

Assessment of the Situation of Environment Statistics
in the 13 Member States of the Economic and Social
Commission Of Western Asia (ESCWA)

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PART ONE

Consultancy purpose and summary

Introduction

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Introduction

Few countries in the ESCWA region seriously started to tackle environment statistics and to consider it one of their primary activities. Other countries have only recently begun to initiate activities in this field or consider it a secondary priority. A few countries have so far not engaged in environment statistics in the ESCWA Region.

On the other hand, the environment is becoming one of the most important subjects. This growing interest is attributed to the serious threats facing the environment in all of its components and their negative and destructive impacts on humans and their surroundings as a result of negligence and irresponsible behavior. The importance of environment statistics is considered a benchmark for sustainable development and can be used to specify the priorities, needs, resources, and the ability of each country to establish sustainable development programs, which include numerous fields of statistics and indicators. These programs are global issues and are suggested by international and regional agencies such as the United Nations and the European Community.

Agenda 21 emphasizes the needs for environment statistics and sustainable development indicators. In addition, the system of national accounts includes environment statistics as one of the main issues to be taken into consideration when calculating the GDP.

Environment statistics is integrated into the infrastructure of sustainable development in order to fill the data gaps and to reduce redundancies in environmental data collection. Furthermore, an efficient environmental information system needs to be accurate, comprehensive and up to-date.

Justification of the Assessment

Sustainable development requires accurate, comprehensive and up-to date data to specify and monitor progress towards target goals. The regional and international agencies therefore recommended developing environment statistics as part of the project "Strengthening Statistical Capacity in the ESCWA Region". This project will aim at building a statistical network in the region. The network facilitates a regional approach to official statistics as well as strengthens the coordination of the compilation and dissemination of official statistics. Furthermore, the project will address the need of the region to improve statistical capacity demands of recent international conferences for statistical information.

As part of the environment statistics component a training workshop will be organized in 2003 and, subject to the needs and availability of resources, fellowship arrangements will be conducted.

Main objectives of the Consultancy

1. To prepare an assessment of the situation in environment statistics in the 13 ESCWA countries: of primary interest are the status of data collection and compilation in different fields of environment statistics, the institutions involved, the frequencies of data production, role of the national statistical office, and the co-ordination of the work on the national and regional level.
2. To investigate what are the priority areas for the countries in the development of environment statistics.

3. To investigate the capacities of regional institutions working on and with environmental data to participate in the planned fellowship training for national environment statistics in 2003/4.

The consultancy, the ways and means used for the assessment

1. The consultant visited 6 of the 13 ESCWA countries: Lebanon, the Syrian Arab Republic, Egypt, Yemen, The Sultanate of Oman, and Saudi Arabia, and met the persons in charge of environment statistics programmes in those countries. Interviews were conducted to assess the status, capacities, needs and priorities with respect to the development of environment statistics. A set of questions had been developed in cooperation with UNSD for this purpose (Annex 1 contains the names, titles and contact details of the persons interviewed and Annex 2 contains the questionnaires used for the interviews).
2. The consultant also studied the available documents such as books and articles, and studied the data available on the Internet (Annex 3 contains a list of publications and internet addresses).
3. The consultant collected for all 13 countries relevant information from secondary sources, for example, the Blue Plan project and CEDARE. He also met the responsible persons in four regional agencies to discuss the ability of each agency to contribute to the project.
4. The consultant used telephone and Internet communication to collect additional information.

The consultant found that the best way to accomplish the mission is to visit each country individually and to discuss with the responsible persons at the relevant institutions the current situation and how it can be improved. In fact, most of the environmental information and data are dispersed and the national statistical offices (NSO) are not always aware of this information. This situation was observed in some of the countries visited.

Another objective of the mission was to raise the level of importance of environment statistics at the NSO and environmental agency and to encourage the directors to initiate and sustaining existing environment statistics programs.

UNSD and ESCWA are invited to use the experiences made in the Blue Plan activities in the five the ESCWA countries, which participate in the project.

PART TWO

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Introduction

There are considerable variations in the situation of environment statistics between the ESCWA countries, which could be classified into four major classes as follows. It is noted that due to the fact that the consultant could not visit all countries, the classification below is subject to adjustment if any new information becomes available:

1. Countries that have not yet started environment statistics programmes: Oman, Saudi Arabia, Iraq, and Lebanon.
2. Countries that only recently started such programmes: Yemen. These countries need technical support to initiate the work correctly and to provide training and other technical assistance.
3. Countries that started partial programmes: The Syrian Arab Republic, Egypt, United Arab Emirates, Bahrain, Qatar, and Kuwait. In some of these countries a strengthened environmental statistical law is needed, while others need to recruit technical employees. In general the work in these countries is still at the beginning.
4. Countries with a relatively long experience in environment statistics: Jordan and Palestine. These countries are relatively advanced compared to other countries in the region yet many issues remain to be solved.

Institutional Background and Legislation

It is noted that the legislative situation with regard to environment statistics differs from one country to another: While Jordan and Palestine base their activities on a general statistical law, which includes environment statistics, the statistical law in Bahrain and the United Arab Emirates covers environment statistics implicitly. Egypt and Lebanon intend to release an environment statistics law.

In general, however, it is noticed that the legislation does not necessarily pose a constraint to carrying out environment statistics activities. Often the countries can initiate environment statistics and subsequently improve the law where necessary.

Sources of environmental data and statistics

Environmental data sources depend heavily on the availability of data from the primary data collectors. For example, air quality data require a functioning monitoring system, which does not exist in Yemen, and in the Syrian Arab Republic some data are produced for local use only.

The most common sources of environmental data are:

- Governmental agencies: this source is mentioned as the main source of data in all ESCWA countries. The government agencies include the Statistical Office, Ministry of Water, Ministry of Environment, and Ministry of Agriculture.
- Special surveys on environment statistics, e.g. on hazardous waste statistics in Jordan and industrial waste statistics in Palestine.

- Secondary data from other surveys conducted by the NSO in areas such as agriculture statistics, economic statistics. In some cases (e.g. Jordan) additional questions for environment statistics were added to the regular questionnaires.

To use data sources in an efficient way requires, first of all, a well-built infrastructure including monitoring stations, secondly, the protection of sensitive information, thirdly, the training of employees for the production of timely and high-quality information by statistical office, and finally, a sufficient level of quality of the data and the avoidance of duplication of data.

On other hand, due to the lack of sufficient employees and their often limited experience in environment statistics, it is noticed that the statistical offices often use only a minimal part of already available data.

Institutions dealing with environmental information

It is noticed that numerous governmental agencies and NGO's work in the environmental field but their concern is mainly environmental protection. This means that often no documentation system exists and therefore the availability of consistent information for use by the statistical office is limited.

In some cases duplication exists sometimes leading to incomparable data. It is thus essential to create a body or agency to guide all environmental institutions with respect to the documentation and exchange of information and environmental data.

Human resources

It is noticed that in most ESCWA countries (e.g. Egypt, Lebanon and Yemen) only one employee is working on environment statistics, which sometimes has additional duties.

On the other hand, the Syrian Arab Republic and Jordan have allocated several staff to environment statistics but their work situation is not stable, i.e. they are often transferred to other missions limiting capacity building and resulting in a general reduction of the quantity and quality of work accomplished. The Director of the Blue Plan project, which provides training to employees, supported this finding.

Closer cooperation and collaboration is recommended in environment statistics because the technicians and statisticians need to work together, otherwise any training or other assistance will not be effective, a point supported by Mr. Khordagui.

Financial resources

Most ESCWA countries, notably the Syrian Arab Republic, Egypt, Yemen, and Lebanon, have not allocated a separate budget for environment statistics and the statistical offices sometimes depend mainly on foreign support to continue or develop their projects (e.g. Palestine), which are then often dependent on the priorities of the donor country and not national priorities.

Therefore, an individual budget is needed, at least at the initiation stage.

Area of data production

The consultant noticed that most ESCWA countries concentrate on a few relevant fields such as meteorological, population, and agricultural statistics, which are already compiled under different categories. In some countries, areas of work include waste and water statistics, e.g. in Yemen, which collects data on earthquakes and Kuwait, which concentrates on waste statistics and water quality. This situation reflects the level of priority given to environment statistics but the data produced reflect a still preliminary stage of development.

Data dissemination

Except for Jordan and Palestine no other countries have so far produced specific reports in environment statistics. Some countries included a few tables in the annual statistical report or other reports such as health statistics reports.

The data disseminated through modern technologies and the Internet are also limited and differ across countries in terms of the methods used for the design of the tables and their contents. This situation also reflects the varying priorities and areas of concern in the countries and the need for harmonizing data dissemination methods using a minimum set of tables to produce regional aggregates.

Activities in environment statistics

The activities in the collection of environmental data and information through special surveys are limited and the items covered vary between countries. Some countries collect data on waste, others on water and electricity. In addition, the sampling units often differ between countries from individuals to economic enterprises (e.g. Jordan) and even government institutions (e.g. Iraq).

In general, the number of surveys conducted is limited and covers only a small fraction of environment statistics and sometimes only a specific part of the country. Overall, these surveys should be reviewed in order to achieve more homogeneity in the region and they should be consistent with national priorities. It is recommended to prepare a pilot survey covering one or more countries in the region, which can be used as a model for other countries.

Statistical modeling techniques are applied in very few countries.

Methodologies

In most cases (e.g. the Syrian Arab Republic, Lebanon, and Egypt) the national statistical offices collect data from government institutions. Some of the available data in the statistical offices are used to calculate some indicators and aggregate available data for presentation in some tables but no proper statistical methodology has been used such as sampling design, the specification of the survey population, methods of data collection, methods of calculation and modeling to produce indicators.

In addition, the concepts and methods applied by the countries vary. International definitions should be used wherever applicable: documents prepared by the United Nations and the Blue Plan project are sufficient for this purpose and could be improved over time.

The use of classifications is sometimes a challenge because often several classifications exist, e.g. for land use. On the other hand, some categories do not yet have an internationally accepted classification such as waste statistics. It is noticed

that the countries in the region use several international classifications as well as national classifications, the latter of which creates difficulties in comparing data across countries. This means that more work is required in these fields by international agencies to harmonize the available classifications and to produce manuals for their application. The national statistical offices are also invited to make better use of existing international classifications.

Publications and databases

As mentioned above annual statistical reports are the main publications containing statistics relating to the environment. The annual environmental report produced in Jordan is the only comprehensive report for environment statistics in the region. In Palestine a special report is produced for each individual area in environment statistics. Annex 2 lists the publications containing environment statistics.

Databases are available in some countries, for example, Lebanon and Jordan. These databases include environmental information and indicators and are mainly created by the environmental protection agencies and not the statistical offices. It is therefore emphasized that the statistical offices develop databases utilizing their experience in handling large amounts of data.

The availability and user-friendliness of a database is another very important issue but in reality no country has reached a satisfactory stage in this regard.

Data gaps

The consultant specified existing data gaps through interviews, recommendations from regional agencies as well as by studying existing documents and publications.

It is noticed that the gaps include basic environment statistics such as water and air quality but the situation differs among countries: in Jordan and Palestine, for example, large amounts of data relating to water quality and resources are available. On the other hand, other countries have only very few tables relating to this field. In general there are pressing data gaps in all ESCWA countries, in particular in the following areas:

1. Water quantity statistics including precipitation, water supply, water demand and water distribution.
2. Water quality including drinking water quality, river water quality, lake and marine water quality, sewage and treated water quality.
3. Air quality and air emissions.
4. Waste statistics, quantities generated by source, methods of disposal and composition.
5. Biodiversity and ecosystems health.
6. Environmental accounting.

The persons interviewed in the countries visited mentioned the gaps above. The consultant notes that in some cases the information could be available in some agencies but their source is still unknown, the information is not available in sufficient amounts or is of limited accuracy.

Priorities

The priorities specified by the countries differ depending on their respective needs, past experience and activities as well as institutional and financial resources. In general, the Syrian Arab Republic mentioned water statistics, solid and liquid wastes, and natural resources, Lebanon and Egypt listed water and air statistics as their first priority, Jordan specified water statistics, land cover, waste statistics, environmental accounting, and environmental indicators, and Yemen and Saudi Arabia prioritize household environment statistics, coastal zone and marine water quality as well as water statistics.

Hence, the consultant concludes that a first step in most ESCWA countries (e.g. Lebanon, Egypt, Oman, and the Syrian Arab Republic) would be to initiate the establishment of an environment statistics division/unit, which administers this type of statistics. This should then be followed by the formation of an environment statistics committee consisting of the main agencies dealing with environmental information. This will facilitate the specification of the data needed as well as pertaining data gaps.

The collection of documents, information and available data from different institutions relating to environment statistics in each country is recommended before other steps are taken.

The main themes proposed for the ESCWA region are:

1. Water statistics since the main challenge the countries in the region are facing is an increasing shortage of water. The production of fresh water is very expensive, especially the desalination of seawater. Hence, water statistics are of highest priority in all ESCWA countries. The suggested items to be covered are:
 - i. Water supply by source and cost of water production.
 - ii. Water use by sectors: the water quantity reaching the final user, and the quantity of water distributed from the source. Water quality including the quality of drinking water, sewage water, treated water and marine water.
 - iii. Import and export of water including water inflow and outflow.
 - iv. Water indicators, for example, per capita water consumption.
 - v. Sewage water plants.
2. Solid and liquid wastes, including hazardous waste, e.g. medical and industrial hazardous wastes.
 - i. Quantity of wastes generated by source.
 - ii. Composition of wastes.
 - iii. Methods of disposal.
 - iv. Cost of disposing of wastes and related waste indicators.
3. Air statistics
 - i. Air quality in hot spots.
 - ii. Air emissions: quantities of pollutants emitted by source.
 - iii. Quantity of ozone depleting substances used by type.
4. Land use and land cover
 - i. Distribution of land by current use.
 - ii. Classification of land by agro-climatic zone.

- iii. Changes in land use.
- iv. Land degradation and Soil erosion.
- v. Desertification.
- 5. Environmental and sustainable development indicators.
- 6. Natural resource statistics.

Main difficulties

1. The absence of an environment statistics division in most of the national statistical offices in the ESCWA countries such as Lebanon, Egypt, Oman and Saudi Arabia, which hinders effectiveness and improvement of the work in this field.
2. As a result of the dispersion of environmental information, the aggregation of data and information is time consuming, expensive and often results in incomparable data.
3. Due to the lack of a sufficient number of monitoring stations and other infrastructure problems, the availability of environmental data from their immediate sources is very limited.
4. One of the main constraints is the high cost of conducting environmental surveys and the lack of sufficient funds in the ESCWA countries for these surveys.
5. Limited expertise, in particular in environment statistics and insufficient human resources in national statistical offices for environment statistics.
6. The cooperation between the concerned agencies in the field needs to be improved.
7. Environment statistics can be highly sensitive, which renders the collection of reliable data more difficult.
8. The field of environment statistics as well as manuals and methodological tools used in environment statistics are still evolving and under development and/or not adopted in the ESCWA region. Most of these documents are not available in Arabic.
9. The low salaries in the government sector compared with the private sector are one of the main obstacles for recruiting and retaining skilled staff.
10. Limited financial resources.

Recommendations

1. Legislation and initiation of environmental statistical division

Considering the absence of environment statistics units in most national statistical offices in the ESCWA region and the lack of legislative guidelines to undertake this activity, the national statistical offices are encouraged to emphasize the need for essential adjustments in the statistical law allowing the sustained establishment of an environmental programme with experienced statisticians, environmental specialists and enumerators as well as the long-term allocation of financial resources. A legislative underpinning is considered particularly beneficial in countries with decentralized statistical activities such as Oman.

The time-consuming training of statisticians in environment statistics without legislative support and a designated environment statistics unit may result in a waste of resources without generating the desirable long-term capacity in this area.

2. Cooperation

The restriction of environment statistics to statisticians at the national statistical offices is not desirable and often unfeasible, unless the statisticians also have a background in environmental sciences. It is hence important to establish a system of coordination and cooperation between the NSO and other environmental administrative agencies such as the Ministry of Environment or the Environmental Protection Agency.

It is very important to simplify the exchange of environmental information and harmonize the available data by using the same standards, concepts, and definitions.

3. Manuals and Other Tools

To establish a harmonized system and to acquire comparable data from the ESCWA countries, it is suggested to provide a manual that covers environment statistics, the basic concepts and definitions, methods for data collection, tabulation of environmental data, and the calculation of environmental indicators as well as the application of classifications.

It is suggested to use available material prepared by United Nations agencies, the Blue Plan project, and regional agencies. The adoption of this material to fit into the regional characteristics of ESCWA is important, as is the translation of the available documents into Arabic.

It is furthermore important evaluate the application of modern technology such as GIS in the region. In this regard it is suggested to develop environmental software similar to the Echems Software for environment database, which was developed by the Blue Plan project in Microsoft Access. It is a database software, available in English and French, which can be used by multiple-users and can handle over 3000 variables.

The program could also be used to aggregate data from the countries in the region. But this program cannot be used for data entry or data editing no operations manual has been prepared yet.

Of further benefit would be a pilot compendium of environment statistics, which could serve as an example for the ESCWA countries to produce national compendia. The consultant suggests using the national data compendium model prepared under the Blue Plan project and adjusting it to the particular characteristics of the ESCWA region.

The consultant considers it desirable to provide the ESCWA countries with standard emissions coefficients etc.

4. Training

In order to strengthen the capacities in environment statistics, the training course should include:

1. An introduction to the principles and methods of environment statistics including concepts and definitions, treatment of environmental data etc.
2. The integration and aggregation of environmental data from diverse origins.
3. The methods for tabulating environment statistics.
4. The qualitative analysis of thematic statistics: water, land use, soil degradation, and waste.

5. The use of statistical tools in environment statistics, for example, specific sources of data and how to obtain data from these sources, basic principles for survey design, calculation of population parameters, estimation of coefficients, statistical modeling. (For more details, please see Annex 4 for a lecture prepared by the consultant for a training course in Malta in March 2002).

5. Technical assistance

Due to the varying levels of development of environment statistics in the ESCWA countries, the technical assistance required needs to be tailored to the specific needs of the countries. Long-term technical assistance could hence be organized as follows:

Conduct consultancy missions to those countries, which have already gained experience in environment statistics such as Jordan and Palestine. For these countries it is important to evaluate the current situation and to determine the strengths and weaknesses to further improve the situation. Data dissemination can often be improved in these countries including the methods for data tabulation. It is also recommended to provide training on environmental indicators and the classification of indicators into pressure, state and response indicators.

Provide training in the institutionalization of environment statistics. This suggestion includes expert missions to assist in the initiation stage of the work and to provide on the job training. This form of assistance is suggested for those countries, which recently began working in the area such as Yemen and Egypt as well as those that are planning to start such as Lebanon. The training is suggested to cover the principles of environment statistics. In addition the consultant suggests training on the aggregation of data from different sources for the production of pilot compendia.

Those countries, which already engaged in certain areas but are not yet producing any publications or other tangible outputs such as the Syrian Arab Republic require a consultancy mission that provides them with training on the production of statistical tables from raw data as well as methods for estimation and filling data gaps. To improve their situation, the countries would benefit from intermediate training and the exchange of practical work experiences.

The consultant discussed this point with the responsible persons and they indicated that the language is one of the main constraints in the Syrian Arab Republic, Yemen, and Egypt. It is thus recommended to use Arabic instead of English as the language of instruction.

6. Equipment and other requirements

It is difficult to specify the equipment needed since many ESCWA countries just started or want to start environment statistics. In this view, the consultant suggests to specify the needs for each country after the work has started and depending on a specific request from the country.

It is, however, desirable to provide some material for the following purposes:

1. Software for environment statistics. It is suggested to make use of available software, which could be adopted to serve the entire region.
2. International classifications for the main themes used in environment statistics, e.g. wastes including hazardous wastes and land use classification.

3. International and suggested national standards for the main environmental themes, e.g. on drinking water quality, treated sewage water quality, toxic residuals in food, and air quality. It is suggested to use available information prepared by international agencies such as WHO and FAO in addition to the national standards prepared by some ESCWA countries.

7. Pilot survey

The consultant proposes to conduct an environmental survey in one of the ESCWA countries to provide on-the-job training to the participants attending the workshop. This survey would also provide useful information on the level of experience of the participants and their respective needs as well as a picture of the present situation in the country, which in turn is expected to help improving the manuals and other documents.

8. General

The comprehensive computerization and documentation of information is recommended.

It is suggested to invite the national statistics offices to specify their priorities, which are consistent with their national objectives in order to achieve the goals of environment statistics.

9. For UNSD

The consultant proposes conducting a workshop for environment statistics covering the following main topics:

1. Justification and importance of environment statistics.
2. The importance of environment statistics for decision makers and policy-making.
3. Identification of the main topics relating to environment statistics such as water, air quality waste, etc.
4. Detailed exploration of major topics such as water and air statistics.
5. Specification of data sources and their proper use.
6. Inclusion of some practical exercises to calculate environmental indicators, e.g. water demand, water supply, and air emissions.
7. Presentation of case studies from the initial survey design to releasing final results and conclusions in topics such as water, land use, and waste statistics.

It is suggested to use Arabic wherever possible and to invite two participants from each country, one from the NSO and the other from the Ministry of Environment, to the workshop.

It is recommended to provide fellowship tours for countries that have specialists working in environment statistics to visit the statistical offices in more advanced countries and gain practical experiences. One such candidate country would be Jordan, which already hosted trainees from other countries in 2001 at the DOS and whose Director General is a supporter of this type of arrangement. The target persons for these study tours are the technicians in environment statistics from those countries

that want to start an environment statistics programme. The study tours could also include regional institutions, for example, CEDARE, which also has experience in hosting trainees. The consultant discussed this point with the Executive Director of CEDARE who accepted the idea to host participants from the ESCWA countries.

The study tours should be tailored to the needs and levels of expertise of the participants in order to ensure that technicians are prepared in a way that maximizes the benefit of the training programme. Other criteria to be determined are the length of the training as well as the provision of the supporting documents and training material.

10. For ESCWA

In general the consultant considers it desirable to establish one specialist in environment statistics at the ESCWA office to provide essential expertise and assistance to the ESCWA countries including technical advice, to maintain contacts with specialists at the NSOs, and to act as a general reference person for environment statistics in this region.

11. Candidate Institutions for Fellowship Tours and Other Activities

1. CEDARE: they can provide training in GIS.
2. ACSAD: they have good experience in desertification studies and how to use GIS for this purpose and it could be used for land use and land cover.
3. Department of Statistics (Jordan): they can host trainees on water statistics and study tours and can also provide a case study.
4. Lebanese Environment and Development Observatory (LEDO): they can provide training on database development for sustainable indicators.
5. The Blue Plan project can provide manuals, training documents; classifications and software prepared by Blue Plan for this project, which will be helpful.
6. There are experts in each field of environment statistics and they could be hired to provide training.

PART THREE

A - THE SITUATION IN THE ESCWA COUNTRIES

- 1. The Syrian Arab Republic**
- 2. Lebanon**
- 3. Egypt**
- 4. Jordan**
- 5. Palestine**
- 6. Yemen**
- 7. Saudi Arabia**
- 8. Iraq**
- 9. Kuwait**
- 10. Bahrain**
- 11. The Sultanate of Oman**
- 12. Qatar**
- 13. United Arab Emirates**

B – REGIONAL INSTITUTIONS

- 1. The Center for Environment and Development for the Arab Region and Europe (CEDARE)**
- 2. The Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD)**
- 3. United Nations, Economic and Social Commission for Western Asia (ESCWA)**
- 4. Plan Bleu**

A THE SITUATION IN THE ESCWA COUNTRIES

1. Syria

The consultant visited Syria from 5 to 9 April 2002. The visits in Syria included the Central Bureau of Statistics (CBS), the Ministry of Environment, and The Center for Environment and Development for the Arab Region and Europe (CEDARE). The consultant also met the Director of the Blue Plan project during his mission in Syria.

The consultant met the responsible persons for environmental activities as well as administrative persons in these agencies (see Annex 1 for a complete list). The consultant also attended a meeting in the Ministry of Environment with members from both the CBS and the Ministry of Environment in addition to the Director of the Blue Plan project to discuss how to improve environment statistics in Syria.

Institutional Background and Legislation

In Syria the Central Bureau of Statistics (CBS) has the responsibility to publish and produce statistical data on the environment. Other institutions cannot produce any official statistics without the agreement of CBS. The 1986 statistical law, the articles relating to this law as well as the decree no. 87 reflect this situation. The law includes all type of statistics and the responsibilities of the CBS mentioned in the law include the compilation, evaluation, and dissemination of statistics, which are used in determining the status, changes and trends in economics and social development.

This statistical law is a general law for all types of statistics and is thus also applicable to environment statistics. No special law exists for environment statistics. On the other hand, the Ministry of Environment has established a General Commission for Environmental Affairs (GCEA), which consists of seven units including a statistical division.

The Ministry of Environment and its executive body, the GCEA, have the responsibility for environmental issues and management in the country. The administrative supervision of the Prime Minister was instituted in 1985. The presidential decree N° 11 dated 1991 created the GCEA. The GCEA is well recognised in the overall development structure. The activities relating to environment statistics in this agency are:

- § Creation of a database and a GIS facility as well as the creation of the statistical service: the main objectives of this new service are the collection of data with the help of CBS and other partners.

The law distributes the duties in environment statistic between both the CBS and Ministry of Environment. It is noticed that the law is working well for activities such as agricultural statistics.

It is also noticed that the CBS is the Center that receives the information from other ministries and government agencies, processes and disseminates the data, and publishes the National Statistical Yearbook for each activity. But the CBS has only a limited ability to conduct surveys or to collect data from the field. Usually, the different governorates send their administrative reports to the CBS directly. These data include public activities.

To serve the CBS in the above activities, the other governmental agencies have the responsibility to maintain the registers and prepare progress reports on their own activities. For example, the different directorates of the Ministry of Agriculture collect data relating to agricultural statistics and the treated information is sent to the center, which then provides the CBS with this data. The CBS reviews and finalizes the results and publishes them. The same process supposedly takes place in the Ministry of Environment.

In 1998 the CBS created the Industry and Environment directorate and the Ministry of Environment created a statistical division in 1999. The latter works under the supervision of the General Commission for Environmental Affairs and has a branch in each governorate to collect environmental data and send it to the statistical division in the Ministry of Environment, which provides the CBS with this data. The work is carried out in cooperation between the head of environment statistics in the CBS and the head of the statistical division in the Ministry of Environment. The final results are supposed to be published by CBS.

As a result of this situation, the quality of the data depends on both the CBS and the original data source, which depends to some extent on the enumerator who collected the data. It is thus important to improve the quality of data through training of the enumerators and those employees dealing with statistical data in the different agencies.

Sources of environmental data and statistics

The consultant studied the data available and disseminated in the statistical abstract. He noticed a large amount of raw data scattered across different agencies. The data available in the CBS is computerized but the data available in the Ministry of Environment exists only in hard copy and for local use by the Ministry.

The sources of environmental data listed in the table below are the main sources of data at the current time but many other sources and data may be available but unknown to the consultant, for example, data from sewage companies, the General Organization for Remote Sensing for land use data, the Marine Institute in Lattakia for data on the marine environment, and the Universities for several topics.

Institution	Data	Time
Central Bureau of Statistics.	Population and demographic indicators	Yearly
Ministry of Environment	Air quality (the consultant understands that monitoring stations exist for air quality but the data is available only for local use), biodiversity, land use and marine environment.	Yearly
Ministry of Irrigation.	Length of rivers, flow rates of the most important rivers and springs, lakes area, fresh water resources, fresh water uses, and characteristics of main dams.	Yearly
Ministry of Agriculture.	Land use and forest (the FAO classification was applied, the results published by CBS).	Yearly
Ministry of Housing.	Waste water treatment and quality	Yearly
General Directorate of	Atmospheric phenomena, temperature,	Yearly

Metrology	annual rainfall and precipitation quantity.	
General Establishments for Survey.	Length of borders, height of mountains, altitude of main cities.	Yearly
Governorate of Damascus	Municipal waste generation, hazardous waste	Yearly

As is mentioned above, portions of the information are available only for local use (i.e. this part is available only in hard copy and cannot be used by other authorities except the Ministry of Environment) and are difficult to evaluate. Therefore, the consultant depends on the information he received from the representatives of the respective agency.

Human resources

Only one employee is dealing with environment statistics in addition to his other responsibilities in industrial statistics. He is also the National Coordinator for Environment Statistics in the Blue Plan project and has a background in economics. This means that his knowledge on environmental issues is still limited. The consultant notices that unless the CBS recruits additional specialists it will be difficult to significantly improve the current situation.

On the other hand, the situation in the Ministry of Environment is not very different from that in the CBS: they have technical employees in the environmental fields, including the monitoring system.

The statistical division at the Ministry of Environment also exists with branches in each governorate but there are not yet active.

The consultant discussed the responsibilities and tasks of both the CBS and the Ministry of Environment and it is suggested to provide the CBS with those environmental questions needed by the Ministry of Environment and to include these questions in the questionnaires used by the CBS. This type of cooperation between the CBS and other governmental agencies like Ministry of Agriculture has been shown to work.

Activities in environment statistics

As mentioned above no environmental survey is currently conducted in Syria. The data instead collected from different sources, compiled and aggregated when there is a specific demand for certain data from national or international agencies.

Classifications, methodologies, standards and coding systems

The Ministry of Environment has developed national standards for drinking water quality, industrial sewage water quality, and air quality. The classifications used depend on these standards. It is clear that the standards mentioned do not cover the main environmental activities such as hazardous waste.

International classifications were applied in several fields, for example in land use statistics (FAO), and waste statistics (Basel Convention) but due to the limited number of disseminated data it is difficult to judge on the current situation.

Publications and databases

Until now no special environmental publication has been released in Syria, but some environmental information is published in the Statistical Abstract:

Title	Period
area of land by soil group	2000
principal mountains, peaks and their altitude above sea level	2000
altitude of main cities and summer resorts above sea level and their ordinates	Not mentioned
length of rivers within the Syrian Arab Republic and their flow rates	2000
area of principal lakes	Not mentioned
flow rates of main springs	1996 – 2000
main dams (storage capacity, surface area of basin, maximum height and length for each dam).	2000
average of maximum and minimum temperature	2000
atmospheric pressure, hours of sun shine, average daily evaporation	2000
annual precipitation in mm	1996 - 2000
Precipitation and weather phenomena	2000

In addition, information relating to the environment includes demographic indicators, transportation and tourism. The CBS also collected data relevant for the Blue Plan questionnaire, which consists of three main parts: water, land, and wastes. Two parts have already been completed and the waste statistics part is now under progress.

The National Coordinator and other employees in his directorate have collected the data for the Blue Plan questionnaire from many sources. Unfortunately, the employees except the National Coordinator were transferred to other government agencies after they received training on environment statistics during the last two years. The Blue Plan Director informed the consultant that this happens regularly in most Arab countries.

The Ministry of Environment produces a Status of Environment Report in Syria for local use only and published a summary of this report. The Ministry also has a database for water and air quality but it is available in hard copy only. In addition, no time series data are available.

The comments made on the environmental data are:

1. There are numerous sources for the same information, but the data are not comparable.
2. The methodology used in estimation is not clear, some data are available for a part of the country, e.g. urban areas.
3. The reliability of data in some case is weak and are thus not used.
4. There is a delay in releasing the results.

Data gaps and requirements to improve environment statistics

The main data gaps are found in air pollutant concentrations, air quality, water statistics including supply and demand, fresh water quality, marine water quality, solid and liquid wastes, and natural resources data in general. These data are available only for some areas and not available at the national level. Monitoring stations are limited and the data are not computerized.

The requirements to improve environment statistics in Syria

Referring to the discussion above and according to a study undertaken by Mr. Khordagui the needs are specified as follows:

1. Recruiting employees with background in different fields of environmental sciences by the CBS to work as permanent staff in environment statistics.
2. Building a system of cooperation between the CBS and the Ministry of Environment.
3. Establishing a statistical division in the Ministry of Environment.
4. Providing training to CBS and Ministry of Environment employees. It is suggested to start from the principles of environment statistics and to cover the major area of water statistics. The training should include a case study from the region and provide a manual. The language used for this training should be Arabic.
5. It is suggested to conduct a regional project in the countries including, for example, Syria, Jordan, Iraq, and Saudi Arabia,
6. Other material such as software and information technology is required.

Main difficulties

The main difficulties faced in environment statistics are:

1. As a result of scattered information relating to many areas in this field and dispersion of information across different institutions, the aggregation of data and information is time consuming, expensive and may result in incomparable data.
2. Sometimes the data are not available from its source, e.g. data from the Ministry of Environment.
3. Due to the shortage of funds to conduct environmental survey, the work requires financial and technical assistance.

Recommendations

To improve environment statistics, it is recommended to provide training to both CBS and Ministry of Environment employees. The training should cover different fields of environment statistics, concentrate on capacity building, foster stability in working conditions, and increase the cooperation between the region countries in this field.

2. Lebanon

The consultant visited Lebanon from 2 to 5 April 2002. The visits in Lebanon covered the ESCWA Office, the Central Administration of Statistics (CAS), and the Ministry of Environment. The consultant first met Mr. Ahmed Hussein, Mr. Mohamed G. Al-Badrawy, and Mr. Hosny K. Khordagui. The purpose of the mission was communicated and the best method for implementing the work was discussed. The consultant discussed the situation of environment statistics in the ESCWA countries, which was followed by a meeting with the Director General of CAS and the responsible person for environment statistics. He then visited the Ministry of Environment and met the director of the Lebanese Environment and Development Observatory (LEDO) and other employees in LEDO.

Institutional Background and Legislation

The Central Administration of Statistics (CAS) currently does not include in its structure a unit/section responsible for environment statistics. However, the preparation of a decree especially for environment statistics is under way as Ms. Maral Totalian said and this year the statistical law was adjusted to include environment statistics in its activities. This legal process is time consuming, as it requires the agreement of the Council of Ministers and other legislative agencies.

Thus, until now the CAS does not have an environment statistics division but one employee is taking care of logistic activities relating to this field.

The general administrative organization of the Lebanese State, according to law III of 16/6/1959 and decree 2894 of 16/12/1959, requires each ministry to collect the statistics relevant for its activities and communicate them to the Central Administration of Statistics (various agencies deal with statistical data including the private sector, i.e. other agencies collect data. However, in the case of the environmental field the consultant understands that only LEDO is involved as will be explained later).

On the other hand, the Ministry of Environment hosts the Lebanese Environment and Development Observatory (LEDO) since 1999. The main objectives of this project are to provide and improve environmental data. The project was funded by the European Union. LEDO started the coordination with national partners from the public, private, academic sectors, research institutions and non- governmental organizations.

Although LEDO has the responsibility to do the work in the field of environment and development indicators, this is not included in the decree 5591 of 30/8/1994, which is related to the tasks of the Ministry of Environment, regulating that the Ministry can only produce the statistics for its own purposes.

In general the legislative situation in Lebanon needs to be improved to include environment statistics activities and to clearly specify the relations between the various government agencies.

Sources of environment statistics

The sources of data used to derive indicators are mentioned in detail in the publication *Environment and Development Indicators for Lebanon*. The indicator topics covered are:

Institution	Indicators
Central Administration of statistics.	Demography, standard of living, services
Ministry of Energy and Water.	Consumption/production patters, energy and water (access to water network and to safe drinking water, total water demand by sector, annual energy consumption per inhabitant, agriculture water demand, annual energy consumption, share of production of renewable energy resource etc.)
Ministry of Agriculture.	Agricultural statistics such as use of pesticides, use of fertilizers, area irrigated with treated/untreated sewage, forest area, arable land, area effected by desertification, burned forest area per year etc.
Ministry of Interior and Municipalities.	Industry, transport, wastes (generation of solid wastes, distribution, area and activity of quarries, number of passenger cars per 100 inhabitants, stocks of motor vehicles by age and fuel type etc).
Ministry of Environment.	Destination of municipal waste, composition of municipal waste, protected coastal area, public expenditure on environmental protection as % of GDP, cost of management of municipal solid waste, total expenditures on protected areas, expenditure on wastewater management by type.

In addition to the above main topics, details on environmental indicators such as unit, type (state, pressure or response), timeframe and concerned institutions are given in the table below. However, the periodicity of each indicator is not mentioned

LEDO can calculate about two thirds of the suggested indicators and it is generally a document of good quality that could be used for training purposes since it mentions the methodology for calculating each indicator.

Indicator	Concerned institutions
Air Emissions of green house gases (GHG) Sulfur oxides, nitrogen oxides, concentration of low level ozone, and consumption of ozone depleting substances, global solar UV index.	Ministry of Environment

<p>Water</p> <p>Seawater quality (quantity per volume and quantity classes) (data not available). Industrial releases into water (tons per day) (data not available).</p> <p>Water global quantity indexes (mg per liter) (data not available).</p> <p>Ground water quality index (data not available).</p> <p>Surface water quality index (data not available).</p> <p>Share of collected and treated wastewater by public sewerage system, amount of wastewater treated by type (available), area irrigated with treated/untreated water (data not available).</p>	<p>Ministry of Environment</p> <p>Ministry of Environment</p> <p>Ministry of energy and water</p> <p>Ministry of public health</p> <p>National council for scientific research</p> <p>Water Authority</p>
<p>Land/soil</p> <p>Forest area, coastal land cover, artificial coastline/total coastline, arable land, land use change, arable land change, wet land area, area effected by desertification, open dump area.</p>	<p>Ministry of Agriculture</p> <p>National center for remote sensing</p> <p>Ministry of environment</p> <p>Ministry of interior and Municipalities</p>
<p>Biodiversity</p> <p>Forest protection rate (%) (data not available). Protected coastal area, threatened species, burnt forest area per year.</p>	<p>Ministry of Agriculture</p> <p>Ministry of Environment</p> <p>Civil Defense</p>
<p>Sustainable development activities and policies</p> <p>Wastewater treatment rate, number of wastewater treatment plants, number of fixed air/water/coastal water-monitoring stations).</p>	<p>Ministry of Environment</p> <p>National council for scientific Research</p>
<p>Policies and strategies</p> <p>Public expenditure on environmental protection (% of GDP), cost of management of municipal solid waste, total expenditures on protected areas, expenditure on wastewater management by type.</p>	<p>Ministry of Environment</p> <p>Ministry of interior and Municipalities.</p>

In addition, international data sources such as FAO are mentioned as a source for agricultural indicators such as arable land, land changes and agricultural water demand.

Human resources

As mentioned above the CAS has only one person, specializing in information technology, who takes care of environment statistics, whereas the Ministry of Environment has a team, which deals with GIS and environmental indicators. The expertise of the employee in IT and database development and management is good and they also have good experience in using GIS. On the other hand, environment statistics has not been the main concern until now. It is suggested to pass a law for this type of statistics that is more flexible so as to give a chance to this institution to take

part in the work: As was mentioned by the Director General of CAS, the CAS wants to engage in collaboration with the Ministry of Environment.

The consultant notices that it might be easier to initiate an environment statistics programme in and through LEDO after providing a short training and some technical support. LEDO also should continue working as a national institution after the European Union has completed its work and even though foreign financing will cease, the government granted continued support. However, the director of the Blue Plan project has doubts on the continuity of the work once foreign support has stopped. So the consultant suggests encouraging the government to support this activity.

Activities in environment statistics

The activities in the CAS cover the minimal requirements for completing the Blue Plan questionnaire. This questionnaire contains three main parts: water, land, and waste. The consultant understands that the work is still in progress in Lebanon and the person hired through the Blue Plan project is in the process of completing it. Thus, the limited activity and involvement of CAS becomes apparent. CAS also provides some statistical data, mainly demographic data, to the Ministry of Environment.

On the other hand, LEDO, which works under the umbrella of the Ministry of Environment, collects and compiles data from different sources to derive environmental indicators and is building a database for environmental data by using GIS tools.

Classifications, methodologies, standards and coding systems

The CAS is not active in this field except for filling out the Blue Plan questionnaire. The questionnaire applies the classifications used in the European Union.

LEDO applies international classifications such as those by FAO for agriculture and land indicators, European classifications (Blue Plan), and WHO Guidelines for air quality. Furthermore, the indicators are classified by type, using international classifications (the indicators are divided into three types: pressure, state and response indicators and 90 indicators were chosen from 130 indicators identified by the Mediterranean Commission on Sustainable Development (MCSD)). Data collection is conducted using secondary data from different sources and the methodology of calculating each indicator is described.

It is noticed that these statistical activities are still at the early stage and hence need time and further development in order to improve.

Publications and databases

The CAS so far has not produced any publication relating to environment statistics but LEDO produced one publication called *Environment and Development Indicators for Lebanon*, (the publication date is not mentioned but it appears to be 2000).

This publication contains a specification of indicators derived in the Blue Plan project and the source of the data for each indicator. A total of 90 indicators are defined into different types of indicators and LEDO succeeded in calculating most (60) of the suggested 90 indicators. The report is available under the address www.moe.gov.lb/ledo/index.htm. The page is updated whenever new data become available but due to lack of data not all indicators are currently calculated. In addition,

the publication is also available on CD-Rom. This work should be continued and used to build a database based on which an environmental compendium could be published using the available data.

Data gaps and priorities

The main data gaps were found in the following areas:

1. Water quality including river and drinking water.
2. Air quality and air emissions.
3. Industrial sewage water quality especially the sewage water disposed of into rivers.

The suggested priorities are:

1. Development of an environmental monitoring system at the local level (decentralization of the work).
2. The data should cover the whole country (comprehensiveness).
3. The main issues covered in the project should cover water statistics and air statistics.

The requirements to improve environment statistics in Lebanon

1. Provide training on environment statistics starting with concepts and methods of data collection. The training suggested includes case studies, the design of questionnaires, and the provision of a manual, which includes a description of methods for data collection.
2. Training on data cleaning and data processing
3. It needs financial and technical support to collect environmental data.
4. The existing good relations between CAS and the Ministry of Environment could be further improved through teamwork. In fact, in environment statistics a close cooperation between specialists in environmental sciences and statisticians is always required.

It is clear that when the work is at this early stage, it is difficult to specify the needs in terms of equipment etc. and therefore no recommendations are made as to this regard.

Main difficulties

1. Shortage of specialists in the CAS and the Ministry of Environment in environment statistics.
2. Environment statistics is a new subject in Lebanon and therefore the existing experience in this field is almost negligible.
3. There is a shortage of data due to the lack of monitoring and other data collection activities in the environmental fields.
4. There exists a shortage of equipment and other facilities for observatory purposes.
5. Currently, there is no information system available in Lebanon for environment statistics.

Recommendations

Due to the time that is needed to adjust the statistical law governing the CAS and the ability of LEDO to carry out some statistical work in this field, it is recommended to extend the work facilitating the cooperation between the two institutions and by providing training for both institutions while concentrating on capacity building.

3. Egypt

The consultant visited Egypt from 19 to 22 April, covering the Central Agency for Public Mobilization and Statistics (CAPMAS). The consultant visited CAPMAS again in March together with the Egyptian Environmental Affairs Agency (EEAA) and the Center for Environment and Development for Arab Region and Europe (CEDARE). The consultant discussed the situation of environment statistics and future programmes to improve these activities.

Institutional Background and Legislation

The Central Agency for Public Mobilization and Statistics (CAPMAS) is the agency responsible to conduct surveys, processing the data, and publishing numerous types of statistics based on sample surveys or censuses.

This agency supposedly has full authority as declared in the presidential decree no. 1946. In reference to the statistical law, all other bodies should obtain permission from CAPMAS prior to any statistical work.

The agency has a sufficient number of employees to carry out its duties in an efficient way but until now environment statistics does not exist. The initiation of a new directorate for environment statistics is scheduled to take place during 2002, after the official agreement for this process has been given. This new activity then needs to recruit employees. The exact plan how to accomplish this project is still not entirely clear and no time schedule has been set for the completion of the different stages. Since the allocation of funds needs the agreement from the Ministry of Finance, a further delay in time is anticipated.

On the other hand, the Egyptian Environmental Affairs Agency (EEAA) is the main body responsible for environmental management in Egypt. It was established in 1982 as an environmental affairs committee and became a full authority by decision of the cabinet of ministers in 1985. As a result of the issuance of the Environmental Law no. 4/1994 in 1995, the EEAA was reorganized and strengthened and its duties and obligations were set forth. The EEAA is mainly a coordinating body, i.e. its executive powers are few and limited. Most of the functions have required it to interact with other organizations and ministries in order to perform the work. A chairman of a board of directors who is at the level of first deputy minister manages the EEAA.

Law 4/94 defined the duties of the EEAA in article 5. Following are the information-related duties of the EEAA as outlined by the article:

1. Participation in the preparation and execution of the national environmental monitoring program and making use of its data.
2. In cooperation with information centers in other bodies, gathering national and international data pertaining to the state of the environment and the changes that happen to it. This data should be evaluated and used in environmental management and planning, and published.
3. Preparing periodic reports on the main environmental indicators.

The law of environment requires the EEAA to submit an annual state of the Environment Report to the President of the Republic and Cabinet of Ministers with a copy to be deposited in the Egyptian People's Assembly (Parliament). This report

would require a large number of environment statistics. This law requires all institutions that are concerned and subject to it to keep environmental records containing statistics on their discharges of various pollutants. Governmental and private institutions, which produce polluted materials, should maintain logbooks containing statistics on their discharges of various pollutants. As these records are quite detailed, they are expected to generate a huge amount of statistics.

In order to undertake the environmental information functions as mandated by the law, the reorganized EEAA has established an Environmental Information Sector, which is presided over by a deputy minister. The sector is mandated to undertake all the environmental information functions for the EEAA; In order to enable the sector to work effectively, a major project is underway to create an environmental information system, but until now there is no environment statistics output from EEAA nor CAPMAS.

The consultant understands that Dr. Ala'a Alserhan who works in the Environmental Center at Ian Shames University is at the mean time preparing an environmental status report for Egypt.

Sources of environmental data and statistics

Due to the fact that no formal environment statistics programme exists in Egypt and because large amounts of data are scattered between national and regional institutions, it is difficult to specify the available data and its sources. The consultant uses the available documents for his assessment, which is not yet published; to specify the main data sources and the contributions of each source are mentioned in the table below.

Institution	Data	Time
Central Agency for Public Mobilization and Statistics. (CAPMAS).	Population and urbanization.	From population census data each 10 years.
Egyptian Environmental Affairs Agency (EEAA)	Solid waste generation and solid waste composition, Quantity of agriculture waste Quantity of industrial waste	1996 1996 1998
Ministry of Irrigation and Water Resources.	Length of coastline and Nile river Ground water resources Surface water resources Water abstraction Water consumption by sector.	Yearly Yearly 1997,1998 1993
Ministry of Agriculture.	Land use Quantity of treated sewage water used for irrigation of artificial forest	1990,1995 2000
Environmental Monitoring Network and Ministry of Health and Population.	Chemical analysis of Nile water Trends in annual means of air pollutants concentration	1999 Yearly
Municipal councils	Total area of pools and swamps	Yearly

	and filled up area of pools.	
FAO	Precipitation	1985
General Dep. Of Traffic	Trends in stocks of motor vehicles	1997, 1998
National Research center	Industrial wastes, which are causing pollution of the Nile river	2001 study

Human resources

CAPMAS employs approximately 6000 people but unfortunately only one employee is allocated to carry out work in environment statistics in addition to his other duties as a technical affairs officer. The employee is a demographer and he is the national coordinator for the Blue Plan project.

The EEAA has no statistician but a technician in environmental science including information systems. In order to improve environment statistics in Egypt it is first of all necessary to initiate the establishment of an environment statistics division at CAPMAS and to specify its relationships with other institutions such as EEAA.

After that the recruitment of a sufficient number of specialists in different fields such as environmental science, soil science, agriculture, biology and chemical in addition to the statistician is required, which should be followed by a training programme for the employees (from both CAPMAS and EEAA) in statistical methodology and environment statistics.

It is also recommended to establish a statistical division in institutions such as the Ministry of Environment in order to deal with the statistical data arising in the institution and to provide CAPMAS with useful data.

Publications and databases

The consultant notices that neither a special publication nor database exist in CAPMAS. The only output available is a draft of a few tables prepared by the national coordinator of the Blue Plan project. These tables are available in addition to the information used to complete the Blue Plan questionnaire.

But there is scattered information available in many governmental and other agencies, which could be utilized for the compilation of some environment statistics. It should also be mentioned that there are some tables relating to environment statistics such as meteorological data, geographical data, and demographic data.

The EEAA (Egyptian Environmental Affairs Agency) has established an information system project called EEIS. Both Canadian International Development Agency (CIDA) and the Danish International Development Agency (DANIDA) supported the execution of this project.

The EEIS project covers two main topics: i) water resources and water pollution, ii) air pollution. The data will be acquired from different institutions using a computer network to establish between the project center and the agency under concern.

At the time being, the GIS unit has been established and a pilot study for environmental geographic information system in Greater Cairo produced. The center also has relations with other institutions collecting environmental information but the available statistics at the center are still limited.

Activities in environment statistics

No environmental survey has yet been carried out by CAPMAS but it is planned to conduct a sample survey on waste statistics in 2002, which will cover only one governorate.

Also, CAPMAS is considering adding one question relating to the environment to the questionnaire used for other surveys by CAMPAS, for example, household surveys and economic enterprises surveys. This is a first step but not sufficient to meet the demand for environment statistics.

It is therefore suggested to use other sources of data, for example, secondary data from governmental and other agencies and to conduct surveys on core environmental topics such as water use and wastewater treatment.

The EEAA with the help of CIDA conducted a pilot study for an environmental geographic information system in the Greater Cairo area with the aim to provide the urban planners and decision makers with reliable information.

In addition to the study completed by the National Research Center in 2001 on industrial waste that causes pollution to the river Nile other studies have been carried out by national and international agencies but are not documented in a central place accessible to the data users. It is therefore important to find a way to document all environmental studies and to build database for this purpose.

Classifications, methodologies, standards and coding systems

Due to the limited activities in the area of environment statistics at CAMPAS, it is noticed that neither statistical methodology nor a coding system are currently used, except in part to fill out the questionnaire of the Blue Plan project, which is a temporary project and mainly done with the help of a Blue Plan expert who takes part in the data collection from different institutions and data tabulation work.

EEAA has access to international standards and the agency has the authority to enact national standards for the environment and acceptable levels of pollution.

The methodology used for data collection is gathering data available from different institutions and from some research studies and monitoring stations but no field survey is conducted for this purpose.

Publications and databases

As mentioned above many institutions deal with environmental data but the programmes of these institutions are not connected with each other. Rather, each institution tries to establish its own environmental database and works independently. CAPMAS produces a large number of annual reports in different fields of statistics, for example, in economic statistics, agriculture, demographic statistics, and mining and petroleum. However, no publication exists for environment statistics. The existing publications could be used as secondary sources of data to produce some parts of environment statistics.

Data requirements to improve environment statistics

In general it is rather difficult to decide whether there are data gaps when no statistical data published by CAPMAS and only scattered data are available in

different areas, which need to be aggregated and tabulated. The huge volume of data that is supposedly available depends on the EEAA Law but is not clearly determined. The consultant notices that there is a lack of data in the main topics water, air, land, and waste. The responsible person in CAPMAS specified these areas as the main field of priority in order to fill the existing gaps:

1. Water statistics including quantity and quality.
2. Air quality.
3. Toxic residuals in food and food safety
4. Public health and epidemiological data on disease rates attributable to pollution

Although these are the main areas with data gaps, some data such as land use data exist in Egypt. The most important step is thus to establish a division, which collects the available information from different sources and can then specify the data gaps in more detail.

Requirements to improve environment statistics in Egypt

1. It is suggested to create a committee for environment statistics.
2. Provide training to employees in both CAMPAS and EEAA as both institutions work in this field. The training should start with the concepts and definitions as well as provide a practical introduction to environment statistics in addition to the statistical methodology needed to produce environment statistics. The short mission of foreign expert would also contribute to achieve this objective.
3. Prepare manuals that contain the most widely used classifications and methodologies for environment statistics.
4. Provide technical and financial support to improve and sustain the activities.

Main difficulties

1. Environmental data are not available from its source, e.g. EEAA.
2. The shortage of qualified persons and of equipment for environment statistics.
3. The cooperation between the agencies working in environment statistics and on environmental issues needs to improve.
4. The lack of sufficient information due to the limited number of monitoring stations.
5. The lack of an institutionalized programme on environmental issues and the prioritization of the work in this area.

Recommendations

In addition to the suggestions above it is recommended to initiate a statistical division in CAPMAS and to deposit sufficient human and financial resources to develop and sustain an environment statistics programme in the division. It is also recommended to recruit qualified personnel and to provide staff with sufficient training to handle their tasks.

Also it is recommended to invite the EEAA to take a share of the responsibilities.

The creation of committee for environment statistics is also recommended.

4. Jordan

Institutional Background and Legislation

Based on the statistical law number 24 in 1950 and its amendments, the department of statistics (DOS) in Jordan is the responsible agency that conducts and publishes all types of statistics, and any other institution cannot engage in this type of work without the prior agreement from DOS.

The government requested in 1994 that the DOS initiate a new unit for environment statistics. Since then this unit has become a section and it has the same rights as any other statistical section. The section conducts its activities under the umbrella of statistical law.

There are other agencies that deal with environmental information and environment statistics such as the National Information Center. This Center hosts the focal point for the environmental information system, which includes environment statistics, and also hosts the environmental information committee, which consists of the main agencies producing environmental data.

All of the relevant Ministries, e.g. the Ministry of Water and Irrigation and the Ministry of Health, have an environment division, which also maintains a database for their main activities. This way the DOS is continuously provided with large quantities of data, which could be used to produce environment statistics.

Sources of environmental data and statistics

The main sources of data are:

1. Governmental agencies: Ministry of Water and Irrigation, Ministry of Agriculture and Ministry of Health.
2. The data are collected through questionnaires, which are attached to other surveys such as economic surveys for industrial activities where the environment questionnaire contains questions about water use, sewage water disposal, quantity of waste produced and the methods of energy generation and consumption by type.
3. The surveys are conducted by the environmental section; some data not available from any source and therefore the environment statistical section designs and conducts the survey to collect the necessary data. An example for this type of survey is the survey on artesian wells and the Medical hazardous waste survey. These types of surveys are comprehensive, special solely for the production of environment statistics.

The table below shows some data collected in the environment statistics section and their sources. All data are published on an annual base.

Institution	Data
Meteorological Department	Amount of Annual Rainfall by Station, Annual Temperatures (Lowest, Highest, Mean) (C°) by Station,
Ministry of Agriculture Laboratory of Residual Pesticides	Local and imported food samples analyzed in the laboratory, Number of local and imported samples that contain acceptable and non-acceptable pesticides

	residuals.
Ministry of Health: Environmental Health.	The General Monthly Rate of TSP, Pb, Relative Humidity and Wind Speed in Downtown & Shmeisani Stations, Monthly Distribution of The General Average for The Total Suspended Particles TSP) and Lead Concentration (Pb) in Air of Down Town, Shmesani, Abu-Nsair and Marka Stations, Detailed and Specialized Results of Microbial and Parasites Tests for Treated Water by Treatment plant, Status of Cleaning Plants by Design and Operating Capacities to Hydraulic and Organic Load in Jordan, Results of Chemical Tests from Out Door of Sewage Water by Treatment Plant, Results of Chemical & Physical Analysis for Drinking Water in Jordan,
Ministry of Agriculture: Directorate of Forestation And Range	Distribution Of Forests Area By Type And Tenure (this work was done with the help of USAID using the FAO Classification and the scientific name for each plant). Number of Forests Fires, Number of Damaged Trees and Area Damaged in Donum (.1 hectare), Area of Reforested, Replanted and Length of Planted Roads.
Water Authority	Comparison of Surface Water Budget 1998/ 1999 Season with Long-Term Average 1937-1999
Annual Report of National Electric Power Company	Distribution of Quantity & Percentage of Electrical Energy (GWh) by Consumption Sector 1993-1999
Report of Ministry of Energy and Natural Resources.	Production of Potash (Metric Ton) and Distribution (Domestic and Export).
Annual Report of the Jordanian Phosphate Mining Company	Geological Reservation of Raw Phosphate and Oil Shale in Jordan, Produced Dried Phosphate (Thousand Ton) by Mine
Ministry of Agriculture	Quantity of Imported, Locally Produced and Exports of Recorded Pesticides by Kind (L - Kg), Quantity of Imported, Locally Produced and Exported Pesticides by Group (L - Kg).
Department of Statistics	Quantity of Solid & Liquid Wastes in Medical Services and Industrial Sector by Category and Method of Disposal (the WHO classification was applied). Quantity of water used and Sewage Water by Economic Activity for Services Sector and Industrial Sector, Quantity of Solid Wastes Resulted From Services Sector Distributed by Method of Disposing of Solid Wastes and Economic Activity.
The Jordan Cement Factories.	Produced Cement and Klencer (Ton) by Factory
National Cancer Registry	Number of cancer cases by site, gender, governorate.
Ministry of health-disease control directorate	Number of Meningococcal Meningitis, Typhoid, Paratyphoid, measles, German Measles, Mumps, Brucellosis, pulmonary TB, Cutaneous leishmaniasis, diarrhea, and

	no. Of infection disease
Traffic Department	Number of vehicles
Royal Society For The Conservation Of Nature.	Number of wild and marine organisms by kind

Human resources

The Environment statistics Section at DOS employs six staff members with training in different scientific fields such as water science, geology, chemistry, biology, and other agricultural fields.

At the beginning of the work, DOS hired only temporary employees and then the DOS recruited staff during 2001. That means that the new employees need training and time is required to substitute the temporary employees who have built up a lot of experience during last few years.

Other agencies and governmental bodies such as the Ministry of Municipality and Environment and the Ministry of Health do not have statisticians but instead employ technical experts in environmental science. Therefore, a close cooperation between DOS and the Ministries is essential.

Furthermore, training of the staff of the Ministries in the basic concepts and principles of environment statistics is recommended.

Activities in environment statistics

The DOS adopted the following methods for data collection:

1. Collects the available data from different governmental agencies, e.g. the Ministry of Water and Irrigation. These data are then classified by subject, processed, and used to produce useful and comparable statistics. The DOS also collects some raw data and laboratory sheet data, which are tabulated at DOS.
2. Data are also collected by adding a page to surveys already conducted by DOS, e.g. economic enterprise surveys. The page added to this survey includes questions on water consumption, sewage water production and method of disposal, quantity of solid waste produced and method of disposal.
3. The environmental section conducts a survey on hazardous waste that covers the chemical manufacturers and health services activities generating hazardous waste. This survey is carried out annually since 1996 and it covers all enterprises except the clinics and small enterprises, which are covered through sampling.

Another survey that was conducted for two years is a survey on the use of water from artesian wells to provide data on the quantity of water pumped and to calculate the average consumption of water for each type of crop and for other uses of water.

These three sources of data were used to provide information on a low cost basis but there are many problems such as a lack of continuity in data availability as well as the format and units of measurement used in the data collection.

With respect to questionnaires attached to other surveys the problem of non-sampling error is eminent because administrative persons in each enterprise usually fill out the main questionnaire, whereas the environmental questions require a

technical expert. Thus, the DOS has decided to apply the environmental surveys independently starting in 2002.

The third method creates some problems such as an increase in non-response due to the repeated visits of enterprises every year.

The DOS also hosts trainees in environment statistics from different countries as part of the Blue Plan project and the Blue Plan invites the trainers from DOS to take part in training courses in environment statistics.

Classifications, methodologies, standards and coding systems

The DOS uses international classifications such as ISIC for economic activities, CPC for commodities, and FAO for land use. The methodologies applied by DOS were already mentioned above, that is the combination of data collected from secondary sources with those collected through field survey.

The Jordan Institution for Standards and Methodology ([the it is web site is www.jism.gov.jo](http://www.jism.gov.jo)) is the responsible agency to produce standards for all commodities in Jordan including water quality and food and other standards relevant for the environment. The standards are brought before the standard committee, which has a special committee for each field. The standards set forth for environment statistics are used. In some case where the Jordanian standard is not available, international standards are applied.

For the coding system of chemical hazardous wastes the DOS adopted a classification using ISIC and documents on hazardous waste available from the Basel Convention on the Transboundary Movement of Hazardous Wastes.

Data collection estimation compilation methods applied in data collection

The data are collected from governmental agencies, other institutions and from annual reports and surveys. The data are collected in different formats and types such as:

1. Laboratory data sheet, which are tabulated and from which the results are extracted, e.g. drinking water quality.
2. Annual reports such as forest reports. The data aggregated from the available information in these reports.
3. Monthly reports like pesticide residual.
4. Some information is collected by questionnaire attached to the economic enterprises survey.
5. The data also collected through special questionnaires such as the hazardous waste survey.

Some indicators are calculated from the available information in different reports.

Frequency of data production

Some data are collected on a monthly basis, for example, meteorological data and drinking water quality whereas other data are collected yearly. In general all data are published yearly.

Publications and databases

The DOS produces an annual environment statistics report since 1995. The most current report was published in 2000 and contains about 15 main topics, among which are natural condition, population indicators, economic indicators, pesticide residuals, agricultural indicators, air quality, biodiversity, water statistics, energy and minerals, and solid and liquid wastes including hazardous waste.

In addition the DOS conducted a survey called urban agriculture, e.g. small scale farming, agricultural production in gardens etc., which covered the indoor environment and the demographic characteristics of households. It included some opinions of families on the environmental situation.

The data relating to environment statistics available on the Internet website of the DOS under www.dos.gov.jo. Most of the annual report tables can be found on this page. The database of environment statistics is also available from the Internet site of the National Information Center under www.nic.gov.jo. This site has a focal point for environmental information and it has links to the main sources of environmental information in Jordan.

Frequency, characterization of databases, compatibility

Despite the relative early start of the environmental protection activities in Jordan, environment statistics still has many data gaps and some fields are not covered yet. The main categories with a lack of data are:

1. Municipal waste, the available data only cover the capital Amman.
2. Land cover, land use, and change of land use.
3. Water outflow, water inflow and water quality in rivers and the sea.
4. Desertification.
5. Biodiversity it is available only for some local areas.
6. Agriculture waste, and waste from other economic activities, which are not yet covered.
7. Air quality is monitored only at very few stations and air emissions should also be calculated for the main pollutants.
8. Environmental accounting including environmental expenditures. This is the main gap of environment statistics but due to the limited availability of technical and financial resources it is difficult to build expertise in this area in the short-term.

Hence the priorities specified by the decision makers are as follows and they depend on the demands from Agenda 21 and sustainable development indicators:

1. To cover water statistics in more detail, e.g. water import and irrigation and the quality of treated water.
2. Land cover and a more detailed survey on land use and changes in land use.
3. Improvement of the work on waste statistics, which includes municipal waste, is required.
4. Initiation of a GIS database including the position of main point sources such as chemical manufactories and sewage water treatment plants.

5. It is very important to start environmental accounting to meet the demand of national accounting in DOS, the SNA 1993 (System of National Account 1993) includes a part for environmental accounting.
6. It is also suggested to conduct some data analysis at least a descriptive analysis for the main environmental topics.
7. Improve the environmental indicators.

Main difficulties

1. Environment statistics is more sensitive than any other type of statistics and it is thus difficult to collect reliable data from the field.
2. Environment statistics is more expensive than most other types of statistics.
3. Environment statistics is a complex field and covers all human activities. It is therefore difficult to meet the demand for data or to specify the priorities.
4. The manuals and tools used for this type of statistics are still incomplete and not adapted to the characteristics of the ESCWA region.
5. This type of statistics needs experience and expertise in many fields, e.g. agriculture and statistics.

Recommendations

1. It is recommended to improve the environment statistics system through the creation of a committee and to foster teamwork including NGOs that are active in this field.
2. It is recommended to build a complete environmental statistical system including manuals, classifications, and guidelines for standardization, methodology and case studies in ESCWA region.
3. The financial support for this type of statistics like other type of statistics is very important because it is new subject and many points need to be clarified.
4. The cooperation of the countries in the region is required in order to transfer the experiences and knowledge from one country to another.

The activities in Jordan with respect to environment statistics are rather advanced but still a lot of work remains to be completed. Many data gaps need to be filled and an improvement in data quality is also required. Also, in some areas the work has not yet begun and should be initiated.

5. Palestine

Institutional Background and Legislation

Based on the statistical law no 5 approved in 2000 the main function of the Palestinian Central Bureau of Statistics (PCBS) is to provide impartial statistics on all fields of statistics including environment statistics.

The PCBS has one directorate called the Area Statistics Directorate (ASD) whose main duty is to produce, compile and disseminate reliable statistics related to land and activities taking place on land which mainly relate to environment statistics. The ASD has also established links with other directorates.

The main areas covered by the ASD are land use, natural resources, transportation, and tourism. To achieve the objectives of this directorate it was divided into 8 departments as follows:

1. Agriculture Statistics Department.
2. Transportation & Communication Statistics Department
3. Environment Department
4. Natural Resources Department
5. Tourism Statistics Department
6. Housing and Housing Conditions Statistics Department
7. Land Use Statistics Department
8. Energy Statistics Department

It is noticed that most of the work of these departments is directly related to environment statistics and thus reflects the importance paid to environment statistics at PCBS.

Sources of environmental data and statistics

The main sources of environmental data are:

1. The results of the surveys conducted for environment statistics purposes such as Household Environmental Surveys. An environmental questionnaire has been designed for this survey, and a two-stage stratified cluster random sampling design was applied to conduct the survey. The survey covered Palestinians households in the West Bank and in Gaza Strip.
2. The available data from other departments of PCBS.
3. Data from governmental agencies such as:
 - i. Ministry of Planning and International Cooperation.
 - ii. Palestinian Water Authority.
 - iii. Palestinian Geographic Center.
 - iv. Ministry of Health.

Publications and databases

The PCBS produces a large number of publications relevant for environment statistics:

Title	Period
Household Environmental Survey: Main Findings	1998
Industrial Environmental Survey 1998: Main Findings	1998
Meteorological Conditions in the Palestinian Territory Annual Report	1998
Wastewater Statistics in Palestinian Territory.	1997-1998
Medical Environmental Survey 2000: Main Findings.	2000
Environment Statistics in Palestine 1999.	1999 annually
Dumping Sites Survey in the Palestinian Territory, Main Findings	2001, yearly
Environmental Survey for Health Care Centers Main Findings	2001, yearly
Water statistics in the Palestinian Territory.	1996-2000
Land use statistics in the Palestinian Territory.	1997-1998
Energy consumption in the Palestinian Territory.	1996-1999
Biodiversity in the Palestinian territory	1991-1997

Annex 5 contains the list of data contained in a selection of these publications. In addition, the information published is also available at the site of the PCBS under the following address: www.pcbs.org. The site includes details on environment statistics as well as other types of statistics. In some cases time series data are available, in other cases data are available for only one year. A list of some environmental tables available at the site above is given in Annex 3.

The valuable work already accomplished by PCBS is very much appreciated and highly estimated but it should be noted that the number of tables in each publication is still limited, and each publication covers only a single subject or part of a subject in environment statistics, which enlarges the number of outputs but requires the user to refer to many publications in order to get a better overview of the field of environment statistics. It is therefore suggested to combine all relevant tables into a single comprehensive publication.

Activities in environment statistics

As described above, the PCBS has many activities in this field. The data for the publications come from two main sources: i) the administrative report, which is prepared after the collection and processing of the data, ii) the field surveys such as medical environmental surveys and other sources, for example, official reports and data coming from other sections of the PCBS.

It is noticed that some descriptive analyses were conducted, which show the relatively advanced level of work in the institution. To the most part the work was done with the support from foreign agencies, which provided great benefits in producing and establishing environment statistics as well as capacity building in PCBS.

Classifications, methodologies, standards, and coding systems

It is apparent from the publication that the PCBS uses international classifications such as ISIC for economic activities, and partially for medical wastes. But the standards used, for example in water statistics, are not mentioned in the report. It could be that no national standards are available or that these standards were not used. Furthermore, the methods of tabulation of water quality data need to be reviewed.

The methodologies used in environment statistics are described in detail in both Arabic and English. For example, water and land statistics are compiled from the administrative records of Palestinian Ministries and institutions as the main data sources, while for energy the data are extracted by attaching energy questionnaires to the household and economic surveys, which are conducted annually by PCBS. A coding system is not applied in the publications.

Data gaps

Despite the large number of publications released by PCBS, many substantive gaps remain:

1. Water quality, e.g. biological parameters of drinking water quality and the quality of sewage water released by wastewater treatment plants.
2. Land use statistics could be further disaggregated as this subject includes about 64% of land classified into *other type*.
3. Waste statistics has many data gaps, in particular, the generation of hazardous wastes and the quantities of waste produced by sector.
4. Air quality has only limited information.

Considering the political conditions in Palestine, the overall situation with respect to environment statistics is rather remarkable and should be further expanded.

Requirements for improving environment statistics in Palestine

It is difficult to anticipate the future needs in this area from the material available. Therefore, the suggested requirements are subject to adjustment if any new information becomes available. Based on the current information, the following requirements are identified:

1. Training on data dissemination techniques of environment statistics.
2. Improving the use of secondary data from different sources, e.g. the Ministry of Environment.
3. Due to the limited use of GIS data in environment statistics it seems that training is needed on the use and applications of new GIS technologies.
4. Better cooperation between the PCBS and other agencies will be beneficial given the current limitations in data sources and funding. Furthermore, the creation of an environment statistics committee and information system could improve the situation.

Main difficulties

The instable political situation in Palestine makes it particularly difficult to sustain environment statistics programmes as it is affecting among other things the conduct of field surveys. In addition there are other difficulties:

1. The limited availability of data on topics such as air quality.
2. Environment statistics is a fairly new subject, which requires training and expertise.
3. The conduct of field surveys is expensive and the lack of sufficient and continued financing is one of the main constraints in the further development of environment statistics.

Recommendations

1. It is recommended to review the methods of data dissemination by reducing the number of publications.
2. It is recommended to increase the cooperation between PCBS and other relevant agencies with regard to the collection and processing of environmental information.
3. The priorities of environment statistics should be set out more specifically and the projects should be consistent with national objectives (not donor objectives).

6. Yemen

The consultant visited Yemen from 22 to 26 April 2002. The visits in Yemen covered the Central Statistical Organization (CSO), the Environment Protection Authority (EPA), the National Water Resources Authority (NWRA), and the Ministry of Agriculture. The consultant met Mr. Mohamed Abdel Rehim, Deputy of the Director General for Planning and Information and, in addition, he has been shown relevant documents as well as available software.

Institutional Background and Legislation

According to law 28 of 1995 the Central Statistical Organization (CSO) is the sole agency that has the authority to collect statistical data except for data relating to the military and security corporations. Thus, the legal framework of the CSO also includes environmental data collection. In addition, the proposed structural set-up of the CSO includes the General Department of Production and Environment statistics.

Yemen is currently in the process of passing a decree in accordance to the above-mentioned framework, which will hopefully come into effect in the near future. The work of the CSO is organized and carried out according to the legal framework, which means that there are no legal constraints to produce environment statistics.

In addition, the Environment Protection Authority (EPA) has the responsibility to produce an environmental status report in Yemen, which includes some environmental data. But the data used in the report are not collected in field surveys by EPA but by other agencies and institutions. In this regard, there appears to be no duplication of efforts but rather a system of shared responsibilities and teamwork. On the other hand, an expansion of the work programme of the CSO in environment statistics may give rise to some duplication in the future.

Sources of environmental data and statistics

The main sources of environmental and other relevant data are as follows:

1. The CSO, which provides data relating to social and economic indicators, sources of drinking water for households, and access of households to the public sewage water system.
2. The Public Electricity Cooperation, which provides data on access of households to the public electricity system.
3. The Ministry of Health, which provides data on the number of hospitals.
4. The Public Board and Civil Aviation Authority, which provides meteorological data.
5. The Ministry of Transport, which provides data relating to transportation and shipping.
6. The Public Board for Water Resources, which provides data on water resources.
7. The Ministry of Works and Urban Development, which provides data on solid wastes and drinking water purification.
8. The National Center for Earthquakes, which provides information related to earthquakes.
9. The Public Corporation for Water and Sanitary Sewage, which provides data on sewage water.

Not yet utilized sources of information are:

1. The National Water Resources Authority (NWRA), which has information on drinking water quality and water resources at national level.
2. The Ministry of Agriculture with its sub-divisions:
 - a. Directorate of natural ranges.
 - b. Directorate of agriculture statistics.
 - c. Directorate of plant protection.
 - d. Directorate of irrigation.

In addition, many studies have been conducted with the support of foreign agencies and companies, for example:

1. The British company *Hunting* classified the plants according to family and species as well as estimated forest density for some areas in Yemen.
2. A focal point for desertification, which is linked to the National Planning Committee, collected data on desertification for 1996, 1998, and 2000 from the National Planning Commission for the Resistance of Desertification (Source of information: Head of Instructions at the Ministry of Agriculture, no further details could be gathered).
3. The Institute of Applied Geosciences, Netherlands conducted a water assessment. The results are available but are scattered and the time series are not homogenous. Most of the information is available in hard copy only and the project was conducted for purposes other than environment statistics.

Human resources

At the time of the visits there was only one employee allocated to work on environment statistics, who also has other tasks in the Agricultural Census. The background of the staff member is in statistics but his main experience is in agricultural statistics. The consultant notices that the knowledge of the staff member is based mostly on the self-study of available documents and tables, which means that training is required to increase his capacities.

The consultant discussed the shortage of employees in environment statistics with Mr. Gradah, the Chairman of the CSO, who promised to lend his full support to this objective. Mr Gradah also emphasized his interest in receiving assistance from an international agency, which he emphasized as absolutely needed.

The Deputy Director General of Planning and Information at EPA is involved in an environmental information system. He has at his disposal a database with efficient software in Microsoft Access, which was developed in a joint project with The Netherlands. It is noticed that although the software is operational, the database has many gaps and numerous empty cells as a result of the scarcity of information. The main data source feeding into this database are the CSO data. The consultant suggested that the CSO may therefore consider using this software.

Activities in environment statistics

As mentioned above, the main sources of data used by the CSO and other agencies are secondary data, collected in collaboration between the CSO, the Ministry of Environment and other governmental agencies. In addition, a demographic environmental survey is currently being prepared. The survey will cover a sample of households through interviews. The consultant has seen the draft of the questionnaire, which is not yet finalized, but is similar to the questionnaire developed in Oman, which is mentioned later.

It is clear from the visits that the activities in the area of environment statistics are still at an early stage in Yemen and it will take time, human, and financial resources to reach a more satisfactory situation.

Classifications, methodologies, standards, and coding systems

Due to the limited quantity of data available at the CSO, which concentrates on indicators, no classification system is currently being used. Therefore, as mentioned before, all data disseminated in the field of environment statistics should be reviewed.

Aggregation of data from secondary sources is performed but no standards or coding systems have been used.

Publications and databases

Until now, no special publication for environment statistics has been released. The CSO includes a chapter *Environment* in its Statistical Yearbook. This chapter contains the following tables:

Title	Source	Period
Social and economic indicators	CSO, Ministry of Health, Public Board of Water Resources, Ministry of Transport.	1999, 2000
Temperature in degrees Celsius	Public Board of Civil Aviation.	2000, monthly
Relative Humidity	Public Board of Civil Aviation.	2000, monthly
Quantity of monthly rainfall	Public Board of Civil Aviation.	2000, monthly
Wind speed and direction.	Public Board of Civil Aviation.	2000, monthly
Quantity of solid waste at governorate's center	Ministry of Works and Urban Development	2000, yearly
Quantity of spoiled or inedible foods	Ministry of Works and Urban Development	2000, yearly
Number of stations for drinking water purification, water bottled in plastic containers.	Ministry of Works and Urban Development	2000, yearly
Distribution of number and	CSO, Household budget	1998

ratio of dwellings and population according to water source.	survey.	
Distribution of number and ratio of dwellings and population by means of sanitary sewage	CSO, Household budget survey.	1998
Distribution of the number and ratio of dwellings and population according to source of light.	CSO, Household budget survey.	1998
Distribution of number and ratio of dwellings and population according to source of cooking fuel.	CSO, Household budget survey.	1998
Number of registered domestic and international earthquake events.	National Center of Earthquake Monitoring.	2000, monthly
Quantity of production and consumption of water.	Public Corporation for Water and Sanitary Sewage.	2000, yearly
Number of subscribers and beneficiaries of sanitary sewage service.	Public Corporation for Water and Sanitary Sewage.	2000, yearly

In addition, the Statistical Yearbook contains information relating to the environment such as demographic indicators, agriculture, and health statistics.

The consultant notices that the quantity of data disseminated in the Statistical Yearbook is rather limited in comparison to the amount of data available in the CSO and other agencies such as the Natural Water Resources Authority (NWRA) and the Ministry of Agriculture. In addition, the arrangement of tables and methods used for the calculations need to be reviewed.

On other hand, as mentioned before, the EPA has a database with some quantities of information, which it acquired mainly from the CSO. This emphasizes the need for better cooperation between the two agencies.

The consultant visited the following agencies: The NRWA, the EPA, the Forest Directorate and the Agriculture Statistics Directorate as well as the library in the Ministry of Agriculture. The consultant found the following environmentally relevant information:

1. Ground water quantity and abstraction at the national level.
2. Water quality.
3. Forest area.
4. Plant classification in some area.
5. Protected area.

The information is available in hard copy or sometimes on laboratory data sheets, which poses the risk of information loss if it is not computerized and archived properly. The consultant agreed with the Chairman of the CSO to build a database and

document all information available in the CSO. However, this work requires a financial budget and external technical assistance.

Data gaps and priorities

The main data gaps determined are:

1. Water statistics such as the quantity of renewable ground and surface water, data on water production and consumption at the national level as well as drinking water quality.
2. Forest area and area affected by desertification.
3. Air quality. It noticed that except for one station, which is currently not working, there is no other air quality monitoring station in Yemen.
4. Hazardous waste and solid waste, the latter of which is currently available only for the governorate's center.

The suggested priorities are:

1. Demographic and environment statistics focusing on indoor environment statistics and environmental indicators.
2. Water statistics with a complete evaluation at the national level for water supply, water consumption, and water quality.
3. Fertilizer and pesticides consumption.
4. Coastal zone and marine water quality.

The requirements to improve environment statistics in Yemen

1. Training and capacity building; it is suggested to provide training on the fundamental principles of environment statistics.
2. It is suggested to organize a study tour for the employees working in this field to countries more advanced in the development of environment statistics and environmental monitoring in the ESCWA region.
3. It is suggested to provide training on how to derive and calculate environmental indicators and on how to link the indicators to environmental impacts.
4. It is recommended to provide manuals and to explain existing classifications and coding systems in Arabic.
5. Tools and materials: Provide the CSO with PCs for use in environment statistics and for the development and use of databases.
6. Capacity building on the use of information systems and data processing systems is required.

Main difficulties

1. The large number of agencies dealing with water management, often resulting in incomparable data and difficulties in the aggregation of the data from different sources.
2. The overall scarcity of relevant data.

3. Non-response to surveys on environmental topics and limited cooperation between data providers and CSO.
4. The sensitivity of some of the environmental information.
5. The insufficient number of employees who are allocated to work in this field.
6. The limited experiences of the staff members due to the relative novelty of the field.
7. The absence of an environmental consciousness in general.

Recommendations

1. It is recommended to promote teamwork and to bring together all agencies directly involved in environmental issues and statistics.
2. It is proposed to collect all available information from the various sources and to properly document it.
3. It is recommended to provide training to the members of the CSO and the staff members from the EPA.
4. External assistance is considered important, in particular technical assistance.

7. Saudi Arabia

The consultant visited Saudi Arabia from 5 to 11 July. In particular, the consultant visited the Executive Office of UNDP and met the UN Residential Representative with whom he discussed the situation of environment statistics in general. Subsequently, the consultant visited the Central Department of Statistics (CDS) and the Ministry of Agriculture and Water in Riyadh. A meeting with the Meteorology and Environmental Protection Administration (MEPA) in Jeddah followed this visit where the consultant met the responsible persons for environment statistics. He also visited the FAO Library in Riyadh and a center for documentation in MEPA.

Institutional Background and Legislation

The Central Department of Statistics (CDS) was established in accordance with the Public Statistics Law issued through the Royal Decree no. (23) dated 7/12/1379 hejri (1960 AD). It is considered the central authority of statistics in the Kingdom of Saudi Arabia. The CDS shall be entrusted with the task of conducting all commercial, economic, health, educational, industrial, financial, and agricultural or any other statistics as required. By virtue of the law, the CDS is responsible for developing the scientific methodology, statistical or technical instructions, which help the other statistical departments in different governmental agencies to collect and prepare different statistics related to the work of that agency. These departments will provide the CDS, regularly, with statistical data. Hence, the CDS has the technical authority to supervise all governmental agencies that produce statistical data, which results in a system somewhere between a centralized system and a decentralized system. The activities of the CDS are conducted by activating the statistical work in the governmental agencies and developing it through the coordination with statistical departments in order to prepare the statistics related to their official tasks.

On the other hand, the Meteorology and Environmental Protection Administration (MEPA) is the agency responsible for environmental protection, including the response to pollution of all kinds. The MEPA also has the authority to establish the different environmental standards as necessary. This responsibility was established by Royal Decree on 24.4.1401 Hijri, (28.2.1981 AD).

The Ministry of Agriculture and Water has the authority and responsibility to produce statistical data related to its activities, which takes place under the supervision by CDS.

Sources of environmental data and statistics

Please note that Internet addresses can be found in Annex 3).

1. Central Department of Statistics (CDS), which provides data from its own sources and from secondary sources relevant to the environment, e.g. weather conditions statistics, population statistics, and health statistics.
2. Meteorology and Environmental Protection Administration (MEPA), which provides data on waste including hazardous waste, marine water quality in the Gulf, air quality, air and water quality standards, and meteorological data.
3. Ministry of Agriculture and Water, which provides data on land use, crop area for the main crops, area of range land fenced, fenced forestation area and parks belonging to the Ministry of Agriculture and Water, area of national

- parks, area of green parks, quantity of pesticides imported, quantity of fertilizers imported, number of wells, number of dams and their capacity, and quantity of treated sewage water used for irrigation.
4. National Commission for Wildlife Conservation and Development, which provides information on protected area and biodiversity in the protected areas.
 5. Saline Water Conversion Corporation, which provides data on the quantity of desalinated water produced and the amount of electricity produced (1980 – 2000).
 6. Ministry of Health, which conducts drinking water quality analyses.
 7. Saudi Arabian Standards Organization (SASO), which develops the national standards.

Human resources

The CDS has planned no environment statistics activities except the new Household Environmental Survey for 2002 and has not allocated any employee to work in this area. Mr. Mohanna, The Deputy Director General for Statistical Affairs, indicated that it is time to initiate a division for environment statistics.

A statistical division exists in the Ministry of Agriculture and Water for agricultural statistics, which includes some relevant environment statistics.

Activities in environment statistics

The CDS has only limited on-going activities relevant for environment statistics, which, as mentioned above, includes a Household Environmental Survey. This type of activity is applied in many countries in the ESCWA region such as Oman and Yemen. The survey covers indoor pollution to some extent and can be regarded as a first but not sufficient step towards the full establishment of an environment statistics programme.

On the other hand, the Meteorology and Environmental Protection Administration (MEPA) has many activities directly relating to environment statistics, for example, air quality monitoring. MEPA operates 11 stations. In addition, MEPA supervises other stations operated by other institution such as ARAMCO and the Arab Oil Company. The data of all stations are available from MEPA. Also, the MEPA monitors marine water quality in the Arab Gulf as well as groundwater quality in certain areas, e.g. in Jeddah. In addition, other institutions monitor coastal zone area, where other institutions operate 10 monitoring stations.

The Ministry of Agriculture and Water has a monitoring system for surface and ground water resources and desalination water stations.

Classifications, methodologies, standards and coding systems

CDS uses international classifications, e.g. ISIC for the classification of economic activities and the Harmonized System for external trade operations. No classification specialist for environment statistics is currently working at CDS.

In addition, the Ministry of Agriculture and Water uses the FAO classification for land use, which is already used by most agriculture statistics divisions in the ESCWA region. MEPA also uses some classifications for hazardous chemicals and air quality.

Methodology

The methodology used for environment statistics is a mixture of different methods, for example, household sample surveys, which are used to collect data for the Household Environmental Survey. The other method for compiling environmental data is report keeping from monitoring stations but this method needs to be revised and improved.

Standards and coding systems

The MEPA produces environmental protection standards, which are mentioned in document no. 1409-01. These standards include the Saudi Arabian standards for air quality and organic pollutants. The standard of water quality including drinking water and marine water is not mentioned.

Publications and databases

The consultant found a large amount of data and information relating to the environment in Saudi Arabia. Parts of these data are published in the Annual Statistical Report, while other data are published in the Annual Agriculture Report or disseminated on the Internet. Yet other information is available only in hard copy for local use such as drinking water quality. Concluding, the data are scattered across areas as well as in method of tabulation and recording. The positive point is that MEPA has a center for documentation of scientific documents and information, which the consultant visited. The center concentrates mainly on meteorological information and some other information relating to the environment but it is good first step and hopefully the Center can expand its documentation programme.

The main data relating to the environment available in Saudi Arabia are mentioned in the table below:

Title	Source	Period
Average Air Pressure, By Month and Meteorological Station (In Millibars).	Statistical Yearbook	Monthly, 2000
Average Temperature, Average Maximum Temperature, Extreme Maximum Temperature, Average Minimum Temperature, and Minimum Temperature By Month and Meteorological Station.(In Centigrade Degrees Celsius).	Statistical Yearbook	Monthly, 2000
Average Relative Humidity, Maximum Relative Humidity, Minimum Relative Humidity By Month and Meteorological Station: 2000 A.D.(In Percent)	Statistical Yearbook	Monthly, 2000
Rainfall, By Month and Meteorological Station: 2000.	Statistical Yearbook	Monthly, 2000
Direction and Average Speed of the Prevailing Wind, Direction and Speed of Maximum Wind, By Month and Meteorological Station: 2000 A.D. (Direction by Compass Points and Speed in Knots) (Direction by Compass Points and Speed in Knots)	Statistical Yearbook	Monthly, 2000
Days with Sandstorms, Thunderstorms and Fog, By Month and Meteorological Station.	Statistical Yearbook	Monthly, 2000
Occupied households by house type and source of drinking	Statistical	Yearly, 2000

water in administrative areas	Yearbook	
Fires Accidents By Region	Statistical Yearbook	Yearly 1419 And 1420 A.H. 1999 AD
Percentage of Fire Accidents by Month:	Statistical Yearbook	Yearly 1416 - 1420 A.H. 1995 AD
Number of Fires by Property Type	Statistical Yearbook	yearly 1419 And 1420 A.H. 1998 AD
Generating Capacity, Peak Load, No. of Subscribers, Electricity Production, Consumption and Industrial Consumption.	Statistical Yearbook	yearly 1410-1420 A.H. 1989-1999 AD
Generating Capacity, Peak Load, No. Of Subscribers, Electricity Consumption and Industrial Consumption by Region	Statistical Yearbook	Yearly 1410-1420 A.H. 1989-1999 AD
Quantity of Electricity Generated, by Desalination Plant (In Megawatt Hour)	Statistical Yearbook	1410 - 1420 A.H. 1989-1999 AD
Quantity of Water Desalinated, by Desalination Plant: (In thousands of cubic meters)	Statistical Yearbook	1410 - 1420 A.H. 1989-1999 AD
Water Consumption and Number of Subscribers, by city (Quantity in thousand Cubic Meters)	Statistical Yearbook	1410 - 1420 A.H. 1989-1999 AD
Cement Production, by Company (In Tons).	Statistical Yearbook	1410 - 1412 A.H 1989-1991 AD
Production of the National Gypsum Company, by Month and Product (In Tons)	Statistical Yearbook	1998 - 2000 A.D.
Natural Gas Sales, by Station (IN tons)	Statistical Yearbook	1999 and 2000 A.D.
The Development of Road Construction from	Statistical Yearbook	1411/1412-1420/1421 A.H. 1990/1991 AD
The Lengths of Roads Constructed up Till End of. (In Kilometers)	Statistical Yearbook	1419/1420 and 1420/1421 A.H 1998/1999 1999/2000
Vehicles Imported, by Type.	Statistical Yearbook	1991-2000 A.D.
Oil Tankers and Oil Products, by Port and Month.	Statistical Yearbook	
Total Land Area Distributed in kingdom according to the Arable Land distribution Scheme Up to the End of	Ministry of agriculture and Water	1420 A.H. 1999 AD
Estimated Area of All Crops, By Administrative Region (Trade. & Spec.)	Ministry of agriculture and Water	Yearly, 2000.
Length of Agriculture Roads	Ministry of	Yearly, 2000.

	agriculture and Water	
Area of rangeland fenced	Ministry of agriculture and Water	Yearly, 2000.
Fenced forestation area and parks belong to Ministry of Agriculture and Water.	Ministry of agriculture and Water	Yearly, 2000.
Area of National Parks belongs to Ministry of Agriculture and Water.	Ministry of agriculture and Water	Yearly, 2000.
Area of Green Parks Belongs to Ministry of Municipality and Ruler Affairs.	Ministry of agriculture and Water	Yearly, 2000.
Quantity of pesticides imported according to their kind	Ministry of agriculture and Water	1984-1999
Quantity of fertilizers imported according to their kind	Ministry of agriculture and Water	1985 -1999
Production capacity of desalinated water and electricity.	Ministry of agriculture and Water	Yearly, 2000.
Cumulative number of public wells.	Ministry of agriculture and Water	Cumulative until 1999.
Cumulative number of privet wells.	Ministry of agriculture and Water	Cumulative until 1999.
Production capacity of drinking water projects, number of wells and capacity of water storage.	Agriculture and Water	Yearly, 2000.
Cost and quantity of drinking water supplied by vehicle.	Ministry of agriculture and Water	Yearly, 2000.
Cumulative number of Dams and Capacity by purpose of establishment until 1999.	Ministry of agriculture and Water	Cumulative until 1999.
Quantity of treated sewage water used for agriculture purpose.	Ministry of agriculture and Water	Yearly, 2000.
Air quality (dust, NO, NO2, NO x, O3, CO, THC, NMHC, SO2) by monitoring station.	PME	Daily results, not published.
Municipal waste statistics (irregular reports)	PME	Daily results, not published
Digital maps contains some information relate to environment statistics like land use, and manufactory sites.	PME	Daily results, not published.

In addition to the above information, the Meteorology and Environment Unit initiated eleven databases, which include water quality, air quality, hazardous

chemicals and environmental companies. These databases are helpful for many environment statistics activities in Saudi Arabia.

A relatively large number of scientific studies were conducted such as, for example, plant cover and desertification, the effect of oil pollution during the Gulf Crises, pollution in the coastal zone in Jeddah, and the enumeration of the forest area and rangeland, which includes a classification of soil, flora, and fauna. This last project is currently under way.

In addition, the National Report on the Current Situation of the Environment in Saudi Arabia contains six chapters:

1. General information about Saudi Arabia.
2. Improvement of environment management concepts.
3. The Meteorology and Environmental Protection Administration (MEPA).
4. Human activities that affect the environment.
5. The current situation of environment and natural resources.
6. Environmental management and future challenge.

Data gaps and priorities

It is difficult to specify the data gaps when no specific environmental division exists that is responsible for cataloging and administering the large amounts of data scattered across governmental agencies and private institutions. In general, Mr. Sameer J. Ghazi, the Director of Natural Resources at MEPA specified the gaps and priorities in environment statistics as follows:

1. Coastal zone including marine water quality, biodiversity and pollution.
2. Classification flora and fauna in general.
3. Environmental monitoring system to cover the country.

In addition, the CDS added the Household Environmental Survey. The other agencies did not mention any other points.

The requirements for improving environment statistics in Saudi Arabia

The response to this question was that after attendance of the workshop on environment statistics and after having been trained in the concepts and methods of environment statistics, ideas and needs can be formulated. At this point only general statements referring to the need for documents and materials on environment statistics and on how to start an environment statistics programme can be made. Technical assistance and expert instructions will also be needed throughout the initiation stage.

Main difficulties

1. The absence of a designated division to administer and direct the work in environment statistics as well as a lack of knowledge on how to institutionalize an environment statistics system.

2. The fact that information is so scattered across different areas and that some of the information is available only in hard copy, while other information is not documented properly.
3. The sensitivity of the environmental information in some fields, in particular water statistics, creates some difficulties.
4. The limited experience in environment statistics and the lack of prioritization of environmental monitoring and statistics.

Recommendations

1. It is recommended to provide training to members from the CDS and members from MEPA.
2. Due to the large amount of data available in different institutions, it is recommended to collect all available data and produce a first environmental compendium.
3. It is recommended to set-up a technical team from the various relevant institutions.
4. The provision of external technical assistance to initiate the new division and to produce the environmental compendium is recommended.

8. Iraq

The Central Statistical Organization (CSO) is the responsible agency to conduct surveys and to publish environmentally relevant statistical data. Since statistics in general is currently no priority area and lacks sufficient financing and equipment, the activities of the CSO in this field are very limited.

Based on the law no. 747 from 1998, the Center of Environmental Protection at the Ministry of Health is the responsible agency to monitor the environmental situation in Iraq and to produce monthly reports on the environmental status in Iraq. It appears that currently no reports are produced by the Center.

Only one annual survey is conducted by the CSO covering water and electricity and the survey provides information on water production and consumption as well as electricity production and consumption. The data are collected from the governmental agencies by sending a questionnaire to the responsible persons in each agency.

Other available data relating to the environment are, among others, demographic statistics.

Due to the absence of communication facilities and other constraints, the consultant could not get sufficient information about the current situation of environment statistics in Iraq. The reply he received states that no activities in environment statistics are taking place in Iraq at this time, except for the survey which was mentioned above.

Therefore it can only be concluded that the level of development of environment statistics is very weak at the current time.

9. Kuwait

According to decree no. 63 in 1997, which relates to the organization and specification of activities of the Ministry of Planning, it is mentioned that the information and statistics sector shall be one of the main sectors of the Ministry of planning.

The statistical sector is responsible for data collection, data processing, and data dissemination for all national statistics including environment statistics.

The statistical sector is undertaking some activities in data collection of environment statistics. The data collected that are relevant to environment statistics are listed in the table below:

Title	Period
Quantity of constructional waste arising at landfill sites from all Kuwait areas in tons	Monthly (1997 – 2000)
Quantity of solid household waste arising at landfill sites from all Kuwait areas in tons	Monthly (1997 – 2000)
Production and Consumption of Water (Billion of Gallons)	Yearly (1992 –2000), and monthly (1998 – 2000)
Production and Consumption of Electrical Energy (Million MW/H)	Yearly (1992 –2000), and monthly (1998 – 2000)
Humidity, Temperature, Rainfall, fog & Evaporation.	Yearly (1957- 2000), and monthly
Maximum wind speed at Kuwait international airport.	Yearly (1998-2000), and monthly
Rainfall, Sunshine, and Mean atmospheric Pressure.	Yearly (1998-2000), and monthly
Monthly and Annual means of Evaporation.	Yearly (1991 –2000), and monthly
Number Of Days with Rainfall.	Yearly (1991 –2000), and monthly
Monthly Mean of Maximum Temperature (C).	Yearly (1991 –2000), and monthly
Total Rain (mm).	Yearly (1991 –2000), and monthly
The Annual Average of Air Pollutants, the amount and rate of changes (TSP, H ₂ S, SO ₂ , THC, NCH ₄).	Yearly
The Annual Average of the results of the analysis of drinking water, the amount and the rate of change (T.ALK, T.HARD.CL, F, N-NO ₃ , SO ₄ , T.D.S, NA, K, CA, HG, CD, PB, MN, CR, CU, ZN, FE, NI, T.O.C., T.HMS, T.COLIFORM, FAECAL COLIFORM).	Yearly (1998 –1999)
The Annual Average of the results of the analysis of brackish water, the amount and the rate of change (T.ALK, T.HARD.CL, F, N-NO ₃ , SO ₄ , T.D.S, NA, K, CA, HG, CD, PB, MN, CR, CU, ZN, FE, NI, T.O.C., T.HMS, T.COLIFORM, FAECAL COLIFORM).	Yearly (1998 –1999)

The Annual Average of the results of the analysis of treated water for Agricultural purposes, the amount and the rate of change (T.ALK, T.HARD.CL, F, N-NO ₃ , SO ₄ , T.D.S, NA, K, CA, HG, CD, PB, MN, CR, CU, ZN, FE, NI, T.O.C., T.HMS, T.COLIFORM, FAECAL COLIFORM).	Yearly (1998 –1999)
Area of cultivated cropland.	1994/95 - 1998/99

As mentioned in the table above, the data are available for only few variables and a limited set of environmentally relevant activities such as waste generation, which covers only parts of this category (only quantity of municipal wastes and construction wastes), and some data relating to the water statistics.

The data are also scattered across various chapters of the annual statistical report, for example in the chapters on agriculture and population. Therefore, it is suggested to aggregate all environmentally relevant tables into a separate chapter.

The methodology used for the data collection is not clear and also no international classification has been applied.

It is recommended to improve the field of environment statistics by using the available data, to re-tabulate the information in a way that is appropriate, and to make use of international classifications, e.g. the FAO classification for land use and ISIC classification for economic activities.

10. Bahrain

The consultant used available documents and web sites for his assessment and based on the information he received, he concluded that the situation of environment statistics is limited to few subjects as is outlined in the following table below:

Title	Period
Area of the state of Bahrain by island	1998
Area of the state of Bahrain by region	1999
Average relative humidity by month	1992-1999
Temperature in centigrade Celsius by month	1992-1999
Rainfall in millimeters by month	1992-1999
Average hours of sunshine by month	1992-1999
Monthly water consumption.	1990-1999
Water production	1990-1999
Population density by region	1999
Number of persons per room	1991
Number of localities connected to sewage water network	1999
Number of connections to water network	1995-1999
Type and quantity of solid wastes disposed of	1999
Number of registered fires	1992-1999
Areas under vegetables crops	1999
Quantity of fertilizers used	1999
Quantity of pesticides consumed	1996

The available data are related to the environment but are not sufficient to provide a complete picture of the state of the environment in Bahrain. It is thus considered very important to include into the existing programmes detailed information for the main statistical topics: water statistics, marine water quality, and air quality.

11. Oman

The consultant visited Oman from 28 June to 4 July on a different assignment but tried to collect some information relating to the stage of development of environment statistics for use in this assessment. The consultant met the Director of Economic Statistics and the expert who designed the household environmental survey in the Ministry of National Accounts. He also met the agriculture statistics expert in the Ministry of Agriculture and Fishery.

The consultant discussed the current situation and how to further develop environment statistics in Oman.

Institutional Background and Legislation

The duties of the Ministry of National Economy with respect to statistical activities is specified as follows:

1. Conducting research and studies in order to broaden the production base, diversify national income sources, and promote human resources development. Promotion of private sector role in economic and social development so as to achieve sustainable development in coordination with the relevant authorities.
2. Collecting and publishing the different statistics, carrying out surveys and censuses in cooperation with the concerned authorities, in accordance with the requirements and needs of the development plans and as per the Statistical Law, and to work toward upgrading the statistical work all over the country.
3. To formulate a national information plan. To create an integrated economic, social and geographical information network so as to serve the various development interests and goals in the country.
4. To formulate the appropriate proposals for the coordination of the activities of the ministries and government units pertaining to the implementation of development plans and programmes, and assist in supporting the role of its existing planning and statistics units.

Environment statistics is not mentioned specifically but the general law covers all types of statistics. Therefore, the creation of an environment statistics division is more urgent than the adjustment of the law, which is sufficient for this purpose. The first environmental legislation was enacted in 1974 and in 1979. His Majesty, the Sultan of Oman, chaired the Council for Conservation of the Environment and Prevention of Pollution in May 1984.

In 1995 a Royal Decree authorized the Minister of Regional Municipalities and the Environment to sign the United Nations Convention to Combat Desertification.

No environment statistics survey has been conducted except for a household environmental survey conducted in 2001. The questionnaire of this survey contained the following main topics:

1. Source of drinking water.
2. Quality of drinking water (qualitative statistics evaluating the personal opinion of the respondents).

3. Quantity and method of disposal of household wastes (cesspool or public waste collection network etc).
4. Method of sewage water disposal.
5. Information on cesspool.
6. Pollution in the close vicinity of the house (evaluating personal opinion of the respondents with respect to noise, bad smell, etc).
7. Use of chemical detergents in the house (including chemical materials used for cleaning purpose inside the house).
8. Use of pesticides inside the house (yes/no)

This questionnaire recorded living conditions. It is a qualitative questionnaire, thus providing only limited results, which may additionally be strongly affected by individual opinions. On the other hand, the questionnaire provides some statistical data relating to the environment.

The table below lists the subjects included in the annual report that are related to the environment.

Title	Period
Maximum and minimum temperature (degrees Celsius) by station	Yearly
Maximum and minimum humidity in % by station	Yearly
Total annual rainfall by station	Yearly
Monthly maximum and minimum temperature (degrees Celsius) by station.	Monthly
Monthly total annual rainfall by station	Monthly
Agriculture land distribution	Yearly
Estimates of cultivated area and production by crop	Yearly
Areas treated against dobas bug & the quantity of insecticides utilized	Yearly
Consumption of electric power by sector;	Yearly
Production and consumption of electricity	Yearly
Production and consumption (use) of water	Yearly and monthly
Production & distribution of water by governorate, region and number of connections.	Yearly and monthly
Production & export of crude oil by production companies	Yearly
Crude oil production & uses.	Yearly

In addition, some information relevant for environment statistics is available from other sources such as water use from the Ministry of Agriculture as well as Wildlife, Natural Reserves, population of Arabian Oryx, Endangered Species, and Rare Plants & Trees from the Ministry of Information.

It is noticed that the data are scattered just as in many other countries, which requires time to collect the available data in order to produce environmental compendium.

The available data provide a starting point for environment statistics but it is noticed that without a specialist in environment statistics and the establishment of a corresponding section or division, the work will be severely hampered and result in a lack of consistency and harmonization. Therefore, the first step is to encourage Omar

to establish an environment statistics section followed by a specification of the priorities and needs.

12. Qatar

The Ministry of Municipal Affairs and Agriculture is the responsible agency for environmental protection as results from the Ameer decision in 1998.

The Central Bureau of Statistics (CBS) is the responsible agency for statistics.

Environment statistics is not yet specifically mentioned in either of the two agencies. However, the first agency provides some information on environmental protection and environmental policies and the CBS provides some information relating to environment statistics but has no direct activities in this field.

The table below contains the main topics relevant for environment statistics in Qatar:

Title	Period
Rainfall, average monthly temperature and relative humidity.	Yearly, monthly
Pressure and scalar wind speed at Doha International airport.	Yearly
Sunshine and global radiation	Yearly
Fog, dust storms, haze, thunder and lightning.	Yearly
Population density.	Census result
Land utilization, area under different crops (FAO classification).	Yearly
Area under different crops	Yearly
Electricity generated by main power stations.	Yearly
Quantities of water production.	Yearly
Water consumed (used) by sectors.	Yearly

It is noticed that the limited quantity of data available in Qatar is related to the low interest in this type of statistics.

13. United Arab Emirates

In accordance with the law no. 1 released in 1972, which specifies the duties and responsibilities of each minister, the law no. 3 from 1973, referring to national planning, and the decree no. 40 from 1974, which specifies the activities of the Ministry of Planning, the role of statistics in the Ministry is outlined as follows:

The Ministry of Planning will conduct the population censuses and other surveys and statistical research, which are needed by the government for social and economic development. The Ministry of Planning is considered the reference body for central statistics for the government.

This law implicitly considers environment statistics in accordance with the law issued in 1974. The law is relatively old but it seems that the legislation is not a constraint for environment statistics. However, environment statistics is not yet incorporated in the activities of the Ministry of Planning and neither a section nor division specializes in environment statistics and no employees are allocated to this type of statistics. It is therefore very important to invite the Ministry of Planning to start environment statistics.

The consultant nevertheless found some data relating to the environment, which are mentioned in various statistical reports. The table below mentions the main topics:

Title	Period
Maximum and minimum temperature absolute and month of incidence.	Monthly and yearly
Relative humidity	Monthly and yearly
Rainfall by years	Monthly and yearly
Rainfall by month	Monthly and yearly
Atmospheric pressure	Monthly and yearly
Cloud and visibility	Monthly and yearly
Surface winds speed in knots	Monthly and yearly
Sunshine	Monthly and yearly
Cultivated area by type of crop	Monthly and yearly
Forest	Monthly and yearly
Water wells	Monthly and yearly

It can be seen from the tabulation that the availability of data is very limited and the classification and periodicity differs from other countries in the ESCWA region. It is therefore recommended to improve environment statistics in the Gulf countries in general by first building the necessary infrastructure and allocating specialists to work on environment statistics.

The Center for Environment and Development for the Arab Region and Europe (CEDARE)

CEDARE was established on the basis of a joint commitment by the three principal sponsors, namely the government of Egypt (GOE), the Arab Fund for Economic and Social Development (AFESD) and the United Nations Development Program (UNDP).

The main mission of CEDARE is capacity building of national institutions (CEDARE mainly deals with the Ministries of Environment) to enhance environmental management and sustainable development. Its mandate covers five programs, Freshwater resources management, Land resources management, Urbanization and human settlements, Industrialization for sustainable development, and Marine resources management. CEDARE concentrates on the first three programs.

A cross-cutting theme, which includes environmental assessment was identified. In addition, CEDARE has developed regional as well as national GIS systems for the Arab countries, which include some information related to natural resources and land cover but still there are many gaps.

CEDARE also has an Information Services Unit. The task of this unit is to assist in the creation and strengthening of national environmental information system, production of environmental information, developing information technology programs, and promoting data harmonization and standardization.

CEDARE produces a CD, which contains the GIS database for the Arab region, environment- related databases, publications, documents, and reports as well as general information on CEDARE.

CEDARE designed a home page www.cedare.org.eg that provides detailed information on the center, documentation, databases, and other information.

The international, regional and national agencies can use the available information from CEDARE to produce environment statistics and build databases in fields such as natural resources.

CEDARE signed a memorandum in the middle of March 2002 with ESCWA to cooperate in four areas:

1. Water resources management.
2. Environmental policies and strategies.
3. Information and GIS.
4. Urbanization and human settlements.

CEDARE has the necessary facilities and experienced trainers to provide training in environmental information systems such as GIS. The consultant discussed the potential for cooperation between ESCWA and CEDARE in the 2003 program and the Executive Director agreed to provide support in accordance with the recently signed Memorandum between ESCWA and CEDARE.

The consultant noticed that CEDARE usually deals with the Ministries of Environment and related institutions but that no contact exists between CEDARE and the National Statistical Offices. This point was discussed and no constraints were identified that would prevent the future inclusion of the statistical offices into CEDARE's activities. However, the ability of this center to provide training in environment statistics is limited due to the lack of environmental statisticians.

The Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD)

The Center was established in 1971 and consists of the states of the Arab League. The mandate of this Center is to improve the situation of the dry lands in the Arab region, which includes combating desertification and increasing the green area in the Arab region. The Center completed a study called *State of Desertification in the Arab Region and the ways and means to deal with it*. The study was published in 1996, includes all of Arab countries, and the main themes covered by the study are climate, geology and geomorphology, water resources, soil resources, plant cover, desertification status, and methods to combat desertification.

Two principal sponsors, the United Nations Environment Program (UNEP) and the General Department of Economic Affairs of the League of Arab States (LAS), have accomplished this work on the basis of a joint commitment. The document was prepared using available information from different sources, which lead to some differences in the temporal coverage between tables, inconsistency of tables, and sometimes out of date data. ACSAD has begun to update this report.

As mentioned above, the tasks of the Center are to combat desertification using remote sensing among other tools and to produce statistical information on the status and trends in desertification. Information is available, for example, for the Hamaad Basin.

The data required for by the Center include natural resources statistics, forest data as well as information on biodiversity.

The ability of the Center to provide training in environment statistics is limited to desertification and remote sensing but is deemed desirable to cooperate with the Center for technical assistance and as a source of environment statistics.

United Nations, Economic and Social Commission for Western Asia (ESCWA)

The consultant discussed the environment statistics situation in ESCWA with Mr. Hosny Khordagui, the Chief of the Environmental Coordination Unit and Mr. Mohamed Al-Badrawy, the First Statistician. The discussion can be summarized as follows:

1. The collection of environmental data from secondary sources faces some problems such as lack of sufficient documentation of environmental data in the most of the countries. This requires technical and financial capacities. And even if the data are available, the credibility of the information is not guaranteed. The corresponding information and statistics need to be reviewed, including verification of the standardization, coding and classification used.
2. It is important to develop a core set of environmental indicators and try to provide those on a regular basis.
3. It is important to specify the sources of the data.
4. The training of statisticians is not feasible unless they have a background in environmental science. It is therefore suggested to provide training to both statisticians and technical staff in the environment agencies. In addition it is suggested to establish technical experts in the national statistic offices.
5. It is suggested to specify the data gaps and to clearly mention the importance of creating an environmental information system.
6. Any training should start from the principles of environment statistics, including concepts and definitions.

In general the consultant finds it desirable to have a specialist in environment statistics base in the office of ESCWA to provide the essential expertise to the ESCWA countries and to maintain communication with the specialists at the NSOs. The expert could also act as a reference person for environment statistics in the region and be the focal point for environmental information, statistics, and experience between ESCWA countries.

Plan Bleu – Plan Blue

In 1975 in Barcelona, the Mediterranean coastal states adopted a Mediterranean Action plan (MAP) under the auspices of UNEP. The MAP consist of three components:

1. Assessment of Mediterranean pollution.
2. Integrated planning (socio-economic component).
3. The Blue Plan (systemic and prospective studies)
4. The Priority Action Programme (PAP).
5. The institutional component, which covers all legal activities concerning the implementation of the Convention for the protection of the Mediterranean Sea against pollution.

The Blue Plan is located in Sophia Antipolis in France. It has many tasks relating to sustainable development indicators in the Mediterranean basin.

Here, the consultant concentrates on the activities of Blue Plan in environment statistics: After the initial assessment of the situation of environment statistics in the Mediterranean countries and the specification of the priorities to be covered by a task force in this field, the Blue Plan began its work on environment activities.

The Mediterranean countries include five ESCWA countries: the Syrian Arab Republic, Lebanon, Egypt, Palestine, and Jordan. The activities that take place as part of the Blue Plan are:

1. Training courses: six one-week training courses were conducted during the first project stage. The courses covered main fields of environment statistics like water, waste, and land use statistics. All lectures of these courses were held in both English and French. The consultant suggests making use of this material in the ESCWA region.
2. Study tours for one or two employees from the NSOs to the more advanced institutions working in environment statistics, e.g. IFEN. The DOS in Jordan is the only institution hosting study tours in the Arab Mediterranean countries.
3. The Blue Plan developed a MS Access software for use as an environment statistics database. The software needs to be improved and made user-friendlier. The consultant suggests making use of this software after the adjustments have been made.
4. The Blue Plan experts visited the countries in six missions to complete the questionnaire on environment statistics and to explain statistical methods to the NSOs employees.
5. Three task force meetings took place in Sophia Antipolis and the task force has a yearly meeting to evaluate the situation of last year and to approve the plan for the following year. Four Mediterranean countries and three European countries were represented in these task forces.
6. The Blue Plan also provides some equipment such as PCs and software to the NSOs.
7. The Blue Plan furthermore arranged the translation of the questionnaire into Arabic.

The Blue Plan project is the only project specializing in environment statistics. Huge numbers of documents and materials have been prepared in this field, despite the fact that this type of statistics has only recently been initiated in the Mediterranean countries.

The first stage of the Blue Plan is nearly completed and a meeting will take place in Turkey by the end of 2002.

In the second stage additional activities will be included and regional training will be organized.

The consultant discussed the opportunity with the Director of Blue Plan to cooperate with UNSD and ESCWA with respect to the project component in environment statistics in ESCWA. The proposal was appreciated and Blue Plan will cooperate within the five countries, which are both members of ESCWA as well as the Mediterranean countries. He will also provide any help such as available materials on environmental issues to UNSD. The consultant advises to make use of the available materials prepared by Blue Plan to date.

The Blue Plan also collects detailed data from the Mediterranean countries relating to water, land, waste, and other environment statistics. These data could be used as a starting point for to the production of an environmental compendium for ESCWA countries.

The consultant proposes that UNSD may review very closely the extensive work conducted by the Blue Plan project to define potential areas for collaboration, strategies to build on the results, and to further facilitate the development of environment statistics.

Annex 1

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Annex 2

A Set of Questions on the Production of Environment Statistics in National Statistical Offices

Part A: General information about the institution

1. Name of institution _____
2. Address _____
3. Name, title and address of contact person.

Part B: Assessment of the current situation in the institution with respect to environment statistics

1. Is the institution actively producing environment statistics and if yes, when and how has it been set up?

2. How many staff members work in environment statistics?

3. What are the main activities undertaken in environment statistics? Please list beginning with the highest priority and also note where a statutory mandate exists.

4. What are the main difficulties encountered in these activities?

5. If the institution is conducting or planning to conduct [when?] data collection in environmentally relevant fields, please describe these activities in terms of **type** [surveys in specific fields of environment statistics, environment statistics integrated in other surveys such as census etc., other], **coverage** [national, regional, urban, local, other], **frequency** [annual, ad-hoc, other], and which national or international **classifications, definitions** and **methodologies** are used?

6. If environmental data are compiled from various institutions, what are the major data sources?

7. What are the outputs produced in environment statistics? Please list all publications such as statistical yearbooks, environment statistics compendia, technical reports, ad-hoc studies etc.

8. Which are the main institutions involved in the production environment statistics and data [e.g. Ministry of Environment, Agriculture etc.] and describe the type of cooperation [Regular meetings, joint projects, ad-hoc collaboration, etc.]?

9. Describe the role of the different institutions involved in the collection, analysis and dissemination of environmental information? [Which is the lead institution in each domain? Which institution is responsible for the compilation of environmental data to international questionnaires? etc.]

Part C: Improvement/Establishment of environment statistics

- 1. Is training in environment statistics [concepts, methods, etc.] needed? Please list the major fields and what type of training is required:

- 2. What are the technical requirements for the improvement or development of environment statistics in the institution?

Personal computers and networks

IT training for data processing

Databases for data storage and retrieval

Other, please specify _____

- 3. Overall, where are the main data gaps observed in the field of environment statistics?



A Set of Questions on the Production of Environmental Data/Statistics in the Ministry of Environment and/or other institutions

Part A: General information about the institution:

4. Name _____ of _____ institution

5. Address _____

6. Name, title and address of contact person. _____

Part B: Assessment of the current situation in the institution with respect to environmental data and information

10. Is the institution producing environmental data/information and if yes, when and how has it been set up?

11. How many staff members work in this field?

12. What are the main activities undertaken in the field of environmental data/information? Please list beginning with the highest priority and also note where a statutory mandate exists.

What are the main difficulties encountered in these activities?

13. If the institution is actively conducting or planning to conduct [when?] data collection in environmentally relevant fields, please describe these activities in terms of **type** [surveys in specific fields of environment statistics, environment statistics

integrated in other surveys such as census etc., other], **coverage** [national, regional, urban, local, other], **frequency** [annual, ad-hoc, other], and which national or international **classifications, definitions** and **methodologies** are used?

14. If environmental data are compiled from various institutions, what are the major data sources?

15. What are the outputs produced with respect to environmental data/information? Please list all publications such as state of the environment report, environmental compendia, technical reports, ad-hoc studies, etc.

16. Which are the main institutions involved in the production of environmental data/information [e.g. National Statistical Office, Ministry of Agriculture, Natural Resources, etc.] and describe the type of cooperation [Regular meetings, joint projects, ad-hoc collaboration, etc.]?

17. Describe the role of the different institutions involved in the collection, analysis and dissemination of environmental information? [Which is the lead institution in each

domain? Which institution is responsible for the compilation of environmental data to international questionnaires and/or conventions? etc.]

Part C: Improvement/Establishment of environment statistics

4. Is training in the field of environmental data/information [concepts, methods, etc.] needed? Please list the major fields and what type of training is required:

5. What are the technical requirements for the improvement or development of environmental data/information in the institution?

Personal computers and networks

IT training for data processing

Databases for data storage and retrieval

Other, please specify _____

Part D: Users of environmental data

1. Please, specify the major sources of environmental data your institution is using.

2. Please comment on the quality of the data the institution uses. [Coverage, timeliness, reliability etc.]

3. Overall, where are the main data gaps observed in the field of environmental data/information?

4. Are there currently any projects, co-operations, etc. under way for the development of environmental data? Please list the project title, participating institutions, scope of the project, time frame, expected outcomes etc.

5. What recommendations does the institution make with regard to the improvement of environmental data/information?

■

Annex 3 - List of publication used

List of publications used for the assessment:

A- Jordan

1. Annual environmental statistics, Jordan, 1995- 2000, Dept. of Statistics.
2. Urban agriculture statistics, Jordan, 2000, Dept. of Statistics.
3. Statistical yearbook, Jordan, 2000, Dept. of Statistics.
4. Jordan statistical law and its amendment, Dept. of Statistics.
5. Family living conditions, Jordan 1998, Dept. of Statistics.

B- Syria

1. Statistical abstract, 2001, Central Bureau of Statistics (CBS).

C- Egypt

1. The environmental statistics position in Egypt by Ahmed Moktar, 2002, (not published).
2. Egyptian experiment in environment statistics, 1998, United Nations and ESCWA meeting in Egypt.

D- Yemen

1. The situation of population and environment in Yemen, 1998, prepared by Mr. Hamid Ahmad, Central Statistical Organization (CSO).
2. Yemen in figures, 2001, Central Statistical Organization (CSO).
3. Act No.28 for the year 1995 of statistics, Central Statistical Organization (CSO).
4. Statistical yearbook, 2000, Central Statistical Organization (CSO).

E- Lebanon

1. Environment and development indicators for Lebanon: User Handbook, LEDO, (no date of publication mentioned).

F- Palestine

1. General statistical law No. 5 for year 2000, Central Bureau of Statistics (CBS).
2. Household Environmental Survey 1998, 1999: Main Findings, Central Bureau of Statistics (CBS).

3. Industrial Environmental Survey 1998: Main Findings, Central Bureau of Statistics (CBS).
4. Meteorological Conditions in the Palestinian Territory Annual Report 1998, Central Bureau of Statistics (CBS).
5. Local Community Survey - 1998, Database, Main Findings, Executive Summary, Central Bureau of Statistics (CBS).
6. Wastewater Statistics in the Palestinian Territory, Central Bureau of Statistics (CBS).
7. Medical Environmental Survey 2000: Main Findings, Central Bureau of Statistics (CBS).
8. Environment Statistics in Palestine 1999, Central Bureau of Statistics (CBS).
9. Dumping Sites Survey in the Palestinian Territory, 2001 Main Findings, Central Bureau of Statistics (CBS).
10. Environmental Survey for Health Care Centers 2001, Main Findings, Central Bureau of Statistics (CBS).
11. Environmental Economic Survey 2001, Main Findings, Central Bureau of Statistics (CBS).

G- Bahrain

1. Statistical yearbook, 2000. [We assume that the publisher is the CSO but could you kindly confirm this?] yes CSO

H- Qatar

1. Statistical yearbook ,the Planning council secretariat general 1999 [We assume that the publisher is the CSO but could you kindly confirm this and also provide the year of the publication?]

I- Kuwait

1. Waste statistics, 1997- 2000, Ministry of Planning.
2. Annual statistical abstract, 2000, Ministry of Planning.

J- United Arab Emirates

1. Emirates in figures, 2001, Ministry of Planning.
2. Annual statistical abstract, 2001, Ministry of Planning.

K- Oman

1. Statistical yearbook, 2001, Ministry of National Economy.

2. Questionnaire of environmental statistics survey, 2001, Ministry of National Economy.

L- Iraq

1. Environmental Statistics and Ability to improve it, 1998, United Nations and ESCWA meeting in Egypt.

M- Saudi Arabia

1. Statistical Yearbook 2000, Ministry of Planning Statistical Affairs.
2. Agriculture Statistical Year book 2001, Ministry of Agriculture and Irrigation.
3. Environmental Protection Standards, Meteorology and Environmental Protection Administration.

N- Blue Plan

1. A blue plan for the Mediterranean peoples from ideas to action, 1997 [Is this a published report and could you provide the name of the publisher?]. it published by blue plan
2. A blue plan for the Mediterranean peoples from thought to action [Is this a published report and could you provide the name of the publisher?] it published by blue plan
- 3.

O- United Nations

1. Glossary of Environment Statistics, United Nations 1997, (Sales No.E.96.XVII.12).
2. Manual: Questionnaire on transmission of information 1998, United Nations Environment Programme (UNEP).

P- CEDARE

1. CEDARE, CD-Rom, 199???? [Could you kindly check the year?].
2. Chronicle CEDARE (6 articles), 1998- 2000.
3. Directory of Arab environmental periodicals [Could you kindly provide the name of the publisher and the year of publication?].the publisher is CEDARE, I don't know the year because the document in my house

Q- ACSAD

1. State of desertification in the Arab region and ways and means to deal with it, 1996, ACSAD with support by the United Nations

Environment Programme (UNEP) and CAMRE [Could you kindly provide the full name of this institution?]. Arab Center for the Studies of Arid Zones and Dry land

List of Internet addresses:

Internet address	Institution	Country
www.dos.gov.jo	Dept. of Statistics	Jordan
www.nic.gov.jo	National Information Center	Jordan
www.uae.gov.ae/mop	Ministry of Planning	United Arab Emirates
www.mop.gov.kw/mopwebsite	Ministry of Planning	Kuwait
www.moe.gov.lb/ledo/index.htm	Ministry of Environment, LEDO	Lebanon
www.bahrain.gov.bh	Government of Bahrain	Bahrain
www.cedare.org.eg	CEDARE	Egypt
www.cas.gov.lb	Central Administration for Statistics	Lebanon
www.pcbs.org	Palestinian Central Bureau of Statistics	Palestine
www.planbleu.org	Blue Plan	France
www.escwa.org.lb	ESCWA	Lebanon
www.eeaa.gov.eg	Egyptian Environmental Affairs Agency	Egypt
www.moe.gov.lb	Ministry of Environment	Lebanon
www.planning.gov.sa	Ministry of Planning	Saudi Arabia
www.mepa.org.sa	Meteorology and Environment Protection Administration	Saudi Arabia
www.ncwcd.gov.sa	National Commission for Wildlife Conservation	Saudi Arabia
www.swcc.gov.sa	Saline Water Conversion Corporation	Saudi Arabia
www.moh.gov.sa	Ministry of Health	Saudi

		Arabia
www.saso.org.sa	Saudi Arabian Standards Organization	Saudi Arabia
www.omannet.com	Oman National Information net	Oman

Annex 4

Specific use of usual tools to produce environment statistics

Introduction

The environment statistics is a comprehensive statistics, it covers most of statistical fields, and it use all methods of data collection and data treatment, also it use some analysis method to derive the technical coefficient and to build modules. In addition, it uses most of statistical tools like GIS.

The main challenge is how to get data from different sources and to make it consistence before aggregate it to make complete view in the studied field. The statistical methods can solve part of this problem, but to come up with this problem too much work is still required.

If the reliability and reasonability of data were required the limitations of using statistical methods should be taken into account.

Sources of data

Due to the huge size of data used in this activity no individual source can cover every thing, so there are many sources of data like:

a- Official governmental source.

It includes the registers forms from different institution including annual and monthly reports, in addition to the scientific reports and progress reports.

The institution also provides data by spreadsheet and some institutions have information system. The huge quantity of data and information could be collected and tabulated and used to produce statistical information from it.

As example of this source is ministry of water which provide data about water supply, water distribution, water pricing, water use and precipitation quantity ...ect.

b- N G O's source

There are many agencies and volunteers' work on environmental protection, rehabilitation, education and other activities relate to this field. Some data was available as a result of conducting there usual works, this data is not in the statistical way, but the environment statistician can make use of this data.

As example of this source is Royal Society for Protection of Nature that they take care about some preservative areas and they plant classification and they take care about wild animal. As a result they provide information relate to bird classification, statistician in biodiversity statistics could use this data.

c- Statistical Offices

The statistical offices have data and information in all fields like demographic, agriculture and economic statistics. It includes information related to the environment fields like water, energy consumption of these sectors, land use ...ect.

The information could be aggregated and re-tabulated to produce new environment tables. This source contributes on a good part of environment statistics with low cost, so any statistician should concentrate on this source before thinking about conducting field surveys to collect data.

d- Additional questions to the questionnaires applied at the statistical office

Some time the usual surveys, which are conducted periodically by statistical offices, provide data that could be used in environment statistics, but some extra information was needed, to fill the gaps of environment data. So the addition of few questions to the questionnaire applied in this survey could be sufficient, which minimize the cost of data collection and keep the results consistent with other results produced by statistical offices.

An example of this approach is adding some questions on economic enterprises survey like water quantity consumed, quantity of energy used, quantity of waste produced and method of disposal.

e- Specialist surveys

In addition to the sources mentioned above another source is available which is considered as most expensive source, when the data is not available in any source or the data is not reliable, and the information was needed the suggested method is to collect data from the target population.

Many methods of data collection could be applied depending on type of data and the domain and accuracy of the results. As an example to know the situation of land use and land covers you can use satellite images and agriculture surveys

f- Other sources of data

There are other sources like international agencies that collect or produce data related to environment, and statistics of other countries like external trade, departure and arrival statistics and water statistics. In addition the use of statistical analysis and building models and deriving technical coefficients also could be applied.

Basic principles to apply survey

There are various methods to collect data by using surveys. Also many purposes were required for each survey. The variation between surveys and another mainly due to objectives, the survey design, the availability of time and resources and characteristics of the target

population. In general there are some basic principles should be taken into considerations for any survey to achieve the goal. The main principles are:

1 – specify the objectives of the survey

For each study there is main objectives to be achieved, these objectives should be reasonable, applicable, and fitted with the available resources and time required. The data user wants as much data as he can get, but due to the limitation of resources this demand should be adapted by current situation, so the main objectives should be proportional with the capacity of the institution. In addition the objectives should be clear, understandable consistence and veritable.

First you need to raise the question that are we really need to conduct a survey, if the answer yes, you can specify the data needed by this items:

- What's the data needed in pressing and has priority relate to other data?
- Who own the study?
- What's the budget deposit for this study?
- What's the availability of human resources to conduct the study?
- What's the level of accuracy for study results?
- What's the dead line to issue the results?

2-Dummy tables

Depending on the objectives mentioned above the dummy tables should be prepared before designing questionnaire. These dummy tables should include all items mentioned in the objectives in details, if any objective not covers in the correct way in the dummy tables and questionnaire it will create problems after collecting data.

3-Questionnaire design

The questionnaire should be fitted with the objectives mentioned above, each objective should be has all questions related to it, the questionnaire design is a difficult job. It needs proficiently and specialist on the field of study in addition to the high expertise on statistics, it needs time and prepare many draft and make pilot survey to check each individual question in the questionnaire, also it need to check the time needed to fill the questionnaire and to check questions ordered in the questionnaire.

-Preparation of questions

The specification of questions should be mentioned in the questionnaire will be done by using the dummy tables, the questionnaire also should include questions for other purpose like identification questions and some questions to check the reply of main questions.

-Questions order

The questionnaire should start with identification questions like address of the establishment, then the key questions like activity of establishment then summary questions for the main topics, after that you can have separate card for each topic contains all question relate to the that topic.

-Questions words

The words of the questions should be clear, easy to understand, each word has one meaning to avoid misunderstanding, each question should includes one informatics only.

-Questionnaire length

The questionnaire shouldn't be too long because non-sampling errors will increase, also non-response rate will increase, so the questionnaire should include only the essential questions to reduce the time of filling the questionnaire. If the questionnaire is long and all questions are important it is recommended to divide this questionnaire into tow part and fill each part in one visit, the maximum time to fill the questionnaire should be not exceed 40 minutes.

4- concepts and definitions

For each study there are concepts and terms used, this concepts should be fitted with international definitions, or national definitions depending on the objectives of the study. The questionnaire instruction manual should include definitions and clarifications and some examples for all concepts and terms used in the study.

5- survey population

The target population subject to the survey should be clear, can reached by the enumerators.

6-Frame and sampling units

The frame defined as a list or a map contains all sampling units. The frame should be:

- Comprehensive covered all sampling units at the target population.
- Up to date.
- Homogenous, all sampling units from the same type; like enterprises or farms or households.
- Avoided from duplication or missing of some sampling units.

The sampling units are all parts of the population and could be natural like families or artificial like farms. These sampling units should be defined and free from any interaction. Each sampling unit should have chance to drawn in the sample.

6-Sampling design

This subject will cover in details in the next section, in general the sampling design should be efficient: the cost is minimum with high precision, accurate, the sampling error at the minimum size. The sampling design should include these points:

- The technical capability of the working team and the software available for this purpose. When every thing available you can apply complex sample design with high efficiency but if some thing not available you need to change the policy.
- The availability of finance and materials.
- The domains for information release; if the results will be published at governorate level it needs more sampling units than when it will be published at national level.
- The required time to issue the results.
- The level of accuracy.
- The objectives of the study.
- The expected size of non-response rate.
- Periodically of the survey.

7-Methods of data collection

There are many method of data collection like:

- Telephone.
- -Normal mail.
- -e-mail.
- - Interviewing the response.
- - Actual measurement.

The method of data collection depends on the nature of the population, the availability of resources, and the level of accuracy. The instruction should be clear to all enumerators to use the same method of data collection to avoid any bias.

8-training of enumerators and other field workers:

It is important to give a sufficient training to all employees by the person who design the questionnaire (the same source give training to all workers to reduce non-sampling errors). The training will include lectures and some practical at the office then some practical at the field.

9-The time reference.

The time reference for each part of questionnaire should be clear and reasonable, in addition the time reference for data collection and the dead line to issue the report also should known in advance prior to start conducting the field work.

10-Pilot survey

It is essential to conduct pilot survey before starting of actual fieldwork. The purpose of pilot survey is to examine the questionnaire design and the time needed to fill the questionnaire and to check the understanding of the work by the field workers. In general it is important to review the plan of the survey to avoid any unwanted problems.

11-Field work

The most critical and important step is the fieldwork. The good regulation of the field work including daily and weekly plan is very important to succeed in the mission, it is important also to reduce the non-response rate and to take care about quality control in data collection, many methods could be applied like editing the filed questionnaire at the field including spot check and apply post enumeration survey. The time of work field always limited because the cost of this step is very high, so it needs incentive work by all survey employees, finally the output of the survey mainly depend on this step, so it should be under control of high position person of the survey team.

12-Data processing and data entry

This step includes questionnaire editing and data cleaning.

Data tabulation

Data entry and computer editing

Extraction of the survey results

13-Preparation of tabulation report

After extracting of results and tabulated it by using the adjusted dummy tables prepared before. The tabulation report should include theoretical part that's mention the objectives and survey methodology, sampling design, method of data collection, and summary of the results.

Then the tabulation report will include the tables classified by subject. The tables should be clear, understandable, friendly to use by data users, and it should be in the good form.

14-Analysis of results

The results mentioned in the tabulation report could be used by the person who is familiar with the statistical tables, but the decision maker cant understand what's behind this results, so he can't make any inference or take any decision, so it is important to produce analytical report contain at least some descriptive analysis. By this report you make more use of the survey results and you get good impressions from data users.

Sampling techniques applied in environment statistics

The sampling design for environmental survey is similar to the sampling design of corresponding survey; as a result of extensive of fields covered by environment statistics the vast of samples design will apply, the sampling design required the expertise, updated frame and clear objectives of the survey and the domains. The efficient sample design is

the design that provides high accuracy with the minimum cost and characterized by simplicity, easy to deal with and applicable, in addition to flexibility and meet the survey objectives.

In general the sample design used for environment purpose could be divided into:

a-Demographic sample design

The frame used in this type of surveys is a population frame prepared by using population census data, the population census is conducting each ten years, so this frame is updated each ten years which is along period so the sample design should take this point inconsideration.

The frame used in this type of survey is frame of clusters each cluster contain number of households, and the frame is stratified by geographic, socioeconomic, location of the cluster and the size of locality that cluster belong to.

The main sampling design in this field is:

Stratified two-stage cluster design; the stratum represent one governorate or urban/ rural at one governorate or some times each homogenous population. At the first stage the drawing of clusters by pps in the systematic way were applied, and then after updating the psu. The number of households was selected by systematic way in the second stage.

Self-weighting design; this design was applied in many survey in last but no more use of this design in many countries. The characteristic of this design is that all sampling units have the same weight to simplify the calculation of weights and result extraction, but this design is inefficient design in terms of cost effective sample size.

The use of this design in environment statistics like indoor environment, household water consumption, quantity of waste produced, method of disposal and energy consumption ...ect.

b-Economic enterprises

Due to the variation between the enterprises in the size and input used and output produced and by product as a result of processing it is difficult to have one sufficient sample design. So to simplify the problem the frame was divided into sub sectors by the main activity of each enterprise, then each sub sector was divided into classes by the size of each enterprise.

The sample design applied in this field is a stratified sample design. The complete coverage for all big enterprises and enterprises with small number in the same activity, then the remain of the enterprises were stratified by size, and each stratum was stratified by location of the enterprise and the activity in details (isc 4digit) then the sample were

drawn from each stratum after ordering the enterprises by pps method in the systematic way to improve the efficiency of the sample design by providing implicit stratification.

The frame of these enterprises could be acquired from enterprises census or from license keeper like ministry of economy or ministry of municipality; also it could be as a result of combination of different sources.

The use of this sample in environment statistics like estimation of quantity and value of water use and quantity and value of energy and estimation of wastes including hazardous waste, also it could be used to estimate sustainable indicators in this sector and other environment indicators.

c-Agriculture sample design

It is divided into three main categories

Crop statistics

This activity covers land use in agriculture sector including the distribution of land by type of crop grown, the irrigated and non irrigated area, source of irrigated water, method of irrigation, quantity of water required per area unit (hectare), and it provides data about usage of pesticide and fertilizers and other agriculture inputs which is related to environment.

The main sample designs for this activity are:

To estimate planted area the stratified one stage sample design were applied.

To estimate average yield and inputs the stratified two stage sample design were applied.

Also the successive sample design was applied

Livestock statistics

The stratified multistage sample design was applied and the psu was drawn by pps way.

Agriculture economic statistics

The cluster sample design was applied.

Case study

Sample design for wastes of manufacture activity

1-The frame

The economic enterprises census was conducted in 1999 and covered all economic enterprises in Jordan. It provides good benchmark and frame for this activity. It includes information about paid capital, total revenue, and total number of employees for each enterprise besides the identification data like the detail activity (isic6digit) and other information needed to make the sample design.

2 – stratification

All enterprises stratified by total revenue into 3 classes, it classified by paid capital, total employee, and it classified by activity 4 digit at the region level.

3 – sample design

All enterprises classified as big enterprises were surveyed by complete coverage. (Revenue 200000 JD and above, or paid capital 200000JD and above, or number of employees 20 person or more).

All enterprises with small number (less than 10 enterprises in the frame) at the same stratum also were surveyed by complete coverage.

The enterprises remained were divided into middle and small size (middle when revenue between 60 thousands to less than 200 thousands, and small when revenue less than 60 thousands J.D.). After that in each stratum and in each size of enterprises the sampling units were selected.

4-Sample allocation

The Nyman allocation was applied to allocate sampling units between stratum after calculating the sample size depending on 1999 results, the coefficient of variation (C.V.) is around 5% at region level for each activity isic 4 digits.

5-Method of drawing sample

The systematic method was applied after ordering all sampling units in each stratum ascending by total revenue, to provide implicit stratification to increase the efficiency of the design.

Use of statistical tools for statistical inference

Tools mentioned in spss program

- Calculation of mean and use of this parameter in water use (ex. from industrial sector).
- Independent – sample t test.
- Paired –sample t test.
- One- way ANOVA.
- Linear Regression.
- Non-parametric tests.
 - Chi- square.
 - Kruskal –wallis H
 - Wilcoxon.
 - Mann-Whitney U.

Limitation of using statistical tools in environment statistics

Due to the privacy of environment statistics like risk on health and other issue

There are some limitations of use statistical tools like

- 1- Some time the absolute figures is only required as indicators instead of averages like water quality, which makes it difficult in statistical tools because sampling, and non-sampling errors.

- 2- The environment statistics needs to take many factors inconsideration to make judge about the situation and take decision. Which needs to apply complex methods and difficult to simplify the problem.
- 3- The statistician who work in the environment statistics should has good experience in many fields.
- 4- The surveys and other statistics of environment are very expensive compared with other types of statistics.
- 5- It is difficult to have adequate result for some parameters like water requirements for each crop.

Conclusion and Recommendation

- 1- the environment statistics is still new subject, so the statistical methodology needs more improvement and to have special methodology for this subject.
- 2- the environment statistics covers huge number of field, which means to derive new methodology and adapt new statistical tool for this field.
- 3- the main source of environment data is from official and other reports, which make the work more difficult because the data some time not consistence, and the tables not prepared in the statistical way, so it needs to think about harmonize system for data collection, classification, and other thing to solve this problems.
- 4- the environment statistics needs to derive some technical coefficient and build models relate to this field.
- 5- it is useful to suggest sampling designs relate to the environment statistics as master and could be use after doing the adjustment to take care about the condition of each country.
- 6- it suggested having complete software to use in this field by improving the program already prepared or to improve new program, which is friendly, use by users with minimum difficulties and cover all statistical requirements like data entry and statistical analysis besides the available option in al shams software.

Annex 5

- Estimated Emission of Air Pollutants due to Gasoline Consumption 1996.
- Number of Localities in Some West Bank Governorates by Method of Waste Water Collection and Disposal (Dec. /1996) Solid Waste Collection Service in West Bank and Gaza Strip 1994. .
- Monthly Mean Air Temperature (Co) by Station Location in the Palestinian Territories 1997
- Monthly Mean Air Temperature Maximum (Co) by Station Location in the Palestinian Territories 1997
- Monthly Mean Air Minimum Temperature (Co) by Station Location in the Palestinian Territories 1997
- Absolute Maximum Air Temperature (Co) by Station Location in the Palestinian Territories 1997
- Absolute Minimum Air Temperature (Co) by Station Location in the Palestinian Territories 1997
- Monthly Rainfall (mm) by Station Location in the Palestinian Territories 1997
- Maximum Daily Rainfall (mm) by Station Location in the Palestinian Territories 1997
- Number of Rainy Daiys by Station Location in the Palestinian Territories 1997
- Monthly Evapouration (mm) by Station Location in the Palestinian Territories 1997
- Monthly Mean Relative Humidity (%) by Station Location in the Palestinian Territories 1997
- Monthly Mean Wind Speed (Km/hour) by Station Location in the Palestinian Territories 1997
- Household Environmental Survey 1998:
- Percentage of Households by Region, the Means of Obtaining Water, and Average Monthly Household Consumption (m3) 1988
- Percentage of Households by Region and Uses of Domestic Water 1998
- Percent Distribution of Households by Region and Household Evaluation of Water Quality 1998
- Percent Distribution of Households by Region and the Solid Waste Disposal Part 1998
- Percent Distribution of Not Served Households by Region and Most Important Disposal Method of Solid Wastes 1998
- Percent Distribution of Not Served Households by Region and Second Important Disposal Method of Solid Wastes 1998

- Percent Distribution of Households by Region and Periodicity of Solid Wastes Collection by Local Authority 1998
- Percent Distribution of Households by Availability of a Close Solid Wastes Collection Location 1998
- Percent Distribution of Households by Region and Most Important Component of Solid Wastes 1998
- Percent of Households by Region and Second Most Important Component of Solid Wastes 1998
- Percent Distribution of Households by Region and existence of a Cesspit and Domestic Well 1998
- Percent Distribution of Households Having Cesspit and Well by Region and Location of Cesspit and Well 1998
- Percent Distribution of Households Having Cesspit and Well by Region and Distance Between Cesspit and Well (m) 1998
- Percent Distribution of Households Having Cesspit by Region and Periodicity of Evacuation 1998
- Percentage Distribution of Households by Region and Waste Water Leakage Outside the House 1998
- Percent Distribution of Households by Region and Exposure to Noise 1998
- Percent Distribution of Households by Region and the Most Important Source of Noise 1998
- Percent Distribution of Households by Region and Exposure to Smell 1998
- Percent Distribution of Households by Region and the Most Important Source of Smell 1998
- Percent Distribution of Households by Region and Exposure to Dust 1998
- Percent Distribution of Households by Region and the Most Important Source of Dust 1998
- Percent Distribution of Households by Region and Exposure to Smoke 1998
- Percent Distribution of Households by Region and the Most Important Source of Smoke 1998
- Industrial Environmental Survey 1998:
- Percentage Distribution of Industrial Establishments by Region and Main Source of Water 1998
- Percentage Distribution of the Industrial Establishments by Economic Activity and Main Source of Water 1998
- Percentage Distribution of Industrial Establishments by Region and Solid Waste Treatment Before Disposal 1998

- Percentage Distribution of Industrial Establishments by Economic Activity and Solid Waste Treatment Before Disposal 1998
- Percentage Distribution of Industrial Establishments by Solid Waste Disposal Part 1998
- Percentage Distribution of Industrial Establishments by Economic Activity and Solid Waste Disposal Part 1998
- Percentage Distribution of Industrial Establishments Not Served by Waste Disposal by the First Method of Solid Waste Disposal 1998
- Percentage Distribution of Industrial Establishments Not Served by Waste Disposal by Economic Activity and First Disposal Method 1998
- Percentage Distribution of Industrial Establishments by Region and Periodicity of Solid Waste Collection by the Local Authority 1998
- Percentage Distribution of Industrial Establishments by the Economic Activity and Periodicity of Solid Waste Collection by the Local Authority 1998
- Percentage Distribution of Industrial Establishments by Region and Most Important Component of Solid Waste 1998
- Percentage Distribution of Industrial Establishments by Economic Activity and the Most Important Component of Solid Waste 1998
- Average Monthly Quantity of the Most Important Component of Solid Waste in the Industrial Establishments by Economic Activity 1998
- Percentage Distribution of Industrial Establishments by Region and Main Method of Waste Water Disposal 1998
- Percentage Distribution of Industrial Establishments by Economic Activity and Main Method of Waste Water Disposal _1998
- Percentage Distribution of the Industrial Establishments by Region and Treatment of Waste Water 1998
- Percentage Distribution of the Industrial Establishments by Economic Activity and Treatment of Waste Water 1998.