

**EUROPEAN NEIGHBOURHOOD AND PARTNERSHIP INSTRUMENT
Towards a Shared Environmental System « SEIS »**

JORDAN COUNTRY REPORT



Legal notice: This project is financed through a service contract ENPI/2009/2010/629 managed by DG EuropeAid. This publication has been produced with the assistance of the European Union.

The contents of this publication are the sole responsibility of Environment Agency Austria, subcontracted by the EEA for this work and can in no way be taken to reflect the views of the European Union.

European Environment Agency

Kongens Nytorv 6

1050 Copenhagen K

Denmark

Reception

Phone: +45 33 36 71 00

Fax: +45 33 36 71 99

<http://www.eea.europa.eu>

More information regarding the ENPI-SEIS project: <http://enpi-seis.ew.eea.europa.eu>

ENVIRONMENT
AGENCY AUSTRIA **umweltbundesamt**^U

Spittelauer Lände 5

1090 Vienna

Austria

Author: Sabah Nait

Contributions: Khaled Alshatarat, Maha Maita, Nisreen Haddadin

Content

I Institutional Framework	6
I.1 Ministries and institutions	6
I.2 Inter-Institutional Cooperation	16
II Content	17
II.1 Reporting obligations	17
2.1.1 National reporting obligations	17
II.2 Policy and Legislative Framework	17
II.2.1 National policy	17
II.2.2 Future steps related to national environmental legislation	21
II.2.3 International Conventions	22
II.3 Description of environmental data availability	24
II.3.1 Air pollution	24
II.3.2 State of Environment Report	25
II.3.3 Water accounts	26
II.3.4 Environmental data of DOS	26
II.3.5 Environmental indicators	30
III Infrastructure	33
III.1 Air monitoring	33
III.2 Water monitoring	34
III.3 Waste Monitoring	38
III.4 Jordan Environmental Information Management System (JEIMS)	39
III.5 The Jordan Info Database	39
IV Cross-Analysis	42
V Work plan	47
V.1 Waste management information system	47
V.2 Water Accounting in cooperation with EEA	48
V.3 Link water quality Data EMARCU to MoEnv	48

List of acronyms

DFZC	Environmental sustainability at development and free zone Commission
DOS	Department of Statistics
EMARCU	Environment Monitoring and Research Central Unit
GCEP	General Corporation for Environmental Protection
GIS	Geographical Information System
JEIMS	Jordan environmental information management system
JVA	Jordan Valley Authority
JICA	Japan International Cooperation Agency
MoEnv	Ministry of Environment
MoH	Ministry of Health
MWI	Ministry of Water and Irrigation
NGO	Non-Governmental Organization
QA/QC	Quality Assurance/ Quality Control
RSS	Royal Scientific Society
RTMS	Real-Time Monitoring System
SEA	Strategic Environmental Assessment
SEIS	Shared Environmental Information System
UNFCCC	United Nations Framework Convention on Climate Change
WAJ	Water Authority of Jordan
WIS	Water information system
WMIS	Waste management information system

Executive Summary

The report was drafted within the framework of the ENPI SEIS project which aims at supporting the partner countries in gradually developing or extending their national environmental information systems in line with the SEIS principles in terms of content, infrastructure and institutional cooperation. This project is managed by the European Environment Agency and is being implemented over the period from September 2010 to September 2014.

The state of play focuses on 4 thematic areas, as defined by the representatives of the countries during the Brussels consultation meeting which are water (fresh and marine waters), waste management, waste water and industrial emissions.

The Country Report is considered a first step in the implementation of the SEIS project and an evaluation of the current information network. Chapter 1 is dedicated to interinstitutional cooperation; this chapter describes the main stakeholders dealing with the environmental data and the linkage between them. Chapter 2 focuses on the content and describes the available data flows and the available environmental indicators. This chapter also describes in detail the data collection steps and data processing done by DOS and the institutions dealing with data and information in Jordan. Chapter 3 describes the available infrastructure and gives a description of the different, and available, monitoring systems.

The last chapter is dedicated to cross analysis and proposes follow-up activities for the implementation of SEIS project in Jordan. Two pilot projects are suggested; the development of a Waste Management Information System (WMIS) and providing direct access to the Ministry of Environment to the available water quality data. Moreover, Jordan wishes to further cooperate on water accounts and to receive financial support to carry out the required surveys that would help all the SEIS relevant institutions.

I Institutional Framework

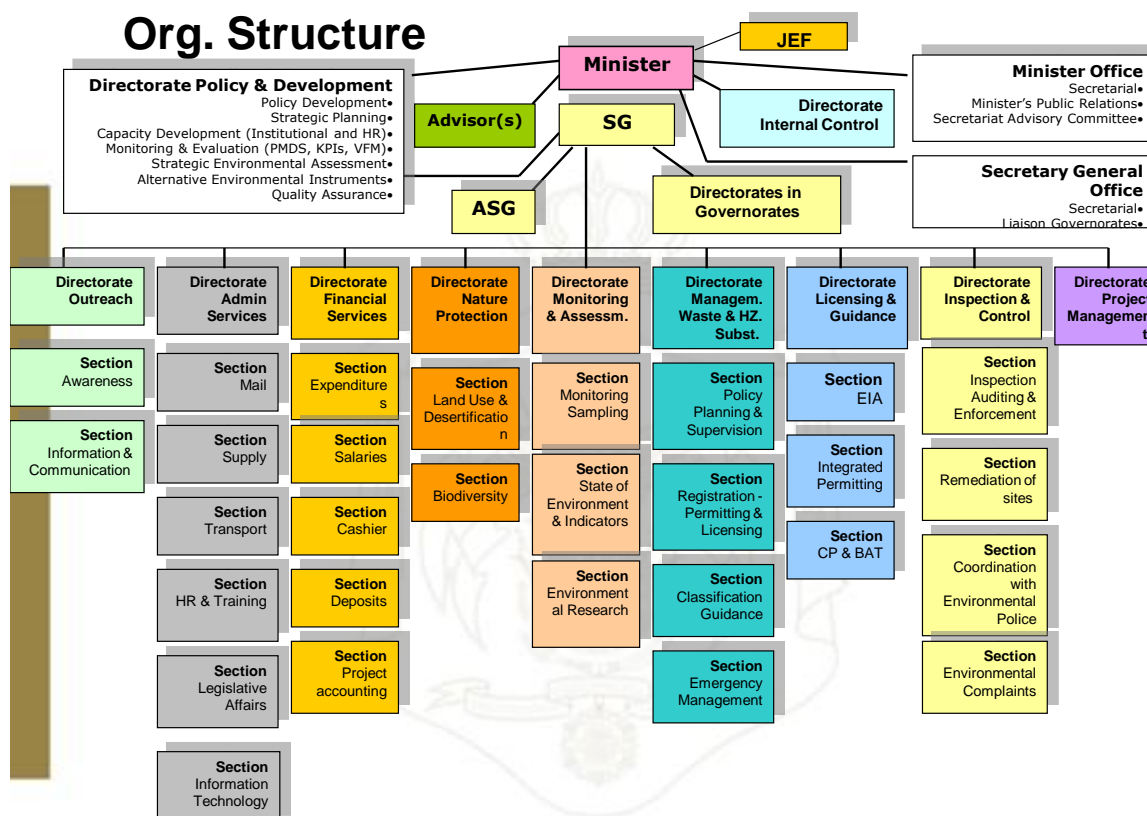
The task of environmental protection is divided between various governmental institutions such as the Ministry of Environment (MoEnv), Ministry of Health (MoH), Ministry of Water and Irrigation (MWI); each of these institutions has articles in their respective laws (an overview is given in the section on national legislation) giving them the responsibility to maintain and monitor some aspects of environmental quality.

I.1 Ministries and institutions

The Ministry of Environment (MoEnv) <http://www.MoEnv.gov.jo>

MoEnv was established in January 2003. The MoEnv includes four major technical divisions, these are: land use, environmental impact assessment, water quality and air quality monitoring.

Increased attention to environmental issues and increased pressure on the environment led to the decision to establish an independent Ministry for the Environment. The Ministry of the Environment was set up in 2003 upon the ratification of the Temporary Environment Protection Law no (1) of 2003 to replace the General Corporation for Environmental Protection (GCEP)/Ministry of Municipal Affairs, which was established in 1996. Since 1996 and according to the former environment protection law No.12/1995, the GCEP had been the major governmental agency responsible for environmental conservation and protection. The Ministry of Environment, being a new institution, has a limited number of staff (only 170 members). The figure below represents the Ministry's organizational chart of 2011 with all the directorates.



The Ministry's mission is to maintain and improve the quality of Jordan's environment, conserve natural resources and contribute to sustainable development through effective policies, legislation, strategies, monitoring and by mainstreaming environmental concepts into all national development plans.

Water Quality

The Environmental Monitoring Department of the Ministry is responsible for water resources quality monitoring but does not have a laboratory. Water quality analysis is subcontracted to the Environment Monitoring and Research Central Unit (EMARCU). The responsibility of EMARCU is to collect data and make available water quality data from a real-time monitoring system (RTMS) and from national water-testing laboratories. Its ultimate objective is public health and environmental protection and sustainability. RTMS is part of the Water Pollution Monitoring system (see paragraph below). The activities of water quality monitoring of the Ministry of Environment –MoEnv- have been designed to avoid overlapping with the activities of MWI.

Air pollution

The responsibility for Air Quality Protection and law enforcement lies with the MoEnv. However, overlapping competencies between MoEnv and the Ministry of internal affairs hamper effective enforcement (e.g. when taking action in case an ambient air quality standard is exceeded).

There exists an agreement between MoEnv and the Royal Scientific Society and the Balaqa Applied University in the form that the latter two perform the practical part of the

measurement (determination of number and location of sampling points, assessment of ambient air quality, reporting, approval of measurement system, quality assessment/quality control (QA/QC), maintenance, etc.).

In practice, RSS and Balaqa Applied University prepare proposals for different steps of the monitoring regime which have to be approved by the MoEnv.

The responsibility for data reporting rests with RSS and Balaqa Applied University, respectively. Running the database and compliance control, however, remains the responsibility of MoEnv.

Waste management

The management of the collection, treatment, disposal and recycling of solid wastes lies with the responsibility of the municipal authority. The Environmental Protection Law gives a clear and concise statement as to how jurisdiction for waste management is addressed among key government institutions.

The administrative structure in the Jordanian context consists of three levels of central Government (ministry level, regional governments, municipalities - of which the largest is Amman). Each Regional Governor (RG) has waste regulatory responsibilities for each region other than municipal solid waste collection, which is generally left to the municipalities. The Ministry of Environment (MoE) oversees these responsibilities and a Memorandum of Understanding with the Police relating to enforcement issues.

The Ministry of Environment is responsible for the safe disposal of waste. Selecting the sites for solid domestic waste disposal is the responsibility of a Committee, involving representatives from:

- Ministry of Environment
- Ministry of Municipal, Rural Affairs
- Ministry of Water and Irrigation
- Ministry of Health
- Ministry of Agriculture
- Ministry of Tourism
- Department of Land and Survey
- Ministry of Interior – Governorate level

This Committee decides upon the location and technical specifications of the site. However, there is currently no monitoring on how these specifications are actually being implemented.

Concerning the disposal of hazardous waste, this waste is currently being stored at each individual industrial site where it is being generated, or at a temporary storage site, until a waste site that can accommodate hazardous waste is established. The MoE is the competent authority for the implementation of all directives under this strategy. Private sector and non-governmental organizations and the public play a role in the waste management sector and with respect to policy issues.

In Jordan, the Institute of Standardization and Meteorology is a potentially important stakeholder, in particular for the Batteries Directive and the End-of-Life Vehicles Directive. In fact, it will be a useful resource for all product-based standardization, measurement and laboratory-based standards.

Furthermore, the MoEnv cooperates with the Ministry of Information and Technology which is considered to be a coordinator between all ministries to provide the electronic services and consultations, as well as with other governmental institutions and ministries, and research centers, state and private universities are also involved. NGOs could also participate. All the above institutions have representatives in the different committees of the MoEnv in order to cooperate on technical issues and decision making. The Ministry of Environment suffers from limited institutional capacity and human and financial resources because of the global financial crisis and difficult economic conditions in Jordan. The ministry has reduced the budget of capital projects by more than 50% and the recruitment has been suspended since 2009.

The Ministry of Water and Irrigation / Water Authority of Jordan/Jordan Valley Authority

<http://www.mwi.gov.jo>

Three organizations are directly responsible for the water sector in Jordan: the Ministry of Water and Irrigation (MWI), the Water Authority of Jordan (WAJ), and the Jordan Valley Authority (JVA).

The MWI was established in 1992 (By-law No.54/1992) and became the official body responsible for the overall monitoring of the water sector, water supply and wastewater system and 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 establishment of the MWI came in response to Jordan's recognition of the need for a more integrated approach to national water management.

The Minister of Water and Irrigation is the head of both organizations (WAJ and JVA). Each of these organizations has its own organizational structure, responsibility, and mission.

WAJ is responsible for developing, conserving, protecting and managing all water resources and sewerage projects. No official or local person or party is permitted to carry out any works related to water and sewerage of any nature, if these works are considered to be within the sole responsibility of WAJ under the respective law (WAJ Law No.18-1988) and the regulations issued in accordance with it, except after obtaining the Minister's written approval.

JVA is responsible for all activities within JVA boundaries including water, irrigation, construction work, etc. No ministry or government or semi-government agency is allowed to perform water and irrigation construction activities in the Jordan Valley without permission from the JVA except for operation and maintenance activities. Moreover, no person is allowed to establish in the Valley any private buildings or structures of any kind for any

purpose before obtaining a license from the JVA. The only exceptions are the land irrigation works and the buildings and structures under construction before the effective date of the law. As for buildings and structures within the municipal boundaries, they shall be licensed in coordination with the concerned municipality.

The Ministry of Health (MOH) <http://www.moh.gov.jo/>

MOH is responsible for ensuring the safety and suitability of drinking water, monitoring sewerage systems, and for ensuring public health. All water and sewerage projects must comply with health standards and are subject to approval by MOH. The Ministry of Health which can provide water and wastewater quality data and data on air pollutants proposes the ideal disposal methods for medical waste. DOS provides data on quantity disposal methods for medical wastes.

The Ministry of Industry and Trade

is responsible for the development and implementation of industrial and commercial policy and can provide information on industrial facilities.

The Ministry of Energy

which is involved in the development of the UNFCCC national communication on the inventory team for emissions from the energy sector.

Department of Statistics http://www.dos.gov.jo

Department of Statistics (DoS) was established in late 1949 and assumed its activities in accordance with the Statistics Law No. 24 for the year 1950, which identified its responsibilities and duties. During that period, basic statistical data covering the socio – economic aspects in the Kingdom had been produced. DoS development was characterized by improving various economic statistics in accordance with the rules, standards and recommendations issued by the UN and other international organizations. New surveys were also added to the DoS activities such as the Constructions, Services, Environment and Commercial Establishments Survey.

During the first years of this millennium, the DoS focused its efforts on the enhancement of statistical capacity, including infrastructures and human resources. It assigned special importance to enhancing statistical awareness among the public, which is positively reflected in the quality of statistical products. It also worked on the strengthening of contacts with data users through employing all available means of communication for maintaining links of trust with them.

- DOS Directorates and Divisions are:
 - A. Directorate of Agricultural and Environmental Statistics.
 - B. Directorate of Economic Statistics.
 - C. Directorate of Population and Social Statistics.
 - D. Directorate of Household Surveys.

DOS data are collected from various directorates in the DOS, whether these data are published or not (such as raw data that is not published by the concerned directorate). Some

environmental indicators are calculated while some other data are re-tabulated in the form of tables for inclusion in annual environmental statistics reports.

Within the Department of Statistics (DOS), the Environment Statistics Division was established in 1995 and covers most environmental issues and components. DOS produces data from annual environmental surveys and from administrative registrations of environmental relevant institutions in Jordan. It publishes an annual environmental statistics report, a compendium and annual environmental sustainable indicators.

With regard to the environment, the Division conducts an annual survey of hazardous industrial activities (manufacturing of chemicals, plastic and rubber industrial activities). The overall industrial survey was stopped in 2002 mainly due to a lack of funds. Now the Division for the industrial sector only covers the manufacturing of chemicals, plastic and rubber industrial activities. The medical and construction sectors are also covered. Surveying of the service sector surveying was stopped in 2003, also because of limited financial resources. The Division also works on integrating environmental accounts within the national accounts by developing water accounts and accounts for environmental expenditures. Most of the survey questionnaires conducted by the Environment Statistics Division have components which serve the compilation of environment accounts in general and water accounts in particular.

Other relevant institutions and NGOs <http://www.rss.jo/news/409>

The Royal Scientific Society (RSS): is a non-profit organization and was established in 1970, responding to the needs of development and concentrating on three major areas, namely scientific and technological research and development. RSS is the largest applied research institution, consultancy, and technical support service provider in Jordan and is a regional leader in the fields of science & technology. RSS provides expert testing services via over 25 specialized locally & internationally accredited laboratories and prides itself on offering unique scientific resources and a wide range of project expertise to both the public and private sectors.

Energy, Water and Environment (EWE) are a crucial scientific theme within the RSS. This important scientific theme is represented by the EWE cluster which provides technical services and consultations in addition to promoting the adoption of sound and best practices to achieve sustainable development. The EWE delivers services in the field of water and environmental measurements and analysis and is fully supported by several nationally and internationally accredited laboratories and monitoring units.

Areas of specialization include water quality monitoring, air quality monitoring and environment monitoring.

Water quality monitoring and assessment: EWE undertakes major environmental monitoring programs to assess levels of pollution and to assess compliance with national standards and regulations. Throughout the last decade EWE collaborated with various national ministries, as well as international agencies to implement an array of development projects. EWE is also involved in various national and regional projects that focus on issues of water management and agriculture including the adoption of innovative water treatment

techniques, the reclamation of water for agricultural purposes and the use of biosolid fertilizers as well as the implementation of community-based projects related to Integrated Wastewater Management, greywater, low-cost technologies, and climate change.

Air quality monitoring and assessment: The EWE cluster's activities are recognized at the local and international levels which include: air quality monitoring in the ambient air at various sites in Jordan and the region, measurements and assessment of air quality at industrial sites for various companies in Jordan, and air pollution dispersion modelling mainly as part of environmental impact assessments (EIA).

EMARCU - <http://www.emarcu.gov.jo>

EMARCU is part of the Royal Scientific Society (NGO) and was established with the support of the Japan International Cooperation Agency (JICA) in 2003. The unit aims at managing, operating and maintaining the "National Project for Real-Time Water Quality Monitoring". Its ultimate objective is public health and environmental protection and sustainability. The monitoring system provides daily reports to MWI, MoH, MoA and MoEnv sent by fax and/or email (Ministry Cabinet). These Ministries are financing the operation of the monitoring network (the setting up was financed as a specific project). EMARCU drafts detailed monthly reports, and for this purpose they need surface water quantity data from MWI. All the data collected are stored in an Oracle database that can be accessed on the web with login and password, but the system is not integrated with the system of any other Ministry. Finally, adding an automatic early warning system with text messages sent in case of emergency would be valuable.

As mentioned before, EMRACU was subcontracted to run a water quality monitoring system on behalf of the Ministry of environment. EMRACU provides vital data related to water quality and sources of pollution caused by human, economical, and agricultural activities; and it provides recommendations regarding the mitigation of negative impacts of such activities on the limited Jordanian water resources as well.

The main task of EMRACU is to monitor water resource quality in Jordan, and to evaluate its compliance with the related national and international specifications and guidelines.

The action plan for the year 2011 covers, geographically, various water sources throughout the kingdom.

Grab water samples are collected from different sources (groundwater sources, streams and valleys, dams, domestic wastewater treatment plants' effluents and industrial locations.

The water quality in such sites is assessed in terms of its suitability for reuse and other different purposes according to environmental protection standards.

Project outcomes over years:

- Investigating the compatibility of the monitored water quality from different sources with the requirements of local specifications and international guidelines.
- Establishing a database on water quality in Jordan .

- Contributing to the development of relevant local standards.
- Contributing to capacity building among stakeholders.

Project methodology:

- Hold regular meetings between MoEnv and RSS representatives to determine the action plan's priorities in the light of scientific and practical developments.
- Propose an action plan for the project (should be reviewed and approved by both parties (MoEnv and RSS)).
- Collect water samples from the monitored locations with the participation of MoEnv representatives
- Conduct field measurements.
- Preserve and transfer the collected samples to RSS laboratories as soon as possible.
- Analyse the collected samples according to the analytical methods adopted locally and internationally.
- Collect additional samples whenever specific pollution indicators require further monitoring.
- Provide MoEnv with monthly reports including the results of analysis for the collected samples and their evaluation.
- Hold periodic meetings to discuss the obtained results as well as the action plan .
- Respond immediately in case emerging pollutants occur (not included within the project's scope)
- Feed the database in the Ministry of Environment periodically .
- Prepare a comprehensive technical report at the end of the contractual year .
- Conduct non-systematic activities.

Monitored water sources in 2011:

- Groundwater sources (15 sites).
- Dams (10 sites).
- Wadies (22 sites).
- Industrial wastewater sources (39 sites).
- Domestic wastewater treatment plants (33 sites).

Conducted analysis:

- Water samples collected from different locations are analysed in order to determine the physical, chemical and microbiological properties of the monitored water sources

Water quality assessment:

The water quality of the monitored sources is assessed depending on the results of analysis and with reference to the followings:

- Jordanian Standard for Drinking Water Quality No. (286/ 2008).
- Higher Committee for Microbiological Water Quality Guidelines of Drinking Water for Surface and Groundwater Sources – (July 2001).
- Jordanian Standard for Reclaimed Domestic Wastewater Quality No. (893/ 2006).
- Jordanian Standard for Reclaimed Industrial Wastewater Quality No. (202/ 2007).
- Food and Agriculture Organization (FAO) Guidelines for Irrigation Water Quality.

Environmental sustainability at Development and Free Zones Commission (DFZC) <http://www.dfzc.jo>

This new concept was initiated by King Abdullah in 2006. Three different regimes were set up at the time and are now all regulated by the Commission. The development zones are regulated by the 2008 Law on Development Zones. The main objectives of the establishment of such zones are:

- Reducing the disparities between the governorates and regions of Jordan.
- Ensuring the distribution of the development gains across Jordan.
- Creating integrated zones for economic, scientific and social activities.
- Building on each area's competitive advantage.
- Creating job opportunities.
- Alleviating poverty.
- Achieving economic growth, alongside the improvement of socio-economic conditions and the enhancement of people's living standards.

The DFZC is playing the role of a one-stop shop, issuing all environmental permits. Six development zones have been established.

The development zones benefit from extensive economic incentives and tax benefits. The strategic goals for 2011-2013 are to improve the investment climate, to design and develop programs, to establish criteria for the selection of development zones managers, and to develop tools for creating linkages with the local communities.

The DZC needs also some data from the MWI, especially data related to water availability and possible connections to waste water treatment.

All master plans are using strategic environmental assessments (SEAs). TAIEX has supported the preparation of SEAs for two zones. Strategic environmental management plans are also required. It should be noted that environmental data is not always available and sufficient, in particular for the setting of targets and for establishing the carrying capacity of the area. In order to get approval, each enterprise must submit a range of environmental data (electricity, water use, etc.) and the conditions are set based on risk. For the already existing sites, a rapid environmental assessment is carried out, for which information from other institutions including DOS can be very useful. There is a framework project on risk-based environmental inspection systems for which a Memorandum of Understanding has been signed with the Ministry of Environment.

One key issue for the setting and management of DFZ is baseline information. Geographical data is provided by a cadastre, territorial planning and maps are purchased from the Royal Geographic Centre, a semi-governmental organization which sells GIS maps. Baseline information is provided by a range of various institutions - which takes time, especially

because the information needs to be quality-checked. For example, data on landownership has often proved to be incorrect.

I.2 Inter-Institutional Cooperation

As described above, environmental information is collected, processed and handled by different institutions. Even if the Ministry of Environment has made efforts to better coordinate activities between the different institutions there is still room for improvements.

Coordination committees have been established for each sector to coordinate efforts and to establish an information sub-network in order to link key institutions dealing with similar types of information to a focal point of that sector. The focal points meet regularly to exchange information. (More detail in the international conventions section).

However, in relation to data sharing, the system of cooperation is an ad-hoc system, based on individual requests from one minister to another. At present, demands are made through official letters to the various ministers and this is a burdensome process for all parties involved.

A number of structures exist with the aim to coordinate the activities of different institutions in the field of industry. Under the Prime Minister, the Committee on Industrial Hazard was established in 1990. It includes permanent representatives from the Ministry of Industry and Trade, the Ministry of Labour, the Ministry of Planning, the Ministry of Health, the Ministry of Water and Irrigation, the Ministry of Environment and the Minister of Civil Defence. The committee is responsible for identifying industries that negatively affect the environment, health and safety, for controlling them and drawing up recommendations. A number of coordination committees have also been set up to deal with the following issues:

- ✓ Awareness, monitoring and control for the industrial sector
- ✓ Management, transportation and handling of harmful and hazardous substances.
- ✓ Environmental impact assessment.
- ✓ Clean development mechanism.
- ✓ Standards.
- ✓ Committee on establishment of a computerized electronic system for management and control of hazardous substances imported and locally produced.
- ✓ Cleaner Production Management

In relation to water, a Royal Committee on Water was set up in 2008, which includes representatives of the Ministers of Water and Irrigation, Agriculture and Environment, along with the director of the Economic Department at the Royal Court. The Committee's mandate is to ensure that water is shared in a fair manner and used rationally, avoiding excessive groundwater abstraction.

In particular, coordination should be improved between institutions involved in collecting and providing environmental data on the one hand and between these institutions and data users on the other hand. The multiplicity of agencies which collect and disseminate environmental statistical data, using different methodologies, leads to some conflicts between data and a lack of reliability of the data itself.

II Content

II.1 Reporting obligations

2.1.1 National reporting obligations

Currently there are no national reporting obligations; the national law and legislation gives the institutions the mandate to monitor and protect the environment.

There are no platforms for exchanges of information. In the water sector the MWI is looking for funds in order to establish a Water Information System based on SEIS principles.

II.2 Policy and Legislative Framework

II.2.1 National policy

With regard to water, the Water Strategy, formally adopted by the Council of Ministers in May 1997, adopts an integrated approach to water management and places a high priority on the resource value of reclaimed water and a new strategy “Water for Life” covers the period 2008-2022. The key objectives are to continue to develop the use of reclaimed water through building new wastewater treatment plants and exploring productive uses in agriculture, industry and urban landscapes as well as exploring the potential for using the treated wastewater for aquifer recharge. It also aims at protecting human health and the environment through the adoption of appropriate treatment technologies and to develop a wastewater master plan for areas not served by treatment facilities.

A National Water Master Plan was adopted in 2004 which analyses future water use demand and assesses consolidated supply measures against future demand needs. The Master Plan is based on its own GIS system based on both river basins and governorates.

Finally, the National Industrial Policy 2010-2014 aims at creating a competitive industrial sector in the local and international markets by achieving significant growth rates which reflect positively on sustainable development. Environment is one of the elements considered in the Policy. However, while the new Policy is looking at mainstreaming environmental issues, these are often seen as extra costs. There is no tool available to demonstrate benefits and this is an area where improvement is needed.

II.2.1.1 Environmental Protection Law No. 52 of 2006

The main law governing environmental management in Jordan is the Environmental Protection Law No. 52 of 2006, which gave rise to the establishment of the Ministry of Environment in Jordan. The law considers the Ministry of Environment to be the competent

authority for the protection of the environment in the Kingdom, and the official and national authorities shall be bound to implement the instructions and resolutions issued under the provisions of this law which gives the Ministry all the juridical powers it requires for implementing the law. The promulgation of the Environmental protection law was a positive development with respect to environmental protection in Jordan. In general terms, it provides a sound basis for the inclusion of more detailed principles, procedures and substantive requirements of a sectoral nature.

In addition, there are other regulations that organize specified areas such as water protection, air protection, nature protection and environmental impacts:

II.2.1.2 Air Pollution

The Air Protection Law Number 28 of 2005 was issued to provide the legal powers to the Ministry of Environment for conducting and enforcing air monitoring programs. The law is based on the "Polluter Pays Principle" under which the polluting facility is committed to pay for any remediation and mitigation measures, whether technical or financial, with the aim to curb pollution sources.

Other relevant legislation and standards concerning air pollution:

Article 44 of the Temporary Traffic Law No. 47 of the year 2001 deals with vehicles that emits pollutant gases above the standards and confers the ultimate authority to the Public Security Directorate to take hold of that vehicle. According to Article 48, a driver who drives a vehicle that emits pollutants has to pay a fine of 30-60 JD.

Article 49 of the Temporary Public Health Law No 54 of the year 2002 specifies that any stack that emits pollutants that might affect public health can be closed and that the owner will be penalized

Article 7 in the Law of the Industrial Cities No 59 of the year 1985 gives full authority to the Corporation of Industrial Cities to take the necessary steps to prevent pollution from various industries within the industrial cities.

The Jordanian Institute for Standards and Metrology has published the Technical Specification for pollutant-maximum allowable limits of air pollutants emitted from stationary sources No. 1189 for the year 1999.

The Jordanian Institute for Standards and Metrology has published the Pollutants – Ambient air quality standards No. 1140 for the year 1999.

Further provisions for air pollution can be found in the Temporary Environment Law No.1 of the year 2003 and in different Articles like Article 12 EIA, Article 17 (prevent pollution), Article 23 (Air Protection by-law).

II.2.1.3 Water and Wastewater Sector

Water Authority Law No. 18-1988

The core law for water resources management, protection and conservation is the 1988 Water Authority Law No.18 (with amendments). This law also presents the plan for best wastewater management practices. The law determines the responsibility of the Ministry as follows: The Ministry shall carry full responsibility for all water and sewerage systems and the related projects and shall set forth a water policy and submit it to the Cabinet of Ministries for approval.

Survey the different water resources, conserve them, and determine ways, means and priorities for their implementation and use.

Develop potential water resources in the Kingdom, increase their capacity and improve their quality, protect them from pollution, supervise them and administer their affairs and put forth programs and plans to meet future water needs by providing additional water resources from inside or outside the Kingdom and through the use of water treatment and desalination.

Jordan Valley Law No. 19-1988

The JVA is responsible for the socio-economic development of the Jordan Rift Valley, including water development and irrigation. Water resources management, conservation and protection in addition to the management of the wastewater issues in the Jordan Valley area are considered in the Jordan Valley Development Law No.19, 1988 - “Water Resources and Wastewater issues” management, water resource conservation and protection (Articles 31, 35 and 38).

By-law No. 54/1992: Organizational Structure of MWI

Under this by-law, WAJ and JVA will report to the MWI. Accordingly, the MWI is responsible (directly and indirectly) for all related matters with respect to water resources, water treatment, public sewers, water policy, and socio-economic developments in the Jordan Valley.

By-law No. 86/2002: Groundwater Control

This by-law specifies that groundwater is a resource for the benefit of the country and this resource cannot be used unless a license has been issued by MWI in accordance with this by-law.

One of the MWI’s tasks is to monitor the abstraction and quality of all licensed wells. The WAJ administration council defines a maximum abstraction in each basin. In cooperation with the MOA, the safe yield for each basin and the maximum size of land to be allowed for irrigation per farmer is defined. Article 10 states that “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.”

According to Article 25 “the distance between wells shall not be less than 1,000 m.” An abstraction license is valid without time limit. According to Article 29 “the maximum amount

of withdrawal is defined for each well.” For abstraction from wells for tourism and industrial proposes, the holder of the license has to pay 250 fils /m³ for every m³ if the amount abstracted exceeds the maximum allowable amount of 50,000 m³/year.

By-law No.66/1994: Wastewater Collection and Disposal

Several sites in the Kingdom serve as dumping sites for untreated sewerage and domestic fluid waste. Usually, houses not connected to wastewater collection system dispose wastewater into cesspits directly dug into the ground without a bottom liner. Wastewater directly infiltrates into the subsurface and sometimes reaches the groundwater. Any accumulated liquid waste is commonly collected by tankers and disposed of at a treatment plant or dumped into dump sites. In many cases the municipalities decide where this wastewater will be disposed of. However, many villages have difficulties finding a suitable and affordable site for disposal. Many locations of liquid waste disposal are poorly sited and possibly lead to groundwater contamination.

To ensure an adequate approach for wastewater management (collection & disposal) as a major tool in water resources and public health conservation and protection, the Wastewater Collection and Disposal By-law No.66 /1994 was issued. This by-law includes:

Important Articles derived from the Wastewater Collection and Disposal By-law N^o.66/1994
A

Article 6: It is prohibited for anyone to discharge to the water sources or to any natural drainage, or to any open area, fluid wastes, polluted or regular water without treating it first, and taken a written permission from the authority to dispose of it, where the relevant Jordanian standards are considered the reference.

Article 10: If any owner does not connect his real estate with the wastewater collection system within the period of time specified for this purpose, the authority has the right to connect it with the public system, with the cost to be paid by the owner in addition to 20% management and supervision expenses

Article 19: No one is allowed to commit any of the following actions (or otherwise shall be subject to legal liability):

Damage the wastewater collection project or hinder any private sewer system connection with the public sewer system, or commit any actions that might hold back the private or public sewer system or commit harm to the treatment works and the wastewater project.

II.2.1.4 Solid Waste management

Within the national legal framework, solid waste management and recycling and hazardous waste management activities are addressed. Instructions (taalemat) on the management and handling of waste oils (2003) exist in draft form, as do finalized instructions on municipal waste management and on solid waste management (2006).

Article 5 contains stakeholder responsibilities in relation to solid waste management including: the provision of qualified manpower; the provision of equipment and vehicles for

solid waste management; monitoring; executing measures necessary to prevent the mixing of hazardous waste and solid waste in containers and in transportation activities; and record keeping for solid waste locations and quantities. According to Article 6 of the Regulations, the Ministry must specify the locations of landfills after consulting with the concerned officials and civil entities. Article 8 contains important provisions concerning the prohibition of (waste) discharges into the marine environment and territorial waters and beaches.

Arguably, Article 19 “sound equipment and anti-pollution measure requirements and penalties” is of benefit because it could be indirectly applied to waste management facilities and waste management vehicles. Article 11 of the "Protecting the Environment in Emergency Situations” Regulations No 26/2005 requires facilities handling hazardous substances to submit regular reports to the Local Operations Committee - formed to plan and implement local environmental emergency plans in governorates - indicating the quantity, quality, potential hazard and location of such substances, as well as the location of control equipment. Article 13 of the same regulations requires the MoEnv to establish an environmental database for hazardous substances present in the Kingdom.

Article 25 provides an important opportunity for the Council of Ministers to address: emergency situations [Article 25(2)], management, transport and handling of harmful and hazardous materials [Article 25(7)]; and the management of solid waste regulations [Article 25(8)].

II.2.2 Future steps related to national environmental legislation

The Ministry of Environment is developing a new framework law on waste, with the objective to provide the basic requirements for the elimination, reduction, recycling, recovery and processing of waste, the extraction of secondary raw materials from waste and energy as well as the safe disposal of waste in accordance with the goals of environmental protection, human health and sustainable development.

New Air Quality Protection and Emission Control Regulations are also under development. They will provide the legal prerequisites for setting up the system for monitoring, control and information on ambient air quality as well as measures for the improvement of air quality, along with monitoring, control and information on air emissions.

Finally, Jordan is currently working on a revision of the framework Environment Protection Law, in particular in order to address overlapping in terms of institutional responsibility and to converge with European requirements. It is also developing a new law on environmental liability, which will establish a framework of environmental liability based on the polluter-pays principle, in order to prevent and remedy environmental pollution.

II.2.3 International Conventions

Information about compliance with and reporting under the various international conventions was not available for this country report.

There are no information systems or common platforms for compiling the reports or communications under international conventions. Usually the information exchange with other parties to the convention takes place via internet and E-mails. On some occasions the information could be directly exchanged in regional and/or international meetings, workshops and conferences.

There is an ongoing project which is worth mentioning in this report, which has the aim of the development of frameworks and legislative politics in Jordan to promote compliance with the global environmental conventions (UNFCCC, the framework convention to combat desertification, Convention on Biological diversity). One of the outputs of the project is: the establishment of a sustainable way of cooperation between policy makers and scientific research and the development of electronic communication tools in order to gather information and ensure its management and dissemination. The executing agency is the MoEnv and key partners (Government of Jordan represented by the Ministry of Planning, GEF, UNDP, universities and research institutions and ministries concerned with international conventions). The Ministry of Environment in Jordan is the focal point for international conventions.

Jordan has submitted 2 communications to the secretariat of UNFCCC in English which can be found under: http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php

For the compilation of communication, data from various sectors have been gathered from the annual reports, surveys and documents produced by the relevant ministries such as MoEnv, Ministry of Energy, Ministry of Mineral Energy and Mineral resources, Ministry of Agriculture (MoA) and public and private institutions Greater Amman Municipality, Jordan Petroleum Refinery, Civil Aviation Authority, National Energy Research Centre, etc...)

The communication gives an overview of the greenhouse gases (GHG) per sector and gas.

Basel convention for the Control of Hazardous Wastes across the Boundaries:

Jordan signed the agreement and it entered into force in 1992. Subsequently, the Hazardous Chemicals Management and Handling By-law No. 44 1999 was issued.

And based thereon, a technical committee for the management of harmful and hazardous materials was formed and tasked with inter alia: Jordan Action Plan for Persistent Organic Pollutants (POPs) Classification of the harmful, hazardous, prohibited and restricted materials and their wastes, specification of the basis and rules necessary for transport of harmful materials.

For governmental institutions the most widely used system is the composition of permanent committees that have regular meetings. Although such committees have specific tasks to work

on, they can be suitable information communication tools to the represented institutions, and to other groups afterwards. An example describing such committees is the Pesticides Registration Committee. The committee is composed of representatives from the Ministry of Agriculture, Ministry of Health, Ministry of Environment, and National Center for Research & Technology Transfer, University of Jordan, Royal Scientific Society, Association of Agricultural Materials Merchants, Association of Agricultural Engineers, Pesticides Factories and Vet-Drugs Factories.

Communication of information to the public can take a form of awareness programs through workshops, seminars, newsletters and by the media. This matter calls for the existence of a developed information network with links between the various governmental and NGO's to facilitate obtaining information pertaining to chemicals at all stages of their handling.

The table below indicates to which international conventions and agreements Jordan is a party. Jordan is not a party to the Barcelona Convention.

Table 1: indicates to which international conventions and agreements Jordan is a party

Convention	Date ratification/ Adhesion	Reporting obligation	Next report due on
The Ramsar Convention on the preservation of wetlands	10/05/1977	Information Sheet on Ramsar Wetlands (RIS)	As required
The Convention on Biological Diversity	12/11/1993	National report on implementation of the Convention	01/03/2012
The Cartagena Protocol on Biosafety	11/11/2003	National report	30/09/2011
The Convention on International Trade in Endangered species of wild fauna and flora.	14/12/1978	Annual report on CITES trade and biannual report on legislation	
The Vienna Convention and Montreal Protocol to protect the ozone layer.	31/05/1989	Annual ODS report	09/2011
The United Nations Framework Convention on Climate Change	12/11/1993	National communication	
The Kyoto Protocol on climate change	17/01/2003	-	
The Basel Convention on the Control of Hazardous Wastes and their transfer across the border	22/06/1989	Yearly report to the Convention	
The United Nations Convention to Combat Desertification	21/10/1996	Report on implementation	
The Rotterdam Convention on the prior approval of the transfer of hazardous chemicals	22/07/2002	Notifications of final regulatory actions to ban or severely restrict chemicals	As required
The Stockholm Convention on Persistent Organic Pollutants	08/11/2004	NIP National report on implementation	2006 Every 4 years
UNCLOS	27/11/1995		

II.3 Description of environmental data availability

II.3.1 Air pollution

Air quality data are recorded in a database of the Ministry of Environment. The table below shows the monitoring sites and the monitored parameters of ambient air in residential areas close to pollution sources. MoEnv has signed an agreement with the Environmental Research Center / Royal Scientific Society to monitor the ambient air quality of five areas vulnerable to

air pollution, these are Al-Baq'a/Al-Balqa, Al-Mowaqqar/Amman, Al-Giza/Amman, Al-Russiefeh/Zarqa and Al-Mafraq.

Monitoring site	Parameters monitored
Al-Baq'a/Al-Balqa	SO ₂ , NO _x , H ₂ S, PM _{2.5} , WS, WD, T & RH
Al-Mowaqqar/Amman	SO ₂ , NO _x , WS, WD, T & RH
Al-Giza/Amman	SO ₂ , NO _x , PM ₁₀ , WS, WD, T & RH
Al-Russiefeh/Zarqa	SO ₂ , NO _x , PM ₁₀ , WS, WD, T & RH
Al-Mafraq	SO ₂ , NO _x , NH ₃ , PM ₁₀ , WS, WD, T & RH

The table below shows the monitored industrial sites

Monitoring site	Monitored parameters
King Abdullah II Bin Al-Hussien Industrial City - Sahab	SO ₂ , CO, NO _x , PM _{2.5} , WS, WD, T & RH
Al-Hassan Industrial City - Irbid	SO ₂ , CO, NO _x , PM _{2.5} , WS, WD, T & RH
Prince Al-Hussien Bin Abdalluh II City - Karak	PM _{2.5} , WS & WD

II.3.2 State of Environment Report

The report is the responsibility of the Ministry of the Environment in accordance with Article (4) of the Environmental Protection Act No. 52 of 2006. The first State of Environment Report (SOER) in the Hashemite Kingdom of Jordan has been produced recently. The report summarizes the enormous efforts of a large number of experts, both national and international, and most importantly, the adoption of the methodology (DPSIR) prepared by the United Nations Environment Program UNEP. The three main objectives of the report are to provide important information on the environmental situation in Jordan as of 2006 in a form suitable for decision-makers who work in the field of sustainable development, to raise environmental awareness among the community, and to contribute to building an environmental database. The report is available online in Arabic

<http://www.MoEnv.gov.jo/arabicMoEnv/users/BindDescription.aspx?id=75&mainPage=1&pageId=192>

II.3.3 Water accounts

DOS is in charge of the development of Water Accounts (SEEA-Water). The main data sources are WIS of the MWI (for physical data) and the national accounts (for monetary data).

The major problems with WIS data are that water use and emissions for manufacturing industries and services cannot be separated according to ISIC. Until 10 years ago DOS had a full survey on industrial water uses which had to be stopped because of duplication of information from the water administration. However, the disaggregation of data according to ISIC divisions (2-digits level) or further down (which could be important for some sectors, e.g. agriculture) is not possible.

II.3.4 Environmental data of DOS

The following describes how data is collected and stored by DOS, as well as the data sources.

Sources of Environmental Statistical Data:

The environmental statistics are collected from the following sources:

- Administrative registrations and records are collected in cooperation with different institutes – air pollutants cooperation with MoEnv and Environmental Health Directorate (MoH), water - Ministry of Water and irrigation, Aqaba Port Corporation, Royal Society for Nature Conservation, Ministry of Energy and Natural Resources + NGOs and research centres and universities. The statistical data is collected from various governmental institutions according to their specialty, and from public and private institutions and associations dealing with this subject. Continuous coordination based on official correspondences with these institutions is maintained to obtain up-to date data and information for inclusion in the environmental statistics report. After collection, data are checked and classified. In case there are any mistakes or conflicts in the data, contacts are made with the parties concerned to carry out the necessary corrections.
- Field surveys (medical surveys, survey for hazardous industrial activities, waste survey for municipalities, surveys related to other surveys e.g. agriculture, services and industries)
- Surveys and Studies
For the purpose of the DOS annual environmental statistics report many surveys are carried out, these are:
 - A. Solid and liquid wastes survey in the medical services activity.
 - B. Manufacturing of chemicals, plastic and rubber survey in the industrial activity.
 - C. Solid wastes survey for the municipalities activity.
 - D. Solid and liquid waste survey in the construction activity.

- Surveys - General Background

Several surveys were conducted during 2009 at the national level for the construction sector, medical services, municipalities and manufacturing of chemicals, plastic and rubber industrial activities, in order to collect data on the uses of water and energy and solid and liquid wastes produced by these activities, and the objectives of these Surveys were:

- A. Provision of statistical data on solid and liquid wastes (hazardous and non-hazardous).
- B. Provision of data on the quantities of used water and sewage, in addition to methods of disposal and treatment.
- C. Provision of data on quantity, type and value of consumed energy.
- D. Provision of data on the expenditures to protect the environment.
- E. Provision of information on infrastructure and capital formation, and fixed assets related to water.

All the surveys are conducted annually in order to correspond to the updated nature of environmental surveys, some of the new surveys might be stopped or shifted to another sector or activities or sets of new questions may be added to meet the updated requirements of improvements of environmental statistics work,

- Surveys Coverage and Respondents

The surveys covered a representative sample on the governorate level for activities of constructions, while the manufacturing of chemicals, plastic and rubber industrial activities were covered by a comprehensive survey for these activities in 2008 and a representative sample of these activities in the previous years, while a comprehensive survey was used for public and private hospitals and municipalities.

- The Surveys Framework

The Enterprises Census carried out in 2006 provided a comprehensive framework for economic establishments. This framework has been used to design the environmental survey samples.

- The Surveys Sample

The stratified sampling method has been employed in the design of these surveys. The establishments were divided into strata according to the number of employees in each establishment. The sample has been distributed among the strata by using the method of proportional distribution among the number of employees in each stratum and was drawn as follows:

- ✓ A comprehensive survey in 2009 was used for all municipalities in the Kingdom. The total number of establishments in the sample was 94.
- ✓ A comprehensive survey in 2009 was used for all public and private hospitals. The total number of establishments in the sample was 92.

- ✓ For the purpose of the survey in 2009 on solid and liquid wastes resulting from the activities of the establishments working in the sectors of constructions, a sample from two groups was used. The framework of this survey covered all contracting establishments registered with the JCA. These establishments included all those classified in the first, second and third categories, in addition to all new establishments registered with the JCA for the first time, as well as the non-Jordanian establishments operating in the Kingdom during the year. The number of such establishments in the year 2009 was 817. The second group was a stratified random sample drawn from establishments classified in the fourth, fifth and sixth categories, where 495 establishments were selected in this group. The total size of the sample of 2009 reached 1312 establishments
- ✓ A stratified sample was selected for the economic framework for industrial activities in 2009, dividing the Kingdom into three regions, and then dividing the society in each region and economic activity into five categories as shown. And the total size of the sample was 591 establishments for that year (2009).

- Data Collection Stage

The field work was carried out by the selected interviewers under the control of the team supervisors who, in general, have a good experience in field work. The interviewers were distributed into teams and the field work operations were controlled by the field supervisors, and the field supervisor checked the questionnaires of his team at the end of each working day, then handed them over to the field editor to check them again. Any questionnaire believed to have a mistake in it was returned to the field to correct the data or to verify any suspected data. Remarks were discussed with the interviewer and transmitted to all interviewers.

- Data Processing Stage

- Office Processing

The completed questionnaires were checked according to written editing rules which were distributed to office editors. Questionnaires containing any suspected data were returned to the field teams for verification, and upon completion of the editing operation, questionnaires were coded according to the adopted coding manuals, with codification also being edited.

- Electronic Processing

The edited and coded questionnaires were delivered to the Data Entry Division, to be entered using the special pre-prepared entry programs and electronic edit rules. Upon completion of data entry and data cleaning, the programmer extracts sheets of the preliminary results using the pre-prepared raising factors for editing and verification of the results. Data is stored in the main database and the raw data is kept within the environment division to observe the secrecy of personal information. Final tables become accessible to all data users even in DOS or in other national and international institutions.

- Preparation of Report and Dissemination of Results

After the editing and tabulation operations were completed, the publication's tables were prepared, and the results loaded on the DOS website.

As per the thematic priorities of SEIS, the table below shows the available datasets produced by DOS, as well as common interests of different institutions concerned with these thematic priorities

Table 2: Stakeholder institutions described in chapter one and data availability

Stakeholder institution	Available Data
DOS, , MoEnv, MWI-WAJ,	Wastewater
MWI-WAJ, DOS	Wastewater quantity and discharge data
MWI-WAJ, MoEnv	Wastewater quality data
DOS	Quantities of wastewater and disposal methods (Reuse, Irrigation, Public network, Septic tank and Treatment unit partial or total)
DOS	Expenditures on wastewater management and infrastructure by activity
DOS	Cost of disposing method/ unit
DOS	Number of Employee and compensations allocated for wastewater management
DOS, MoEnv, Mo Municipalities, Greater Amman	Waste
DOS	Quantities of waste and types by activity and disposal methods
DOS	Expenditures on Waste Management by Activity
DOS	Quantities of Municipal Waste collected by Municipalities
DOS, M industry & Trade, MoEnv, MWI-WAJ, Mo Energy	Industrial Emissions
DOS	Quantities of waste and types by activity and disposal methods
DOS	Energy Consumption by Industrial Activities
DOS	Quantities of wastewater and disposal methods (Reuse, Irrigation, Public network, Septic tank and Treatment unit partial or total)
DOS	Expenditures on Pollution Abatement and Control (PAC)
DOS	Number of Employees and compensations allocated for PAC

II.3.5 Environmental indicators

The Ministry of Environment does not have a list of indicators and the first State of Environment Report was a descriptive report.

MoEnv and DOS established a committee from different institutions (Ministry of Planning and International Cooperation, Ministry of Water and Irrigation, Ministry of Agriculture, Ministry of Energy and Mineral Resources, Ministry of Health, Jordan Environment Association, Royal Society for Conservation of Nature). The aim of the committee is to select and determine a list of environmental indicators.

The environmental indicators cited below are indicators used by the Ministry of Water and Irrigation and the Department of Statistics. The data sets are available and easily accessible and regularly updated. As far as the SEIS thematic areas are concerned, the indicator on industrial emissions is the only indicator available. The data used to calculate this indicator is based on a DOS survey with restricted coverage. One of the aims of the committee is to enhance coordination and cooperation between the different institutions and to facilitate access to data and information in order to implement further indicators.

Table 3 below gives an overview on available environmental indicators.

Domain	Indicator label	Indicator Definition	Frequency of production	Geographical coverage	Data and Time Series	Methodology [2]	Source
Water	Percentage of dwellings connected to safe drinking water	Number of homes connected to safe drinking water				The formula for calculating the index: = (Number of housing units connected to safe water / total number of housing units) X100	Ministry of water and irrigation
	Total volume of surface water	Include running water or settle on an area of land, or the normal flow of water such as rivers, valleys, streams, lakes, etc., in addition to synthetic tracks of water such as irrigation canals and drainage system and artificial reservoirs.				-	Ministry of water and irrigation
Domain	Indicator label	Indicator Definition	Frequency of production	Geographical coverage	Data and Time Series	Methodology [2]	Source
	water available for use and per capita	<ul style="list-style-type: none"> the size of traditional water available for use: It is a total amount of surface water from its sources (the Jordan Valley, springs, floods, dams) and groundwater (renewable and non-renewable) that can be used for different purposes. per capita of the traditional water 				-	Ministry of water and irrigation

Domain	Indicator label	Indicator Definition	Frequency of production	Geographical coverage	Data and Time Series	Methodology [2]	Source
		available for use: the per capita share of the total freshwater traditional that can be used for different purposes					
Industrial emissions	Total waste water from industrial sector	Total quantity of waste water from industrial sector in million cubic meter and now aim to use it for any purpose	Produced in 2003 and stopped	Jordan Boundaries	3.8	Industrial survey as mentioned previously of the sampling method of industrial activities	Department of statistics

Source: MWI and DOS

III Infrastructure

III.1 Air monitoring

Major point sources of air pollution in Jordan are the major industries such as the oil refinery, and the phosphate, cement industry etc. that emit carbon and sulphur oxides because these factories are still burning oil fuel as an energy source.

Mobile sources of air pollution are basically found in the transportation sector. During the period from 1981 – 2006, the number of automobiles using gasoline saw a six-fold increase while the increase in number of automobiles using diesel was ten-fold. The total gaseous emissions in Jordan are estimated at 12.5 tons per year, very small compared to those in industrialized nations.

There are a variety of fixed monitoring stations located in the vicinity of industrial emitters. The locations of sampling points have been determined by the RSS and Balaqa Applied University and approved by the MoEnv. Some sampling points have been relocated on request of the MoEnv. There are no general written criteria for the macroscale and microscale siting of sampling sites. Siting is the result of a stakeholder process in which operators of facilities are taking part. Documentation of the decision-finding process is not performed.

Existing monitoring stations (compare with Map)

1. Irbid (one MS; Al-Hassan Industry City): SO₂, NO_x, VOC, PM₁₀
2. Al Mafraq (one MS; fertilizer plant): SO₂, NO_x, NH₃
3. Al Zarqa (three MS; Hashmia Area; Waste Water Treatment Plant, Power plant, refinery): SO₂, NO_x, H₂S, CO
4. Amman (one MS): SO₂, NO_x, PM₁₀, PM_{2.5}, CO, Meteorological data
5. Fehiash (five MS; Cement Plant): PM₁₀, TSP, Meteorological data
6. Al Karak (one MS; ind. city): PM₁₀
7. Al Tafilah (three MS; Al-Qadesha, cement plant): PM₁₀
8. Baqaà (one MS, Traffic, Waste Water Treatment Plant): SO₂, NO_x, H₂S

In relation to air emissions, there are four monitoring programmes in five governorates, with a focus on hot spot (industrial) areas. The data varies from one station to another: NO_x and SO₂ are monitored in all locations. Other parameters covered include H₂S, NO, PM₁₀ (and in one case PM₂₅), NO₂, NH₃ (in the North because of the presence of animal farms). The Ministry intends to extend monitoring of cement industry with two new stations planned for 2012. The French Development Agency (AFD) is providing support for the development of a monitoring system for air quality in Amman, Zarqa and Irbid, with 12 monitoring stations (7 in Amman, 3 in Zarqa and 2 in Irbid). The Ministry plans to disseminate information on air pollution to the population through information boards showing real time air quality. Car emissions are measured by the police department. By 2012, the database should be complete and running.

The MoEnv does not have the financial, technical and personnel capacity to ensure a QA/QC system and to conduct external calibration. In this respect they fully rely on the RSS and Balaqa Applied University and their doing the QA/QC according to their best knowledge. There exists no written specification of the QA/QC prerequisites.

In the future, also third parties may be in charge for ambient air quality assessment at the request of the MoEnv.

III.2 Water monitoring

The ground water network includes 116 recorders to measure level of water in full wells. The 12 ground water basins and 108 controlling wells are measured manually by devices prepared for this purpose.

Jordan has one public network (groundwater and lakes) that provides surveillance monitoring and quality control; the water uses concerned include drinking water supply and irrigation. The Ministry of Water and Irrigation keeps a record of the amounts of water used.

In terms of monitoring, the Ministry of Environment conducts monitoring in 5 main sectors: groundwater (10 locations), dams (10 locations), valleys, municipal waters and industrial wastewaters in 8 sectors including pharmaceuticals, refinery, slaughter houses, textile sector, chemical sector (14 industrial installations and 3 main treatment plants). Periodic testing is carried out once every 4 months. Development of self-monitoring is one of the priorities of the Ministry. With regard to domestic wastewater, 33 plants are regularly monitored. Eleven stations belonging to hospitals and other public administrations are also monitored.

The MWI has developed GIS-based digital tools for Water Master Planning activities, offering the framework, databases and tools necessary to manage water data and providing water specialists with data and information for water sector monitoring, management and planning. Software based analysis and planning tools such as WEAP, WIS, ArcGIS and PIS are in use and integrated into the Ministry's planning and operations processes.

Jordan has developed the use of treated urban waste water for irrigation in the Jordan Valley and has introduced advanced tools for water resource management e.g. real-time meters.

MWI is managing an integrated Water Information System –WIS - collecting or interfaced with all the existing information systems in the other “water sector” entities. The WIS (Oracle data base and applications) provides a comprehensive set of data for the water sector. A web based interface is available on the water sector intranet for remote use of WIS, but the number of users remains limited.

Various external governmental entities are undertaking water quality monitoring of surface water (EMARCU on behalf of MoE), industrial waste water (MoE), waste water reuse for irrigation (MoA), drinking water resources and supply, bathing waters, effluents from public and private waste water treatment plants (MoH).

Data exchanges with entities outside the water sector are based on demand and authorizations.

Today, no Geographical Information System –GIS- is integrated with the WIS. GIS is only used for specific projects, while JVA and water utilities have their own GIS applications.

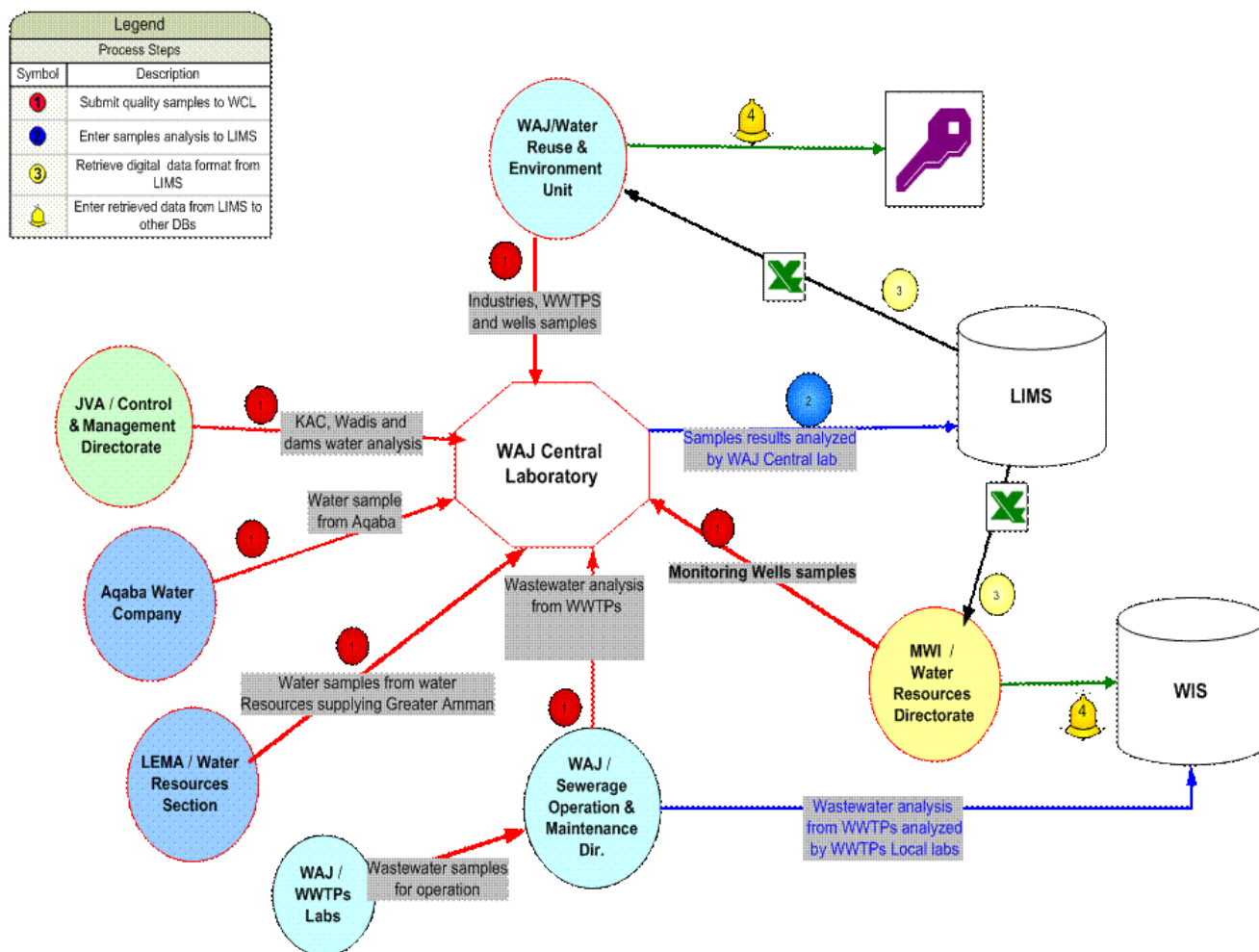
The Ministry of Water and irrigation is further developing its water information system within the Ministry; two new units have been set up to manage WIS:

- The WIS unit (business process and data flows) in MWI
- The Water Systems department under the unified sector ICTU (service department).

The WIS/DEVA user interface has been upgraded & deployed to Internet module on the Oracle Application Server. The WIS includes:

Water resources/quality monitoring and facility, as well as water resources production and water use databases (ORACLE), GIS databases (ArcView), interactive digital planning tools for the National Water Master Plan, and applications for water resources/quality analyses such as numerical models.

Data sources include water quality data from fixed monitoring stations, data from the Ministry of Health from mobile stations and data from the specific monitoring system put in place for the Abuqala Canal.



The Jordanian Ministry of Water and Irrigation (MWI) launched, in 2010, an initiative to establish a Telemetric Water Resources Observation Network (TeWARON). The envisioned telemetric reconditioning of the hydrological and meteorological monitoring system will contribute to a stabilized data flow leading to higher data reliability and availability. The so obtained data will be the basis for a data evaluation system providing a permanent information basis in the hands of decision makers in the National Water Resources Planning and Management.

Based on a pre-assessment mission carried out with the help of GIZ in August and September 2009, the status of the present installations, up to now operated and maintained by MWI, has been investigated. Based on the assessment, specific recommendations were given for a stepwise implementation of the future TeWaRON, starting with pilot installations testing various technical options for groundwater and surface water monitoring, including hydro-meteorological stations for telemetric data acquisition (16 stations, 8 monitoring ground wells, 2 wadis and six meteorological) to measure *water level, temperature, conductivity, pH, nitrate*.

In support of the National Water Master Planning Process and the establishment of TeWaRON, GIZ has initiated a PPP for the pilot-phase, jointly organized with a German

company. The PPP is designed to include 11 stations to measure *water level, temperature, Conductivity, pH, precipitation.*

Upon request of the MWI, the United Nations Economic and Social Commission for Western Asia (UN-ESCWA) and the German Federal Institute for Geosciences and Natural Resources (BGR) cooperation project have granted funds for a telemetric data acquisition upgrade of the existing groundwater monitoring network in the Ram Group/Khreim Group aquifers, including operation and maintenance for 2 years (12 stations, 11 monitoring ground wells and one metrological station) to measure *water level, wind direction and velocity, solar radiation, humidity, temperature and pressure.*

As an extension of the telemetric system in 2011, MWI implemented TeWaRON2 including 35 stations, 15 monitoring ground wells, 15 meteorological stations and 15 rain fall gauge stations.

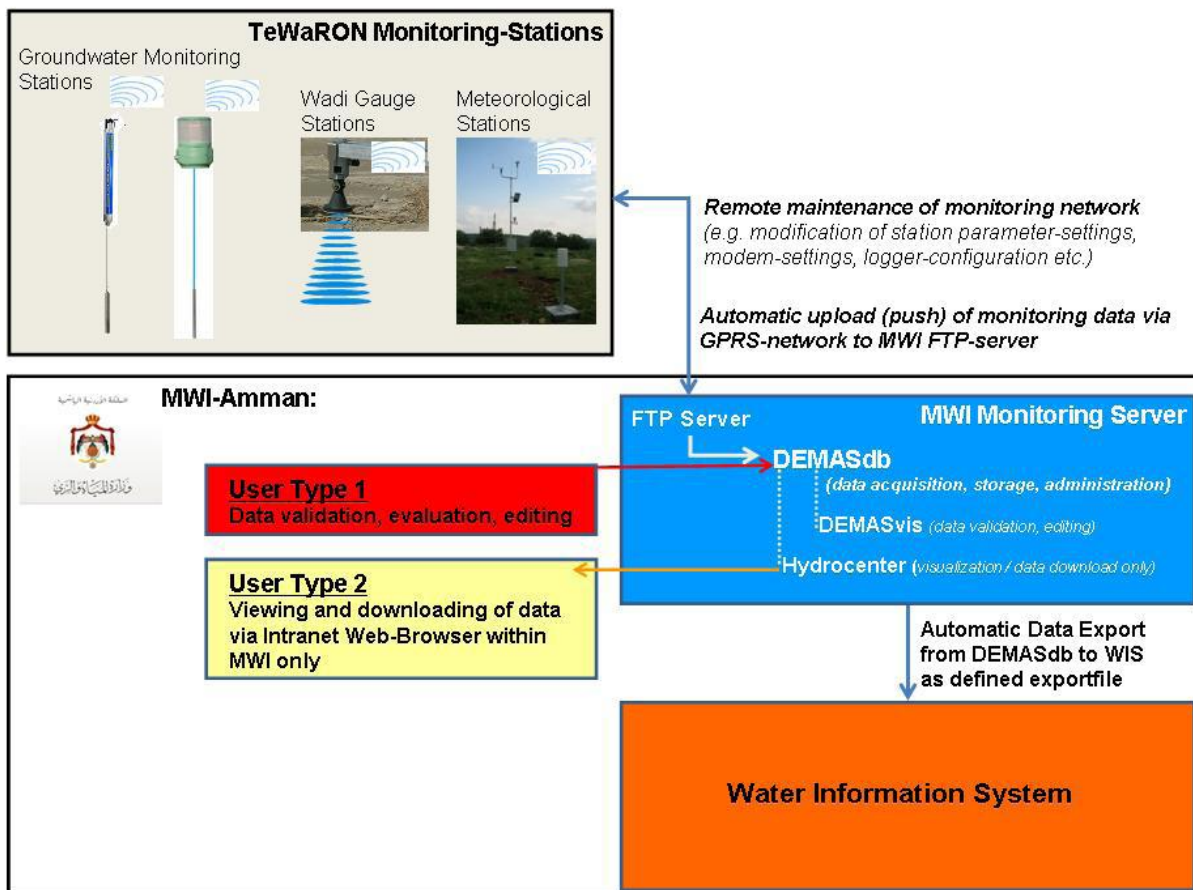
According to upcoming projects it is very important to coordinate activities between all different donors and MWI in order to have one integrated and efficient system. All stations shall be equipped with GSM/GPRS-based telemetric data transfer. The technical equipment has to be installed in parallel to the existing measurement equipment for comparison measurements. All ground water monitoring stations shall be equipped with a highly integrated, compact remote system which consists of a data logger, GSM/GPRS modem, antenna and solar panel. For surface water monitoring, the installation of radar sensors with a data logger with integrated GSM/GPRS modem and a solar panel is planned. The meteorological stations shall be equipped with new automatic stations for wind direction and velocity, solar radiation, humidity, temperature and pressure sensor and tipping bucket rain gauge sensor.

Existing Data-Management Infrastructure at MWI :

The nationwide telemetric monitoring network of MWI consists of groundwater monitoring, wadi-gauge (surface-water), meteorological and rain gauge stations which were installed within the first phase of TeWaRON in 2010/2011.

The recorded data is being **pushed** by the respective station directly to the FTPserver of MWI in Amman via the GPRS network (Orange 3G) *hourly* or *daily*, depending on the implemented power supply (*with* or *without solar panel*). Without any data-format modification the data is automatically imported at an interval of 10 minutes from the FTPserver into the monitoring database DEMASdb in a special format ('D-channel, ZRXPformat') on the MWI server. DEMASdb is an object orientated, graphical user interface extension for Oracle, responsible for the acquisition, storage and general administration (e.g. archiving) of data transferred by the telemetric network.

Schematic Diagram of Data Flow and Existing Data Management Infrastructure at MWI for TeWaRON.



III.3 Waste Monitoring

Currently 20 dumpsites exist in Jordan. Except for the Ghabawi landfill, none of the others meet the requirements for a sanitary landfill. One hazardous waste landfill exists in Swaqa, 125 km south of Amman and it receives hazardous wastes generated in factories, hospitals, universities, and research centers. Wastes are neutralized and chemically treated and then kept in lined ponds.

The Ministry of Environment is also considering the need for an electronic data management system for waste, including basic information on industries and waste generators such as name, location, environmental identification number, nature of the process, types and amounts of waste produced. This information will be used for the licensing and permitting of waste producers, transporters and treatment facilities, registration of industries and waste generators as well as reporting to MOENV on amounts and types of waste; hazard evaluation and development of emergency response; tracking system for waste transport vehicles and for project implementation and future planning. Information on the siting of new landfills, existing landfill sites, closed landfill sites and illegal dumping sites would be provided through a GIS system. (See suggested WMIS work plan.)

Jordan has signed the Basel convention. In terms of strict legal compliance, as Jordan does not engage in hazardous waste exports, the applicable provisions are respected. However,

measures to track, monitor, regulate, document and reduce hazardous waste are, perhaps, less effectively implemented than would be required for full legal compliance. A waste information system will improve the management of waste. It is also important to mention that hazardous waste is very often mixed up with other waste streams.

MoEnv has an inspection system that uses both paper and electronic (PDA) forms used by inspectors who visit different establishments all over the Kingdom. MoEnv is the custodian of this system; the system is a central one and is not linked to other systems of the MoEnv directorate that are located in different governorates of the Kingdom. The system consists one server using Windows 2008. Another existing system could be viewed at www.hsms.jo and is related to hazardous substances. This system has 2 servers, a web server and an Oracle database server. It was established around 2004-2005 in cooperation with the Royal Scientific Society-Jordan. MoEnv is planning to introduce a licensing system for services, to be linked with the existing inspection system, and including all establishments that have to register with MoEnv, to set up annual licensing procedures. The system will have the same geographical coverage as the inspection system. MoEnv also has future plans to establish a GIS system in cooperation with different stakeholders. In general, MoEnv has about 170 PCs, 14 servers and storage area management (SAM) with 4 Tera.

Other information systems

III.4 Jordan Environmental Information Management System (JEIMS)

The Ministry of Environment is currently developing its own environmental information management system - JEIMS. The main objectives are:

- To build an environmental database in order to track the state of the environment in Jordan.
- To provide assistance and support for researchers and professionals in the field of the environment.
- To raise environmental awareness and facilitate decision making processes.

The system will be implemented using the technology of Client-Server (three-tier application), using mainly descriptive and geographical data. At present, it is available only in Arabic, based on open-source and trial data. In the near future, JEIMS will be uploaded on a dedicated server in the Ministry and necessary training provided.

III.5 The Jordan Info Database

The DOS manages the Jordan Info Database, which was created using the DevInfo software. It includes 222 indicators, covering 16 sectors: demographics, economics, construction, telecommunications and information, education, social security, travel, women, health, enterprises and trade unions, nutrition, energy, agriculture, housing and households, security and justice, environment. The database covers the period 2000-2009 and is based on statistical publications and results of surveys and censuses conducted by DOS. The database has been

published on a CD and is available on the website of the Department of Statistics: www.DOS.gov.jo

Within the DOS, the Division of Environmental Statistics was established in 1995 and has as main objectives:

- Collecting data on natural resources and pollutants
- Maintaining an environmental database compatible with international standards and comparative with other countries
- Developing and improving sustainable environmental indicators
- Integrating environment with the economy by establishing environmental accounts

The main data sources are:

- Field surveys (medical surveys, survey for hazardous industrial activities, waste surveys for municipalities, survey related to other surveys (e.g. agriculture, services and industries)
- Administrative records: cooperation with different institutes – air pollutants cooperation with MoEnv and the Environmental Health Directorate (MoH), water - Ministry of Water and Irrigation, Aqaba Port Corporation, Royal Society for Nature Conservation, Ministry of Energy and Natural Resources + NGOs and research centres and universities

As an example, questionnaires used for the medical surveys include the following elements:

- Identification information on the establishment.
- Quantity and value of water used in the establishment.
- Quantity of sewage and method of disposal.
- Quantity, type and value of energy used by the establishment.
- Used commodity requirements.
- Quantity of wastes by item, type and method of disposal.
- Fixed assets of the establishment designated for the protection of the environment

Another example is the questionnaire component related to wastewater for the surveys of hazardous industrial activities, which covers the following points:

- Quantities of wastewater and disposal methods (Reuse, Irrigation, Public network, Septic tank and Treatment unit partial or total)
- Expenditures on wastewater management and infrastructure by activity
- Cost of disposal method/ unit
- Number of employees allocated for wastewater management

Environmental data published by DOS includes data sets on the quantity of municipal solid waste from the economic enterprises sector, industry and households, water supply for household and municipal purposes. Data are the results of annual surveys which are available annually at the beginning of the year following the surveyed year.

The Environment Division is planning to resume the overall industrial survey by extending it again to all industries and manufacturing activities. At present, the survey is limited to 18

hazardous industrial activities for which data on water consumption per type, sources, and waste water, along with information on energy use and waste production are provided.

Data delivery is free and upon request, but it is reported annually in the environment statistics report, which can be found in the library of the Headquarter of DOS. In addition, some of the survey results are published on the website of DOS (http://www.DOS.gov.jo/env/env_e/index.htm). The Environment Division also plans to develop water account tables (water used, produced wastewater, emissions to water and hybrid accounts by activity) linked with the National Water Information System managed by the MWI.

The Environment Division intends to improve integration of environmental, economic and social aspects, in line with UNSD and UNEP Green Economy initiatives. Finally, the Division wishes to conduct household surveys covering waste electrical and electronic equipment, energy and water.

The Division has also been working on environmental indicators for sustainable development for the last five years. The indicators are measured according to data availability and country priorities.

The following water indicators selected in the framework of the Mediterranean Commission on Sustainable Development and Med 60 indicators are used:

- Percentage of people connected to safe drinking water
- Total agricultural areas / irrigated lands
- Total volume of surface water
- Total volume of renewable and non-renewable GW
- Exploitation of water resources
- Water supply form surface and ground water

Other indicators include 1) energy indicators (production, consumption per capita and per economic activity, imported energy and energy efficiency), 2) air pollution indicators (GHG, number of vehicle per inhabitants, road density), 3) biodiversity indicators (number of mammals, birds, reptiles, amphibians, vascular plants, indigenous threatened species).

The Division is developing further indicators on water quality and quantity, air pollution, eco-efficiency, waste recycling, etc.

However, all future plans are suffering from financial constraints. Extensive use is made of other surveys e.g. economic statistics on all sectors by adding specific questions relevant to the environment. There is a need to mix sources (surveys, models) especially for water.

IV Cross-Analysis

Cross-analysis of the three SEIS components identified by DOS for the thematic areas with identification of the main strengths, concerns, problems, shortcomings, insufficiencies for coordinated SEIS implementation within the country with all stakeholders. The matrix below shows the detailed analysis:

Wastewater	Content	Infrastructure	Inter-institutional Cooperation
State of Play	Available time series database concern wastewater quantity and disposal methods in some economic activities and cost of disposal and treatment of wastewater	Available environmental statistics report and data on website www.DOS.gov.jo English/statistics by Sector/Environment statistics/Environment surveys/ Results of the Study Liquid and Solid Wastes - Hazardous Wastes/ year/hazardous Industry or medical waste or construction /report appearing and data needed will be waste water if we choose waste water tables	Available time series data on waste water quality and total quantities on country base and quantity of reuse
Processes (Planned Activities)	- WW is a very important component of Water Accounts which is developed by DOS - Coverage for all economic activities	improve dissemination tools and more connect to the national information system	More cooperation with (MWI) to have data about inlet waste water to treatment plants
Expected Benefits and what is missing	data exchange about waste water quantities and the missing is more detailed data for more economic activities	- Access to the existing information SYS will increase, and the missing is adequate training and infrastructure	Data used for different purposes especially in water accounts, what is missing is the quantity and quality of

			inlet waste water to treatment plants, - disputes & duplications
Support to be provided	Funds for more surveys, capacity building and waste water coefficients	- enhancing infrastructure, - capacity building, - adequate funds	- Access to the existing information SYS and increase of data exchange and dissemination, more cooperation

Waste	Content	Infrastructure	Inter-institutional Cooperation
State of Play	Available time series data concerning waste in some economic activities, information about waste disposal methods and cost	<p>Available environmental statistics report and data on website www.DOS.gov.jo</p> <p>English/statistics by Sector/Environment statistics/Environment surveys/Results of the Study Liquid and Solid Wastes - Hazardous Wastes/</p> <p>year/hazardous Industry or construction or medical surveys /report appearing and data needed will be on waste</p>	<p>Available is the total amount of waste at country level which go to landfills from municipalities</p>

Processes (Planned Activities)	Coverage for all economic activities	Connect to the national information system with Ministry of Environment and other municipalities	- More cooperation with the involved Institutions (MoEnv)
Expected Benefits and what is missing	Data about waste quantities is produced, - Data will be used for waste account, what is missing is more detailed data for more activities, and what is missing is the waste type of municipal waste.	Access to the data and what is missing is a more suitable way to have the needed data in a timely fashion	-Data exchange with the involved Institutions (MoEnv) - Access to the existing information SYS
Support to be provided	Fund for more surveys, capacity building	Improve dissemination tools, brochure for data users and respondents to improve data quality	More cooperation

Industrial Emissions	Content	Infrastructure	Inter-institutional Cooperation
State of Play	Available time series database for consumed energy, waste and wastewater in some economic activities, and information about disposal methods.	Available environmental statistics report and data on website www.DOS.gov.jo English/statistics by Sector/Environment statistics/Environment surveys/ Results of the Study Liquid and Solid Wastes - Hazardous Wastes/ year/hazardous Industry /report appearing and data needed will be on waste, waste water and energy	Available is the amount of air emissions in hot spots and the monitoring stations network which is new in Ministry of Environment

consumption			
Processes (Planned Activities)	Coverage for all economic activities, data on calculation for air emissions depending on energy consumption in each economic activity, use for Emission and Energy Accounts	Access to the national information system at the Ministry of Environment, Ministry of Water, Irrigation and other Municipalities	Increase cooperation - experiences exchange
Expected Benefits and what is missing	Data about solid, liquid and gaseous emissions is produced and what is missing is more detailed data for all industrial activities – technical coefficients	Access to the data and what is missing is a more suitable way to have the needed data in a timely fashion - GIS and capacity building	-Data exchange with the involved Institutions - Access to the existing information SYS and what is missing are disputes and duplication
Support to be provided	Funds for specialized surveys(if we can ask for gas emissions and pollution abatement control tools), and coverage for all industrial activities - capacity building	Improve dissemination tools, brochures for data users and respondents to improve data quality	More cooperation and experiences exchange - Access to the existing information SYS

Compiling the country report has shown some difficulties especially in terms of the coordination and cooperation between different institutions, and also some difficulties when accessing data and information. The information and data is not always disseminated.

It is obvious that an improvement in cooperation is crucial and important. It appears that building a network that links together different institutions and would help enhance their cooperation is very important for future work. As a general remark, despite some progress in the past years, the different monitoring networks and information systems are still poorly coordinated and a common e-government platform would greatly facilitate the exchange of information between the relevant institutions and organizations and ensure that the data are used at a strategic level for policy development and enforcement. There is a good level of cooperation between the MWI and the Environment Division of DOS. For example - in relation to water - while water use is accounted for by the MWI, often based on estimates, the Environment Division brings in data from visits to individual plants. The sharing of information can lead to a good overview of the water balance. However, it will be crucial to ensure that the same criteria are used for industry classification (use of a common coding system as mentioned above), and the work on water accounts, which is suggested as one of the follow-up activities, will help solve this issue. The Ministry of Environment could also contribute to the work of DOS through provision of data, in particular data from monitoring.

Hazardous waste management: as mentioned in section III.3 waste streams are not always separated - indeed, hazardous waste is very often mixed up with solid waste.

Waste management in the Jordanian context is in need of serious consideration because part of the infrastructure needs to be phased out (particularly where landfills are concerned) as it constitutes a threat to health and the environment and because waste is subject to uncontrolled and illegal burning by residents. This also poses a health threat because household and hazardous wastes are not always separate waste streams.

The Ministry of Environment of Jordan wishes to have an integrated IT-supported system for all the requirements concerning applications for permits, licensing by the authorities, support for inspections, notification of transboundary shipment, etc.

Apart from supporting the authorities in their enforcement and inspection duties, additional use shall be made of the data stored in the IT system, e.g. for preparing waste management reports, facilitate compliance monitoring with regard to environmental targets specified in the National Agenda for minimizing waste, reporting to the Secretariat of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes, providing information for waste management planning, etc.

Conduct surveys in SEIS thematic areas: the availability of environmental information and data within the environment sector concerning water, industrial emissions solid waste etc. is not satisfying user needs - indeed, data is often missing and if it exists it provides only partial coverage. Therefore, it has been suggested to DOS that surveys should be conducted in the

different thematic areas. Such surveys will not serve only DOS but other institutions as well. So, a survey that is of common interest to different concerned institutions should be carried out. This survey will provide the required data and information for the SEIS thematic areas (waste water, industrial emissions and waste). Since DOS carries our regular surveys for different purposes, support from EEA is needed to provide financial help in order to carry out surveys that capture the required data for the thematic priorities of SEIS. Such surveys have been strongly recommended by different institutions relevant to the SEIS project.

Water accounts: It is essential and very important to draw up water accounts since Jordan suffers from water shortage and has to ensure that the available water resource is used wisely and effectively. DOS and especially the Department of Environmental Statistics have played a considerable role in this context and some countries in the region have benefited from the experience in this field. A training mission was organized in Bahrain and Khaled Alshatarat (SEIS national focal point) acted as expert and shared his experience with the colleagues in Bahrain. DOS is also ready to provide training for the south countries.

V Work plan

V.1 Waste management information system

a)Organize an expert Mission: Evaluation of the software in use, as well as the required development tools and methods and the current situation is needed.

The question is whether the Jordan Integrated Hazardous Substances Information Management (HSIM) and Control System, stage 1 of which is already in operation, could serve as nucleus for the new WMIS. The options to either adapt or improve the existing Jordanian software and tools to the information requirements or to develop a new Waste Management System were assessed briefly.

It seems that HSIM is a very good stand-alone solution to meet the information requirements of the public and of the authorities concerned with regard to hazardous substances. Nevertheless, it is lacking some essential features of a system specifically designed for efficient support of enforcement and inspection activities.

b)Workshop

As first step for the development or further development of a waste information system, we recommend the organization of a workshop. The workshop will help to analyse and assess the current situation in Jordan with regard to the requirements concerning application for permits, licensing by the authorities, support for inspections, notification of transboundary shipment and data collection for waste management planning and reporting.

This workshop will help to clarify whether/how the Jordan integrated Hazardous Substances Information Management and control system can be developed or adapted to meet the needs of Jordanian authorities. The option to either adapt or improve the existing Jordanian software and tools to the information requirements or to develop a new Management information System will be discussed.

Basel convention experts will be invited to participate in the workshop and the distribution of work will be discussed with them.

DOS needs the financial support from EEA to conduct the surveys:

The survey described in the section on cross analysis demands about 7 enumerators, 2 -3 supervisors and one coordinator. Also, it demands 3 rental cars to provide one car for each team. The sample size of around 10000 samples which covers the industrial, service, household, trade, construction and agricultural sector and any other sector might be interesting to some concerned institutions. These efforts will be distributed all over Jordan's regions. The accurate budget for such a survey will be calculated upon the approval of this activity.

V.2 Water Accounting in cooperation with EEA

In order to develop the water accounts further, a survey is needed. The previous survey could not capture all the sectors that use water due to the restricted coverage of the survey because of budget restrictions. EEA support to expand the existing survey can be given by providing the necessary funds as mentioned above.

Help is needed for providing wastewater coefficients per industry, and help DOS identify data gaps and data needs in order to develop the accounts.

V.3 Link water quality data EMARCU to MoEnv

In order to avoid sending reports by fax as mentioned above, the following activity can be envisaged:

Activity 1:

- Evaluation of the system used by the MoEnv for water quality data and see if the current system can be linked to the EMACU system or provide direct access to the experts of the MoEnv and adapt the system to their real needs.
- Furthermore, organize a workshop for different stakeholders involved with the MWI such as MoEnv, MoA, MoH, Dos in order to explain the purpose of country indicators in general, as well as their methodology and current status in Jordan and the outcome should be a common agreement between the ministries and a clear implementation work plan.
- Training for the Ministry of Water and Irrigation staff on the collection, processing and presenting of data
- Training for Ministry staff concerned with the assessment of work flow procedures and enhancement of such procedures to facilitate the process of data collection for the benefit of creating different indicators.