommendations are listed below.

The main conclusions are:

- IDARA has worked closely with WDMU. The capacity building aspects of such work are obvious: IDARA has succeeded in institutionalizing the concept within the M oWI and equipping the WDMU staff with the skills needed to assume an effective role. The changes in the WDMU management have somewhat affected the continuity; however, the fact that the new management comes from the National Water Master Plan should help the unit assume a role that is part of the national water strategy and future planning. The unit should play a more active role in the water planning and allocation process. Currently, it has support from upper management but that may not be the case should there be changes in management. Therefore, it is important that the unit's active engagement in the planning process is institutionalized. WDMU should now assume a leading role in initiating all of its functions and implementing its own business plan; IDARA should only play a support role for the remainder of the contract, even if the contract is extended.
- Developing a second generation of leaders within the WDMU is needed both to enable a wider geographic spread and to help guarantee continuity in the services the unit could offer. While most of the staff consists of mid-level professionals, there is always the risk of them pursuing careers in the private or development sectors (it has happened in the past). Therefore, cross training is important for sustainability of the WDMU.
- Given the recent appointment of a new director in the WDMU, IDARA should invest some effort over the next two months to allow her to become more familiar and involved with the project and the various stakeholders that IDARA has worked with in order for the Director and her team to continue working and coordinating with the various stakeholders. Some of the key stakeholders have still not met the new Director.
- The work with the Action Plan Teams from the four Ministries has been very successful. The efforts in working in a participatory approach are evident and the counterparts from the different ministries recognize this. There is, however, a further need to build the capacity of relevant staff in some aspects of WDM to better enable them to implement such plans in the coming years. Some of the Ministries have already started implementing some of the initiatives identified in their respective action plans; however, they need further support to be able to fully implement these plans.
- IDARA was able to convince the utilities to each develop a Master Plan specific to water use efficiency (WUE) to promote WDM as one of the core businesses of each utility. Now the WUE plans are in place, and the utilities have started implementing the residential component of those plans with the support of WDMU and IDARA. Institutionalization of WDM in Jordan is highly dependent on the success of full implementation of the WUE plans of utilities. The utilities still need extensive technical

support to implement their plans and capacity building to institute WDM. This should be one of the key high-priority tasks of IDARA to follow-up on.

- The efforts on the development of technical standards for sanitary fixtures and water saving appliances have been tremendous. As a result, JSMO and other relevant organizations recognize the importance of WDM aspects and are taking necessary actions. However, there is a need to develop additional specifications and regulations as well as improve their enforcement.
- The building codes are another significant achievement (although not 100% finalized). Once they are finalized, there will be a need to develop guidance manuals and other materials in order to further educate building and trade associations and provide capacity building.
- IDARA has not focused on outdoor water use component of WDM at the domestic/urban level, which is something that should have been done, especially in the rural areas of Jordan. Because of its importance, this should be one of the task areas included in a follow-on project to IDARA.
- There is great potential for collaboration between IDARA and Aqaba Special Economic Zone Authority (ASEZA) and this opportunity needs to be taken into consideration. It would have been worthwhile to develop an action plan for ASEZA similar to the manner in which the four other Ministries participated. ASEZA should have been more involved in the code development process, as well. IDARA should follow-up with this activity during a contract extension, if it is awarded by USAID.

The key recommendations are:

- IDARA should continue to work with JSMO and other relevant agencies to develop technical standards for residential and commercial washing machines and dishwashers; urinals, roof tank float valves and control valves; and backflow prevention check valves for residential, commercial, and industrial applications.
- Once the new technical standards, plumbing codes and building codes all become law, IDARA should continue capacity building of various associations including, but not limited to, the Jordan Engineers Association, the Jordan Contractors Association, the Jordan Architects Association, all the municipal governments, the Jordan Hotels Association, the Jordan Restaurants Association, and all the universities in Jordan that have accredited mechanical, civil, and structural engineering curriculums or vocational plumbing trade curriculums.
- IDARA should continue to work with the appropriate technical committees to finish the two chapters proposed for the new Plumbing Code on Grey Water and Rainwater Harvesting.
- Water Authority of Jordan (WAJ) is responsible for overseeing small water and wastewater systems that serve approximately 20% of the Jordanian population. These systems are not served by any of the three major utilities. Thus, to be truly effective, the

WDMU should be collecting quarterly data from WAJ, using the same WDMS that was developed by IDARA for the other three major utilities. This activity requires developing a similar database, forecasting tool, and tracking tool for WAJ as was done for the other utilities. WAJ staff will also have to be trained on using those tools and database applications. Because of the extensive time required to develop these applications, USAID should include these activities in a follow-on project to IDARA.

- Expand the RSS water efficiency laboratory for it to be able to test commercial and industrial water savings devices and appliances. The lab should also become certified to meet the appropriate ISO standards. This could be one task area in a follow-on project to IDARA.
- MoWI has several independent Information Technology (IT) applications that are not integrated with each other; i.e. data cannot be shared or transferred from one system to another without exporting it, manipulating it into proper formats, and then importing or uploading it into another application. These applications include the Water Information System (WIS), the Geographic Information System (GIS), the Water Evaluation and Planning (WEAP), the WDMS and probably the new Executive Information System (EIS), which is just getting underway for design and implementation. This practice is archaic, time consuming, and impractical for making timely decisions. What is needed is a complete integration of all the computer applications by creating direct linkages to all of them. USAID should consider expanding the existing Scope of Work (SOW) of the Information Technology Master Plan (ITMP) project to include the development of an overall IT strategic plan for the MoWI and the development of direct linkages interconnecting all the IT applications mentioned above. This work should be coordinated through the Information and Communications Technology Unit (ICTU) within the Ministry.
- One of IDARA's U.S. subcontractors, Aquacraft, conducted a comprehensive end-use analysis program that covered 95 residential units countrywide. The draft report received from Aquacraft on May 13, 2011, showed that approximately 11% of the water used was due to internal leaks. In general, non-revenue water (NRW) and unaccounted for water (UFW) are specialized areas where not much work has been done through USAID. There was one previous USAID-sponsored project specifically for Miyahuna Water Company, in which a 14-step action plan was developed but has not yet been implemented due to lack of funding by the utility. The Miyahuna NRW pilot program included a component of indoor water loss. All three major utilities have undertaken leak detection and leak repair activities on their networks and service connections. However, leaking pipes are only one source of NRW and UFW. There are also other technical and commercial losses that need to be discovered and corrected such as: 1) leaking valves, pumps, storage tanks (reservoirs), blow-offs, and hydrants; and 2) meter inaccuracies, malfunctioning meters, internal leaks, tampered meters, illegal connections. All of these activities should be investigated in detail by providing technical assistance to the three major utilities and WAJ to demonstrate proper techniques to reduce NRW and UFW in accordance with best international management practices, including using the water balance categories developed by the International Water Association (IWA), as shown in Annex E. NRW is also considered in the WUE plans of the utilities as part of WDM forecasting. Based on Aquacraft's reported results, both indoor water loss and urban NRW and UFW should be part of the follow-on IDARA project. USAID should include

these activities, as well as the implementation of Miyahuna's proposed action plan, in a new project that focuses exclusively on NRW and UFW in the utilities' (including WAJ) operations and in irrigation operations. Both commercial and technical losses should be investigated and programs must be developed to minimize or eliminate such losses.

- The Port of Aqaba presents many opportunities for improving water use efficiencies. The container ships and other types of ships need to wash down their decks and cargo holds using high pressure hoses. This activity should use treated reuse water instead of fresh water, and the reuse water should be sold to the ships through an established tariff. The ships also re-fill their freshwater supplies before sailing on to the next port. This water should be sold to the ships by Aqaba Water Company (AWC) through a bulk meter. Finally, the ships discharge their bilge and sewage in each port. There should be special trucks or barges acting as collection vessels to prevent these discharges from going into the Gulf of Aqaba and then transport the collected waste and empty it into the wastewater treatment plant headwaters to be properly treated and reused. USAID must consider studying this situation and adding these activities to the SOW of the Water Reuse and Environmental Conservation (WREC) project and coordinate such activities with AWC and ASEZA.
- Climate changes, drought management and emergency preparedness are three areas where not much work has been done through USAID. Emergency preparedness includes drought preparedness and other types of emergencies that could cause interruptions in the operations of water utilities (WUs). Each utility and WAJ should be required to have an emergency preparedness plan as part of their strategic plans. Technical assistance should be given to the WDMU and the National Master Planning Unit (NMPU) to encourage them to require emergency preparedness plans to be developed by the three major utilities and WAJ and updated every five years. The technical assistance could also be given directly to the utilities and WAJ to help them prepare such plans. Because of the extensive time required to fully explore these issues - especially the effects of climate changes in Jordan - and develop the emergency preparedness plans, USAID should consider including these activities in a follow-on project to IDARA.

1.0 INTRODUCTION AND BACKGROUND

1.1 Purpose of the Evaluation

This evaluation report has been commissioned by ME&A on behalf of USAID/Jordan. It represents the findings of an external and independent assessment of USAID's IDARA project implemented by a consulting consortium led by DAI. According to the SOW, the objective of the evaluation is to evaluate the performance of the project and identify the areas and tasks pertaining to WDM – in the municipal, commercial and industrial sectors – that remain to be addressed in potential future projects. Essentially, the evaluation team's brief was to:

- Review the activities of the project from its inception through its duration from March 2007 – July 2011
- Identify strengths and weaknesses, constraints and obstacles encountered during its implementation
- Provide recommendations to USAID for one or more potential follow-on projects

1.2 Background on Jordan's Water Sector and Water Demand Management in Jordan

Located in the heart of the Middle East, Jordan is a small country with a present population of nearly 6 million people. Since its independence in 1946, Jordan has had one of the fastest growing populations in the world: from only 0.25 million in 1946, its population is expected to reach 8.3 million by year 2025 according to a General Department of Statistics publication. Population increases, coupled with successive years of water shortage, are further straining the country's water resources availability as well as increasing competition among sectors for water resources.

Today, Jordan is one of the poorest of five countries in the world in terms of water resources. Projections of water availability per capita show a drastic drop from 3600 m³/capita/year in 1946 to 145 m³/capita/year in 2008. This is less than one third of the widely recognized “*Water Poverty Line*” of 500 m³ per capita per year¹. Water availability for domestic use is proving to be an issue of extreme urgency to address and resolve by public and government, as it is becoming a common topic among Jordanians for public discussion. This drop in water availability for domestic use in Jordan is the direct result of two factors: growth and the downward trend in rainfall. For instance, Jordan's projected growth in population for the year 2025 is 8.3 million, an increase of 125% in less than 15 years. The second factor is the regional downward trend in rainfall that is noticed for the past 20 years resulting in lower volumes of available water for the different economic sectors in Jordan. Responding to this perilous situation, the Government of Jordan declared its commitment to secure the domestic sector with the much needed volumes of water. However, this is coming at the expense of depleting groundwater reservoirs. The depleted Azraq Basin is a witness of the environmental dangers resulting from such actions. Despite the grim situation, water authorities of Jordan have done an excellent job of delivering water to the population at large. Public water supplies in Jordan are

¹ Jordan National Strategy, 2008

presently serving 98% and 92% of urban and rural residents, respectively. However, this large accessibility is operated on a supply basis rather than a demand one, resulting in an extreme pressure on the limited water resources and leading to a situation where intermittent water supply has become the acceptable norm for the majority of Jordanians. Operating on an intermittent basis, results in limited availability of water despite the accessibility to water supply service. Furthermore, intermittent water supply can result in water quality deterioration due to high pressure in the network, which can loosen sedimentary material that has accumulated inside water pipelines. Such accumulations usually dislodge and end up in water storage facilities (i.e., rooftop and underground storage tanks). Unfortunately, the majority of the population does not maintain their storage facilities, resulting in large accumulations of deposits that can alter and deteriorate the quality of delivered water.

Another consequence of the intermittent water supply is the inequitable availability of water supply, despite of the equitable access. High income people can afford to increase the capacity of their household storage facilities, or purchase additional trucked water, or bottled water. However, low income people usually settle for the water delivered through the network, regardless of its quantity or quality. The increasing water deficit year-on-year poses a serious future threat that will impact all sectors if not addressed properly. Therefore, the most viable and feasible short-term option available to the country is management of its water demand to a more effective use of the current water supply, in addition to embracing water use efficiency throughout the country.

1.2.1 Jordan Water Supply In Brief

As mentioned above, Jordan has one of the lowest levels of water resources availability, per capita, in the world. Water scarcity will become an even greater problem as the population grows fast and climate change potentially makes precipitation more uncertain and variable, particularly in this region. Management of water resources is, therefore, a key issue facing national government authorities. Increasing overall water extraction to meet demand carries a high cost; Jordan is now accessing non-renewable water resources from fossilized deep-water aquifers. Water quantity and quality also have major health and environmental impacts. Assessing those impacts against alternative water management and efficiency strategies, and in the light of policy costs and economic development issues, can optimize the use of a scarce resource.

Water resources are meager in relation to population size and amount of arable lands. Both surface and underground waters are highly dependent on rainfall; thus, fluctuation in rainfall is a great hazard for both the population and the environment. Presently, Jordan is over-exploiting its water resources. Aquifers are found throughout Jordan from which safe production levels were and still are being vastly exceeded. Many aquifers go out of production every year because of a decline in the quality and quantity of their waters. Consequently, water levels are dropping, groundwater resources are being mined, and domestic water supplies do not reach adequate standards. The problem of water scarcity in the country is escalating as the demand for water increases dramatically along with the population. The result is that water managers must struggle to keep taps flowing without compromising water supplies for future generations.

The renewable water resources in Jordan are estimated at about 775 million cubic meters per year (mcm/yr). The safe yield of groundwater is 275 mcm/yr, and the actual abstraction is 180% of the safe yield, and 692 mcm/yr of surface water, of which 68% can be developed economically. An additional 143 mcm/yr comes from fossil aquifers and a further 50 mcm/yr is expected to be accessible for urban uses after desalination. The present water supply is short of the water demand by 491 mcm.

Furthermore, Jordan is facing an unremitting imbalance between the total sectoral water demands and the available supply of freshwater. The scarcity of water in Jordan makes the management of this critical resource very complex from a political, technical, socio-economic and environmental perspective. By 2020, the total demand for water is expected to increase to 1,686 mcm because of the large increases in population, improvements in living standards and growth in economic activity. While the total water supply is expected to be around 1,250 mcm, a shortage in supply of around 373 mcm will remain and will have to be managed through appropriate demand-reduction programs.

1.2.2 Governmental and Donor Remedial Programs to Combat Water Shortage

A more efficient and well-planned use of water can result in significant savings in fresh water. In the absence of new water resources, such savings in water can be considered as new sources. One approach that has been successfully implemented worldwide is the implementation of strategic water efficiency and educational programs. The savings resulting from such programs often translate into capital and operating savings, allowing water management entities to defer or avoid significant expenditures for water supply facilities and wastewater facilities. For instance, an assessment conducted by the United States Environmental Protection Agency (USEPA) found that the efficient use of water, through *behavioral, operational, or equipment changes*, if practiced broadly, could help mitigate the effects of drought. The USEPA's assessment also indicated that efficiency measures and demand management could also save the homeowners money on their water and energy bills. USEPA cited a number of measures that could improve domestic water use efficiency and demand management. For example, in the bathroom, where over half of all the water is used, such practices as not letting the water run while shaving or brushing teeth, taking short showers instead of baths, turning off the water while soaping or shampooing, could result in significant savings at home. USEPA's assessment emphasized the importance of supplementing such behavioral practices with the utilization of proper water efficiency equipment (i.e., water saving devices), since they could save about 30% of indoor water use and yield substantial savings on water, sewer, and energy bills. As important as those behaviors and technologies is the creation of an enabling environment that promotes demand management. In the United States, numerous water systems have successfully implemented water efficiency and demand management programs. Such water systems range in size from small to very large, and their efficiency programs incorporate a wide range of techniques for achieving various water management goals. The results of such systems have been extremely encouraging with some of these systems reporting savings valued at millions of dollars annually.

In past years, the Government of Jordan has developed extensive water resources management schemes. In addition, several donor agencies such as USAID, the German Technical Cooperation (GTZ), the Japanese International Cooperation Agency (JICA), and many others, have invested billions of dollars in water related projects aimed at solving or reducing water scarcity in Jordan. There has been a number of donor funded activities that specifically address water use efficiency and awareness for the municipal, industrial, and agricultural sectors.

1.3 Background to the IDARA Project and its Activities

USAID has implemented a number of projects in the Jordan water sector. While some of those have focused on infrastructure development and expansion, several of them have focused on some aspects of efficiency and WDM. USAID's efforts to support WDM started in 1999. They have mostly focused on urban water use; however, some of their projects have also promoted demand management in other sectors. The following is a summary of the key USAID activities related to WDM in Jordan:

- In 1999, USAID initiated the Water Efficiency and Public Information for Action (WEPIA) project to promote water conservation among Jordanians and introduce water demand management principles
- In 2003, USAID initiated the Education and Information Program to Improve Irrigation Water Use Efficiency (KAFA'A) that aimed to initiate water conservation among Jordanian farmers in selected areas
- In 2006, USAID started the Community-Based Initiative for Water Demand Management Project (CBI-WDM). This project aims to enable poor communities in rural areas establish water efficiency programs
- In 2007, USAID launched IDARA

In addition to the above projects, there have been a number of other USAID water projects that have had various components that related to the promotion of WDM. Those included:

- Reuse of Industrial and Agricultural Landscape which, among other things, promoted the re-use of reclaimed water
- Ground Water Monitoring Project, which helped the WAJ enforce the Ground Water By-Law
- Public Action Project, which focuses on awareness related to the efficiency of water and energy use in Jordan

Table 2, next page, graphically depicts USAID's efforts and projects related to WDM in Jordan over the past 12 years. The table presents very brief summaries on the focuses of such programs from a WDM context and shows where the sector stands in terms of future steps for continuing such initiatives.

As can be seen, with the help of these USAID initiatives, WDM is now recognized as a viable option, which needs to be pursued together with new water supply development. However, instituting this in Jordan needs further USAID support and a major objective of this evaluation effort was to identify what kind of support is still needed and what opportunities offer wider dissemination and institutionalization of this concept. The IDARA project can be viewed as the most successful WDM project in Jordan because it truly has reaped benefits that several other projects could not do. In particular, it made important progress towards institutionalizing a national WDM policy, by finalizing the policy and setting up and strengthening its implementation structure, as well as the other notable achievements mentioned in the Executive Summary of this report.

Table 2: USAID’s Efforts and Projects Related to WDM in Jordan (1999 – 2011)

Project	Year												
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
WEPIA	<ul style="list-style-type: none"> Promote water conservation among Jordanians. Introducing WDM principles Laid the foundation and created the enabling environment for DM 												
KAFA’A					<ul style="list-style-type: none"> Initiate water conservation among farmers Demonstrate need for certification to increase the value of water used Disseminated many water efficient practices. 								
CBI							<ul style="list-style-type: none"> Enable poor communities in rural areas establish water efficiency programs Improve the inhabitants’ daily lives and promote citizen participation Enabling communities across Jordan to reduce water demand through improved management. 						
IDARA								<ul style="list-style-type: none"> Build up on WEPIA’s successes Create an enabling environment for WDM 					
GMED					<ul style="list-style-type: none"> WDM at the macro level through metering private wells Supporting the groundwater by-law 								
RIAL						<ul style="list-style-type: none"> Promote and build the capacity for treated waste water reuse as one mean of WDM. Focus on industrial use, agricultural and landscape 							
WREC												Build upon RIAL successes	
PAP												Promote efficiency and conservation initiatives for water and energy	

2.0 GENERAL OVERVIEW OF QUANTITATIVE DATA

2.1 Introduction

In order to evaluate IDARA fully, an understanding of the project's performance in relation to its specific quantitative metrics is critical. A table has been prepared to allow a 'snapshot' view of the relevant indicators and the actual results achieved. More detailed findings and observations are presented in text in the following sections with regard to each of the IDARA objectives: 1) Building institutional capacity for WDM; 2) Creating the institutional and legal environment to promote WDM; and 3) Demonstrating selected WDM initiatives to the public.

2.2 Presentation of the Quantitative Table

Table 3, Overall Monitoring and Evaluation Matrix, summarizes the overall findings of the evaluation team from the assessment of the IDARA project in Jordan. The table depicts the expected and achieved results for the three project components over the lifetime of the project. The figures presented here are based on the monitoring and evaluation (M&E) reports received from the IDARA staff. Where it was obvious that targets would be achieved within the remaining months of the project, they have been included.

Table 3 – Overall Monitoring and Evaluation Matrix

Task	Performance Indicators Original/Revised (Plan)	Cumulative targets for 4 years	Cumulative achievements for 4 years	Status (%)
	Overall Objectives:			
	Total number of people (participants in the project) trained	1345	2300	>100%
	Number of beneficiaries (Jordanian citizens assisted along the supply chain)	5000	>18,000	>100%
1.1	Build consensus on WDM functions and institutions as part of the water sector reform and restructuring			
	No performance indicator defined		Achieved	100%
1.2	Institute planning, allocation, and monitoring functions at the WDMU			
	WDMU Policy Milestone Scale Score Scale 1 to 8	7	year 1: stage 6 year 2: stage 7 year 3: stage 7 year 4: stage 7	
	Number of linkages formed to support WDM functions and programs	40	46	>100%

Task	Performance Indicators Original/Revised (Plan)	Cumulative targets for 4 years	Cumulative achievements for 4 years	Status (%)
	Number of institutions with improved water-use and demand management information	17	19	>100%
1.3	Strengthen the MWI Planning Directorate by establishing a national water use information program			
	Number of sources included in national water use information systems water users	18	18	100%
1.4	Perform end-use analyses			
	Number of stakeholders involved with the end-use analyses	12	11	92%
	Number of information gathering or research activities	4	5	>100%
	Number of end-use analyses carried out independently by MoWI and utilities	52	42	81%
1.5	Assist in the establishment of a decentralized system for water demand management functions			
	Score on the Water Organization Capacity Assessment Tool (WOCAT). Maximum 42 points possible	Miyahuna: 32.5 AWC: 32.5 YWC: 31.3 WDMU: 32.8	final score: Miyahuna: 30 AWC: 30 YWC: 27 WDMU: 30	91%
1.6	Develop BMP guides on conservation of nonagricultural water and high rise buildings			
	Number of best management practices (BMP) guides	7	7	100%
	Number of stakeholders involved in the development of BMPs	NA	78	100%
1.7	Provide training and capacity building to promote water demand management			
	Score on the Water Organization Capacity Assessment Tool (WOCAT). Maximum 42 points possible	Miyahuna: 32.5 AWC: 32.5 NGWA: 31.3 WDMU: 32.8	final score Miyahuna: 30 AWC: 30 YWC: 27 WDMU: 30	91%

Task	Performance Indicators Original/Revised (Plan)	Cumulative targets for 4 years	Cumulative achievements for 4 years	Status (%)
	Average score on individual skills assessment rating	3	3	100%
	Number of training participants	770	1543	>100%
1.8	Introduce and promote drought response principles in the water community			
	Number of information gathering or research activities related to drought response principles	6	2	33%
	Number of drought response principles that have been introduced and promoted by utilities and WDMU	6	0	0%
1.9	Design, administer, and institutionalize a yearly event to recognize individuals, institutions, and industries that help advance water efficiency			
	Number of organizations who scored on the water efficiency sub-criteria under the King Abdullah II Center for Excellence Award	130	130	100%
2.1	Assist in creating a stakeholder-driven WDM policy program			
	Number of stakeholders involved in policy change	244	251	>100%
2.2.1	Develop a national standardized plumbing code			
	Total number of people trained on the new codes	100	176	>100%
2.2.2	Draft a report that recommends to MoWI the specifications on water that need to be incorporated into a potential High-rise Building Code			
	Number of recommended practices to include in High Rise Code	5	20	>100%
2.3	Implement a plumbing materials certification program			
	Number of technical standards drafted for Jordan	7	7	100%
2.4	Establish a “master plumbers” vocational training program at the VTC			

Task	Performance Indicators Original/Revised (Plan)	Cumulative targets for 4 years	Cumulative achievements for 4 years	Status (%)
	Number of master plumbers trained in certification programs	135	90	67%
2.5	Prepare a work plan to implement a labeling program			
	Number of research and information gathering activities to identify the types of appliances and fixtures with labels in place in the market	2	2	100%
	Number of stores/shops that carry labeled appliances and fixtures	Incorrect indicator as IDARA task was to conduct market survey and develop a work plan for labeling of water-using fixtures and appliances		100%
2.6	Identify WDM enforcement mechanisms and recommend the most feasible			
	Percentage of plumbing code enforcement recommendations accepted by the Government of Jordan / MoWI	100%	100%	100%
2.7	Develop mechanisms to finance the implementation of WDM projects			
	Number of mechanisms to finance the implementation of WDM projects in place	11	15	>100%
	Dollar value of financial instruments in place	\$545,000	\$ 553,505	>100%
3.1	Expand the urban landscape program introduced by WEPIA			
	Number of water-wise public parks landscaped designs developed for public parks	6	12	>100%
	Number of people trained in water-wise landscaping principles	235	281	>100%
	Number of public parks converted/ or created based on water-wise landscaping principles that are maintained after project resources end	6	6	100%

Task	Performance Indicators Original/Revised (Plan)	Cumulative targets for 4 years	Cumulative achievements for 4 years	Status (%)
	Number of institutions of higher-education adopting water-wise landscaping principles into their curriculum	2	3	>100%
	Number of university agricultural students completing classes which include water-wise landscaping principles	210	160	76%
3.2	Host a competition for the best low-income, water-efficient houses in the highland and Jordan Valley areas			
	Number of design entrants to competition	was never fixed	14	N/A
	Number of strategies developed to finance building of prototypes or mass construction based on designs	none	None	0%
3.3	Provide plumbing services and plumbing fixtures to rural areas			
	No of homes in rural areas provided with plumbing services and/or water saving devices or other plumbing equipment	320	327	>100%
3.4	Implement best management practices in pilot areas			
	Number of BMPs implemented by utilities	9	9	100%
	Number of customers benefitting by implementation of BMPs	4200	13,978	>100%

2.3 Findings and Observations

- a) From the data gathered, reviewed and analyzed by the evaluation team and summarized in the above table, all the main quantitative key result indicators have either been met or, in several cases, exceeded.
- b) The indicators at the overall objective level score more than 100 % and clearly show the high engagement level of the project. The number of people trained is almost double of what was planned and the number of citizen beneficiaries is very high (over 18,000). It should be remarked that this number is not the merit of IDARA alone; W Us, Mercy Corps, and the HSBC bank have played their positive role as well.
- c) With regard to institutionalizing WDM, the indicators show an average performance of close to 100%. The project has scored well on most indicators and is within the reach of

the original targets to achieve its objectives. This concerns the institutionalization of the policy and planning processes within the WDMU as well as within WUs and the Ministries. The Water Organization Capacity Assessment Tool (WOCAT) score for WDM functions for the utilities reached a satisfactory score of around 30 out of 42 maximum possible, with some increase still expected until the end of the project (target of 32 may be achieved). This indicates that, although the project has achieved its targets, some work remains to be done. WUs have not fully followed up on end-use analyses as expected. This is certainly due to the fact that they seem to need more time (in particular Yarmouk Water Company (YWC) and Miyahuna) to completely absorb the expectations put upon them by their new WDM functions. In Aqaba, the in-house water savings do not have the same priority as in the other utilities. The introduction of drought response principles in the water community scores low; the subject has been insufficiently addressed, even though this was improved substantially through IDARA's participation in the Efficiency 2011 conference. The participation of the private sector in the award assignment of KACE is somewhat disappointing but this seems out of the control of the project. In the future probably more promotion of the award should take place by KACE, which could also be supported by future USAID activities.

- d) With regard to enabling the institutional and legal environment, the indicators show an average performance of over 100%, with exception of the numbers of master plumbers trained in certification programs. The achievement of indicators, in general, clearly shows that the preparation of the plumbing code and additional training and dissemination activities were a major success of the IDARA project. The number of trained master plumbers is below expectations as the program was rescheduled and only started in 2010. The late start was due to the fact that the curriculum could only be developed after the plumbing technical specifications were completed, which did not happen until March 2010. The delay was largely outside the control of IDARA; however, the number of trainees was too optimistically planned originally. The 2010 training program met expectations but, so far, not enough plumbers have been trained.
- e) With regard to the demonstration of selected WDM initiatives to the public, the indicators show an average performance of close to 100%. In terms of the urban landscaping program, IDARA scored very well on training of municipalities and designs of parks but had some problems with implementation of designs supported by the project. Thus far, five parks have been constructed and are being run sustainably by their municipalities. For one park the design is ready and construction has just started (this delay is caused by problems such as change of mayors, which are outside the control of the project). Two of the municipalities that installed parks - Deir Alla and Mafraq - hired full-time maintenance personnel in order to properly maintain the parks.
- f) The number of students completing classes in water-wise landscaping is somewhat below expectations. It should be noted here that in the German Jordan University only Iraqi students took classes in water-wise landscaping. This is mainly due to the fact that Jordanian students tend to concentrate on courses that generate income later; they consider that water-wise landscaping is not one of these (comments made by the University staff during the interviews). Making interpretations of the scored percentage of 76%, it should also be noted that a considerable part of this score was achieved by students following a special well-advertised and innovative course on water-wise landscaping. Far less students than expected are following the traditional curriculum

courses. All-in-all, the number of students remains below expectations.

3.0 EVALUATION OF OBJECTIVE 1: INSTITUTIONAL CAPACITY FOR WDM

The overall purpose of this objective was to strengthen the institutional capacity for WDM in a number of entities in the water sector. These include mainly the WDMU in MoWI and the three privatized water companies in Jordan, Miyahuna, YMC and AWC, which provide approximately 80% of Jordan's drinking water supply. As WDMU and IDARA have reached out to other Ministries, JSMO, universities, VCT, RSS, municipalities, KACE and others, some indirect institutional strengthening - mainly in the form of capacity building (ToT, training courses and learning-by-doing) - has taken place in these institutions as well.

Objective 1 includes a number of performance indicators for the various tasks that had to be completed under this objective. Table 4, below, summarizes to what extent the various tasks were completed.

Table 4 – Objective One Task/Subtask Completion Status

Task/Subtask Descriptions	Level of Achievement (actual)	Sources of Verification	Data Collection Method	Comments
Task 1.1: Build consensus on WDM functions and institutions as part of the water sector reform and restructuring	Full consensus was reached culminating in a WDM Policy for Jordan (100% achieved)	WDM Policy document; MoM consultation meetings	Meetings with IDARA and stakeholders; WDM Policy	This task was completed early in the project; interviews show good consensus
Task 1.2: Institute planning, allocation, and monitoring functions at the WDMU	Organizational setup of WDMU has been completed; WDM Policy finalized; Action Plans with Line Ministries; WDM database(95% achieved)	WDM Policy; action plans; WDM database	Meetings with IDARA, WDMU, line ministries with actions plans, 3 water utilities	This task is largely completed; data still needs to be received from the WUs on the impact of WDM Link with the WIS not yet established and problematic
Task 1.3: Strengthen the MoWI Planning Directorate by establishing a national water use information program	The activities implemented were part of the WDM database mentioned under Task 1.2	WDM database	Meetings with IDARA, WDMU	No separate comments; should be considered part of task 1.2

Task/Subtask Descriptions	Level of Achievement (actual)	Sources of Verification	Data Collection Method	Comments
Task 1.4: Perform end-use analyses	Residential End User report produced; water saving devices installed in households (100% achieved)	Project reports; interviews with Utilities	Meetings with IDARA and water utilities	The analysis delivered unexpected results which are very valuable for further planning of WDM. The success of WSD cannot yet be fully assessed
Task 1.5: Assist in the establishment of a decentralized system for water demand management functions	KPIs developed; WUE plans prepared for all 3 utilities; tracking tools installed; outreach to private sector (95% achieved)	KPI documents, WUE plans, tracking tool operational; workshop MoM	Meeting with IDARA and water utilities	Tracking tools are not fully operational (links with customer databases in YMC; links with business plans in YMC and Miyahuna)
Task 1.6: Develop BMP guides on conservation of nonagricultural water and on high rise buildings	Seven guides are delivered (100% achieved)	Guides	Meeting with IDARA	No comments; guides seem adequate
Task 1.7: Provide training and capacity building to promote WDM	Large number of training sessions provided; not completed yet (95% achieved)	IDARA progress reports	Meetings with IDARA	A small number of trainings still pending
Task 1.8: Introduce and promote drought response principles in the water community	Draft Drought Guidelines; Efficient 2011 Conference (90% achieved)	Draft Report Conference Website	Meetings with IDARA; consultation conference website	It seems that the drought exercise is not fully completed; more work should be planned in IDARA extension
Task 1.9: Design, administer, and institutionalize a yearly event to recognize individuals, institutions, and industries that help advance WE	K.A. II Centre for Excellence has been supported/trained for the integration of water efficiency criteria in public and private sector award (100% achieved)	Project reports	Meetings with IDARA and KAII Centre for Excellence	No comments; adequate award procedure in place

3.1 Task Initiatives and Qualitative Evaluation

The implementation has been carried out within nine different tasks (some divided in sub-tasks), which are briefly discussed hereafter.

Task 1.1: Build consensus on WDM functions and institutions as part of the water sector reform and restructuring

IDARA has built consensus on WDM functions and institutions as part of the water sector reform in Jordan. For this purpose, a Task Force was set up that included water sector institutions (Ministries, the PMU within MoWI, water supply companies), authorities like ASEZA and Greater Amman Municipality (GAM), donors like USAID and GIZ, and civil society (JEA, JOHUD). The Task Force conducted a number of working sessions and prepared a draft WDM institutional set-up documents, which was discussed and agreed upon with a larger number of stakeholders. In particular, the role and functions of the WDMU were defined for them to become the lead coordination and facilitation entity, and all the other institutions would assume an operational role in implementing WDM. The activity was completed in November 2007, early in the IDARA project. Key deliverables were three restructuring scenarios, a workshop to discuss these scenarios, and a resulting final restructuring scenario including an institutional framework for WDM.

Task 1.2: Institute planning, allocation, and monitoring functions at the WDMU

IDARA has further strengthened the WDMU. The organizational structure of the WDMU has been assessed and operational procedures for the linkage of the unit to the other entities in the water sector have been established. These included the water utilities YWC, Miyahuna and AWC and, occasionally, WAJ.

The project has assisted MoWI in the preparation of a WDM policy through the preparation of discussion documents and draft policy elements, through discussing these policy elements in a number of workshops with all relevant stakeholders (covering both urban and agricultural WDM), and through preparing a final draft policy document, which was adopted and finalized by MoWI. Under the same task, linkages have been identified between the WDMU and other organizations such as line ministries that can play a role in WDM. Action plans to implement WDM options have been developed for four different Ministries: MoTA, MoPWH, MoENV and MoIT. Portions of these action plans have already been implemented.

IDARA has designed and implemented a database for WDM in the WDMU. This database is operational since late 2010 with 3 years of consumer data from the WUs. The first data that include the results of water saving measures are expected any moment. A linkage with the WIS in the Ministry is under discussion but not yet realized.

Key deliverables have been a number of reports (assessment WDMU structure, gap analysis, transformation guidelines, a strategic business plan, a draft policy paper, training plans, procedures for collection of WDM data, a WDM database needs assessment and design), a National Water Demand Management Policy, Action Plans with four Ministries, and a number of workshops to discuss the WDM policy and the Actions Plans. Moreover, IDARA has delivered a WDM database in the WDMU, which serves to track developments of WDM in the water utilities and the ministries outside the water sector.

Task 1.3: Strengthen the MoWI Planning Directorate by establishing a national water use information program

IDARA has strengthened the MoWI Planning Directorate by establishing a national water uses information program. The project has defined sources of information for water uses, which have been included in the WDM database under Task 1.2.

Key deliverables are the assessment of current and available data, a planning document for the national water use information program and a functional water uses information program, which is part of the WDM database under Task 1.2.

Task 1.4: Perform end-use analyses

The project has performed end-use analyses in the service areas of all three WUs. The end-use analysis included residential areas, hotels, schools, universities and office buildings. For the residential analysis it was also studied how socio-economic factors influence end-use characteristics.

Based on the results of the end-use analysis, the most promising water saving measures were defined and earmarked for water use efficiency measures in the WUE plans. For residential areas, approximately 2400 homes were retrofitted by IDARA with water saving devices (WSD) on tap, showers and toilets. The utilities, using their own funds, and supported by additional funds of HBSC Bank, were able to distribute additional WSDs to end users. The retrofitted homes are earmarked in the utilities' customer databases and all three utilities are following up on water saving information.

A model was developed to perform demand forecasting and tested in GAM/Miyahuna service areas; this activity was further pursued under Task 1.5. Key deliverables for this task were the Residential End Use report and Water Demand Forecasting scenarios for the Water Utilities.

Task 1.5: Assist in the establishment of a decentralized system for water demand management functions ask

The project has supported WUs to implement WDM functions. In coordination with the WDMU, IDARA developed key performance indicators (KPIs) for monitoring the implementation of WDM measures. The KPIs include financial aspects such as water savings, avoided costs, and payback for WDM, which enable the utilities to estimate their incentive for implementing WDM.

Moreover, IDARA has assisted the WUs in establishing WDM functions. After an intensive dialogue - in particular with Miyahuna but also with the other utilities - on all aspects of WDM and how to proceed with the institutionalization of WDM, it was decided to develop WUE plans for all three utilities. At the same time a tracking tool - developed by the North American Alliance for Water Efficiency (AWE) - was introduced in order to enable WUs to follow up on progress made with WDM.

In the framework of this task, IDARA has also informed the private sector in the utilities' service areas on options for WDM including water/energy saving options. Additionally, a number of private companies have been trained to do water audits for the private sector (hotels, industries).

Key deliverables for this task included KPIs, WUE plans, acquisition and installation of WDM tracking tools, training sessions on leak detection, water audits, code enforcement, marketing and providing WDM services, communication tools and opportunities for WDM products, and workshops for the private sector to become accustomed to WDM issues.

Task 1.6: Develop Best Management Practices (BMP) guides on conservation of nonagricultural water and on high rise buildings

IDARA has developed BMP guides on conservation of non-agricultural water and for high rise buildings. The project has developed 9 guidelines for the conservation of non-agricultural water of which, 6 have been transformed to guides for hospitals, hotels, offices, residential, park landscaping, and public information. In addition, a High Rise BMP Guide has been developed and discussed with GAM. Key deliverables for these tasks were the seven aforementioned guides.

Task 1.7: Provide training and capacity building to promote water demand management

IDARA has provided training and capacity building to promote WDM. This training covered general training on WDM policies, WDM strategic planning, change management, high rise efficient water use and reuse, development of water efficiency plans, public information and education, etc.

In addition, IDARA trained WDMU and WUs staff on all WDM aspects, including conducting audits, end-use analysis, retrofitting, water use efficiency planning, water demand forecasting, development of BMPs, water-wise landscaping, labeling and many others.

Key deliverables were an Industrial, Commercial and Institutional (ICI) Water Audit Training, training workshops on implementing BMPs, a training workshop on WDM strategies and policies for decision makers in Amman and Aqaba, a training on WDM for WDMU staff, and a training on WDM forecasting tools.

Task 1.8: Introduce and promote drought response principles in the water community

IDARA has introduced and promoted drought response principles in the water sector. Meetings were conducted with MoWI and draft drought guidelines were prepared. The project supported MoWI in organizing the Efficient 2011 Conference (6th IWA Specialist Conference on Efficient Use and Management of Water) conducted in March 2011 at the Dead Sea. Key deliverables were a draft drought guideline and the Efficient 2011 Conference.

Task 1.9: Design, administer, and institutionalize a yearly event to recognize individuals, institutions, and industries that help advance water efficiency

IDARA has supported KACE in integrating WUE criteria in its annual awards for the public and private sector (examples of energy and water-wise construction and management). Key deliverables were the identification of criteria and questions, and the preparation of case studies and a WDM Glossary.

3.3 Findings and Observations

The building of consensus on WDM functions and institutions has been implemented early in the project. During discussions with stakeholders in- and outside the water sector, the evaluation team could not uncover any misunderstanding on this issue. However, there was some uncertainty on the exact role of the WDMU, most probably as the WDMU was not yet able to profile itself sufficiently outside its limited activities on water savings in residential buildings, water-wise landscaping and assisting WUs with forecasting and tracking the impact of WDM. The scenario to institutionalize WDM is not yet fully implemented.

IDARA has properly defined the tasks of the WDMU and put in place operational procedures

with the WUs and the four Ministries with which action plans were established. Operational procedures with WAJ are until now inexistent or insufficient. However, even though they are desirable, they were not explicitly mentioned as a project task.

Probably the most important output of Objective 1 was the preparation of the WDM policy. Without having a clear policy, the preparation of WUE Plans and WDM Action Plans cannot be properly done. Therefore, immediately after the startup of its activities, IDARA has given priority to the preparation of the WDM policy and a number of aforementioned planning activities were rightfully postponed until the policy was finalized. The project involved all relevant stakeholders in the preparation of the policy, including all water sector stakeholders and a number of other line ministries. Interviews show that there is general agreement on all aspects of the WDM policy.

The project has worked closely with WDMU and a number of WDMU functions were established through adequate capacity building. Functions of the WDMU were defined and a business plan was drawn up to implement WDM capacities. The unit consists of 5 people and 1 Director. They are talented and capable of performing most of the 28 functions that were delineated for them by IDARA, especially: planning and operating the new WDMS database; conducting water audits and installing water efficiency devices; providing technical guidance to others on water wise gardens, performing water audits, rain water harvesting, and water efficiency devices. However, they have little or no knowledge of commercial, industrial, agricultural, irrigational, and grey water WDM applications. They also have no knowledge of utility operations to be able to properly interpret the KPIs generated by the WDMS model.

The reason might be that on-the-job training and learning by doing have only covered a limited number of WDM aspects - WSDs, standards, WDM forecasting and tracking - and other aspects such as NRW, agricultural WDM and industrial WDM have hardly been touched upon. The staff will continue to need training to develop skills in project management, communications, facilitations, and negotiations. Ideally the unit should be an extension of the NMPU, since the data they collect will significantly affect master planning.

After the WDMU completes its first 5 years of operation, it is recommended that the Ministry reassesses the tasks and functioning of the WDMU, i.e. a reorientation of the WDMU on its core task to implement and promote the policy and act as a facilitator mainly with regard to operational and technical WDM processes. The function of USAID in the institutionalization of WDM will need to be adapted to the outcomes of such a reassessment.

The WDM action plans developed for the four most relevant Ministries were comprehensive and relatively detailed. Each of these Ministries will need help from the WDM unit to implement their plans. The MoTA and MoPWH have already started to implement these plans on their own. Both of these Ministries are ready to sign a Memorandum of Understanding (MOU) with the MoWI regarding full implementation of their action plans. The project team has been very successful in working with the four Ministries for which it has developed WDM action plans. The efforts working in a participatory approach are evident and the counterparts from the different ministries recognize this. There are some delays in implementation due to budget constraints and not having staff dedicated to the implementation of WDM. The WDMU has started discussions with these Ministries but should become more proactive in the implementation and follow-up of these plans.

The WDM database within the WDMU is operational. First data from the WUs on consumer behavior after WSDs were installed is expected to come in before July 2011. This action was delayed due to the change of all three utilities from quarterly to monthly billing. The data is important to measure the impact of the first WDM operational measures in the WUs. Part of the WDM database is a National Water Uses Information program, in which sources of data have been defined by the project and included in the WDM database. This is in particular of interest for the NWMP exercise, which needs adequate actual water use data and predictions next to data on available water resources. Due to the inexistence of live data links in the Information Systems in the Ministry, there are some question marks on the integration of the WDM database with the rest of the IT system in the Ministry. This would be beneficial, but it is felt that a general overhaul of the Ministry's IT system is needed before the WDM database can function 100% satisfactorily.

The end-use analyses performed by IDARA in the service areas of all three WUs have delivered interesting and partially unexpected results. It turned out that in Jordan the most important water savings can be expected in the kitchen, toilet flushing and shower, respectively. The end-use analyses have been used to design the water saving programs implemented by retrofitting a larger number of households. The analyses have contributed substantially to the understanding of the most promising water saving options and their potential and can be considered as one of the major outputs of the project. Such analyses should be repeated in future to measure and analyze if changes in water use behavior have taken place. It is expected that WUs can implement such analyses themselves, after having been properly equipped and trained by IDARA.

As a follow up of the end-use analyses, WSDs were installed in approximately 400 homes in the respective service area of the three utilities. The homes were flagged in the respective databases and changes in consumption patterns were measured. Under other programs sponsored by the water utilities themselves (Miyahuna - 2000 homes targeted; Aqaba - 10% of the homes targeted); and the promotion campaign with the HBSC bank - 2000 homes targeted), more devices were installed and consumer usage patterns are being tracked. End-use analyses included only apartments and not outdoor use.

IDARA has developed WUE Plans for all three WUs with very little input from the utilities (i.e. most comments of AWC were disregarded by IDARA). So far, these WUE plans have not been largely implemented. Aqaba has almost completed a 5-year strategic plan incorporating WDM measures in it. However, AWC gives other issues such as NRW a higher priority because, as according to AWC calculations, these pay off more. In YWC and Miyahuna, it is necessary to bring the elements of the WUE plans in to the multiyear strategic development plans of the companies. Miyahuna's management is waiting for clear direction from the Ministry's WDM unit but is really not committed yet to implement its WUE plan. YMC is ready to start implementation but needs more technical guidance and training. The plans certainly represent a necessary tool for WUs; however, WDMU needs to start a proper dialogue on the plans and modify them as appropriate to suit each utility's specific situation. There should not be uniformity among the utilities' water efficiency plans if the actual situation does not warrant certain activities in a particular service area. However, there needs to be an extended dialogue on the use of such plans and its implementation under different circumstances.

Key Performance Indicators (KPIs) developed by IDARA include financial aspects, enabling WUs estimate the incentive that can be obtained by implementing WDM measures. Such incentives include: more water available; reduced costs of production and distribution; as well as

more water being sold. However, AWC reports not to be fully satisfied with the KPIs delivered by IDARA and that WUs need to have more freedom to develop additional KPIs.

The tracking and forecasting tool developed by AWE and installed on the computers of all three utilities and WDMU, was received positively by WUs. The WDMS forecasting and tracking models and database are good planning tools but the delivery and distribution to WUs (about 6 months ago) was inconvenient as during the period January - April 2011, the three major utilities were in the process of converting their billing cycles from quarterly to monthly. Therefore, they were not practicing with the models until these conversions were finished. As the decision for this conversion was made ad hoc by the water sector, and IDARA was nearing its end, it had little opportunity to adapt its pre-designed program to it.

The models were designed to aggregate the data on a quarterly basis (instead of monthly) and then transmit it to the WDMU at MoWI. If IDARA could have anticipated the problems that the utilities might face during the conversion, they might have been able to deliver the final products earlier or waited until now to offer the training on proper use of the models. Only in Aqaba, the tracking tool is fully integrated in the IT system and properly linked with the customers' database, GIS, etc. In YWC, the COBOL programmed customers' database needs to be transferred to the new X7 software before such linkage can take place. In both YWC and Miyahuna, intermediate steps through Excel files are necessary.

WUs began transmitting data to WDMU in May. It was noted that the utility users, especially at Miyahuna, need refresher training and de-bugging technical assistance. More extensive IT upgrading activities are not part of IDARA tasks but are important to make efficient use of the tracking and forecasting tool.

The AWE requires the utilities to become members of the organization as a condition of using the software, and charges an annual fee, which up until now, has been paid for by IDARA. The software is still proprietary to the AWE and after IDARA ends, the utilities must start paying the fees on their own. This practice might conflict with USAID's regulations on intellectual property rights and should be investigated further by IDARA. The utilities could continue using the installed software without being a member, but there would be no technical support and no upgrading possible. Having a group license for the Ministry and affiliated utilities is an option that should be considered.

IDARA has developed 6 BMP guides for the conservation of non-agricultural water (hospitals, hotels, offices, residential, park landscaping, and public information). In addition to this, a High Rise BMP Guide has been developed and discussed with GAM. All guides have been prepared under an intensive dialogue with relevant stakeholders. However, apart from the distribution of the guides, there seems to be no real implementation process and follow-up/evaluation of their implementation.

An ample training program has been implemented to promote WDM. This training covered general training on WDM policies, WDM strategic planning, change management, high rise efficient water use and reuse, development of water efficiency plans, public information and education, etc., and included WDMU and WUs' staff. The impact of the training program was measured using the WOCAT scoring system. Towards the end of the project, the WOCAT score was approximately 32 out of 42 points for the necessary knowledge within WUs and the number of training participants was well over 1200, almost double of the originally planned. It can

therefore be stated that training within the project was more than sufficient, although important capacity building remains to be done (vs. WOCAT score).

The promotion of drought response principles took place through a number of consultation meetings, culminating in IDARA's intensive participation in the Efficient 2011 Conference (6th IWA Specialist Conference on Efficient Use and Management of Water) conducted in March 2011 at the Dead Sea. These activities laid the foundation for further activities with regard to drought response. However, it is necessary that the National Water Master Plan and the water utilities integrate planning and management processes into their future drought response strategies.

With the support of IDARA, KACE has integrated WUE (together with energy efficiency) criteria into its annual awards for the public and private sectors. The first award including these criteria will be provided in June 2011. Approximately 200 applications (government and private sector 50/50) have been received this year for this award. It is judged that KACE is a capable institution and the award is an important promotion tool for WDM. Accordingly, it should be further supported where needed. The Director of KACE believes that much more public awareness campaigns are needed on WDM.

3.4 Recommendations

With regard to the institutionalizing of the WDMU, it is necessary to reassess its functions in the sense that the unit should be responsible for the implementation of the WDM policy in all its aspects (including WDM in industry, tourism and agriculture) and, apart from the necessary central information collection and analysis, should not become very involved in the operational aspects of WDM other than giving guidance to the WUs and other stakeholders (ministries, etc.). The developed Business Plan (Strategic and Operational Plan for WDMU) should be revisited and readjusted, if necessary, and the WDMU staff should be trained to follow its established vision, mission goals, objectives, job descriptions, performance indicators and action plans.

The new Director of the WDMU should be trained on policy implementation aspects and facilitation of policy implementation. It is necessary to develop a second generation of leaders within the WDMU (e.g. plumbing team) both to enable a wider geographic spread and to help continuity in the services they offer. It is also necessary to appoint and train a Deputy Director of the unit who can take over in case the Director is absent or would leave the unit. Cross training and creating a second line of defense is important for sustainability. There is a need for continuation of training to develop skills in project management, database management, negotiation and facilitation, communications with stakeholders, and establishing public-private partnerships.

The unit has no knowledge of utility operations to be able to properly interpret the KPIs generated by the WDMS models. In order to make the unit very effective to address the utilities' concerns, a technical committee should be formed, with one technical representative from each of the three major WUs. PMU should participate in this committee, too.

In order to getting the unit and its Director to continue working and coordinating with the various stakeholders, IDARA should invest some effort over the next months to get the director more involved in project implementation and getting her to know the various stakeholders that the

project has worked with. In order to improve sustainability, it is recommended that all WDM actions from now on are implemented by the WDMU with support of USAID and IDARA. The WDMU also needs continuous resources provided by MoWI to be self-sustaining, such as an annual budget and two dedicated vehicles.

With regard to the integration of database it is recommended that USAID considers expanding the existing SOW of the ITMP project to include an overall IT strategic plan for the Ministry and the development of direct linkages interconnecting all IT applications mentioned in this document. The WDMU needs to continue its support to the four line ministries for which WDM action plans have been developed. This would also be an excellent opportunity for the unit to establish itself as a WDM policy leader. The WDMU should initiate meetings with both MoTA and MoPWH and start negotiating and drafting MOUs. The WDMU should start this process with the MoTA as this Ministry seems to be the most enthusiastic and receptive to introduce WDM concepts in particular in the hotels and restaurant branches, which have an important potential for water savings.

The data loggers and software used for the end-use analysis should be transferred to the WUs. WUs staff should be properly trained in its use and encouraged to make follow-up end-use investigations, among others to investigate behavior changes with respect to in-house water uses.

The WDMS forecasting and tracking tools should be fully integrated into the IT systems of the three utilities to enable automated data transfer. This is already the case for Aqaba. It would be beneficial if the three utilities had a proper dialogue on this issue and learned lessons and skills from each other. The WDMU could be instrumental in this (organizing a small workshop in Aqaba with participation of YMC and Miyahuna; cross-consultancy from AWC to the other utilities to create the necessary electronic links between the CIS and the WDMS). More training may be needed from the project for at least two WUs (YMC and Miyahuna).

Copies of the original WDMS software should be provided to WUs in order to enable reinstallation of the software and installation on additional computers. Proper operational and maintenance (O&M) procedures for the software and databases also need to be conveyed by the project to the utilities, to keep these tools sustainable in the future. The tracking tools should be used by WUs to investigate in more detail consumption patterns (also for outdoor use) and use this data to shape future water saving promotion campaigns. It is necessary for the WDMU and IDARA to intensively discuss the results of the pilot studies for residential use and the observed changes on water uses with the WUs and assess if a change in policies is required.

The WDMU needs to become more proactive in assisting WUs in implementing their WUE plans and integrate them in the respective multi-year business plans. Given the varying ages and capacities of the three utilities, the results of IDARA reflect differently. It is obvious that AWC has the best capacity to continue and further develop the tools and skills provided by IDARA almost independently. YWC certainly needs further support in integrating WDM in its 5-year business plan. Miyahuna, however, given the size of its customer base, is in need of substantial further support to enable them to realize the potential gains that could be achieved.

Since WAJ is responsible for overseeing small water and wastewater systems that serve approximately 20% of Jordan's population, in order to become fully effective, WDMU should start collecting from WAJ the same data it collects from the three WUs, using the same WDMS that was developed for these. Because of the extensive time involved in setting this up, this

should be considered for the follow-on project to IDARA, if there will be one.

With regard to the integration of databases it is recommended that USAID consider expanding the existing SOW of the ITMP project to include an overall IT strategic plan for the Ministry and the development of direct linkages interconnecting all IT applications mentioned above. The IT architecture could take the form of a *shared water information system* in which the data is managed by its owners (ministry departments, WUs, etc.) and selective access is arranged through the Internet.

As promotion (public awareness) remains an important aspect of WDM implementation, the WDMU should continue to work with KACE to develop and implement new campaigns. Alternatively, the USAID support for this activity could be assigned to the USAID-funded Public Action Project (PAP) project for them to work with KACE. However PAP staff may need to be trained on specific aspects of WDM concepts.

4.0 EVALUATION OF OBJECTIVE 2: ENABLING INSTITUTIONAL AND LEGAL ENVIRONMENT

The overall purpose of Objective 2 was to create an enabling environment that would promote WDM. The objective was comprised of seven main tasks, some of which had several sub-tasks under them. The key task under this objective was the creation of a National Water Demand and Policy that helped provide an overall umbrella for the other activities under the objective. Table 5 below summarizes each task and subtask and the extent to which they were completed.

Table 5 – Objective Two Task/Subtask Completion Status

Task/Subtask Descriptions	Level of Achievement (actual)	Sources of Verification	Data Collection Method	Comments
Task 2.1: Assist in creating a stakeholder-driven WDM policy program	Created 4 Action Plans (100% complete)	Project progress reports; actual Action Plan Documents	Meetings with IDARA and the 4 relevant Ministries	N/A
Task 2.2.1 Develop a national standardized plumbing code	Code completed with the exception of the chapters on Grey water and Rainwater Harvesting (80% complete); UPC adopted for Jordan	Project progress reports	Meetings with RSS and JNBC	There has been significant debate amongst the technical committee on finalizing those chapters
Task 2.2.2 Draft a report that recommends to the Ministry of Water and Irrigation the specifications on water that need to be incorporated into a potential	(100% complete)	Project progress reports; final deliverable report	Meetings with IDARA and Miyahuna Water Company	N/A

Task/Subtask Descriptions	Level of Achievement (actual)	Sources of Verification	Data Collection Method	Comments
High-rise Building Code				
Task 2.3: Implement a plumbing materials certification program	(100% complete)	Project progress reports; certification procedures	Meetings with JSMO	N/A
Task 2.4: Establish a “master plumbers” vocational training program at the VTC	(80% complete)	Project progress reports; reviewed syllabus of certification program	Meetings with VTC and TEVET	Delay in approving the by-laws of TEVET
Task 2.5: Prepare a work plan to implement a labeling program	(100% complete)	Project progress reports	Meetings with IDARA	Use EU or USA models as examples
Task 2.6: Identify WDM enforcement mechanisms and recommend the most feasible	(100% complete)	Project progress reports	Meetings with IDARA	More work is needed in this area by IDARA
Task 2.7: Develop mechanisms to finance the implementation of WDM projects	(100% complete)	Project progress reports	Meetings with IDARA	More work is needed in this area by IDARA

4.1 Tasks Initiatives and Qualitative Evaluation

Task 2.1: Assist in creating a stakeholder-driven WDM policy program

Early on in the project, IDARA made a presentation to the Royal Water Committee on the tools for implementing WDM in Jordan with the objective of embedding WDM in the National Water Strategy. IDARA staff also met with the Royal Committee’s consultant and provided information for the development of Jordan’s Water Strategy 2008-2022. It subsequently designed activities to facilitate implementation of the approved WDM policy with stakeholders. IDARA provided logistical support for the stakeholder meeting to present the “Water for Life” Strategy 2008-2022 for high officials from the Government of Jordan and members of Parliament. In addition, IDARA supported the MoWI in fine tuning and finalizing specific measures and tasks under the WDM section in the strategy in line with the national WDM policy. Furthermore, IDARA supported the development of action plans for implementation of the WDM policy for the MoENV, MoIT, MoPHW and MoTA, based on recommendations of His Excellency, the Minister of Water and Irrigation.

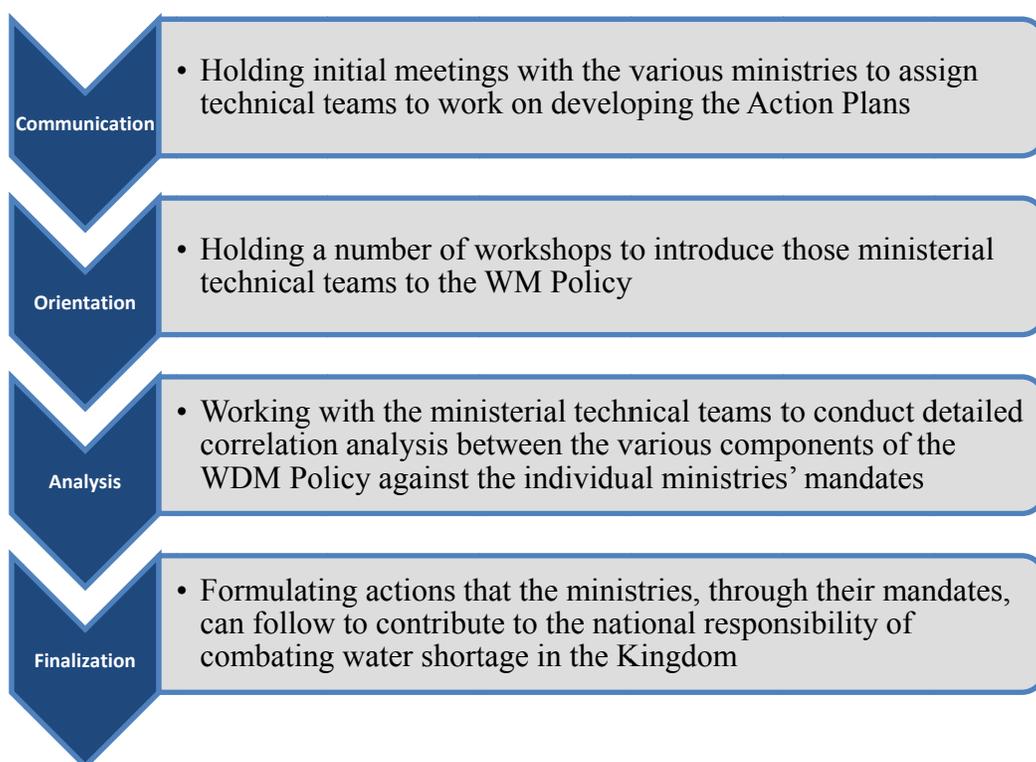
IDARA was successful in identifying and closely working with key entities to design and develop action plans that will help bring the policy into effect. The project focused on four key

sectors² through their respective ministries. Those were as follows:

- Public Works Projects and Building through MoPWH
- Industrial Sector through the MoIT
- Tourism Sector through the MoTA; and
- Environmental Protection and Sustainability Sector through the MoENV

The reasoning behind choosing those sectors/ministries was based on the “municipal” water consumed by end users in the sectors, which covers a significant portion of urban water use. The approach followed by the IDARA team in working with those entities was very effective in creating a collaborative work environment between various stakeholders, and securing exposure and understanding of “non-water sector focused” entities to the WDM policy. The approach is summarized in Figure 1 below.

Figure 1: IDARA Approach Used in Developing WDM Policy Action Plans



Discussions with the various technical working groups that were involved in the development of various action plans revealed that the cooperation with IDARA was very successful. They also confirmed that the effort was very important in making them better visualize the role they could play in combating water shortage and institutionalizing WDM. Key shortcomings/challenges that were identified in those discussions included the following:

1. Members of the working group teams think that they could have played a more effective role had they undergone additional training and capacity building related to the technical aspects of WDM, and to the specifics of how the water sector is organized in Jordan

² IDARA also successfully worked with other relevant entities to develop business plans for WDM; this mainly included the three water utilities. The evaluation team focused on the four ministries in this section given the significance of this activity in institutionalizing WDM in non-water sector entities.

2. While some activities in the action plans have already commenced, most of the working group teams indicated that they will require technical assistance to help them implement the remainder of the plan, and suggested working through certain partners within the respective sectors as will be clarified in section 5.4
3. The various teams see a risk in delaying the implementation of the action plans, thus, they view such technical assistance as a priority
4. While not one of the groups for which an action plan was developed, discussions with ASEZA representatives revealed that they should have been more involved in the project and in developing an ASEZA action plan that targets tourism, industry, projects, and environment. The evaluation team agrees with this and suggests that any follow-on work include more focused efforts with ASEZA

Task 2.2: Develop a National Standardized Plumbing Code

IDARA reviewed the existing plumbing codes in Jordan and recommended to adopt the Uniform Plumbing Code (UPC) of the International Association of Plumbing and Mechanical Officials (IAPMO) for use in Jordan, which is an international code that is regularly updated every three years.

A review of current Jordanian plumbing codes was initiated during the first quarter of the project. Through the Jordan National Building Council (JNBC), a plumbing code technical committee or working group was formed. The first meeting of the technical committee took place in July 2007. IDARA worked with the JNBC technical committee to review the existing Jordanian plumbing codes and reached a consensus to adopt the UPC in Jordan. At first, the technical committee was reluctant to adopt a totally new plumbing code for Jordan and expressed a preference for modifying the existing two codes. IDARA staff attended all 22 meetings held by the Committee, between July 2007 and January 2008, and pointed out the advantages of adopting the UPC in Jordan, with local amendments. To facilitate the adoption of a new code, IAPMO offered to waive the code copyright for Jordan.

As a result, JNBC agreed to develop a new standardized plumbing code based on the UPC. To accomplish this task, IDARA, RSS and MoP WH-JNBC signed an agreement in July 2008 to develop the code, to which IDARA provided technical support and co-shared the cost of developing the code with JNBC. The drafting of the code was done by RSS. IDARA's contribution was through a grant to RSS. The grant agreement was finalized and signed in October 2008.

RSS completed the first draft of the Code based on the 2006 edition of the UPC. IDARA started working with the Plumbing Code Technical Committee in February 2009 to review the RSS draft. Taking into consideration that the UPC is updated every three years and to keep abreast of the new code development, the Committee decided to benefit from the 2009 edition and incorporate its changes into the Jordanian Plumbing Code. The Code was completed in June 2010; training and outreach activities have been on-going since then.

This effort was undertaken jointly with JNBC at MoPWH. JNBC is the body responsible for regulating the Construction Sector (Regulator) in Jordan and enabling this sector to continue its activity and development work through the modernization of its own legislation and programmed development and future strategies to encourage investment and competition locally and regionally. Among other things, JNBC is responsible for:

- Laying down the bases and principles related to the National Building Codes

- Approval of the various codes of the Jordanian National Building Codes and their submission to the Council of Ministers for their approval
- Finalize any objection on the approved codes or any amendment thereon in accordance with the provisions of the Law
- Publication and circulation of the approved codes
- Issuance of the instructions pertaining to the application of codes

As per the practice in Jordan, several other entities were involved in the development of the revised code including representatives from the Jordan Engineers Association and the private sector. The key player in this task was RSS, given its credibility in the testing and certification of various building related materials. In addition to its experience in developing codes related to buildings, RSS also aims at disseminating awareness in the scientific and technological fields and providing specialized technical consultations and services to the public and private sectors. Therefore, the appropriate combination of players under this Task has been a key factor in its success and effectiveness.

Task 2.3: Implement a Plumbing Materials Certification Program

The kickoff meeting for this task was held at the JSMO (formerly JISM) on August 2, 2007, to get clarification on the approach and mechanism of developing and updating Jordanian Standards, especially those related to plumbing fixtures and appliances.

A meeting was conducted with JSMO Equipment and Electrical Apparatus Committee on October 29, 2007. The IDARA team introduced the project and its main activities, and the task of implementing a plumbing and material certification program that included working with JSMO to develop technical specifications and standards for washing machines and dishwashers. IDARA researched and purchased official copies of international and local technical standards related to plumbing products, home appliances and sanitary installations. International standards included ISO standards (ISO), British Standards Institute (BSI), European Committee for Standardization (CEN), and German Institute for Standardization (DIN), in addition to the US testing procedures for water efficient products. IDARA staff reviewed water and energy efficiency programs (e.g. energy star, water sense program, etc.) and prepared a table of water efficient standards. IDARA also reviewed existing Jordanian inspection laws and procedures on imported and exported products as well as WTO and TBT agreements. Additional meetings were held with related stakeholders at JSMO, customs department and WAJ. A summary of the existing enforcement mechanisms for banning non-compliant products from Jordanian markets was completed.

IDARA and WDMU became members of the Technical Committee for Plumbing Products and attended all its meetings. IDARA then drafted proposed faucet (flow regulator) and toilet technical standards for review by the JSMO technical committee. Each draft standard took at least two months for review by stakeholders and approval by JSMO's Board.

A SOW for an international consultant in Product Certification, Testing and Manufacturing Specialist was prepared. Mr. Bill Gauley of Veritec Consulting, came to Jordan and conducted an assessment of the existing toilets and water using appliances in Jordan in terms of water efficiency. The assessment included visits to toilet manufacturers, washing machine manufacturers and toilet retail stores. Mr. Gauley also met with IDARA's counterparts and the Plumbing Products Technical Committee at JSMO. Major changes to the existing toilet standards were recommended to JSMO. The Technical Committee took the recommendations into consideration and is finalizing the promulgation of a new toilet standard.

The Flow Rate Regulators Standard was approved by the JSMO technical committee and the standard was officially passed to JSMO Board members who endorsed it as a technical regulation.

An assessment of the RSS space designated for the water equipment testing lab was conducted in March 2009. A toilet testing demonstration was carried out using a sample of toilets representing the range of products from various manufacturers and importers in Amman. The test was followed by Bill Gauley's presentation on toilet Maximum Performance (MAP) testing. The final report for the establishment of a plumbing fixture and appliance testing lab was submitted to MWI and RSS in September 2009. IDARA worked with Mr. Gauley to complete the reference standards for the proposed water using products list submitted to JSMO in December 2008.

An official letter was sent to JSMO requesting them to enter into an agreement with the American National Standard Institute (ANSI). The agreement was necessary to help in the implementation of the new plumbing code given that many of the standards in this code are based on ANSI. The task of supporting local manufacturers to produce efficient toilets was discontinued because the local manufacturers of toilets stopped production in Jordan due to high energy and operational costs.

The overall objective of this task was to update the *Technical Standards* of some sanitary fixtures and home appliances to be compliant with water efficiency standards and to be compatible with the requirements of the new building codes as described in the previous section. To achieve this, IDARA worked closely with JSMO.

JSMO is an autonomous organization under MoIT that is mandated with the adoption of a national system for standardization and metrology based on accepted international practices. It is responsible for keeping pace with scientific and technical developments in the fields of standards, metrology, conformity assessment and laboratory accreditation for imported products. As a result, JSMO conducts tests on water devices to ensure the health and safety of the Kingdom's citizenry and protection of the environment by making sure that products are in compliance with the technical regulations adopted by the Institution for the purpose. To ensure this at the local level, JSMO is also responsible for raising the quality of local products through the adoption of appropriate Jordanian Standards in order to enhance their competitiveness in the local and international markets and, thus, support the national economy.

JSMO develops and/or updates its different standards through technical committees that review existing standards or draft new standards that are deemed needed for a certain product (whether imported or locally manufactured). These technical committees usually include technical experts from various relevant governmental organizations in addition to representatives from the private sector (importers and manufacturers). The updating/drafting process is based on a detailed review of international standards and the tailoring of the standards based on local requirements. Several international references and materials are often consulted in the process.

IDARA supported JSMO through the participation in some technical committees tasked with the updating of some standards related to WDM. IDARA experts participated in various meetings, helped with the provision of needed international references and standards, and assisted in the final formulation of the new standards. The approach was a participatory one that included the facilitation of exposure to international practices.

In general, there were no obstacles or challenges faced in the process. The main difficulty was

the length of the process to review /update a standard. This is mainly due to the fact that the technical committees usually set a plan for the year that includes a number of standards. The committees generally start with two standards at a time up to a certain stage of review before they can start with an additional two. It is believed that some more extensive technical support could result in expediting the process. While there is an enforcement mechanism within JSMO to ensure compliance both for the import and the local manufacturing of relevant appliances/equipment, there is a challenge in terms of the understaffing of those units.

Task 2.4: Establish a “Master Plumbers” Vocational Training Program at the VTC

Assessment of VTC Plumbing Facilities

IDARA conducted site visits to several facilities at the Vocational Training Corporation (VTC) in the Irbid and Ein Al Basha centers to assess their capacity in implementing an advanced level of plumbing training and “Master Plumber” program. The formation of a technical committee at VTC to develop the proposed “Master Plumber” program was established in October 2007.

In December 2007, IDARA prepared an assessment report on the plumbing training programs at the VTC. The report included the following recommendations:

- Upgrade of VTC plumbing training facilities in order to improve basic plumbing training courses
- Carry out the proposed Master Plumber program independently from the current plumbing training available at the VTC
- Use Texas experience in the design of the proposed Master Plumber program

During the investigation and assessment of the VTC plumbing facilities, IDARA was informed that the National Employment and Training (NET) Company launched a training program for professions in the construction sector including plumbing. The program was carried out at the VTC’s training facilities from January to April 2008. As a result, the plumbing lab was not available to be upgraded at that time. To mitigate this, IDARA met with the Ministry of Labor (MoL) and NET Company and received their cooperation in upgrading the VTC facility at Ein Al-Basha using the money (100,000 JD) allocated by USAID.

Upgrade of VTC Plumbing Lab

IDARA prepared tender documents for the renovation work and supervised the contractor during implementation. IDARA also assisted the VTC in developing a list of required furniture and equipment for the plumbing lab. The renovation tender was released in July 2008 and the upgrade of the plumbing lab was completed by March 2009. Furnishing and new equipment installation was completed in August 2009. Official inauguration for the refurbished workshop took place in November 2009.

Master Plumber Program

IDARA worked with the VTC on developing a “Master Plumber” program. However, the responsibility of accrediting and certifying skilled workers, including plumbers, was given to the Employment-Technical and Vocational Education and Training (E-TVET) Council and no longer was the responsibility of the VTC. The E-TVET Council was established under Law No. 46, which was enacted in June 2008.

Following this institutional change, IDARA conducted several meetings with the MoL and E-TVET to develop a certified “Master Plumber” program. The E-TVET Council agreed to consider a “Master Plumber” program as a pilot program that the Council and MoL could use to

establish an advanced certification for all trades. Moreover, a committee was established by the E-TVET Council in October 2008 to draft an agreement/MOU between the Council and IDARA, and to develop the certification framework for a “Master Plumber” program. The development of a certified program was completed in the fourth quarter of 2009.

Under this activity, IDARA worked with MoL, which is the entity responsible for organizing the Jordanian labor sector as well as updating labor legislations to meet the needs of the labor market in light of the social and economic developments. MoL is responsible for contribution to the development of workforces through the Technical and Environmental Vocational Educational Training Council. For this reason, IDARA worked with two key units in the Ministry. Those were:

VCT: established pursuant to the temporary Law number (35) for the year 1976, and currently function in accordance with Law number (11) for the year 1985 (The Vocational Training Corporation Law) and its amendments for the year 2001, and Law number (27) for the year 1999 (Vocational Labor Regulatory Law), through which the Corporation works on regulating vocational labor in the Jordanian labor market. The Corporation is responsible for: 1) providing vocational training opportunities to prepare the technical workforce and raising its level of efficiency in the various non-academic vocational training levels and specializations, and working on diversifying vocational training; 2) Providing supporting guidance services for the establishment and development of small and medium enterprises; and 3) Regulating the practice of vocational labor by classifying work locales and workers.

E-TVET: responsible for raising the efficiency of the technical vocational and education training sector in accordance with the Government’s vision to develop Jordan as a skilled knowledge-based economy to meet the needs of the labor market. The overall objective of the E-TVET sector reform is to provide the Jordanian labor market with the required competences to support the growth of the economy and enhance the competitiveness of Jordanian enterprises.

The collaboration with those two entities commenced through the signing of a MOU between them and IDARA to establish a program to train and certify Master Plumbers. As a result of the MOU, a six staged action plan was developed that included the following:

Stage	Key Indicators	Responsibility	Status
Preparatory Works	Curriculum Development ToT	E-TVET and IDARA	Complete
Approving the program	Finalized program document	E-TVET	Complete
Awareness	Awareness Campaign completion	IDARA and VTC	Complete
Selection of Candidates	Finalize selection criteria Preparing workshop, Trainers Admission	IDARA and VTC	Complete
Execution	Accepting 25 trainees	VTC	Mostly Complete
Quality Assurance	Follow up and M&E	E-TVET	Mostly Complete

Discussions with VTC and E-TVET indicated that the collaboration was very successful. The

key accomplishments under this collaboration were as follows:

- ***Training of trainers on the Master Plumber program***: this will enable the VTC to replicate the program in some of its other centers throughout the Kingdom
- ***Finalization of curricula***: this will enable the concept (and the new codes in the future) to be institutionalized in their curricula for plumbers at all levels
- ***Refurbishment of training facility***: this will serve as the main training facility for future training

Task 2.5: Prepare a Work Plan to implement a Labeling Program

IDARA developed surveys and conducted informative interviews and discussions with the leading local manufacturers and importers of water-using plumbing products and appliances. IDARA conducted a workshop on May 15, 2008, to get stakeholders feedback and solicit their input on the work plan for this activity. A draft copy of the work plan was prepared and discussed with stakeholders then submitted in August 2008. A market survey report was submitted the following month.

Following USAID's review of the submitted market survey and labeling work plan, a recommendation was made to obtain customers' perceptions towards the establishment of a recognized label on water efficiency for specific plumbing products and electric appliances rather than just relying on salespeople's perspectives. In January 2009, IDARA conducted a market survey on the customers' acceptance of plumbing products and electric appliances labeling. The results were presented on April 9, 2009, to stakeholders from public and private sector entities. The presentation was held and hosted by the Amman Chamber of Commerce in an attempt to build linkages between the MoWI and the said organization to promote water use efficiency in Jordan. Feedback and comments of stakeholders were incorporated in the market survey report, which was submitted to USAID and MoWI in July 2009.

Task 2.6: Identify WDM enforcement mechanisms and recommend the most feasible

IDARA reviewed and assessed the existing WDM policies, laws, bylaws, instructions and enforcement mechanisms set by the different ministries, and gave a presentation at the Water Law Conference, held in June 2008. During the conference, IDARA presented the draft WDM policy and assessed the limitation of the current laws in addressing the various policy statements. The presentation illustrated the need for the development of a law for the water sector. The final WDM legal assessment report was submitted in September 2008. The report spelled out the limitations of the current laws and provided recommendations to address WDM policy. IDARA also assessed current enforcement mechanisms related to WDM policy and provided recommendations for incentive-based and regulatory tools.

IDARA provided recommendations on enforcement mechanisms for the water and sanitation code and the high rise water use and reuse efficiency recommendations developed in subtasks 1.6.2-2.2.2.

The focus of this task was to create enforcement mechanisms that would help promote the new building codes. While the eventual enforcement responsibility lies within the responsibilities of JNBC, IDARA has helped provide recommendations on enforcement for both the codes and the new technical standards developed for JSMO. For the latter, IDARA worked with the RSS to establish a new lab that could provide the testing needed to ensure that all imported and manufactured WSDs met the technical standards that were developed with JSMO with active support from IDARA. This also included the training and capacity building of the staff that

would eventually manage and operate the laboratory.

As a result of these efforts from IDARA, the RSS can now provide a significant supportive role to JSMO in enforcing the new technical standards for water saving devices distributors. Also, they could play a vital capacity building role related to the new building and plumbing codes. They could also help in providing assistance in further codes modifications.

This was the most challenging of all the tasks under this component. One key task that was implemented by IDARA was the conduct of a legal assessment to determine how the various sections in the WDM policy related to existing laws or by-laws, but very little was found. To overcome this gap in legislation, relevant stakeholders strengthened their current enforcement mechanisms (i.e., the JSMO enforcement mechanism and the JNBC mandate) to be able to implement the new WDM national policy.

Task 2.7: Develop mechanisms to finance the implementation of WDM projects

Grant Pool

IDARA drafted a grant manual, which was approved by USAID, and finalized a proposed list of grants that were linked to IDARA's grants objectives. Priority was given to grants that had the highest impact in saving water and instituting WDM measures and functions.

Fixed Obligation Grant (FOG) to RSS: IDARA prepared a grant agreement with the RSS, which was signed in October 2008. Under this grant, RSS drafted a new plumbing code for Jordan.

Provide plumbing services for poor rural areas: IDARA prepared a Fixed Obligation Grant awarded to Mercy Corps; 320 houses (739 people) received plumbing services and fixtures in poor areas in Zarqa, and Mafraq Governorates.

Implementation of a residential retrofit program in Jordan: IDARA provided MWC a Limited-Scope Grant in July 2009 to support the "Yalla Nwaffer Mai" initiative as part of the public-private partnership between HSBC and Miyahuna.

Global Development Alliance (GDA)

In May 2008, IDARA identified potential private partners for partnerships with the utilities to implement and promote WDM in Jordan. Private partners included PepsiCo, Coca-Cola, Zain, Orange, and Nuqul. Based on consultation with these private partners and the utilities, IDARA selected two models for GDA and Public-Private Partnership (PPP) opportunities:

- Model one, Integrated Water Audit for Water Efficiency and Sustainability, targets high water users in manufacturing, processing, and tourism to improve water efficiency and contribute a portion of the value of water savings for sustainable funding streams in support of water saving retrofit programs at residences, schools, and health care facilities in urban poor neighborhoods.
- Model two, Pooled Corporate Social Responsibility for Water Demand Management among the Poor, targets private companies, which have corporate social responsibility (CSR) programs, for long-term partnerships with utilities to fund through CSR programs projects retrofit of water devices and equipment in poor urban areas.

At the time, CSR programs in Jordan were mainly focused on education and health. IDARA introduced innovative approaches to bring water on the radar screen of the private sector as a

vital element for health and sustainable development. To this effect, IDARA started a pilot program in the Abu Nseir area, in collaboration with Miyahuna and the MoW I-WDMU, to demonstrate the effectiveness of WSDs to the public as well as the potential private partners for PPP. In addition, IDARA used part of its grant pool to cost-share with private partners, who had CSR programs, to replicate the water saving devices retrofit program in Abu-Nseir in collaboration with Miyahuna. This program paved the way for a long-term alliance between the private partners and Miyahuna for expansion of the retrofit program to other urban poor areas. IDARA also used its audit/end use activity to establish a model one type partnership with Miyahuna and a high use private company such as PepsiCo.

In July 2009, IDARA succeeded to bring together HSBC bank and Miyahuna to forge the first PPP in water use efficiency in Jordan. This alliance implemented the “let’s save water” initiative as part of Miyahuna summer water conservation program. The initiative included a communication campaign followed by a plumbing fixture retrofit for around 2000 homes. The retrofit concentrated on the lavatory and kitchen faucets and showerheads. HSBC covered the cost of the communication campaign and the purchase of the WSDs for faucets and showerheads, while Miyahuna cost-shared the initiative by covering the cost of the installation of the WSDs through an IDARA grant. This alliance qualified as a GDOA since both partners Miyahuna and HSBC co-designed the initiative and provided one-to-one match for its funding. The “let’s save water” initiative was well received by Amman residents and got the attention of the media that also welcomed the idea. HSBC initially agreed to continue funding this initiative, if proven successful. It was hoped that those efforts will be the start of a snow ball rolling effect for the CSR mechanism, and other private companies will follow.

Global Partnership of Output Based Aid (GPOBA)

IDARA discussed GPOBA with Miyahuna to identify topics for the development of a proposal to secure GPOBA funds.

The SOW for GPOBA consultants, Matthew Hensley and Brian Desilets, was prepared in May 2009. It was agreed that the consultants would work with WDMU and the utilities to prepare a proposal to secure GPOBA funds for implementation of pilot activities that clearly demonstrate how WDM measures can improve customer service. However, it was learnt from the World Bank that Jordan is not an eligible country for Output-Based Aid (OBA) funding as there are many active donors in the country. Based on this, the IDARA COP, consulted with USAID D COTR, and mutually agreed to cancel this sub-task.

Development Credit Authority (DCA)

IDARA explored DCA opportunities with private sector specifically potential manufacturers of water-efficient equipment.

Performance Contract

The performance contract is a form of partnership where a private audit/retrofit company retrofits a high water user facility to improve water efficiency and receives an agreed portion of the value of water saving. The retrofit is more attractive when the partnership targets both water and energy. Performance contracting is practiced in the energy sector in Jordan.

A one day forum on water-energy efficiency for hotels in Aqaba was organized in September 2009 by IDARA and ACED. The forum brought together hotel owners/managers, water-energy performance contractors including those trained by IDARA on water audits, suppliers of water-

energy conservation equipment, and lenders to discuss water-energy saving for the hotel industry. The objective was to establish business deals for water-energy retrofits to assist the hotels in obtaining green certification, i.e. green key. One business scenario can consist of a performance contract between a hotel and a water-energy audit contractor to perform water-energy retrofit fully funded by the latter contractor via a loan from a bank or other financial institution. This type of performance contract mechanism can be replicated to other large water users including hospitals, manufacturers, and large offices.

This task was focused on creating some mechanisms to finance the implementation of WDM projects. Financial mechanisms implemented under the IDARA project included awarding grants, developing contracts, and securing loans, that support water demand management projects.

One of the key successes under this task was the partnership with the Miyahuna Water Company (Miyahuna) and the HSBC Bank through the summer 2010 campaign. The campaign was a success in terms of the wide exposure that it received. A key factor of the campaign was the retrofitting of 2000 households in Amman, and the cooperation by Miyahuna to flag those accounts in their database and in the newly installed WDM System, for tracking purposes. Not only did this help create synergies between the various tasks of IDARA, but it also helped create a mechanism under which predictions could be made using the AWE forecasting and tracking tools. Miyahuna indicated that they intend to use the tracking tool for developing future decision-making related to WDM. Therefore, this financial mechanism provided by IDARA will help “fine-tune” the forecasting system to be used more effectively in the WDM-related decision-making process.

Other grants included working with Mercy Corps by providing a revolving fund mechanism for a number of homes through 7 CBOs. Through this grant program the loans were extended to low income families in order to rehabilitate their indoor plumbing system. While the feedback received on this program was very positive, the evaluation team believes that more effort should have been invested in monitoring water consumption at those beneficiaries to better document the benefits of such investments and later use them for further calibrating the WDM system at the three utilities.

Finally, IDARA has worked with JSMO and MoIT in order to secure customs exemptions for water saving technology. While some success has been achieved, there are still components that have not been able to obtain such exemptions (e.g., to fully exempt a faucet or mixer system with built-in WSDs). This, however, is beyond the scope or the control of the IDARA project.

4.2 Findings and Observations

1. Finalizing the WDM policy at a relatively early stage of the project (August 2008) was a key factor for the success of several activities under Objective 2 of IDARA. IDARA worked with a large number of stakeholders that included utilities, ministries, plumbing companies, and other water entities.
2. The methodology used to promulgate new plumbing codes for Jordan was a participatory approach where IDARA supported the JNBC and the RSS in the code development process. Given their advanced experience in building research, RSS was actively consulted and involved as a vital member of the committee responsible for reviewing and finalizing the codes. RSS was also involved in the development of new chapters in the codes related to rainwater harvesting and grey water use. Discussions with various members of the technical committee indicated that the collaborative effort was

successful, and the support provided by IDARA (through technical contribution and reference materials and references provided by the project) were key to the finalization of the codes. The only challenge has been the delay in the finalization of the code chapters related to grey water and rainwater harvesting. Specialized experts have been brought into the process and the new chapters are expected to be finalized soon. A key challenge that will be faced once the codes are finalized is the dissemination and capacity building required as discussed in section 4.4.

3. IDARA worked with JS MO on the updating and revision of standards and regulations that are relevant to WDM. The efforts were focused on standards in two main areas, Electrical Appliances and Sanitary Fixtures. In total, one standard under electrical appliances, and five standards under sanitary fixtures were updated and finalized. The standards were formally approved by the JS MO Board of Directors and published in the National Gazette and in the local national newspapers. They are currently in place and enforced.
4. The establishment of the Center for Accreditation and Quality Assurance (CAQA) under the E-TVET Council set the stage to launch the “Master Plumber” certification and training activities through IAPMO. A MOU between IDARA, E-TVET and VTC was signed in October 2009. Work on the certification program started in November 2009, and the “Master Plumber” training started in 2010. Given that both the Jordanian Code and “Master Plumber” curriculum were technically supported by IAPMO and are based on the UPC, IAPMO ensured that all the “Master Plumber” training topics were tailored to the modified code.
5. As per the interviews that the study team conducted, there were a few shortcomings regarding the Master Plumber program. One obstacle has been the finalization of the certification process for the program for the trainees. This obstacle has been beyond the control of the program and is mainly attributed to delays in the approval of the Law for E-TVET at the MoL. IDARA could have structured the program to avoid any conflict of interest between training provider and testing facility. In the past, VTC has been criticized for performing both roles - training provider and certification agency - at the same time, which has led to a very bad outcome in terms of performance of graduated trainees. Some of the trainees who took the Master Plumber course have stated that the certificate provided is the same certificate achieved years back and that VTC does not have a vision about how to manage the program in the future. The evaluation team believes that the lack of an approved “certification mechanism” is a risk that could result in reducing the attractiveness of the program. In other words, having an official certificate will provide an incentive to the training candidates to join the program. This will allow having WDM trained plumbers in the market. Delays in finalizing this could reduce the attractiveness of the program and, consequently, lead to loss of some momentum. In order for the Master Plumber training to become sustainable, IDARA will need to resolve the certificates issue quickly and the VTC will have to either charge higher fees to trainees participating in the courses, or rely on external funding sources to provide the resources required for the program.
6. The main activity undertaken to implement a labeling program was the conduct of an Assessment of Barriers and Opportunities to Increase Participation in Water-Efficient Markets. Other activities included a market survey that clearly identified the need for an

improved product labeling program to raise awareness of WSDs and water-saving features of plumbing products. The majority of plumbing products were found to not have water efficiency labels. Several plumbing products retailers interviewed for this evaluation acknowledged the need and opportunity to raise their customers' awareness of water efficiency. The key deliverable for this program was the development of a Work Plan to implement a Labeling Program for Water Efficient Products, which has been successfully completed.

7. The finalization of enforcement mechanisms is dependent on the finalization of the plumbing and building codes, which has not been yet accomplished. However, IDARA should invest more time and effort in some dissemination and capacity building activities once they are finalized.

4.3 Recommendations

As seen in the previous sections, most of the objectives under this component of IDARA have been achieved. Some tasks had some challenges; however, most of those were outside of IDARA's control, primarily due to various government agencies taking longer than anticipated to approve various aspects of IDARA's activities. The following are activities that are recommended for consideration under an IDARA extension or follow-on project:

1. A number of areas to help RSS further contribute to WDM in Jordan include:
 - Support to develop manuals for the use of the new codes
 - Development of additional relevant building codes (e.g., mechanical specifications as they relate to WDM)
 - Technical support to help market the new lab on a regional basis
 - Expanding the lab to include non-domestic uses and components related to grey water re-use at the household level
2. A number of areas to further assist the VTC in continuing its activities related to the Master Plumber program include:
 - Study tours and orientation on plumbers training facilities
 - Need to replicate the program in other governorates, especially Aqaba, given the nature of the large projects in ASEZA
3. Being the entity responsible for evaluating and approving any new project in Aqaba, ASEZA sees itself as a key partner in promoting WDM. They have the authority to enforce the implementation of water use efficiency in new projects, if they choose to adopt such standards. (ASEZA Law, Article 6, states that all legislation in force in the Kingdom of Jordan shall be applicable in the Zone, including the plumbing code). However the provisions in the ASEZA Law eventually supersede any Jordanian legislation. The explicit authority given under Article 10 B to ASEZA on a number of issues does not include standards. Therefore, standards developed for Jordan are obligatory for the Zone as well (as is for instance the Jordanian penal code and many others), unless the Council of Ministers decides otherwise. Thus, ASEZA needs training and capacity building on how to include such measures in their project requirements, in addition to capacity building related to evaluating the efficiency plans submitted by new project applicants. They also need assistance in implementing the new building codes. Given the wide application of landscaping in Aqaba, there are plenty of opportunities to

promote and use water wise parks and the concepts of xeriscaping.

4. There is still a need to revise/update some other relevant technical standards with JSMO. For instance, twin tub washing machines are very popular in Jordan, especially in the lower income households. Therefore, the review of the standards related to them is warranted. Other appliances such as dishwashers and other types of washing machines need to have their standards reviewed. Accordingly, there is a need to assess and evaluate where additional WDM measures could be achieved, identify the relevant standards, and assist JSMO in the review of those standards. While there is a mechanism in place at JSMO to review/update standards every five years, the evaluation team believes that it would be helpful to institutionalize a procedure for shortening that period given the importance of WDM for Jordan. Such procedure would also be based on a standard decision-making process to identify the needs and warrants of an update of a certain standard.
5. Although to a lesser extent, there is also a need to support JSMO with the aspects related to enforcement. This includes the development of Standard Operating Procedures that would help the staff responsible for enforcing standards for locally manufactured products to increase their efficiency. It would also help overcome the shortages faced in terms of staffing. The same applies to staff responsible for monitoring imported products. While JSMO maintains a very productive working relationship with RSS to test imported equipment, there is a need to build the capacity of JSMO border staff to expedite the clearance process in a manner that guarantees compliance, yet, ensures the smoothness of the customs clearance process. This is an area that USAID has also been supporting through the Jordan Fiscal Reform Project. Another area of assistance could be assisting JSMO in creating a tracking tool for the volumes of imports/manufacturing of relevant appliances and fixtures. This could help maintain the tracking systems created for the water utilities and the WDMU.
6. Aqaba Water Company could use further technical assistance in the following areas:
 - More extensive involvement in all the project components (i.e., to have a smaller replica of the project to involve them in its various stages)
 - Assistance in the implementation of the business plan developed by IDARA, and assistance with other areas of savings especially as it relates to NRW
 - Finalization of the tracking tool to eliminate all glitches
 - Expanding retrofit programs to households in the service area, and
 - Detailed results of the household tracking data and more involvement in the analysis of such data in order to be able to make more sound inferences
7. Miyahuna Water Company could use further technical assistance in the following areas:
 - Assistance to create a WDMU within the utility to cooperate with the WDMU at the MoWI. This mainly stems from the size of the utility and due to the unique nature of water utilities compared to other areas/sectors covered by the WDMU at the MoWI
 - Assistance in the implementation of the business plan developed by IDARA
 - Finalization of the tracking tool to eliminate all glitches
 - Expanding retrofit programs to households in the service area, and
 - Given the success of the GDA, Miyahuna has a need to build its capacity that will enable the company to implement similar endeavors and partnerships

8. The four ministries involved in developing WDM action plans are in need of technical assistance to help them implement their plans. Main areas of assistance are summarized below:

- MoTA staff clearly identified their limited capacity in terms of implementing the WDM action plan. MoTA is fully committed to implementing the action plan but is in need of additional technical support to do so. MoTA believes that the best implementation strategy would be to work closely with key entities within the sector, especially the Jordan Hotels Association and the Jordan Restaurants Association. Ideas such as pilot demonstration projects are also seen as needed in facilities such as the Hoteliers College and some of the resorts in Jordan.
- MoIT staff also identified their limited capacity in terms of implementing the WDM Action Plan. Like MoTA, MoIT is also fully committed to implementing the action plan but is in need of additional technical support to do so. MoIT believes that working closely with key entities within the sector, especially the Chambers of Industry, will be the best implementation strategy. Key areas of additional assistance include the following:
 - Technical and financial assistance for the establishment of “Mobil Labs” that could visit industries and provide advice (similar to the lab that currently offers advice on energy efficiency)
 - Capacity building to enable them to review and evaluate water efficiency plans submitted by new industrial applications
 - Detailed assessment of the Jordanian Industrial Sector to further categorize them according to their water consumption needs in order to promote low consuming industries, and place restrictions on high consuming industries.
 - Funds to further incentivize WDM and water use efficiency
- The key areas where MoPWH sees they need assistance in include technical work to explore the possibility of using non-traditional water sources in some of their projects. For example, they see the experimentation on the use of grey water in asphalt mixing for road project as worthy of investigating. They also need assistance in upgrading their laboratories to enable them to do such experimentation. They would like to implement a comprehensive governmental building retrofit; however, they lack the funds to implement such a program in all their buildings. As part of their public housing projects, they are responsible for landscaping. Accordingly, they see that they could benefit from technical assistance related to water wise landscaping and the implementation of Xeriscaping in such projects.
- The main area where the MoE needs additional help is through technical training and capacity building for their staff responsible for reviewing Environmental Impact Assessments’ to enable them to evaluate water use efficiency plans. Training is also needed for their inspection staff to enable them to evaluate water use efficiency in existing facilities, and to include that in their environmental audit procedures. Training should target the Licensing and Inspection Departments within the Ministry.

5.0 EVALUATION OF OBJECTIVE 3: DEMONSTRATE SELECTIVE WDM INITIATIVES TO THE PUBLIC

The overall purpose of this objective was to demonstrate selective WDM initiatives to the public. Objective 3 included a number of tasks and specific indicators for each task. Table 6 below summarizes each task and subtask and the extent to which they were completed.

Table 6 – Objective Two Task/Subtask Completion Status

Task/Subtask Description	Level of Achievement (actual)	Sources of Verification	Data Collection Method	Comments
Task 3.1: Expand the urban landscape program introduced by WEPIA	Training of 66 municipalities (235 trainees) in water-wise landscaping (100%); training modules for universities (100%); design and implementation of 6 water-wise parks (4 parks fully constructed as of May 2011)	Project progress reports, designs, observations on field trip of Deir Alla park	Meetings with IDARA, CSBE, Municipality of Deir Alla; field visit	Municipalities are happy with the support and sustain the concept; Deir Alla already planning expansion of park; some implementation work still on-going
Task 3.2: Host a competition for the best low-income, water-efficient houses in the highland and Jordan Valley areas	One competition was held; results were evaluated; three winning designs were selected	Project progress reports, competition publicity, competition evaluation criteria	Meetings with IDARA	Still need to explore financing strategies and adoption mechanisms to develop prototype and later mass production
Task 3.3: Provide plumbing services and plumbing fixtures to rural areas	7 grants of \$10,000 each were awarded to CBOs under oversight of Mercy Corps; 320 houses (739 people) in rural areas received plumbing services and fixtures	Project progress reports, Mercy Corps final report to IDARA	Meetings with IDARA, Mercy Corps	77 field visits were conducted by the IDARA team members to follow-up on the implementation and installation of water saving fixtures
Task 3.4: Implement best management practices in pilot areas	Pilot program for 50 houses in Abu-Nseir; 9 BMPs implemented and 4,000 persons benefitted from the program	Project progress reports, utility records	Meetings with IDARA	Additional follow-up is needed to evaluate the water savings

As illustrated above, IDARA achieved its quantitative targets for Objective 3. In addition, IDARA achieved most of its yearly targets despite a difficult implementation period for some of its activities.

5.1 Tasks Initiatives and Qualitative Evaluation

Task 3.1: Expand the urban landscape program introduced by WEPIA

Subtask 3.1.1: Explore public conceptions of culturally desirable park space use to inform water-wise landscaping efforts

During the second quarter of the project, the survey and focus group content was prepared and an agreement was reached with the Jordanian Hashemite Fund for Human Development (JOHUD), a non-governmental organization, to assist the project in contacting/organizing participants in the targeted geographic areas. Data collection started at the end of October 2007.

Surveys were conducted in six geographic locations: Irbid, Aqaba, Karak, Madaba, Mafraq, and Kafraïn. The implemented survey method was the personal interview. Personal interviews were conducted with 24 men and women of diverse age groups in each of the 6 geographic areas. A total of 132 interviews were completed; the data for the interviews that were completed was compiled, analyzed, and evaluated. The final report on the surveys was submitted in June 2008. All milestones in this task have been completed.

Subtask 3.1.2: Train personnel from at least 70 of the 99 municipalities on water-wise landscape principles

Under the patronage of the Mayor of Amman, a one-day seminar for mayors entitled “Water-Wise Landscaping in Jordan,” was held on December 16, 2007. A total of 163 participants attended the seminar. Sixty-five attendees represented GAM, and 77 attendees represented 58 other municipalities. Sponsorship for the seminar was secured through support from GAM. The seminar informed the mayors about IDARA and this task, in preparation for asking the mayors to send appropriate personnel from their municipalities to attend training courses on water-wise landscaping principles and applications for public parks and areas. Presentations in the seminar included the following topics: an introduction to water-wise landscaping; GAM’s practices in water-wise landscaping; a briefing on IDARA’s activities; water-wise parks established under WEPIA; and, a briefing on IDARA’s municipal training and park implementation programs.

The seminar was a success. There was a high attendance from the various municipalities, and the discussions following the presentations indicated an interest on the part of the mayors in nominating technical staff for training and participating in water-wise park building initiatives.

Two GAM employed trainers, with background in agricultural engineering, were identified and underwent knowledge-base assessment and training. The bi-weekly training sessions took place at the IDARA office. A member of the WDMU also attended the training sessions as part of the capacity building initiative for the WDMU. The trainers studied the completed material and their queries were addressed during the regular bi-weekly meetings.

All training content comprising 11 modules was completed in Year 1 of the project. The trainers studied the material and their comments were incorporated. Four training sessions for municipalities were successfully completed. The first was held in Amman (May 4 -7, 2008) for GAM, the second was held in Irbid (June 16 – 19, 2008) for 18 municipalities that comprise all the municipalities within the Irbid Governorate, the third was held in Zarqa (July 27 – 30, 2008)

for 6 municipalities within the governorate, and the fourth held in Tafila (August 17 – 20, 2008) for six municipalities in the governorates of Tafila and Karak.

Contact with municipalities to nominate technical staff to participate in water-wise landscape training was carried out via coordination with the Ministry of Municipal Affairs (MOMA) to ensure timely responses and better coordination with the municipalities.

Field visits to the W EPIA-established parks were conducted and an assessment report was completed and submitted.

Contact was made with MOMA to establish links with their park building program. Initial discussions regarding the possibility of IDARA's grants program funding water-wise components such as irrigation systems were held. A preliminary assessment of the 3 park prototypes adopted by MOMA was also completed. Discussions with MOMA regarding IDARA's participation in the development of 6 water wise parks, was also completed. MOMA prepared a report on potential parks requiring technical and financial assistance for consideration from IDARA. The report on the 6 parks was reviewed and irrigation estimates were obtained from an irrigation specialist.

IDARA provided training in water-wise landscape principles to 6 JOHUD employees participating in an awareness project called the "Water-Wise Women's Initiative" (four women and two men). The participants were given a condensed version of the municipal training course and covered the following topics: 1) Landscapes in history; 2) The seven principles of water-wise landscaping; 3) Drought-tolerant plant materials; 4) Drawing techniques and graphic communication; and 5) Planting design. This training was an in-kind exchange of services between IDARA and JOHUD. In exchange, JOHUD set up the logistics for IDARA, through their outreach centers, to reach urban stakeholders in different geographic areas for the conduction of surveys for Task 3.1.1.

Through April 2011, IDARA completed the training of 66 municipalities in water-wise landscaping and will hold one more training session for the remaining 4. IDARA trained engineers from those municipalities on principles of water-wise landscaping, drought-tolerant plant materials, and planting designs.

Working with engineers from the Municipality of Manshiet Bani Hassan, IDARA completed the development of one water-wise park prior to the start of Year 4. At the present time, a total of 5 water-wise parks have been completed, and the remaining one is currently under construction. IDARA will also monitor the maintenance of the parks and provide assistance in maintenance practices.

IDARA has also reviewed the designs of neighborhood parks proposed in Aqaba and provided comments to ASEZA. IDARA will hold another training session and invite other municipalities.

Subtask 3.1.3: Introduce water-wise landscaping principles in the curriculum of agricultural faculties in at least two universities

A preliminary survey of landscape courses at several universities was conducted. It included both the faculties of architecture and agriculture at 5 Jordanian universities. After many discussions with the various universities, IDARA completed the development of modules in water-wise landscaping for existing courses at the College of Agriculture at Jordan University and the

Colleges of Architecture and Urban Planning at JUST and the German Jordanian University. The modules included a syllabus, lecture content and reading materials. In Year 4, IDARA expanded the program to include Petra University.

IDARA continues to provide technical support to Jordan University (JU), Jordan University for Science and Technology, Petra University, and the German Jordanian University in training faculty members, assessing current curriculum, providing course materials syllabi, samples lectures, and reading materials.

Subtask 3.1.4: Expand work with nurseries

The assessment report on WEPIA-established nurseries was completed and submitted. A revised strategy and schedule for completion of this task was then proposed. Accordingly, IDARA concentrated its efforts in providing technical assistance to large government and/or large private sector nurseries. CBO-owned nurseries were only supported if sustainability could be insured after the conduction of rigorous evaluations.

A check-list for potential new sites that were interested in becoming nurseries was developed. The check-list was sent to JOHUD to fill out for potential sites under their supervision. A meeting was held with JOHUD regarding potential CBOs interested in becoming nurseries. A JOHUD biodiversity site in Ajloun was identified as a suitable candidate.

The GAM nursery in Ain Ghazal was visited by the IDARA team in order to get an overview of their production facilities and product range and to further explore the potential for technical support in establishing an in-house drought-tolerant tree nursery. A brainstorming session was held with GAM's Director of Nurseries and nursery consultant to discuss the drought-tolerant tree nursery further.

A business plan for the Productive Women's Cooperative Society Nursery in Marka was prepared in coordination with its nursery consultant.

Contact with ASEZA's Planning and Studies Department was also made. The Planning and Studies Department sent IDARA copies of the Gensler guidelines (Master plan guidelines for Aqaba) and the plant list adopted by the Saraya project. Those lists were reviewed for use later in the project as potential product lines for new nurseries.

IDARA also provided assistance to two large nurseries at GAM and Friends of the Earth Middle East (FOEME), and to a small private nursery by local and expat experts. In Year 4, IDARA followed-up with GAM and FOEME on the development of their tree nurseries and is supervising the installation of a demo garden at the private nursery. Establishing a drought-tolerant tree nursery at GAM required support from the GAM's upper management. Although a meeting to promote this idea was held with senior staff, no progress has been made. A follow-up meeting with the Mayor is necessary to push the progress further.

Subtask 3.1.5: Determine incentives for water-wise landscaping

Work on this task was carried out and mostly completed in the second year of the project. IDARA identified financing strategies for smaller municipalities to develop and improve public spaces. Grant funds were used to support the most creative ideas in municipal water-wise landscaping. They also identified opportunities for public-private partnerships, such as enlisting the Chamber of Commerce or some of the larger industrial and commercial businesses to support

parks and playgrounds in municipal areas, much like the “adopt a highway” approach employed in the United States.

IDARA is currently providing marketing support by designing a water-wise demonstration garden at a local private sector garden center that specializes in drought-tolerant plants. The project has also completed the design of a demonstration garden for Miyahuna’s headquarters.

Task 3.2: Host a competition for best design of low-income water efficient houses in the highland and the Jordan Valley areas

In the first quarter of the project, a meeting was held with the Minister of Public Works and Housing to explore areas where IDARA could provide conceptual designs for Government housing projects, thus gaining more visibility and possibly greater acceptance for the competition and the concept of water efficient housing.

A meeting was also held with the Director of Design of the Housing and Urban Development Corporation (HUDC) department responsible for providing low-income housing designs to citizens, to explore the potential for hosting the competition with one of the developers working on HUDC’s housing villages. An agreement was made to pursue the improvement of the adopted prototypes for water and energy efficiency. A letter was sent to HUDC to obtain information on these design prototypes given to citizens.

IDARA then contacted a representative from one of the development companies, TAMEER, to explore the company’s interest in possible sponsorship. TAMEER expressed interest in working with IDARA on improving water-efficiency in their projects (particularly the Giza project for the limited-income sector) but no conclusion was reached. Future meetings were planned to further pursue this activity.

IDARA also explored the possibility of building the Aqaba-prototype developed under the WEPIA project. Discussions with Habitat for Humanity took place and field visits to Habitat’s sites were conducted. Discussions with ASEZA and ADC regarding the building of the Aqaba design competition prototype were held.

IDARA conducted the competition in Year 2 of the project, earlier than what was originally proposed in the work plan. They prepared a special work plan to launch the competition. An advisory committee including members of HUDC was formed to guide the design brief and select members for the evaluation committee. Ultimately, enough money was raised through sponsorships to cover half of the expenses for the competition.

After the completion of the competition and the selection of three winning designs, IDARA worked with HUDC and the Green Building Council to publicize the designs and to develop strategies to fashion public and private partnerships to finance the first prototypes.

Task 3.3: Provide plumbing services to poor rural areas.

This task originally entailed distributing 20,000 school bags filled with public awareness information in poor rural areas. During the Project Management Committee meeting in November 2007, the Committee voted to revise this task to “providing plumbing services to poor rural areas.” As a result of that meeting, DAI submitted a request to USAID to modify Task 3.3 to provide plumbing services to poor rural areas. IDARA signed a grant agreement in April 2008 with the CBI WDM project (Mercy Corps) to provide plumbing services to poor rural

areas. In accordance with the agreement, Mercy Corps awarded 7 grants of \$10,000 each to seven CBOs.

Mercy Corps received 26 proposals for plumbing services in which 14 were screened to be potential grantees. Based on the selection criteria, the Advisory Committee selected 7 CBOs.

An awarding ceremony for the seven CBOs was conducted in August 2008 at the MoWI offices. Mercy Corps conducted 3 training workshops for these CBOs in the following areas:

- Loan management training: one day training
- Technical training: a two day workshop
- Proposal Writing: one day training

IDARA provided supervision, technical assistance and support to the awarded CBOs in conducting plumbing services, maintenance of plumbing fixtures, and any other needed support to improve water-use efficiency in households in poor rural areas. These activities benefited 5 CBOs in Zarqa Governorate namely Ajjour for Social Development, Beer Al-Sabe' Voluntary Society, Northern Azraq Women Society for Social Development, Al-Hashimiyya Society for Society Development, and Environmental and Economic Investment Cooperative. In addition, it benefited 2 CBOs in Al-Mafraq Governorate, namely Aal Al-Bait University Employees Cooperative and Sharq Al-Mafraq Cooperative. This task was implemented in partnership with 2 local partners, Jordan River Foundation who conducted field supervision on the performance of CBOs in Zarqa Governorate, and RSS who supervised the work of CBOs in Al-Mafraq Governorate.

The grants directly benefitted 137 households, of which 28% were women-led households, and had an impact on more than 700 people by improving water use efficiency and increasing water availability in the targeted areas. The total amount of funds awarded from the IDARA project to the CBOs was JD 49,000 (USD 69,209), which was used for the following plumbing maintenance and retrofit activities inside households:

- Water tanks/float valves
- Piping network
- Plumbing fixtures including toilets, faucets and shower heads
- Installation of water saving devices.

The activities were expanded to reach out to female students living in dorms in the neighborhood of Aal Al-Bait University, by providing them with WSDs to enhance water-use efficiency in the dorms' facilities. The administration of the dorms was very impressed with the success of this initiative. Water used to run out towards mid-week; now the same allocation of supply lasts for two weeks. This success was the start of a snow-ball rolling effect as more dorms requested the installation of WSDs inside their premises.

The grant also supported a school within Sharq Al-Mafraq Cooperative in the installation of a new fresh-water drinking facility with 10 automatic shut-off faucets outside. The administration is now very pleased, as children can drink and use water appropriately without excessive wastage. The school is also part of the Madrasati initiative and has recently been awarded the Healthy School Certificate.

Throughout the duration of the project, the IDARA staff conducted more than 77 field follow-up visits accompanied by non-formal training to CBOs. Two of the awarded CBOs completed their first lending cycle and started a new one. The average loan size given to beneficiaries was JD 333 (USD 545), and the average payback percentage was 95%. Follow up and supervision on implementation of this task will be carried out by IDARA and MoWI.

Task 3.4: Implement Best Management Practices in pilot areas

During the second year of the IDARA project, a concept paper was drafted detailing the objective of the pilot program and its linkage with other IDARA tasks, such as the grants, and the formation of a Global Development Alliance (GDA) to replicate the program with Miyahuna Water Company in collaboration with the private sector.

A preliminary list of the best management practices that were to be implemented in the pilot area was developed. This entailed a number of activities including: developing pilot implementation strategies for retrofitting a pilot residential area with WSDs, implementing rebate programs for toilets and washing machines, and working with the WDMU and Miyahuna Utility to implement the BMPs.

The residential area, which included the Abu Nuseir Housing Complex, was selected to implement the pilot program. Fifty residential units were selected, based on water consumption data provided by Miyahuna's CIS Department, to participate in the pilot study. A preliminary verification visit was made to cross match meter numbers and customers with the tables and GIS maps of the utility. Installation of the devices took place during the month of October 2008. A report documenting the activities of the program, analysis of data and savings amounts is currently being prepared. The report will document the lessons learned about strategies for implementing the BMPs in the field, and disseminate those lessons to other utilities.

In addition, a thorough assessment of WSD types was conducted for use in the HSBC retrofit campaign and planned retrofit programs under IDARA project.

5.2 Findings and Observations

- 1) The 5 completed water-wise parks appear to be successful and are being utilized by the general public. The one in Deir Alla, in particular, has developed a plan to expand and develop more usable space and has secured some funding from the Jordan River Foundation for this purpose. Presently, only 6,000 m² out of 60,000 m² are landscaped with xeriscaping principles. The municipality itself has contributed labor, benches to sit on, and umbrellas made out of palms for shade, to further attract people to the park. The Deir Alla Park is already very popular and these amenities will draw even more people. The park could easily become self-sustaining if the municipality started charging a modest entrance fee of 1 JD per family, to cover the maintenance and administration costs.
- 2) The Mercy Corp project has done an excellent job of incorporating WDM concepts and water efficiency criteria into its revolving loan programs, with some assistance from the IDARA project. These impacts will be significant in rural villages, in terms of water saved and cost savings for low income customers. In some cases, Mercy Corp did a better job than IDARA of managing the loan issuance process and tracking the results.
- 3) HSBC was very proud of the water efficiency devices campaign that they participated in

last summer with Miyahuna Water Company and the IDARA project. Internally, they have developed a policy to become more environmentally responsible and more proactive in promoting green buildings in all their branches, promoting more public awareness on environmental issues including WDM, and encouraging their employees to engage in volunteer opportunities to give back to the communities in which they serve. As a result of this new internal policy, they recently signed a new agreement with IDARA to sponsor another campaign this summer. But this time, they will insist on some of their own employees being trained on installing WSDs and the employees will also install such devices in their own homes to demonstrate their conscious efforts to support water demand management.

- 4) There has been some success in incorporating the concepts of WDM into formal curriculums for students at Jordan University of Science and Technology (JUST), Jordan University, and German Jordanian University. The JUST program includes an undergraduate course in water demand management and demonstrations on its campus of active rain water harvesting systems and complete reuse of treated wastewater for irrigation of flowers and landscaped gardens. JUST is planning to add a water-wise garden with xeriscaping using drought tolerant plants as a future demonstration. The garden will be designed and planted by students enrolled in the WDM course. This program can serve as a model for other universities.

5.3 Recommendations

1. In order to expand the Deir Alla Park and others or to create other similar parks, the trained municipalities need some resources such as fertilizer, hand tools (shovels, hoes, pickaxes, wheel barrows), plants, drip irrigation tubing, and some amenities such as permanent picnic tables, permanent grills for cooking, and trash containers to encourage the park users not to litter. Sixty-six municipalities were trained by IDARA on developing water-wise parks. USAID should consider developing additional parks using xeriscaping principles in areas designated by the Ministry of Planning as “poverty areas” to provide demonstrations and opportunities for further social development and some income generation for the municipality involved. The Center for the Study of the Built Environment (CSBE) should also be consulted on the development of these water-wise parks as they also have expertise in landscape architecture, rainwater harvesting, and grey water uses. They could serve as training providers or as park design consultants to the municipalities. IDARA should follow-up with each of the municipalities where they trained people to see what plans might have been developed for sustainable water-wise parks to be constructed, and if proper O&M is being provided to the parks by some of the trained municipalities’ people.
2. USAID should continue to fund the Mercy Corp project and extend its contract for another two years to allow time for the water efficiency projects and resulting water savings to materialize. The WDMU should take on the responsibility of tracking and monitoring the water savings in rural villages by having WAJ follow up with these community based organizations to report what water saving improvements have been implemented, on a quarterly basis. IDARA should no longer be involved with the Mercy Corp Project because Mercy Corp has developed the expertise of qualifying CBOs and providing seed money to establish low interest revolving fund loans.

3. In order for the HSBC public private partnership or GDA to continue in future years, after the IDARA project ends, USAID should consider giving the IDARA project the task of finding willing NGOs to team up with HSBC as part of their project extension. IDARA should also get the WDMU involved in participating in these activities, with the WDMU taking the lead role. In addition, since HSBC has set the perfect example for other Arab banks and other private businesses to get involved, the WDMU should leverage this opportunity to reach out to other private partners for them to participate in similar WDM projects.
4. During the last year of the project, IDARA introduced a water-wise curriculum at Petra University, similar to the ones that have been incorporated in the other three universities. Follow-up projects are needed at other universities in key areas of the Kingdom of Jordan. IDARA should sponsor and host a workshop for only universities, with Faculty from JUST, Jordan University, and German Jordanian University giving presentations and showing slides about their respective programs. IDARA staff should also make presentations explaining the concepts of WDM and how they are being applied in Jordan. As a minimum, the following universities should be invited to guarantee that all the major regions of the Kingdom are represented: Ajloun University, Al-Zaytoonah University, American University of the Middle East, Amman Arab University for Graduate Studies, Applied Science Private University, Depaul University, Jordanian Canadian College, New York Institute of Technology, Princess Alla University College, Princess Sumaya University for Technology, The Islamic University of Gaza, University of Palestine International, Yarmouk University, Aqaba University College, Princess Rahma University College, Irbid Private University, Philadelphia University, Jerash Private University, Mu'tah University, Tafila Technical University, Al-Shoubak University College, and The Hashemite University.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations listed below are the most important ones that should be followed up within a timely manner, so as to not have a long gap between the IDARA project and a follow-on project. In chapters 3, 4 and 5 of this report, there are some secondary recommendations that should also be considered, most of which can be performed by the IDARA team during the extension period of that project, if one is awarded. The recommendations listed in Section 6.2 below and in chapters 3, 4 and 5 are listed in order of decreasing priority, with the highest priorities listed first.

6.1 Conclusions

1. The evaluation team interviewed 55 persons familiar with the IDARA project. The majority of them had a favorable view of IDARA and its implementer, DAI. IDARA was consistently cited for proactively contacting stakeholders and asking them to participate in the program. Just about all of the stakeholders praised IDARA's Chief of Party and Deputy Chief of Party. The intention of the evaluation was not to compare donor projects. However, on four separate occasions, stakeholders volunteered and they thought that IDARA was the most effective of the related water sector projects with which they were familiar.

2. IDARA has worked closely with the WDMU. The capacity building aspects of such work are obvious. They have succeeded in institutionalizing the concept within the MoWI and equipping the WDMU staff with the skills needed to assume an effective role. The changes in the WDMU management have somewhat affected the continuity; however, the fact that the new management comes from the National Water Master Plan should help the unit assume a role that is part of the national water strategy and future planning. The unit should play a more active role in the water planning and allocation process. The unit has support from upper management but that may not be the case shall there be changes in management. Their active engagement in the planning process, therefore, is important to be institutionalized.
3. Developing a second generation of leaders within the WDM is needed (e.g., the plumbing team) both to enable a wider geographic spread and to help guarantee continuity in the services they could offer. While most of the staff consists of mid-level professionals, there is always the risk of them pursuing careers in the private or development sectors (it has happened). Therefore, cross training and creating a “second line of defense” is important for sustainability.
4. Given the recent appointment of a new WDMU Director, IDARA should invest some effort over the next two months to allow her to become more involved in the project and get to know the various stakeholders that IDARA have worked with in order for her and her team to continue working and coordinating with the various stakeholders. Some of the key stakeholders have still not met the new Director.
5. The work with the Action Plan Teams has been very successful. The efforts in working in a participatory approach are evident and the counterparts from the different ministries recognize this. There is, however, a further need to build the capacity of relevant staff in aspects of WDM to better enable them to implement such plans in the coming years. Some of the Ministries have already started implementing some of the initiatives identified in the plans; however, there is an urgent need for further support to enable them to implement the plans.
6. Given the varying ages, and capacities, of the three utilities, the results of IDARA’s efforts reflect differently. It is obvious that AWC has the best capacity to continue and further develop the tools and skills provided by IDARA. However, given the size of its customer base, Miyahuna is in need of further support to enable them to realize the potential gains that could be achieved.
7. The efforts on the standards for sanitary fixtures and appliances standards have been tremendous. JSMO and the other relevant organizations recognize the importance of WDM aspects and are taking the necessary actions. There has been some procedural constraints, and there is a need to develop additional specs and regulations. There is also still a need to improve the enforcement aspects related to such standards.
8. The building codes are another significant achievement (although not 100% finalized). There are still further needs to develop manuals and other materials. There is also a need for capacity building once the codes are finalized.
9. IDARA has not focused on outdoor water use as a component of WDM at the

domestic/urban level, which is something that should have been focused on especially in the rural areas of Jordan.

10. There should have been more collaboration with ASEZA. There is a huge potential for collaboration; it would have been worthwhile to develop an action plan for ASEZA similar to the manner in which other ministries were involved. They should have been more involved in the code development process as well.

6.2 Recommendations

6.2.1 Key Recommendations

1. IDARA should continue to work with JSMO and other relevant agencies to develop technical standards for residential and commercial clothing washing machines; commercial and residential dishwashers; urinals, roof tank float valves and control valves; and backflow prevention check valves for residential, commercial, and industrial applications.
2. Once the new technical standards, new plumbing codes, and new building codes all become law, IDARA should continue capacity building of various associations, including but not limited to, the Jordan Engineers Association, the Jordan Contractors Association, the Jordan Architects Association, the Jordan Hotels Association, the Jordan Restaurants Association, all the municipal governments, and all the universities in Jordan that have accredited mechanical, civil, and structural engineering curriculums or vocational plumbing trade curriculums.
3. IDARA should continue to work with the appropriate technical committees to finish the two chapters proposed for the new Plumbing Code on Grey Water and Rainwater Harvesting.
4. WAJ is responsible for overseeing small water and wastewater systems that serve approximately 20% of the Jordanian population. These systems are not served by any of the three major utilities. Thus, to be truly effective, the WDMU should be collecting quarterly data from WAJ, using the same WDMS that was developed by IDARA for the other three major utilities. This activity requires developing a similar database, forecasting tool, and tracking tool for WAJ as was done for the other utilities. WAJ staff will also have to be trained on using those tools and database applications. Because of the extensive time required to develop these applications, USAID should include these activities in a follow-on project to IDARA.
5. Expand the RSS water efficiency laboratory for it to be able to test commercial and industrial water savings devices and appliances. The lab should also become certified to meet the appropriate ISO standards. This could be one task area in a follow-on project to IDARA.
6. MoWI has several independent IT applications that are not integrated with each other; i.e. data cannot be shared or transferred from one system to another without exporting it, manipulating it into proper formats, and then importing or uploading it into another application. This practice is archaic, time consuming, and impractical for making timely

decisions. These applications include the WIS, the GIS, the WEAP, the WDMS and probably the new EIS, which is just getting underway for design and implementation. What is needed is a complete integration of all the computer applications by creating direct linkages to all of them. USAID should consider expanding the existing SOW of the ITMP project to include the development of an overall IT strategic plan for the MoWI and the development of direct linkages interconnecting all the IT applications mentioned above. This work should be coordinated through the ICTU within the Ministry.

7. One of IDARA's U.S. subcontractors, Aquacraft, conducted a comprehensive end use analysis program that covered 95 residential units countrywide. The draft report received from Aquacraft on May 13, 2011 showed that approximately 11% of the water used was due to internal leaks. In general, NRW and UFW are specialized areas where not much work has been done through USAID. There was one previous USAID sponsored project specifically for Miyahuna Water Company, in which a 14 step action plan was developed but has not yet been implemented, due to lack of funding by the utility. The Miyahuna NRW pilot program included a component of indoor water loss. All three major utilities have undertaken leak detection and leak repair activities on their networks and service connections, but leaking pipes are only one source of non-revenue and unaccounted for water. There are also other technical and commercial losses that need to be discovered and corrected such as leaking valves, pumps, storage tanks (reservoirs), blow-offs, and hydrants; and meter inaccuracies, malfunctioning meters, internal leaks, tampered meters, illegal connections. All of these activities should be investigated in detail by providing technical assistance to the three major utilities and WAJ to demonstrate proper techniques to reduce non-revenue and unaccounted for water in accordance with best international management practices, including using the water balance categories developed by the International Water Association (IWA), as shown in Annex E. Based on Aquacraft's reported results, indoor water leak reduction should be included in a follow on project. NRW is also considered in the WUE plans of the utilities as part of WDM forecasting. Both indoor water loss and urban NRW and UFW should be part of the follow on IDARA project. USAID should include these activities, as well as the implementation of Miyahuna's proposed action plan, in a new project that focuses exclusively on NRW and UFW in the utilities' (including WAJ) operations and in irrigation operations. Both commercial and technical losses should be investigated and programs developed to minimize or eliminate such losses.
8. The Port of Aqaba has many opportunities to improve the water use efficiencies involving the AWC and the ships that come into the port. The container ships and other types of ships need to wash down their decks and cargo holds using high pressure hoses; this activity should use treated reuse water instead of fresh water, and the reuse water should be sold to the ships through an established tariff. The ships also re-fill their freshwater supplies before sailing on to the next port. This water should be sold to the ships by AWC through a bulk meter. Finally, the ships discharge their bilge and sewage in each port. There should be special trucks or barges acting as collection vessels to prevent these discharges from going into the Gulf of Aqaba and then transport the collected waste and empty it into the wastewater treatment plant headwaters to be properly treated and reused. USAID consider studying this situation and adding these activities to the SOW of the WREC project and coordinate such activities with AWC and ASEZA.

9. Climate changes, drought management and emergency preparedness are three other areas where not much work has been done through USAID. Emergency preparedness includes drought preparedness and other types of emergencies that WUs could encounter, which could cause interruptions in their operations. Each utility and WAJ should be required to have an emergency preparedness plan as part of their strategic plans. Technical assistance should be given to WDMU and the National Master Planning Unit to encourage them to require emergency preparedness plans to be developed by the three major utilities and WAJ and updated every five years. The technical assistance could also be given directly to the utilities and WAJ to help them prepare such plans. Because of the extensive time required to fully explore these issues, especially the effects of climate changes in Jordan, and develop the emergency preparedness plans, USAID should consider including these activities in a follow-on project to IDARA.

6.2.2 Other Less Critical Recommendations

1. IDARA has concentrated on two technical aspects of WDM: in-house residential water use reduction and water-wise landscaping. Other aspects of WDM such as leak detection, grey water usage, and rain water harvesting, have been touched upon but not really studied in detail. WDM in other sectors such as commercial, industrial, and agricultural irrigation is being explored under the WREC project, and by other international donors. WDMU should be included as a beneficiary or stakeholder of the WREC project so that it can be trained on the proper management of water in those sectors as well. WDMU should be constantly informed of the WREC activities and invited to participate in all trainings.
2. Some work needs to be done to help the three major utilities bill and collect all the revenue they are legally entitled to. The Amman Land Registry Directorate and the Amman Institute have been registering every plot of land in each municipality's jurisdiction. Those plots need to be cross-referenced with the utilities' and WAJ CIS' data bases to be sure all addresses match and that there is a utility customer of record at each address, who is responsible for receiving and paying the bill. If each utility has a GIS software application, this data should be entered in there as well in order to track leakage and other service related issues. Wherever gaps are discovered, the utilities' and WAJ records should be corrected to match the official registry prepared by the Amman Land Registry Directorate and the Amman Institute. Because of the extensive time required to fully develop these inventories of customers, USAID should consider including these activities in a future follow-on project. The contractor selected should be required to work with the three utilities, the Amman Land Registry Directorate, the Amman Institute and WAJ to accomplish this work. To be most effective, this SOW should be combined with the non-revenue water reduction SOW, mentioned in Key Recommendation 7 above.
3. The MCA is currently preparing a tender for rehabilitating or replacing the plumbing in 5,000 poverty households in Zarga. There needs to be some coordination between the IDARA project and the MCA project to get MCA to put in their tender specifications that the work should be performed by certified plumbers (provided that by that time there are sufficient certified plumbers available) and that WSDs should be installed with the new plumbing. USAID should consider giving IDARA project the task to follow-up with these activities, if there is a project extension. IDARA should also get the WDMU involved in participating and taking the lead role in these coordination activities.

4. Some of the other foreign donors are also sponsoring projects in various aspects of WDM. More specifically, GIZ will be hosting a Highland water forum; the EU will be going forward with important irrigation efficiency elements in a 10 million EUROS bilateral support project to be tendered this summer; AFD will be supporting improvements of on-farm drip irrigation systems in the Jordan Valley (MIRA: they redesign on-farm irrigation systems and provide a subsidy to replace the old irrigation systems with better designed systems; uneven distribution has been identified as the main cause of irrigation inefficiencies by other AFD, GIZ, and EU (IRWA) projects in the past.) WDMU needs to be at the forefront of all these activities. They need to be knowledgeable of every donor project working in the water sector and should actively participate in other donor meetings, trainings, and activities. USAID should consider giving the IDARA project the task of establishing coordinated meetings on at least a quarterly basis with the other donors as part of their project extension. IDARA should also get WDMU involved in participating in these activities, with WDMU taking the lead role.
5. A Master Plumbers' certification program has been established at VTC, which considers this program to be highly successful. About 50 plumbers have been trained so far. VTC wants to replicate this program in its facilities in Aqaba and in the Northern Governorates but first needs to renovate its training workshops in those areas and needs to complete the formalization of the certification process with MoL. VTC also wants to set up a demonstration laboratory in its Amman offices, illustrating various aspects of the new plumbing code, which includes using WSDs. Before setting up the laboratory, VTC wants to send two of its employees to visit a state-of-the-art plumbing laboratory in a developed country that uses the UPC and ANSI standards in its plumbing codes. Suggested countries include the United States, Great Britain, France, Germany, or India. IDARA should follow-up with these ideas to help expand this program and make it even more successful. The highest priority should be to work with MoL to get the certification issues resolved and formal certificates issued to the trainees that completed the course. Then IDARA should investigate the condition of the facilities in Aqaba and in the Northern Governorates to see what renovations, furniture, and equipment are needed to make it suitable for training plumbers. Finally, IDARA should work with VTC to arrange a short study tour to see a functioning laboratory using water savings fixtures and devices. Representatives of MoL, WDMU and RSS water efficiency laboratory should be included on that tour as well. VTC should actively participate in the funding of activities required to renovate its facilities and establish the demonstration laboratory.
6. As a partial regulator of AWC, ASEZA wants to have more involvement in the planning of WDM activities within the city limits of Aqaba. They want IDARA to seek their input more often during implementation of water efficiency plans and keep them informed of progress being made by AWC in executing the plan once it is approved by the WDMU. ASEZA is also interested in developing 100 hectares into a water wise park for use by residents and visitors. They want to include some xeriscaping and greenways as demonstrations of best management practices. The park will be fully irrigated using treated reuse water. IDARA should work to foster a closer relationship with ASEZA and offer them technical assistance in the design, layout, and construction of their proposed park.

ANNEXES

Annex A – Work Plan

1. Introduction

The United States Agency for International Development (USAID), Water Resources and Environment Office, in Jordan, contracted with Mendez England and Associates (ME&A) to carry out a final evaluation of the Instituting Water Demand Management in Jordan (IDARA) project. In the preparation of its management and technical approach, the ME&A's Evaluation Team has followed the guidelines detailed in the Request for Task Order Proposal (RFTOP). As stated, the purpose of this Task Order is "to evaluate the performance of the project and identify the areas and tasks pertaining to water demand management – in the municipal, commercial and industrial sectors – that remain to be addressed in potential future projects."

The RFTOP requires the Contractor selected for the requested work to provide a written final work plan of the methodology and draft schedule, including an interview schedule, list of proposed organizations to be interviewed, and outline for a final report.

Based on the tasks and deliverables stipulated by the RFTOP – final detailed work plan; approximately three weeks of work in Jordan to conduct interviews, including site visits to project locations of Amman; a draft report to be prepared prior to departure of the Team Leader from Jordan; a presentation of the findings, conclusions and recommendations for follow-on interventions; and the completion of the final report in the U.S. – the ME&A Evaluation Team has prepared this draft implementation plan for discussion with the Mission. The plan consists of a description of the Evaluation Team, evaluation design plan, work plan and draft schedule outside for tasks, meetings and field visits. A final report outline will be submitted on April 25, 2011.

Annex I contains the overall project timetable, Annex II contains the list of questions to be answered by the evaluation, Annex III contains a potential list of interviewees and Annex IV contains a partially confirmed list of scheduled interviews and meetings.

2. Evaluation Team

The evaluation of the IDARA project will be conducted by a three person team consisting of in-country and expatriate specialists. These include: Rick Albani (Team Leader), Tarek Tarawneh (Water Sector Specialist), Gert Soer (Water Sector Specialist) and Muna Atallah (Logistics Specialist).

Rick Albani will provide direction to the team members and overall management of the evaluation. This will include identifying persons and materials to be consulted prior to the departure of the Team to the field and liaising and working with the Contracting Officer's Technical Representative (COTR) to assure that the evaluation meets the objectives of USAID/Jordan. *Tarek Tarawneh and Gert Soer* will identify and schedule interviewees, conduct interviews and research, conduct regional field visits and contribute to the drafting of the draft and the final report. *Muna Atallah*, will lead the arrangement of interviews and coordination of site visits. She will also catalogue and organize materials collected and provide logistical support, as needed.

The Team will function as a single unit. However, due to the wide ranging scope of the evaluation, and in order to maximize the limited time in the field, the Team proposes to divide up several of the interviews in Amman and jointly participate in those meetings and briefings where a Team approach is warranted. The Team members plan to travel together for the visits to sites outside of Amman but may split if deemed more efficient.

In addition, ME&A's Evaluation IQC Manager and Project Manager, Ms. Mirela McDonald, will be accessible to the COTR and responsible for providing oversight to the Team's activities. They will assure that resources are available to the Team to meet all needs that might arise in the course of the evaluation effort.

3. Evaluation Design Plan

The ME&A Team will complete the end of project evaluation for the Instituting Water Demand Management in Jordan (IDARA) Project, which began in 2007 and will end in 2011. The evaluation will be both qualitative and quantitative. Qualitative data will be gathered through the Team's observations and meetings, and interviews with groups and beneficiaries, national and local government officials, experts and international donor representatives. Quantitative data will come from reports of the project implementers. The emphasis of this evaluation will be the impact of the IDARA project and recommendations for future USAID interventions to the Mission for comment.

The Evaluation will take place from April 11 – May 16, 2011 and will include preparation time, a 24 day field visit to Jordan and report and recommendations preparation.

The Team will review pertinent documents provided to it by the Mission and the IDARA Contractor as well as pertinent third party reports related to the water sector in Jordan, as appropriate. The review of all project documents will focus specifically on the key questions identified by USAID in the RFTOP. Prior to traveling to Amman, the Team Leader met with the IDARA Project home office management team; Ms. Betsy Marcotte and Mr. Walter Weaver of DAI, to gain some useful insights from their perspective.

4. Methodology

The early part of the field visit to Jordan will be focused on preparing the list of interviewees, list of key questions to be answered, final report outline and arranging interviews and project site visits. The bulk of the Jordan field visit will be oriented toward collecting and analyzing relevant information. The Team may employ three principal means of gathering information:

- *Document Review.* The Team will perform a document review of available reports and studies provided by USAID, the Contractor and other relevant parties.
- *Structured Interviews.* The Team will ask questions designed to answer the key questions identified by USAID. Our approach will be to use a core set of questions to enable a common baseline of information but to modify the set of interview questions based on the experience and position of the interviewee. For example, government officials and enterprise owners would have different questions. All of the interviews will go beyond qualitative "yes/no" to open ended answers to solicit as much explicit and concrete information as possible. Our intent is to have those interviewed speak frankly

and candidly about the status of water demand management programs and IDARA's contributions in their organizations.

- *Focus Groups.* If deemed more efficient, the Team may gather focus groups of ministry or water utility representatives to elicit information regarding IDARA's efforts to institutionalize water demand management.

We anticipate conducting 25-40 interviews and site visits depending on the location, willingness and availability of interviewees as well as the time available. The list reflects representatives of the Government of Jordan, professional associations, universities, international development/donor organizations, financial institutions, and community-based organizations participating in IDARA. The list of interviewees is Annex III.

Data analysis and report writing will comprise the final days of the field visit. The Team will deliver a presentation of results and a draft report to USAID prior to departure from Jordan. After review of the draft, the Team will edit the document based on USAID comments and submit a final report, five working days after submitting the draft report.

During the field visit, the Team Leader will deliver two status reports to USAID. The Team will be available for status meetings as requested by USAID, tentatively set for April 28, 2011 and May 4, 2011.

Attachment I: Schedule

DRAFT SCHEDULE FOR THE PROJECT EVALUATION OF USAID JORDAN INSTITUTING WATER DEMAND MANAGEMENT IN JORDAN

April 13	Meeting with IDARA home office management team, Betsy Marcotte and Walter Weaver, Development Alternatives, Inc.
April 16	Arrival of ME&A Team Leader in Amman to join local team members
April 18	Initial meeting with USAID; Separate initial meeting with IDARA COP
April 19	Meeting with IDARA staff; finalization of organizations to interview
April 21	Submission of work plan, conduct interviews, and visit water utility facility in Amman
April 19 – 25	Interviews in Amman
April 25	Submission of draft outline for report
April 26 – 27	Travel to Irbid and Aqaba
April 26 – 27	Visit water utilities facilities and conduct interviews in Irbid and Aqaba

April 28	Progress report meeting at USAID
April 30 – May 4	Follow-up meetings, additional interviews in Amman
May 4	Progress report meeting at USAID, if needed; drafting results analysis
May 5	Drafting of conclusions, findings, and recommendations
May 8	Final Presentation to USAID
May 10	Draft report submission to USAID
May 11	ME&A Team Leader departs Jordan
May 12 - 15	USAID provides comments on the draft report
May 16	Final report submission to USAID

Attachment II - Questions

The key questions provided by USAID in the Scope of Work are listed below. Answers to these questions and other related questions, based on the respondents' answers, will be the focus of the evaluation.

1. What has been the impact of IDARA project? What is the impact of the 32 tasks and sub-tasks implemented by IDARA? Which are critical and require further investment? Which are fully instituted and which still need to be advanced through direct USAID intervention?
2. Did the project's strategy enhance or weaken achievement of the anticipated tasks? Did the project's management approach enhance or weaken achievement of the anticipated tasks? Did the project's implementation approach enhance or weaken achievement of the anticipated tasks? Define the approaches – from strategy, management and implementation – that enhanced the project and identify the ones that can be replicated in the future. Also identify the ones that weakened the program and how these can be alleviated in future programs.
3. Determine what has changed in the country's working environment, specifically the water sector and political will, that has impacted (positively or negatively) USAID's interventions.
4. Determine the level of satisfaction of the counterpart institutions and the stakeholders with the program. Specify what satisfied them and what did not and why.
5. Given the status of water demand management in Jordan and USAID's historical involvement and achievements in this area, identify and recommend needed future intervention. Needed intervention must be identified at the task level and prioritized. Also, linkages between interventions need to be highlighted. This should include discussion of the water sector environment (political will) and how this would impact future interventions to sustain achievements related to water demand management.

In addition to the structured interviews, the Team will collect comments during unstructured moments with stakeholders and counterparts. These comments concerning the projects become stories and, as numerous stories are collected, certain anecdotal information can be drawn that will serve as the basis for success stories. The Team will document all of its observations, noting the participants, their affiliation, and the time and date of the interviews.

Attachment III - Organizations to be Interviewed

The following list of organizations represents a broad cross-section of stakeholders that could provide input into the evaluation of the IDARA project. The Team will interview one or more representatives of each organization on the following list based on the location, availability and willingness of the interviewees, their knowledge of IDARA's efforts and the time available.

Based on our team meetings on April 18, 2011, with USAID and the IDARA COP, we prioritized the list below, based on each organization's role with the IDARA project. More specifically, we matched each organization with the three primary components of the project, as follows: A = Policy Formulation, Codes, and Regulations; B = Institutional Support and Capacity Building; and C = Best Management Practices and Technologies. Then we assigned the priorities for conducting interviews as high, medium, and low. We deleted the organizations from the original list which did not contribute significantly to the achievements of the IDARA project and we also added some organizations to the list, which were not previously mentioned. The final list of potential interviewees is shown in the table below.

Name of Organization	Role in IDARA Project	Priority for Interviewing
IDARA Project Internal Team	A, B, C	High
Aqaba Water Company	A, B, C	High
Ministry of Water & Irrigation	A, B, C	High
Miyahuna Jordan Water Company for Amman	A, B, C	High
Northern Governorates Water Authority (Yarmouk)	A, B, C	High
WDM Unit at Ministry of Water & Irrigation	A, B, C	High
Water Sector Audit Unit at Ministry of Water & Irrigation	A, B	High
National Water Master Plan at Ministry of Water & Irrigation	A, B, C	High
Jordanian National Building Council	A	High
King Abdullah II Center for Excellence	B, C	High
Royal Scientific Society (NGO)	A, C	High
Vocational Training Corp Corporation	B, C	High
Aqaba Special Economic Zone	A, B	Medium

Community Based Organization Merci Corps	C	Medium
Greater Amman Municipality	A, C	Medium
Jordan Engineers Association	A, C	Medium
Jordan Standards & Metrology Organization (new name)	A, C	Medium
Ministry of Industry and Trade (task force – action plans)	A	Medium
Ministry of Municipal Affairs	C	Medium
Ministry of Environment (task force – action plans)	A	Medium
Ministry of Labor	A, B	Medium
Ministry of Tourism (task force action plans)	A	Medium
Ministry of Planning & International Cooperation		Medium
Ministry of Public Works and Housing (task force – action plans)	A	Medium
McKinsey Report		Medium
End user groups (hospitals, offices, landscapes, hotels, and residential) random samples	C	Medium
The Center for the Study of the Built Environment (NGO)	C	Medium
Jordan Dept. of Statistics		Low
International Association of Plumbing and Mechanical Officials (US based)	A	Low
Jordan Valley Authority	A	Low
Jordan University for Science & Technology	C	Low
Water Authority of Jordan	A	Low
Plumbing, Heating, Cooling Contractors Association (US based)	A	Low
Jordan German University	C	Low
AFD (French Donor)		Low
Public Action Project (Ecodit)		Low
ISSP Project (IRG)		Low
Arab Countries Water Utilities Association		Low
HSBC		Low

Attachment IV – Partial Schedule of Interviews, Site Visits, and Key Meetings

Sunday 4/17

10:00 am Team Organizational Meeting and Drafting of General Interview Questions

Monday 4/18

11:00 am Kenana Amin, Setta Tutundjian – Kickoff Meeting at USAID
1:30 pm Dr. Mohamed Chebaane – IDARA COP

Tuesday 4/19

9:00 am – 12:30 pm Key Task Leaders of IDARA Staff
2:00 pm Secretary General – Ministry of Water & Irrigation

Wednesday 4/20

8:30 am Team Strategy Meeting
10:00 am – 1:00 pm Remainder of Task Leaders of IDARA Staff
2:00 pm Ayman Jaber – Ministry of Water & Irrigation, Water Information System and Database

Thursday 4/21

9:00 am Dalal Shehadeh – Jordan Standards & Metrology Organization
10:15 am Abeer Momani – Miyahuna Water Company Discussion + Facilities Visitation
12:00 pm Abeer Mubaideen – Ministry of Tourism
1:15 pm Secretary General – Ministry of Tourism
2:00 pm Nisreen Haddadin – Ministry of Water & Irrigation, WDM Unit

Saturday 4/23

9:00 am – 6:00 pm Potential Additional Meetings and Begin Drafting Evaluation Report including Draft Outline of each Section of Report

Sunday 4/24

10:00 am Yasser Rejjal – Jordan German University
1:00 pm Ministry of Environment

Monday 4/25

8:00 am Ali Suboh – Ministry of Water & Irrigation, National Water Master Plan
10:00 am Rawan Hunaiti – Ministry of Public Works
11:30 am Mahmoud Disi – Vocational Training Corporation
3:00 pm Yassera Ghosheh – King Abdullah II Center for Excellence (pending)

Tuesday 4/26

10:00 am – 6:00 pm Travel to Irbid; Discussion and Visit Facilities with Northern Governorates Water Authority; Jordan University for Science & Technology; and visit Mafraq Water Wise Park; Stay Overnight in Aqaba

Wednesday 4/27

9:00 am – 5:00 pm Spend all Day in Aqaba; Discussion and Visit Facilities with Aqaba Water Company and with Aqaba Special Economic Zone; Travel back to Amman

Thursday 4/28

10:00 am Progress Report Meeting at USAID with Water Office Director and COTRs
11:30 am – 6:00 pm Other Pending Meetings with Jordanian National Building Council, Royal Scientific Society, Arab Countries Water Utilities Association, and the Ministry of Industry and Trade

Saturday 4/30

9:00 am – 6:00 pm Potential Additional Meetings (samples from end user groups) and Continue Drafting Evaluation Report

Sunday 5/1

9:00 am – 6:00 pm Jordanian Holiday (Labor Day) - Continue Drafting Evaluation Report

Monday 5/2

9:00 am – 6:00 pm Potential Additional Meetings (Merci Corps Community Based Organization, Ministry of Labor, AFD – French Donor, Millennium Challenge Agency)

Tuesday 5/3

9:00 am – 6:00 pm Potential Additional Meetings (Public Action Project - Ecodit, HSBC, Greater Amman Municipality, Ministry of Municipal Affairs)

Wednesday 5/4

9:00 am – 3:00 pm Potential Additional Meetings (Jordan Engineers Association, Ministry of Planning & International Cooperation, Ministry of Public Works and Housing)
4:00 pm Progress Report Meeting at USAID with 2 COTRs

Thursday 5/5

9:00 am – 6:00 pm Potential Additional Meetings (The Center for the Study of the Built Environment, Jordan Valley Authority, Water Authority of Jordan); Draft Findings and Recommendations

Saturday 5/7

9:00 am – 6:00 pm Potential Final Meetings (Jordan Department of Statistics, and the ISSP Project – IRG) and Prepare Power Point Presentation for Delivery to USAID

Sunday 5/8

10:00 am Deliver Presentation to USAID emphasizing Findings and Recommendations and Receive Feedback
2:00 pm Final Meeting with IDARA COP and Key Task Leaders

Monday 5/9

9:00 am – 5:00 pm Finalize Draft Report and Send to Mendez England for Final Review

Tuesday 5/10

10:00 am Deliver Final Draft Report (Hard and Soft Copies) to USAID

Annex B – List of Interviews, Site Visits and Meetings

	PERSON	POSITION	ORGANIZATION	LOCATION	DATE
1	Betsy Marcotte	SVP, Technical Programs	DAI	Bethesda, MD	13-Apr
2	Walter Weaver	Sr. Development Specialist	DAI	Bethesda, MD	13-Apr
3	Kenana Amin	Program Development Specialist	USAID	Amman	18-Apr
4	Setta Tutundjian	Project Management Specialist (COTR for IDARA)	USAID	Amman	18-Apr
5	Dr. Mohamed Chebaane	Chief of Party	IDARA	Amman	18-Apr
6	Hala Dahlan	Policy & Institutional Development Expert	IDARA	Amman	19-Apr
7	Lara Zureikat	Landscape Specialist	IDARA	Amman	19-Apr
8	Lara Shahin	Policy & Planning Specialist	IDARA	Amman	19-Apr
9	Maysoon Al-Z 'ubi	Secretary General	Ministry of Water & Irrigation	Amman	19-Apr
10	Eng. Ali Subah	Secretary General Assistant – Technical Affairs	Ministry of Water & Irrigation	Amman	19-Apr
11	Ayman Jaber	Sr. Hydro Geologist (WIS database operator)	Ministry of Water & Irrigation	Amman	20-Apr
12	Eng. Dalal Shehadeh	Head Editing & Follow-up Division: Standardization Dept	Jordan Standards and Metrology Organization	Amman	21-Apr
13	Eng. Abeer Al-Momani	Technical Support Head of Customers Unit	Miyahuna Water Company	Amman	21-Apr
14	Jihad Majali	Customer Services Representative	Miyahuna Water Company	Amman	21-Apr
15	Abeer Mubaideen	Licensing Department	Ministry of Tourism	Amman	21-Apr
16	Ihab Haddadin	Licensing Department	Ministry of Tourism	Amman	21-Apr
17	Issa Gammo	Secretary General	Ministry of Tourism	Amman	21-Apr
18	Eng. Nisreen Haddadin	Director of Water Demand Management Unit	Ministry of Water & Irrigation	Amman	21-Apr
19	Lynnette Wood	IT Specialist	ARD – ITMP Project	Amman	22-Apr
20	Dr. Yasser Rajjal	Dean, School of Architecture and Built Environment	German Jordan University	Amman	24-Apr
21	Dr. Omaimah Ali Al-Aria	Assist Prof, Dept. of Design & Visual Communications	German Jordan University	Amman	24-Apr
22	Dr. Muna Albanneh	Department Chair & Assistant Professor Dept. of Water and Environmental Engineering	German Jordan University	Amman	24-Apr
23	Adnan Khasawneh	Professor of Civil Engineering	Royal Scientific Society	Amman	24-Apr

	PERSON	POSITION	ORGANIZATION	LOCATION	DATE
24	Eng. Ali Subah	Secretary General Assistant & National Master Plan Unit Head	Ministry of Water & Irrigation	Amman	25-Apr
25	Rawan Hunaiti	Procurement Department	Ministry of Public Works and Housing	Amman	25-Apr
26	Eng. Khaled Sou 'di	Government Tenders Directorate	Ministry of Public Works and Housing	Amman	25-Apr
27	Yasera Ghosheh	Executive Director	King Abdullah II Center for Excellence	Amman	25-Apr
28	Dr. Eng, Mahmoud Al-Disi	Master Plumbing Program Manager	Vocational Training Corporation	Amman	25-Apr
29	Nawaf Shobaki	Chief Executive Officer	Yarmouk Water Company	Irbid	26-Apr
30	Mohammed Zoubi	ICT Specialist	Yarmouk Water Company	Irbid	26-Apr
31	Dr. Anne Gharaibeh	Vice Dean, College of Agriculture and Design	Jordan University of Science and	Irbid	26-Apr
32	Mohammad Al Shafey	Head of Central Operations	Aqaba Water Company	Aqaba	27-Apr
33	Naem Saleh	Director of Technical and Engineering Affairs	Aqaba Water Company	Aqaba	27-Apr
34	Eng. Ahmad Abu Alsoud	Head of Information and Systems Department	Aqaba Water Company	Aqaba	27-Apr
35	Eng. Mohamed Al-Mahamid	Head of Aqaba Wastewater and Reuse Treatment Plant	Aqaba Water Company	Aqaba	27-Apr
36	Eng. Mazen Rayyan	Head of Water Resources Management Division	Aqaba Special Economic Zone	Aqaba	27-Apr
37	Kenana Amin	Program Development Specialist	USAID	Amman	28-Apr
38	Setta Tutundjian	Project Management Specialist (COTR for IDARA)	USAID	Amman	28-Apr
39	Tom Rhodes	Water Res & Envir Off Director	USAID	Amman	28-Apr
40	Dr. Mohamed Chebaane	Chief of Party	IDARA	Amman	28-Apr
41	Eng. Khaldon Khashman	Secretary General	ACWUA	Amman	28-Apr
42	Eng. Mustafa Nasereddin	Director of Programs and Technical Services	ACWUA	Amman	28-Apr
43	Mohammad Irshaid	Director of Center of Accredit. and Quality Assurance	TEVET Council	Amman	3-May
44	Jawdat Yaghmour	General Manager of Associated Consulting	Jordan Engineers Association	Amman	3-May
45	Amad Zahran	Head of Mechanical Department of ACE	Jordan Engineers Association	Amman	3-May
46	Shadi Bushnaq	Chief of Party	Mercy Corp	Amman	4-May
47	Stephen Mcilwaine	Director	Center for the Study of the Built Environment	Amman	4-May
48	Touleen Barto	Manager Marketing and Communications	HSBC	Amman	4-May

	PERSON	POSITION	ORGANIZATION	LOCATION	DATE
49	Maria Qsous	Marketing Associate	HSBC	Amman	4-May
50	Kenana Amin	Program Development Specialist	USAID	Amman	5-May
51	Setta Tutundjian	Project Management Specialist (COTR for IDARA)	USAID	Amman	5-May
52	Tom Rhodes	Water Res & Envir Off Director	USAID	Amman	5-May
53	Dr. Amer Al-Homoud	Program Management Specialist (Environment)	USAID	Amman	5-May
54	Aiman Bani Hani	Project Management Specialist	USAID	Amman	5-May
55	Roger Patrick	Utility Expert	ISSP Project	Amman	7-May
56	Dana Mansuri	Acting Mission Director	USAID	Amman	8-May
57	Amy Tohill-Stull	Acting Deputy Mission Director	USAID	Amman	8-May
58	Tom Rhodes	Water Res & Envir Off Director	USAID	Amman	8-May
59	Ziad Abd Rabu	Acquisition Specialist	USAID	Amman	8-May
60	Amal Abu-Hanna	Administrative Assistant	USAID	Amman	8-May
61	Qais Naber	Financial Analyst, FMO	USAID	Amman	8-May
62	Bill Thomas	Outreach Specialist	USAID	Amman	8-May
63	Wayne Frank	WR & E Off Deputy Director	USAID	Amman	8-May
64	Kenana Amin	Program Development Specialist	USAID	Amman	8-May
65	Setta Tutundjian	Project Management Specialist (COTR for IDARA)	USAID	Amman	8-May
66	Dr. Amer Al-Homoud	Program Management Specialist (Environment)	USAID	Amman	8-May
67	Aiman Bani Hani	Project Management Specialist	USAID	Amman	8-May

Annex C – List of Documents Received and Consulted

- Sample – WDM System Outputs (hard copy only)
- A National Water Demand Management Policy (hard copy only)
- IDARA – Third year Progress Report Oct 2009 – Sep 2010 (hard copy only)
- IDARA Water Use Efficiency Plan for Miyahuna Water Company (hard and soft copy)
- IDARA Sub-Task 1.5.3 Capacity Building for Private Sector Report (hard and soft copy)
- IDARA WDMU strategic and operational plan, 2008-2012 (soft copy only)
- IDARA Task 1.2.5 - Design and build appropriate database under WDMU (soft copy only)
- IDARA Objectives and Achievements (soft copy only)
- Four Action Plans – Ministries of Environment, Tourism & Antiquities, Industry & Trade, and Public Works & Housing (hard copies only in Arabic)
- Mercy Corps Programs Descriptions and Final Report for IDARA
- Accelerating Water Sector Transformation in Jordan (McKinsey PowerPoint presentation – soft copy)
- Water & Environment Sector: Project Profile (soft copy)
- Community-Based Initiative for Water Demand Management (soft copy)
- Securing Jordan’s Prosperity through Improved Water Management (soft copy)
- USAID/Jordan Country Strategy (soft copy)
- USAID/Jordan List of Activities (soft copy)
Final Deliverables List (soft copy)
- Water Resources List (soft copy)
- The 6th IWA Specialist Conference on Efficient Use and Management of Water – Technical Papers (CD only)
- The 6th IWA Specialist Conference on Efficient Use and Management of Water – Technical Presentations (CD only)
- Four water efficiency guides for hotels, hospitals, offices, and landscaping (hard copies and CD)
- Master Plumber Training Program Syllabus (hard copy)

- Arab Countries Water Utilities Association Programs Descriptions (hard copy)
- Grey Water Use in the Middle East (hard copy)
- USAID – Eight One Page Descriptions of Various Aspects of WDM (hard copy)
- King Abdullah II Center for Excellence Description Booklet and Awards Criteria (hard copy)
- IDARA – Fourth Year Monitoring and Evaluation Plan (hard copy)
- IDARA Task 1.5.3 Assessment of Barriers and Opportunities Report (soft copy)
- EIS Steering Committee Kickoff Presentation (soft copy)
- Rainwater Harvesting Draft Report (soft copy)
- WDMS Deliverables 1 & 2 (soft copy)
- WDMU Strategic and Operational Plan (soft copy)
- IDARA Year 1 M&E Plan (soft copy)
- IDARA Year 1 Progress Report (soft copy)
- IDARA Year 2 M&E Plan (soft copy)
- IDARA Year 2 Progress Report (soft copy)
- IDARA Year 4 Work Plan (soft copy)

Annex D – Selected Pictures and Site Visits



Figure 1: WDMS Operator at Yarmouk Water Company



Figure 2: Residential Water Saving Devices Testing Lab



Figure 3: Water Saving Devices



Figure 4: Leak Detection Equipment



Figure 5: Treated Reuse Water at Aqaba



Figure 6: Deir Alla Water Wise Park



Figure 7: Xeriscaping at JUST Campus

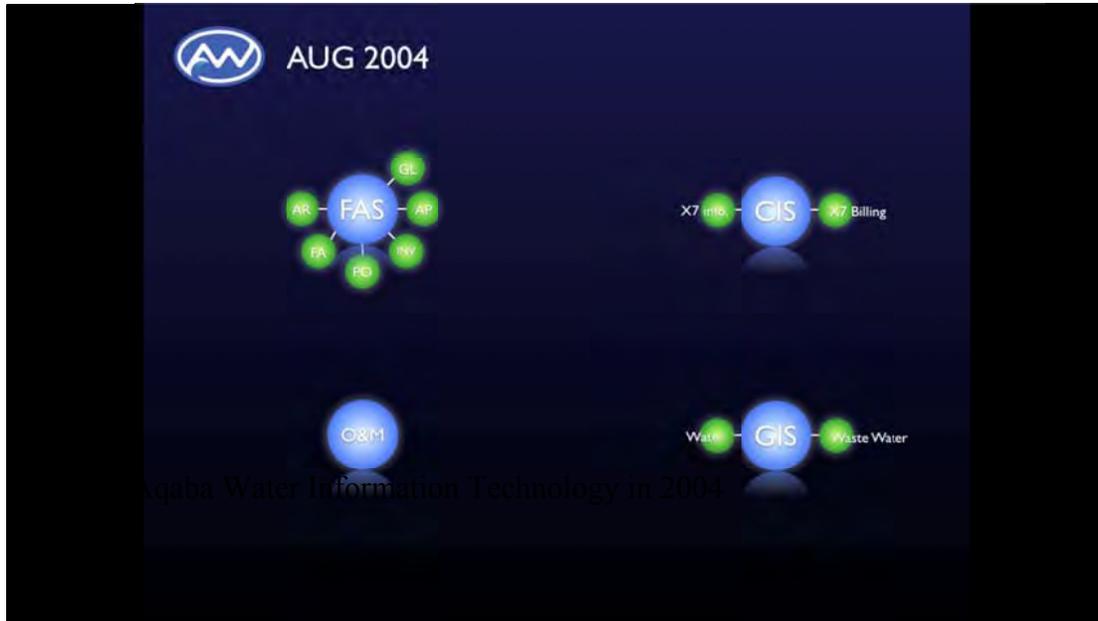


Figure 8: Aqaba Water Information Technology in 2004

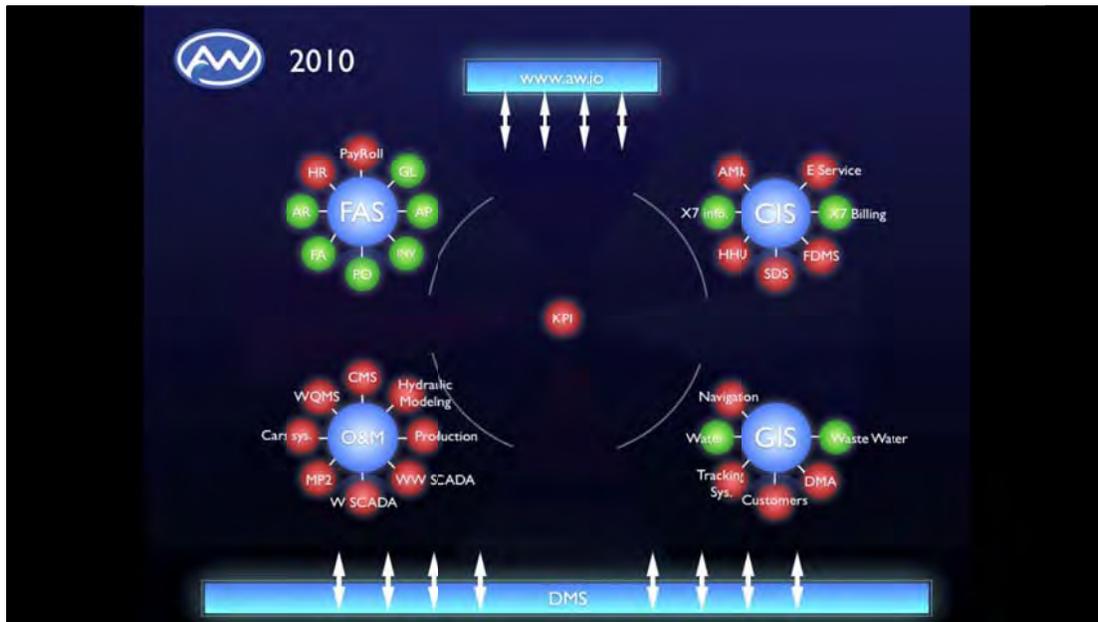


Figure 9: Aqaba Water Information Technology in 2010

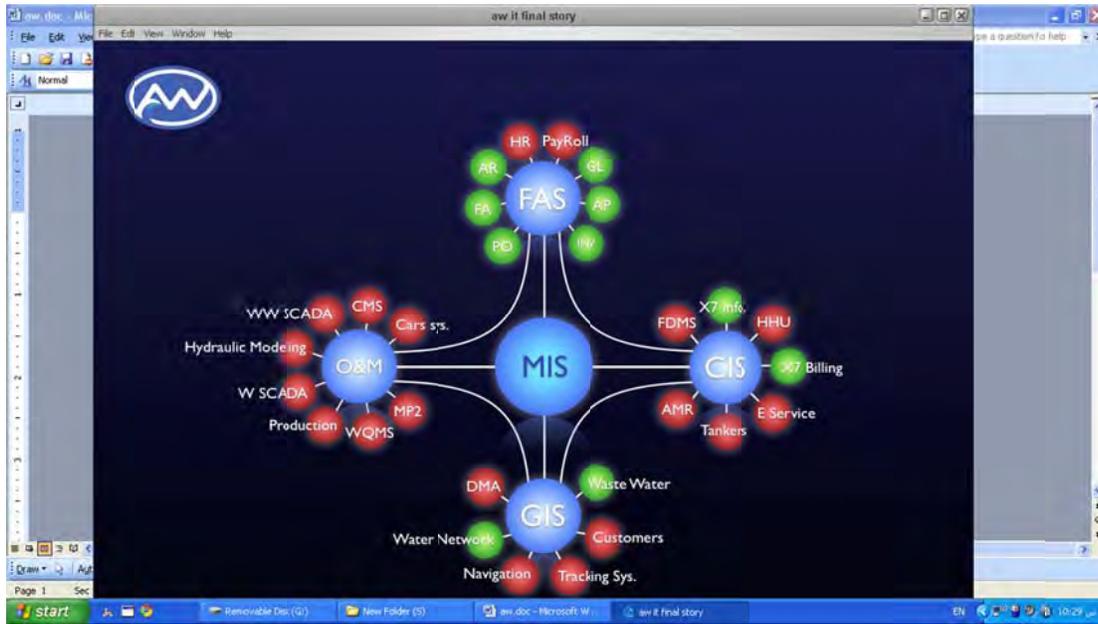
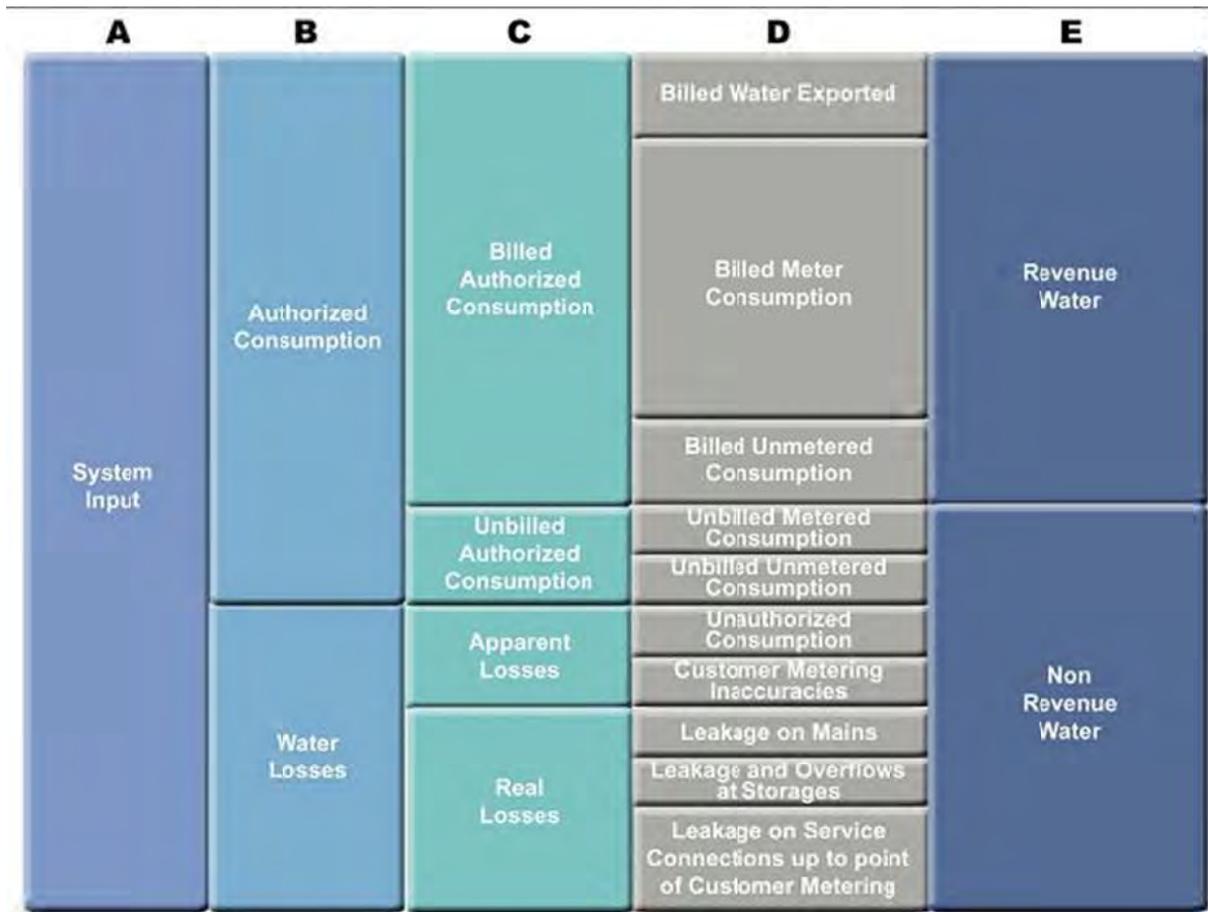


Figure 10: Aqaba Water Information Technology Fully Integrated in 2011



Figure 11: Aqaba Water Information Technology Configuration

Annex E – IWA Water Loss Categories



Annex F – Progress Reports to USAID

During the mission to Jordan, two informal verbal progress reports were delivered by the Team Leader and his team members to USAID via meetings at the U.S. Embassy. Representing USAID at both meetings were Mr. Tom Rhodes, Water Resources and Environment Office Director; Ms. Setta Tutundjian, Project Management Specialist from the Office of Water Resources and Environment; and Ms. Kenana Amin, Program Development Specialist. In addition to the aforementioned folks, at the second progress report meeting, two other staff members from USAID were present. They were Dr. Amer Sh. Al-Homoud, Project Management Specialist from the Office of Water Resources and Environment; and Mr. Aiman Baihani, Project Management Specialist from the Office of Water Resources and Environment. The highlights of those two reports follow.

PROGRESS REPORT – APRIL 28, 2011

A general discussion was had regarding which organizations the team had already interviewed and what our remaining activities would be. We then discussed the feedback that was given by the stakeholders. Finally, we presented some preliminary findings and a preliminary set of recommendations based on the successes that IDARA had experienced. This set of recommendations indicated areas where extra support was needed by IDARA. They are summarized below:

- The WDMU should initiate all activities from now on with support from the IDARA staff.
- IDARA should work with the Director of the WDM unit to formalize the mission statement, goals, objectives, job descriptions, performance measures and indicators, and the action plan needed, especially the role that the Director plays, which needs to be very clear.
- IDARA should work with the Secretary General of the Ministry of Water & Irrigation to secure the required resources for the WDMU.
- IDARA should work with the Director of the WDM Unit to establish the technical committee and its ground rules and convene the first couple of meetings.
- IDARA should provide additional user training to the three major utilities during the month of May, for the WDMS, if they require it.
- IDARA should sponsor a workshop hosted by AWC in Aqaba and invite Miyahuna Water Company, Yarmouk Water Company and the WDM Unit to attend it. Following the workshop, IDARA and AWC could work together to provide consulting services to the other two utilities to create the necessary electronic links between the CIS and the WDMS.
- IDARA needs to provide each of the three major utilities with the source codes of the WDMS within the next two months, so they can have some reliability and back-up copies in case of system failures.
- Proper O&M procedures for the software and database also need to be conveyed by IDARA to the utilities, to keep these tools sustainable in the future.
- WDMU should initiate meetings with both Ministries of Tourism and Public Works and start negotiating and drafting the MOUs. The WDM Unit should start with the Ministry of Tourism because they seemed to be the most enthusiastic and receptive to the water demand management concepts.
- IDARA should formally transfer the data loggers and accompanying software to each utility and train them on how to use them and encourage them to start performing their own residential end use analyses studies within their service areas.
- IDARA should continue to work with KACE to develop and implement new campaigns. Alternatively, this activity could be assigned to the USAID PAP project for them to work with KACE, but IDARA might have to provide some training to the PAP staff to educate them on the WDM concepts.

- IDARA should host a workshop for other Universities that might be interested in starting a curriculum with water demand management courses. JUST and German Jordan University staff should also make presentations explaining the concepts of WDM and how they are being applied in curriculums at their universities.
- IDARA should work with VTC to arrange a short study tour to see a functioning laboratory using water savings fixtures and devices. Representatives of the Ministry of Labor, the WDMU and the RSS water efficiency laboratory should be included on that tour as well. VTC should actively participate in the funding of activities required to renovate its facilities and establish the demonstration laboratory.
- IDARA should work to foster a closer relationship with ASEZA and offer them technical assistance in the design, layout, and construction of their proposed park.
- IDARA needs to work with the appropriate stakeholders to get the grey water and rain harvesting standards and codes approved and into law before the end of 2011. The remaining water savings devices and valves standards and codes mentioned above need to be developed, reviewed, and approved during a follow-on project.

Immediately following this meeting, the above recommendations were written up in more detail and e-mailed to USAID for them to start considering them.

PROGRESS REPORT – MAY 5, 2011

At the second meeting our team presented more findings and more recommendations, but this time the recommendations focused mostly on potential scopes of work for future follow-on projects. Those recommendations are summarized below:

- The MoWI has several independent IT applications that are not integrated with each other. What is needed is a complete integration of all the computer applications by creating direct linkages to all of them. We recommend that USAID consider expanding the existing SOW of the ITMP project to include the development of an overall IT strategic plan for the Ministry and the development of direct linkages interconnecting all the IT applications mentioned above. This work should be coordinated through the ICTU within the MoWI.
- WAJ is responsible for overseeing small water and wastewater systems that serve approximately 20% of the Jordanian population. Thus, to be truly effective, the WDM Unit should be collecting quarterly data from WAJ, using the same WDMS that was developed by IDARA for the other three major utilities. Because of the extensive time required to develop these applications, we recommend that USAID include these activities in a follow-on project to IDARA.
- IDARA has concentrated on two technical aspects of WDM; in house residential water use reduction and water-wise landscaping; Other aspects of WDM such as leak detection, grey water usage, and rain water harvesting, have been touched upon but not really studied in detail. WDM in other sectors such as commercial, industrial, and agricultural irrigation are being explored under the WREC project by AECOM, and by other donors. We recommend that the WDMU be included as a beneficiary or stakeholder of the WREC project so that the WDMU can be trained on the proper management of water in those sectors as well.
- Non-revenue water and unaccounted for water are specialized areas where not much work has been done through USAID. The technical and commercial losses activities should be added to the future IDARA II project.

- The Port of Aqaba has very special water needs and there are many opportunities to improve the water use efficiencies, involving the Aqaba Water Company (AWC) and the ships that come into the port. We recommend that USAID consider studying this situation and adding these activities to the SOW of the WREC project and coordinate such activities with AWC and ASEZA.
- The Ministry of Tourism could use some additional technical assistance in working with the Jordan Hotels Association and the Jordan Restaurants Association to implement the best management practices (BMP) guidelines in water use efficiency, including using water savings devices, as developed by IDARA. We recommend that the WDMU provide some of this training to the Ministry of Tourism staff, but USAID should consider giving the IDARA project this task to follow-up with these activities as part of their project extension.
- New building codes incorporating water saving devices are currently being drafted by the MoPWH. Once the revised plumbing codes and building codes go into effect, it is going to be necessary to provide a lot of training to the members of the JEA, the JCA, the JAA, ASEZA, and all the universities that have an accredited engineering or architect curriculum. We recommend that USAID consider giving the IDARA project this task to follow-up with these activities as part of their project extension. IDARA should also get the WDMU involved in participating in these activities.
- The RSS water efficiency laboratory is actively functioning and should expand its operations to also be able to test commercial and industrial water savings devices. The lab should also become certified to meet the appropriate ISO standards. Because of the extensive time required to fully develop this laboratory expansion plan, we recommend that USAID include these activities in a potential IDARA II project. Alternately, this SOW could be added to the WREC project, if deemed appropriate.
- Climate changes, drought management and emergency preparedness are three other areas where not much work has been done through USAID. Each utility and WAJ should be required to have an emergency preparedness plan as part of their strategic plans. Because of the extensive time required to fully explore these issues, especially the effects of climate changes in Jordan, and develop the emergency preparedness plans, we recommend that USAID include these activities in a potential IDARA II project.
- The 6 water wise parks by themselves appear to be successful and are being utilized by the general public. The one in Deir Alla in particular has developed a plan to expand and develop more usable space and has secured some funding from the Jordan River Foundation for this purpose. We recommend that USAID consider developing additional parks using xeriscaping principles in areas designated by the MoP as “poverty areas” to provide demonstrations and opportunities for further social development and some income generation for the municipality involved. The CSBE should also be consulted on the development of these water wise parks as they also have expertise in landscape architecture, rainwater harvesting, and grey water uses. They could serve as training providers or as park design consultants to the municipalities.
- Some work needs to be done to help the 3 major utilities bill and collect all the revenue they are legally entitled to. The Amman Land Registry Directorate and the Amman Institute have been registering every plot of land in each municipality’s jurisdiction. Those plots need to be cross-referenced with the utilities’ and WAJ CIS data bases to be sure all addresses match and that there is a utility customer of record at each address, who is responsible for receiving and paying the bill.

Because of the extensive time required to fully develop these inventories of customers, we recommend that USAID include these activities in a potential IDARA II project. To be most effective, this SOW should be combined with the non-revenue water reduction SOW, mentioned earlier.

- The MCA is currently preparing a tender for rehabilitating or replacing the plumbing in 5,000 poverty households in Zarga. There needs to be some coordination between the IDARA project and the MCA project to get MCA to put in their tender specifications that the work should be performed by certified plumbers and that water saving devices should be installed with the new plumbing. We recommend that USAID consider giving the IDARA project this task to follow-up with these activities as part of their project extension. IDARA should also get the WDMU involved in participating and taking the lead role in these coordination activities.
- Issues like consumer behavior and tariff pricing have so far been insufficiently studied and need more attention. Changes in consumer behavior will affect water savings as do low tariffs. The first block rate of the existing tariff has a very high water allowance built into it. More than 70% of the customers in Amman never get out of the first block so they never pay the more severe rate for the second block. This is symptomatic of an inefficient water pricing structure. Because of the extensive time required to conduct a full cost of service study for each utility and the WAJ water systems, we recommend that USAID include these activities in a potential IDARA II project.
- Some of the other foreign donors are also sponsoring projects in various aspects of water demand management (GIZ, EU, AFD) The WDMU needs to be at the forefront of all these activities. They need to be knowledgeable of every donor project working in the water sector and they should actively participate in other donor meetings, trainings, and activities. We recommend that USAID consider giving the IDARA project the task of establishing coordinated meetings on at least a quarterly basis with the other donors as part of their project extension. IDARA should also get the WDMU involved in participating in these activities, with the WDM Unit taking the lead role.
- The Mercy Corp project has done an excellent job of incorporating WDM concepts and water efficiency criteria into its revolving loan programs, with some assistance from the IDARA project. These impacts will be significant in the rural villages, in terms of water saved and cost savings for low income customers. We recommend that USAID continue to fund the Mercy Corp project and extend its contract for another two years to allow time for the water savings to materialize.
- HSBC was very proud of the water efficiency devices campaign that they participated in last summer with Miyahuna Water Company and the IDARA project. Internally, they have developed a policy to become more environmentally responsible and more proactive in promoting green buildings in all their branches, promoting more public awareness on environmental issues – including water demand management, and encouraging their employees to engage in volunteer opportunities to give back to the communities in which they serve. We recommend that USAID consider giving the IDARA project the task of finding willing NGOs to team up with HSBC as part of their project extension. IDARA should also get the WDMU involved in participating in these activities, with the WDM Unit taking the lead role.

Once again, following this meeting, the team's recommendations were written up in great detail and e-mailed to USAID for them to start considering them as well.

Annex G – Scope of Work

INSTITUTING WATER DEMAND MANAGEMENT IN JORDAN (IDARA) END OF PROJECT EVALUATION

Introduction

USAID Jordan wishes to carry out a final evaluation of the Instituting Water Demand Management in Jordan (IDARA) project. The objective from the evaluation is to evaluate the performance of the project and identify the areas and tasks pertaining to water demand management – in the municipal, commercial and industrial sectors – that remain to be addressed in potential future projects.

Background

On March 28, 2007, USAID/Jordan competitively awarded a US\$8,863,437, Cost-Plus -Fixed-Fee term contract to Development Alternatives Inc. to implement activities to help institute water demand management in Jordan. The resulting IDARA project is a four-year project that focuses on improving the institutional and regulatory framework for water demand management in the country. The contract was made up of a two-year base period and a two-year option period.

IDARA scope includes the following broad categories:

1. Building institutional capacity for water demand management in the Ministry of Water & Irrigation and in the water utilities (Miyahuna, Aqaba Water Company and Northern Water Utility).
2. Creating the institutional and legal environment to promote water demand management.
3. Demonstrating water demand management practices to the public.

Major milestones during the first three years of project implementation included:

1. Development of a water demand management policy through a participatory process, and approval of the policy by the Council of Ministers.
2. Development of 28 water demand management functions through a participatory process that involved more than 14 institutions. Subsequently and based on it, the development of a strategic plan for the Water Demand Management Unit at the Ministry of Water and Irrigation and the establishment of linkages between various concerned institutions.
3. Development of utility water use efficiency plans, which constitute the backbone for the institutionalization of water efficiency. Also, instituting a water use efficiency tracking tool within the existing water utilities, which monitors water and energy savings from various interventions.
4. Integration of water and energy efficiency criteria within the King Abdullah II Center for Excellence.
5. Obtaining government decision to develop a new national plumbing code for Jordan; efforts are on-going on this effort.
6. Development of standards for lavatory and kitchen faucets and their approval by the board of the Jordan Institution for Standards and Metrology as technical direction.

However some critical tasks have lagged behind schedule, including:

1. The review and upgrade of the plumbers' vocational training.
2. The review of technical standards for water efficient fixtures and appliances by the Jordan Institute for Standards and Metrology (JISM) and adoption of new water efficient standards.

Shortly after the IDARA project started the vocational training efforts, Jordan witnessed drastic transformation efforts which included the establishment of a certification body. For the long-term success and sustainability of the plumbing training, this transformation is positive, although it had a major impact on the task schedule. As for technical standards, standards are yet to be issued for many other fixtures and appliance, but the process is quite lengthy and will need a few years.

Program Theory

Jordan is one of the most water scarce countries in the world. Consequently, water is the single most critical natural resource since virtually all aspects of sustainable economic, social, and political development in the country depend on an adequate water supply.

Water demand in Jordan is met by over pumping from renewable aquifers, exploiting fossil water, and rationing the municipal water supply. The water scarcity is exacerbated by rapid population increases, the growing industrial and services (including tourism) sectors, inefficient irrigation practices, inadequate wastewater treatment capacity, and inefficient water management and use.

Recurring droughts in the 1980s, 1990s, and 2000s increased perceptions of Jordan's acute vulnerability and has prompted the Government of Jordan (GOJ) to initiate a wide range of infrastructure projects to develop fresh water supplies. However, supply options are limited and very expensive. While desalination is a possible solution, it does have a number of limitations – for one, Jordan has an extremely short coastline that is more than 300km away from the major inhabited areas. But even with the mega projects the Government is pursuing, such as the Dissi aquifer and Red-Dead Sea conveyors, projected demand will not be met and, even worse, delivery costs will far exceed current water tariffs and will have a major impact on cost recovery and required government subsidies.

Domestic water use in Jordan is among the lowest in the world, and barely meets basic household needs for sanitation, cooking, and basic cleaning. Most Jordanians experience problems of water supply, with water supplied through the system only once a week in the summer months, and some rural areas going for weeks without municipal water supplies.

Even with these shortages, annual water consumption still exceeds renewable supply, and groundwater aquifers are being depleted at an alarming rate.

Over the short-term, the most feasible options for reducing the gap between water demand and supply are improved management of existing water resources, and improved quality of treated wastewater for reuse.

USAID has worked since 1998 with the GOJ to introduce and promote the concept of water demand. In 1999, USAID initiated the Water Efficiency and Public Information for Action (WEPIA) project to promote water conservation among Jordanians. The WEPIA program ran for five years and was very successful in introducing water demand management principles and in gaining support for this new approach among many stakeholders. It laid the foundation and created the enabling environment for Demand Management.

In 2003, USAID initiated the Education and Information Program to Improve Irrigation Water Use Efficiency (KAFA'A) that aimed to initiate water conservation among Jordanian farmers in selected areas. The project succeeded in demonstrating the need for farmers to adopt ErepGap certification as a means to increase the value of water used in agriculture. They also disseminated many water efficient practices. A major challenge for the program was the relatively low cost of agricultural water, which does not encourage farmers to conserve.

In 2006, USAID started the Community-Based Initiative for Water Demand Management Project (CBI). This project aims to enable poor communities in rural areas establish water efficiency programs that, in addition to saving water, improve the inhabitants' daily lives and promote citizen participation in solving local problems. This project has been very successful in enabling communities across Jordan to reduce water demand through improved management. It has also increased the understanding among communities about the water situation and the role that they can play to benefit their community and advocate for their issues. The project's methodology is to empower local organizations in managing their water issues by creating revolving loan funds that the local organizations manage. Demand has been very high from voluntary and cooperative societies for managing these revolving funds, as well as from beneficiaries for acquiring loans to implement water saving projects. The generated demand is far beyond the current budget capacity of the ongoing project.

In 2007, USAID launched the Instituting Water Demand Management in Jordan project (IDARA).

With the help of these USAID initiatives, water demand management is now recognized as a viable option which needs to be pursued together with water supply. However, instituting this in Jordan needs further USAID support and a major objective of this evaluation effort will be to identify what support is still needed and what opportunities offer wider dissemination and institutionalization of this concept.

USAID's methodology in designing the water demand and management interventions discussed above are listed below:

Public Education/ Social Marketing (Behavioral)

- School programs
- Mass media advertising
- Outreach programs
- Demonstration projects

“Good” Management (Technological)

- Leak detection and repair
- Water system audits
- Metering and billing
- Social incentives

Laws and Regulation (Institutional)

- Tradable water rights
- Regional water markets
- Water banking
- Local codes/ordinances

Economic incentives

- Pricing and rate-making
- Subsidies and rebates
- Tax incentives
- Privatization

The first step aimed to convince people that conservation is needed. This was done through social marketing programs that heavily utilized public information and education programs. Subsequently, when the timing was appropriate, interventions aimed to create the enabling institutional and legal environment, which is critical for the sustainability of water demand and management programs. Currently, IDARA is working in this area. Future interventions are still needed to create the enabling institutional and legal environment plus moving to the fourth strategy which is economic incentives.

Evaluation Questions

The planned evaluation must provide detailed answers for the following questions:

1. What has been the impact of IDARA project? What is the impact of the 32 tasks and sub-tasks implemented by IDARA? Which are critical and require further investment? Which are fully instituted and which still need to be advanced through direct USAID intervention?
2. Did the project's strategy enhance or weaken achievement of the anticipated tasks? Did the project's management approach enhance or weaken achievement of the anticipated tasks? Did the project's implementation approach enhance or weaken achievement of the anticipated tasks? Define the approaches – from strategy, management and implementation – that enhanced the project and identify the ones that can be replicated in the future. Also identify the ones that weakened the program and how these can be alleviated in future programs.
3. Determine what has changed in the country's working environment, specifically the water sector and political will, that has impacted (positively or negatively) USAID's interventions.
4. Determine the level of satisfaction of the counterpart institutions and the stakeholders with the program. Specify what satisfied them and what did not and why.
5. Given the status of water demand management in Jordan and USAID's historical involvement and achievements in this area, identify and recommend needed future intervention. Needed intervention must be identified at the task level and prioritized. Also, linkages between interventions need to be highlighted. This should include discussion of the water sector environment (political will) and how this would impact future interventions to sustain achievements related to water demand management.

Management

The Evaluation Team will report to the Office of Program Management at USAID/Jordan, and will work closely with the Contracting Officer Technical Representative (COTR) of the IDARA project to determine plans, methods of action and timelines. USAID staff will join the Evaluation Team on some of their meetings with stakeholders and partners. The Team will provide a debriefing to USAID prior to commencing the evaluation and at the submittal of the draft report.

The Evaluation will be implemented in Jordan. Travel throughout Jordan is required.

Schedule and Logistics

The evaluation is expected to take place in February – March 2011. A draft final report must be submitted before the team departs post. USAID anticipates that approximately 35 working days are needed to conduct the evaluation. The Evaluation Team needs to make arrangements for a 6-day workweek for the team although the formal working week in Jordan is Sunday through Thursday. The Evaluation Team needs to budget for travel within Jordan to visit the Northern Water Utility (day trip), and Aqaba Water Utility (overnight trip). The evaluation team is expected to arrange all logistics needed for the evaluation.