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Innovative Study Utilizing EMIS in Supporting Participatory Urban Decision Making Process in Jordan

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ABSTRACT
The environmental system is distinguished in the balance among its elements (i.e. water, air and land) and it can adapt, within certain limits, with changes that may occur. But, life development, technological advancement and introduction of machines, chemicals, radio-active items, various sources of power generation, exhaustion of natural resources, occurrence of catastrophes due to human activities such as nuclear explosions in addition to the use of fertilizers and pesticides, all these lead to environmental disequilibrium and many environmental problems. So, environmental protection must be taken seriously in order to reduce these problems. It should be given top priority by the public and private sectors because each being has the right to live in a balanced, clean and pollution-free environment. Urban Decision Makers are seeking for environmental information that seems to be continually changing and expanding. Though, environmental management information system (EMIS) is the computer-based systems that support environmental management systems. The important component of environmental management can assist both environmental and non-environmental managers to fulfill their everyday jobs. In this paper, EMIS concept and its main components have been defined and explained. Additionally, the paper presents the role of EMIS as a tool to support Participatory Urban Decision Making Process. Moreover, the paper shows, the EMIS importance, by which the Jordanian environmental ministry can effectively concentrate on the spatial aspect of urban planning and management.

General Terms
Environmental Management, Management Information Systems, Decision Support Systems Information System, Urban Decision Makers.

Keywords
Environmental Management Information System, Urban Decision Makers. EMIS, MIS.

1. INTRODUCTION
The way environmental professionals work is changing. Many environmental "knowledge" jobs increasingly can be characterized in terms of their workflow as decision cycles rather than as a fixed sequence of well-defined tasks. These decision cycles may be part of an ongoing system or framework, such as an Environmental Management Information System (EMIS), or they may relate to a specific project, such as a compliance audit. To carry out their responsibilities, environmental professionals must assemble tasks and knowledge in response to business cycles and events. This requires the engagement in a combination of actions including: implementing procedures and training, planning for future changes, making decisions about new ways of doing things, consulting experts such as legal counsel or engineers, creating forecasting scenarios, researching and analyzing possible effects of changes on other systems, identifying new opportunities or problems that may arise as a result of the changes, and lastly, monitoring the changes in order to provide feedback for system improvements or future projects [1]. EMIS is an important component of environmental management that can assist both environmental and non-environmental managers fulfill their daily tasks [2].

Recently, the Urban Decision Makers (UDM) have progressed from using a manual-based EMIS to making significant use of information technology in many of its facilities. Increasing environment problems and the complexity of environment management is forcing UDM to respond to changing and identifying new opportunities more quickly than ever before. UDM not only work in different functional groups at their specific locations, they often participate in other UDM around the world. Therefore, they need technology, such as web-enabled groupware, that would allow exchanging information and collaborating on systems, projects, and reporting, regardless of their physical location. To succeed in meeting these goals, the UDM needs an enhanced and dynamic EMIS. Jordan has been one of the pioneer countries to exert extensive efforts in the field of environmental protection. Accordingly, many directorates and divisions dealing with environmental issues have been established in various governmental institutions, in addition to the establishment of the Ministry of Environment. Moreover, the Government issued the Environment Protection Law, and continuously supports the non-governmental organizations interested in this issue. Today," Unchs and Unep "said information is crucial to any planning and management activity. The challenges experienced by cities usually are [3]:

- To determine what data and information is needed for the purpose at hand.
- To find out where data and information are exist and how to collect them.
- How to store this information in easily accessible and referenced form.
- How to interpret the data, resolve questions of quality, inconsistencies.
- To determine who needs the information, when and in what form(s).
- To actually disseminate it as required.

Introducing EMIS in urban planning and management is not only driven by the wish to improve management of

environment but also to support participatory urban decision making process. Substantial pressures are placed on UDM today to consider the preservation of the environment as one of their primary strategies. UDM, therefore, need to consider new approaches for implementation of EMIS if they wish to manage these pressures effectively. Unfortunately, managing such a system manually proves to be inefficient and creates the potential effect of substantially limiting the performance of the EMIS. In fact, such a system may perhaps never meet the ever-growing information demands of UDM if managed manually.

Empirically, the Global environment had a major effect on human lives. Likewise, the local environment has a profound impact on the health of Jordanians. Taking preventive measure to stop the harmful effects of the environment on human lives is of a profound importance. Furthermore, ensuring a healthy environment will reduce the health costs in Jordan and will lead to lessened strain on the economy of Jordan. Taking into consideration the significant pressures on natural resources in Jordan, the dynamic state of the environment demands information that is both timely and accurate. Jordan is a country with meager natural resources and high population growth rate. This combination renders Jordan vulnerable to a broad spectrum of environmental challenges, including:

a) *Water*: Water scarcity in Jordan is by far the most serious environmental challenge facing the country. Furthermore, it is projected that per capita consumption will fall to 91 cubic meters per annum by the year 2025. This problem is attributed to several factors including; limited water resources, reduced water quality due to pollution and over pumping of groundwater, leaky water distribution networks, illegal connections, and inefficient water management practices. This problem is compounded by population increases due to natural growth, as well as the influx of refugees during periods of regional political unrest.

b) *Air*: The degradation of air quality is an emerging problem, especially in downtown Amman areas where surrounding hills trap emissions. Two thirds of Jordan's registered vehicles are located in the capital, Amman, and almost all use leaded gasoline or high sulfur content diesel oil. Jordan is not a highly industrialized country; however, several major industries contribute to the pollution problem.

c) *Solid Waste:* Jordan lacks a program to separate and recycle solid waste. Some hospitals have their own incinerators, but most medical wastes are still collected and disposed of with municipal waste. On a slightly positive note, modest recycling programs for aluminum cans and paper have been launched in several areas of Amman as an initiative by NGO.

d) *Land:* Land degradation in Jordan is caused by uncontrolled urban expansion, desertification due to overgrazing, rising soil salinity due to inefficient irrigation measures, deforestation, mining spoils, and absence of land use planning. Because most area of Jordan is a desert land, the largest number of population are concentrated in the Western margin where most of the rainfall occurs, thereby subjecting this land to further pressure.

In the context of this research problem, we will try to answer the following research questions:

- Do the UDM know the real purpose of such a system, especially; in urban planning and management?
- To what extent is EMIS in Jordanian environment can contribute in urban planning and management?
- What are the main types of information provided by EMIS?

In this paper, EMIS concept and its main components have been defined and explained. Additionally, the paper presents the role of EMIS as a tool to support Participatory Urban Decision Making Process. Moreover, the paper shows, the EMIS important by which the Jordanian environmental ministry can effectively concentrate on the spatial aspect of urban planning and management.

2. BACKGROUND AND REVIEW

2.1 EMIS Definition

EMIS can be divided into two forms: narrowband and broadband. Many commonly-used EMIS can be regarded as narrowband EMIS, it is already concentrate on each company alone. However, broadband EMIS are capable to applicants broadly (e.g. country or even globally). Therefore, various definitions have been applied to EMIS, including:

- Environmental knowledge management system. Is the system that intended to maintain and enhance the environmental knowledge base of a company in order to meet the information needs of its environmental professionals [1].
- EMISs are the computer-based technologies that support EMISs. They support tracking activities, tracking waste, monitoring emissions, scheduling tasks, coordinating permits and documentation, managing MSDSs, conducting cost/benefit analysis, and choosing alternative materials. However, many computer-based tools available on the market today are designed to support these types of tasks are labeled EMIS [2].

Whatever we use the narrowband or the broadband to describe the EMIS, according to a definition of decision support systems, an EMIS have the following characteristics [4]:

a. Explicit design to solve ill-structured problems.
b. Powerful and easy-to-use user interface.
c. Ability to flexibly combine analytical models with data.
d. Ability to explore the solution space by building alternatives.
e. Capability of supporting a variety of decision making process styles.
f. Allowing interactive and recursive problem solving.

2.2 EMIS Components

In order to determine the components of EMISs, several studies have been published. Ford, Glenna J. et al. [1] refer that EMISs include diverse content, integrated diverse services and rich presentation, it has three information technology imperatives: inclusion of a web browser to provide a common user access platform, integration of disparate content stores, allowing for common access methods independent of the information type, and use of internet standards for universal connectedness (Fig. 1a and Fig. 1b). By incorporating the unique knowledge and workflow of each environmental professional into overall corporate knowledge management and business processes, the environmental knowledge management system and its workspace become vital components of doing business in the global economy. While, as described by the preliminary report on the middle shire investigation, a sustainable EMIS includes in country capacity to address the following components [5]:

- Developing an environmental data infrastructure.
- Conducting routine environmental analysis.
- Establishing an environmental decision support network.
- Making the EMISs oversight.

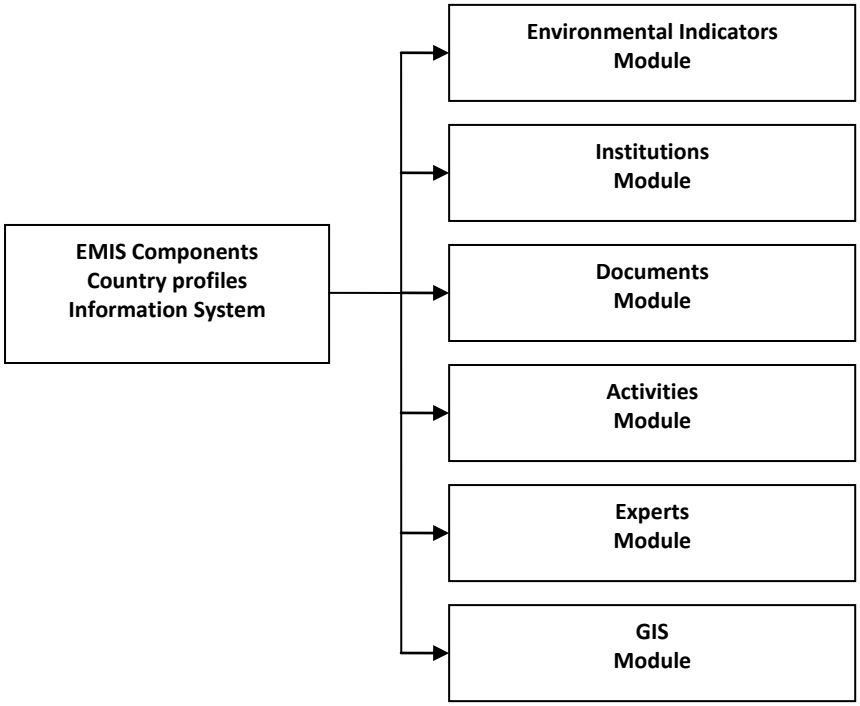

Fig. 1a: The major components of Environmental Information Management.

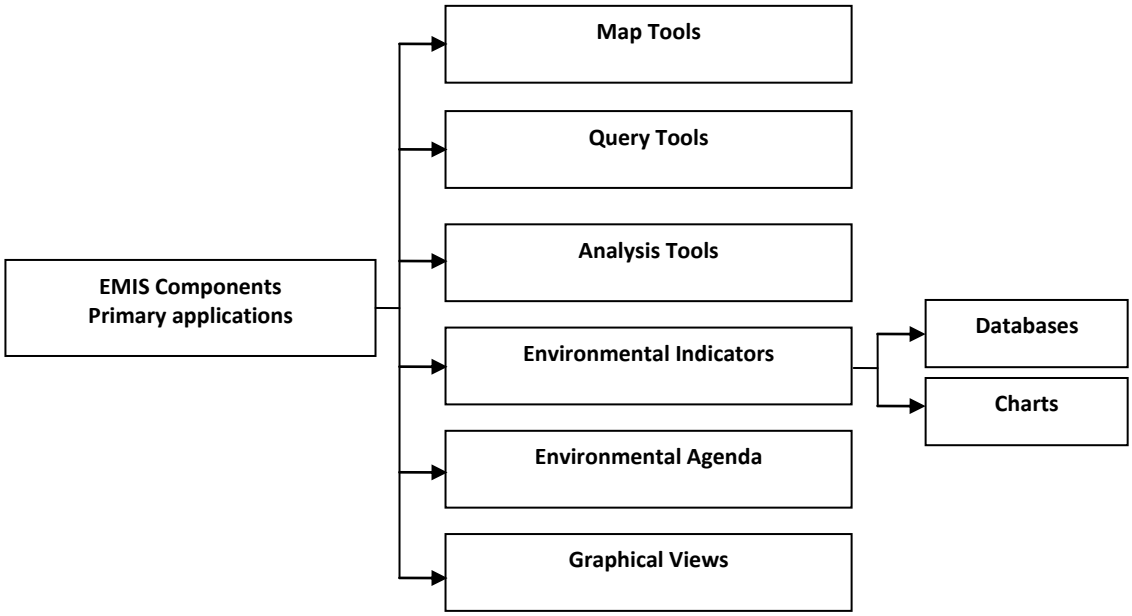

Fig. 1b: The EMIS Primary Applications

3. PROBLEM STATEMENT

The environmental system is distinguished in the balance among its elements (i.e. water, air and land) and it can adapt, within certain limits, with changes that may occur. But, life development, technological advancement and introduction of machines, chemicals, radio-active items, various sources of power generation, exhaustion of natural resources, occurrence of catastrophes due to human activities such as nuclear explosions in addition to the use of fertilizers and pesticides, all these lead to environmental disequilibrium and many environmental problems. So, environmental protection must be taken seriously in order to reduce these problems. It should be given top priority by the public and private sectors because each being has the right to live in a balanced, clean and pollution-free environment.

4. PURPOSE OF EMIS

The main purpose of EMIS is to provide concise timely and relevant information for the decision-making process on urban issues. The EMIS covers the gathering of relevant information for a participatory urban environmental planning and management process [3]. However, it could also include the collection of information about the various urban issues (such as poverty, environment, security) facing a particular city. Information maintained and generated through such a system is usually up-to-date as it allows for continuous input of data generated through an agreed standard, involving public and popular participation [7]. An EMIS concentrates on the spatial aspect of urban planning and management and provides the basis for an open planning framework which complements or even super cedes traditional master planning concepts and, therefore, is applicable not only to environment planning but to a broad range of urban planning approaches [3]. Thus, it is critical that national to local environmental information users and providers are adequately linked such that:

1. Environmental information is collected with respect to user demands for various environmental indicators.
2. Environmental information on various environmental elements is adequately disseminated to all relevant environmental decision makers and stakeholders in Jordan.
3. Adequate support is given for environmental information usage to protect the environment.
4. Creating environmental database on environmental pollutants by type, source and their effects on environment, and on available natural resources, deposits and safe exploitation of these resources.
5. Moreover, The EMIS has been used to attract investors by providing maps which show the best locations for investment in the Jordan. Although The EMIS has used environment as a particular entry point, but experience has shown that, with suitable but simple modifications, the EMIS can easily be adopted to other thematic areas and sectors, such as security and disaster management.

5. EMIS END USER

However, participatory urban environmental planning and management process is beginning to realize that they must be able to evaluate their environmental planning and management process performance better, and on a continual, real-time basis. They must also be able to quickly identify new ways to do planning and management process in order to improve performance while reducing potential environmental problems and risks. And, by carrying out these objectives, they will ideally be able to recognize how new environmental targets should be defined and supported. Finally, they identify a key element of success as being the ability to create appropriate implementation and training plans that can be set up and provided to employees quickly, follow-ups on established performance processes carried out, and audits

conducted accurately [8]. The key elements of EMIS established within a participatory decision making framework are its interactive nature and its accessibility to all users and stakeholders including community groups, organized informal sector operators, developers, researchers and public activists. This greatly enhances transparency and makes information a shared resource, so the EMIS also becomes an effective tool to empower the different stakeholder groups [3].

Though, the EMIS information can directly supports a consultative and participatory working group process, and respond to diverse needs and uses in urban planning and management. It has the capability to serve a number of urban management functions, for example, the city assessor, the Ministry of Water (MoW.), the planning department, and the environment department. Such a system can respond to diverse needs and uses in urban planning and management. Thus, a generic EMIS has the capability to serve a number of urban management functions. For example, the city assessor (or officer in charge of local taxation) needs a detailed, large-scale land information system to improve the collection of property taxes. The water department requires precise spatial information on the physical infrastructure, especially reticulation network, for better operation, maintenance and revenue collection. The planning department is concerned about the physical development of the city, while the environment department needs to better manage environmental resources and hazards. Equally, perhaps the mayor needs to present a self-explanatory "snapshot" of the city's development situation at a conference in order to attract tourism or interest investors. To develop Jordan's EMIS that uses the environmental information to improve the management of natural resources and environment. This may include:

- The Department of Forestry to routinely monitor land cover change.
- The Ministry of Agriculture to routinely monitor agricultural yields and soil loss;
- The Meteorology Department to routinely monitor rainfall and rainfall energy,
- The Department of Surveys to provide core spatial environmental data sets and to ensure future management and interoperability of in-country environmental data. However technical assistance was needed to the Department of Surveys in developing environmental data standards.
- The Department of Statistical.
- The Ministry of Health.
- The Ministry of Environmental (MoE) needs to better manage environmental resources and hazards.
- For better operation, maintenance and revenue collection, the water department requires precise spatial information on the physical infrastructure, especially reticulation network.
- The planning department is concerned about the physical development of the Jordanian cities.
- Other states experience has shown that, with suitable but simple modifications, the EMIS can easily be adapted to other thematic areas and sectors, such as security and disaster management.

6. EMIS OUTPUT AND DISCUSSION

The information produced by EMIS is presented in an easily understandable form using attractive maps, graphics and photos. So, EMIS has been designed to provide information which is directly usable by the participants in an urban management process. The information is therefore not comprehensive or overly technical, but highly focused, concentrating on what is relevant for the decision-making process. Because it is up-to-date, issue-oriented, and well-presented, though the EMIS has been designed to provide concise, timely, and usable information on urban issues to support participatory decision-making process in an urban management framework.

The main outputs of an EMIS are attractive and colorful maps, graphics and photos. The information is presented in an easily understandable form, is widely accessible, (the system must enable all environmental information to be accessed and shared when desired, for example through information kiosks, newspaper features, local neighborhood exhibitions, general distribution publications, etc.), is directly usable by the participants in an urban management process, and supports a consultative and participatory working group process [9]. Because it relies on stakeholder participation for finding and inputting data, the EMIS is not an exclusive technical exercise but a broader-based participatory one. This information is stored in archives, databases and in maps, though EMIS consists of fixed procedures to retrieve the produced information. The following samples of output and information defining corresponding fields in the environmental "hot spots" produced by the Jordanians EMIS, including:

6.1 Health Indicators Caused by Air Pollution

It has been considered that Pulmonary diseases exchange directly with environment, as it was categorized from the hazardous epidemic infectious diseases that formed by air pollution. It can be seen [11] that an increase in the number of Pulmonary cases from 168 case in 2009 to 186 case in 2010 (Fig. 2).

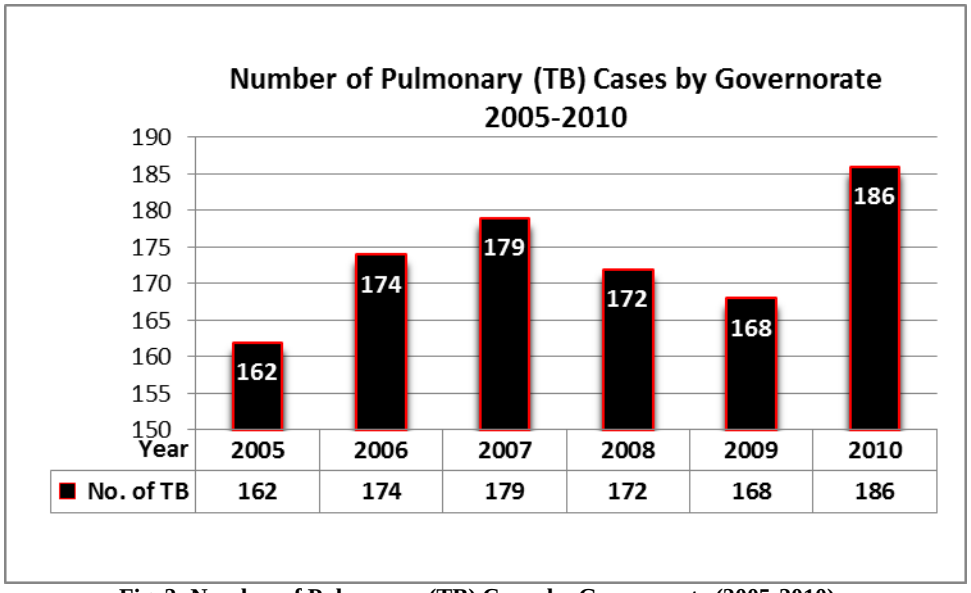

Fig. 2: Number of Pulmonary (TB) Cases by Governorate (2005-2010).

6.2 Agriculture

It can be seen that the results for 2010 showed that an increase in the watered area by 8%, and non-watered area increased by 21% compared with 2009 [9,12]. Similarly, the results showed that the imported fungicides denoted 43% of the total imported pesticides, followed by insecticides which is denoted 18%. Moreover, the results indicated that the number of samples received by the Lab of local and imported Pesticides Residues are 3515 in 2010 (708 local and 2807 imported) [9]. Additionally, the results indicate that the number of dis-conformed samples is 6 local and 0 imported samples. Also, the food samples are examined for the purpose of examining the most damaging residues on human health and the environment (Fig. 3, Fig. 4).

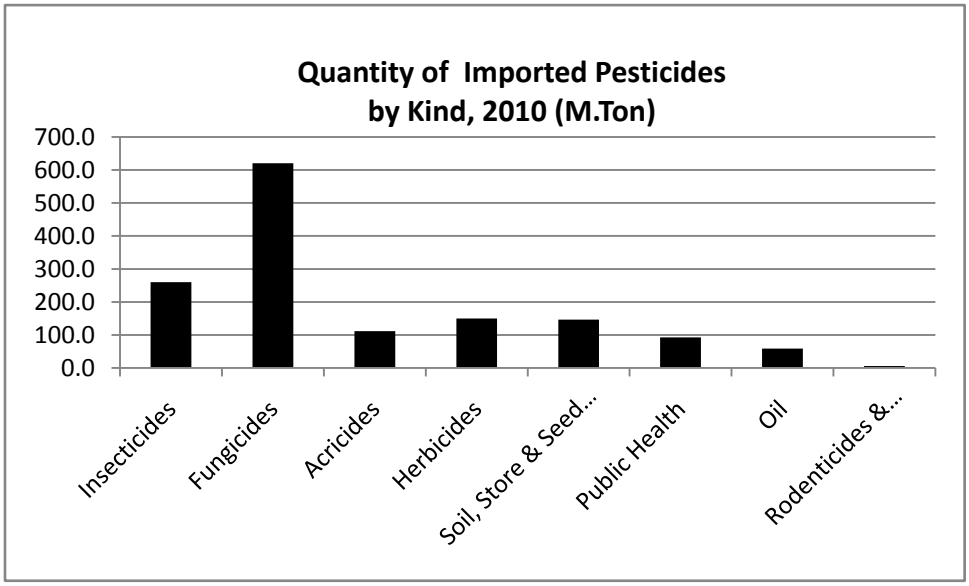

Fig. 3: Quantity of Imported Pesticides by Kind, 2010.

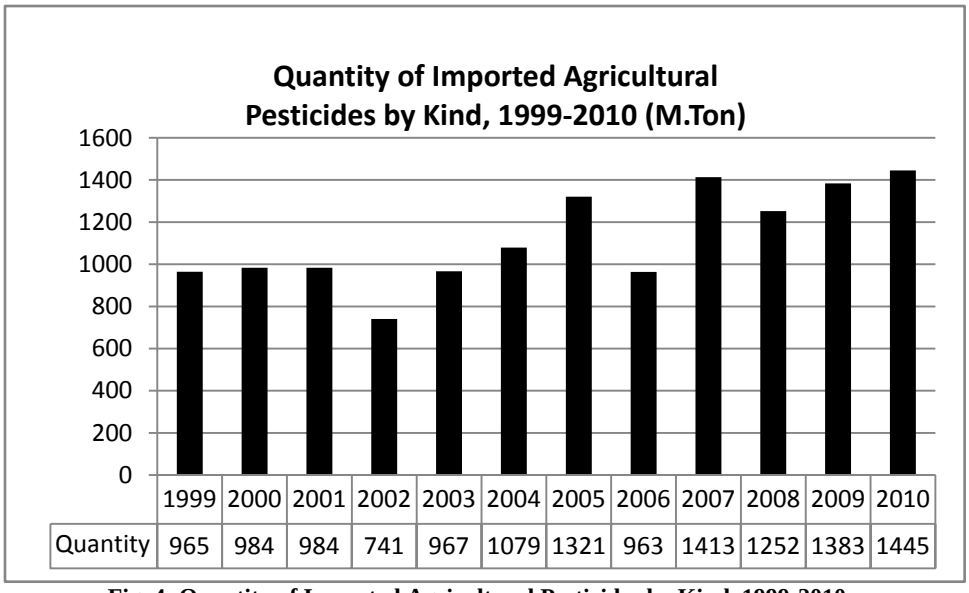

Fig. 4: Quantity of Imported Agricultural Pesticides by Kind, 1999-2010.

6.3 Health Indicators Caused by Water Pollution

It can be seen that there is an advance in number of Diarrhea cases in 2010 which touched 131128 cases compared to 122255 cases in 2009 [11]. Clearly, the main source of Diarrhea is the inflammation that is formed from food exterminating or from rotten food or unclean water that polluted with microbes (Fig. 5).

6.4 Medical Services

Clearly, the results showed that 5% of syringes and needles, and 7% of the external organs disposed in public dumps which designates environmental threat [11]. Though, chemical and medical wastes such as clinical kits, medicinal stains, disinfections, and liquids from surgeries, are disposed of through the public network system, as well as the infected blood samples (Fig. 6).

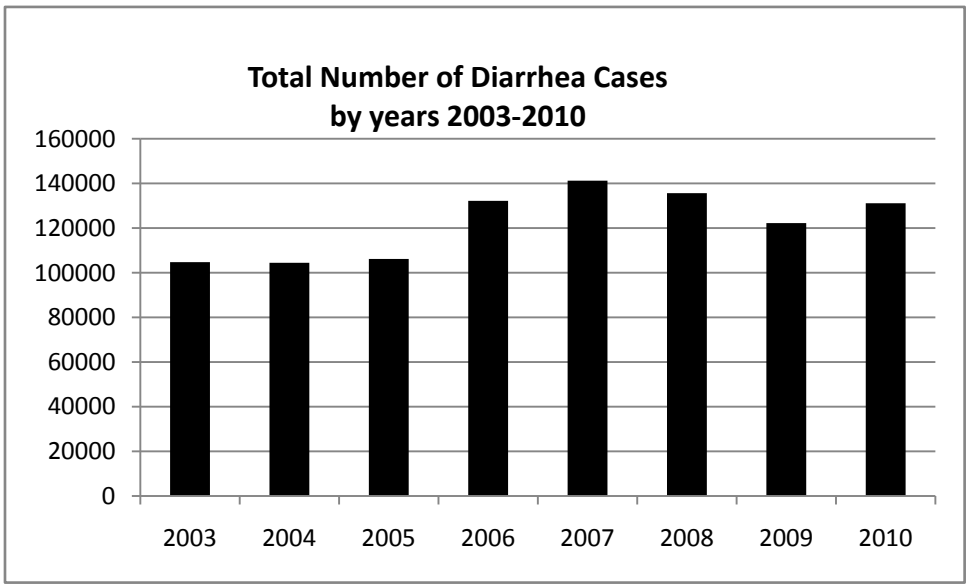

Fig. 5: Total Number of Diarrhea Cases by years 2003-2010.

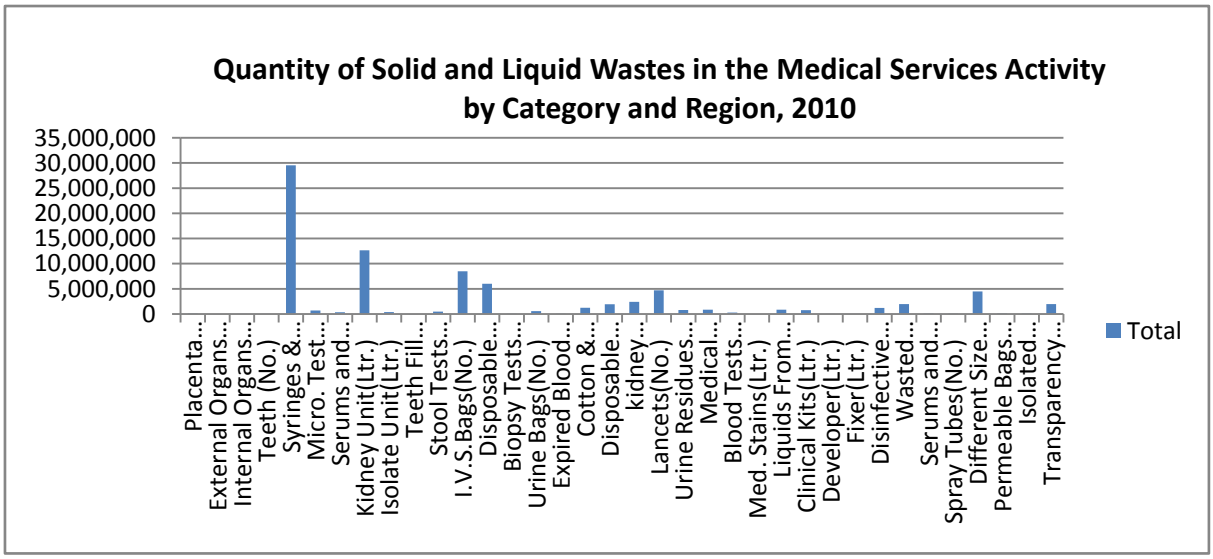

Fig. 6: Quantity of Solid and Liquid Wastes in the Medical Services Activity, 2010.

6.5 Water Quantity and Quality

The capacity of rainwater in 2009/2010 season has increased compared with last year. This capacity represents 105.8% of the long term average this season, while it represents 77.4% of the long term average through 2008/2009 season. Whereas, the total water consumption for municipal, industrial and irrigation usage is 900.7 (M.C.M) from surface, ground water and treated waste water sources [12]. Agriculture is the highest water consumption with the percentage of 56% from the total convention. As for water quality, it can be noticed that the water quality regarding the microbial tests have slight change in 2010 as compared with 2009. The results show that the desecrated samples are 1.1% in 2010. Regarding the microbial tests of desalinized, natural, filled and imported water, the results show that the violation is 1.3% (Table 1) [13]..

6.6 Air Pollutants

Obviously, the results show that the lowest mean of SO_2 concentration during August 2009-July 2010 is in monitoring station surrounding Al-Hasan Industrial City, it is 0.002 ppm and the highest mean of this gas concentration is in Al-Rusiefa monitoring station, it is 0.01 ppm [10,11].

Moreover, the results show that the lowest mean of particulate Matter 10 is 105 (µg /m3) in Al Khaldeah monitoring station and the highest mean meditation for this particulates is 216 (µg /m3) in Al jezza monitoring station for the same period (Fig. 7).

6.7 Transport

Clearly, the number of registered automobiles increases by 8% in 2010 compared with 2009. It can be seen that it increases from 995 thousands automobiles in 2009 to 1075 thousands automobiles in 2010 [10]. Thus, it dictates an increase in fuel consumption and gas discharge due to fuel burning, which is reflected as one of the main air pollution sources (Fig. 8).

Table 1: Quantity of Pollutants Discharged in Aqaba Gulf Water Resulted from Shipping Activity and the Covered Area.

Type of Pollutant, 2003-2010									
Type of Pollutant	**Unit**	**2010**	**2009**	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**
Heavy Fuel Oil	M.Ton	0	0	0	0	0	0	0	0
	Liter	0	0	0	200	0	0	0	0
Diesel	M.Ton	0	0	0	0	0	0	0	10
Plant Ghee	M.Ton	0	0	0	0	0	0	0	2
Vegetable Oil	M.Ton	0	0	0	0	0	0	2	1
	M^2	0	0	0	0	0	0	0	0
Chemical Materials	Kg	0	0	0	0	0	0	0	0
Sewage Waste	Kg	0	0	0	0	0	0	0	0
Oil Mixture	Liter	0	0	0	5	1617	0	0	0
	M^2	0	0	0	0	0	0	0	0

	M.Ton	0	0	0	0	0	0	8	0	
Sewage Oil	Liter	0	0	125	0	0	30	0	0	
Lubricating Oil	M^2	0	0	0	0	0	0	0	0	
Hydraulic Oil	M^2	0	0	0	0	0	0	0	0	
Bilge Oil	M^2	0	0	0	0	0	0	0	0	
Source: Ports Corporation/Aqaba										

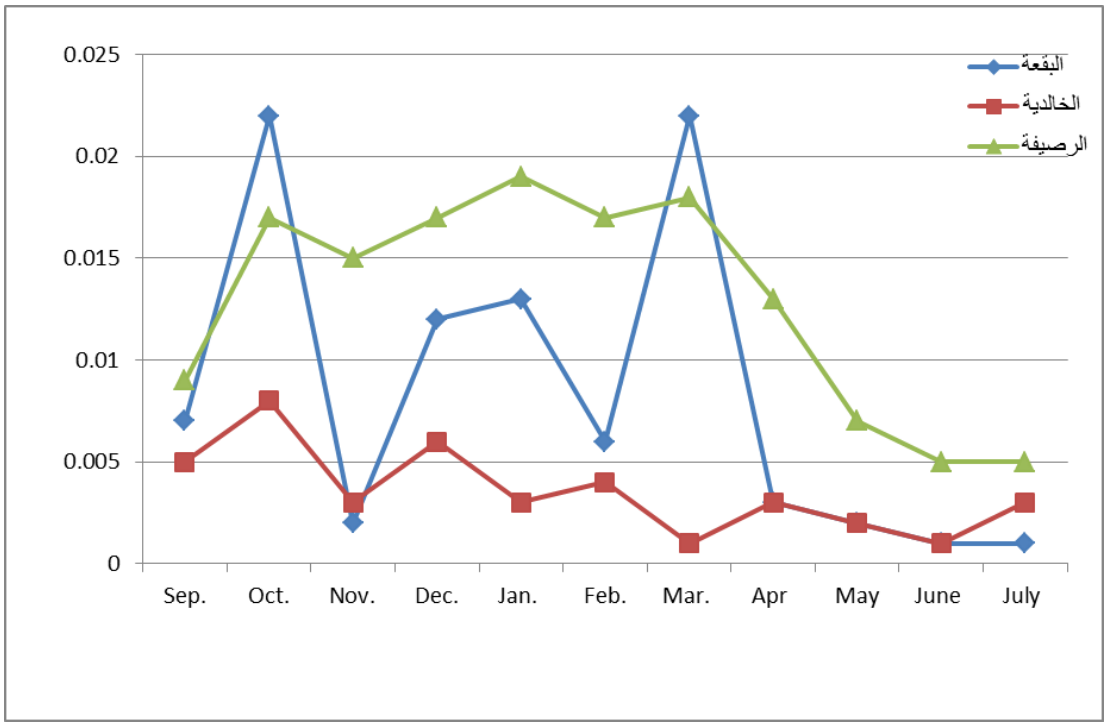

Fig. 7: General Rate of SO2 Concentrations in Selected Sites (Aug. 09-July 10).

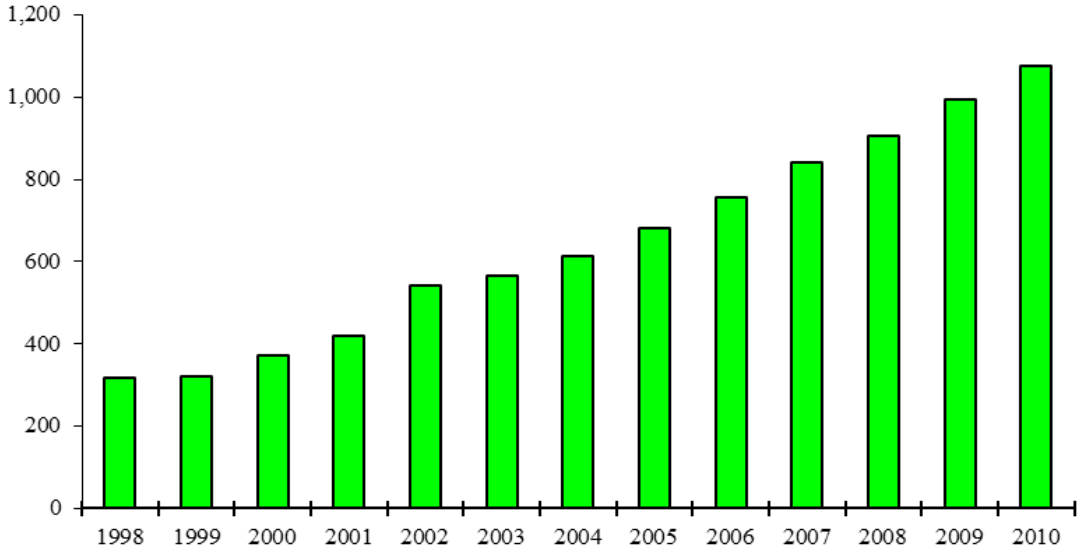

Fig. 8: Number of Registered Vehicles, 1998-2010

6.8 Energy and Natural Resources

It can be seen that there is an increase in the total consumption of electrical energy in different subdivisions during 2010, which touches 12843 GWH compared with 11956 GWH in 2009. The results show a decrease in the formation of crude oil throughout 2010, which touches 1.2KT, compared with 1.5KT in 2009 [8]. Additionally, the creation of the natural gas was decreased during 2010, which touches 137.6KT compared with 163.4 KT in 200 (Fig. 9). Additionally, for the natural resources, the results show an increase in the creation of all forms of potash products from 1119.9 thousand metric tons in 2009 to 1942.6 thousand metric tons in 2010. The results show an increase in the creation of phosphate to 6529 thousand metric tons and decrease in cement to 2110 thousand metric tons during 2010 compared with 2009 which reaches 5281 thousand metric tons and 3834 thousand metric tons respectively (Table 2) [8,13].

7. ENVIRONMENTAL ACCOUNTS & EXPENDITURES

It can be seen that the information on environmental expenditures designates about the social responsibility, welling to keep, and manage the environment as well as the amenability with environmental regulations by these sectors. The results show that, municipalities environmental expenditures are 61.5 MJD, 89% for current expenditures and 11% for capital expenditures, and the major of financial source is the Municipalities on their own with 97% and 1% is grants from the central government [8]. Governmental and Private Hospitals expenditures are classified secondly with 7.2 MJD, 41% for current expenditures and 59% for capitals investments. Dangerous and some non-hazardous activities expenditure are classified thirdly with 6.7 MJD, 47% for current expenditures and 53% as capitals expenditures. Additionally, for services sector expenditure is the last and it is 1.4 MJD from which 64%current expenditures and 36% capital expenditure (Table 3) [8,13].

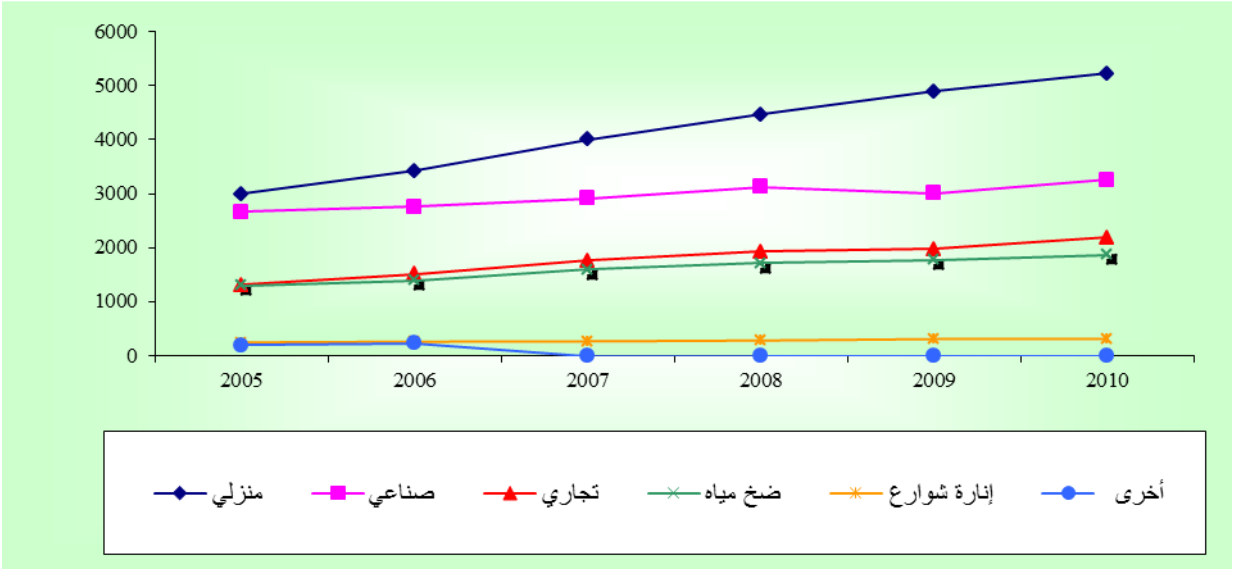

Fig. 9: Electrical Energy Used by Sector, 2005-2010 (GWH)

Table 2: Production of Natural Resources, 2004-2010 (000 Metric.Ton.

Year	Potash	Dried Phosphate	Klencer	Cement
2004	1928.9	6188.0	3402.0	3908.0
2005	1829.5	6374.8	3374.0	4046.0
2006	1699.4	5870.9	3389.0	3968.0
2007	1796.0	5551.6	3367.0	3970.0
2008	2004.6	6265.0	3233.0	4284.0
2009	1119.9	5281.0	3063.0	3834.0
2010	1942.6	6529.0	Not available	2110.5

Table 3: Environmental Expenditures in Medical Services Activity, 2010.

Environmental Expenditures	2421	2413	2412	2411	2320	2101	1911	1514	1110
Waste management	50	1825	6920	171235	7696	500	0	4379	0
Prevention of pollution through in-process modifications	0	875	0	154086	0	0	0	3629	0
Treatment of waste	50	950	0	17149	0	500	0	750	0
Other activities	0	0	6920	0	7696	0	0	0	0
Pollution abatement (Protection of water & climate)	0	838	2000	140224	2496	0	200	42857	0
Prevention of pollution through in-process modifications	0	188	2000	0	0	0	0	17143	0
Protection of Ambient Air	0	500	0	30850	0	0	200	0	0
Activities for the protection of climate and ozone layer	0	0	0	0	0	0	0	0	0
Measurement, control, laboratories and the like	0	150	0	20420	0	0	0	25714	0
Other activities	0	0	0	88954	2496	0	0	0	0
Noise and vibration abatement	0	500	0	11550	0	180	0	0	0
Prevention of pollution through in-process modifications	0	0	0	0	0	0	0	0	0
Measurement, control, laboratories and the like	0	500	0	10000	0	0	0	0	0
Abatement of industrial noise and others	0	0	0	1200	0	0	0	0	0
Other activities	0	0	0	350	0	180	0	0	0
Research and development	0	0	1600	3550	0	0	0	0	0
Protection of ambient air	0	0	1600	2850	0	0	0	0	0
Waste studies	0	0	0	350	0	0	0	0	0
Abatement of noise and vibration	0	0	0	350	0	0	0	0	0
Protection against radiation	0	0	0	0	0	0	0	0	0
Environmental Protection n.e.c.	180	18880	250990	83660	0	34450	40	24786	0
Environmental fines and taxes	180	0	90	2600	0	0	40	887	0
General administration, regulation and the like (ISO 14000)	0	0	0	1700	0	0	0	420	0
Wages of environmental protection employees	0	18880	250900	79360	0	34450	0	23479	0
Total	230	22043	261510	410219	10192	35130	240	72022	0

Environmental Expenditures	3140	2720	2710	2520	2519	2511	2429	2423	2422
Waste management	0	0	14855	43735	300	3568	0	79285	20285
Prevention of pollution through in-process modifications	0	0	0	33327	0	3000	0	1856	0
Treatment of waste	0	0	14855	10408	300	568	0	77429	14025
Other activities	0	0	0	0	0	0	0	0	6260
Pollution abatement (Protection of water & climate)	2000	0	20091	7526	0	0	0	2379331	21243
Prevention of pollution through in-process modifications	0	0	0	952	0	0	0	1250	8560

Protection of Ambient Air	2000	0	20091	3274	0	0	0	247581	7683
Activities for the protection of climate and ozone layer	0	0	0	0	0	0	0	2125000	0
Measurement, control, laboratories and the like	0	0	0	3300	0	0	0	5500	5000
Other activities									
Noise and vibration abatement	**0**	**0**	**25318**	**3443**	**1600**	**200**	**0**	**500**	**12375**
Prevention of pollution through in-process modifications	0	0	0	307	0	0	0	0	0
Measurement, control, laboratories and the like	0	0	19500	1150	0	0	0	0	9000
Abatement of industrial noise and others	0	0	5818	1986	1600	200	0	500	3300
Other activities	0	0	0	0	0	0	0	0	75
Research and development	**0**	**0**	**4255**	**0**	**0**	**0**	**0**	**718**	**3680**
Protection of ambient air	0	0	2836	0	0	0	0	505	1000
Waste studies	0	0	1005	0	0	0	0	0	1680
Abatement of noise and vibration	0	0	414	0	0	0	0	213	1000
Protection against radiation	0	0	0	0	0	0	0	0	0
Environmental Protection n.e.c.	**10760**	**60**	**20567**	**110570**	**1860**	**1800**	**3100**	**151449**	**54084**
Environmental fines and taxes	0	60	375	1569	60	0	40	1434	224
General administration, regulation and the like (ISO 14000)	1160	0	1182	3614	0	0	900	28451	12052
Wages of environmental protection employees	9600	0	19010	105387	1800	1800	2160	121564	41808
Total	**12760**	**60**	**85086**	**165274**	**3760**	**5568**	**3100**	**261123**	**111667**

8. CONCLUSION

Armed with EMIS, Jordan can lay the groundwork for achieving its goal of meeting the challenges of knowledge-oriented society. An EMIS is intended solely for the support of environmental decision making and to improve environmental conditions and management. An EMIS needs to accomplish these tasks on a routine basis. The following are some of the conclusions that need to be addressed:

1. EMIS must be keen to improve its work to articulate and deliver the proper and comprehensive environmental information to decision makers for other areas of environmental interest environmental information in this field. The decision makers, policy makers, planners and researchers can benefit a lot by the comprehensive environmental database available, and becoming a reliable national benchmark for high quality environmental information in addition to being a national source for the decision and policy makers in Jordan.
2. The importance of the environmental information is realized through upgrading and developing the work in this field which is characterized by its rapid development and increasing interest at the international and local levels. Currently, the work trend is directed towards environmental economic integration and environmental social integration in order to achieve the concept of sustainable development.
3. The output of EMIS must be compatible with the information of the best international standards and practices adopted by the EUROSTAT, the ESCWA and the UNSD.

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