Feasibility Study on the Development of a Regional Water Observation Mechanism in the Mediterranean Region

Jordan Diagnostic Study

Final report

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MEDA Water

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ECO Consult

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Executive Summary

This Feasibility Study is prepared in accordance with the Euro-Mediterranean Information System on Know-How in the Water Sector (EMWIS) Project so as to study the objectives and the feasibility for establishing a Regional Water Observation Mechanism (WOM) in the Mediterranean Region. The study shows that there are no comprehensive procedures for data collection and processing in Jordan, where production and exchange of data is carried out in a manner that lacks coordination, organization and efficiency. Therefore, the development of a NWIS should be preceded by many efforts supporting its establishment. These efforts should emphasize on outlining the present data gaps, improving the collection, production and exchange of water data, in addition to strengthening the comparability of data at the regional and global levels.

The Feasibility Study is based on gathering the opinion of concerned stakeholders via investigations and dissemination of questionnaires. The main findings of this Study are summarized below.

1. The importance of establishing a WOM in the Mediterranean Region with reservation on sharing data in the Middle East due to the political situation in the region where sharing of information would be faced with obstacles and resistance.
2. The importance of the WOM for the following targeted groups: international organizations, civil society organizations, stakeholders in water resource management at the national level, and cooperation organizations intervening in water resource management. Within each targeted group, stakeholders have given particular priority to the following organizations:
   - International organizations: financing and donor agencies.
   - Civil society organizations: research centers and universities.
   - Stakeholders in water resource management at the national level: ministries responsible for environment, water management, and water and wastewater operation.
   - Cooperation organizations intervening in the water resource management: ASEZA and JVA.
3. Agreement of all stakeholders on the importance of all functionalities and assignments listed in the questionnaire. However, some stakeholders have attached more importance to some assignments than the others. The assignments and functionalities are:
   - Supporting the organization and development of national water information systems in the Euromed interested countries.
   - Strengthening international cooperation between Mediterranean countries.
   - Facilitating the production and the collection of comparable information at the regional level.
   - Supporting the evaluation, improvement, production and dissemination of information at the regional level.
4. The mechanism should cover all Euromed Countries.
5. The most important topics that should be dealt with in the mechanism are: sanitation, drinking water supply and health. Hence, the observation mechanism should particularly monitor the indicators towards the achievement of these topics, i.e. the percentage of population having access to water networks, the percentage of population having access to adequate sanitation, the unaccounted for water from domestic use, and the individual annual share of water.

List of Acronyms

ADC: Aqaba Development Corporation
ASEZ: Aqaba Special Economic Zone
ASEZA: Aqaba Special Economic Zone Authority
AWC: Aqaba Water Company
CDM: Clean Development Mechanism
DLS: Department of Lands & Survey
DOS: Department of Statistics
EC: European Commission
EHD: Environmental Health Directorate
EMARCU: Environmental Monitoring and Research Central Unit
EMWIS: Euro-Mediterranean Information System on Know-How in the Water Sector
ERFKE: Education Reform for the Knowledge Economy
EU: European Union
EXACT: Executive Action Team
FOES: Friends of Environment Society
FTA: Free Trade Agreement
GAM: Greater Amman Municipality
GATT: General Agreement to Tariffs and Trade
GDP: Gross Domestic Product
GEF: Global Environment Facility
GTZ: German Technical Cooperation
HCST: Higher Council for Science and Technology
HEDP: Higher Education Development Project
IM: Information Management
ISCWS: Improvement of Steering Competence in the Water Sector
IUCN: International Union for the Conservation of Nature
JEI: Jordan Education Initiative
JES: Jordan Environment Society
JICA: Japan International Cooperation Agency
JIEC: Jordan Industrial Estate Corporation
JISM: Jordan Institution for Standards and Meteorology
JMD: Jordan Meteorological Department
JREDS: Jordan Royal Ecological Diving Society
JS: Jordanian Standards
JVA: Jordan Valley Authority
KFW: Kreditanstalt für Wiederaufbau
LEMA: Lyonnaise Des Eaux - Montgomery Watson - Arabtech Jardaneh
LIMS: Laboratory Information Management System
MCM: Million Cubic Meters
MDGs: Millennium Development Goals
MoA: Ministry of Agriculture
MoE: Ministry of Environment
MoH: Ministry of Health
MoIT: Ministry of Industry and Trade
MMRA: Ministry of Municipalities and Rural Affairs
MoPIC: Ministry of Planning and International Cooperation
MSS: Marine Science Station
MWI: Ministry of Water and Irrigation
NCARTT: National Centre for Agricultural Research and Technology Transfer
NDP: National Development Project
NFP: National Focal Point

NGO: Nongovernmental Organization
NGWA: Northern Governorates Water Administration
NITC: National Information Technology Centre
NRA: Natural Resources Authority
NWIS: National Water Information System
NWMP: National Water Master Plan
O&M: Operation and Maintenance
PMU: Programme Management Unit
PSP: Private Sector Participation
RJGC: Royal Jordanian Geographic Centre
RSCN: Royal Society for Conservation of Nature
RSS: Royal Scientific Society
RTMS: Real-Time Monitoring System
RWP: Reclaimed Water Project
SETP: Social and Economic Transformation Program
UNDP: United Nations Development Program
UNEP: United Nations Environment Programme
UNESCO: United Nations Educational, Scientific and Cultural Organization
USAID: United States for International Development
WAJ: Water Authority of Jordan
WERSC: Water and Environment Research and Study Center
WIS: Water Information System
WMIS: Water Management information System
WOM: Water Observation Mechanism
WPMS: Water Pollution Monitoring System
WQICP: Water Quality Improvement and Conservation Project
WSPSP: Water Sector Planning Support Project
WTO: World Trade Organization

1. Introduction

The SEMIDE/ EMWIS project has realized the need for a Mediterranean regional observation mechanism. In this context, the Euro Mediterranean Water Directors agreed on studying with voluntary partner countries the objectives and the feasibility of creating, within EMWIS, a Water Observation Mechanism (WOM) for monitoring the indicators towards the achievement of the Millennium Development Goals related to water and sanitation in the Mediterranean Region, as well as the implementation of the 'water' component of the Mediterranean Strategy on Sustainable Development, based on information coming from the upcoming National Water Information System.

The EMWIS Steering Group commissioned consultants to carry out the first step of feasibility studies on the water observation mechanism in four pilot countries, i.e. France, Spain, Tunisia and Jordan, with the aim of formulating a vision and main orientations for this observation mechanism, based, on:

1. A study of the expectations of the regional organizations and national partners concerned;
2. An analysis of the systems for the collection and production of information existing both at the regional and national levels;

The results of the first step (to be validated by the Euro-Med Water Directors during their meeting in Athens between Nov 6th and 7th, 2006), will be followed by a 2nd step which should enable the definition of detailed proposals. During this second step, national studies in other voluntary countries of the Mediterranean region will complement the analysis of existing systems and the study of expectations while refining the overall vision.

ECO Consult from Jordan was commissioned to carry out the first step of the Feasibility Study in Jordan. Two types of questionnaires were provided to the consultant to be disseminated for stakeholders at the national level, with the aim of a) identifying expectations and needs, and b) identify information products, data collection and reporting processes. To this effect, ECO Consult identified main stakeholders and decision makers concerned with water information production, reporting and monitoring. Accordingly, their opinion on the water observation mechanism was gathered via investigations, dissemination of questionnaires to concerned parties and performing documentary analysis.

The outcome of this study is a Feasibility Report that includes a summary assessment of the organizations managing water data at the national level, an analysis of the information production processes in the water sector that allows meeting the international and national information requirements, and an analysis of the opinions and expectations of the decision makers on the mechanism.

The report also includes an update of the information related to water management mentioned in Jordan's Country Profile Report prepared for Johannesburg in addition to the progress made in the National Water Information System (NWIS).

2. Update of Jordan's Country Profile Report

Below is an update of the water management information mentioned in Jordan's country profile report prepared in Johannesburg 2002. The update encompasses the progress made towards water management information with particular focus on the progress made in the field of decision making, financing, capacity building and education, and the development of relevant projects and programs in the sector. It focuses specifically on updating the chapters related to: a) international cooperation to accelerate sustainable development, b) protection of coastal areas and all kinds of seas and development of their living resources, c) protection of the quality and supply of freshwater resources, in addition to d) the availability of information for decision makers.

2.1 International cooperation to accelerate sustainable development in developing countries and related domestic policies- trade

2.1.1 Decision-making

The Ministry of Planning and International Cooperation (MoPIC) is in charge of supporting national development initiatives, establishing, implementing and monitoring economic and development plans, as well as enhancing technical, financial and economic cooperation with the donors, international organizations and financing institutions to support and implement development projects.

In 2002, the Government of Jordan established the Higher Committee for Sustainable Development that aimed at representing Jordan in Johannesburg Summit. In 2005, the Committee was restructured to include 22 members including Secretary Generals of various ministries and directors of NGOs. The committee's main responsibilities are contribution to the development of national priorities in order to ensure coherence and consistency with all the national plans and programs being implemented, integration of environmental issues into sectoral strategies and overall plans, and adoption of related action plans. In addition, the committee considers new legislations, reviews related existing legislations, and proposes measures for development of legislations in line with the requirements for achieving sustainable development. Furthermore, it reviews and adopts national reports for follow-up on progress towards sustainable development.

Jordan has signed the EU Association Agreement in November 1997, ratified it in September 1999, and brought it into force in May 2002. The agreement revolves around the following major themes: political, economic, financial, social and cultural and aims at establishing a Euro-Jordanian Free Trade Area, in progressive steps by the year 2014. The Free Trade agreement (FTA) shall be based on the provisions of this agreement as well as the General Agreement to Tariffs and Trade (GATT) and the General Agreement to Services. The provisions of the agreement covers: trade in agricultural and industrial products, right of establishment and services, payments and capital movements, competition, intellectual property rights, financial cooperation, economic cooperation in the fields of industry, agriculture, investment, standards and measurements, transportation, telecommunications, energy, science and technology, environment, tourism, statistics, and the fight against illegal drugs.

The government also has liberalized the trade regime sufficiently to secure Jordan's membership in the World Trade Organization (WTO); (2000), a free trade accord with the US (2000), and an Environmental Profile of Jordan 2006 association agreement with the EU (2001). These measures have helped improve productivity and have put Jordan on the foreign investment map.

An official agreement was signed in 2004 between the Ministry of Environment (MoE) and Royal Society for Conservation of Nature (RSCN), in which MoE delegated the management of protected areas to the RSCN according to the Environment Protection Law.

2.1.2 Programs and projects

Aiming to achieve sustainable development, Jordan has developed a set of national and international plans and programs.

At the national level, the Ministry of Planning and International Cooperation formulated the country's social and economic development plan which includes an executive program that constitutes policies, programs and projects that are implemented in response to the recent challenges to sustainable development in the country, covering the period 2004 – 2006.

Jordan has also adopted a series of environment and health legislations to face its environmental challenges which are aggravated by scarcity of water supply, deterioration of water resources, land contamination, desertification, mismanagement of land use and air pollution. The following is a list of environment related laws, regulations, and standards.

- Environment Protection Law No. 52 of 2006 and subsequent regulations:
  1. Nature Protection Regulation.
  2. Environment Protection from Pollution in Emergency Cases Regulation.
  3. Water Protection Regulation.
  4. Air Protection Regulation.
  5. Marine Environment & Coastal Protection Regulation.
  6. Natural Reserves & Parks Regulation.
  7. Management, Transport and Handling of Harmful & Hazardous Substances Regulation.
  8. Management of Solid Waste Regulation.
  9. Environmental Impact Assessment Regulation.
  10. Soil Protection Regulation.
  11. Charges & Wages Regulation
- The Water Authority Law, Law No. 18 of 1988.
- Law of Public Health, No. 21 of 1971.
- The Criminal Code.
- The Standards and Specifications Law No. 22 of 2000.

The following standard specifications have also been issued and are currently in force:

- The Industrial Wastewater Standard Specification, Jordanian Standard, No. 202 of 1991, Second Edition.
- The Reclaimed Domestic Wastewater Standard Specification, Jordanian Standard, No. 893 of 2002.
- The Sewage Sludge Use in Agriculture Specification, Jordanian Standard, No. 1145 of 1996.
- The Natural Mineral Water Standard Specification, Jordanian Standard, No. 200 of 2001, Second Edition.
- The Drinking Water Standard Specification, Jordanian Standard, No. 286 of 2001, Fourth Edition.
- The Bottled Drinking Water Standard Specification, Jordanian Standard, No.1214 of 2001, First Edition.

In addition Jordan has undergone a set of government reforms aiming to launch new strategies and initiatives in order to effectively enhance the welfare and standards of living of all Jordanians. One of the main initiatives was the launch of the Social and Economic Transformation Program (SETP) in 2002, which gave priority to projects with the most significant impact on the standard of living of all Jordanians. Moreover, SETP provided a main vehicle to channel qualitative public investment according to prioritized developmental

needs, helped fuel the legislative reforms, and served as a catalyst to expedite the progress of many projects funded by the private sector. However, there are challenges still facing the economy and new requirements have emerged, which necessitated a rigorous review of the reform agenda for the period (2004-2006). The main component of the program include: Human Resource Development, Basic Government Services, Rural Development and Poverty Alleviation, and Institutional and Structural Reforms. The Government will also work on reducing poverty and unemployment through enhancing qualitative investment in rural development and introducing programs which aim to empower and enable citizens, as well as encourage more private investment.

In addition, the Government of Jordan has developed and launched the following;

- A National Action Plan to Combat Desertification in the period between 2003- 2005.
- A digital National Water Master Plan (NWMP) (2004) aimed at rational water resources management and integrated planning and implementation of water resources programs and projects covering the period 2005-2020.
- The National Agenda in 2006 setting guidelines, programs, and strategies to reform Jordan's political, educational, social welfare, and state financial systems over the next decade, outlining policies to which successive governments would be committed.
- 'We are all Jordan' declaration in July 2006 aiming at defining a mechanism to implement national priorities, as well as strengthening the ownership of these priorities by different spectrums of the community, to ensure reinforcement of the country's internal front in light of the current surrounding conflicts.

In this context, Jordan has foreseen the importance of sustainable development and the necessity of implementing it in various projects in the environmental sector. Some projects for which sustainable development have been regarded and implemented include pollution prevention, cleaner production, climate change and environment monitoring projects, as well as development of Environmental Action Plan for the Gulf of Aqaba.

At the international level, Jordan has adopted the Agenda 21 in 1999. The Agenda is a National Strategy for Environmental Education, Awareness and Communication that aims to achieve sustainable development. The strategy constitutes an integral part of the National Development Project (NDP) for the 21st century. It is a set of practical measures that are expected to enhance and develop values, knowledge and institutional capacities in order to achieve particular objectives and improve the welfare of people and the environmental system.

2.1.3 Status

See that in projects and programs section.

2.1.4 Capacity-building, education, training and awareness-raising

The Jordan Education Initiative (JEI) was launched during the World Economic Forum in 2003. JEI is a global-local public-private partnership to examine and explore innovative ideas for educational reform to meet the needs of a knowledge economy, examine models of delivery, and create and facilitate a forum for debate on educational policy development.

The Higher Education Development Project (HEDP) (2000-2007) aiming to initiate improvements in the quality, relevance, and efficiency of Jordan's higher education; and to support the government's program to reform sector governance. There are four project components. The first is to help improve essential infrastructure for inter- and intra-university information technology networks, management information systems, modern library systems, and faculty training; and the second is to support the Higher Education Development Fund.

The Education Reform for the Knowledge Economy (ERFKE) (2003-2008). ERFKE is implemented in order to foster significant changes in the governance and administration of education, restructure education programs and practices, improve physical learning environments and promote learning readiness through improved and more accessible early childhood education.

2.1.5 Information

Relevant organizations (e.g. MoPIC) have their information stored in their local intranet systems, where access to such information is restricted to their employees only. Some information is published on their internet websites and accessible to public.

MoPIC has enhanced it infrastructure and local intranet by introducing MoPIC Portal. The portal aims to unify access for all MoPIC employees to be through a single web site. This site will present a standard schema used by all Ministry's sectors. In addition, the portal will allow for systems integrations and document and content management in a manner suitable for none highly technical personnel

2.1.6 Research and technologies

See programs and projects section.

2.1.7 Financing

So far, Jordan has given a major priority for implementing projects aiming to achieve sustainable development. The initiatives and efforts were supported by many international donor agencies, including the United States for International Development (USAID), United Nations Development Program (UNDP), German Technical Cooperation (GTZ), Japan International Cooperation Agency (JICA), European Union (EU), Global Environment Facility (GEF), and The International Union for the Conservation of Nature (IUCN), etc.

2.1.8 Cooperation

Jordan ratified the Kyoto protocol in 2003. A national committee was formed to develop proposals for projects and initiatives for the Clean Development Mechanism (CDM) of the Kyoto protocol.

International law also plays an important role in policy and decision-making in Jordan. The country is party to many international conventions and agreements relating to the environment. The most relevant of these are as follows:

The Treaty of Peace between the Hashemite Kingdom of Jordan and the State of Israel which was signed in October 1994 contains many clauses committing both parties towards protecting the environment and water resources shared between the two countries

2.2 Protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources

2.2.1 Decision making

Aqaba Special Economic Zone Authority (ASEZA): is a financially and administratively autonomous institution responsible for the management, and regulation of the Aqaba Special Economic Zone (ASEZ). ASEZ is a private sector-driven development initiative that maximizes private sector participation in a duty free, tax-advantaged and flexible regulatory operations environment providing a model approach to environmentally sustainable development and governance, a unique tourist destination on the Red Sea with a duty free shopping oasis accompanied with a high quality of life.

Since its establishment in 2001, ASEZA has passed through a number of relevant regulations including the Environmental Protection Regulation No 21 for the year 2001, Marine Park Protection Regulation No 22 for 2001, Wadi Rum Regulation No 24 for year 2001 and Investment Climate regulation No 11 for the year 2001 which contains articles pertaining to environmental aspects of investment permit requirements. In accordance with these regulations a number of procedures have also been established including the environmental impact assessment, the environmental audit and the environmental inspection procedures. This package has been developed in order to ensure the environmental and occupational health conditions of the workers throughout the various facilities in Aqaba.

In 2002, ASEZA adopted a new Master Plan to promote and stimulate investments in the Zone. The plan is a comprehensive vision that defines long-term development throughout the area with respect to land use, zoning, density, and design guidelines to simplify and streamline the planning approval process.

The new Master Plan removes development barriers and encourages investment in industrial and port activities, urban tourism, residential development, commercial and retail ventures, academic and institutional development, coastal communities, and recreational and open space facilities. To date, detailed planning has been developed in five special areas; Aqaba Town, the Port Areas, the Coral Coastal Zone, the Southern Industrial Zone, and the Airport Industrial Zone.

In addition to ASEZA, other institutions that have been involved so far include, but are not limited to:

The Aqaba Development Corporation (ADC): is a development entity tasked with developing Aqaba and managing the land assets, utilities, and ports.

The Aqaba Water Company (AWC): is owned by the government and run on a commercial basis. Eighty-five per cent of AWC's shares are owned by the Water Authority of Jordan (WAJ) and the remaining 25 per cent by ASEZA. Both, ASEZA and WAJ take over the monitoring of AWC's overall performance until a national water monitoring unit is in place.

The Royal Scientific Society (RSS): a semi-governmental organization, which was contracted by ASEZA, the Ports Corporation, and individual industries in Aqaba to monitor environmental quality and industrial discharges.

The Royal Society for the Conservation of Nature (RSCN): a non-governmental agency with a governmental mandate to establish and manage protected areas around the Kingdom. The RSCN is involved in the enforcement of the law against illegal hunting and in enforcing the articles of the CITES Convention against illegal trade in endangered species. The RSCN is also involved in conducting and collecting baseline information on Jordan's biodiversity.

In 2005 ASEZA and RSCN signed an agreement, commissioning RSCN to provide technical supervision for the management and the development of the Wadi Rum Protected Area. Thus, the Wadi Rum Reserve is currently co-managed by RSCN and ASEZA.

Jordan Royal Ecological Diving Society (JREDS): a recently established non-governmental organization that addresses Gulf of Aqaba environmental concerns by conducting beach and underwater cleanup campaigns, organizing diver awareness and public education programs. JREDS has worked under a Global Environment Facility Small Grant to establish three coral reef monitoring stations.

The Marine Science Station (MSS): established in the early 1980's, the Station is administered jointly by the University of Jordan and Yarmouk University. Its objective is monitoring coral reef ecological trends and providing facilities for training and research.

ASEZA has signed a contract with the Marine Science Station providing the Station with the responsibility to monitor seawater quality and sedimentation along with marine life.

The Aqaba Ports Corporation: directly responsible for the construction, operation, and maintenance of Aqaba port facilities, as well as ensuring the health and safety of the largest work force in Aqaba. In addition, the Corporation's Marine Department is responsible for the safety of ship operations in port areas.

Royal Jordanian Navy: The most active presence in policing the environmental performance of marine vessels operating in Jordanian waters. The Navy will, in collaboration with the Ports Corporation, stop any polluting discharge by ships and help bring the polluters before an emergency court hearing.

Department of Antiquities (under the Ministry of Tourism and Antiquities), entrusted in applying the Law of Antiquities (Provisional Law No. 12 of 1976 and Law No. 12 of 1988), which sets and regulates policies for dealing with archaeological sites and ancient artifacts and imposes penalties for any breach of the law.

Water Authority of Jordan: is responsible for the supply of drinking water, the operation and maintenance of sewage treatment plants, and the supply of wastewater effluent for irrigation and industrial development in Aqaba. In this respect, an agreement was signed between the Fertilizers Company and WAJ to partially substitute the nonrenewable Disi fossil water with treated effluent from Aqaba Waste Water Treatment Plant as of the last quarter of 2005. The Central Laboratories of the Water Authority of Jordan are responsible for conducting monitoring programs for groundwater resources and the effluent quality of the wastewater treatment plants.

Research Centers, such as the Water and Environment Research and Study Center (WERSC) of the University of Jordan, and the Queen Rania Al Abdullah Center for Environmental Science and Technology, are involved primarily in conducting research related to the fields of water and environment.

2.2.2 Programs and Projects

Aqaba

Strategic Environmental Assessment of Aqaba Special Economic Zone Master Plan.

Institutional support to the Aqaba Special Economic Zone Authority (2002-2008) - an EU-funded program with co-finance from ASEZA. The program is designed to enable ASEZA to successfully complete its transition process and to guide the zone towards becoming a dynamic and attractive engine of economic growth for the country and the region. The program provides assistance within three areas: tourism, environment and food laboratories, and trade.

Expansion of Aqaba Wastewater Treatment Plant (2003-2005): the capacity of the original plant has been doubled to 21,000 cubic meters per day, enough to serve Aqaba and the surrounding areas until the year 2025.

A water Master Plan has been also developed for ASEZ as part of recent efforts to upgrade the water supply services for the whole zone.

Dead Sea

The Government of Jordan has developed a strategic plan to establish a canal to bring sea water from the Red Sea port of Aqaba to the Dead Sea in order to restore its original and natural water level. The project is currently being subjected to an environmental impact assessment study.

2.2.3 Status

Several projects are implemented within ASEZA to enable it to successfully complete its transition process and to guide the zone towards becoming a dynamic and attractive engine of economic growth for the country and the region.

2.2.4 Capacity-building, education, training and awareness-raising

ASEZA has launched a number of programs supporting capacity building and promoting community awareness. Some of the Major developments in the field of community development are:

- Launching the “Millennium Development Goals” (MDGs) program that will be implemented in the ASEZ.
- Forming Human Resources Development Committee; which has conducted research to evaluate the general training needs for individuals based on the market needs and has organized a number of training courses particularly in communication, hotel management fields among others.
- Elevate the educational standards in Aqaba in accordance to the ASEZA’s objectives and avail extra-curriculum programs and activities which coincide with the Authority’s social and economic vision, such as organizing summer students camps in coordination with the Directorate of Education and related entities, as well as resuming the ‘Twin Project’ between private sector companies and public schools, in order to provide yearly contributions and sufficient support to elevate educational standards in Aqaba.

2.2.5 Information: Information Not Available

2.2.6 Research and technologies: See that in programs and projects section.

2.2.7 Financing

So far, ASEZA has been supported by many international donor agencies, including the USAID, UNDP, EU, GEF, etc.

2.2.8 Cooperation

The Treaty of Peace signed between Jordan and Israel in October 1994, commits the two parties to cooperate in activities related to protecting the environment and water resources shared between the two countries. Annex IV of the treaty tackles the need to co-operate in activities and projects along the common boundaries; related to the protection of the marine environment and coastal zone management in Aqaba, ecological rehabilitation of the Jordan River, environmental protection of water resources to ensure optimal water quality, and agricultural pollution control, and pest control, in the Dead Sea and Jordan River Valley.

2.3 Protection of the quality and supply of freshwater resources application of integrated approaches to the development, management and use of water resources

2.3.1 Decision Making

The Ministry of Water and Irrigation (MWI) is the primary government body in Jordan responsible for the protection and conservation of water resources. MWI performs systematic monitoring of water resources quantity and quality as an integral component of its water resources protection strategy. Prevention of the drying of wetlands due to over extraction of groundwater is another environmental responsibility of MWI. This responsibility is shared with the Ministry of Environment mandated to implement environmental treaties, with regard to wetland protection. Waste disposal, industrial, mining and military practices fall under the jurisdiction of the Ministry of Municipalities, Ministry of Environment, Natural Resources Authority and the Ministry of Defense, respectively.

The water resources used for drinking purposes are monitored by both the Water Authority of Jordan (WAJ Law No. 18, 1988) and the Ministry of Health (MoH); Public Health Law No. 54 of 2002. They are both mandated to prohibit the utilization of a certain source if they find that its water quality does not comply with the set standards. WAJ is also mandated to control the licensing of wells and monitoring of water resources and for setting conditions, requirements and specifications regarding water and aquifer conservation and protection against pollution. In case of water pollution or over-abstraction, the Water Authority has the duty to stop the source of pollution or over-pumping in order to reinstate the previous conditions (Underground Water Control By-Law No.85 of 2002).

All health matters of Jordan are under the responsibility of MoH. This includes monitoring of both wastewater and water systems to ensure compliance with public health standards, controlling of potable water resources and their networks, in order to ensure they were not exposed to pollution, and taking the necessary measures to prevent the occurrence of an anticipated detriment to health as a result of the presence of a wastewater network, installation or treatment station. In cases of disputes regarding the use of treated wastewater in restricted irrigation, MoH also monitors wastewater reuse.

The Jordan Valley Authority which has been entrusted by the Development Law No. 19 of 1988 with development, management and distribution of water resources along the Jordan Rift Valley, is also mandated with environmental protection, including the Dead Sea.

Solid domestic waste collection and disposal is the responsibility of the municipalities under the umbrella of the Ministry of Municipalities and Rural Affairs (MMRA). Selection of a disposal site is done after MMRA approval in cooperation with assigned committee representing related agencies.

Within the Ministry of Industry and Trade (MoIT), the Jordan Institution for Standards and Metrology (JISM) is the body responsible for setting standards and regulations in Jordan (Standards and Metrology Law No. 22 of 2000) while ensuring consultation with all relevant bodies. JISM is responsible for ‘protection of the health, environment and safety for all citizens through ensuring that products are in compliance with the technical regulations adopted by the Institution’.

Monitoring the quality of treated wastewater to be used for irrigation, as well as the quality of fresh water mixed with treated wastewater to be used for unrestricted irrigation is an activity carried out by the Ministry of Agriculture (MoA) (Law of Agriculture No. 44 of 2002) which regulates how irrigated agriculture is to be executed. Nevertheless, there does not seem to be any regulation for application of fertilizers and pesticides, an activity that has a lot of implications regarding water quality and conservation.

The only law pertaining directly to the environment in Jordan is the Environment Protection Law No. 52 of 2006, which mandates the establishment of the Ministry of Environment and

its roles in setting standards and specifications for environmental elements, water being one of these elements, in conjunction with other parties, including the Jordan Institution for Standards and Metrology, and Ministry of Water and Irrigation in case of water. The law stipulates prohibition of disposal of solid, liquid, gaseous, radioactive, or thermic substances, in water resources and requires environmental impact assessment study for any activity seen as having an impact on the environment to be submitted for approval by MOE.

The most relevant specifications relating to water in Jordan are: a) the Jordanian Standards for Drinking Water JS No. 286 of 2001), which defines the limits for quality parameters for drinking water, as well monitoring and testing requirements for surface water, private and public water sources, and protect groundwater sources; b) the Jordanian industrial wastewater standards for the effluent discharged from industries directly connected into public sewer, cesspits, wadis and surface waters or artificially recharged into aquifers or reused for irrigation purposes, c) The Jordanian Standards for Reclaimed Domestic Water No. 893 of 2002 which delineate the physical, chemical and biological characteristics of reclaimed domestic water permissible for wadi discharge, reuse in irrigation and groundwater recharge.

Being party to many international conventions and agreements relating to the environment, international law plays an important role in policy and decision-making in Jordan. Prevention of contamination of shared water resources with Israel was stipulated in the peace treaty signed in 1994, where disposal of municipal and industrial wastewater into the courses of shared resources is subject to adequate treatment to meet unrestricted use in irrigation.

2.3.2 Programs and Projects

About 97% of the country's population is connected to water supply networks, and 60% is connected to central sewage systems. Presently there are 21 wastewater treatment plants in Jordan with plans to upgrade and rehabilitate some and construct new ones (13 new plants until the year 2015), to be designed for secondary treatment to meet Jordanian criteria for discharge to streams, wadis or water bodies (JS893, 2002).

So far there are no regulations for application of fertilizers and pesticides in Jordan, an activity that has a lot of implications regarding water quality and conservation. However, measures to control the use of fertilisers include encouragement of farmers to use fertigation and drip system; the main irrigation application method in the country. Other measures include ongoing preparation of guidelines for irrigation and for the reuse of reclaimed water (GTZ Brackish Water Project), irrigation advisory services and training of farmers (USAID Kafa'a Project and GTZ Water Resource Management in Irrigated Agriculture) and regular monitoring of water resources,

In order to mitigate the problems related to the decline of groundwater levels and degradation of water quality of some aquifers in the country, a new Underground Water Control By-Law (No.85) was developed in 2002 and later amended to control over-drafting of groundwater, illegal well drilling, provide for substantive penalties for illegal use and motivate farmers to use brackish groundwater in irrigation. Other measures include continuous enhancement of the groundwater quantity and quality monitoring networks, substitution of fresh groundwater with marginal water (brackish, treated wastewater) in agriculture, and adopting strategies for the reduction of groundwater abstractions, to reach the safe yield levels of 275 MCM/year by the year 2020 within the scope of Water Master Planning.

The legislative sector is also presently working to enable the legal implementation of the water resources protection guidelines issued in 2006. A new by-law that specifically addresses pollution prevention and protection of water resources used for domestic purposes through appropriate land use restrictions and zoning is currently under preparation. Furthermore, groundwater vulnerability mapping and delineation of groundwater protection zones implemented with the support of the "German BGR Groundwater Resources Management Project", in addition to implementation of watershed protection

projects around main water sources supported by the USAID are other effective measures to control agriculture and industrial pollution.

2.3.3 Status

Jordan has taken several measures to reform the water sector and improve the water resources management situation in the country. These measures fall along the following aspects.

- Full development of Surface- and groundwater with due consideration of Economic feasibility, social and environmental considerations.
- Continuous Development of marginal water including desalination (e.g. Zara-Ma'in Desalination Plant at Sweimeh, near the East Coast of the Dead Sea, completed in 2006).
- Gradual reduction of mining of renewable GW (By 2020).
- Construction and expansion of water and waste water supply systems, and treatment, rehabilitation of networks in order to reduce Non Revenue Water, and achieve Highest Possible efficiency in conveyance, and distribution.
- Waste water management to achieve public health standards and construction of small communities' wastewater treatment plants.
- Public awareness campaigns about the country's water shortage problems, and implementation of water demand management programs to provide support and information to reduce consumption.
- Periodical review of institutional arrangements & restructuring to match changing needs and regular update of legislation whenever necessary.
- Recovery of operation and maintenance (O&M) cost to become a standard practice and linking capital cost recovery to per capita share of GDP& cost of living.
- Preparation of the Investment Plan for the years 2002- 2011, and the action plan 2002-2010 and the completion of the Digital National Water Master Plan in 2004 to be updated regularly.
- Implementation of major investment projects with the support of donors.

Enhancement of stakeholders' participation and expansion of private sector role has been also accorded special attention. Presently several forms of Private Sector Participation (PSP) options and utility corporatisation were introduced, such as the management contract for Greater Amman, where water and wastewater utilities and services are operated by a private company, i.e. Lyonnaise Des Eaux - Montgomery Watson - Arabtech Jardaneh (LEMA), administered and managed by WAJ Program Management Unit (PMU) mandated to regulate the water supply and wastewater utilities under private management. LEMA is responsible for water distribution in Greater Amman, and produces operational data related to the water sources within LEMA's service area. While in the Northern Governorates (Irbid, Ajloun, Jarash and Mafraq) which are separately administered by WAJ Northern Governorates Water Administration (NGWA), it is envisaged that a public company for water and wastewater services will be established soon. NGWA is currently in control of the water sources and distribution for these North Governorates. In Aqaba, a corporate entity under the name "Aqaba Water Company (AWC)" is responsible for the supply of Aqaba Governorate with water. The company which was established in August of 2004 is a limited liability company operated as a financially viable, self-sustaining entity that runs under commercial principles. About 85% of AWC share holds are owned by WAJ and the reset for by Aqaba Special Economic Zone Authority.

Since Jordan receives a large share of its water resources from trans-boundary watercourses, namely the Yarmouk River, the Jordan River and from trans-boundary

aquifers, special attention was accorded on cooperation with riparian countries to alleviate part of the water shortage problem. Regional cooperation activities in order to augment surface water supply and release the pressure on the depleting groundwater resources is pursued diligently in Jordan in order to construct Wehdeh Reservoir on the Yarmouk River, and raise funds for the implementation of the Red Sea - Dead Sea Canal Project.

2.3.4 Cooperation

Jordan ratified the Kyoto Protocol in 2003. A national committee was formed to develop proposals for projects and initiatives for the Clean Development mechanism (CDM) of the Kyoto Protocol.

International law also plays an important role in policy and decision-making in Jordan. The country is party to many international conventions and agreements relating to the environment. The most relevant of these are as follows:

- The Treaty of Peace between the Hashemite Kingdom of Jordan and the State of Israel which was signed in October 1994 contains many clauses committing both parties towards protecting the environment and water resources shared between the two countries.
- In 1977, Jordan ratified the 'Convention on Wetlands of International Importance especially as Waterfowl Habitat', also known as the 'Ramsar Convention'. The convention states that ‘each contracting party shall designate suitable wetlands within its territory for inclusion in a List of Wetlands of International Importance’. With the approval of the Ramsar Bureau, Jordan has so far selected the Azraq Oasis as its only protected wetland area and is thereby responsible for its conservation and ‘wise use’ (Article 3) (UNESCO 1971).
- The Convention on Biological Diversity was ratified by Jordan in 1993, which includes stipulation to ‘introduce appropriate procedures requiring environmental impact assessment of proposed projects likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures’. Other stipulations require that the countries shall ‘establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity’, emphasizing the need for protection and conservation of endangered or threatened species (UNEP 1992).2001, First Edition.

2.4 Information for Decision making

2.4.1 Decision Making

The Ministry of Water and Irrigation (MWI) is the official body responsible for the overall monitoring of the water sector, water supply and wastewater system and the related projects, planning and management, the formulation of national water strategies and policies, research and development, information systems and procurement of financial resources. Its Role also includes the provision of centralized water related data, standardization and consolidation of Data.

The MWI was established in 1992, by a bylaw issued by the executive Branch of the Government under the Jordanian Constitution. The establishment of the Ministry of Water and Irrigation was in response to Jordan's recognition for the need of a more integrated approach to national water management. Since its establishment, MWI has been supported by several donor organization projects that have assisted in the development of water policy and water master planning as well as restructuring the water sector.

The Ministry of Water and Irrigation MWI embraces the two most important entities dealing with water in Jordan:

- The Water Authority of Jordan (WAJ): WAJ is a financially and administratively autonomous body, established in 1988 under the Water Authority Law No. 18, 1988, with the full responsibility of carrying out water and wastewater projects in Jordan.
- The Jordan Valley Authority (JVA); responsible for the socio-economic development of the Jordan Rift Valley (north and south of the Dead Sea), including water resources development, management, distribution of irrigation water, land reclamation and development, tourism development and environmental improvement and protection. JVA is mandated to plan, design, construct, operate and maintain irrigation projects, dams and hydroelectric power stations in the Valley.

MWI, WAJ and JVA all have legal responsibilities for water resources data monitoring and water sector planning. MWI is formally authorized for the establishment of a computer-aided water database and to prepare information pertaining to water sector management situation, and development. According to Article 23 of the Water Authority Law No.18 of 1988 WAJ should continue to obtain data regarding the water needs of the Kingdom and the actual consumption of water for different uses. WAJ should utilize such data for future planning, to provide for the Kingdom's needs for water and to conserve its consumption. Article 3 of the Jordan Valley Authority Law No. 30 of 2001 testifies that JVA should undertake all the works related to the development, utilization, protection and conservation of the water resources in the Jordan Valley.

2.4.2 Programmes and Projects

In 1992, the Ministry of Water and Irrigation, with the help of the UNDP funded project "Water Policies Planning & Management Project", established the kernel of the water sector database presently known as the Water Information System (WIS). The WIS, which is now developed under ORACLE database, has been since then subject for continuous development and enhancement with the support of the USAID and the GTZ, within the framework of the "Water Quality Improvement and Conservation Project (WQICP) ; 1995-98" and the "Water Sector Planning Support Project (WSPSP); 1997-2004", respectively.

The WIS hosts most of the data important for planning, monitoring and management. These include:

- Water Resources & Water Quality Monitoring data
- Water Resources Production and Water Uses data

- GIS Spatial Databases (ArcView)
- Applications for Water Resources Assessment and Water Quality Analysis
- Digital Water Balancing Tools for the regular updating of the NWMP
- Information related to water and wastewater facilities

The WIS is considered the main data container for the NWMP related information. It receives data from both internal sources such as WAJ and JVA and from external organizations including the Department of Statistics, Ministry of Agriculture, Ministry of Tourism, the Royal Scientific Society, etc.

Currently, the WIS is managed by MWI and provides water sector data for MWI, WAJ and JVA, in addition to external users like universities, media and public awareness programs, research institutions and international donors. It is the 'Authorized Source of Information' for all ministries & government and supports the government water-related decision centers and water related committees.

In order to facilitate proper planning and improve management, the WIS was integrated with analytical and predictive tools (Digital Planning Tools). These are database applications with GIS interface, which were developed under the GTZ, funded WSPS Project in order to create a Digital Water Master Plan that can be regularly updated and hence adjusted according to the changing conditions in the Jordanian water sector.

In addition to the WIS there are other stand alone systems available at JVA and WAJ;

- The Water Management information System (WMIS); an Information Technology Tool based on a relational and distributed Database. The system provides relevant information for water resources and supply management, and irrigation distribution in the Jordan Valley It is connected to a SCADA system and hosts all the historical data including daily inflows and outflows, reservoirs levels and irrigation areas, in addition to planning data.
- The Laboratory Information Management System (LIMS) which is customized to manage and ensure the validity and security of water and wastewater quality data This system provides tools for lab management and data dissemination. It represents an excellent database for historic water quality information, essential for policy design and assessment of policy implementation. The LIMS system is managed by WAJ laboratories.

Apart from the LIMS system WAJ's water sector information management capacities are not much developed. Most WAJ information processing activities are still manual. Clear procedures for data collection and processing do not exist. Therefore, data management is carried out according to individual knowledge, priorities and preferences.

2.4.3 Status

Despite the well developed information system, MWI, WAJ and JVA need to produce, share and exchange data both internally and externally with more efficiency. Apart from the National Water Master Plan, few standard information products are produced. Frequently significant amount of information is required from MWI in order to support water sector related activities, mostly on ad-hoc basis. Reporting needs for decision making are not always clearly defined and the management of data is not systematically supported by given IT-tools. Raw data is scattered across different departments, stored on different media and in different formats. Water sector project management, also suffers from lack of centralization and coordination, the tasks of which being distributed between MWI, WAJ and JVA. While MWI is responsible to pursue planning and monitoring of donor-funded projects, neither a central projects database nor a coordinating body for project data and information management exist in the water sector as yet.

The establishment of an integrated information management within MWI, WAJ and JVA in addition to centralization of data and information structure has been undertaken by the current GTZ - funded "Improvement of Steering Competence in the Water Sector (ISCWS)" project, with focus on information management tools and business process optimization including development of water sector information management policy. Efforts are put forth in order to centrally coordinate, empower and supervise data formats and codes as well as reporting from the water sector databases. The GTZ project's scope also includes establishment of a central project information system and a central Geographic Information System to serve the three entities (MWI, WAJ and JVA)1.

At the National level, data exchange still falls short of being coordinated, organized or structured. Underlying reasons is related to absence of a National Water Information System, and subsequent lack of access to common data. The result is duplication of data among, multiple information sources, and lack of synchronized updates. Presently, several institutions are analyzing and collecting water related data. This results in a situation, where little coherence can be seen between the efforts of such organizations as MWI, WAJ, JVA, RSS, LEMA, MoH, MoE, etc.), in duplication of efforts, and lack of standardization, which poses problems if water data is to be exchanged between institutions

In view of the above, the Ministry of Water and Irrigation is currently preparing to move to a web based distributed Water Information System to serve as a first step MWI with its two sister organizations including remote sites. This would enable extension of WIS access and use to all relevant WAJ and JVA entities once the necessary infrastructure is identified and installed within the framework of the proposed USAID IT Master Plan. Furthermore it would provide the technical set up to ensure solving the problems of data exchange with other institutions once a National Water Information System (NWIS) is in place; a need which has been increasingly pressing.

It is also envisaged that with the implementation of the IT Master Plan in the water sector, pending USAID funding, significant improvements to the flow of critical information to management decision makers across the sector and thereby; enabling significant performance improvement in the sector, Improvement of policy making and support sector regulation.

2.4.4 Capacity Building, training and awareness raising

In order to meet water sector challenges; training programs at the Ministry of Water and Irrigation are arranged locally in Jordan and overseas. Special emphasis during the past decade has been made on capacity building in the fields of IT and Information Management (IM) with the support of several donors including GTZ, USAID, EC, JICA, etc.

Within the framework of the GTZ funded project ISCWS, awareness campaign promoting the use of the central Water Information System WIS at MWI, WAJ, and JVA was carried out. On the national level, within the framework of the Euro Mediterranean Information System on Know How in the Water sector (EMWIS), national information seminars involving water actors were organized as a step towards building partnership around a national water information system.

2.4.5 Research and technologies: see under programmes and projects.

2.4.6 Financing

During the past twenty years, Jordan gave priority to the task of developing water data management system. The efforts were supported by many international donor agencies, including the USAID, UNDP, GTZ, KFW, JICA, and EU. They shared with the Ministry of

[1] Source: Ministry of Water and Irrigation. Proposal for the Establishment of a National Water Information System

Water and Irrigation and its predecessors the belief in the need for a water data management system to guide management of the water sector in Jordan. At the regional level several countries supported fostering actions towards harmonization, standardization and sharing of data related to water resources and wastewater management, including the U.S government, the EC, the EU, France, the Netherlands, Canada and Australia.

2.4.7 Cooperation

Peace treaty: Exchange of relevant data on water resources through the Jordanian-Israeli Joint Water Committee was one of the provisions of the Peace Treaty: In 1994 and within the framework of the multilateral working group on water resources and the environment, the Water Data Banks Project was endorsed. The project which is managed by an Executive Action Team (EXACT) involves a series of actions to be taken by the Israelis, Jordanians, and Palestinians in order to foster the adoption of common, standardized data collection and storage techniques among the Parties, improve the quality of the water resources data collected in the region and the communication among the scientific community. The project comprises of water experts from Jordanian, Israeli and Palestinian water-management agencies, with the technical and financial support being contributed by the EU, France, Netherlands, and the U.S. Former donors include Australia and Canada.

Jordan is an active member of international initiatives, such as the Euro Mediterranean Partnership. MWI is the country's National Focal Point (NFP) for EMWIS, the first tangible operational system of integration and cooperation at the Euro-Med level, involving 35 member states. Within this system MWI is managing and maintaining a water information server to respond to national users while acting simultaneously as an EMWIS node and the country's water information portal and window on the Know-how in the water sector2.

In addition to the above, MWI has its commitments towards provision of necessary data for donors and international agencies. Similarly MoPIC submits status reports regarding Jordan's achievement with respect to MDG upon request of donors. The most recent of which is 'The millennium Development Goals, Jordan Report 2004'. Updating of the report is currently underway. Furthermore, DOS, with the contribution of Plan Bleu and Eurostat, produced a compendium on environment statistics in Jordan in 2006. The compendium includes statistical data on: geography and population, air pollution, lands and forests, hazardous water generation, water resources and uses, water quality, biodiversity, and sustainable development indicators.

[2] A thematic directory (who is doing what in the water sector) and a catalogue of information sources have been developed. Thematic studies in the fields of water and wastewater in the Mediterranean countries have also been prepared and are now available on EMWIS site (www.emwis.org).

3. Status on the National Water Information System (NWIS)

3.1 Introduction

Within the second phase of EMWIS, a technical and financial feasibility study for the establishment of a National Water Information System (NWIS) was conducted in 12 Mediterranean Countries, including Jordan. The study defined a road map for the implementation of NWIS in the country based on interviews conducted with six stakeholders. These include:

- Ministry of Water and Irrigation
- Ministry of Agriculture
- Ministry of Environment
- Department of Statistics
- National Information Technology Center
- Environmental Monitoring and Research Central Unit

In order to develop an NWIS in Jordan the following steps were proposed:

1. Start an awareness campaign between stakeholders at high levels to show the importance of NWIS.
2. Start an initiative for the development of a NWIS with all main stakeholders as part of the initiative whereby they would act as focal points for the NWIS. Decision to join the initiative and commitment to carry out responsibilities given to each stakeholder should be taken on a high level.
3. Allocate appropriate funds for the implementation of a NWIS.
4. Establish a unit to coordinate between all stakeholders and be responsible for the continuous updating of information. The unit should be located at MWI which is the main stakeholder for water information in Jordan and the focal point for water information exchange.
5. Develop the capacity and assign qualified staff that can carry out the responsibilities given to each stakeholder.
6. Classify information based on sensitivity and confidentiality to:
   i. Public information
   ii. Stakeholders' information
   iii. Entity use information
   iv. Special users' information (researchers, decision makers…etc)
7. Assign clear roles and responsibilities for all stakeholders. Every stakeholder should know what information should be provided, by whom, when and how?
8. Access rights to the envisioned NWIS system should be clarified. Who has access to what?
9. Develop Standard Operation Procedures for updating and sharing of information.
10. Develop a web based distributed data base system (XML based) for the NWIS where every stakeholder (agency) is responsible for the provision, updating and maintenance of its own information. The system should have dynamic links to the information systems owned by stakeholders and should provide the facility to ware house the information taken from different stakeholders who do not have information systems.
11. Upgrade stakeholder systems so that they can act as nodes under the NWIS.

12. Make sure all future developments of systems follow same technology and can be integrated to the NWIS.

3.2 Partnerships

The feasibility study mentioned in Section 3.1 above recommended a list of stakeholders that can supply part of the information required to the NWIS in Jordan, to be considered when developing the NWIS:

1. Aqaba Special Economic Zone Authority
2. Aqaba Water Company
3. Jordan Industrial Estate Corporation
4. Universities
5. Royal Society for Conservation of Nature
6. Jordan Environment Society
7. Royal Scientific Society
8. Friends of Environment Society
9. Greater Amman Municipality
10. El Badia Research Program Center
11. Jordan Department of lands and survey
12. Jordan Meteorological Department
13. Ministry of Finance
14. Royal Jordanian Geographic Center
15. Ministry of Industry
16. Ministry of Energy
17. Environmental Health Directorate
18. Jordan Valley Authority
19. Water Authority of Jordan

3.3 Plans for setting up the NWIS

Since 2005, MWI has identified a more comprehensive list of stakeholders that include, in addition to those identified in the feasibility study (section 3.2 above), water utilities such as LEMA managing water and wastewater services in Greater Amman area and NGWA administering the same in the Northern Governorates, WAJ Program Management Unit (PMU) regulating the water supply and wastewater utilities under private management, and WAJ laboratory and Water Quality Directorate, in addition to parent organizations of some stakeholders with whom, exchange of water related information is necessary. The final list comprised the following:

1. Ministry of Water and Irrigation - MWI
2. Water Authority of Jordan - WAJ
3. WAJ Laboratories and Quality Directorate
4. Programme Management Unit - PMU
5. Jordan Valley Authority - JVA
6. North Governorates Water Administration - NGWA
7. Lyonnaise Des Eaux - Montgomery Watson - Arabtech Jardaneh - LEMA
8. Aqaba Water Company - AWC
9. Aqaba Special Economic Zone Authority - ASEZA
10. Royal Scientific Society - RSS
11. National Information Technology Center - NITC
12. Environmental Health Directorate/ Ministry of Health (EHD/MoH)
13. Higher Council for Science and Technology (HCST)
14. Environmental Monitoring and Research Central Unit - EMARCU
15. El Badia Research Program Center
16. Department of Lands & Survey (Ministry of Finance) - DLS
17. Ministry of Planning and International Cooperation - MoPIC

18. Department of Statistics - DOS
19. Jordan Meteorological Department (Ministry of Transport) - JMD
20. Ministry of Industry and Trade - MoIT
21. Jordan Institution for Standard and Metrology - JISM
22. Ministry of Agriculture - MoA
23. National Centre for Agricultural Research and Technology Transfer (NCARTT)
24. Natural Resources Authority; (Ministry of Energy and Mineral Resources) - NRA
25. Ministry of Environment - MoE
26. Royal Jordanian Geographic Centre - RJGC
27. Royal Society for Conservation of Nature - RSCN
28. Universities
29. Water & Environment Research & Study Centre - WERSC
30. Ministry of Municipal and Rural Affairs
31. Friends of Environment Society - FOES
32. Jordan Environment Society - JES
33. Jordan Industrial Estate Corporation - JIEC

There are already plans at MWI to move to a web based distributed Water Information System to serve, as a first step, MWI with its two sister organizations including PMU and the remote sites such as WAJ Laboratories, and WAJ water directorates in each governorate. However, as mentioned in section 2.4.3, this requires the necessary infrastructure pending USAID funding. It is believed that once this is implemented, the bulk of information would be ready for sharing with other stakeholders, subject to related needs.

MWI realizes that moving into the web based information system should be closely planned with due consideration to the implementation of the National Water Information System to ensure that the adopted system follow the same technology that can be integrated to the NWIS. MWI is therefore keen on starting the implementation of NWIS as soon as possible and has, to this effect, been approaching donors for funding (JICA, EC Delegation, USAID).

As EMWIS NFP, MWI has set up a web site dedicated to share information related to the five EMWIS water related priority topics in the fields of 'Institutions', 'Research and Development', 'Documentation', 'Training', and 'Data Administration'; See www.emwis-jo.org..The site, which is currently being updated and redesigned using EMWIS portal toolkit, is expected to be launched by early 2007. It will be hosted on the EMWIS information server at MWI (www.emwis.jo).

Yellow pages (who is doing what in the water sector) have also been implemented together with a catalogue of water information sources (www.emwis.org), and are currently being updated.

In order to build collaborations with water actors and ensure access and continuous and sustainable updates of Jordan's EMWIS National Focal Point Website, the yellow pages, and the catalogue of information sources, MWI has drafted agreements to be signed with each of the previously identified stakeholders, according to which a permanent representative in each partner organization, which could be the web master, will be assigned the following responsibilities:

1. Update of EMWIS yellow pages and the catalogue on sources of information for the respective organization; yearly or as necessary, according to access rights which will be defined.
2. Provision of information on water related projects involving the organization according to the data structure defined by EMWIS.
3. Posting of information, experience, know-how, studies or any water and environment related document which the partner organization is willing to share, publicize or facilitate access to, be it on the national or regional level using EMWIS NFP website and according to EMWIS standards - in both languages Arabic and English. Provide

links to studies already published on the partner web site. Update the EMWIS Focal point on any new document posted.

4. Post agenda of national and international events: seminars, exhibitions, workshops, training courses, practices, symposiums, universities events, etc, and providing information about these national events by at least 6 months of advance.
5. Collect the necessary feedback from users in his organization and fill 'the Users Needs Assessment Questionnaire' as needed to enable EMWIS NFP improving the services provided to local partners, and better respond to national needs.
6. Validate information to be released to EMWIS website. And regularly update whenever necessary.

3.4 The legal framework

According to the feasibility study conducted by Easy Info, it was recommended that the development, hosting and management of the National Water Information System was more suited at the Jordanian National Information Technology Centre (NITC), including operating, maintenance and management of the database and web site computers. While MWI was proposed to coordinate the exchange of water information and ensure that these are given from stakeholders to the NITC for storage and publication in the web site. The objective of the National Information Technology Centre, which was established in 2003, in accordance with the temporary law No. (81) for 2003 'Deployment of Information Technology Resources in Government Organization Law' is to participate in implementing the national strategy, plans and programs related to the deployment of information technology resources in government organizations and to establish and manage an integrated and comprehensive information system at the national level by linking the various organizations in the public sector to a national network. The network will coordinate efforts to facilitate the provision and accessibility to socio-economic and technological information produced by the public sector to users in both the public and private sectors

While the NITC has the mandate for the establishment and management of integrated information systems in Jordan, consensus of all stakeholders still needs to be made, including the approval of MWI; the most influential stakeholder in the sector.

3.5 Difficulties linked to water information access

Some of the problems that hamper the development of NWIS in Jordan are related to difficulties linked to access to information. Access to information is hindered by such problems related to:

- Data; such as confidentiality of data, lack of standard data exchange formats, and problems in data readiness and reliability because of lack of qualified staff;
- Systems; such as old computers systems and outdated software packages;
- Management; such as the lack of standard operating procedures, unclear roles and responsibilities and the absence of an NWIS management unit;
- Lack of policies for data sharing, and access.
- Lack of commitment and political decision to establish NWIS due to lack of stakeholders' knowledge of the benefits that they can reap from NWIS.

3.6 Difficulties for water information dissemination and exploitation

The main difficulties related to water information dissemination is linked to the absence of NWIS in Jordan due to such reasons as: absence of political decision to establish such a system, lack of financial resources, and absence of sensitivity classification for data to define the data types that can be shared.

It is increasingly recognized sector wide, that implementation of a National Water Information System in Jordan has become imperative and more pressing than ever. In its proposal to establish such a system, MWI has identified the following benefits:

The establishment of a National Information System in Jordan would achieve the following benefits:

- Help provide coherent reliable water related data and information for monitoring, management and planning of the water sector thus making more informed planning decisions.
- Offer a great opportunity to review and improve the information flows between the various institutions involved in the water sector on the basis of recognized standards.
- Facilitate the provision of data relevant to local and international bodies on the basis of information classes.
- Eradicate data redundancy, duplication and multiple data sources.
- Avoiding the costs of bad decisions based on multiple unreliable data sources.
- Saving of sector leadership's time.
- Saving the cost of processing & maintaining redundant data stores.
- Increasing transparency of information.
- Monitoring and controlling data quality and integrity.

4. National Processes for Water Information Production

Based on the replies obtained from the questionnaire related to water information products and reporting processes, the main national processes for water information production and their relevance to MDG, MSSD and Medstat are listed in the table below.

Table 4.1: Main National Processes for Water Information Production and their Relevance to MDG, MSSD and Medstat

Stakeholder	Main Process for Information Production	Author of Synthetic Product	Targeted Public	Information Source (Producer Organization)	Relevance to		
					MDG	MSSD	Medstat
MWI	Calculation of domestic water uses	National Water Master Plan Directorate/MWI	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	WAJ, PMU, and NWMP modules for assessment of demand	Assessment of domestic water use	Assessment of domestic water use	Not relevant
	Calculation and projection of domestic water demand	National Water Master Plan Directorate/MWI	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	WAJ, PMU, ASEZA, DOS and NWMP modules for assessment of demand	Assessment of future water demand	Assessment of future water demand	Not relevant
	Calculation of industrial water use	National Water Master Plan Directorate/MWI	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	WAJ and JVA	Assessment of industrial sector consumption	Assessment of industrial sector consumption	Not relevant
	Projection of industrial water demand	National Water Master Plan Directorate/MWI	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	Ministry of trade and industry, Ministry of Planning and International Cooperation, DOS, ASEZA, Ministry of Energy and Mineral Resources, WAJ, surveys to big industries, and NWMP modules for	Assessment of future industrial water demand	Assessment of future industrial water demand	Not relevant

Stakeholder	Main Process for Information Production	Author of Synthetic Product	Targeted Public	Information Source (Producer Organization)	Relevance to		
					MDG	MSSD	Medstat
				assessment of demand			
	Calculation of water use in tourism	National Water Master Plan Directorate/MWI	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	WAJ and Surveys to Hotels	Assessment of tourism sector consumption	Assessment of tourism sector consumption	Not relevant
	Growth in tourism sector	National Water Master Plan Directorate/MWI	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	Ministry of Tourism, ASEZA, JVA, DOS, and Jordan tourism Bureau	Not relevant	GDP growth estimation	Not relevant
	Calculation and projection of tourism water demand	National Water Master Plan Directorate/MWI	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	Ministry of Tourism, ASEZA, JVA, DOS, Jordan tourism Bureau and NWMP modules for assessment of demand	Assessment of future tourism water demand	Assessment of future tourism water demand	Not relevant
	Calculation of agricultural Water use	National Water Master Plan Directorate/MWI	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	Ministry of Agriculture, DOS, RJGC and JVA	Assessment of agricultural sector consumption	Assessment of agricultural sector consumption	Estimation of irrigated agricultural land, water use efficiency for irrigation
	Projection of agricultural water demand	National Water Master Plan Directorate/MWI	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	Ministry of Agriculture, JVA and NWMP modules for assessment of demand	Assessment of future agricultural water demand	Assessment of future agricultural water demand	Assessment of future agricultural water demand
	Population estimation and projections	National Water Master Plan Directorate/MWI	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	DOS and NWMP modules for assessment of demand	Projected population	Projected population	Projected population
	Monitoring of	Water Planning and	Cabinet, ministries,	Water Planning and	Indication of	Monitoring of	---

Stakeholder	Main Process for Information Production	Author of Synthetic Product	Targeted Public	Information Source (Producer Organization)	Relevance to		
					MDG	MSSD	Medstat
	GW level	Resources Directorate and Water Resources Protection Unit	parliament, public and private institutions, private consultants, donor agencies	Resources Directorate, Water Resources Protection Unit. Information collected is entered into the Water Information System WIS at MWI.	abstraction from aquifers i.e. increase in demand	water resources quantities	
	Monitoring of base flow and flood flow	Water Planning and Resources Directorate	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	Water Planning and Resources Directorate, Information collected is entered into the Water Information System WIS at MWI.	Estimation of surface water resources quantities	Monitoring of water resources quantities	---
	Monitoring of quantities of public and private wells	Water Planning and Resources Directorate	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	Groundwater basins and licensing unit at WAJ (for private wells), and WAJ Central Operations Directorate, LEMA and NGWA for public wells. Information is digitally entered into Water Information System WIS at MWI	Monitoring of quantities of groundwater	Monitoring of water resources quantities	Assessment of how much the country depends on non-sustainable water resources
	Monitoring of GW quality	Water Planning and Resources Directorate	Cabinet, ministries, parliament, public and private institutions, private consultants, donor agencies	WAJ labs for 'Water Planning and Resources Directorate' at MWI. Information is updated automatically by WIS	Degree of pollution/safety of GW resources used for drinking purposes	Monitoring of water resources quality	Assessment of water quality/ Water quality global index
WAJ Lab	Monitoring of water and wastewater quality	WAJ Labs	Decision makers in public and private sectors and the whole population of Jordan	LIMS at WAJ Labs, WIS at MWI, LEMA & MWI GIS	Assessment of water and wastewater quality	Not relevant	Not relevant `

Stakeholder	Main Process for Information Production	Author of Synthetic Product	Targeted Public	Information Source (Producer Organization)	Relevance to		
					MDG	MSSD	Medstat
JVA	Monitoring of surface- and groundwater resources quantities	JVA	Concerned public and private institutions and the whole population of Jordan	Data is collected by JVA from water resources and is stored in the WMIS	Monitoring of quantities of surface- and groundwater resources	Monitoring of water resources quantities.	Monitoring of renewable water resources quantities
	Calculating the quantities of water released for industry	JVA	Industries	Data is collected from related water projects and resources supplying industries with water and is stored in the WMIS.	Assessment of water quantities released for industry	Assessment of water quantities released for industry. GDP growth estimation.	Not relevant
	Monitoring of water quantities pumped for domestic use	JVA	WAJ and MWI	Data is collected from site and is stored in WMIS.	Assessment of water quantities pumped for domestic use	Assessment of quantities of water pumped from water resources	Monitoring of renewable water resources exploitation
	Calculating the amounts of water allocated for agriculture and distributed on farms	JVA	Stage offices of water distributors, farm units and farmers	• The water allocated for each farm unit is set and recorded based on the irrigation water cycle, type of plantation, and planted area as confirmed by the field reports. • The quantities of water released for farm units is taken from water meters records or calculated as per the water flow incase of meters malfunction.	Monitoring of water quantities allocated for agriculture	Assessment of water distribution on farm units. Assessment of water consumption of different crops	Assessment of water distribution on farm units. Assessment of water consumption of different crops

Stakeholder	Main Process for Information Production	Author of Synthetic Product	Targeted Public	Information Source (Producer Organization)	Relevance to		
					MDG	MSSD	Medstat
				This information is then entered in the WMIS.			
	Monitoring of water quality used for irrigation	JVA and RSS on a contract basis for JVA	• WAJ Labs and JVA • EMARCU/RSS • Ministry of Environment • Ministry of Health	*1. Based on agreements with RSS, JVA receives monthly and annual reports from RSS on water quality.* *2. JVA also receives information from 13 environmental monitoring units owned by EMARCU.* *3. Water quality reports received from WAJ Labs and JVA and other stations for measuring salinity.* *4. Reclaimed Water Project (RWP) and other projects* Data will then be stored in the WMIS.	Not relevant	Assessment of water quality used for irrigation	Not relevant
EMARCU	Monitoring of water pollution	Real-Time Monitoring System in EMARCU	Organizations such as MWI, JVA, WAJ, MoE, and MoH Decision makers, Planners, water utility managers, engineering consultants, farmers, academicians, researches and the public at large	Real time Monitoring System for some wadis monitored by EMARCU, WAJ Labs, and Environmental Research Center in RSS	Assessment of water pollution	Not relevant	Assessment of water quality
WERSC	Collection/ production of data related to	WERSC	MWI	MWI, MoE, and WERSC	Monitoring of water resources quality	Monitoring of water resources	Monitoring of water resources

Stakeholder	Main Process for Information Production	Author of Synthetic Product	Targeted Public	Information Source (Producer Organization)	Relevance to		
					MDG	MSSD	Medstat
	water resource management & quality analysis					quality	quality
NITC	Conducting a study on quantities of hazardous waste present in wastewater discharged from hospitals	NITC DOS	Decision makers in the public sector	Information source: records on water quantities used & discharged from hospitals and its cost. Producer: hospitals. Gathering of info: DOS Information source: analysis of wastewater samples. Producer: EHD/ MoH	Monitoring of wastewater qualities	Monitoring of wastewater qualities	Monitoring of wastewater qualities
	Publishing of water quality data present on MWI & EMWIS websites	EMWIS/MWI	The population of Jordan	MoE, RSS, MWI, EHD/ MoH, DOS	Monitoring of water qualities	Monitoring of water qualities	Monitoring of water qualities
EHD/ MoH	Monitoring of water and wastewater qualities	Central unit of EHD in addition to twenty-one EHDs distributed throughout the country	MWI, Public Health Department in MoH, all EHD centers in the country	Hard- and soft-copy reports present at the Central unit of EHD in addition to twenty-one EHDs distributed all over the country.	Assessment of water and wastewater qualities	Assessment of water and wastewater qualities	Assessment of water and wastewater qualities
MoE	Monitoring of water resources quality	MoE, WAJ Labs, and RSS	Cabinet, parliament, public and private institutions, donor agencies	RSS and WAJ Labs	Assessment of water resources qualities	Assessment of water resources qualities	Assessment of water resources qualities/ Global Water Quality Index

5. Synthesis of Opinion and Expectations of Decision Makers

Concerned stakeholders were interviewed and divided into two groups; decision makers and managers. Accordingly, their opinions and expectations on the water observation mechanism were gathered by filling-in either the Analysis of Information Production/ Reporting Processes Questionnaire that was addressed to managers, or the Needs and Expectations Questionnaire that was addressed to decision makers.

Below are the thirteen interviewed organizations, their representatives and forms of questionnaires that were filled-in.

Table 5.1: Interviewed Stakeholders and forms of questionnaires that were filled in

Organization	Representative	Title	Questionnaire
Ministry of Water and Irrigation (MWI)	Eng. Khaldoun Khashman	Secretary General	Interview
Ministry of Water and Irrigation (MWI)	Suzan Taha	Director of National Water Master Plan	Needs & Expectations
Ministry of Planning and International Cooperation (MoPIC)	Dr. Kamal Khdeir	Advisor, Director of Water and Environment Directorate	Needs & Expectations
Ministry of Agriculture (MoA)	Abdullah Naimat	Director of Land and Irrigation Department	Needs & Expectations
Aqaba Special Economic Zone Authority (ASEZA)	Dr. Bilal Bashir	Commissioner of Environment	Needs & Expectations
United Nations Development Program (UNDP)	Helena Naber	Environment Analyst	Needs & Expectations
European Union (EU)	Andrew Warsap	Task Manager of E.C. Regional Water Projects	Needs & Expectations
Ministry of Environment (MoE)	Adnan Zawahreh	Inspection and Enforcement Director	Information Production
Ministry of Health (MoH), Environment Health Directorate	Suhad Al-Basti	Responsible of Water Quality Monitoring	Information Production
WAJ Labs	Rania Shaban	Head of Information Section	Information Production
Jordan Valley Authority (JVA)	Yousef Hassan	Director of Planning	Information Production
Environmental Monitoring and Research Central Unit (EMARCU)	Dr. Mohammed Saidam	Senior Researcher, Director of EMARCU	Information Production
Water and Environmental Research and Study Center (WERSC)	Dr. Manar Fayyad	Director of WERSC	Information Production
National Information and Technology Center (NITC)	Laila Abu Haija	Head of Environmental Information Section	Information Production

Following is a synthesis of the opinions and expectations of decision makers on the water observation mechanism.

5.1 Analysis of needs and expectations questionnaire

Section B/ Opinion on the targeted public

All interviewed stakeholders agreed on the importance of the Water Observation Mechanism (WOM) for the following target groups:

- international organizations,
- stakeholders in water resource management at the national level,
- cooperation organizations intervening in water resource management,
- civil society organizations.

However, they have differed in prioritizing the most important organizations within each target group for which the observation mechanism would be useful. The assessment clearly depends on the political background and stakeholder mandate. For example, both MWI; a national water entity and ASEZA; a regional entity for the economic development of Aqaba Zone have given priority to ASEZA and JVA as the priority 'cooperation organizations intervening in the water resource management', while an international donor agency such as UNDP have viewed the importance of the mechanism for donor agencies.

Under the targeted group 'civil society organizations', MWI, ASEZA and the UNDP seemed to agree on the importance of the mechanism for research centers and universities, or experts, The UNDP also thought it would be important to community-based organizations (CBO's) and NGO's.

MWI has been given priority by all stakeholders as the priority target 'stakeholder in water resource management at the national level' for whom the WOM would be useful. The only difference was in giving priority to WAJ and MoE, where ASEZA nominated MoE while the UNDP nominated WAJ.

Within the target group ‘international organizations’, MWI, ASEZA and UNDP agreed on the importance of the mechanism for financing and donor agencies.

Except for the EU all interviewed stakeholders have seen the importance of the mechanism for the ’stakeholders in water resource management at local level’ and the ‘press and public’. However, 'water administrations at the governorate level' was considered as priority organizations by MWI, while ASEZA nominated 'local governorates' and the UNDP nominated 'the municipalities and the JVA; responsible for the integrated development of the Jordan Valley'.

With regards to 'the users of water resources', MWI, MoPIC and ASEZA have agreed on the importance of the mechanism for this group. MoA did not think that the mechanism would be useful for this targeted group, the EU assumes that the mechanism could be useful in the long-term, while the UNDP had no opinion on this issue. In this context, MWI has given priority to water utilities, water users associations, municipalities and Badia Development Project while ASEZA has given the highest priority to municipalities only.

Section C/ Opinion on the topics to be dealt with in the mechanism

The opinion of interviewed stakeholders on the most important topics that should be dealt with in the mechanism was taken. Eighteen topics were presented by the questionnaires. These are:

1. Drinking water supply,
2. Sanitation,

3. Follow-up of IWRM implementation,
4. Inventory and characterization of water resources,
5. Characterization of programs for water resource monitoring,
6. Synthesis of information on the qualitative and quantitative follow-up of the resource
7. Characterization of non-conventional water resources,
8. Synthesis of information on meteorology and climatology,
9. Characterization of programs for following up on demand and uses,
10. Synthesis of information on uses,
11. Protection and exploitation of sea waters,
12. Production of economic data related to the water sector,
13. Usefulness of data for risk prevention of drought and flood,
14. Production of water–related information linked to tourism, health, land-use planning, and sustainable development.

Based on the questionnaire results, the above topics were ranked according to the importance assigned by the stakeholders. All stakeholders agreed that sanitation, drinking water supply, health were the most important topics that should be dealt with within the mechanism. These were followed by characterization of programs for water resource monitoring, and land-use. This result seems to be consistent with the Millennium Development Goals, with respect to sanitation and drinking water supply. However, since these are closely linked with health, it is only logical that the mechanism should also deal with water related health issues.

Section D/ Opinion on potential assignments and functionalities

The opinion of stakeholders on the assignments and functionalities of the mechanism was investigated. These are further discussed below.

- *A support to the organization and development of national water information systems in the Euromed interested countries.*

Most stakeholders agreed that the mechanism would support the organization and development of national water information systems in the interested countries. However, stakeholders having regional or international points of view such as ASEZA and UNDP did assign significant importance for the potential role of the mechanism to support the appraisal of organizational and technical aspects of NWIS, and to assist the development of common languages at national level.

- *A tool for strengthening international cooperation between Mediterranean countries.*

There has been a general agreement on the importance of the mechanism in strengthening international cooperation between Mediterranean countries. However, the national stakeholders did not agree on some of the components of this assignment. For example, MWI has given little significance to the mechanism in terms of increasing the exchanges of experience between countries on data administration and enhancement, sharing the acquisition of additional data of common interest, and promoting common methods for the production of information on the assessment of resources and uses, and socioeconomic impact of IWRM policies. MoPIC has given little significance to the mechanism in terms of developing and coordinating the establishment of common reference frames at sub-regional level. MoA believes that the mechanism will not useful for promoting south-south transfer of good practices.

Furthermore, an international-oriented organization such as the EU have viewed the importance of the mechanism for achieving most of the components of this assignment except for 'developing new information sources according to needs and targets', 'developing and coordinating the establishment of common reference frames at sub-regional level', 'promoting south-south transfer of good practices', and 'promoting common methods for the production of information on environmental economy and socioeconomic impact of IWRM policies'.

- *A relay between the collection processes at international level and the national and local sources in order to facilitate the production and the collection of comparable information at the regional level.*

The stakeholders have agreed on the importance of the mechanism for most of the components of this assignment. Nevertheless, MoPIC has given little significance to the mechanism in supporting the definition of common reference frames between international organizations and countries allowing strengthening of data comparability at regional level. In addition, ASEZA and EU have given little significance to the mechanism in terms of providing assistance with needs assessment.

- *A support for the evaluation and promotion of what exists and the production and dissemination of information at the regional level.*

All stakeholders have considered the importance of the mechanism in providing most of the components under this assignment. However, MoPIC has given little significance to the mechanism in producing additional regional information. This was also the opinion of MoA towards providing a follow-up on the national and international financing measures implemented in the area. In addition, the EU has had the same opinion on the mechanism towards providing a follow-up on the measures taken by governments, accessing the produced information within international partnership, and reviewing the regional progresses made.

As has been discussed earlier in this section, most of the interviewed stakeholders have agreed on the importance of the functionalities and assignments listed in the questionnaire. However, some has attached more importance to some assignments than the others. This is interpreted according to the political background of each stakeholder. For example MWI; a national key stakeholder believes that the mechanism would be applicable at the regional level and that it would contribute to standardization and harmonization of data and possible sharing of information. It could enable dissemination of results that are of interest for riparian countries, particularly within the scope of projects implemented by international organizations on shared resources. In addition, monitoring of transboundary resources could also be possible and would ensure protection, and improved management of shared resources.

However, it expresses its concerns in case of the Middle East, as there would be many constraints due to the political situation in the region where sharing of information would be faced with obstacles and resistance.

EMARCU, another national entity, believes that having such a water observation mechanism can be of great value for the same reasons listed above. Nonetheless, EMARCU believes that it remains highly theoretical and wishful thinking if it was intended for this part of the region due to the political situation. Further still, EMARCU believes that Jordan should first and foremost investigate its success in implementing such a mechanism on the national level which is, according to EMARCU, rather bitter despite all the contingencies made to make it possible.

Section E/ Opinion on the geographic area to be covered

At the regional level, most of the interviewed stakeholders have agreed that the mechanism should cover the Euromed countries and any other interested country of the Mediterranean basin. The EU emphasized that the mechanism should cover all previously mentioned countries including Israel. Yet, MoPIC believes that the mechanism should only cover the Mediterranean basin countries.

At the level of each country, MWI, MoPIC and UNDP believe that the mechanism should cover the whole country. While MoA believes that the mechanism should only cover the administrative regions of the country which are in contact with the Mediterranean. Whereas ASEZA believes that the mechanism should only cover the main water resource management units in the country.

Section F/ Proposal for giving another name to the mechanism

MWI suggested 'MED-WOM' for the name of the water observation mechanism, ASEZA suggested 'Mediterranean Water Resources Observation Mechanism' while MoA suggested 'Mediterranean Water Observation Network'.

5.2 Analysis of Information Production Questionnaire

The interviewees were given the opportunity to rank the topics that should be dealt with in the mechanism according to their importance. The five topics with the highest priorities were health, drinking water supply, sanitation, characterization of programs for water resources monitoring, and land use planning. These topics were further synthesized and their expected outputs were compiled in the table below. The table also includes a compilation of the current processes that contribute to the production of such outputs and recommendations for additional needed processes.

Most interviewed stakeholders have agreed on the outputs of the topics listed in the table below, however MWI representative has expressed concerns towards the output related to water and health as it is a sensitive issue and should be first approved by related entities. Furthermore, MWI representative has expressed the importance of land-use planning topic yet noted that there are no maps available in a presentable form to be produced as an output for the process.

Table 5.1: Summary of the Topics to be monitored by the mechanism, their expected outputs, and the processes that would lead to them

Topics	Main Expected Outputs	Current Processes Leading to the Outputs	Recommendation for Further Processes
Water and health	• Reports on water borne diseases and population hygiene studies. • Epidemiological and economic indicators, water quality, water quantity and water-borne disease prevalence.	• Monitoring of surface- and groundwater quality. • Monitoring of water and wastewater quality. • Monitoring of water pollution.	• Monitoring of sanitation practices especially in rural and under-developed areas.
Drinking Water Supply	• L/C/day in rural and urban areas. • % of people having access to water in rural and urban	• Monitoring of water quantities and qualities pumped for domestic use. • Monitoring of	• Monitoring the frequency for delivering drinking water especially to rural and under-

Topics	Main Expected Outputs	Current Processes Leading to the Outputs	Recommendation for Further Processes
	areas. • Water quality, quantity and water delivery reports.	surface- and groundwater quality and quantity. • Calculating the percentage of people having access to water. • Calculating the percentage of water loss throughout the network.	developed areas. • Monitoring of drinking water quality available in networks and that accessed by end-users. • Monitoring of water tanks and percentage of people cleaning their tanks.
Sanitation	• % of people having access to adequate sanitation (rural and urban areas). • Reports on flow and quality of water. • Reports on the percentage of sanitation coverage, effluent of treated wastewater, and suitability for reuse.	• Monitoring of wastewater quality. • Monitoring of quality of wastewater discharged from hospitals.	• Monitoring of wastewater coverage. • Monitoring of quality of treated wastewater effluent and assessment of its suitability for reuse.
Characterization of programs for water resource monitoring	• National and local programs for monitoring of water resources.	• Monitoring of quantity and quality of water resources.	___
Water and land use planning	• Land-use Master Plan and decree of compliance with the plan. • Demand, allocation and infrastructure investment need studies. • Maps, reports on water availability for agricultural lands. • Link between land-use and availability of water resources and cost.	• Monitoring of demand, allocation, and distribution of water to the industrial, agricultural, tourism, and domestic sectors.	• Developing a master plan for land-use and allocation of water.

The three topics that got the highest ranks are drinking water supply, sanitation and health. Hence, the observation mechanism should specifically monitor the indicators towards the achievement of the previously mentioned topics in particular.

The indicators proposed to be monitored by the mechanism towards the achievement of the three selected topics are: percentage of population having access to water networks, percentage of population having access to adequate sanitation, unaccounted for water from

domestic use, and the individual annual share of water. It is worth to note here that these indicators come in compliance with the national agenda issued in 2005.