Ministry of State For Environmental Affairs
Egyptian Environmental Affairs Agency
EEAA

Ministry of the Environment, Land & Sea
APAT
(Agency for Environmental Protection and Technical Services)

Annual Guide for Environmental Data and Indicators

2008 Issue

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Foreword

Egypt was keen on implementing the Rio's declaration principles of 1992, and that were recommended by Agenda 21. Along with that came Egypt's full reform program since 1991. It included social and economical reform, as well as, combating poverty, availability of drinking water, sewage networks, and the expansion of electricity and transport networks. Furthermore, including the environmental prospect in the process of social and economical development, to ensure the continuity of these programs for the sake of future generations. Egypt also re-affirmed the necessity of participation of all the governments and countries of the world to achieve sustainable development with its three dimensions, based on the principle of common responsibility with defferentiated burdens.

Egypt's capability of environmental management is continuously improving. However, there are still main challenges that face the country, such as; Urban encroashment on farmland, air pollution, soil salinity and desertification, marine pollution, fresh water pollution from agriculture chemicals, untreated sewage water, rapid increase of population which affects the natural resources, and discord between development policies and environmental guiding principles.

The Egyptian government realized the significance of preparing a national strategy for sustainable development for achieving harmony among economical policies, social plans, and various environmental elements, in order to reach the balance between economic and social development in compliance with environment, for the sake of the future generations. This is why

policy planing and evaluation in general needs to be built upon a forceful system of indicators, which would provide the government with clear indications related to developmental issues.

These indicators depend on monitoring the data, allowing the government to take appropriate decisions. All sectoral indicators (social, economical, and environmental), should be integrated to form a complete system for sustainable development indicators. This will facilitate decision-taking for policy-makers, as it will help in evaluating the general performance for society. Sustainable development indicators present early warnings, to avoid social, economical, or environmental loss in appropriate timing.

It is important to build up indicators to reflect the sustainability for current development schemes that would conform to the needs of the national strategy for sustainable development. This passes through several stages, among which: preparatory stage, selection and determination of indicators that comply with national needs, and the availability of data and information. Finally, the evaluation of the present status, regarding the developmental patterns of sustainability, and the co-relation between non-sustainable patterns and breakdowns in policies and the factors that led to it. As a result, sustainable development indicators have to be chosen through conformity among different sectors, to ensure their adoption to the suggested indicators and the accomplishment of the evaluation stage.

Finally, the greatest challenge facing sustainable development is altering one's habits in consuming the natural resources and protecting nature, taking into consideration the qualitative side along with the quantitative and consumption side of one's life. Consequently, to encourage consumption with the frame of the environmental system capability. This requires rise of consumer's awareness to all policies related to sustainable development, using various tools as economic ones and directed educational

programs, which gives the consumer product or service information that have higher environmental performance.

In the end, while taking this step, we have to reflect our deepest thanks to all who contributed, participated or shared in the preparation of this valuable guide. Especially, to APAT, for the great effort it presented in data accuracy and update, and thorough knowledge of environmental affairs. The accomplishment of this guide in a record time is a tribute to the fruitful and constructive cooperation between two main pillars in the Mediterranean Basin, which will be valuable for generations to come.

Minister of State for Environmental Affairs
His Excellency Engineer
Maged George Elias

General Framework

Environmental protection issues are one of the major concerns within the local and international level, as one of the issues that have top attention locally, regionally, and internationally. The Egyptian government has started to achieve social and economical development. However, it faces several environmental problems, which is due to rapid increase of its population, and expansion in industrial, agricultural, and touristic activities to accomplish economical development. This increases the burden on our natural resources. The augmentation of internal immigration from rural areas to urban ones in Egypt has a great impact in threatening environment. This is why we have to be more careful in using those resources, and to achieve that in the best way, as they are considered as the main reserve for development.

President Mubarak has given due care to environmental protection issues, as he pointed out that protecting the environment and preserving is not a luxury it is a prerequisite, it became a matter that the Egyptian citizen's life depends on in order to enjoy safe and healthy life. It will enable him to produce and innovate. His Excellency's support was through making alterations in the constitution by including an article that calls for preserving environment, which is «Article no. 59». It stated that protecting environment is a national duty, and it classifies the procedures needed to protect it. This will escort all the State's effort, represented by governmental institutions, non-governmental organizations, civil society, and private sector, to reach out to a healthy environment for the Egyptian citizen. Consequently, it will achieve balance between both the demand on economical and social

developmental needs, and the best use for the natural resources.

The national aim for the Egyptian government is to achieve advancement in the field of sustainable development. That is to be done through altering the ratio of economical development, with putting less pressure on natural resources and the environment, and guarantying fair distribution of wealth among society's categories. Accordingly, this will lead to increase the rate of development, and reduce burden off the State's budget. This can be done through the presence of a powerful administrative institution, capable of keeping up with change, having the capacity to manage the State's resources, and presenting exceptional services to the citizens. Furthermore, it would work on getting Egypt ready to get involved into the global system, through bi and multinational partnership and cooperation to escalate with various fields, such as economy, environment, and society, by having measurements enabling the country to obtain aids, and at the same time accomplish economical and political improvement to reduce poverty. All this can not be attained except through having indicators for achieving development in all fields and sectors, and improving them to measure the level of sustainability, to be used by policy-makers in decision-making. In addition to, economic indicators that deal with the social perspective for the civil society, so as to provide early warnings to avoid social, economical, or environmental breakdown in the appropriate timing.

Chief Executive Officer

Dr. Mawaheb Abou El Azm

Background

Egypt is distinguished by its ecological balance throughout thousands of years by its ecological zones, including: the fertile Nile Valley, the extended coastal areas, and the major deserts with scattered Oases, which enabled the ancient Egyptian to establish an extended civilization over the centuries. The ecological balance was the result of continued production at rates synchronized with active working forces and population of the varied ecosystems. In addition to the rational use of natural resources of rates appropriate to resources conversation and continued development in accordance with the prevailing conditions throughout the centuries.

However, through the last century, Egypt witnessed several changes related to technological development in various fields. In addition to, flourishing industries, greater use of primary materials, development of production techniques and agricultural activities, which introduced high yielding varieties. Such major changes were accompanied by changes in management practices and land use patterns. At the same time, there were enhanced impacts of local, regional and international wars and increase of adverse environmental impacts due to inappropriate human activities to environmental safety. Through the second half of the last century unusual drought spells appeared in many areas including : USA , several countries of Northern Africa, and others all over the world. Climate change processes began to be of more concern. Moreover, increasing rates of population led to immense pressure on the use of natural resources due to increase of food and agricultural commodities demands. Such demands, led to the

irrational use of agricultural inputs including; mineral fertilizers and pesticides, which in turn caused degradation of land and water resources. On the other hand, the continued increase of urban areas, industrial and touristic centers led to enhanced production of water and air pollutants, traffic problems and excess use of energy resources leading to greater emissions of greenhouse gases, which are one of the main causes of climate change.

The previous review of the general background of the guide clearly indicates that the environmental systems at the international level, as well as, at the national level, suffered from varied changes, constraints, and many challenges. Such conditions call for the establishment of an integrated information system for environmental data, based on appropriate and credible indicators that should be chosen upon proper scientific bases. Such system would serve for assessing, comparing and monitoring for the determination and evaluation of the implemented environmental activities at the short, medium, and longer terms. Such a system will also support proper planning and collaboration of the various institutions and centers to address the emerging problems and environmental challenges.

The various components of the present guide were complied through a methodological framework composed of environmental assessment, filling and analyzing to gather a group of appropriate indicators that would be useful for planning, assessing and comparing data, which will be of great benefit for specialists and researchers.

Two training workshops were carried out during the preparation of the present guide, which helped to achieve capacity building for many Egyptian specialists, in addition to, exchange of ideas, unifying methodologies and preparatory approaches for the information system and indicators. I take this opportunity to thank the Italian partners who showed great effort and distinguished experiences.

This valuable Annual Guide is being issued in Arabic and English versions to act as an important guideline at the national level, as well as, to serve as a guiding tool for possible collaboration means in environmental fields with environmental, financial, and international institutions and organization at the present and future time.

Finally, we look forward to issue a series of this guide through reasonable intervals to be a valuable foundation and precious guiding tool for the present and future generation of our beloved country.

Head of Central Division for
Coastal Areas and Lakes
Head of Component
Dr. Hoda El shayeb

Contents

Acronyms

Acronyms

µg/m³	Microgram per cubic meter
µM	Micromol
ACSAD	Arab Centre for the Studies of Arid Zone and Dry lands.
APAT	Agency for Environmental Protection and Technical Services
ARC	Agriculture Research Centre
CAPMAS	Central Agency for Public Mobilization and Statistics
CBD	Convention for Biological Diversity
CO	Carbon Monoxide
DANIDA	Danish International Development Assistance
DPSIR	Driving Forces – Pressure - State – Impact – Response
DRC	Desert Research Centre
EALIP	Executive Authority for Land Improvement Projects
EEA	European Environment Agency
EEAA	Egyptian Environmental Affairs Agency
EIMP	Environmental Information Monitoring Program
ENR	Egyptian National Railway
GC	Greater Cairo
IGSR	Institute for Graduate Studies and Research
ISO	International Standard Organisation
IUCN	International Union for Conservation of Nature
IWT	Island Waterway Transport
MALR	Ministry of Agriculture and Land Reclamation
MAP	Mediterranean Action Plan
MED	Ministry of Economical Development
MEE	Ministry of Electricity and Energy
Mg/m³	Milligram per cubic meter

MHUUD	Ministry of Housing, Utilities and Urban Development
MLD	Ministry of Local Development
MOHP	Ministry of Health and Population
MOT	Ministry of Transport
MSEA	Ministry of State for Environmental Affairs
MTS	Maritime Transport Sector
MWRI	Ministry of Water Resources and Irrigation
NARSS	National Authority for Remote Sensing and Space Sciences
NCS	Natural Conservation Sector
NIOF	National Institute of Oceanographic and Fisheries
NO	Nitric Oxide
NO2	Nitrogen Dioxide
O3	Ozone
OEP	Organization of Energy Planning
PAs	Protected Areas
Pb	Lead
PM10	Particulate Matter with nominal diameter less than 10 micrometer
RTA	River Transport Authority
SO2	Sulphur Dioxide
VOC	Volatile Organic Compounds
WHO	World Health Organisation
WQI	Water Quality Index

Methodological Framework

Methodological Framework

The aim of the methodological framework of the guide is to describe the activities led by the Egyptian and the Italian task forces in order to compile the present Annual Guide.

1. The Steps

Activities have been accomplished through four steps.

Cognitive Step

The inception Meeting in Cairo (25th -26th September 2005) marked the beginning of the collaboration between Egypt and Italy aiming at issuing the hereby Data Annual Guide. During this meeting, activities referred to as the **cognitive** step took place. First of all, the Italian delegation informed the Egyptian Side with the related approaches and the methodologies used for building the APAT Environmental Data Yearbook. In particular, some experts illustrated the Italian experience in the indicators building for the following thematic areas:

- Fresh Water Quality
- Coastal Water Quality
- Biodiversity and Protected Areas
- Land Use Management
- Afforestation
- Air Quality
- Noise
- Energy
- Transport

- Solid Waste Management

A general review was presented by the Egyptian delegation of the territorial, institutional, and environmental contexts of Egypt, in order to point out the main Egyptian environmental **priority thematic areas**. Consequently, the **task forces** of experts were formed on these bases. This process allowed the creation of a network consisting of: EEAA experts and other important Egyptian holders of environmental data.

Finally, some **questionnaires** have been designed and used to gather information about the effective data available at the Egyptian institutions. The questionnaire is a flexible tool, adaptable to all the selected thematic areas: on the basis of the information gathered based on the Egyptian environmental context and on the basis of the data included in the Egyptian State of Environment Reports. The Italian experts prepared a draft version of the questionnaire for each thematic area, including the following items:

Data gathering methodology (monitoring sites, data sources, others);
Data owners;
Data availability.
The questionnaires were compiled by Egyptian experts in the varied fields.

Analytical Step

The **questionnaires analysis** allowed the recognition of effective information availability, specification of indicators and definition of items to be included in the indicators fact-sheets.
The fact-sheet is the tool used to collect all the information related to a single indicator. guidelines have been made in order to make the collection process easier.

Once the fact-sheets have been compiled, they have been analyzed and checked in order to point out the gaps and needs.

Synthesis Step

Once the available information has been compiled based on the thematic area, it was possible to build the core set of indicators.

Capacity Building Step

The formulation process of the hereby Annual Guide included the realization of two training courses made by the Italian task force according to the Egyptian task force needs.

First Training Course – "Environmental Indicators"

Main issues presented:

- key concepts and terminologies;
- the "information pyramid" and the most important environmental reporting models (such as PSR and DPSIR);
- indicators classifications (EEAA experience);
- index's concept and examples ("Biocapacity" and "Ecological footprint" indexes);
- the decoupling model (OECD methodology & APAT application);
- core set of indicators (APAT core set in details);
- practical applications of the notions discussed (core set building).

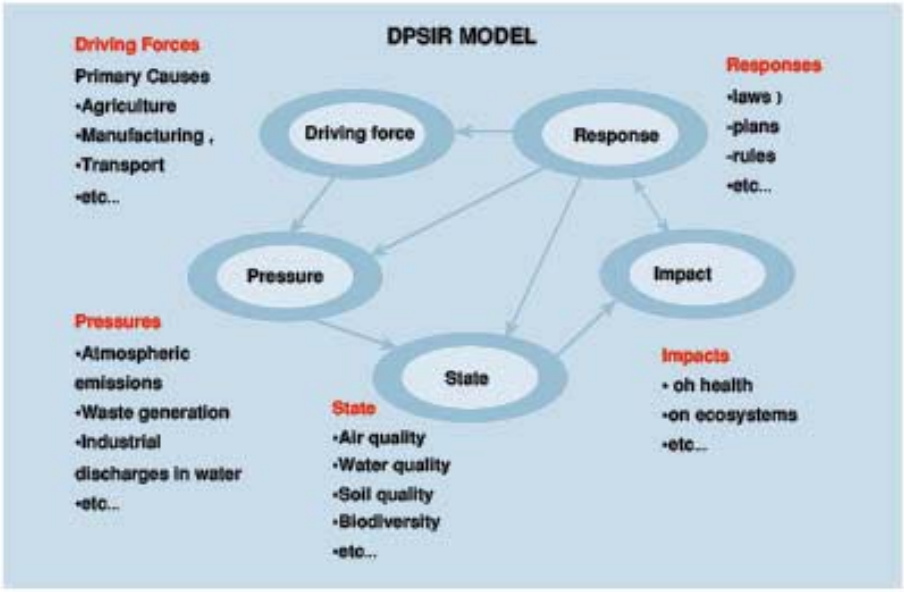
Second Training Course – "How to Produce a Annual Guide for Environmental Data and Indicators"

Main issues presented:

- methodological approach used by APAT to build the "Italian Environmental Data Yearbook";
- data process illustration: how to prepare the indicators data (activities, tools and sources) and how to use them to present the environmental information;
- different frameworks to structure an Annual Guide have been illustrated through some examples of "Environmental Data and Yearbook";
- discussion about the Egyptian Annual Guide for Environmental Data and Indicators structure.

2. The DPSIR Model

The DPSIR framework, developed by the European Environment Agency and based on an earlier model (PSR) developed by the OECD (Organization for Economic Cooperation and Development) has been adopted by APAT to build the environmental fact-finding system. As shown in the following figure, the DPSIR framework organises the environmental data and information according to five categories linked by specific causality relations.



The ***state***, that is the set of physical, chemical and biological qualities of the environmental resources (air, water, soils, etc.) is altered by the ***pressures***, which includes everything and anything that tends to deteriorate the environment (air emissions, waste production, industrial releases, etc.) most of which are caused by human activities (called ***driving forces***) such as industry, agriculture, transport, etc., but which can also be caused by natural phenomena. These alterations produce effects (***impacts***) on the health of human beings, living organisms, ecosystems, economic aspects, and others. The impacts may be addressed and contrasted by means of ***responses***, which are measures (such as laws and regulations, action plans, guidelines, etc.) aiming at acting on all the other categories.

Structure of the Annual Guide

Structure of the Annual Guide

Description of the Contents

The Annual Guide is composed of "Methodological Framework" aiming at describing the activities led by the Egyptian and the Italian task forces, in order to build the Annual Guide, and contains the reading guidelines for it. In particular, it illustrates the contents, comments on synoptic tables and the review of indicator fact sheet, and shows the main features of Egyptian environment. The guide is divided into two units: the first one is an overview of the environmental conditions in Egypt, as well as, some geographic information. The second one is the "Egyptian Environmental Components", including the specific topic areas of : Fresh Water Quality, Coastal Water Quality, Biodiversity and Protected Areas, Land Use Management, Afforestation, Air Quality, Noise, Energy, Transport, and Solid Waste Management.

Description of the Second Unit "Egyptian Environmental Components"

For an easier consultation of the text, the paragraphs of the second unit are articulated on the basis of the main Egyptian topic issues. Each paragraph includes the suitable indicator fact-sheets. A fact-sheet is made up of "metadata" (the attributes that characterize the elements of the cognitive base) and "data".

Description of Synoptic table

This unit begins with an overview on «Egyptian Environmental Condition» and ends with the synoptical framework of the information (metadata and data) for the developed indicators, as well as, the indication of the elements of representation (charts, figures) available.

Topic Area	Indicator	DPSIR	Aim

Synoptic framework indicators

Topic Area

The topic area is the specific topic of the indicator

Indicator

In this field the indicator's name was defined univocally.

DPSIR

The category of affiliation of the indicator is related to the model DPSIR.

Aim

Illustrates the main objective of the indicator.

For every Thematic Area, the informative complex is expressed in the followings paragraphs:

- *Introduction (to the Thematic area)*
- *Bibliography*
- *Indicator fact sheets*

Introduction (to the Thematic area)

For every Thematic Area a systematic description of the topic elements is provided, both from the physical point of view, and in terms of principal phenomenon.
In details the Introduction to Topic Area contains:

- Topic area description
- Territorial, Environmental and Political Background
- Criteria of Indicators Selection
- Further work required (at data and indicator levels)

Bibliography

Includes the documents, publications, relationships, links and websites which are useful for understanding the Thematic area and indicators.

Description of Indicator Fact sheet

The detailed information (data and metadata) related to each indicator, are organized in fact sheets:

"Metadata" include:

- **Description** of the indicator (main features, limitations, methodology);
- **Measuring Unit**;
- **Data Source** (Agency, Association, Ministry, Organization etc);
- **Periodicity of the Updating**, the time elapsed between two different presentations of the indicator in the Annual Guide;
- **Information Quality**, gives indications on the quality of the data used in terms of; relevance, accuracy, comparability over time and space, as follows:

- **Relevance:** compliance of the indicator with the information demand relating to environmental issues.

- **Accuracy:** could be shown by data comparability, reliability of information sources, indicator coverage, data validation.
- **Comparability over time:** adherence to the time series, consistency of the methodology over time.
- **Comparability across space:** number of regions represented, use of the same or similar methodologies, reliability within the region itself.
- **Purpose** of the indicator, is the main objective of the indicator;
- **Target Fixed by the Law**, shows the relevance of the indicator to specific national or international targets;
- **Assessment of State and the Trend** of the indicator, represents an evaluation, made by experts, of the monitored environmental issues, (eventual targets have been considered).
- **Comments on Tables and Figures**; provides further elements useful to the comprehension of the data.

The Representation of the indicators is made by graphic, thematic tables and charts. They are often immediately interpretable, if related to the metadata.

- Introduction
- Unit 1 :
  - General Overview of Egypt
- Unit 2 :
  - Egyptian Environmental Components and Its Indicators.
  - List of Indicators

Introduction

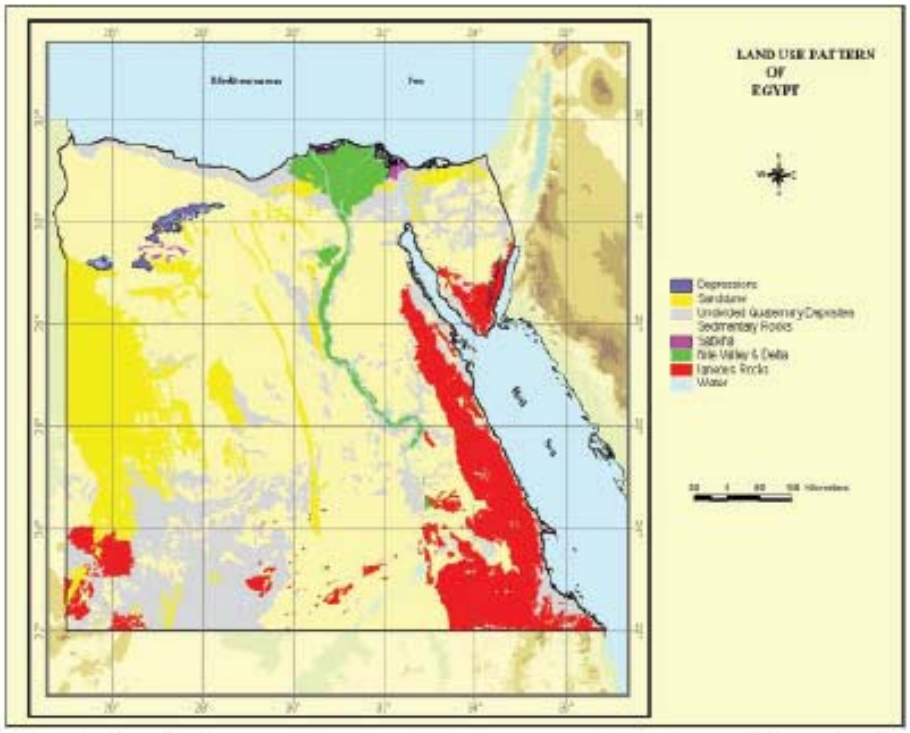
Through the last three decades the world recognized the significant linkages among the environment, economic and social issues. Environment preservation has became indispensable for the rational utilization of natural resources and its sustainable development. The Egyptian Authorities directed the national activities towards mainstreaming the environmental dimension in all pertinent areas for achieving sustainable development. Currently, Environmental management and conservation in Egypt focus on the rational utilization of varied natural resources and prevention of practices and activities conducive to the degradation of available resources, or the living conditions of the people for the benefit of the present, as well as, for the rights of generations to come. To properly assess the environmental dimensions in Egypt, it is imperative to outline the main features that have significant impacts on the environment.

Egypt is a land of strategic location and cross roads, distinguished by mild climate, varied terrain attributes and diversified ecosystems: with a total area of one million square kilometer projecting the River Nile Valley, cradle of ancient civilization, Sinai Peninsula the seat of historic events and religions, lengthy coastal lines overlooking three continents, and large deserts and several oasis. The following map depicts the major physiographic features of Egypt. Such features along with climatic variation, available natural resources, and population distribution lead to distinguish four agro-ecological zones as follows:

1. North Coastal Areas.
2. Nile Valley and Adjacent Reclaimed Desert Soils.
3. Sinai and Eastern Desert.
4. Western Desert and Scattered Oasis.

Each agro-ecological zone has its unique attributes and environmental characteristics. Such significance of local features of the main environmental components of each ecological zone will vary according to climatic, physiographic, available resources and demographic considerations. The main components of the environment that are addressed in the present guide of statistics are related to the natural resources, rural, and urban centers as follows:

1-Fresh Water Quality
2- Coastal Water Quality
3- Biodiversity and Protected Areas
4- Land Use Management
5- Afforestation
6-Air Quality
7-Noise
8-Energy
9-Transport
10-Solid Waste Management



Each of the environmental components referred to will be addressed separately with reference to its nature, variations, potential constraints, and achieved actions.

The previous review clearly points out the need and significance of building environmental assessment, analysis, planning and decision-making upon credible, reliable and processed data. Proper compilation of statistics and formulation of thematic databases are among the basic needs for monitoring directions and quantified changes of the environmental component over time. Thus, measures taken to address such changes would be carried out on sound bases.

The Ministry of State for Environmental Affairs is taking wide strides to achieve sound environmental planning at the short, medium, and long terms through the formulation of the National Environmental Action Plan till 2017. The issuance of the present guide for Environmental Statistics, in cooperation with Italian Ministry for Environment represented by Agency for Environmental Protection and Technical Services (APAT), will pave the way for the implementation of the scheme.

The fruitful outcome of such valued cooperation is depicted in the first edition of the guide of Environmental Statistics to be issued in Arabic and English languages.

- Unit 1:
  General Overview of Egypt

1. General Overview of Egypt

The knowledge of the geographical characteristics of a country is very important for the understanding of the statistics in general, and specifically for environmental statistics.

Egypt is located in the Northeastern corner of Africa. It is bounded by the Mediterranean Sea on the North, Sudan on the South, the Red Sea on the East, and Libya on the West.

Egypt has the longest river in the world, which is the River Nile. It is an international river, it has three main tributaries (The Blue Nile, White Nile and the Atbara River), that flow in Sudan. The River Nile passes through Congo Democratic Republic, Burundi, Rwanda, Tanzania, Kenya, Uganda, Ethiopia, Sudan and Egypt.

Egypt is divided into 27 governorates, of which 4 governorates are metropolitan (cities only) and the others have urban and rural areas. Also, it is divided into four main geographical regions:

1- The Nile Valley And Delta:

It represents 4% of the total area of Egypt, and is divided into 2 divisions:

a) Upper Egypt Region;
b) Lower Egypt Region;

2- The Eastern Desert:

It represents 22.3% of Egypt area; it extends from the Nile Valley till Egypt, s East boundaries along side the Red Sea Coast.

3- The Western Desert:

It represents 2/3 of the total area of Egypt, 68.3% of Egypt' s area and its average altitude is 500 m. It spreads from the Nile Valley to the West of the Egyptian/Libyan boundaries, and from the Northern to the Southern boundaries of Egypt with Sudan.

4- Sinai Peninsula:

It represents 6% of the total area of Egypt. It is triangular in shape. Its bottom from Mediterranean Sea in the North, its head from Ras Mohamed, Aqaba Gulf in the East and Suez Gulf, and Suez Canal in the West.

Egypt's climate is affected by several geographical factors:

a) Location.
b) Terrains of Egyptian Lands.
c) Solar Irradiation.
d) Water Surfaces.

The following table has some geographical characteristics of Egypt:

Table 1.1: Geographical Characteristics of Egypt

Geographical Characteristics	Unit	Data	% From total area of Egypt
Total National area	km²	1.009.449.9	
Western desert area	km²	681.000	68.3
Eastern desert area	km²	225.000	22.3
Sinai peninsula area	km²	60.000	6
Nile valley area	km²	33.000	
Altitude maximum (Sinai Gabel Catherine)	m	2640.0	
Nile length	km	1.532	
Main lake area, (Nasser lake)	km²	4000	
Coastline length total (Red sea and Mediterranean)	km	2.936	
Mediterranean coastline length Red sea coastline length	Km Km	995 1941	

Sources: CAPMAS

Population:

Egypt's population was estimated arround 73 million in 2006. The basic data source concerning population and its distribution in Egypt is the Population Census which covers the whole country and is carried out every ten years using the de facto census.

Table 1.2: Population and Urbanization for Some Selected Census Years for Egypt and the Three Biggest Governorates

Variables	Unit	1976	1986	1996	2006
Total Population[a]	1000	36626	48254	59313	72579
Population growth rate (%)	%	1.92	2.75	2.08	2.05
Urban Population[a]	1000	16036	21216	25286	30950
Urban Population growth rate(%)	%	2.87	2.8	1.75	1.94
Population of Cairo[a]	1000	5074	6069	6801	7787
Population of Alexandria[a]	1000	2318	2927	3339	4110
Population of Giza[a]	1000	2471	3725	4784	6273
Population Density/Inhabited Area (Person/km²)	Person/ Km²	665	877	918	918
Sex Ratio (%)		104	105	105	105

Sources: CAPMAS

NOTE:

a Population in thousand.

1 Female for male

(Growth rate is an inter censual periods)

The total population has rapidly increased , it was doubled from 1976 to 2006. Population growth rate increased from 1.92% in 1976, to 2.75 % in 1986. Then it decreased to 2.08 % in 1996, and to 2.05 in 2006. Population increase is giving rise to rapid urbanization, as urban population is concentrated in some large cities such as Cairo and Alexandria which have about 40% of it (Table 1.2).

Population density is high in Egypt, (table 1.2) indicates that the density of population increases through the years in spite of the establishment of the new cities because of the continuous increase of population.

Table 1.3: Slums in Egypt

YEAR	Slum Areas	Population
	n.	n.*1,000
1996	1,111	15,737
2000	909	5,667

Source CAPMAS

The enhanced number of slums has adverse impacts on the environment. In detail, the number of slum areas decreased from 1,111 area in 1996, to 909 in 2000 because of the governmental and non-governmental efforts to develop such areas (Table 1.3).

Table 1.4: Crude Rate of Birth, Death, and Natural Increase in Egypt

Years	Rate in Thousands		
	Births	Deaths ª	Natural Increase
1960	43	16.9	26.1
1986	40.1	9.6	30.5
1987	38.8	9.5	29.3
1988	37.8	8.4	29.4
1989	33.2	8	25.2
1990	31.7	7.4	24.3
1991	30	7.2	22.8
1992	26.9	6.9	20
1993	28.1	6.7	21.4
1994	27.7	6.6	21.7
1995	27.9	6.7	21.2
1996	28.3	6.5	21.8
1997	27.5	6.5	21
1998	27.5	6.5	21.5
1999	27	6.4	20.6

2000	27.4	6.3	21.1
2001	26.7	6.2	20.5
2002	26.5	6.4	20.1
2003	26.2	6.5	19.7
2004	25.7	6.4	19.3
2005	25.5	6.4	19.1
2006b	25.8	6.3	19.5

Source: CAPMAS
NOTE:
a) Data from 1995 doesn't include the outside Egyptian. The ratio of births is 1000 pop
b) Primary data

(Table 1.4) shows that crude birth decreased from 43 in 1960, to 40.1 in 1986 and 26.9 in 1992, then it increased to 28.3 in 1996 and after that decreased to reach 26.1 in 2003, and 25.8 in 2006. According to the crude death rate, it also decreased continuously from 16.9 in 1960, to 6.6 in 1994. Then, it decreased slowly over time to reach 6.5 in 2003, and 6.3 in 2006. While the natural increase rate was 26.1 in 1960, it increased to 30.5 in 1986, then decreased to 19.7 in 2003, and 19.5 in 2006 .

Table 1.5: Total Fertility Rate in Egypt

YEAR	1980	1984	1989	1991	1995	1997	1998	2000	2003	2005	2006
						%					
Total Fertility Rate	5.3	4.9	4.4	4.1	3.6	3.3	3.4	3.5	3.2	3.1	2.9

Source: CAPMAS

Total Fertility Rate decreased from 5.3 child in 1980, to 3.2 in 2003, and 2.9 in 2006 (Table 1.5). The decrease in fertility hasn't yet stabilized the population growth, but it is considered as a start to make a reduction in this growth .

Table 1.6: Infant and Maternal Mortality Rate in Egypt

YEAR	Infant	Maternal
1996	28.7	30
1997	30.0	30
1998	29.1	30
1999	29.4	30
2000	31.5	30
2001	28.2	69
2002	24.8	67
2003	21.9	62
2004	22.6	65
2005	20.1	65

Source: CAPMAS
The infant mortality rate in 1000
The maternal mortality rate in 100000

Mortality Rate is considered one of the important health indicators which reflect the quality of environment. (Table 1.6) indicates the infant and Maternal Mortality Rate for the period (1996 - 2005).

Table 1.7: Building Connection to Some Utilities (Water & Sanitation) by Urban and Rural Census 2006

Items	No. Of Building	Water						Sanitation					
		Public Network		Others		No Connection		Public Network		Others		No Connection	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Urban	3566770	3095243	86.8	100155	2.8	371372	10.4	2218162	62.2	940833	26.4	407775	11.4
Rural	7964746	6251943	78.5	714515	9.0	998288	12.5	1087488	13.7	6000114	75.3	877144	11.0
Total	11531516	9347186	81.1	814670	7.1	1369660	11.9	3305650	28.7	6940947	60.2	1284919	11.1

Source: CAPMAS

(Table 1.7) shows the percent distribution of building and household according to connecting facilities, water, sanitation, and electricity .

The high and rapid increase of population causes many problems that affect the quality of environment, urbanization is one of these problems because of direct and indirect effects on the environment.

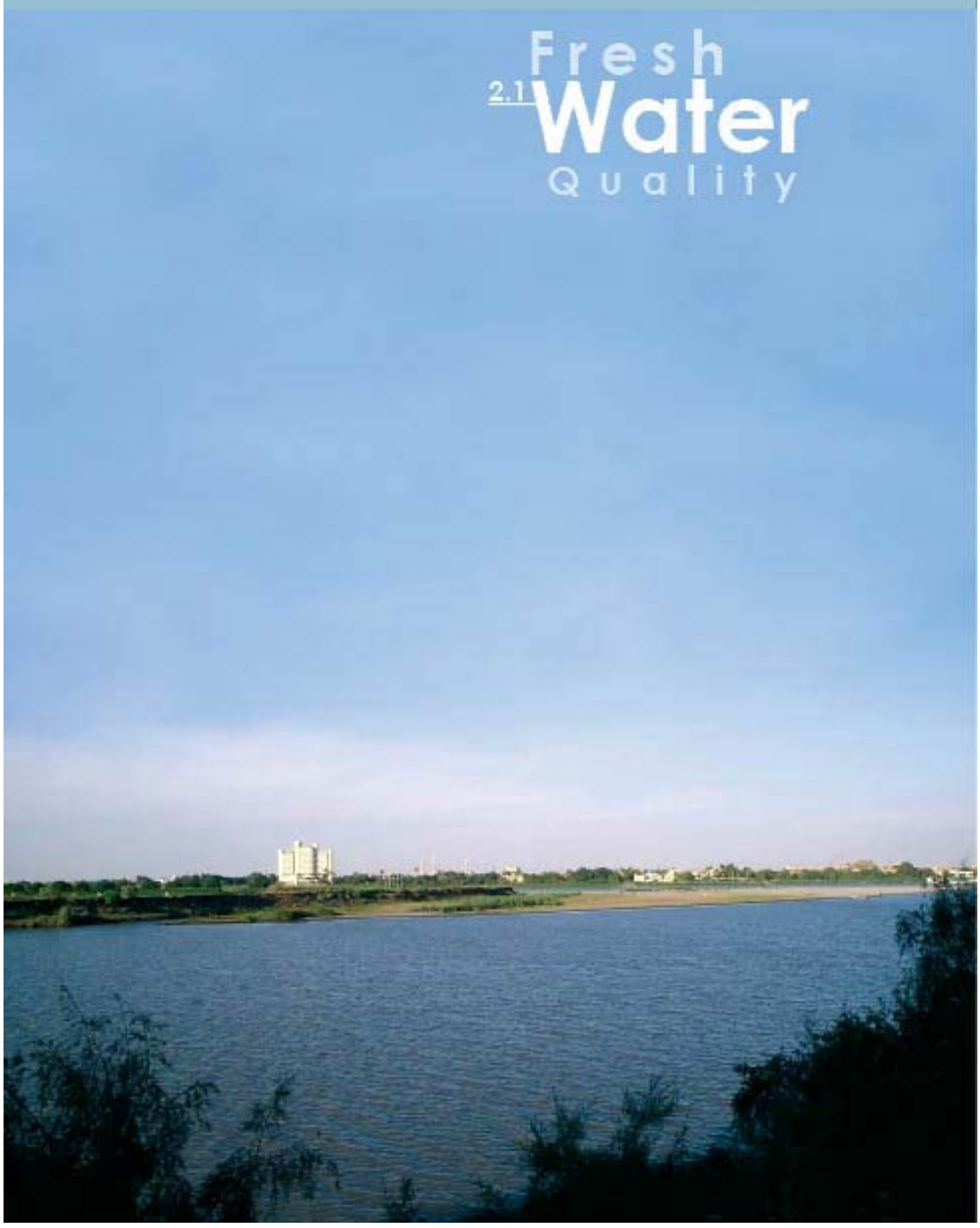
Table 1.8: Households Distribution according to Utilities Connection (Water, Electricity & Sanitation) by Urban and Rural Censuses 2006

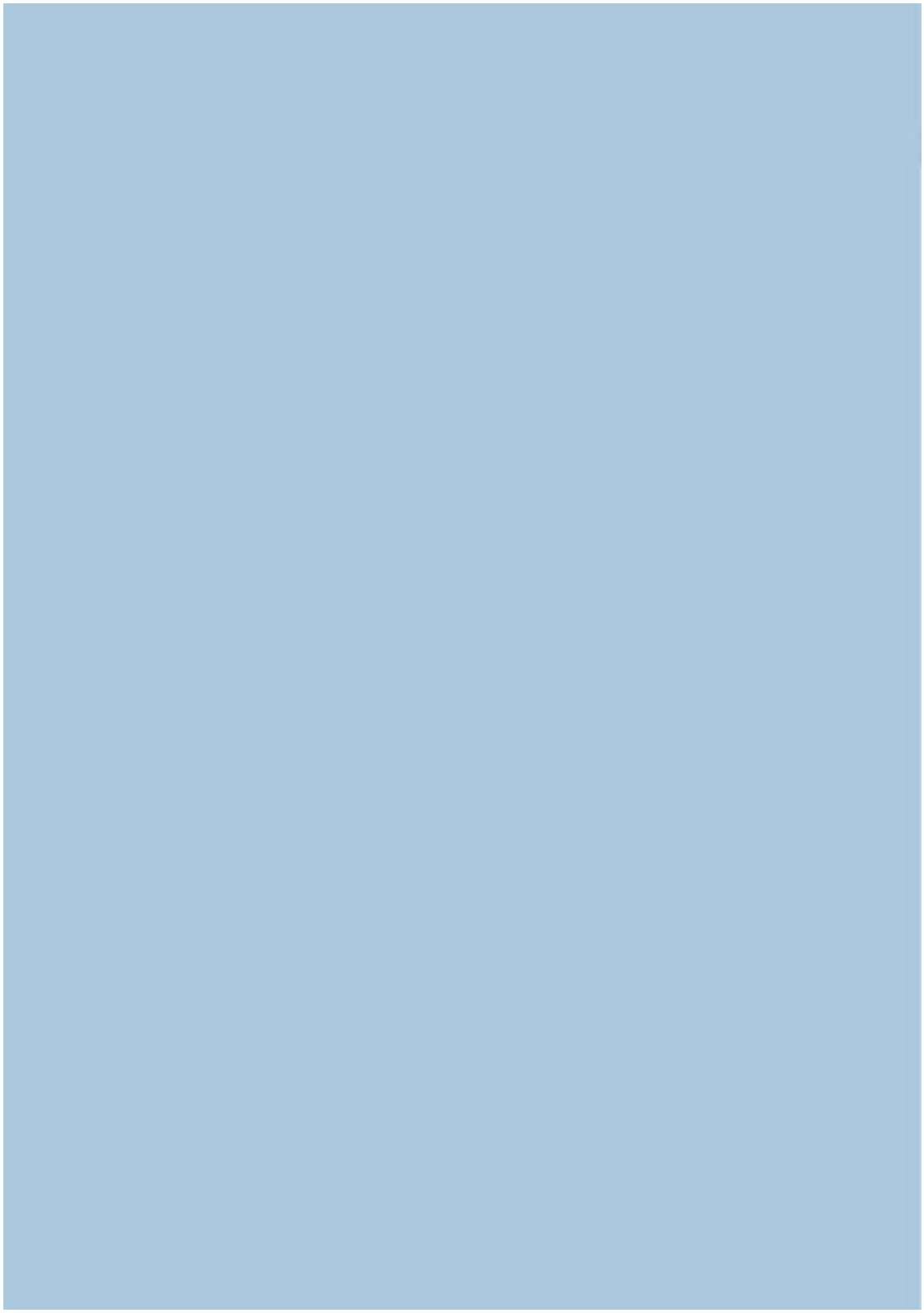
Items	No. Of Households	Households Connection to Utilities								
		Water			Electricity			Sanitation		
		Connected	Not connected	Percent of Connection (%)	Connected	Not connected	Percent of Connection (%)	Connected	Not connected	Percent of Connection (%)
Urban	7751512	7658083	93429	98.8	7714865	36647	99.5	6397946	1353566	82.5
Rural	9514055	8835927	678128	92.9	9422275	91780	99.0	2313976	7200079	24.3
Total	17265567	16494010	771557	95.5	17137140	128427	99.3	8711922	8553645	50.5

Source: CAPMAS

- Unit 2:
  Egyptian Environmental Components and Its Indicators.

2.1 Fresh Water Quality



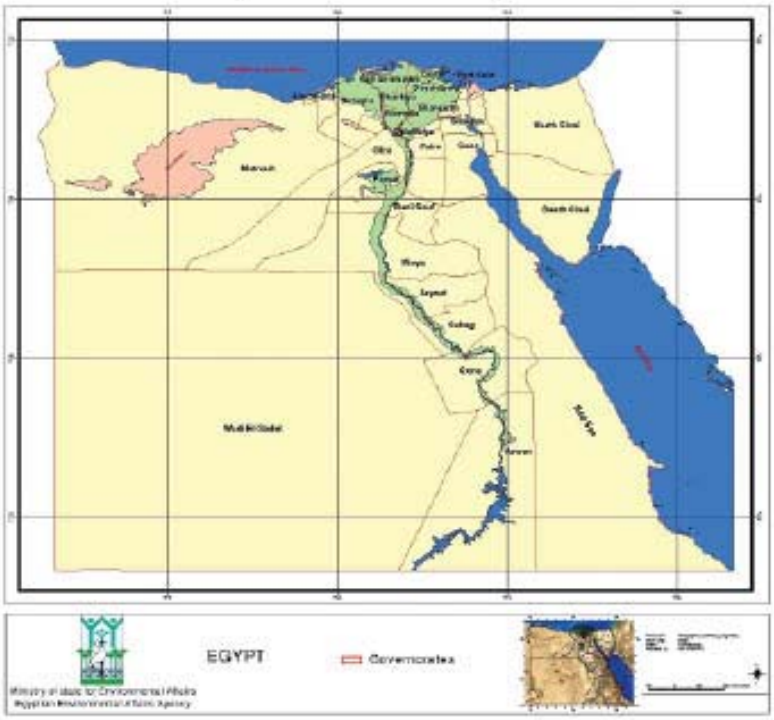


2. Egyptian Environmental Components and Its Indicators.

2. 1 Fresh Water Quality

Introduction

The Nile River is the main source of fresh water in Egypt. It is estimated that the Nile provides approximately 97% of the renewable fresh water resources (Nile Trans-boundary Environmental Action



Project, 2005). Egypt's share of the Nile water is determined as 55.5 billion m^3 annually. The Nile flows for a distance of approximately 1,532 km from the Southern Egyptian borders Northward until it branches approximately 25 km North of Cairo into two branches: Rosetta and Damietta forming a delta. The delta is bound to the North by the Mediterranean Sea with a coastline approximately 300 km long from Alexandria to the West, to Port Said to the East. A map of Egypt is presented showing the locations of main cities.

The Egyptian government has introduced legislations and policies to protect the quality of freshwater from the threats of pollution. The main sources of pollution to surface water are industrial and municipal wastewater, and agricultural drainage water. The Environment Law No. 4 /1994 has been issued to protect the environment in Egypt in general, while Law 48 /1982 deals with pollution of all water resources in Egypt and sets standards for the liquid waste discharge to fresh water bodies. The Ministry of Health and Population (MOHP), along with the Ministry of Water Resources and Irrigation (MWRI) and the Ministry of State for Environmental Affairs (MSEA), oversee the implementation and enforcement of environmental legislations pertaining to water quality. The National Authority for Drinking and Municipal Water (Ministry of Housing, Utilities and Urban Development - MHUUD) oversees the installation of sewage collection networks and municipal wastewater treatment, whereas the holding companies oversee the operation of municipal wastewater treatment.

National networks were established to monitor the quality of surface water through the measurement of physical, chemical and biological parameters (MSEA, 2006). Monitoring networks include:

- Surface water monitoring networks:

- 232 monitoring locations on the Nile River, canals and agricultural drains, managed by MWRI.

- 69 locations on the Nile River, managed by the laboratories of EEAA and are used to determine the quality of the Nile River water and its branches near sources of pollution.
- 139 locations on the Nile River and its two branches, managed by MoHP, that include intakes of the water treatment plants, inlets to the Damietta and the Rosetta branches, agricultural drain outlets and some industrial discharge outlets.

- Groundwater monitoring network:

- 203 locations to monitor groundwater quality and variability, managed by MWRI. Several environmental indicators have been developed in the past to guide the decision making process. A Water Quality Index (WQI) was developed to describe the Nile River water quality based on nine parameters (National Environmental Action Plan, 2001). In addition, the World Bank has set a group of indicators to study the status and trends of agricultural drainage in Egypt (Ton van Achthoven et. al. 2004). Some of these indicators can be adopted in the Annual Guide for Environmental Data and Indicators especially those related to drainage water re-use.

The indicators selected for the water quality sector were developed within the conceptual framework of the Driving Forces – Pressure – State – Impact – Response (DPSIR) model. However, data availability was the main driving factor in indicator development. Therefore, the presented indicators mainly describe aspects of the state of the water quality in Egypt.

The cumulative number of industrial facilities in compliance with industrial effluent discharge standards is a driving force indicator developed to address the performance of the measures taken to reduce exerted pressures on the Nile River by the industrial sector. The indicator describes the progress of the implementation of policies aiming at preventing the discharge of industrial wastewater that does not comply with current environmental standards to the Nile River.

The Chemical Oxygen Demand (COD) was selected to reflect changes in organic matter concentration in water due to impacts from industrial and municipal wastewater. Reliability of data was considered during the selection of this indicator.

The selected state indicator is compared to current guidelines. The COD guideline is a long-term target that water quality policies strive to achieve. In order to assess water quality policy performance, trends in this indicator will be measured against the guideline to determine the effectiveness of the policy or the adequacy of implemented measures.

The presented indicators generally show trends in specific parameters that describe aspects of the state of freshwater quality in Egypt. These indicators can be used by decision-makers to assess environmental policies in the water sector. Nevertheless, knowledge of technical aspects in the field of water quality is necessary in order to use some of these indicators. Further work on indicator development will include the adoption and updating of previously developed water quality indices that summarize the water quality conditions so that they can be easily understood by the general public. Time constraints, as well as, limitations or lack of data have been major obstacles toward the formulation of such indicators. Once developed, these indicators should be linked to objectives or targets set by the environmental policies.
One recommended approach for future work toward indicator development includes:

- Development of indicators to measure the progress of environmental policies in the water sector.
- The developed sets of indicators should be prioritized in terms of their significance and/or importance.
- Selected indicators should not require high additional cost for data collection. In such case, a lower cost alternative should be developed.

Bibliography

- *Ministry of State for Environmental Affairs, 2006. Egypt State of the Environment Report – 2005, December 2006.*
- *Nile Trans-Boundary Environmental Action Project, 2005, Nile Water National Water Quality Monitoring Baseline Study Report for Egypt - Nile Basin Initiative, August 2005.*
- *The National Environmental Action Plan of Egypt 2002 /17 - DRAFT, 2001, Environment at the Centre of Modernizing Egypt, December 2001.*
- *Ton van Achthoven, Zohra Merabet, Karim S. Shalaby and Frank van Steenburgen, 2004, Balancing Productivity and Environmental Pressures in Egypt - Toward an Interdisciplinary and Integrated Approach to Agricultural Drainage, Agriculture & Rural Development Working Paper 13, Agriculture & Rural Development Department, The International Bank for Reconstruction and Development, February 2004.*

INDICATOR: COD CONCENTRATION IN THE RIVER NILE ITS BRANCHES AND MAIN CANALS

Description

Chemical Oxygen Demand (COD) is an indicator of the level of organic matter in the Nile River water and its branches. Major sources of organic matter include discharges from municipal and industrial wastewater. COD concentration is measured monthly at numerous monitoring locations along the river.

Unit of Measurement

mg/l

Data Sources

Ministry of Health and Population (MOHP).

Indicator Update Frequency

COD concentration is measured monthly and compiled annually.

Quality of Information

The indicator is directly linked to the organic load discharged to the river. Indicator values are determined through the use of standard qualitative laboratory methods. Quality assurance/ quality control measures were also implemented to ensure accuracy of the analytical results. The sampling and analytical methods used to populate the indicator are consistent over time and space. Therefore, the indicator can be used both for tracking changes at one location over time and for comparisons among different locations.

Purpose

The purpose of the indicator is to describe the Nile River water quality by the COD concentration giving the chance to take corrective action in case there is any deviation from the permissible level.

Target Fixed by Law

According to the law n. 48/ 1982 in order to prevent the Nile River pollution by the discharge of waste waters loaded by organic matter, the limit is fixed at 10 mg/l.

Assessment of State and Trend

COD concentration is generally lower than the maximum acceptable concentration (10 mg/l) in all governorates in 2006 except for: Alexandria, Damietta, Greater Cairo and El-Gharbiya, because these areas suffer from high organic load discharges from food processing industries, untreated municipal wastewater and treated wastewater from treatment plants.
Historical data suggest a declining trend in COD concentration over time at Assuit, El Gharbiya, Damietta, Alexandria and Port Said. Although the average COD concentration remain higher than the acceptable limit, a general declining trend in COD concentration over time is evident.

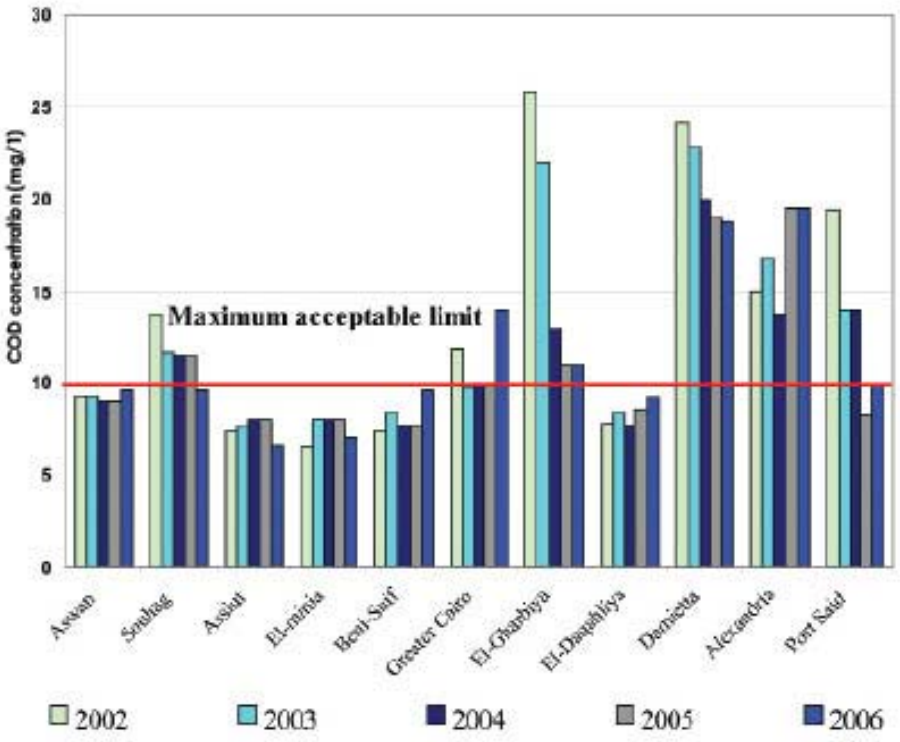
Comments on Tables and Figures

Mean COD concentration in the Nile River within selected governorates is presented in (Table 2.1). Mean concentration is used in order to facilitate comparison over time and space. The selected governorates represent different areas along the river flow path. COD concentration in the upstream portion of the river at Aswan exhibits the least variability over time. Comparatively higher mean COD values and higher variability are indicative of high organic load wastewater discharged to the river.
The yearly mean COD concentration at some governorates (Figure 2.1) exceeds the 10 mg/L guideline. However, mean COD concentration has decreased in 2006 relative to previous years indicating overall improvement due to the achieved reduction in industrial wastewater volumes and improved treatment.

Table 2.1: Comparison between COD Averages in Some Governorates in the Arab Republic of Egypt

Years / Gov.	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	Permissible Limit mg/l									
Aswan	9.14	9.30	8.87	9.10	10.23	9.32	9.34	9.00	9.00	9.60
Sohage	6.46	4.88	4.02	4.39	13.53	13.74	11.72	11.50	11.50	9.60
Aswit	74.97	25.19	12.34	8.56	7.15	7.41	7.60	8.00	8.00	6.60
Bmina	10.39	3.99	4.65	4.10	5.76	6.49	8.00	8.00	8.00	7.10
Banyswat	19.21	13.49	8.94	9.77	9.20	7.39	8.40	7.70	7.70	9.60
Cairo Region	14.76	14.60	13.48	13.4	8.97	11.84	9.76	10.00	10.00	14.00
B garba	32.62	27.75	24.66	34.8	19.88	25.83	21.99	13.00	11.00	11.00
El dakhlya	13.64	12.82	10.39	8.8	8.42	7.83	8.40	7.70	8.60	9.20
Damilta	28.58	29.07	26.10	28.1	32.04	24.11	22.80	20.00	19.00	18.80
Alexandria	35.23	30.58	24.25	21.9	16.19	14.94	16.80	13.80	19.50	19.50
Port Said	16.08	12.75	14.42	15.0	10.53	19.41	13.97	14.00	8.30	9.90

Source : MoHP



Source: MOHP
Figure 2.1: Annual Mean COD Concentration in the Nile River, Its Branches and Major Canals in Selected Governorats

INDICATOR : CUMULATIVE NUMBER OF INDUSTRIAL FACILITIS IN COMPLIANCE WITH INDUSTRIAL EFFLUENT DISCHARGE STANDARDS

Description

The cumulative number of industrial installations, where new measures were introduced to ensure compliance with the standards of industrial effluent discharge to the Nile, addresses the progress of the policy and measures aiming at reducing the pollution load on the Nile. This indicator combines the installations that ceased discharging their effluent to the Nile and those that upgraded their treatment facilities to meet the regulatory standards set by the executive regulations of Law 48 / 1982.

Unit of measurement

Number

Data Sources

The Ministry of State for Environmental Affairs (MSEA).

Indicator Update Frequency

Annually

Quality of Information

Indicator is directly linked to the progress of reducing environmental pressure on the Nile River from the industrial sector.
Indicator values are determined through surveys and inspections of the industrial installations that discharge to the Nile River and statistical analysis of monitoring data.
Indicator data has been generated through a geographic information system. All information collected was processed according to standard data preparation and analysis protocols. The index is intended for tracking changes over time, and its use for comparability over space has a limited applicability.

Purpose

The purpose of the indicator is to cumulate number of industrial installations compliance with the environmental standards to take corrective actions for the industrial installations not in compliance.

Target Fixed by Law

The indicator is evaluated based on the progress over time.

Assessment of State and Trend

The activities to reduce the industrial wastewater discharge to the Nile were initiated in 1998, through the implementation of measures to treat or reuse the industrial effluent from a total of 116 industrial installations, which was typically discharged directly to the Nile.
By 2006, a total of 91 installations either ceased discharging their effluent to the Nile or have complied with the regulatory standards for effluent discharge to surface water bodies. The discharge volume from these 91 installations constituted 99.64% of the total industrial discharge volume to the Nile River. Overall, the progress of reducing the pollution pressure on the Nile (Figure 2.2) is satisfactory and the results can be linked to the observed reduction in chemical and/or organic pollution (e.g. COD).

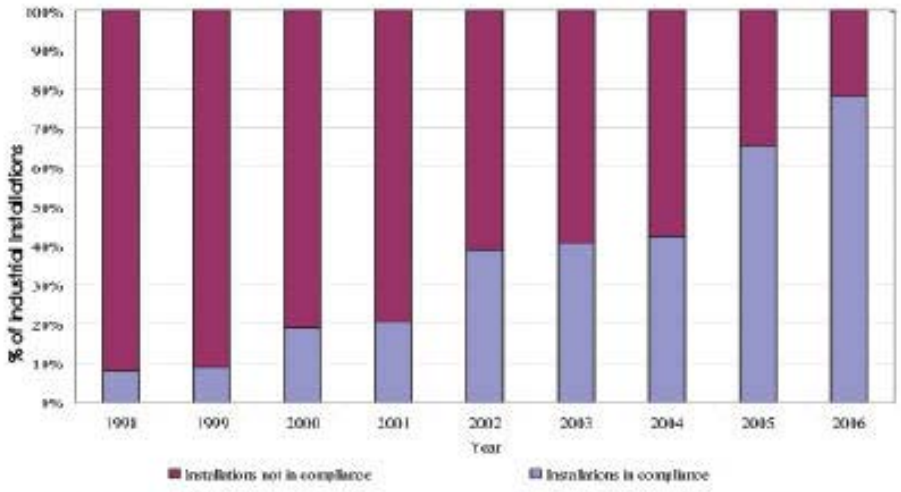
Comments on Tables and Figures

The goals set to bring industrial installations into compliance with the standards outlined in the executive regulations of Law 48 / 1982 have prioritized these installations according to their impact on the quality of the Nile River water. Therefore, relatively fewer industrial installations became compliant in earlier years.

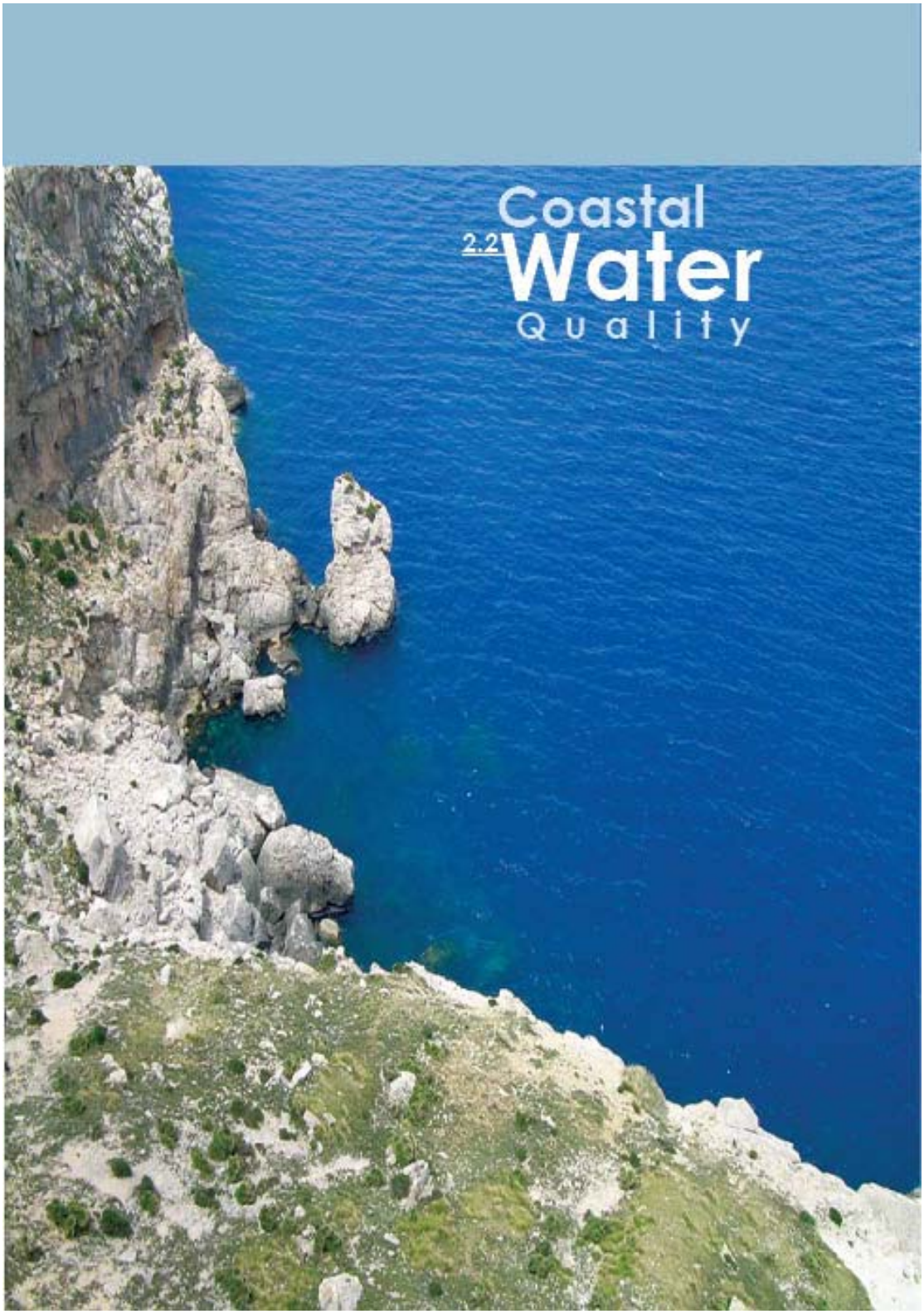
Table 2.2: Annual and Cumulative Number of Industrial Installations in Compliance with Regulatory Standards of Effluent Discharge to the Nile

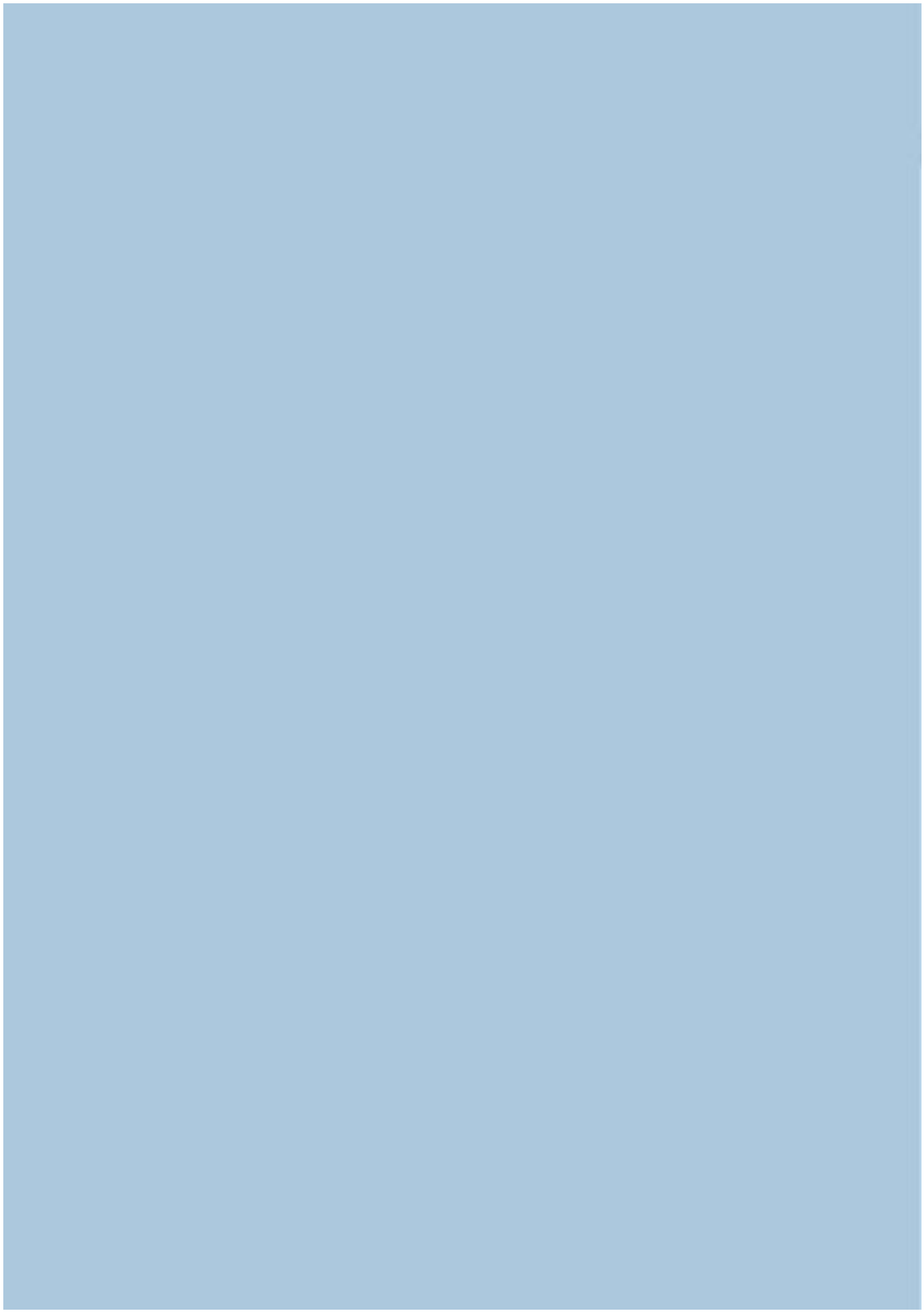
Year	No. of Industrial Facilities	Cumulative No. of Industrial Facilities
1998	9	9
1999	1	10
2000	12	22
2001	2	24
2002	21	45
2003	2	47
2004	2	49
2005	27	76
2006	15	91

Source: MSEA



Source: MSEA
Figure 2.2: Cumulative Percentage of Industrial Installations in Compliance with Regulatory Standards of Effluent Discharge to the Nile


2.2
Coastal
Water
Quality



2.2 Coastal Water Quality

Introduction

Egypt lies in the North-Eastern corner of the African continent and has a total area of about 1 million km². It is bordered in the North by the Mediterranean Sea. The Mediterranean Sea is a large semi-enclosed sea with a total surface area of approximately 2.5 million km² and an 80 year water renewal time. Water enters from the Atlantic through the straits of Gibraltar, while the Suez Canal connects the Mediterranean with the Red Sea since 1869. The Egyptian Coastline on the Mediterranean is about 995 Km and 1941 Km along Red Sea , Suez gulf and Aqaba gulf.

Human activities result in environmental stress such as high nutrient concentration and eutrophication of the coastal water with increased incidences of algal blooms, as well as, high levels of hazardous substances (Stanners and Bourdeau, 1995; EEA, 1998). Multilateral cooperation within the Mediterranean region to solve these problems has taken place under the umbrella of the Mediterranean Action Plan (MAP) and Barcelona Convention (amended in 1995).

The Egyptian Mediterranean coastal water receives a huge amount of nutrient-rich fresh and brackish water discharged from the Nile river outlets (Damietta and Rosetta branch), Northern Lakes (El-Bardawel, Mariut, Idko, El-Manzala and El-Burullus) and other small water channels (Elmax, Umum and Eltabia) located along the North coast. Therefore, many eutrophication events have been reported mostly within the Nile Delta region especially during the

winter season (Dowidar 1988, Hamza et al, 1998). Several scientists have written scientific publications concerning this phenomena as an alarm for both the society and decision- makers to take action related to policies, strategies and legislations needed to reduce the pollution of the coastal water.

The Egyptian Environmental Affairs Agency (EEAA), with the support of Danish International Development Assistance (DANIDA), has established an Environmental Information Monitoring Program (EIMP) to collect data and information for the quality of both air and coastal water. Monitoring coastal water quality along both the Egyptian Mediterranean and Red Sea coasts has been a major component of the program since 1998 and a still ongoing activity. 45 stations along the Mediterranean coast and 38 stations along the Red Sea coast as shown in (Figures 2.3 & 2.4), have been established in these selected locations according to their geographical distribution and the present land based activities near shore. Some stations far from the land based sources of pollution were selected to be as reference stations. The program intends to compile baseline knowledge of the water quality, to define hot spots, and to apply possible measures to improve the water quality.

Sampling, analyzing, and data reporting were carried out by the Institute for Graduate Studies and Research (IGSR), the National Institute of Oceanography and Fisheries (NIOF) through an annual contract between EEAA and the concerned institute. EEAA is responsible for providing the annual budget required for this monitoring program and dissemination of monitoring results.

The water parameters measured at a bimonthly frequency are divided into three groups:

- Physical parameters: Vertical profiles of salinity, alkalinity, conductivity, oxygen concentration, temperature and visual

observations on the beach, including litter and oil, oil slicks or any visual disturbances of relevance to the general environmental condition. These basic parameters give a general description of the marine area.

- Bacteriological parameters: Total coliforms, Fecal streptococci and E. coli characterising the bathing water quality. The bacteriological parameters are measured in the areas with high activity of tourism and facing major towns with sewage discharge. The samples are taken in the bathing zone.
- Eutrophication parameters: Water transparency (Secchi depth), nitrate/nitrite, phosphate, ammonia, silicate, SPM (Suspended Particular Matter) and chlorophyll. The eutrophication parameters are measured in areas where possible eutrophication problems have been identified.

The data from the EIMP program covered the whole Egyptian Mediterranean coastal line from Salloum (West 25 09 44) to Rafah (East 33 49 03). The sampling stations were 45 stations in the period from 1998 to 2000. After the First program revision in the year 2000, the number of stations was decreased to 41 stations along the coast. By the end of 2004, the program has been evaluated for the second time and the number of the stations was further reduced to 30 stations instead of 41.

The data from the EIMP program covered the whole Egyptian Red Sea coastal line from Suez (North 32.565) to Marsa Alam (South 34.9001) and in Aqaba Bay from Sharm El Sheikh North to Taba South. The sampling stations were 42 stations in the period from 1998 to 2000. After First program revision in the year 2000, the number of stations was decreased to 41 stations along the coast. By the end of 2004, the program has been evaluated for the second time and the number of the stations was further reduced to 23 stations instead of 41.

Samples are periodically collected and analyzed for determination of water quality. From the beginning of the program at 1998 till 2004 the samples were collected five times a year at January, March, May, July, and September. At the beginning of the year 2005, the number of field trips were reduced to be 4 times a year as a result of the second program evaluation, the new sample collection schedule has been developed to monitor the seasonal variation in the marine coastal water quality. The new sampling campaign is taking place in March, May, July and September each year.

For items related to eutrophication ; samples were collected from the stations using a Rottener Water Grab Sampler. Samples were collected 1 - 5 meter depth from the surface and 0.5 - 1 kilometre offshore. Three water samples were collected from each station for the purpose of quality control assessment. Physical measurements were carried out in the field using field instruments. Samples were divided and preserved on the sampling boat for each parameter and all samples kept refrigerated at 4°C or less till further processing in the laboratory. All samples were treated effectively according to the standard methods for the analysis of sea water .

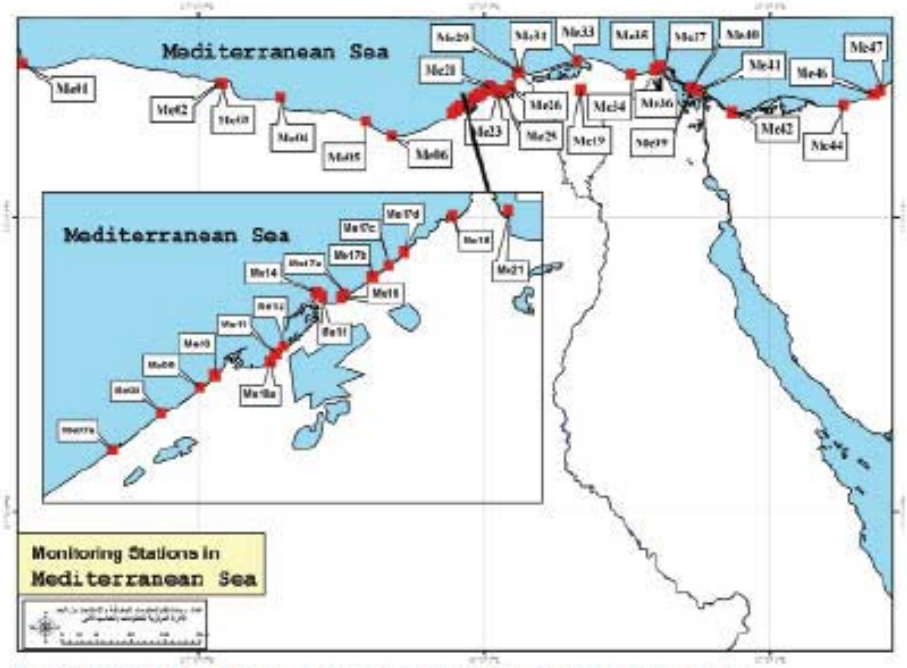
The physical measurements which contain the data profile of water temperature, salinity, dissolved oxygen and pH were collected from the whole water column at each station by using the CTD (YSI-6000). The data revealed that variations in water temperature were normal and correlated with season and time of sample collection. Slight decrease in temperature values with increasing depth was observed. Variations in salinity and pH values were insignificant in different cases. Generally, no pronounced variations were found in the horizontal, as well as, vertical distribution pattern of dissolved oxygen contents in the coastal water of the different investigated regions. The main status is good and well oxygenated water with some tendency towards a slight decrease in oxygen contents with increasing depth. The meseared

parameters indicated that the impacts of land based sources and/or human activities on the levels of different hydrographical conditions are still insignificant.

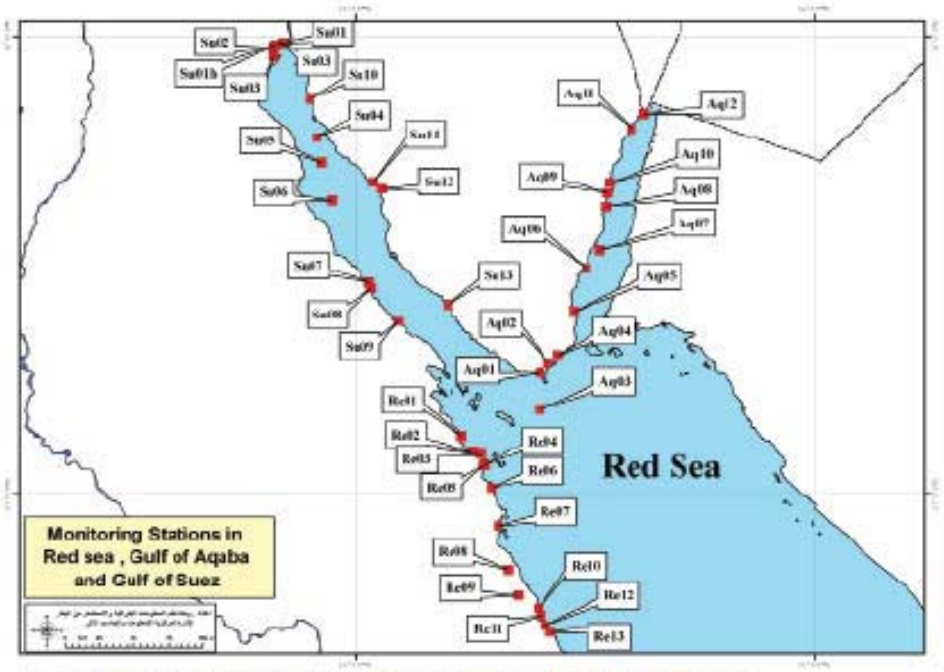
The bacteriological sampling technique was carried out according to the international standard ISO 5667 /1 and ISO 5667 /2 using blue cap flask (500 ml) and special sampler, from 50 cm below the sea surface of 1m depth. The bacteriological analysis was carried out using the membrane filtration system in the Lab - van and the stationary labs of the monitoring institutes as described in :

1. ISO method 9308-1. Water quality. Detection and enumeration of coli form organisms, thermo tolerant organisms and presumptive E coli.
2. ISO method 7899-2. Water quality. Detection and enumeration of faecal streptococci.

For bacterial levels in bathing waters; samples were collected from the surface waters in near shore areas in a sterile glass bottle. The samples were preserved at 4°C for further processing in the laboratory. Using a membrane method, specific selective media



Source: EMP Database System – Environmental Information Monitoring System-EEAA
Figure 2.3 : Sampling Stations along the Mediterranean Sea Coast



Source: EIMP Database System – Environmental Information Monitoring System- EEAA
Figure 2.4 : Sampling Stations along the Red Sea, Gulf of Aqaba and Suez Gulf

to grow each type of bacteria, the colonies were counted and estimated at 100ml.

Bibliography

- *H.I.E. Emara, M.A. Shriadah, T.H. Moustafa and M.S.El-Deek, 1992. Effects of Sewage and Industrial Wastes on the Chemical Characteristics of the Eastern Harbour and El-Mex Bay Water of Alexandria, Egypt. Sci. Tot. Envir., Suppl., p. 773 - 784 ;*
- *European Council Directive of 8 December 1975 concerning the quality of bathing water, 761 / 69 EEC;*
- *Jensen, Dr. M.E.Zarka and E.Povlsen, 1997. A Strategy for an Egyptian Coastal Monitoring Program. In E. Zhan (editor). Proceedings of the Third International Conference on the Mediterranean Coastal Environment, MEDCOAST, 1, p. 367 - 376;*
- *M.A.H. Saad and E.I.M. Hemeda, 1992b. Effects of Pollution on the Western Harbour of Alexandria. I. Nutrients Salt. Sci. Tot. Envir., Suppl., p. 755 - 772 ;*
- *Hasiund, O.H.,and Jensen A., Nasr S., Povlsen E., Boisen F., Ebrahim A.M.M., El-Seoud A.A., El-Raey M., El-Shenawy M.A., El-Gamal A., and El-Aziz M. A., 1999. First Results from the Egyptian Coastal Water Monitoring Program. Zhan, E. (Editor), Proceedings of MEDCOAST'99 - EMECS'99 Joint Conference: Land-Ocean Interactions - Managing Coastal Eco-systems, 9 - 13 November 1999, Antalya, Turkey, MEDCOAST, Middle East Technical Univ. 06531, Ankara, Turkey, Vol. 1- 3, p. 1940 - 1958;*
- *EIMP end report of mission1. DANIDA Coastal Water Monitoring end of Mission report 1 Arene Jansen and Erling povelsen, April 1996;*
- *Nixon et al (1996). " The Harmonized Monitoring and Classification of Ecological Quality of Surface Water in the European Union". EU Commission WRc Ref: CO 4150 EU;*
- *Vucak, Skrivanic & Strin, J (1982). Basic physical chemical and biological data reports, R.V.A Mohorov Adriatic cruises 1974 - 76. Hydrographic Institute of Yugoslav Navy Split 175 pp;*
- *EIMP end report of mission 16.DANIDA Coastal Water Monitoring End of Mission Report 16 Erling povelsen, July 2001;*
- *Hot Spots recorded by Egyptian Coastal Water Monitoring Program First International Conference On Chemical and Environmental Engineering (CEE) May 14 -16, 2002, Cairo;*
- *Result of RED Sea Coastal Water Monitoring Program 7th Environmental National Conference, Environmental Research Institute , Ain Shams University. Cairo from 20 - 22 April 2003;*
- *Characteristics of the Suez Gulf coastal waters, Egypt during year 2000. AMSE Journals 02, 190 (2c) (Accepted for publications);*
- *A. Jensen. Alshabrawy M. M Mohammed Shindy ,Strategy for Red Sea Regional Coastal Monitoring Program and Results , Sustainable Tourism Egypt (STE) 2002;*
- *The International Symposium on Ecosystem Indicators for Fisheries Management, Paris 12 - 14 January 2004,conference proceedings, part 2 page 334353-;*

- *Testing of Marine Pollution Indicator in the Egyptian Mediterranean Coastal Region – accepted for publication in 4th Dubrovnik conference on sustainable Development of Energy , Water and Environment 4 - 8 June /2007;*
- *The Result for the Water quality Monitoring System along the Red Sea , Suez Gulf and Aqaba Gulf during 2006 --- The First Conference for Sustainable Development for the Rea Sea and Aden Gulf --- Egypt --- Aeen Sukhnaa 25 - 27 / 112007/.*

- *The main web sites references :*
- *http://www.eeaa.gov.eg/eimp/introcw.html*
- *http://www.unepmap.org/*
- *http://www.esf.edu/efb/schulz/Limnology/Eutrophication.html*
- *http://www.state.nj.us/dep/bmw/waterquality.htm*

NDICATOR: TOTAL NITROGEN CONCENTRATION IN THE EGYPTIAN RED SEA COASTAL WATER

Description

Total Nitrogen concentration is an indicator that measures the level of eutrophication state in the Egyptian Red Sea Coastal water. Major sources of Nitrogen are land based sources, in addition to the effluent wastewater originating from various anthropogenic activities, such as : transportation by oil tankers via the Suez Canal, and tourist activities in the coastal cities. Total Nitrogen concentration is measured on quarterly basis in 23 monitoring locations along the Egyptian Red Sea Coast.

Unit of Measurement

µM

Information Sources

Ministry of State for Environmental Affairs, Egyptian Environmental Affairs Agency, the Environmental Information Monitoring Program (EIMP).

Indicator Update Frequency

Total Nitrogen concentration is measured 4 times a year and compiled annually, The data is updated annually

Quality of Information

The indicator gives information on the anthropogenic activities along the Egyptian Red Sea Coast especially the transportation via the Suez Canal.
Indicator values are determined through the use of standard quantitative laboratory methods and quality assurance; Quality Control measures are applied. The sampling and analytical methods used to compile the indicator are consistent over time and space.

Purpose

This indicator describes the quality of the Egyptian Red Sea Coastal water to guide future planning or trigger corrective actions.

Target Fixed by Law

Indicator levels are compared to the international guidelines (EU Commissions WRC Ref: CO4150, Nixon et al, May 1996) for sea water quality; and the Egyptian Guidelines for recreation water quality.

Table:Nutrient limitation

	K_s	K_s	Redfield's Ratio
	µg/l	µmol/l	Weight basis
DIN	28	2	
DIP	6.2	0.2	
DISi	56	2	
DIN:DIP			7
DISi: DIN			2
DISi: DIP			32

NOTE:
DIN is dissolved inorganic nitrogen (NO_3+NO_2+NH_4). DIP is dissolved inorganic phosphorus (PO_4). DSi is dissolved inorganic silicate (SiO_4).

Assessment of State and Trend:

Total Nitrogen (TN) concentration is generally fluctuating in all sampling locations along the Egyptian Red Sea Coast in 2006; the Annual mean of total nitrogen concentration is fluctuating around a concentration of 30uM. The TN concentration decreases everywhere, in details the area of Suez with highest population density is found and transportation activities via Suez Canal occurred, shows the highest values.

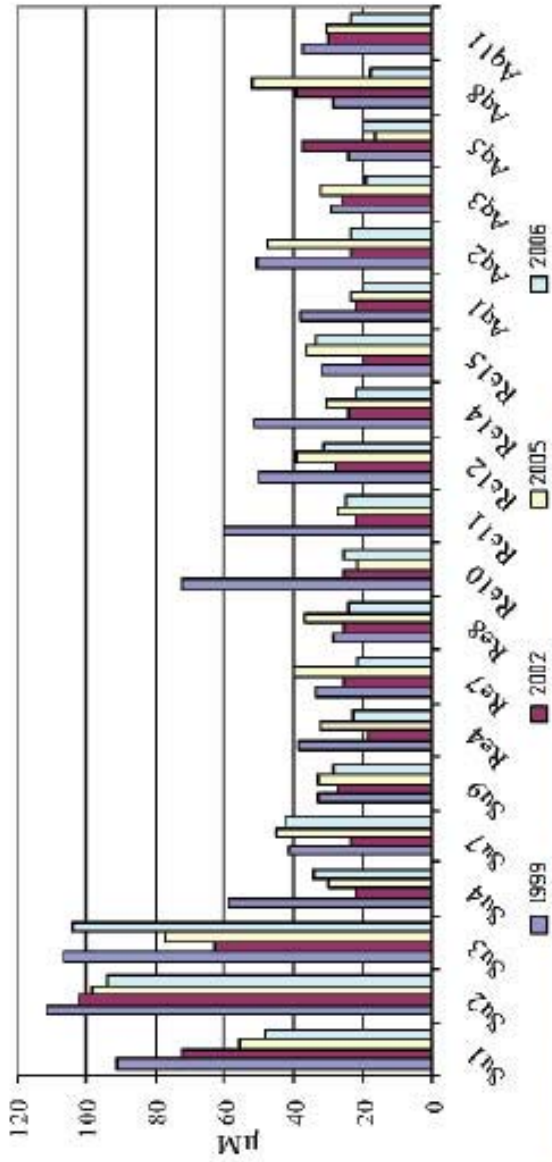
Comments on Tables and Figures

Mean TN concentration in the Egyptian Red Sea Coastal water, at mentioned locations, is presented in (Table 2.3). Mean concentration is used in order to facilitate comparison over time and space. The selected locations represent different areas along the Egyptian Red Sea Coastal line. TN concentration in the portion of the Coast at Suez exhibits the highest concentration over space. Comparatively higher mean TN values and higher variability are indicative of high anthropogenic activities on the Coast.

Table 2.3: Total Nitrogen Concentration along the Egyptian Red Sea Coast

Site Name	Site ID	Annual Average 1999	Annual average 2000	Annual Average 2001	Annual Average 2002	Annual average 2003	Annual Average 2004	Annual Average 2005	Annual Average 2006
Suez North	Su1	91,61	33,50	45,46	72,40	58,79	50,50	56,13	48,30
Suez Middle	Su2	111,87	50,83	84,93	102,20	70,49	64,43	98,63	94,08
Suez South	Su3	106,65	51,87	77,55	62,91	55,26	66,97	77,48	104,40
Ain Sukhna Off Shor	Su4	58,86	18,88	28,31	22,16	27,80	29,95	30,02	34,33
Ras Gharib City	Su7	41,10	17,74	27,90	23,40	32,19	59,62	45,14	42,46
Ras Shukheir	Su9	33,06	19,23	29,19	27,60	36,97	19,25	33,16	28,68
Hurghada-Hotel Sheraton	Re4	38,70	12,15	19,32	18,19	23,33	23,33	32,07	22,99
Safaga North	Re7	33,90	12,20	16,77	25,20	24,47	23,22	39,95	21,85
Safaga Middle	Re8	28,47	15,28	19,63	25,40	38,59	17,87	36,71	24,37
El Hamarawein	Re10	72,16	14,21	17,86	25,68	25,90	21,47	21,35	25,49
Quseir North	Re11	60,51	14,14	21,95	22,13	27,67	27,67	27,10	24,97
Quseir Middle	Re12	50,13	22,69	21,09	28,01	25,17	23,68	39,39	30,84
Marsa Alam	Re14	51,19	18,66	40,14	24,33	27,42	19,17	30,18	22,25
Bir Shalatin	Re15	31,98	25,58	29,32	19,78	28,01	30,13	36,46	33,42
Sharm El Sheikh Ras Mohamed	Aq1	38,12	12,86	16,25	21,92	22,77	21,14	23,27	19,53
Sharm El Sheikh Harbour	Aq2	50,72	17,63	17,74	23,49	23,69	35,06	47,49	23,81
Sharm El Sheikh Na>ama bay	Aq3	29,37	15,67	20,16	25,95	32,97	26,51	32,33	19,34
Dahab	Aq5	24,23	24,84	19,12	37,76	35,78	24,13	16,81	19,59
Nuweiba harbour-El Saiadin	Aq8	28,53	14,34	25,86	39,47	29,14	22,11	51,91	17,74
Taba	Aq11	37,57	18,33	31,39	29,78	24,65	59,08	30,34	23,43

Source: EIMP Database System – Environmental Information Monitoring Program - EEAA
Unit of measurement µM



Source: EIMP Database System – Environmental Information Monitoring Program - EEAA
Figure 2.5: Total Nitrogen Concentration Along the Egyptian Red Sea Coast

INDICATOR: TOTAL NITROGEN CONCENTRATION IN THE EGYPTIAN MEDITERRANEAN COASTAL WATER

Description

Total Nitrogen concentration is an indicator that measures the level of eutrophication state in the Egyptian Mediterranean Coastal water. Major sources of Nitrogen are land based sources including the discharged water from the agricultural drains and the effluent wastewater originating from various anthropogenic activities in the coastal cities. Total Nitrogen concentration is measured quarterly in 30 monitoring locations along the Egyptian Mediterranean Coast.

Unit of Measurement

µM

Information Sources

Ministry of State for Environmental Affairs, Egyptian Environmental Affairs Agency, the Environmental Information Monitoring program (EIMP).

Indicator Update Frequency

Total Nitrogen concentration is measured 4 times a year and compiled annually. The data is updated annually .

Quality of Information

The indicator describes the state of the effluent wastewater discharged to the Egyptian Mediterranean Coast.
Indicator values are determined through the use of standard quantitative laboratory methods and quality assurance; Quality Control measures are applied.
The sampling and analytical methods used to compile the indicator are consistent over time and space.

Purpose

This indicator describes the quality of the Egyptian Mediterranean Coastal water in term of eutrophication to guide future planning or trigger corrective actions if the indicator level exceeds the established guidelines.

Target Fixed by Law

Indicator levels are compared to the international guidelines (EU Commissions WRc Ref: CO4150, Nixon et al, May 1996) for sea water quality; and the Egyptian Guidelines for recreation water quality.

Table:Nutrient limitation

	K_s	K_s	Redfield's Ratio
	µg/l	µmol/l	Weight basis
DIN	28	2	
DIP	6.2	0.2	
DISi	56	2	
DIN:DIP			7
DISi: DIN			2
DIN:DIP			32

NOTE:
DIN is dissolved inorganic nitrogen (NO_2+NO_3+NH_4). DIP is dissolved inorganic phosphorus (PO_4). DSI is dissolved inorganic silicate (SiO_4).

Assessment of State and Trend

Total Nitrogen (TN) concentration is generally decreasing in all sampling locations along the Egyptian Mediterranean Coast in 2006; with respect to 1998 the Annual Mean of total nitrogen concentrations were decreasing compared to the last 6 years.

Comments on Tables and Figures

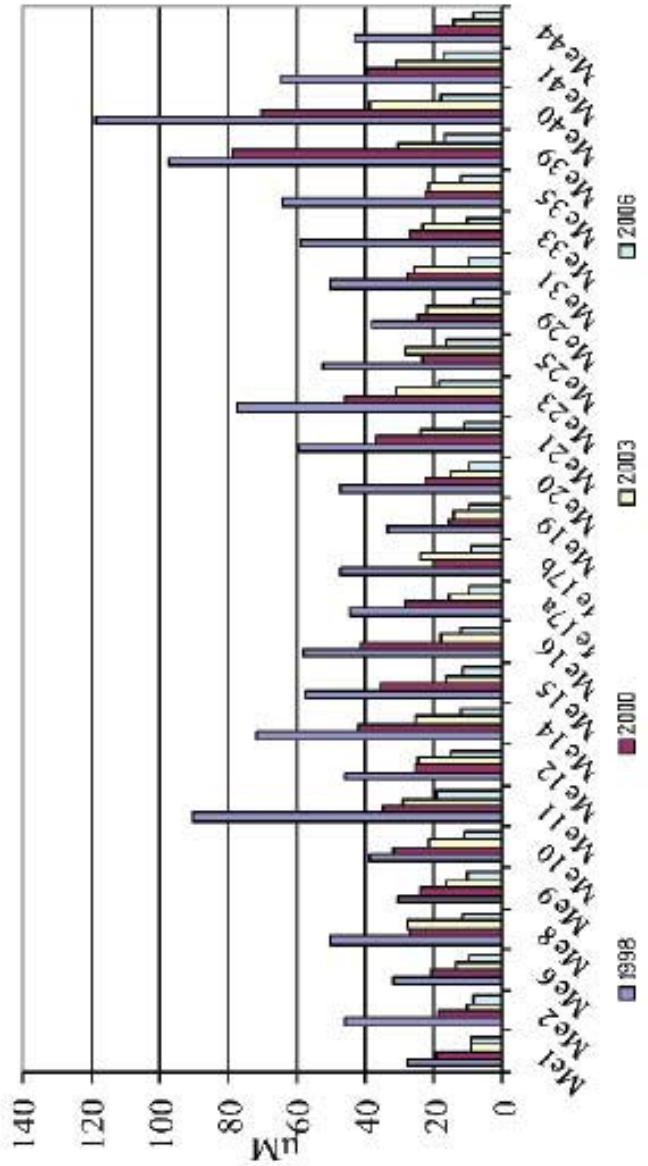
Mean TN concentration in the Egyptian Mediterranean Coastal water, within the mentioned locations, is presented in (Table 2.4). Mean concentration is used in order to facilitate comparison over time and space. The selected locations represent different areas along the Egyptian Mediterranean Coastal line. TN concentration in the portion of the Coast at El Gamil East, NIOF and Matrouh West exhibits the highest decrease over time (1998 - 2006) (major decreases).

Comparatively higher mean TN values and higher variability is indicative of high anthropogenic activities at the Coast.

Table 2.4 : Total Nitrogen average Concentration along the Egyptian Mediterranean Coast.

Site ID	Site Name	1998 annual mean	1999 annual mean	2000 annual mean	2001 annual mean	2002 annual mean	2003 annual mean	2004 annual mean	2005 annual mean	2006 annual mean
Me1	Salloum	27,49	14,54	19,23	22,70	9,48	9,24	14,94	5,83	9,00
Me 2	Matrouh	45,54	16,85	18,72	18,89	12,64	10,25	15,08	6,15	8,65
Me 6	Marina	31,67	17,93	20,47	19,71	10,70	13,57	17,90	7,42	9,96
Me 8	Nobareya	50,10	26,81	27,22	18,64	14,38	28,05	19,37	7,81	11,50
Me 9	Hanoville	30,34	23,46	23,58	17,36	12,47	15,87	20,21	7,83	10,39
Me 10	Bilash	38,80	27,28	31,48	19,16	14,15	21,24	21,01	10,94	10,98
Me 11	Mex	90,46	55,25	34,65	25,57	22,55	29,01	30,89	17,68	19,28
Me 12	W_harbor	45,50	33,29	25,39	19,77	13,06	24,54	24,17	16,54	14,78
Me 14	NIOF	71,77	59,62	42,19	38,08	24,03	24,97	22,81	10,59	12,53
Me 15	E_harbor- West	57,65	45,58	35,74	25,13	22,75	16,34	23,88	8,92	11,87
Me 16	E_harbor- East	58,28	50,37	41,11	28,79	22,47	18,34	24,64	9,15	12,26
Me 17a	Alexandria -Shatby	44,51	29,79	28,43	22,88	15,75	15,24	22,22	8,18	9,70
Me17b	Alexandria – Sidi Gaber	47,07	35,71	19,73	18,33	13,67	24,19	17,48	9,08	9,22
Me 19	Montaza	33,57	22,00	15,54	14,75	10,06	14,08	17,74	7,19	9,40
Me 20	Abu Qir – West	47,18	27,01	22,42	20,58	12,75	14,53	19,89	6,62	9,84
Me 21	Abu Qir – East	59,47	52,97	36,72	35,71	16,69	24,04	26,66	7,91	10,80
Me 23	Electrical station	77,28	59,71	45,88	27,10	20,81	30,89	29,31	24,96	18,41
Me 25	Maadia	52,12	41,52	23,43	20,00	15,19	28,65	21,91	12,96	16,40
Me 29	Rashid	38,15	25,36	24,26	17,19	15,52	21,86	18,37	8,38	8,26
Me 31	Rashid	50,27	21,32	27,70	24,17	15,77	25,55	19,19	8,04	9,80
Me 33	El-burg	58,69	22,16	27,27	21,45	11,50	23,34	20,02	8,52	10,42
Me 35	Damietta	64,02	24,97	22,27	20,68	23,83	21,47	22,64	10,16	12,55
Me 39	El-Gamil -West	97,37	52,38	78,59	43,24	29,60	30,26	48,67	14,13	16,79
Me 40	El-Gamil -East	118,84	36,19	70,62	45,93	30,16	38,96	48,25	12,62	18,22
Me 41	Port Said	64,65	35,97	39,25	30,75	20,56	31,05	34,79	8,73	17,25
Me 44	Arish	43,03	18,54	20,19	15,74	9,53	14,44	13,17	6,22	8,25

Source: EMP Database System – Environmental Information Monitoring Program - EEAA
Unit of Measurement µM



Source: EMP Database System – Environmental Information Monitoring Program - EEAA
Figure 2.6:Comparison of the Total Nitrogen Average Concentration along the Egyptian Mediterranean Coast in Different Stations.

INDICATOR: TOTAL PHOSPHORUS CONCENTRATION IN THE EGYPTIAN RED SEA COASTAL WATER

Description

Total Phosphorus concentration is an indicator that measures the level of eutrophication state in the Egyptian Red Sea Coastal water. Major sources of Phosphorous are land based sources including the discharged water from the agricultural drains and the effluent wastewater originating from various anthropogenic activities in the coastal cities. Total Phosphorus concentration is measured on quarterly basis in 23 monitoring locations along the Egyptian Red Sea Coast.

Unit of Measurement

µM

Information Sources

Ministry of State for Environmental Affairs, Egyptian Environmental Affairs Agency, the Environmental Information Monitoring Program (EIMP).

Indicator Update Frequency

Total Phosphorus concentration is measured 4 times a year and compiled annually, The indicator data is updated annually

Quality of Information

The indicator describes the consequences of the anthropogenic activities along the Egyptian Red Sea Coast, especially the transportation via the Suez Canal.
Indicator values are determined through the use of standard qualitative and quantitative laboratory methods and quality assurance; Quality control measures are applied.
The sampling and analytical methods used to compile the indicator are the same over time and space.

Purpose

This indicator describes the quality of the Egyptian Red Sea Coastal water to guide future planning or trigger corrective actions.

Target Fixed by Law

Indicator levels are compared to the international guidelines (EU Commissions WRc Ref: CO4150, Nixon et al, May 1996), there are no Egyptian Guidelines concerning the sea water quality, related to phosphorus concentrations

Table:Nutrient limites

	K_s	K_s	Redfield's Ratio
	µg/l	µmol/l	Weight basis
DIN	28	2	
DIP	6.2	0.2	
DISi	56	2	
DIN:DIP			7
DISi: DIN			2
DIN:DIP			32

NOTE:
DIN is dissolved inorganic nitrogen (NO_3+NO_2+NH_4), DIP is dissolved inorganic phosphorus (PO_4). DSi is dissolved inorganic silicate (SiO_4).

Assessment of State and Trend

Total Phosphorous (TP) concentration, in 1998, has been fluctuating in all sampling locations along the Egyptian Red Sea Coast. In 2006; The TP concentration increased in the Suez segment coastal area where the highest population density is found, and transportation and tourist activities occur.

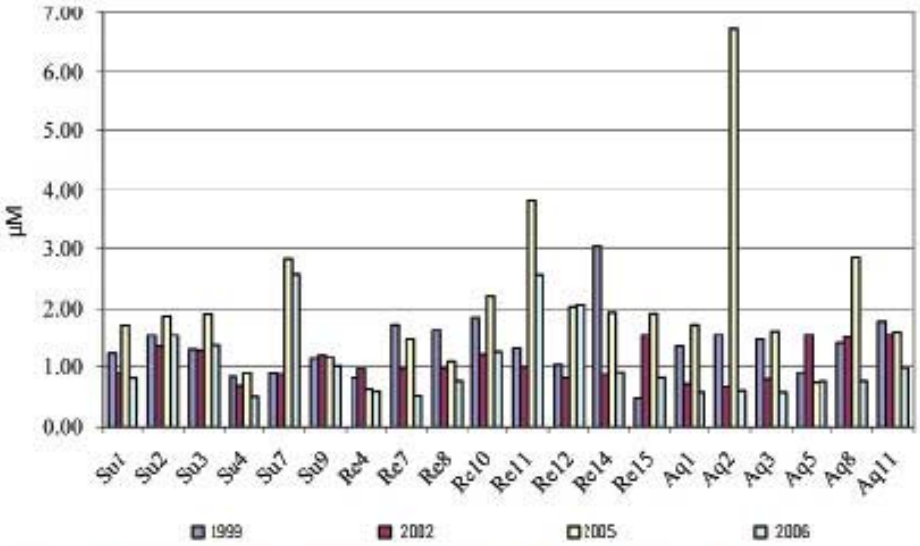
Comments on Tables and Figures

Mean TP concentration in the Egyptian Red Sea Coastal water, within mentioned locations, is presented in (Table 2.5). Mean concentration is used in order to facilitate comparison over time and space. The selected locations represent different areas along the Egyptian Red Sea Coastal line. In 2006, TP concentration in the portion of the Ras Gharib City exhibits the highest concentration over space, followed by Qseir North and Qseir Middle. Comparatively higher mean TP values and higher variability are indicative of high anthropogenic activities at the Coast.

Table 2.5: Total Phosphorous Concentration Along the Egyptian Red Sea Coast

Site Name	Site ID	Annual Average 1999	Annual average 2000	Annual Average 2001	Annual Average 2002	Annual average 2003	Annual Average 2004	Annual Average 2005	Annual Average 2006
Suez North	Su1	1,22	1,22	0,54	0,89	0,86	1,51	1,72	0,81
Suez Middle	Su2	1,52	1,27	0,94	1,34	1,33	1,69	1,87	1,53
Suez South	Su3	1,29	0,81	0,47	1,26	0,86	2,71	1,91	1,36
Ain Sukhna Off Shor	Su4	0,84	0,76	0,46	0,69	0,72	1,01	0,90	0,50
Ras Gharib City	Su7	0,89	0,70	0,44	0,88	1,27	3,01	2,82	2,57
Ras Shukheir	Su9	1,14	0,70	0,49	1,19	1,15	1,13	1,15	1,02
Hurghada-Hotel Sheraton	Re4	0,82	0,59	0,63	0,99	0,88	0,67	0,62	0,58
Safaga North	Re7	1,73	0,85	0,41	0,96	0,68	0,79	1,46	0,51
Safaga Middle	Re8	1,64	1,92	1,19	0,98	1,32	1,97	1,09	0,76
El Hamarawein	Re10	1,85	1,49	1,04	1,21	1,89	3,65	2,21	1,25
Quseir North	Re11	1,31	1,50	0,48	0,99	1,86	7,34	3,83	2,56
Quseir Middle	Re12	1,03	1,11	0,48	0,82	1,38	1,35	2,03	2,06
Marsa Alam	Re14	3,03	1,43	0,55	0,87	1,31	1,04	1,94	0,91
Bir Shalatin	Re15	0,48	0,87	0,45	1,54	0,98	0,82	1,92	0,82
Sharm El Sheikh Ras Mohamed	Aq1	1,34	0,60	0,41	0,72	0,56	0,91	1,73	0,58
Sharm El Sheikh Harbour	Aq2	1,55	0,86	0,54	0,67	0,63	1,07	6,72	0,60
Sharm El Sheikh Na'ama bay	Aq3	1,46	1,32	0,44	0,79	0,72	0,80	1,62	0,58
Dahab	Aq5	0,90	0,90	0,55	1,55	0,76	0,79	0,74	0,76
Nuweiba harbour-El Saladin	Aq8	1,40	1,64	0,61	1,50	0,71	0,62	2,85	0,76
Taba	Aq11	1,78	0,93	0,64	1,54	0,82	1,02	1,60	0,99

Source: EIMP Database System – Environmental information monitoring program - EEAA
Unit of Measurement µM



Source: EIMP Database System – Environmental Information Monitoring Program - EEAA
Figure 2.7: Total Phosphorous Concentration Along the Egyptian Red Sea Coast, Suez & Aquaba Gulf

INDICATOR: TOTAL PHOSPHORUS CONCENTRATIONS IN THE EGYPTIAN MEDITERRANEAN COASTAL WATER

Description

Total Phosphorus concentration is an indicator that measures the level of eutrophication state in the Egyptian Mediterranean Coastal water. Major sources of Phosphorous are land based sources, including the discharged water from the agricultural drains and the effluent wastewater originating from various anthropogenic activities in the coastal cities. Total Phosphorus concentration is measured on quarterly basis in 30 monitoring locations along the Egyptian Mediterranean Coast.

Unit of Measurement

µM

Information sources

Ministry of State for Environmental Affairs, Egyptian Environmental Affairs Agency, the Environmental Information Monitoring Program (EIMP).

Indicator Update Frequency

Total Phosphorus concentration is measured 4 times a year and compiled annually, The data is updated annually .

Quality of Information

The indicator describes the state of the effluent wastewater discharged to the Egyptian Mediterranean Coast.
Indicator values are determined through the use of standard qualitative and quantitative laboratory methods and quality assurance. Quality control measures are applied.
The sampling and analytical methods used to compile the indicator are consistent over time and space.

Purpose

This indicator describes the quality of the Egyptian Mediterranean Coastal water in term of eutrophication to guide future planning or trigger corrective actions if the indicator level exceeds the established guideline.

Target Fixed by Law

Indicator levels are compared to the international guidelines (EU Commissions WRC Ref: CO4150, Nixon et al, My 1996) There are no Egyptian Guidelines concerning the sea water quality, related to phosphorus concentrations

Table:Nutriment limitation

	K_s	K_s	Redfield's Ratio
	µg/l	µmol/l	Weight basis
DIN	28	2	
DIP	6.2	0.2	
DISi	56	2	
DIN:DIP			7
DISi: DIN			2
DIN:DIP			32

NOTE:
DIN is dissolved inorganic nitrogen (NO_2+NO_3+NH_4). DIP is dissolved inorganic phosphorus (PO_4). DSi is dissolved inorganic silicate (SiO_4).

Assessment of State and Trend

Total Phosphorous (TP) concentration is fluctuating in all sampling locations along the Egyptian Mediterranean coast in 2006; The TP concentration increased in the area of the coast where highest population density or more activities have been observed.

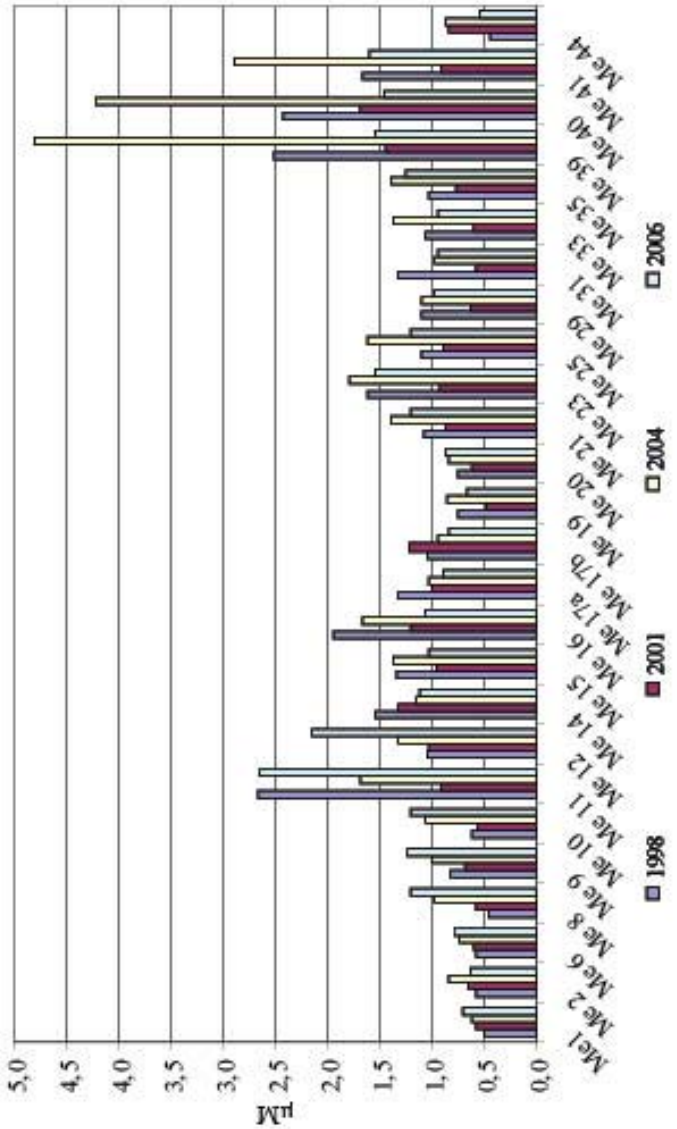
Comments on Tables and Figures

Mean TP concentration in the Egyptian Mediterranean coastal, water within mentioned locations, is presented in (Table 2.6).
Mean concentration is used in order to facilitate comparison over time and space. The selected locations represent different areas along the Egyptian Mediterranean Coastal line. TP concentration in the portion of the Coast at E-harbor east, El-Gamil East and West exhibits the highest decrease over time (1998-2006) (major decreases). Comparatively higher mean TP values and higher variability are indicative of high anthropogenic activities on the Coast.

Table 2.6 : Total Phosphorous Concentration Along the Egyptian Mediterranean Coast

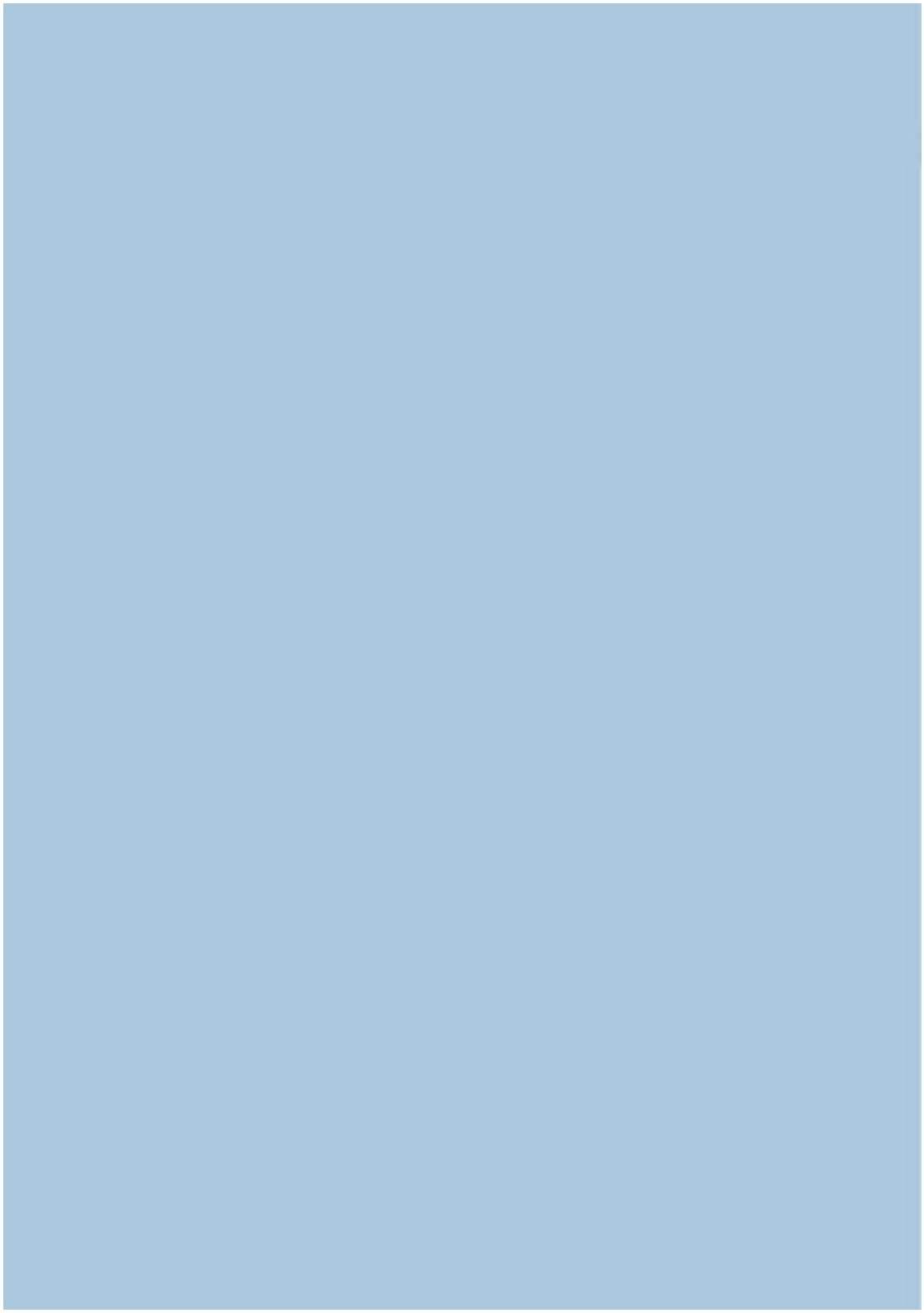
site ID	site Name	1998 annual mean	1999 annual mean	2000 annual mean	2001 annual mean	2002 annual mean	2003 annual mean	2004 annual mean	2005 annual mean	2006 annual mean
Me1	Salloum	0.49	0.27	0.43	0.58	0.33	0.57	0.62	0.68	0.72
Me 2	Matrouh	0.59	0.31	0.40	0.66	0.46	0.56	0.84	0.67	0.64
Me 6	Marina	0.58	0.34	0.38	0.60	0.44	0.60	0.73	0.74	0.80
Me 8	Nobareya	0.47	0.38	0.75	0.59	0.57	0.68	0.98	1.14	1.21
Me 9	Hanoville	0.83	0.33	0.80	0.68	0.48	0.68	1.01	1.93	1.25
Me 10	Bilash	0.63	0.39	0.97	0.57	1.18	1.37	1.08	1.44	1.20
Me 11	Mex	2.67	0.64	0.55	0.91	1.51	2.42	1.69	2.21	2.65
Me 12	W_harbor	1.05	0.44	1.66	1.03	0.82	1.51	1.33	1.42	2.15
Me 14	NIOF	1.56	1.74	1.24	1.33	2.89	1.01	1.16	1.86	1.12
Me 15	E_harbor – West	1.35	1.16	0.76	0.96	2.19	1.11	1.38	1.38	1.04
Me 16	E_harbor – East	1.96	1.47	1.06	1.21	1.63	1.27	1.67	1.35	1.08
Me 17a	Alexandria –Shatby	1.33	0.97	0.97	0.99	1.12	0.87	1.04	0.93	0.89
Me 17b	Alexandria – Sidi Gaber	1.05	0.78	1.02	1.23	0.81	0.84	0.96	0.86	0.84
Me 19	Montaza	0.76	0.52	0.48	0.48	0.70	0.68	0.86	0.55	0.68
Me 20	Abu Qir – West	0.77	0.44	0.48	0.61	0.62	0.85	0.85	0.90	0.88
Me 21	Abu Qir – East	1.08	0.88	0.93	0.88	1.43	1.15	1.40	1.00	1.21
Me 23	Electrical station	1.63	1.09	1.05	0.92	2.12	1.63	1.80	1.72	1.54
Me 25	Maadia	1.11	1.12	0.86	0.90	1.96	1.52	1.63	1.20	1.20
Me 29	Rashid	1.11	0.67	0.91	0.63	1.83	1.24	1.10	0.94	0.98
Me 31	Rashid	1.33	0.96	0.61	0.59	1.46	1.17	0.98	0.91	0.94
Me 33	El-borg	1.07	0.98	0.85	0.61	1.25	1.58	1.39	0.98	0.96
Me 35	Damietta	1.04	0.86	0.82	0.77	1.77	1.29	1.39	1.65	1.26
Me 39	El-Gamil – West	2.51	1.53	2.63	1.44	2.79	3.26	4.80	3.21	1.56
Me 40	El-Gamil - East	2.43	1.88	2.53	1.70	3.87	3.46	4.22	3.25	1.46
Me 41	Port Said	1.67	1.55	2.44	0.91	2.54	2.56	2.90	1.55	1.60
Me 44	Arish	0.44	0.41	0.54	0.85	0.67	0.72	0.89	0.60	0.55

Source: EIMP Database System – Environmental Information Monitoring Program - EEAA
Unit of Measurement µM



Source : BMP Database System – Environmental Information Monitoring Program - EEAA
Figure 2.8: Total Phosphorus Concentration Along the Egyptian Mediterranean coast


2.3 Biodiversity
andProtected Areas



2.3 Biodiversity and Protected Areas

Introduction

Protected Areas play an essential role in the maintenance of global biodiversity and in sustainable use of resources. As part of Egypt's commitment to the Convention for Biological Diversity (CBD's) trends and resolutions, 25 protected areas (PAs) have been declared between 1983 - 2006. The Nature Conservation Sector (NCS) has developed the work plan for its Protected Area network to correspond with the CBD's program of work for Protected Areas, which gives trends and recommended actions to all parties in order to reach common goals.

The biosphere is the product of interactions between soil, rocks, water, air and the living organisms they contain. Therefore, given the close inter-relations both with and within the other thematic areas, the biosphere indicators presented here are related to different issues; in particular, the area expansion of Egyptian protectorates, its classification and the number of species, as biodiversity indicator, in PAs. Further work is required to cover all the protected areas in providing a data collection program that ensures an uninterrupted, accurate and reliable flow of data.

The set of indicators shows that there are still high threat levels facing animals, plants and natural habitats, as a result of pressure on the environmental matrices, and land fragmentation. Numerous direct and indirect regulatory measures have been implemented, at the national level, aiming at combating the loss of biodiversity. A National Biodiversity Strategy and Action Plan are being

implemented since 1998. Other new strategies for ecotourism and wetlands were prepared and implemented during 2005.

Bibliography

- *Biodiversity Conservation Capacity Building in Egypt, EEAA – 2006*
- *Egypt State of the Environment Report, EEAA – 2005*
- *Third National Report On Convention On Biological Diversity (Egypt), EEAA-2005*
- *http://www.eeaa.gov.eg (site of "Egyptian Environment Affairs Agency")*
- *http://www.eeaa.gov.eg/nbd/ (site of "National Bioaiversity Department")*
- *http://www.zone.biomapegypt.org/experts (site of Bioaiversity Expert Database)*
- *http://www.egyptchm.org*
- *http://www.iucn.org (site of "IUCN - The World Conservation Union-*
- *http://www.biomapegypt.org (Biomap website)*
- *http://www.zone.biomapegypt.org/hiaa (Biomap Forum)*

INDICATOR: TOTAL AREA AND NUMBER OF PROTECTED AREAS

Description

This indicator describes the growth in Egyptian protected area surface over time.
A natural protectorate is defined as: any area of Land, or coastal or inland water characterized by flora, fauna, and natural features having cultural, scientific, tourist or aesthetic value. These areas will be designated and delineated by decree of the Prime Minister upon the recommendation of the Egyptian Environmental Affairs Agency.
For each year, starting from 1983,when the first protected area was declared, the total protected area surface has been calculated every year.

Unit of Measurement

Kilometre Square (km^2)

Data Sources

Cabinet of Ministers, Ministry of State for Environmental Affairs (MSEA), Egyptian Environmental Affairs Agency (EEAA), Nature Conservation Sector (NCS).

Indicator Update Frequency

Indicator update frequency is variable upon declaration of a new protected area.

Quality of Information

As for "Relevance", this indicator is an essential tool for assessing ecosystem conservation policy.
Accuracy is very good because data sources are reliable. The comparability over time and across space is reliable. Hand-held GPSs are used to determine the area of PAs. UTM projection system is used for all pre-processing projection of field work.

Purpose

To value the level and temporal (time) trend of protected areas declaration.

Target Fixed by Law

The protected areas, defined by «Outline Law on Protected Areas (L 102 / 83)», have been specified to assure conservation of the environment.

Assessment of State and Trend

The indicator trend is positive because it shows an increase of the protected areas

Comments on Tables and Figures

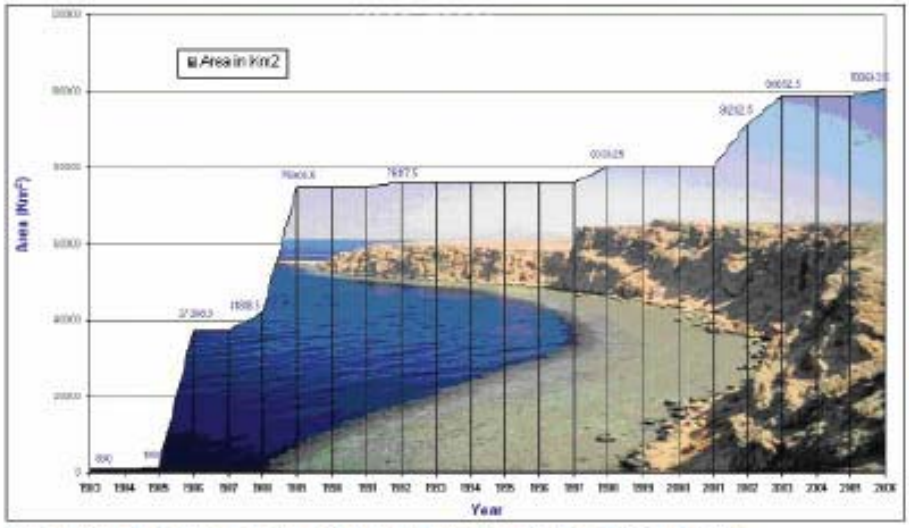
In Egypt, protected land areas cover 10.06% of the country's land. (Table 2.7) and (Figure 2.8) show a significant increase of the protected areas since 1983, when the first one was declared until the current year giving 25 protected areas.

Table 2.7: Annual Variation of Surface and Number of Protected Areas.

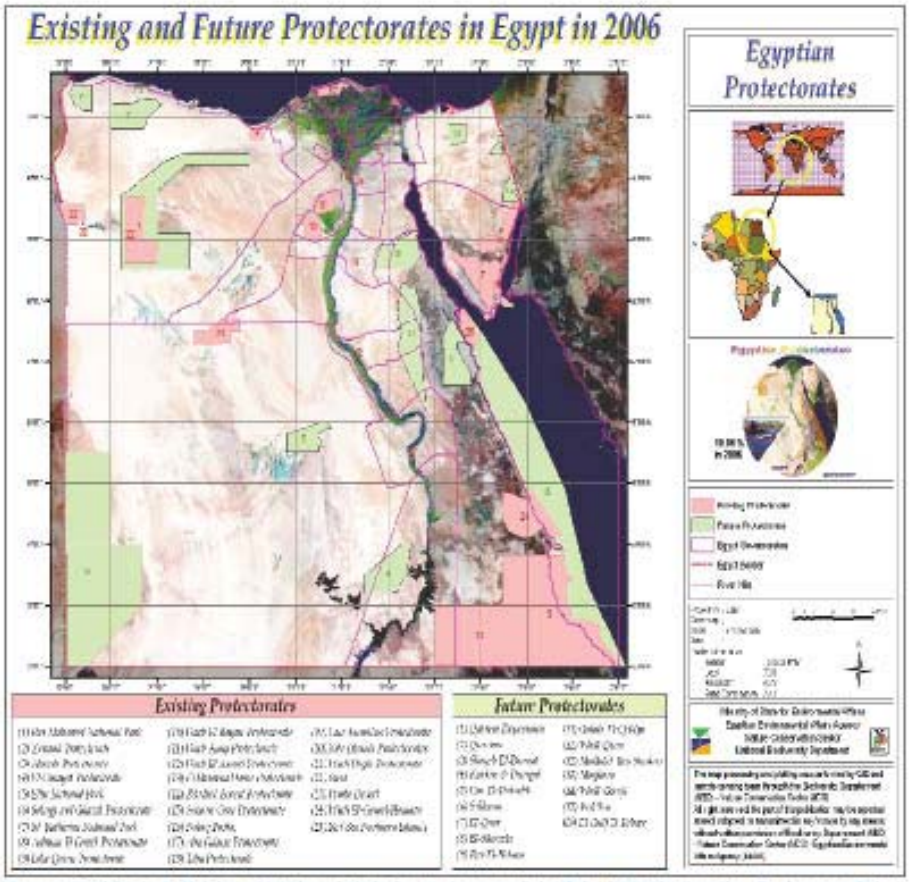
Year	Cumulative Area	Percentage of Cumulative Protected Area in Respect to the Total Area of Egypt*	Cumulative Number of Protectorates
	km²	%	n.
1983	850	0.09	1
1984	850	0.09	1
1985	1088	0.11	3
1986	37388.5	3.74	6
1987	37388.5	3.74	6
1988	41818.5	4.18	8
1989	75005.5	7.50	14
1990	75005.5	7.50	14
1991	75005.5	7.50	14
1992	76117.5	7.61	17
1993	76117.5	7.61	17
1994	76117.5	7.61	17
1995	76117.5	7.61	17
1996	76117.5	7.61	17
1997	76117.5	7.61	17
1998	80332.5	8.03	20
1999	80332.5	8.03	21
2000	80332.5	8.03	21
2001	80332.5	8.03	21
2002	91202.5	9.12	23
2003	98652.5	9.87	24
2004	98652.5	9.87	24
2005	98652.5	9.87	24
2006	100643.5	10.06	25

** The Total area of Egypt is about 1,000,000 km²*

Source: Cabinet of Ministers, Ministry of State for Environmental Affairs (MSEA), Egyptian Environmental Affairs Agency (EEAA), Nature Conservation Sector (NCS).



Source: Cabinet of Ministers, Ministry of State for Environmental Affairs (MSEA), Egyptian Environmental Affairs Agency (EEAA), Nature Conservation Sector (NCS).
Figure 2.9: Annual Variation of the Cumulative Area of Protected Areas (1983-2006)



Source: Cabinet of Ministers, Ministry of State for Environmental Affairs (MSEA), Egyptian Environmental Affairs Agency (EEAA), Nature Conservation Sector (NCS).

Figure 2.10: Map of Protected Areas in Egypt (2006)

INDICATOR: PROTECTED AREAS ACCORDING TO IUCN CLASSIFICATION

Description

This indicator describes the classification of Egyptian protected areas according to the International Union for Conservation of Nature (IUCN) classification.

Unit of Measurement

Number of protectorates in each IUCN Class.

Data Sources

Cabinet of Ministers, Ministry of State for Environmental Affairs (MSEA), Egyptian Environmental Affairs Agency (EEAA), Nature Conservation Sector (NCS).

Indicator Update Frequency

Indicator update frequency is variable upon declaring a new protected area.

Quality of Information

As for "Relevance", this indicator is an essential tool for classifying Egyptian protected areas.
Accuracy is quite good because data sources are quite reliable. The comparability over time and across space is possible.

Purpose

To describe the specific status of the Egyptian Protected Areas according to an international classification (IUCN).

Target Fixed by Law

The protected areas, defined by «Outline Law on Protected Areas (L 102 / 83)», have been specified to assure conservation of the environment.

Assessment of State and Trend

Show the classified categories of the protected areas in Egypt and the number of protected areas for each category .

Comments on Tables and Figures

Most of the Egyptian protected areas are multipurpose. However, they can be classified in five of the six categories of IUCN - The World Conservation Union; it's remarkable that in Egypt there are two important National Parks (Ras Mohamed) and the recent declared one, (Wadi El-Gemal).

Table 2.8: Number of Protected Areas According to IUCN Classification (2006)

IUCN Category	Protectorates
Category II: National Park: protected area managed mainly for ecosystem protection and recreation. (7 PAs)	Elba Hurghada Islands Ras Mohamed Ras Mohamed Siwa Wadi Allaqi Wadi El Gemal Wadi El Rayan
Category III: Natural Monument: protected area managed mainly for conservation of specific natural features. (4 PAs)	Hassana Dome Petrified Forest Sannur Cave Taba
Category IV: Habitat/Species Management Area: protected area managed mainly for conservation through management intervention. (3 PAs)	El Ahrash Saluga & Ghazal Wadi El Assiuti
Category V: Protected Landscape/Seascape: protected area managed mainly for landscape/ seascape conservation and recreation. (6 PAs)	Abu Galum Lake Qarun Nabq Wadi Degla White Desert
Category VI: Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems. (5 PAs)	Ashtum El Gamil Burullus El Omayed Nile Islands Zaranik

Source: Cabinet of Ministers, Ministry of State for Environmental Affairs (MSEA), Egyptian Environmental Affairs Agency (EEAA), Nature Conservation Sector (NCS).

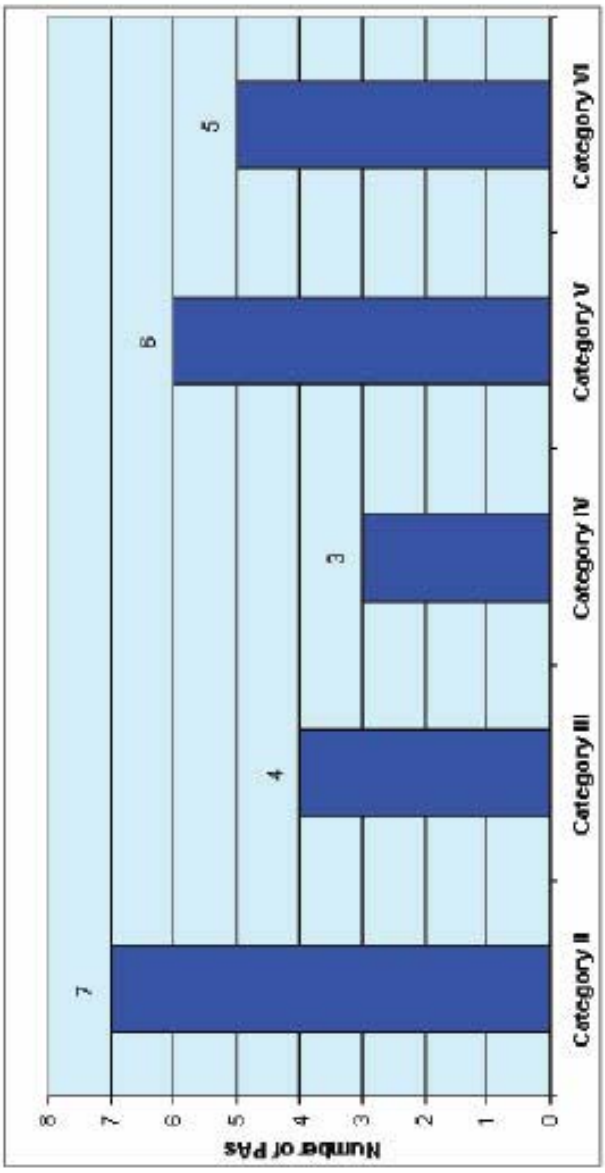


Figure 2.11: Number of Protected Areas According to IUCN Classification.

INDICATOR: BIODIVERSITY IN PROTECTED AREAS

Description

This indicator describes the progress in protection programs achieved in protected areas regarding biodiversity.

Unit of Measurement

Number

Data Sources

Cabinet of Ministers, Ministry of State for Environmental Affairs (MSEA), Egyptian Environmental Affairs Agency (EEAA), Nature Conservation Sector (NCS).

Indicator Update Frequency

Indicator update is irregular as it depends on the available data.

Quality of Information

As for "Relevance", this indicator is an essential tool for assessing ecosystem conservation policy.
Accuracy should be more refined by applying the same methodology of data collection. The comparability over time is rarely possible. However, comparability across space is possible.

Purpose

To value the protection of species carried out by protected areas.

Target Fixed by Law

The protected areas, defined by Outline Law on Protected Areas (L102 / 83), have been fixed to assure conservation of the environment.

Assessment of State and Trend

The state of protection of species has to be improved: (only 13.4% and 19.3% of the total number of fauna and flora of Egypt, respectively are protected by the establishment of protected areas). These percentages should be increased since there are many endangered species to be protected, for highly significant reasons

Comments on Tables and Figures

The total number of fauna and flora species in Egypt is about 17,238 and 5,121 species, respectively. On the other hand, the total number of fauna and flora species in the Egyptian protected areas is about 2,391 and 989 species, respectively. Hence, only 13.9% and 19.3% of the total number of fauna and flora of Egypt, are protected.

Table 2.9: Number of Species in Protected Areas and in Egypt

	Species in Protected Areas	Species in Egypt	Species in Protected Areas
Type	No.	No.	%
Fauna	2,391	17,238	13.9
Flora	989	5,121	19.3
TOTAL	3,380	22,359	15.1

Source: Cabinet of Ministers, Ministry of State for Environmental Affairs (MSEA), Egyptian Environmental Affairs Agency (EEAA), Nature Conservation Sector (NCS).
Ref : Soliman A.A. (2005) , Status of Biodiversity in Protected Area . Report submitted to NCS 25pp

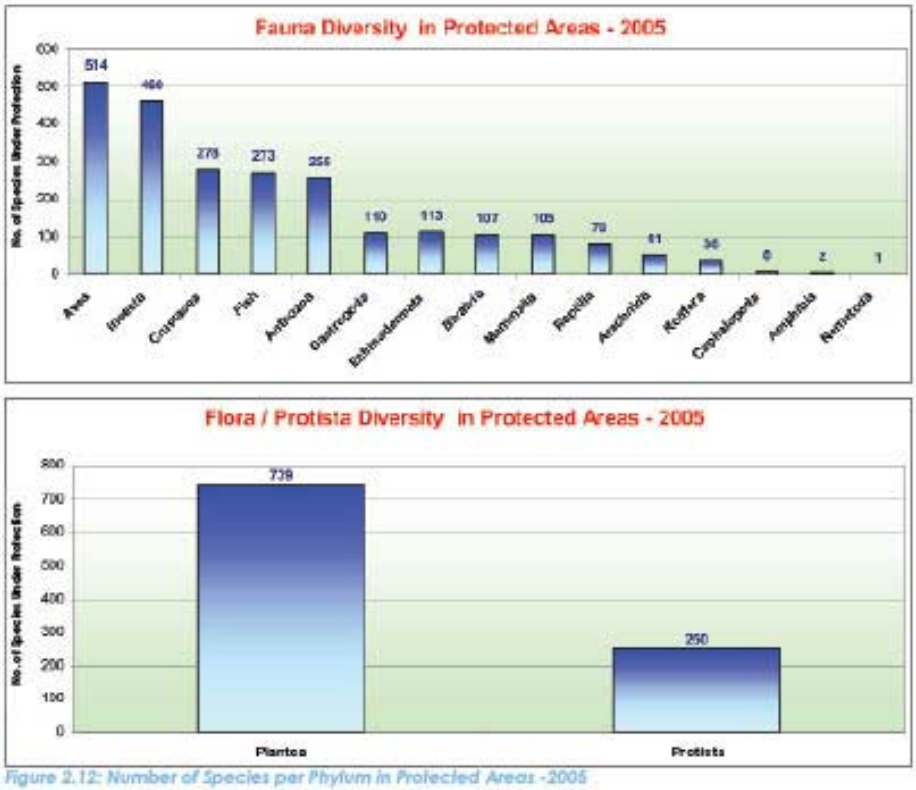
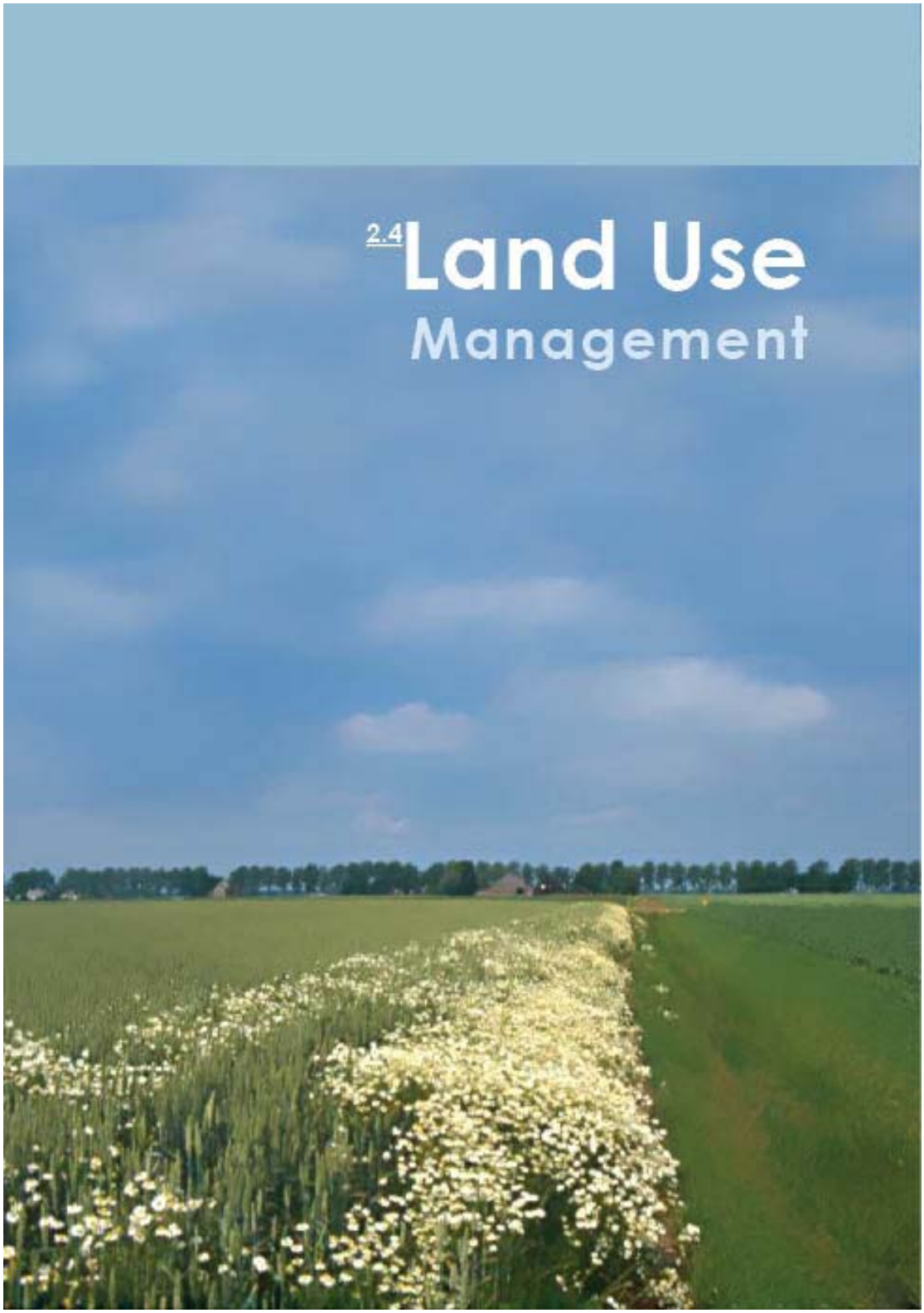
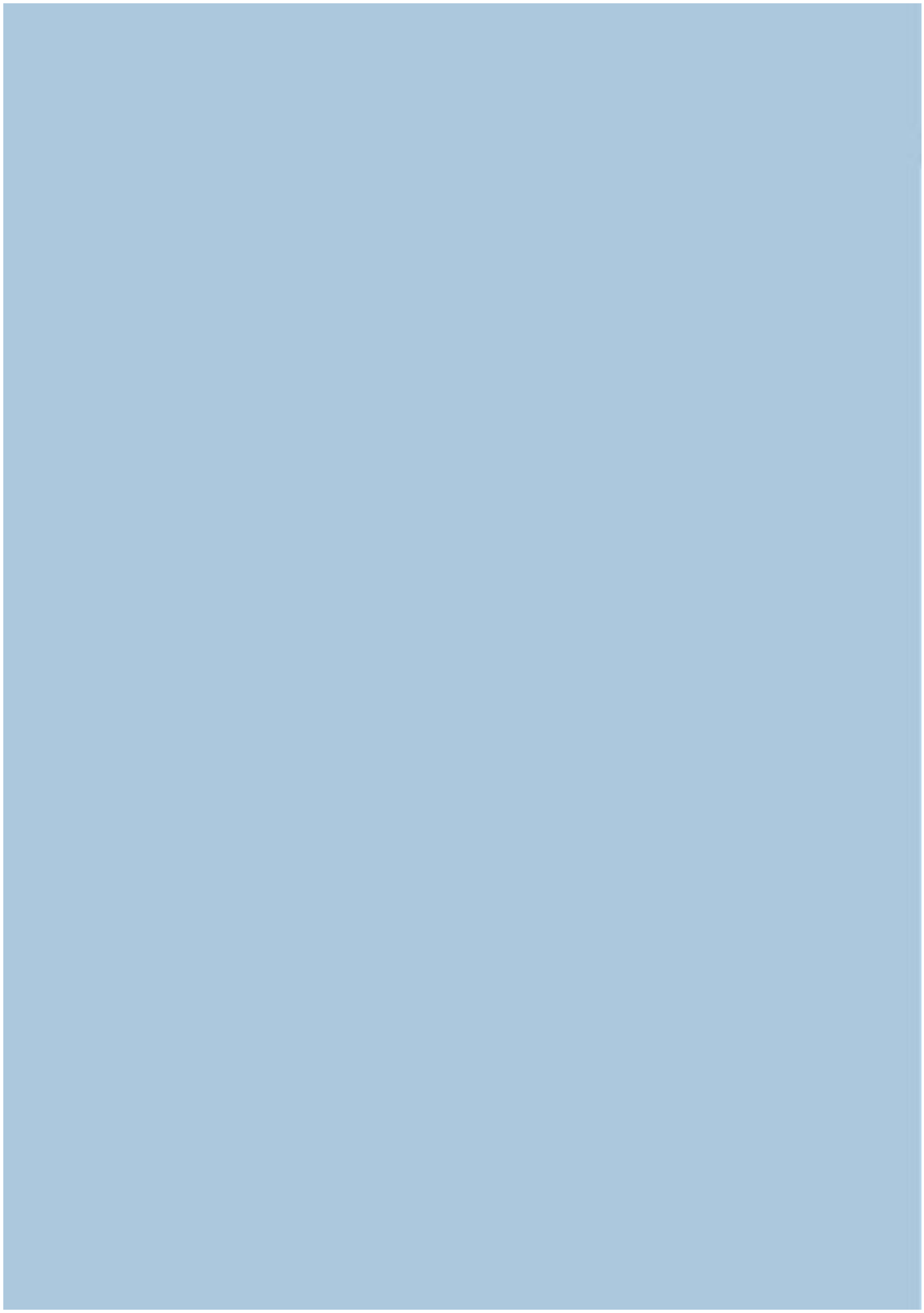


Figure 2.12: Number of Species per Phylum in Protected Areas -2005

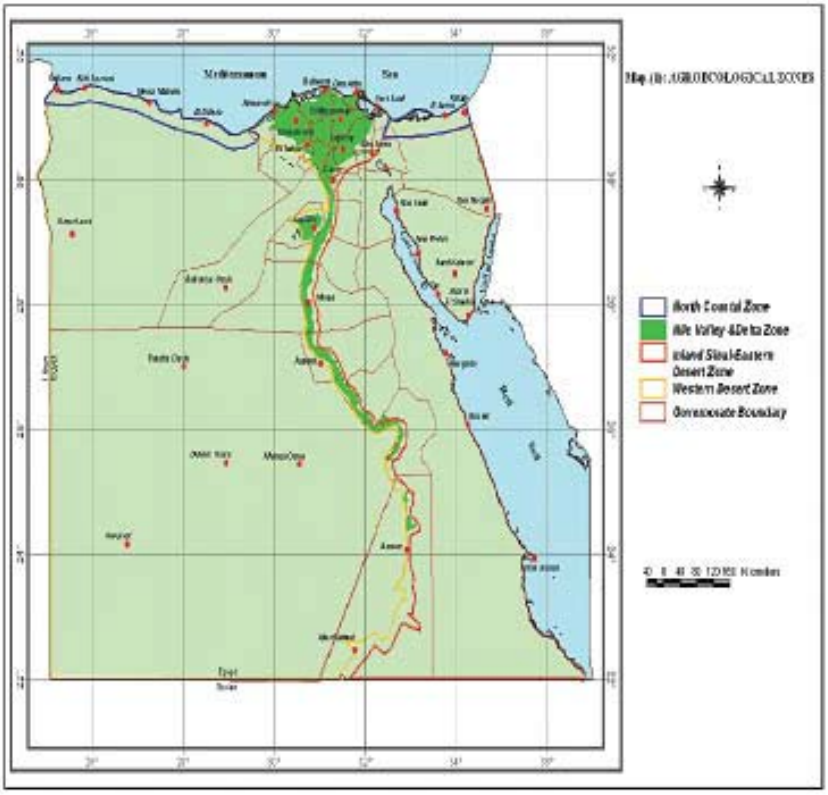

2.4
Land Use
Management



2.4 Land Use Management

Introduction

The total area of Egypt is one million km². The total area is characterized by vast desert areas Western, Eastern and Sinai



deserts where sparse populations live representing less than 5% of the total population. About 95% of the total population lives in the old Nile Valley, Delta zone, newly reclaimed desert areas in the fringes of the Delta, Valley, and North Coastal zone. The lands of the old Nile Valley are very rich alluvial soils formed through deposition of sediments carried by the River Nile water. The rich soil of the Valley, Delta, and reclaimed desert soil in the fringes are irrigated presently by Nile water and produce more than 90% of total agricultural products. Thus, these lands are highly valuable for Egypt and the Egyptian population living in local units (Governorates) marked in the map.

The three selected indicators are very valuable indicators to economics, environment and decision making in Egypt.

- *Per capita share of cultivated land:* is the resultant of the ratio between two dynamic factors, i.e. population increase and expansion of cultivated lands over time.
- *Soil salinity and sodicity:* the increased soil salinity is the most significant land degradation factor that reduces the most productivity of productive lands of Egypt. Soil salinity and sodicity has large adverse impacts on land productivity, food security, agricultural exports, success of land reclamation projects and decision making for agricultural development. It is a dynamic factor varying through farmers management practices. This indicator is assessed through local units (Governorates).
- *Urban encroachment on cultivated lands:* this indicator is a measure of growing urban and rural dwellings into area of the very productive lands despite laws prohibiting such expansion. This indicator is the most serious degradation factor as it causes irreversible degradation.(i.e. complete loss of productive agricultural lands).

The first two indicators are produced by efficient methodologies producing accurate data despite the dynamic nature of both. The third indicator needs and is receiving greater improvements, as enhanced remote sensing assessment and monitoring are being carried out.

Bibliography

- *Central Authority for Public Mobilization and Statistics (CAPMAS) yearly publications;*
- *Ministry of Agriculture and land Reclamation (MALR) yearly reports;*
- *Reports of Agriculture Research Centre (Institute of Land, Water and Environment) Annual reports 2004 – 2006;*
- *Activities of the National Authority for Remote Sensing and Space Sciences. (NARSS) Annual Reports 2003 / 2004 - 2005 / 2006;*
- *ACSAD (2004) State of Desertification in the Arab World (updated study) Egypt - pp503 - 560. (In Arabic);*
- *Publications of DRC - project reports 2002 – 2007;*

INDICATOR: PER-CAPITA SHARE OF CULTIVATED LAND

Description

Cultivated lands in Egypt are of relative scarcity. The cultivated lands include the Old Nile Valley of highly fertile soil and newly reclaimed desert soil. Cultivated lands are irrigated with highly diversified agricultural techniques, in addition to Oasis where cultivated lands are dependent on groundwater for cultivation. This indicator shows the progressive decline of per-capita share of cultivated lands despite its increase in area. This is due to pressures from increasing population.

Unit of Measurement

Feddan (4200 m^2) per capita

Data Sources

CAPMAS statistics.

Indicator Update Frequency

Every ten years.

Quality of Information

As far as «Relevance» is concerned, the indicator is a good tool to monitor per capita share of cultivated lands by assessing total cultivated lands and total population every 10 years with the same methodology, and at the same time.

Purpose

To monitor the changes in per capita share of cultivated land.

Target Fixed by Law

Policy objectives aim at the progressive increase of cultivated areas through macro projects to reclaim desert lands utilizing all available and appropriate water resources.

Assessment of State and Trend:

Per capita share of cultivated land has been in constant decline during the last century, almost stable in the last two decades.

Comments on Tables and Figures

The data shows constant decline of per-capita share of cultivated land, despite the considerable increase in cultivated land through the last three decades, which has sensibly contributed to slow down such a trend.
This evidence has driven the decision makers to enhance productivity per unit area in quantity and quality and to rehabilitate degraded cultivated areas by means of various types of intervention.

Table 2.10: Per-Capita Share of Cultivated Land Over a Century

Year	Population	Total Cultivated area	Per-capita share
	million	million feddans	feddans/per prson
1907	11.2	5.4	0.42
1917	12.8	5.3	0.41
1927	14.2	5.2	0.39
1937	15.9	5.3	0.33
1947	19.0	5.8	0.31
1960	26.1	5.9	0.23
1970	43.2	6.0	0.18
1980	42.1	6.1	0.14
1990	55.0	7.2	0.13
1998	62.5	7.7	0.12
2005	71.0	8.2	0.115

Source: Central Authority for Public Mobilization and Statistics CAPMAS 2005

INDICATOR: SOIL SALINITY AND SODICITY

Description

Soil salinity and sodicity are among the major land and environmental degradation factors. Both parameters have adverse impacts on soil properties, productivity and quality of agriculture products. Reduction of soil productivity ranges between 20 - 35% of potential productivity. Assessment methodologies include remote sensing, field surveys and laboratory analyses.

Unit of Measurement

Total Salt concentration / soil past(dc/m) - Exchangeable sodium Meq/100 gm soil

Data Sources

NARSS, MALR, EALIP.

Indicator Update Frequency

Every five years

Quality of Information

The relevance of this indicator is clearly stated in the introduction of the land section. Accuracy is high as assessment of the areas affected by salinity and sodicity are measured through local agricultural directorates in each of the governorates (Table 2.13). (compiled figures provided by governorates). Such figures are presently verified by remote sensing techniques covering all the lands of the Nile Valley, delta and reclaimed desert areas.
Comparability over time is definitely variable over time and location as the process itself is dynamic over time (years) due to cropping patterns, soil management practices and maintenance of drainage canals.

Purpose

To define and assess the areas of cultivated lands affected by soil salinity and sodicity (state) to estimate productivity losses (impacts) and design mitigation efforts (Response).

Target Fixed by Law

To curtail and minimize the impact of one of the most significant land degradation factors. As well as to recover the fore-gone economic losses and enhance house-hold income in rural areas.

Assessment of State and Trend

Soil salinity and sodicity continues to occur and soil continues to be reclaimed in many places in Egypt.

Comments on Tables and Figures

The data shows considerable activities especially in the last 15 years to mitigate the impacts of soil salinity and sodicity in about 1.4 million Feddans. Activities prior to this period show only scattered interventions. The present interventions would increase the treated areas to represent more than 65% of the affected areas. Progressive treatments through the following five year plan (2007 - 2012) are anticipated to completely address the problem.

Latest survey (2004) shows the total area of cultivated land affected by salinity and sodicity to be equal to 3.15 million Feddans out of total cultivated area of 8.2 million feddans with an average of 38% of the total area (MALR).

Estimated productivity reduction due to salinity and sodicity range between 20 - 35% of potential productivity based on severity (slight - medium - severe - very severe) of salinity and sodicity (EALIP).

Farmers tend to over-use irrigation water applying quantities over the normal water requirements for cultivated crops with the motivation to enhance the productivity, thus leading to water logging and soil salination

Table 2.11: Total Area of Treated Saline Soils in Egyptian Governorates

Year July/June	Nile Delta Gov.	Upper-Egypt Gov.	Other Area	TOTAL
	Thousand Feddans			
2001/ 2002	158.1	123.5	11.2	292.8
2002 /2003	138.7	82.9	9.3	230.9
2003 /2004	64.6	30.3	-	94.9
2004 /2005	17.2	27.3	5.9	50.4
2005/ 2006	45.8	44.6	1.9	92.3
TOTAL	424.4	308.6	28.3	761.3
Previous five years (before 2001)		610.0		
Grand Total		1,371.3		

Source: NARSS, MALR, EALP

INDICATOR: URBAN ENCROACHMENT ON CULTIVATED LAND

Description

Urban encroachment on cultivated lands is one of the major land factors in Egypt. It is a serious factor since its impact is not reversible. This indicator shows the advancement of urban centres and villages in the rural areas especially in the Old Nile fertile Valley.

Unit of Measurement

Feddans

Data Sources

National Authority for Remote Sensing and Space Science (NARSS);
Ministry of Housing, Utilities, and Urban Development;
Ministry of Agriculture and Land Reclamation (MALR).

Indicator Update Frequency

Non systematic.

Quality of Information

Information is gathered from the local authorities of the governorates with varied accuracy. Certain governorates are covered by satellite imagery which gives accurate monitoring of urban encroachment.

Purpose

To monitor the urban encroachment on cultivated lands.

Target Fixed by Law

First to halt the progressive urban encroachment which is continuing despite prohibiting legislations.

To provide alternatives to expand urban activities in desert areas of adjacent location.
Military Order n° 12 /5/ 1996 (Military Governor General President of Egypt) Forbidding scraping of the top soil or building on fertile lands or causing the fallowing of lands.
MARL – Law 1983, amended 1985 which forbids the use of soil materials to manufacture bricks or using the top soil material for any other industrial purposes.

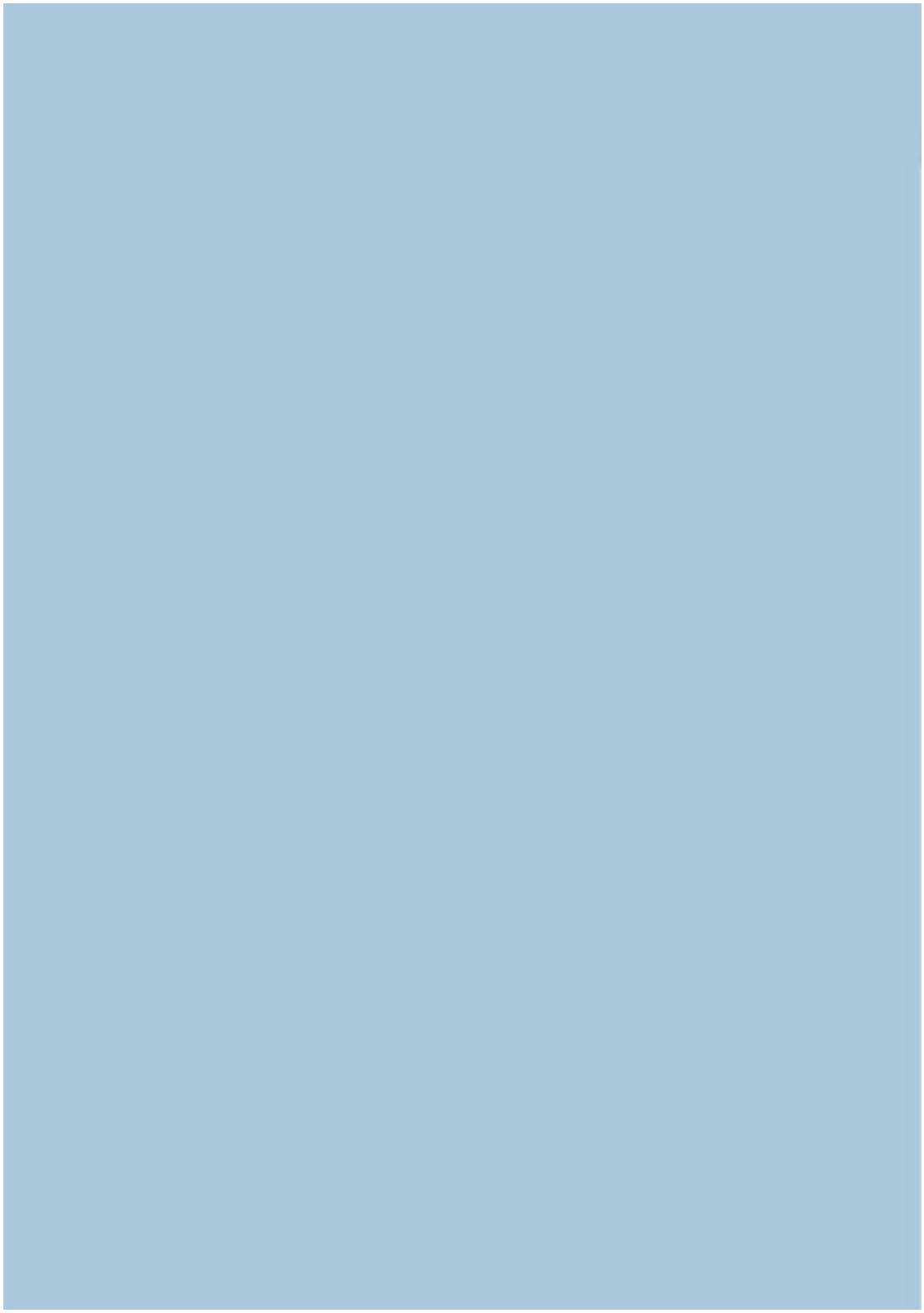
Assessment of State and Trend

Continued loss of agriculture productive land due to constant expansion of villages in rural areas and cities in the agricultural governorates in the Old Valley.

Comments on Tables and Figures

Records from field surveys in governorates distinguished by high population density show that prior to 1984 when a law was issued prohibiting construction on cultivated land, a total loss of about 630,000 Feddans of fertile land took place. Since then and despite the enforcement of the prohibiting legislations, it is estimated that between 15,000 - 20,000 Feddans are still being lost every year due to population increase, which results in the expansion of rural villages and urban centres in the old Nile Valley.
Such estimate leads to more than 20% loss in agricultural productivity, which might be hidden by the apparent increase of average productivity of each of the main crops (cotton, rice, corn, sugar-cane, and others, especially vegetables and fruit trees).
There are concerted efforts recently to provide alternatives to farmers and end-users to enhance construction of urban areas in desert lands of near proximity to old urban areas. No available information at the concerned authorities.

2.5 Afforestation



2.5 Afforestation

Introduction

The geographic area of Egypt exceeds one million km^2, including desert lands that cover over 96% of the total area with scattered small areas of shrub vegetation and planted trees. Most of the country's planted trees grow in the Nile Delta and Valley, which have rich varieties and tree species, some of which are indigenous and some are exotic.

During the Fatimi era, hundreds of years ago, Egypt was the first country in the world to establish a National Forest Organisation. Today, 0.14% of the inhabited country's land area is covered with trees. The Country has very limited natural forests, (Mount Elba). Sparse, scattered mangrove occurs along the Red Sea Coast.

The National Program for National Use of Treated Sewage Water that has started in 1995 aimed at using the treated sewage water for establishing forests. This program achieved good results in marginal desert in Egypt. The success that has been achieved by establishing the treated sewage water plants in many areas of the country led to increase the production of these plants to reach about 2.4 billion m^3/year, and it is expected to reach more than 4 billion m^3/year. This success requires cooperative efforts by MSEA and other concerned ministries and organizations to increase the use of treated sewage water for afforestation in new areas. In addition, it is necessary to review all the available data about the areas that have been established (including selecting, testing, auditing, adopting data), and then we need to establish a new database about afforestation.

Bibliography

Egypt State of the Environment Report. Ministry of State for Environmental Affairs (2005)

INDICATOR: TOTAL FOREST AREA

Description

The indicator describes the total area covered by cultivated forests (13,500 feddans) and the total amount of treated wastewater used (880,000m³/ year).

Unit of Measurement

Feddan (4200 m²)

Information Sources

MSEA and MALR.

Indicator Update Frequency

Annual basis.

Quality of Information

As far as Relevance, Accuracy, Comparability over time and space, the presented information describes the basic lines of using the treated sewage water for afforestaion.
The collected data indicates its relevance to the extension in cultivation of man made forests and amounts of wastewater used in irrigation in relation to the different species of trees and cultivation sites to set up future expansion plans for planting forests.

Purpose

To measure the total areas planted with forest trees and its relation with the amount of treated sewage water used according to the pertinent Egyptian code.

Target Fixed by Law

The overall aim of the National Program for safe use of treated sewage water for Afforestation is to solve the problem of accumulation of wastewater, add new reclaimed areas, increase forest areas, achieve health benefits, and create new job opportunities for youth.

Assessment of State and Trend

Data indicates that progress was achieved in expanding the area of cultivated forests based on its irrigation with wastewater. The cultivated forest areas were 90, 500, 13,500 feddans for the years 1995, 1997 and 2005 respectively.

Comments on Tables and Figures

Afforestation Program for safe use of treated sewage water addresses the problem of accumulation of wastewater, which represents a major environmental issue. It also participates in reducing air and soil pollution, and adds micro climate improving factors. The present total forest area is 13,500 feddan, which is equal to 0.14% of the inhabited area in Egypt.

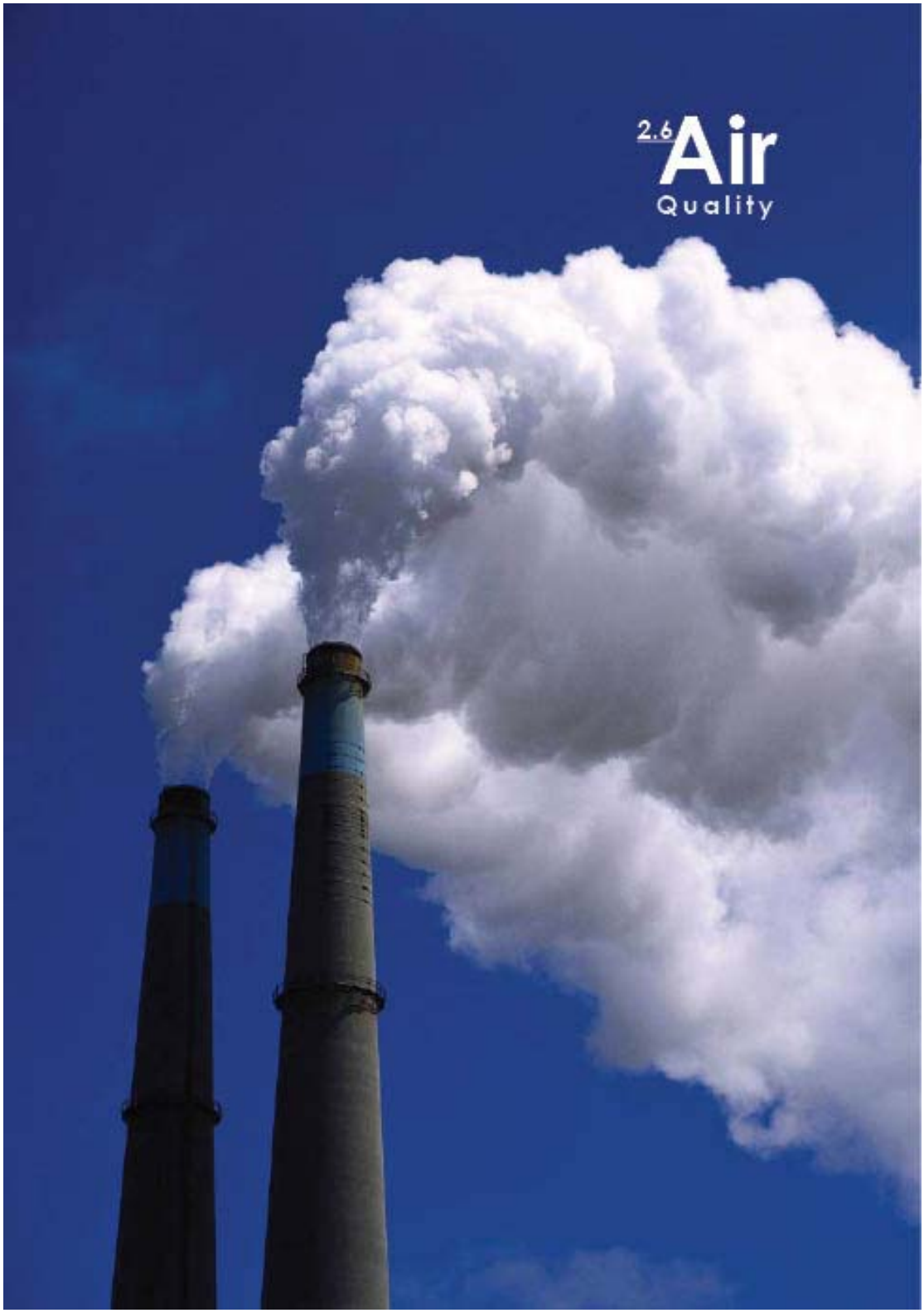
Table 2.12: Established and Under-establishment Areas of Cultivated Forest Stands (2005)

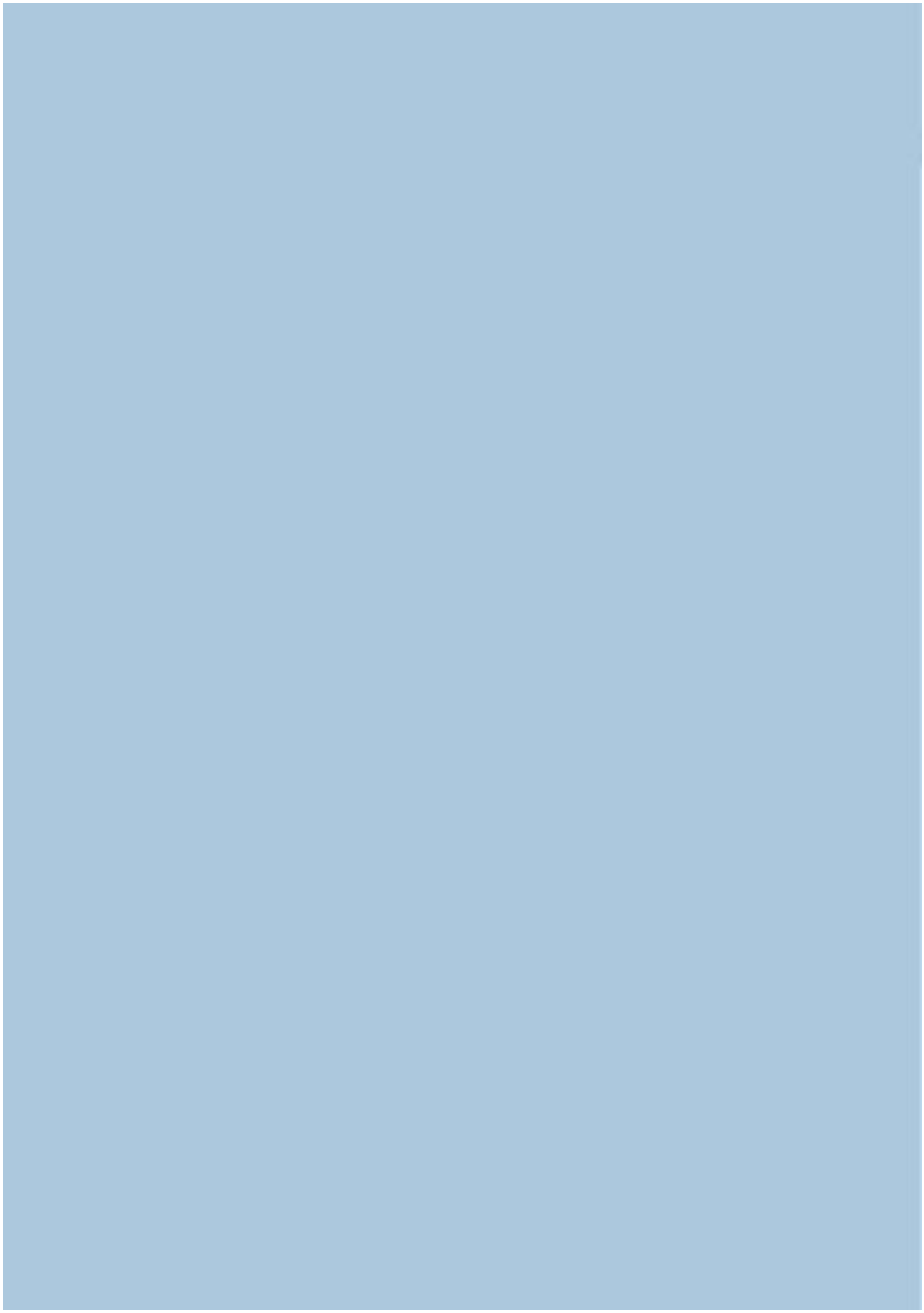
No.	Governorate	Forest location	Area (Feddans)	Volume of treated sewage water m3	Irrigation system used
1	Ismailia	Sarabium	1,000	90,000	Drip
2	Menoufia	Sadat	1,500	18,000	Drip
3	Luxor	Luxor	1,700	30,000	Drip and MSI
4	Qena	Qena	500	23,000	MSI
5	South Sinai	El-Tour	200	3,500	MSI
6	Aswan	Edfu	500	8,000	MSI
7	New valley	Al kharga	1,300	13,000	MSI
8	New valley	Paris	200	18,000	Drip
9	South Sinai	Shram El- Sheikh	200	3,000	Drip
10	Dakahlia	Gamasa	150	1,500	Drip
11	Giza	Al Saf*	500	65,000	Drip
12	Aswan	Balana	500	8,000	Drip
13	Aswan	Nasr El Nouba	100	1,400	Drip
14	Beni Sweif	El Wasta	500	10,000	Drip
15	New valley	Moot	700	10,000	Drip
16	North Sinai	Al-Arish	500	15,000	Drip
17	Asyout	Asyout	40	50,000	Drip
18	Sohag	West Sohag	1,000	28,000	Drip and MSI
19	Sohag	East Sohag	1,000	28,000	Drip and MSI
20	Red Sea	Hurgada	200	10,000	Drip
21	South Sinai	Nayiba	200	4,000	Drip
22	Suez	Ataka	400	90,000	Drip
23	Aswan	Elalaqey	550	8,000	Drip
24	Alexandria	N9	60	10,000	drip

Source: MSEA and MALR

Note:
MSI = modified surface irrigation
1 feddan = 4,200 m²

Source: MSEA and MALR
Figure 2.13: Cultivated Forest Locations in Egypt (2006).


2.6
Air
Quality



2.6 Air Quality

Introduction

The commitment of the Egyptian government to the welfare, well-being and health of the Egyptian citizen was shown in the great support to the air quality monitoring network, through its extension and continuous development of the existing network all over the country. Air quality monitoring is conducted in Egypt to assess the compliance with the national air quality standards. It is also important to evaluate the air pollution control policy and strategies adopted by the Egyptian Environmental Affairs Agency (EEAA) and to examine the trends of air pollutants over time (seasonally and annually), to produce state of the environment reports. The data generated from the air quality monitoring network can also be used for other purposes such as ; scientific research, clinical, epidemiological and other studies.

Today, Egypt's population is about 73 million. Some estimates suggest that approximately 25 % of Egypt's population lives in the Greater Cairo area (GC), with population that exceeds more than 20 million people. These numbers suggest that high population density in the Greater Cairo area and some other areas nationwide, where most of the population lives on about 6 % of Egypt's total land area, affect the air quality. There are many industrial sources of pollutants including power plants, oil refineries, iron and steel industries, fertilizers, textile, brick factories, cement industries, food processing, and open burning of solid wastes, etc. In addition to mobile sources such as vehicles exhaust, which are significant sources of air pollution.

Currently, there are 58 monitoring stations that were established for continuous monitoring of air pollutants. The stations are working with full capacity and the data is collected and analyzed by EEAA staff. The air quality monitoring sites are distributed in many types of locations, such as industrial, residential, urban and rural areas. The network measures different types of air quality indicators such as PM_{10}, SO_2, NO_2, CO and O_3. Other pollutants such as Volatile Organic Compounds (VOCs), and heavy metals such as lead (Pb) are being measured at some selected sites. As a result of the extensive efforts of the Egyptian Environmental Affairs Agency, and the enforcement of the environmental law No. 4 / 1994 and its related executive regulations, there is a substantial reduction in the ambient concentration for many air pollutants indicators such as (Pb and SO_2).

There are many reasons to be optimistic about the future of air quality in Egypt that can be attributed to policies and strategies adopted by EEAA. These policies involve using unleaded gasoline since 1998, extending the use of compressed natural gas as: fuel in vehicles and industrial facilities, using clean energy sources such as solar energy, relocating polluting industries outside the residential areas, applying new and cleaner technologies in many factories, achieving economic benefits from agricultural waste management and recycling, and restricting the open burning of the solid municipal wastes. The effective implementation and enforcement of these strategies and policies are usually attained through the full participation of the stakeholders and relevant ministers and authorities.

Bibliography

- *Environmental law No. 4 / 1994 and its related executive regulations*

INDICATOR: THE INDICATOR: PM_{10} CONCENTRATION

Description

The PM_{10} air quality indicator measures the emissions from different natural and anthropogenic sources. These sources involve emissions from industrial, mobile and geological (due to wind erosion) sources. This indicator of the air quality improvement represents the effective policy undertaken by EEAA to mitigate the pollution and coordinate with other ministries to solve various problems from polluting sources. This leads to better quality of life and health related activities and finally improve the national economy due to reduction in the economic losses as a result of high PM_{10} concentration.

Unit of Measurement

Microgram per cubic meter.

Data Sources

EEAA

Indicator Update Frequency

All air quality data is collected on hourly, daily and annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator excellently describes the improvement of the ambient air quality.
As far as «Accuracy» is concerned, the collected data is validated according to standard methodologies, which requires complete revision, quality control and assurance of the data by the Danish experience which supervises the monitoring network.
The temporal coverage is eight years and the data is comparable in time, as the collection methodology is always the same.
The «Comparability across space» is not valid or under concern since there are many activities undertaken for each governorates and different industrial types in all corresponding areas.

Purpose

To measure the PM_{10} in ambient air and the state of pollution in each governorate.

Target Fixed by Law

The overall aim of air quality policy is ultimately to prevent the generation of polluting emissions in the ambient air and to encourage applying cleaner production technologies in industries through environmental friendly equipment, which increases productivity with higher quality. In addition to, the compliance with the Egyptian Environmental Law 4 / 1994 and its related executive regulations.

Assessment of State and Trend

The year 1999 was chosen as a reference year because the ambient air quality network and the database were fully operating since that year. The data shows that PM_{10} air concentration level is constantly decreasing since 1999 in all examined macro-areas.
This agrees with the general policy target of the air quality improvement, but the levels still exceed the limits assigned by the limits of law 4/ 1994.

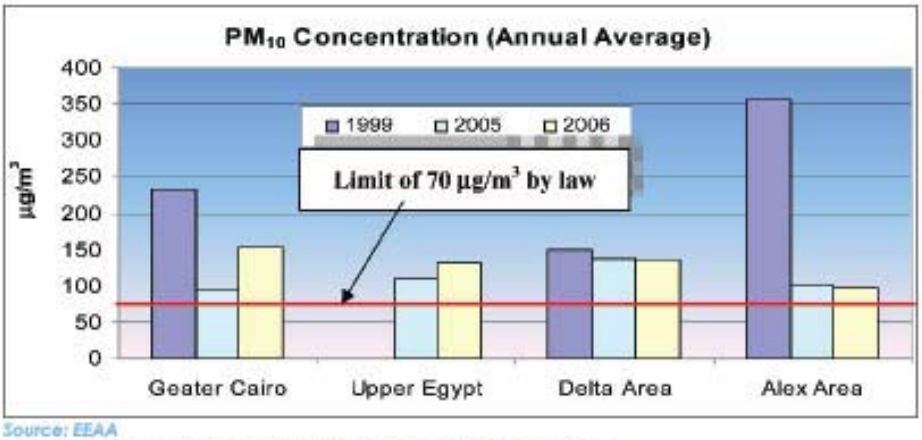
Comments on Tables and Figures

In order to guarantee the consistency of air quality, the annual update of PM_{10} data requires a re-evaluation over time series on the basis of new available information and policy development to assess pollution sources.
Even though PM_{10} annual levels have always decreased during the latest years, in 2006 the PM_{10} measured concentration is still higher than the critical limit value for this indicator (Figure 2.14).

Table 2.13: Annual Means of PM_{10} Concentration Values in the Years 1999, 2005 and 2006

Station Name \ Year	1999	2005	2006
	µg/m³		
Greater Cairo	234	96	153
Upper Egypt	α	110	130
Delta Area	150	138	135
Alexandria Area	357	101	97

Source: EEAA
NOTE:
α: Data not available.



Source: EEAA
Figure 2.14: PM_{10} annual Mean Values Over Years 1999, 2005 and 2006

INDICATOR: SO_2 CONCENTRATION

Description

Sulphur dioxide is formed in direct proportion to the amount of sulphur burned (about 2 grams of SO_2 for every gram being burned). Sulphur dioxide upon oxidation can be transformed to sulphur trioxide. Then can be converted to sulphuric acid causing acid deposition. Additionally, SO_2 readily forms secondary particulates through condensation from gas to particle conversion and atmospheric reaction with other particulates. Combustion of high sulphur content fuel is the major source of ambient SO_2, other sources are petroleum refining, smelting of metals and steel manufacture.

The effects from acute exposure to SO_2 occur very rapidly, within minutes of inhalation. These include various respiratory symptoms such as lung function impairment, in both healthy subjects and more vulnerable groups. Many of the epidemiological studies of the health effects of ambient SO_2 are in association with concomitant high levels of atmospheric particulates and the reported symptoms are very similar. This indicator of the air quality improvement represents the effective policy undertaken by EEAA to mitigate the pollution and coordinate with other ministries to solve various pollution sources problems, which leads to higher quality of life and health related activities.

Unit of Measurement

Microgram per cubic meter.

Data Sources

EEAA.

Indicator Update Frequency

All air quality data is collected on hourly, daily and annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator describes excellently the improvement of the ambient air quality.
As far as «Accuracy» is concerned, the collected data is validated according to standard methodologies, which requires complete revision, quality control and assurance of the data by the Danish experience which supervise the monitoring network.
The temporal coverage is eight years and the data is comparable in time, as the collection methodology is always the same.
The «Comparability across space» is not valid or under concern since there are many activities undertaken for each governorates and different industrial types in all corresponding areas.

Purpose

To measure the SO_2 in ambient air and the state of pollution in each governorate.

Target Fixed by Law

The overall aim of air quality policy is to ultimately prevent the generation of hazardous emissions in the ambient air and to encourage applying cleaner production technologies with industries through environmental friendly equipment, which increases productivity with higher quality. In addition to, the compliance with the Egyptian Environmental Law 4 / 1994 and its related executive regulations.

Assessment of State and Trend

The SO_2 concentration measured at various sites in Egypt occasionally exceeds the ambient air quality standards as given by Law no. 4/ 1994. However, in Egypt SO_2 is not an air pollution problem of the same magnitude as the suspended particles. The ambient air quality standard is most often exceeded in or near industrial areas and in some few cases inside urban areas as in the Cairo downtown.

Industrial areas like Shoubra (several industries), and Kom Ombo (where the measurements are taken only 1 km downwind from a sugar factory) have shown that frequent incidents of exceeding the limit are allowed by the law. For example, some urban stations inside Cairo occasionally exceed the limit values. SO_2 measured in Kafr El-Zayat and Tabbin South stations recorded high concentration, but still less than the standard value spesfied by the law.

The short-term concentration represented by the one-hour average concentration is normally exceeded during less than 1 % of the time inside Greater Cairo. (Figure 2.15) shows the annual mean concentration of SO_2 over different regions of Arab Republic of Egypt for 1999, 2005 and 2006 and the results indicates that SO_2 in 1999 was higher than observed in 2005 and 2006. Finally, we conclude that sites impacted by industrial emissions suffer from high concentration of SO_2 which might exceed the standard specified by the law for SO_2 decreased in 2005 and 2006 compared to 1999.

Comments on Tables and Figures

In order to guarantee the consistency of the air quality, the annual update of SO_2 data requires a re-evaluation over time series on the basis of new available information and policy development to permit pollution sources.

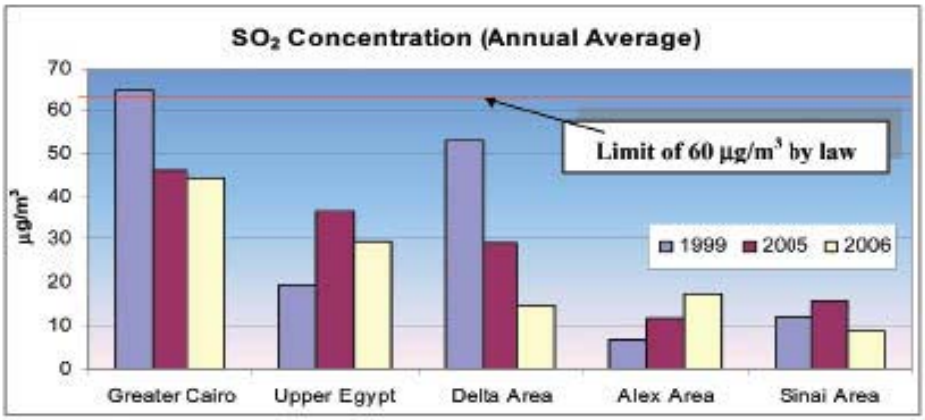
Comparing the SO_2 levels recorded in 1999 and those recorded in 2006, we can see that SO_2 concentration levels decreased in all the examined macro-areas except for Upper Egypt and Alexandria.

In 2006, the SO_2 measured concentration was under the limit specified by law for this indicator (Figure 2.15).

Table 2.14: Annual Mean Values of SO_2 Concentration 1999, 2005 and 2006

Station Name / Year	1999	2005	2006
	µg/m³		
Greater Cairo	65	46	44
Upper Egypt	19	37	29
Delta Area	53	29	15
Alexandria Area	7	12	17
Sinai Area	12	16	9

Source: EEAA/EIMP



Source: EEAA/EIMP

Figure 2.15: SO_2 annual Mean Values Over Years 1999, 2005 and 2006

INDICATOR: NO_2 CONCENTRATION

Description

The major sources of anthropogenic emissions nitrogen dioxide (NO_2) into the atmosphere are motor vehicles and stationary sources, such as electrical power plants and industrial boilers. NO_2 is highly reactive and has been reported to cause bronchitis and pneumonia, as well as, increase susceptibility to respiratory infections. NO_2 has been shown to affect both the cellular and humeral immune system (HIR), impair immune responses, and also has been associated with increase in mortality of children under five years old. The interdependence between NO_2 and other pollutants observed in various studies suggest that the observed health effects could be related to the interactions among the contaminants from combustion sources. This indicator of air quality improvement represents the effective policy undertaken by EEAA to mitigate the pollution and coordinate with other ministries to solve various pollution sources problems, which leads to higher quality of life and health related activities and finally affect the economy.

Unit of Measurement

Microgram per cubic meter.

Data Sources

EEAA

Indicator Update Frequency

All Air Quality Data is collected on hourly, daily and annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator excellently describes the improvement of the ambient air quality.
As far as «Accuracy» is concerned, the collected data is validated according to standard methodologies, which requires complete

revision, quality control and assurance of the data by the Danish experience which supervise the monitoring network.
The temporal coverage is eight years and the data is comparable in time, as the collection methodology is always the same.
The «Comparability across space» is not valid or under concern since there are many activities undertaken for each governorate and different industrial types in all corresponding areas.

Purpose

To measure the NO_2 in ambient air and the state of pollution in each governorate.

Target Fixed by Law

The overall aim of air quality policy is ultimately to prevent the generation of hazardous emissions in the ambient air and to encourage applying cleaner production technologies with industries through environmental friendly equipment, which increases productivity with higher quality. In addition to, the compliance with the Egyptian Environmental Law 4 / 1994 and its related executive regulations.

Assessment of State and Trend

The year 1999 was chosen as a reference year, because the ambient air quality network and the database was fully operating since that year. It is observed that NO_2 air concentration levels are the same in 2006 in all the examined macro-areas.

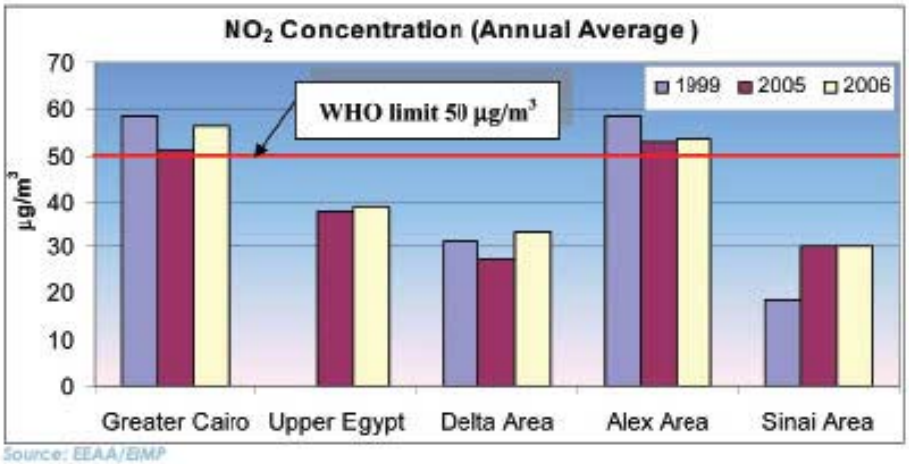
Comments on Tables and Figures

In order to guarantee the consistency of the air quality, the annual update of NO_2 data requires a re-evaluation over time series on the basis of new available information and policy development to permit pollution sources.
The status of NO_2 concentration throughout the previous years did not change: In fact for Upper Egypt, Delta, and Sinai areas the NO_2 measured concentration is still lower than the limit specified for this indicator. In Greater Cairo and Alexandria the observed NO_2 concentration is higher than the standard. (Figure 2.16).

Table 2.15: Annual Mean Values of NO_2 Concentration 1999, 2005 and 2006

Station Name / Year	1999	2005	2006
	µg/m³		
Greater Cairo	58	51	56
Upper Egypt	N/A	38	39
Delta Area	31	27	33
Alexandria Area	58	53	54
Sinai Area	18	30	30

Note That: NA:Not Available
Source: EEAA/EIMP



Source: EEAA/EIMP
Figure 2.16: NO_2 Annual Mean Values Over Years 1999, 2005 and 2006

INDICATOR: O_3 CONCENTRATION

Description

Ground level Ozone is a colorless reactive gas that occurs by a complex series of reactions, involving volatile organic compounds and nitrogen dioxide, and radiation. Ozone can be classified as both «good» and «bad», depending on where it is found. «Good» ozone is formed naturally in the stratosphere, providing a protective layer from the sun's ultraviolet rays. This type of ozone serves to protect our health. «Bad» ozone is found at ground-level at hot sunny days. This type of ozone is harmful to our health. It might cause coughing, wheezing, pain during deep breathing, breathing difficulty during outdoor activities, shortness of breath, headache, nausea, throat and lung irritation. Long term exposure to ozone can lead to premature aging of the lungs, decrease lung function, worsened symptoms of asthma, emphysema, and other lung diseases.

Recent studies have reported a significant association between ozone and daily mortality counts during the high ozone episodes. The health implications of long-term exposure remain unclear, but there are good reasons for growing concern. This indicator of the air quality improvement represents the effective policy undertaken by EEAA to mitigate the pollution and coordinate with other ministries to solve various pollution sources problems, which leads to higher quality of life and health related activities and finally affect the economy.

Unit of Measurement

Microgram per cubic meter.

Data sources

EEAA

Indicator Update Frequency

All Air Quality Data is collected on hourly, daily and annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator excellently describes the improvement of ambient air quality.
As far as «Accuracy» is concerned, the collected data is validated according to standard methodologies, which requires complete revision, quality control and assurance of the data by the Danish experience which supervise the monitoring network.
The temporal coverage is eight years and the data is comparable in time, as the collection methodology is always the same.
The «Comparability across space» is not valid or under concern since there are many activities undertaken for each governorate and different industrial types in all corresponding areas.

Purpose

To measure the O_3 in ambient air and the state of pollution in each governorate.

Target Fixed by Law

The overall aim of air quality policy is ultimately to prevent the generation of hazardous emissions in the ambient air and to encourage applying cleaner production technologies with industries through environmental friendly equipment, which increases productivity with higher quality. In addition to, the compliance with the Egyptian Environmental Law 4 /1994 and its related executive regulations.

Assessment of State and Trend

Ozone is measured at few sites around the country. Comparing ozone concentration recorded in 2006, with respect to 1999 we find that the ozone concentration has slightly increased. The limit values are often exceeded in or near background areas. However, ozone is not an air pollution problem of the same magnitude in Egypt as suspended particles. Finally, we conclude that sites impacted by low emissions are exposed to the highest concentration of O_3. Ras Mohamed and Aswan often record higher O_3 concentration than other areas in Egypt.

Comments on Tables and Figures

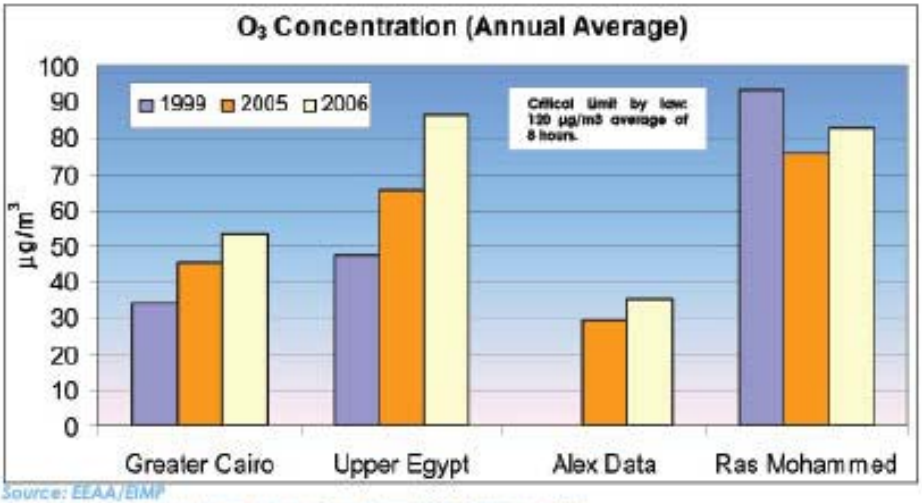
In order to guarantee the consistency of air quality, the annual update of O_3 data requires a re-evaluation over time series on the basis of new available information and policy development to control pollution sources.

In 2006, for each macro area, we can observe that O_3 air concentration levels have increased compared to previous years (figure 2.17).

Table 2.16: Annual Mean Values of O_3 Concentration 1999, 2005 and 2006

Station Name / Year	1999	2005	2006
	µg/m³		
Greater Cairo	34	45	53
Upper Egypt	47	66	86
Alexandria Area	N/A	29	35
Ras Mohamed	93	76	83

Note that: NA: Not Available
Source: EEAA/EIMP



Source: EEAA/EIMP
Figure 2.17: O_3 Annual Mean Values Over Years 1999, 2005 and 2006

INDICATOR: CO CONCENTRATION

Description

Carbon monoxide (CO) is one of the most common and important air pollutants. It is the product of incomplete combustion of fossil fuel. When carbon monoxide is inhaled and reaches the respiratory system and enters the blood stream , it combines with haemoglobin forming carboxghemoglobin. This reduces the delivery of oxygen to the body's organs and tissues. People who suffer from cardiovascular diseases, particularly those with angina or peripheral vascular disease are much more susceptible to the adverse health effects of carbon monoxide. Classic symptoms of CO poisoning are headache and dizziness at carboxyhemoglobin levels of 10%. Above 30 % the patient suffers from cardiovascular problems and acute malaise. At levels above 40% there is a considerable risk of coma and death. Various epidemiological studies in the developed countries have documented significant association between variations in CO and an increase in premature mortality and hospitalizations due to congestive heart failure.

Unit of Measurement

Milligram per cubic meter.

Data Sources

EEAA

Indicator Update Frequency

All Air Quality Data is collected on hourly, daily and annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator describes excellently the improvement of ambient air quality.
As far as «Accuracy» is concerned, the collected data is validated according to standard methodologies, which requires complete

revision, quality control and assurance of the data by the Danish experience which supervise the monitoring network.
The temporal coverage is eight years and the data is comparable in time, as the collection methodology is always the same.
The «Comparability across space» is not valid or under concern since there are many activities undertaken for each governorate and different industrial types in all corresponding areas.

Purpose

To measure the CO in ambient air and the state of pollution in each governorate.

Target Fixed by Law

The overall aim of air quality policy is ultimately to prevent the generation of hazardous emissions in the ambient air and to encourage applying cleaner production technologies with industries through environmental friendly equipment, which increases productivity with higher quality. In addition to, the compliance with the Egyptian Environmental Law 4 / 1994 and its related executive regulations.

Assessment of State and Trend

The CO concentration measured at a few number of sites in Egypt decreased over time from 1999 to 2005, and 2006, respectively. CO, however, is not an air pollution problem of the same magnitude in Egypt as suspended particles. The limit specified by air quality standard is often exceeded in or near traffic. Gomhoreya street is one of the highly loaded traffic areas in down town Cairo; the CO level was higher at this site than the other sites in Greater Cairo area. Finally, we conclude that sites impacted by traffic emissions are exposed to the highest concentration of CO.

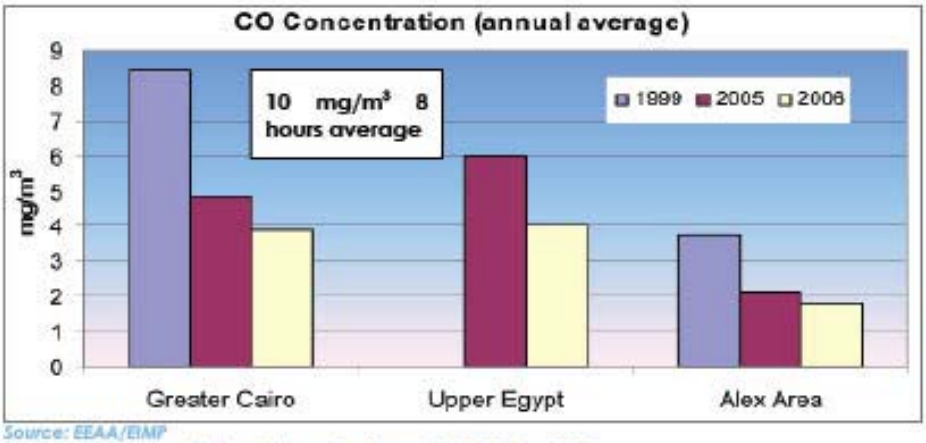
Comments on Tables and Figures

In order to guarantee the consistency of air quality, the annual update of CO data requires a re-evaluation over time series on the basis of new available information and policy development to permit pollution sources.
In following table and figure, the national air quality data for CO in 2006 shows a decrease in the trend as compared to 2005.

Table 2.17: Annual Mean Values of CO Concentration 1999, 2005 and 2006

Station Name / Year	1999	2005	2006
	mg/m³		
Greater Cairo	8	5	4
Upper Egypt	N/A	6	4
Alexandria Area	4	2	2

Note that: NA:Not Available
Source: EEAA/EIMP



Source: EEAA/EIMP
Figure 2.18: CO Annual Mean Values Over Years 1999, 2005 and 2006

INDICATOR: Pb CONCENTRATION

Description

Lead (Pb) occurs naturally in the environment and it has many industrial uses. However, even small amounts of lead can be hazardous to human health. Everyone is exposed to trace amounts of lead through air, soil, household dust, food, drinking water and various consumer products. The amount of lead in the environment increased during the industrial revolution, and again significantly in the 1920s with the introduction of leaded gasoline. During the early 1990s, lead was one of the main pollutants affecting the health and lives of Egyptian citizens. Diagnosed cases of lead poisoning and measurable levels of lead in the blood were more than twenty times higher than those recorded for adults in the United States. Short-term exposure to high levels of lead can cause vomiting, diarrhea, convulsions, coma or even death. Lead concentration observed in ambient air of Greater Cairo areas was more than thirty times higher than world health standards. Most of the lead concentration in Greater Cairo ambient air was mainly coming from two sources; the first source is using leaded gasoline which is not used any more and phased out since mid 1990s, the second source is uncontrolled emissions of secondary lead smelters in the densely populated area of Shoubra El Kheima in the outskirts of Cairo.

Unit of Measurement

Microgram per cubic meter.

Data sources

EEAA

Indicator Update Frequency

All Air Quality Data is collected on hourly, daily and annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator describes excellently the improvement of ambient air quality.
As far as «Accuracy» is concerned, the collected data is validated according to standard methodologies, which requires complete revision, quality control and assurance of the data by the Danish experience which supervise the monitoring network.
The temporal coverage is eight years and the data is comparable in time, as the collection methodology is always the same.
The «Comparability across space» is not valid or under concern since there are many activities undertaken for each governorates and different industrial types in all corresponding areas.

Purpose

To measure the Pb in ambient air and the state of pollution in each governorate.

Target fixed by law

The overall aim of air quality policy is ultimately to prevent the generation of hazardous emissions in the ambient air and to encourage applying cleaner production technologies with industries through environmental friendly equipment, which increases productivity with higher quality. In addition to, the compliance with the Egyptian Environmental Law 4 / 1994 and its related executive regulations.

Assessment of State and Trend

In the period 1999 - 2005, the observed Pb concentration in the residential areas was still higher than the limit value for this indicator. A progress has been shown in the industrial areas of Cairo and Giza sites where the detected Pb concentration was under the limits specified by the law.

Comments on Tables and Figures

All EEAA's action plans and its long term strategic efforts coupled with other governmental efforts had the highest impact. These efforts resulted in environmental improvement which is reflected upon reducing ambient Pb concentration, thus enhancing health and quality of life. The action plans and strategies were based on the data from the ambient air quality monitoring network.

The following table shows the action taken with the corresponding lead levels decrease:

EEAA actions in cooperation with others to mitigate Pb pollution	Concentration before the action plan	First monitoring indicator after the action plan
	µg/m³	µg/m³
With Petroleum Ministry to produce unleaded gasoline (Traffic Sites).	6.10	1.46
Relocate lead smelters outside the residential area (Shoubra El Khiema).	25.27	6.90
After remediation of some locations of old lead smelters (Shoubra El Khiema).	1.05	0.91

This table shows that the pollution from lead has been decreasing throughout the previous years due to the efforts of EEAA.

Table 2.18: The Annual Average of Pb Concentration Values in Residential Area from 1999- 2005

Years / Zones	Qalyobia	Cairo	Giza
1999	9.68	0.91	0.77
2000	3.83	1.02	0.99
2001	2.68	1.14	1.12
2002	2.69	0.97	0.95
2003	0.91	1.03	0.91
2004	0.98	0.97	0.90
2005	1.11	0.90	0.94

Source: EEAA

Table 2.19: Pb Concentration Annual Average Values in Industrial Area from 1999-2005.

Years / Zones	Qalyobia	Cairo	Giza
1999	8.67	1.21	1.00
2000	1.89	1.27	0.95
2001	2.00	1.20	1.06
2002	2.59	1.23	1.03
2003	1.40	1.17	1.02
2004	1.60	1.08	1.09
2005	1.86	1.08	1.16

Source: EEAA

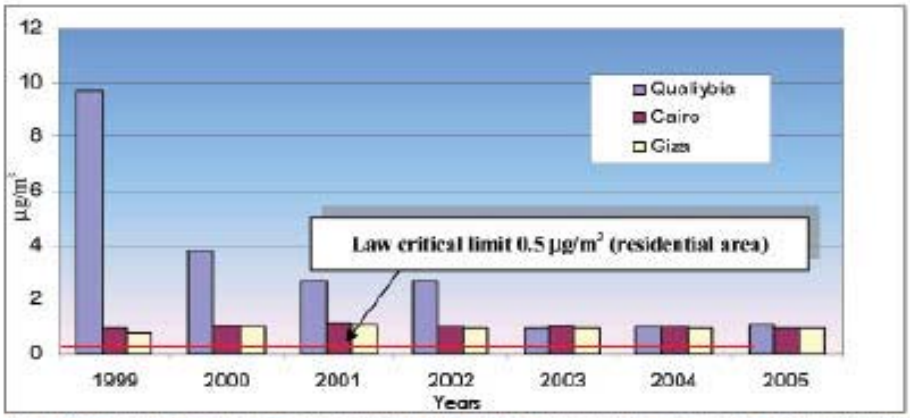


Figure 2.19: Annual average Pb concentration in the three governorates of Greater Cairo residential areas.

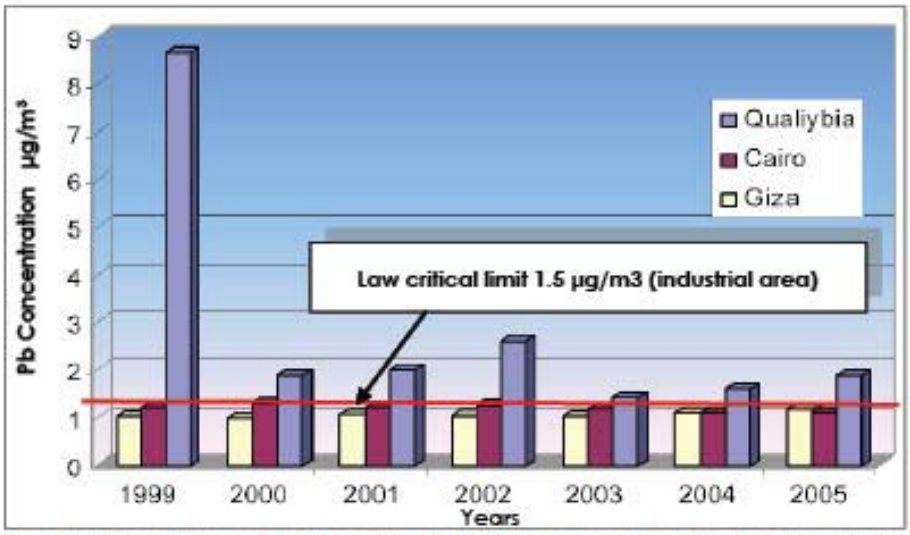
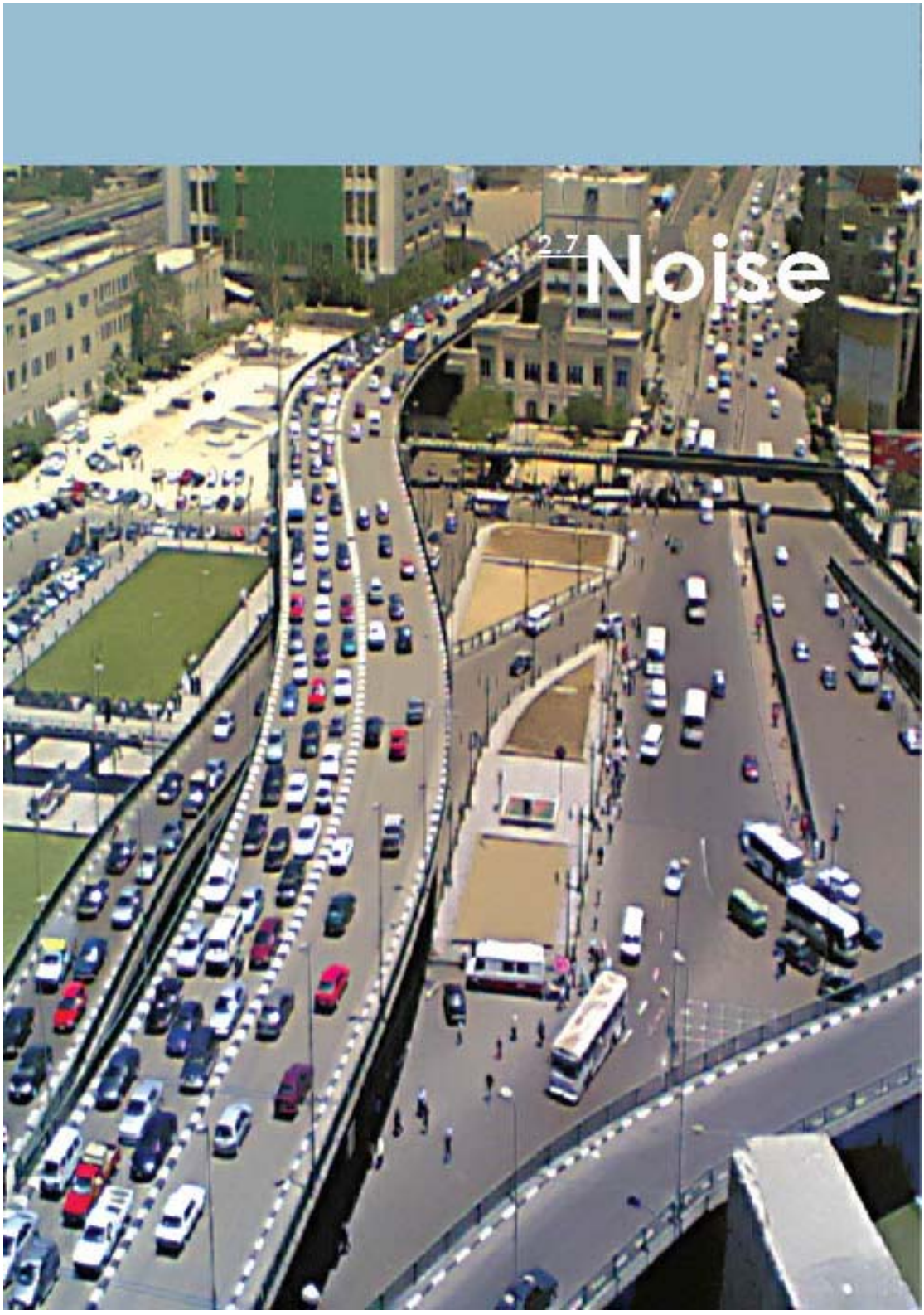
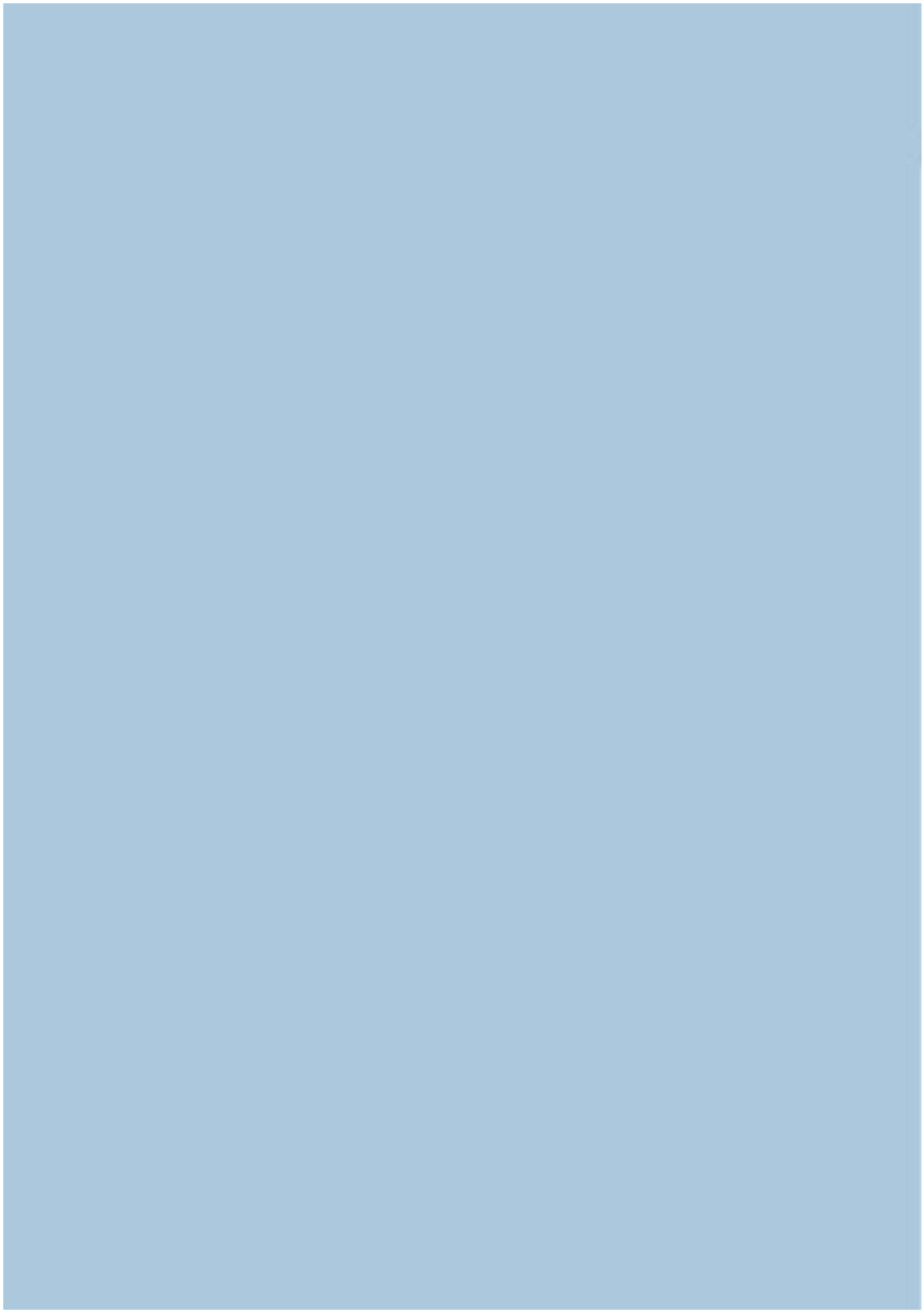


Figure 2.20: Annual Average Pb Concentration in the Three governorates of Greater Cairo Industrial Areas.


2.7
Noise



2.7 Noise

Introduction

Noise is defined as the sound that exceeds the permissible level. It is considered one of the most widespread environmental issues all over the world. For Egypt, the noise issue as environmental pollution ranks second among environmental pollution issues according to the complaint survey (received by EEAA) for 2006. The importance of the problem lies in the multiple adverse effects on citizens and public health physically and psychologically. The impact of noise may cause permanent hearing loss due to the exposure to noise levels exceeding 90 dB (where dB is the noise measurement unit). Noise adversely impacts sustainable development as a result of its direct and indirect effects on life activities (education, production, economic processes, and social aspects, etc.). Exposure to high noise levels is among the key causes of human mistakes leading to increased accident rate.

Egypt had been the scene of ever-growing development of new projects especially in metropolitan cities . Continued population increases resulted in establishment of additional commercial activities and industrial facilities within residential areas without prior planning and thus the increase in the number of vehicles . All these factors together lead to high noise levels in some locations in which the Egyptian Environmental Affairs Agency monitored noise to find excess in permissible limits set in the Executive Regulation of the Environmental Law no. 4 /1994 . Main sources of noise in Egypt can be summarized up in the following :

A- Traffic Noise:

The noise emitted from the traffic is the main cause of environmental noise in Egypt as its contribution reaches up to 60% of the causes of noise. Citizens in all regions of the major cities are exposed to high levels of noise at work, home, roads and other different places. Traffic Noise includes the following sources:-

I. Vehicles :

Types of vehicles are divided into heavy and light vehicle, Heavy vehicles such as trucks, trailers and buses which work by diesel are causing more noise than the private cars and taxis which work by benzene. Noise of vehicles is produced from the following parts:

- Vehicle Motor
- Exhaust pipe
- Alert machines
- Friction of tires on asphalt
- Sound of the cooling fan and Gear boxes from movement transfer

II- Railway:

The railway noise affects the citizens living in the vicinity of the railway lines to a distance of 150 meters. So, in action plans, buffer zones has to be considered and it necessary to design. the suitable technical means for reducing the emitted noise such as establishment of sound barriers on both sides of the line. The problem of the noise of the railway increases when the train passes within cities or over bridges, in addition to the use of old trains, which lack the periodical maintenance.

III- Air Crafts:

The increase of movement of aircraft at the airports affect the urban and residential areas surrounding it by high noise levels, especially the areas near the runways. The disturbance and noise level depend on several factors: the type of aircraft and engine, the landing location, the method and speed of landing and taking – off.

B- From the Power Plants:

The Ministry of Electricity & Energy annually establishes large capacity power stations due to the continuous demand on electricity. These plants are one of the noise sources in the cities. Thus, means of reducing noise resulting from it should be taken in an effort to control its implications.

C- Industrial Installations:

The noise of workshops and factories affect the workers, depending on the type of industry. Especially, if the exposure noise level exceeds the equivalent of 90 dB for 8 hours. Many industries like the textile industry, metal and wood are considered to be a main sources of high noise, as well as, the use of some equipment, such as air compressors and steam boilers and power generators.

D- Commercial Activities :

The noise generated from human and commercial activities when inaugurating new stores and other activities in the residential areas is difficult to control. Therefore, markets and commercial activities must be transferred outside residential areas. The noise generated by daily activities and street vendors and the noise of high sound of radio and television. In addition to that, the sound of washing machines, vacuum cleaners and water lifting engines. All these factors are linked to human behaviour and habits.

E- Amplifiers and Celebrations:

This noise is exported from the use of loudspeakers in the ceremonies and weddings in open spaces and use of microphones with high-capacity sound in the weddings halls and nightclubs.

F- Central Cooling Systems :

This problem lies in the lack of the noise code for buildings and the suitable acoustic design of central air conditioning systems locations, where the cooling system is installed in inappropriate locations, and therefore resulting in more noise and complaints by citizens.

The Ministry of State for Environmental Affairs, in coordination with the concerned ministries, prepared the national plan for noise control. In the framework of this plan, Ministry of Environment has established a national network for noise monitoring and began to install its stations in Cairo Governorate as a first stage. The network started operation in March 2007. It consists of 20 fixed monitoring stations and 2 mobile ones. Five of these stations are permanently installed in five major squares (El-Tahreer –El-Opera -Ramses - Roxy – El-Ataba), and the other 15 station sites are installed in different locations representing the various activities in South of Cairo as a first phase. These activities include industrial, commercial, touristic,railway, residential, and roads.

These stations will be transferred afterwards to the North, East, and West of Cairo governorate. After the completion of noise level monitoring in Cairo governorate, based on the monitoring data, the environmental noise map will be prepared to assist in the development of a plan for noise control and preparing distribution of land use for new activities.

In coordination with the Ministry of Civil Aviation, the network of aircraft noise monitoring has been established. It consists of 20 fixed stations and 2 mobile stations. These stations have been installed in Cairo and Sharm el-Sheikh Airports to monitor aircraft noise during landing and take-off.

Within the framework of the planning and development of Giza square, which has been suffering from high noise due to the high density of traffic and the large overlapping activities in this square. Some measurements have been implemented to determine the current noise level and benefit from the results of measurements in proper planning for the square and avoiding high noise levels after the completion of the development, and this aims to :

1. Assess the noise level which the Egyptian citizen is exposed to currently in the Giza square and its compliance with the limits

stated in the Environmental Law No. 4 of 1994.

2. Benefit from the results of measurements in reducing noise levels during the re-development and planning of the square to reach the noise limits set in the Environmental Law No. 4 of 1994.

Noise level has been monitored in the Nile Corniche road (Maadi-Helwan) within the 24 hour, by a mobile station as an experimental stage of the process of continuous noise monitoring, with the aim to :

1. Assess the noise level generated by traffic and that affects the Egyptian citizen in the street.
2. Prepare a report on noise levels and proposed solutions to improve the current situation to be presented to the decision makers.

Bibliography

- *List relevant scientific publications, manuals, web sites relating the references used or cited on the fact sheet*
- *Environmental Law 4 /94;*
- *ISO 1996 « Description, measurement and assessment of environmental noise »*
  part 1 : Measuring of environmental noise,
  part 2 :Determination of environmental noise levels
- *Egyptian Standard.;*
- *Methodology of noise monitoring used in European Union directive*

INDICATOR: NOISE LEVEL ACCORDING TO THE ENVIRONMENTAL NATIONAL LAW NO.4 /1994

Description

The indicator describes the noise level measured in different sites, using LAeq parameter . This is an indicator to determine how the noise level (at the monitored sites) comply with the permissible limits of noise on the executive regulation of Environmental National Law no.4 /1994.

Unit of Measurement

L(A)eq by decibel (dB)

Data Sources

EEAA

Indicator Update Frequency

Noise level is collected according to annual frequency.

Quality of Information

As for «Relevance», the indicator describes the development of noise level in the environment.

As for «Accuracy», the collected data is validated according to standard methodologies which requires the local operator to take part.

- The accuracy and comparability across the space present two different scores due to the following reasons:-
  1. Giza square and Cornish El-Nile are assimilated two types of the areas on the law, and it is not express on all over of Cairo and Giza governorates.
  2. The selection of measurement time of noise in Giza square was random, where measure is for two hours on every period for each location. But the measurement in Cornish El- Nile was all over the day (Continuous monitoring).
- The data is not comparable over time due to the following reasons:

1. This data is for the first time measurement (Reference Year).
2. Measurement was on a specific period on 2006 and did not cover the whole year.
3. It doesn't take into consideration the meteorological conditions when measurement is taken this year.

Purpose

To measure the noise level (L_{Aeq}) in the monitored sites, describing the state of the acoustic environment, compare it with the limit values expressed by Environmental National Law no.4 / 1994, and according to this indicator, taking the necessary measurement for noise abatement.

Target Fixed by Law

Policy objectives and references

The overall aim of Noise level Policy is ultimately to reduce the noise level to the permissible limits of noise setup in the executive regulation of Environment National Law no.4 /1994.

The Executive regulation of Law no 4 /1994 put limits for the different areas at the three periods (day , evening and night) , where the limit values are:

TYPE OF AREA	PERMISSIBLE LIMIT FOR EQUIVALENT NOISE LEVEL dB (A)		
	DAY	EVENING	NIGHT
Commercial, administrative and downtown areas	65	60	55
Residential areas in which some workshops or commercial establishments can be found located on a main road	60	55	50
Residential areas in the city	55	50	45
Residential suburbs with low traffic	50	45	40
Residential rural areas, hospitals and gardens	45	40	35
Industrial areas (heavy industries)	70	65	60

Day from 7 a.m. to 6 p.m.
Evening from 6 p.m. to 10 p.m.
Night from 10 p.m. to 7 a.m
(A) Frequency weighting curves which can forms approximately to the response of the human ear.

Assessment of State and Trend

Data suggested that the noise level is higher than the permissible limits of noise on the executive regulation of Environmental National Law no.4 1994.

Comments on Tables and Figures

1-Noise Level in Giza Square - Giza Governorate

El-Giza square is assimilated as a commercial, administration and residential area on the city center area, and the analysis of the results show the following:-

1. Results showed a rise in (L_{Aeq}) than permissible limits set by the executive regulation of environmental law, during day periods for all monitoring locations. Noise level increased during day time by a range of 15 to 17 dB, during evening by a range of 16 to 20 dB, and at night to more than 20 dB.
2. The high noise level at all locations due to the increasing volume of traffic and the spread of microbus parks sites and the presence of street vendors, leading to heavy traffic and the use of alert machines significantly.
3. The most important sources of noise field are as follows :
   a. Increase of utilization rates of alert machines as a result of the following reasons:
      - High traffic density with the lack of traffic flow.
      - Failure to allocate a place for pedestrian crossing and non compliance of existing premises in some area
      - Random waiting of microbuses.
      - Spread of street vendors which impedes traffic.

   b. Increased traffic on Bridge Street in Giza outward Murad and Al-Ahram streets lead to reflection of the noise on the bottom of the bridge which leads to high level of noise in the square , in addition to the bridge is metal and non-isolated thereby increasing the level of noise from the vehicles movement on the bridge.

   c. Many of the surrounding buildings are high which leads to high level of noise due to the reflections from the traffic on the walls of buildings.

2-Noise Level on Cornish El-Nile Road - Cairo Governorate

Cornish El-Nile Road (in Cairo South area), as a Residential area on general road.

1. Results show that (L_{Aeq}) level exceeds permissible limits stipulated in the Executive Regulations of the Law of Environment during the three periods of the day: 60 dB during day, 55 dB during evening, and 50 dB during night. Throughout the monitoring period (October, November, and December), noise level was higher approx by 16 dB during day, 20 dB during evening, and by 25 dB during night.
2. Analysis of monitoring results show that the main source of sound which increases noise rates in this region is increased traffic volume in addition to the high sound of horns which are used extensively. This could be due to the absence of a pedestrian area, accordingly pedestrians pass randomly.
3. Noise level exceeding permissible limits during night could be the result of increased heavy truck traffic and use of horns in vehicles and wedding processions at night time.
4. Comparing noise level during days of the week, it was found that they are close although it was expected that noise level would decrease during Fridays and Saturdays as the weekends. This shows that traffic volume increases during weekends.

1- Noise Level in Giza Square - Giza Governorate

Table 2.20: Equivalent Noise Level (L_{Aeq}) During Day, Evening and Night Period Time at Different Measurement Locations in Giza Square - Giza Governorate

Measurement period	Noise level				
	The permitted limit according to the law	Locations			
		Esteqama Mosque	Omar Affandi	Masr Eltaemeen Building	Cairo Bank
	L_{Aeq} (dB)(A)				
Day	65	82,10	79,37	80,14	81,19
Evening	60	76,97	77,95	79,90	79,64
Night	55	75,73	74,40	79,30	79,29

Source: EEAA

1. Giza square is considered as Commercial, administrative and downtown area . The permitted limits according to the law are 65 dB on day , 60 on evening and 55 on the night.
2. The number of monitoring locations on Giza square were 4 locations (Esteqama Mosque, Omar Affandi, Masr Eltaemeen Building and Cairo Bank)
3. The monitoring was 3 times per day for a week (from 10 / 12 to 17 /12/ 2006). The period of monitoring was 2 hours per day, evening and night.
4. The type of measurement instrument was Noise Monitoring Unit B&K 2250.

Google map for the noise measurement locations of Giza square

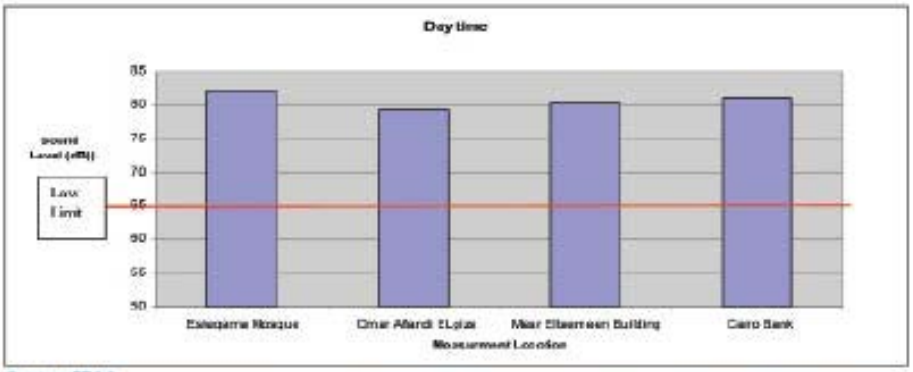
2- Noise Level on Cornish El-Nile Road - Cairo Governorate

Table 2.21: Equivalent Noise Level (L_{Aeq}) During Day, Evening and Night Period Time at Cornish El-Nile Road - Cairo Governorate.

Month	The permitted limit according to the law L_{Aeq}(dB)	Day time	Evening time	Night time
October	60	75.91	75.73	74.61
November	55	76.27	75.77	74.63
December	50	75.98	75.43	74.45

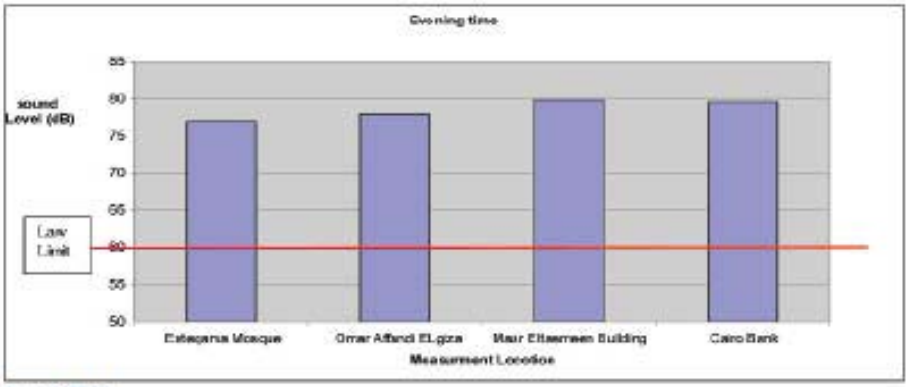
Source: EEAA

1. The measurements were continuous monitoring 24hr / day along the three months (October, November and December).
2. The values presented are the average values of the measurement periods.



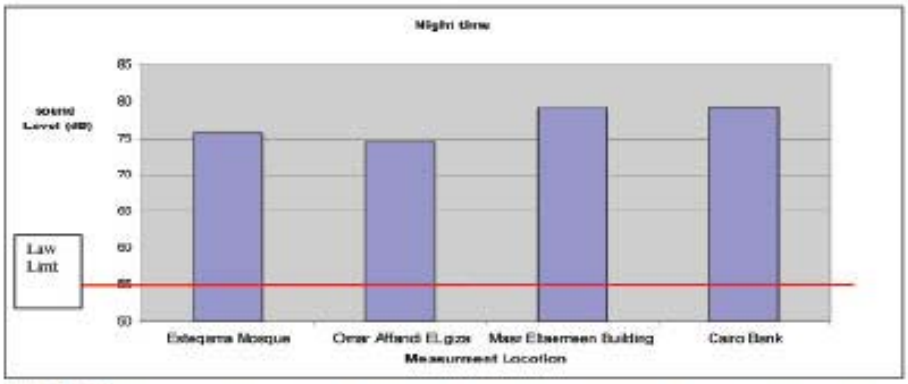
Source:EEAA

Figure 2.21 : Comparison between L_{Aeq} Results for Different Measurment Locations in Giza Square During the Morning Period, in Year 2006.



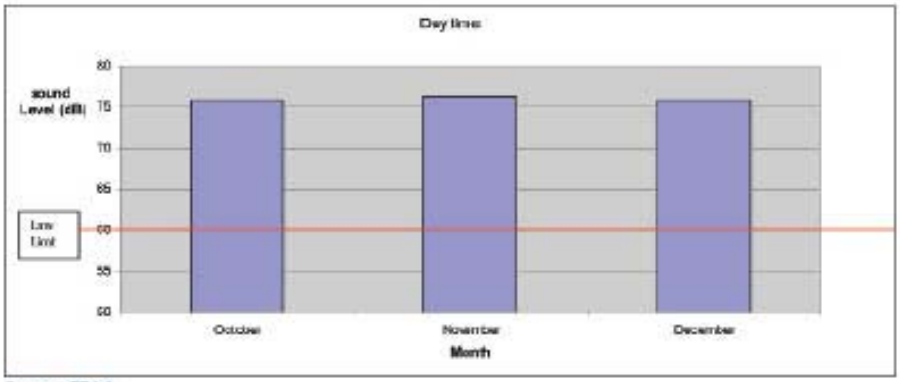
Source:EEAA

Figure 2.22: Comparison between L_{Aeq} Results for Different Measurment Locations in Giza Square During the Evening Period, in Year 2006.

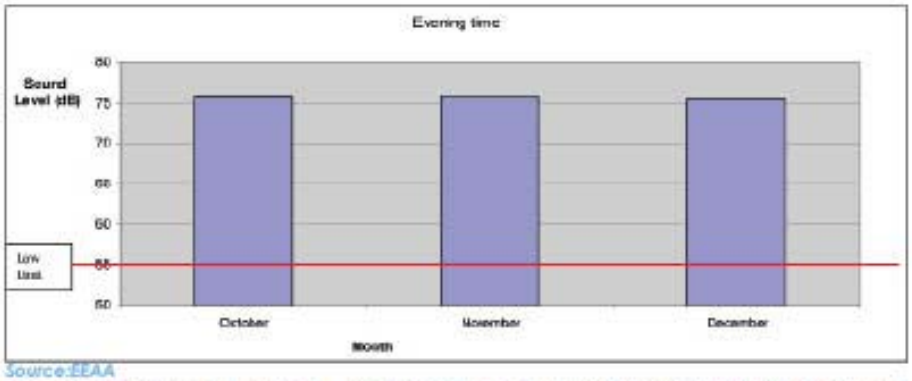


Source:EEAA
Figure 2.23 : Comparison between L_{Aeq} Results for Different Measurment Locations in Giza Square During the Night Period, in Year 2006.

1. Noise Level on Cornish El-Nile Road - Cairo Governorate.

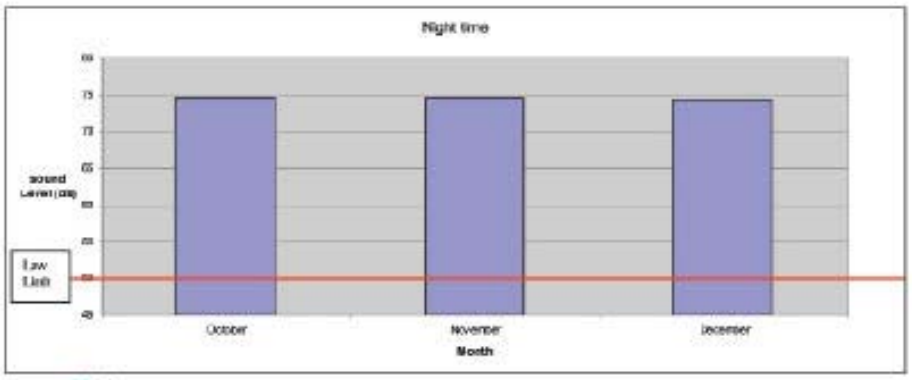


Source:EEAA
Figure 2.24 : Comparison between L_{Aeq} Results for Different Months in 2006 at Cornish El-Nile Road During the Morning Period.



Source:EEAA

Figure 2.25 : Comparison between L_{Aeq} Results for Different Months in 2006 at Cornish El-Nile Road During the Evening Period.

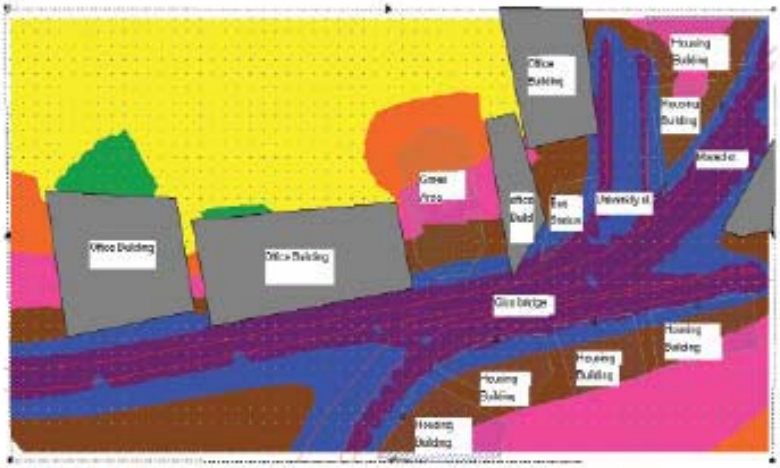


Source:EEAA

Figure 2.26: Comparison between L_{Aeq} Results for Different Months in 2006 at Cornish El-Nile Road During the Night Period.

1- Noise Level in Giza Square - Giza Governorate

The Software used for the maps is The Noise Prediction software type B&K 7810

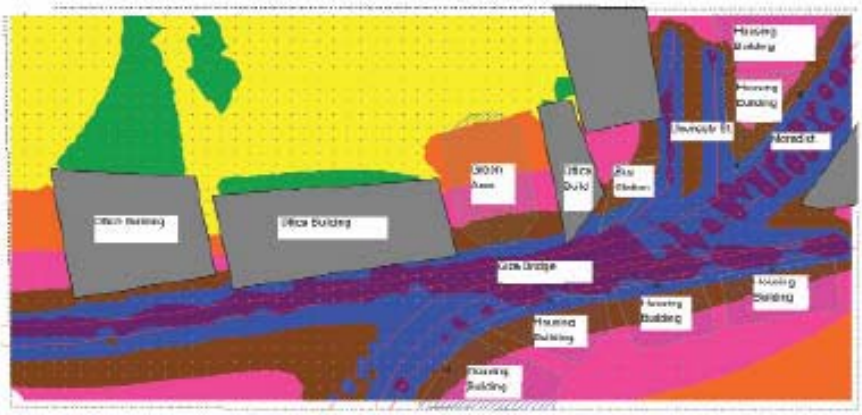


Source: EEAA

Figure 2.27: Noise Contour Map for Giza Square in 2006 During the Morning Period

Source: EEAA

Figure 2.28: Noise Contour Map for Giza Square in 2006 During the Evening Period



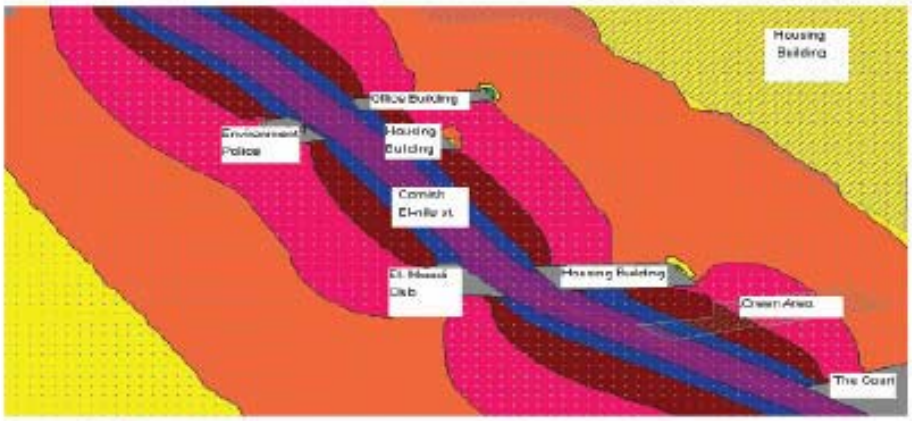
Source: EEAA
Figure 2.29: Noise Contour Map for Giza Square in 2006 During the Night Period

nr	From	To	fill style	fill color
1	30.0	50.0		
2	50.0	60.0		
3	60.0	65.0		
4	65.0	70.0		
5	70.0	75.0		
6	75.0	80.0		
7	80.0	90.0		

The Key of Noise Contour Map for Giza Square
Colours Indicate the Level of Noise in dB

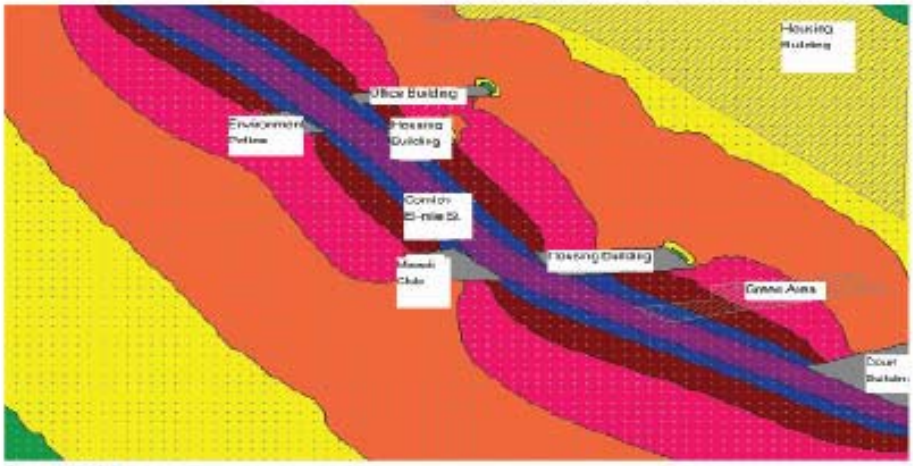
2- Noise Level on Cornish El-Nile Road - Cairo Governorate.

The Software used for the maps is The Noise Prediction software type B&K 7810



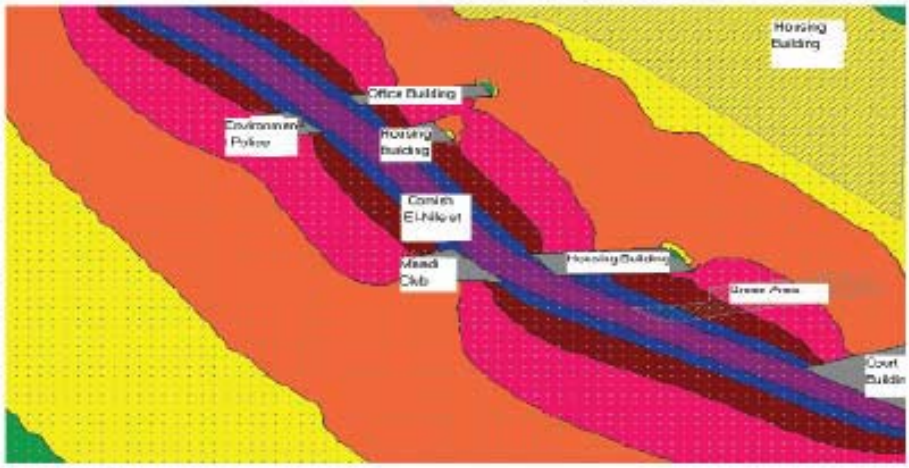
Source: EEAA

Figure 2.30: Noise Contour Map for Cornish El-Nile Road During the Morning Period



Source: EEAA

Figure 2.31: Noise Contour Map for Cornish El-Nile Road During the Evening Period

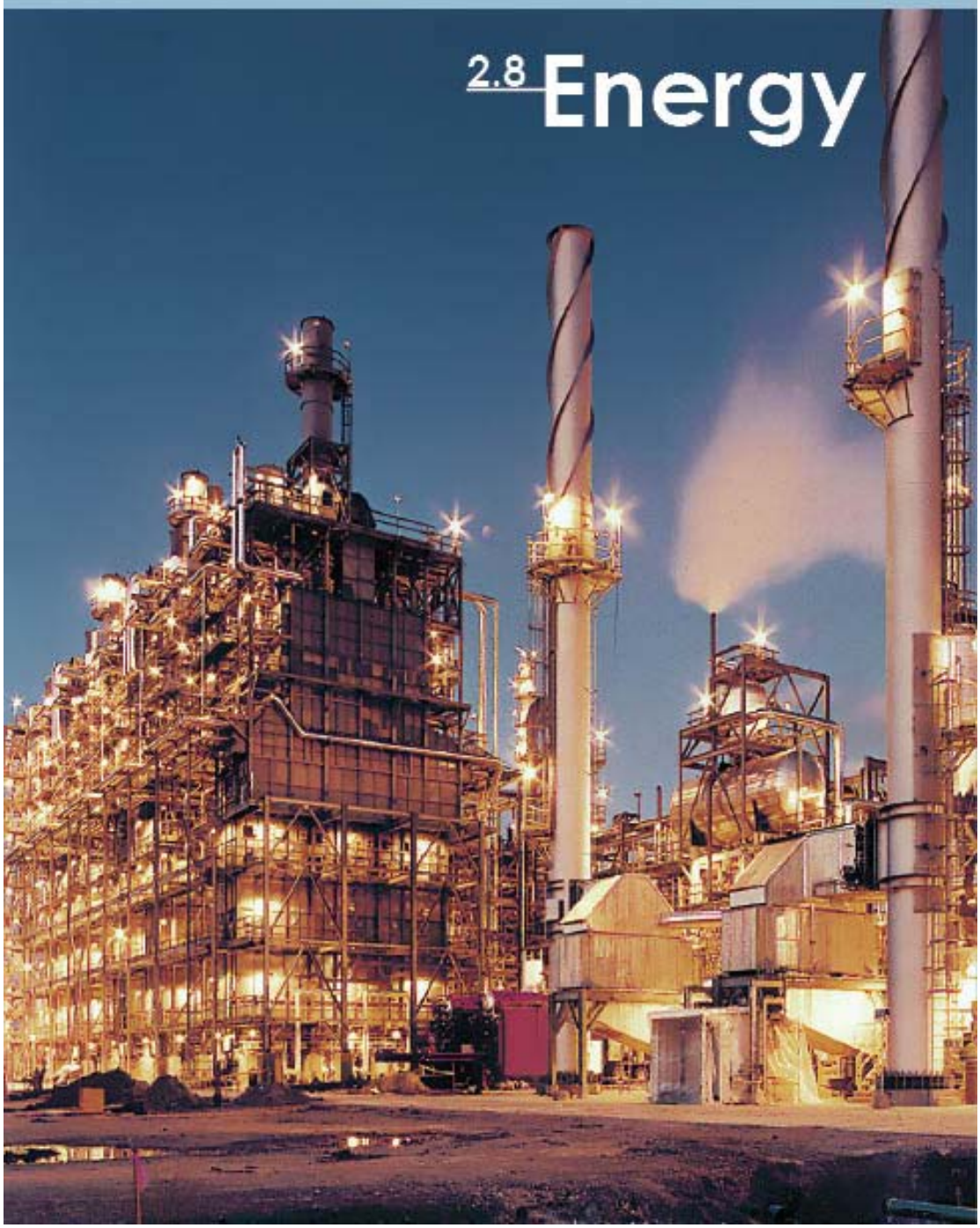


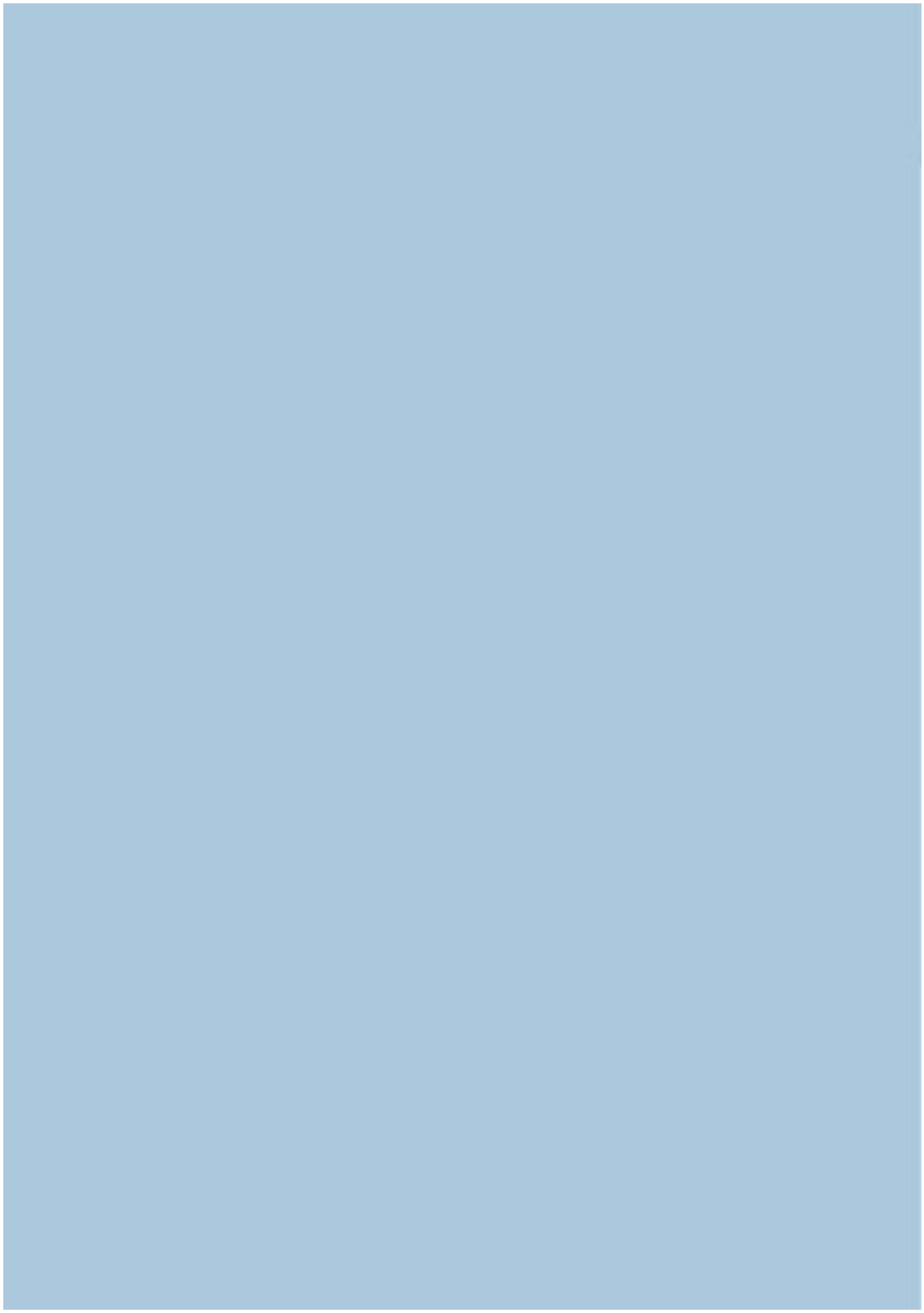
Source: EEAA
Figure 2.32: Noise Contour Map for Cornish El-Nile Road During the Night Period

nr	From	To	fill style	fill color
1	45.0	55.0		
2	55.0	60.0		
3	60.0	65.0		
4	65.0	70.0		
5	70.0	75.0		
6	75.0	80.0		
7	80.0	95.0		

The Key of Noise Contour Map for Cornish El-Nile
Colours indicate the Level of Noise in dB

2.8 Energy





2.8 Energy

Introduction

Energy constitutes the stepping stone for the advancement and prosperity of the society where it should be made available in any manner required, provided that it is environmentally safe and sustainable. In cooperation with the Ministry of Petroleum and Mineral Wealth and the Ministry of Electricity and Energy, the Ministry of State for Environment Affairs has undertaken to prepare this part of the data year guide to include overall energy activities and their relation with the environment in the Arab Republic of Egypt, with particular emphasis on electricity, new and renewable energy sources, bearing in mind that the reference year differs from one source to another according to the latest data.

This part determines the ratio consumption of each economic sector and it's trend. To evaluate the trend of final consumed energy in national level in the economic sector, with the aim to reduce energy use as it conflicts with the general policy target, as data suggests, that the consumption of energy in Egypt increased between 2001 and 2006. Especially, for houses due to increase of use of electrical devices. Although the best use for energy is in the production fields to create a new job opportunities and increase production.

Also, the necessity to improve the efficiency of energy utilization and renewable sources of energy to achieve sustainable development, and avoid the drain-off of natural resources, besides reducing energy consumption and green-effect gas emissions while providing job opportunities.

Bibliography

- *Energy in Egypt 2003 - 2004, Organization for Energy Planning;*

INDICATOR: ELECTRICAL ENERGY CONSUMPTION PER ECONOMIC SECTOR

Description

To determine the ratio consumption of energy for each economic sector and it's trends.

Unit of Measurement

Giga Watt / hr

Information Sources

Ministry of Electricity and Energy

Indicator Update Frequency

All data is collected on an annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator describes electrical energy consumption per economic sector according to purpose .
As far as «Accuracy» is concerned, the collected data is validated according to standard methodologies, which requires complete revision, quality control and assurance of the data per time.
The temporal coverage is five years (2001 - 2006) and the data is comparable in time as the collection methodology is always the same.
The «Comparability across space» is not valid or under concern since there are many activities undertaken for each governorate and different industrial types in all corresponding areas.

Purpose

To evaluate the trend of final energy consumption at the national level in economic sectors with the aim to reduce energy consumption.

Target Fixed by Law

No law available.

Assessment of State and Trend

Data suggests that in Egypt the consumption of energy increased between 2001 and 2006 especially for houses due to the increase in use of electrical devices. This is in conflict with the general policy target.

Comments on Tables and Figures

On tables and graphs, energy sold from distribution companies according to utilisation purposes show a remarkable increase in consumption within time through different years.

Table 2.22: Energy Sold from Distribution Companies According to Utilization Purposes.

	Quantity(GW / h)									
	2001/ 2002		2002 / 2003		2003 / 2004		2004 / 2005		2005 / 2006	
Purpose	GW/h	%	GW/h	%	GW/h	%	GW/h	%	GW/h	%
Industry	25402	36.7	26525	35.8	28386	35.6	30284	35.6	32701	35.5
Agriculture	2733	3.9	2991	4.1	3280	4.1	3460	4.1	3719	4.1
Utilities	3250	4.7	3565	4.8	3719	4.7	4011	4.7	4206	4.6
Public lights	4481	6.6	5026	6.8	5302	6.7	5919	7	6489	7
Governorate organizations	3815	5.5	4040	5.4	4331	5.4	4710	5.5	5024	5.5
Houses	25752	37.2	27717	37.4	29823	37.4	31311	36.8	33900	36.8
Commercial & Others	3733	5.4	4256	5.7	4801	6.1	5393	6.3	6016	6.5
Total	69166	100	74120	100	79642	100	85088	100	92055	100

Source : Annual Report of Ministry of Electricity and Energy

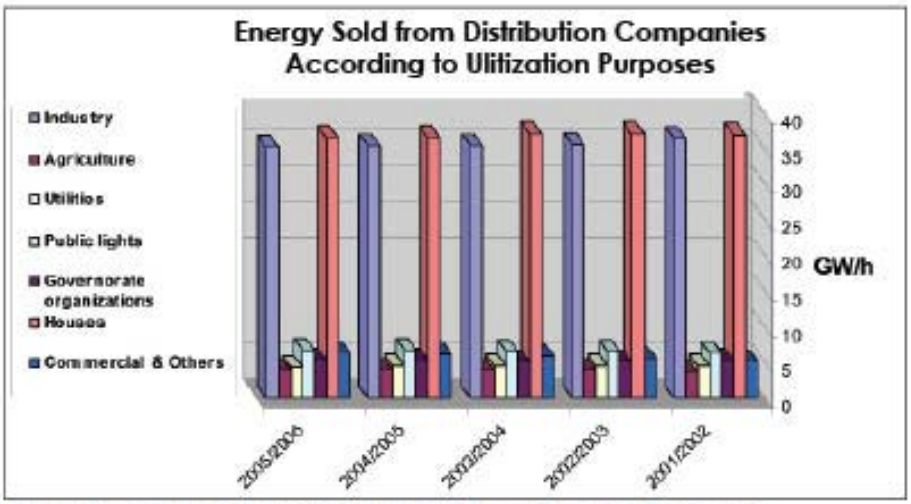
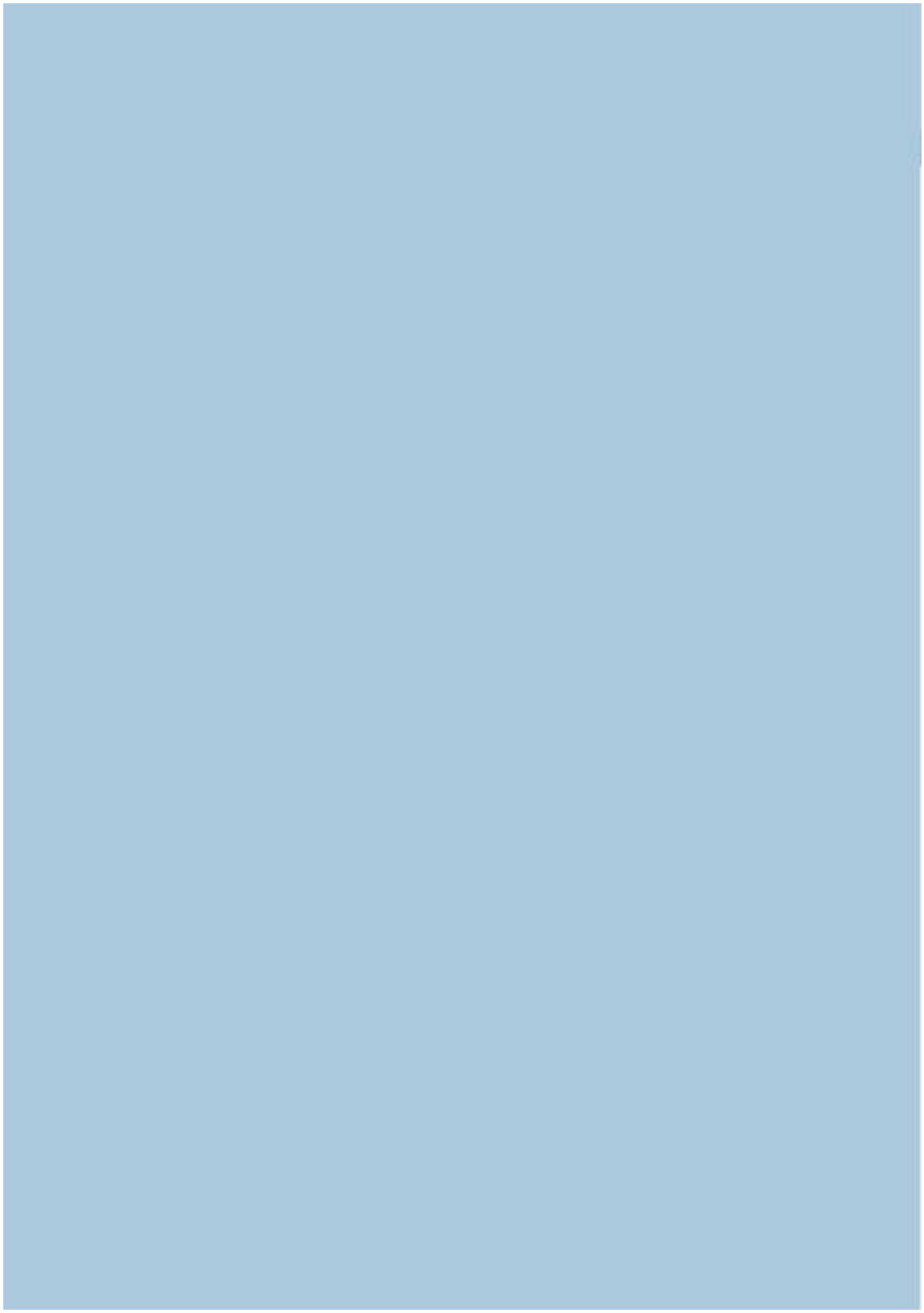


Figure 2.33: Energy Sold from Distribution Companies According to Utilization Purposes
Source : Annual Report of Ministry of Electricity And Energy

2.9 Transport



2.9 Transport

Introduction

The policies and activities of Ministry of Transport are based on the development of an integrated transport system of high efficiency, to play an effective role in supporting economic and social development in Egypt.

Transport sector is considered one of the major factors that has direct impacts on the environmental conditions, 40% of the total consumption of petroleum products is geared for the transport sector that needs new policies, counter measures, and procedures to reduce the energy consumption. Especially that, there is a yearly increase in demands of both passengers and freight, leading to the increase of energy consumption in that important sector of the national economy.

1. Upgrade transport systems.
2. Develop measures of safety and security in using transport systems.
3. Enhance railway shares of freight and passenger.
4. Maximize waterway shares of freight.
5. Promote public transport for passenger.
6. Establish the third subway to address the demands for passenger transport in the following 6 years.
7. Construct a number of ring roads around big cities to avoid traffic jams inside these cities.
8. Increase the total length of road networks away from the populated areas.
9. Rationalize the consumption of energy.

10. Rationalize subsides to the transport sector.
11. Promote other alternative sources like natural gas to replace gasoline.

a) Marine Transport

The Government represented by Ministry of Transport is doing all efforts to reduce impacts through:

- Convention on Protection of the Mediterranean Sea against Pollution (Barcelona), 1976.
- Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircrafts, 1976.
- Protocol concerning Co-operation in Combating Oil and Other Matter Pollution in Cases of Emergency in the Mediterranean (Barcelona), 1976.
- Protocol for the Prevention of Marine Pollution from Land-Based Sources in the Mediterranean, 1980.
- Protocol concerning Mediterranean Specially Protected Areas, 1984.

Presently, the agreement between Egypt and the European Commission was signed. It contains items concerning development of maritime safety in Egypt, through dual contracts between the European commission , Egyptian Ministry of transport , Egyptian Authority for Maritime Safety (EAMS), and the Swedish Maritime Administration (SMA), which aims at bringing Egyptian legislation and performance within maritime safety closer to European standards, within following areas:

- International Oil Pollution Compensation Funds
- Procedures for continuous dialogues with regional organizations in the fields of environmental protection safety , health safety and others.
- Flag state control on conventional and non-conventional Egyptian vessels.
- Safety regulations and monitoring diving activities.

This agreement started in April 2007 and with a duration of 24 months.

b) River Transport

The River Transport Authority is (RTA) currently implementing many projects and most of them were covered by the recommendations of the Master Plan entitled "The Development Study on the Inland Waterway System in the Arab Republic of Egypt". Completion of these projects is expected to attract additional traffic to Inland Waterway Transport (IWT).
So, RTA has almost completed their development works of dredging for container navigation during the daytime.

- Eliminate critical bottlenecks or navigational constraints.
- Establish new river ports. (Ather Elnabi port)
- Increase the draft of water to reach depth of 1.8 m.
- Renew the fleet of river transport.

c) Railway Transport

National five year development plan allocated a total of LE 11.2 billion to the transport sector of which 8.2 billion is allocated to railways, to achieve the following:

- Improve the power of locomotives
- Modernization of signalling on some lines
- Construct new lines to connect industrial cities

The selected indicators explain the current situation of the transport activities that have direct impacts on the environmental conditions, show the changes across the last 10 years, and depict the following:

1. The increase of volume of freight transport by roads, which reflects the increase of CO_2 emissions, as well as, pollution rates.
2. The changes of volume of freight transport by railway, which reflects the decrease of CO_2 emissions, as well as, pollution rates.
3. The changes of volume of freight transport by river, which reflects the decrease of CO_2 emissions, as well as, pollution rates.

Bibliography

- *Study: Organizing Freight Transport on Public Roads in Egypt – May 2004;*
- *Annual Analysis of Freight Transport for both Egyptian National Railways and River Transport Authority.*

INDICATOR: SPILLAGE FROM OIL TANKERS

Description

The indicator measures the occurrence of incidents accompanied by spillage from oil tankers.

Unit of Measurement

Number (frequency of occurrence)

Information Sources

MOT, MTS – EEAA.

Indicator Update Frequency

Data is collected on an annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator describes the frequency of occurrence of release from oil tankers.
As far as «Accuracy» is concerned, the collected data is validated according to standard methodologies, which requires complete revision, quality control and assurance of the data per time. Temporal coverage is six years , so the data is comparable in time.
« Comparability across space « is verified.

Purpose

To measure the oil pollution frequency related to activities of oil tankers.

Target Fixed by Law

One of the objectives of Maritime Safety Policy is to ultimately prevent the release of hazardous pollutants within and outside the national water.

Assessment of State and Trend

Data suggests that releases from oil tankers in Egypt has increased between 2001 and 2006. The trend is also increasing by two incidents in 2006 compared to one in both 2005 and 2004.

Comments on Tables and Figures

There is an increase in the number of release from oil tankers in Suez Canal in comparison to other waterways.

Table 2.23: Release from Oil Tankers

Year	Number of releases	Location	Amount of Oil Tankers releases (Ton)
2001	0		
2002	0		
2003	1	Suez	Undefined
2004	1	Suez Canal	10000
2005	1	Damitta/International water	550
2006	2	Suez Canal	3000 - 600

Source: MOT, MTS – EEAA

Source: MOT, MTS - EEAA
Figure 2.34: Location, of Release from Oil Tankers

INDICATOR: HAZARDOUS RELEASE FROM VESSELS (NON-OIL TANKERS)

Description

The indicator measures the occurrence of release from non oil tankers.

Unit of Measurement

Number (frequency of occurrence).

Information Sources

MOT, MTS - EEAA.

Indicator Update Frequency

Data is collected on an annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator describes the frequency of occurrence of release from vessels (non-oil tankers).
As far as «Accuracy» is concerned, the collected data is validated according to standard methodologies, which requires complete revision, quality control and assurance of the data.
The temporal coverage is six years and the data is comparable in time.
«Comparability across space» is verified.

Purpose

To measure the hazardous pollution frequency related to release from non-oil tankers.

Target Fixed by Law

One of the objectives of the Maritime Safety Policy is to ultimately prevent the release of hazardous pollutants within and outside the national water.

Assessment of State and Trend

Assessment of state and trend cannot be carried out since data is provided, for only one-year. Data describes that the number of release from non oil tanker varying but it is increase from six to ten incidence between 2001 to 2006 .

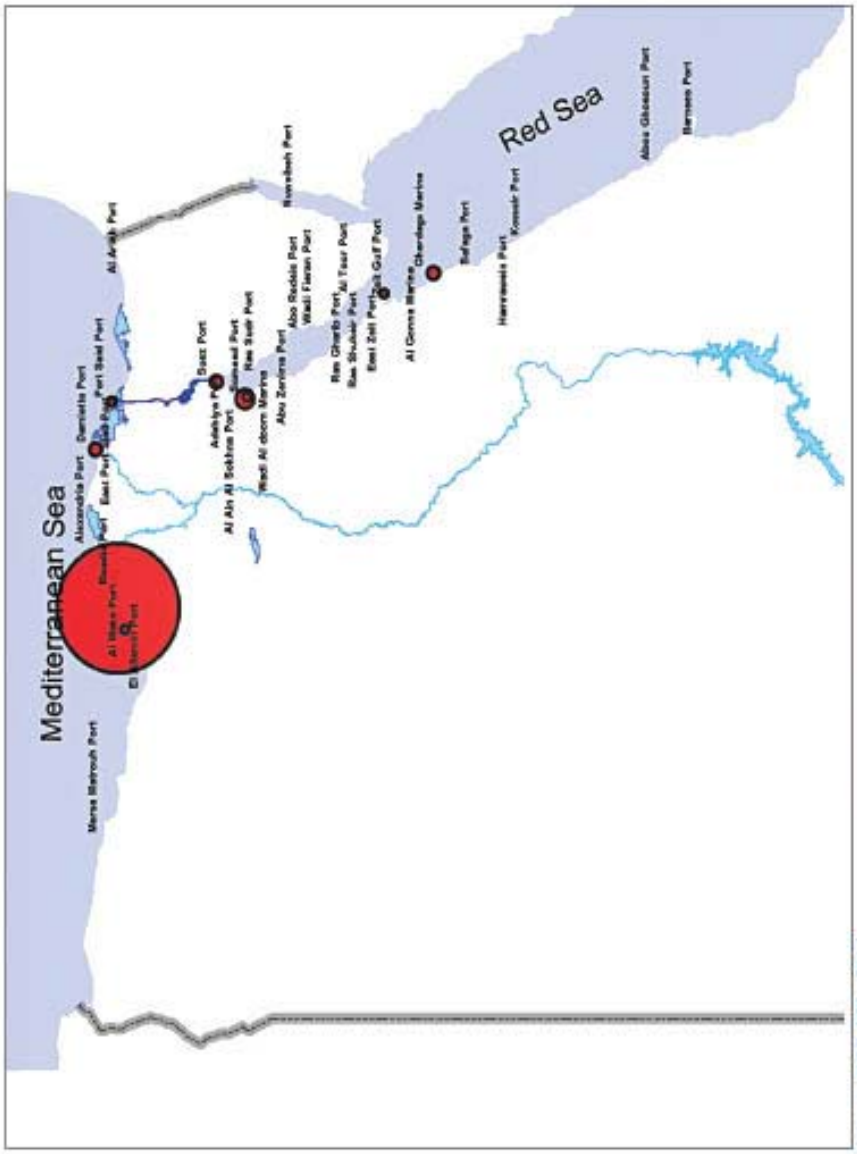
Comments on Tables and Figures

Red Sea area witnesses a high number of releases, corresponding to 67% of total incidents. Releases include: diesel, crude oil, petroleum residue, gasoline, wax, acids and others (not all the releases defiened the amount).

Table 2.24: Release from non Oil Tankers

Year	Number of releases	Location	Amount of Oil (m^2)
2001	5	Alexandria	200 - 45 -15 -100 - 100
	1	Hurgada	undefined
2002	2	Alexandria	200 - 30
	1	Alexandria	Sink of vessel carrying 800 ton of petrol substance
2003	1	Suez	15
	1	Zayteyat port	200
	1	someed	undefined
	3	Alexandria	300 -10 - 20
2004	1	Zayteyat port	1750
	4	Alexandria& Dekhela	30 - 1500 - 20 - undefined
	1	Someed sidi kreer	800000
2005	8	Alexandria& Dekhela	undefined
	1	Hirgada	5040
	1	Sokhna port	undefined
2006	2	Sokhna port	undefined
	1	Suez	200
	4	Alexandria	undefined
	2	Demiatta	150 - 120
	1	Port said	undefined

Source: MOT, MTS – EEAA



Source: MOT, MTS – EEAA
Figure 2.35: Locations of Release from Non-Oil Tankers (2001/2006)

INDICATOR: ENERGY CONSUMPTION IN THE TRANSPORT SECTOR

Description

The indicator measures the amount of energy consumed in the transport sector.

Unit of Measurement

Million TOE (Tons of Oil Equivalent) and 1000 Tons;
Data are reported for fiscal year (1st of July – 30th of June).

Data Sources

Ministry of Economical Development; Organization of Energy Planning.

Indicator Update Frequency

All Air Quality Data is collected on an annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator describes the level of energy consumed in the transport sector.
«Accuracy» is verified.
The temporal coverage is 8 years and the data is comparable in time as the collection methodology is always the same.
"Comparability across space" is verified.

Purpose

To monitor energy consumption level of the transport sector comparing to the total energy consumption of other sectors.

Target Fixed by Law

To promote energy-smart alternatives.

Assessment of State and Trend

There is an increase in the percentage of energy consumption by transport sector as compared to the total consumption of all sectors; it increased from 13% in 1980 / 1981 to 29% in 2003 / 2004.

Comments on Tables and Figures

Consumption of both petroleum products and natural gas has witnessed a substantial increase; however the rate of increase in consumption of petroleum products is higher than in natural gas. In particular, between 2002 and 2004, the consumption of petroleum products has increased by 6.8% while the consumption of natural gas increased by 4.7%.

Table 2.25: Total Energy Consumption in Transport Sector

Year	Energy consumption by all sector (Million TOE)	Energy consumption by transport sector (Million TOE)	Energy consumption by transport sector (%)
1980 / 1981	13.797	1.889	13.7
1990 / 1991	26.95	3.111	11.5
1995 / 1996	29.624	6.747	22.8
1999 / 2000	30.85	9.654	31
2000 / 2001	32.45	10.52	32.4
2001 / 2002	33.57	9.36	27.9
2002 / 2003	35.55	9.94	28
2003 / 2004	36.956	10.78	29

Source: MOID, Organization of Energy Planning

Table 2.26: Total Energy Consumption in Transport Sector by Fuel

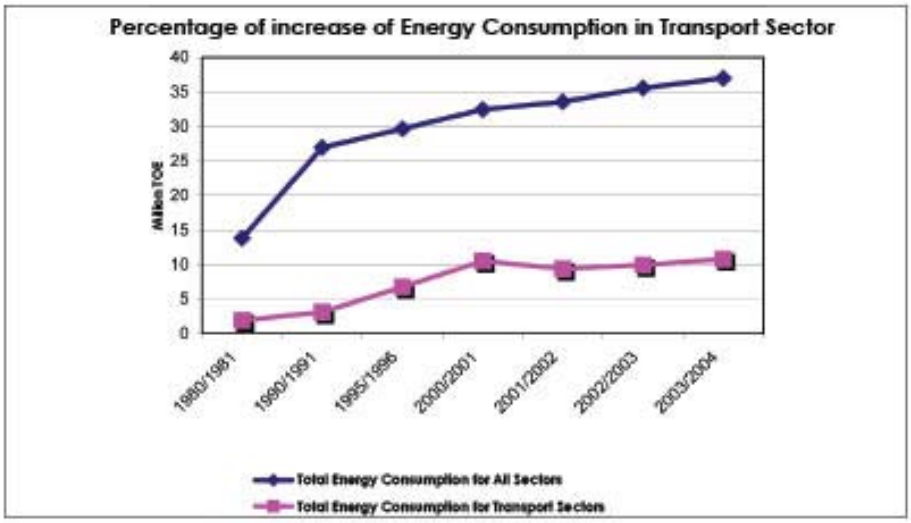
Year	Energy consumption in transport sector Natural Gas (Million TOE)	Energy consumption in transport sector Petroleum Products (Million TOE)
2001 / 2002	0.16	9.2
2002 / 2003	0.21	9.73
2003 / 2004	0.22	10.56

Source: MOID, Organization of Energy Planning

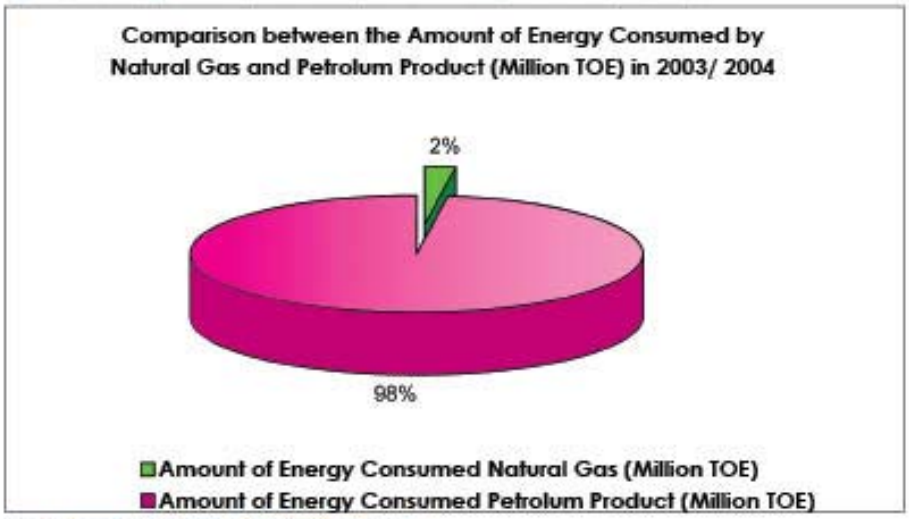
Table 2.27: Consumption of Petroleum Product in Transport Sector by Fuel Type

FUEL TYPE	2000 /2001	2001/ 2002	2002 /2003	2003 /2004
Gas oil				
local consumption of all sectors (t*1,000)	7865	8111	8470	9066
local consumption of transport sector (t*1,000)	5454	5284	5470	5874
%	69	65	65	65
Gasoline				
local consumption of all sectors (t*1,000)	2357	2386	2430	2521
local consumption of transport sector (t*1,000)	2357	2386	2430	2521
%	100	100	100	100
Kerosene				
local consumption of all sectors (t*1,000)	1414	1274	1200	1007
local consumption of transport sector (t*1,000)	420	402	379	422
%	30	32	32	42
Fuel oil				
local consumption of all sectors (t*1,000)	7091	6257	6520	5758
local consumption of transport sector (t*1,000)	787	521	539	846
%	11	8	8	15
Others				
local consumption of all sectors (t*1,000)	349	357	380	397
local consumption of transport sector (t*1,000)	187	190	202	210
%	54	53	53	53

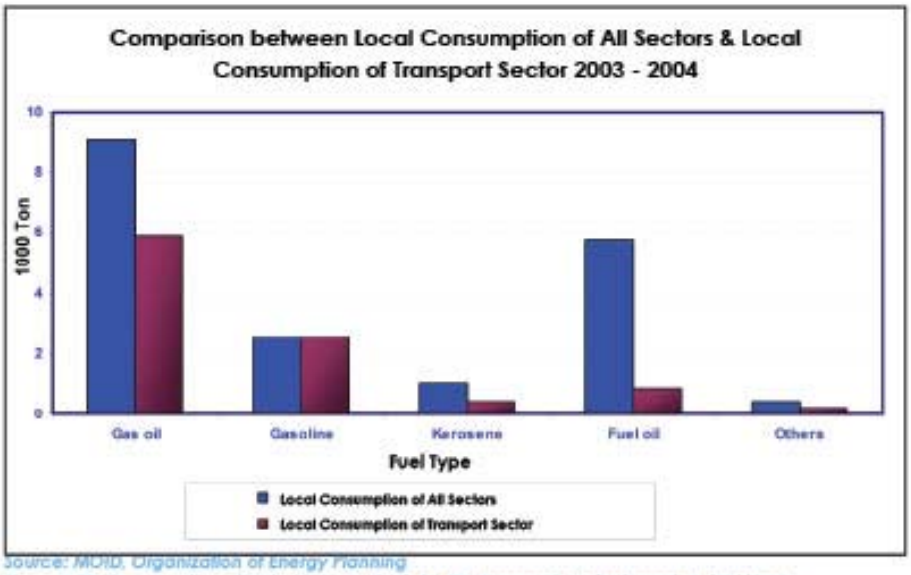
Source: MOID, Organization of Energy Planning
Unit of Mesearement : 1000 Ton Metric



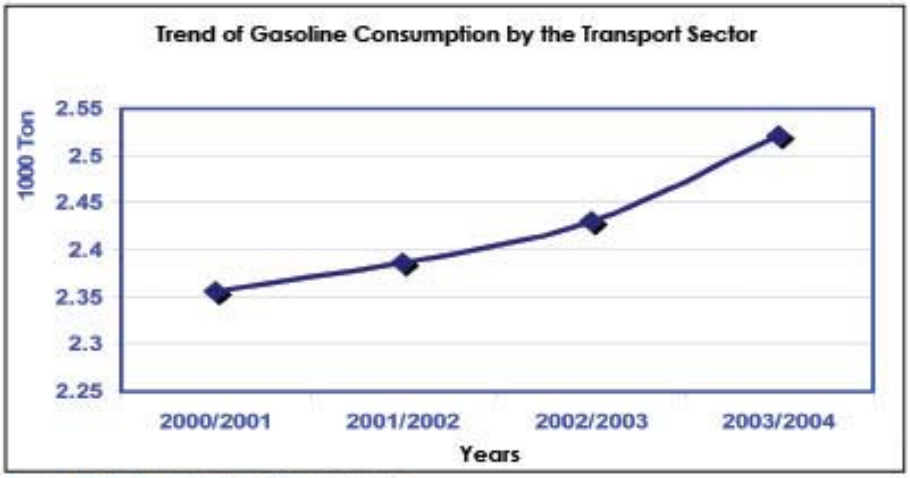
Source: MOID, Organization of Energy Planning
Figure 2.36: Energy Consumption in Transport Sector through 19801981/ to 2003 / 2004



Source: MOID, Organization of Energy Planning
Figure 2.37: Comparison between Energy Consumption by the Transport Sector using Petroleum Products and Natural Gas through 2003 / 2004.



Source: MOID, Organization of Energy Planning
Figure 2.38: Consumption of petroleum products by the Transport Sector based on fuel type



Source: MOID, Organization of Energy Planning
Figure 2.39: Trend of Gasoline Consumption by the Transport Sector

INDICATOR: VOLUME OF FREIGHT TRANSPORT ON ROADS

Description

The indicator measures the amount of freight transported over roads.

Unit of Measurement

Million ton / year

Information Sources

Ministry of Transport.

Indicator Update Frequency

Data available only for 2002.

Quality of Information

As far as «Relevance» is concerned, the indicator describes the amount of goods transported over the roads.
«Accuracy»: the data is the result of a detailed study, however a margin of error might exist.
The temporal coverage is only for the year 2002 and data is the result of a detailed study and such level of details might not be available for other years.
"Comparability across space": data is comparable across space.

Purpose

To measure the freight volume transported by product typology.

Target Fixed by Law

MOT main policies are:

1. Raise up the share of both railway and waterway of freight transport
2. Improve the services and facilities on road network

Assessment of State and Trend

Presented data is the result of a detailed study and such level of details might not be available for other years. Thus, assessment of state and trend cannot be carried out since only one-year data is provided.

Comments on Tables and Figures

The share of volume of freight transported by roads is 96% of the total volume of freight.

Table 2.28: Volume of Freight Transported on Roads (2002)

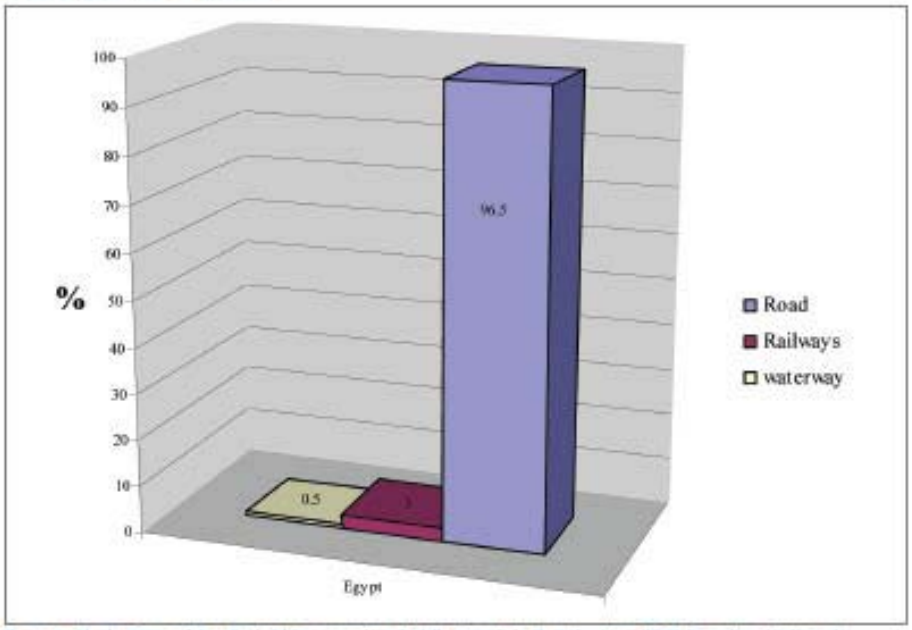
Product	Volume (Million ton)	Percentage of Total (%)
Petroleum products	24.11	6
Construction materials	204.68	49
Metals and minerals	9.39	2
Agriculture and farm products	115.36	27
Chemical and mineral products	24.44	6
Textile	4.26	1
Industrial goods	34.12	8
Mixed goods	4.81	1
TOTAL	421.17	100

Source: Study: Organizing Freight Transport on Public Roads in Egypt – May 2004

Table 2.29 Modal Share of Freight Transport in Egypt (2003)

Mode	Transported volume of freight	
	Million ton year	% of total
Road	312	96.9
Railway	12	2.8
IWT Internal Water Transport	2.3	0.3
Total	326.3	100

Source: Study; Organizing Freight Transport on Public Roads in Egypt – May 2004.Egyptian National Railway Data & River Transport Authority.



Source: Study; Organizing Freight Transport on Public Roads in Egypt – May 2004.Egyptian National Railway Data & River Transport Authority.
Figure 2.40: Modal share of freight.

INDICATOR: VOLUME OF FREIGHT TRANSPORT ON RAILWAYS

Description

The indicator measures the amount of freight transported by railways.

Unit of Measurement

Million ton / year
Data is reported for fiscal year (1st of July – 30th of June).

Information Sources

Egyptian National Railway "ENR".

Indicator Update Frequency

Data is collected on an annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator describes the volume of freight transported by railway.
«Accuracy»: the data is the result of operating system of Egyptian national railway no error may exist.
The temporal coverage is for years 1995/ 1996 to 2005 / 2006 years.
"Comparability across space": data is available for the national level.

Purpose

To indicate the freight volume transported by railway, also the performance of railways compared to road networks.

Target Fixed by Law

Increase the railway share of freight transport.

Assessment of State and Trend

Data indicates that the volume of freight transported by railway was reduced by 25% in the last 10 years.

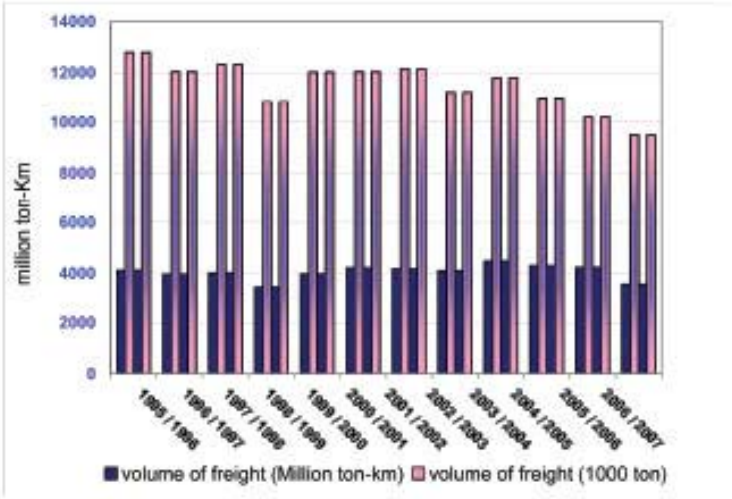
Comments on Tables and Figures

Data reflects that the volume of freight transported by railway was reduced by 25% in the past 10 years.
This reduction attracted to roads transport which have direct impacts on the CO_2 emission on the road network.

Table 2.30: Volume of Freight Transport by Railways

Year	Volume of freight (Million ton-km)	Volume of freight (1000 ton)
1995 / 1996	4117	12795
1996 / 1997	3969	12042
1997 / 1998	4027	12334
1998 / 1999	3464	10800
1999 / 2000	3983	12027
2000 / 2001	4217	12037
2001 / 2002	4180	12160
2002 / 2003	4104	11237
2003 /2 004	4479	11800
2004 / 2005	4305	11000
2005 / 2006	4233	10200
2006 / 2007	3581	9500

Source: *Ministry of Transport and Egyptian Railway Authority*



Source: *Ministry of Transport and Egyptian Railway Authority*
Figure 2.41: Volume of Freight Transport by Railways

INDICATOR: VOLUME OF FREIGHT TRANSPORT ON RIVER

Description

The indicator measures the volume of freight transported on the River Nile.

Unit of Measurement

1000 Ton - Million ton / Km

Information Sources

Ministry of Transport, General Authority of River Transport.

Indicator Update Frequency

All data is collected on an annual basis.

Quality of Information

As far as «Relevance» is concerned, the indicator describes the volume of goods transported by river.
«Accuracy»: the data is the result operating system in River Transport Authority
The temporal coverage is only for the years 1997 to 2006.
"Comparability across space": data is compiled on the national level.

Purpose

To indicate the freight volume transported by river, also the performance of waterway compared to other modes of transport.

Target Fixed by Law

Increase the waterway share of freight transport.

Assessment of State and Trend

Volume of the freight transport on river decreased by 61% in the last 10 years.

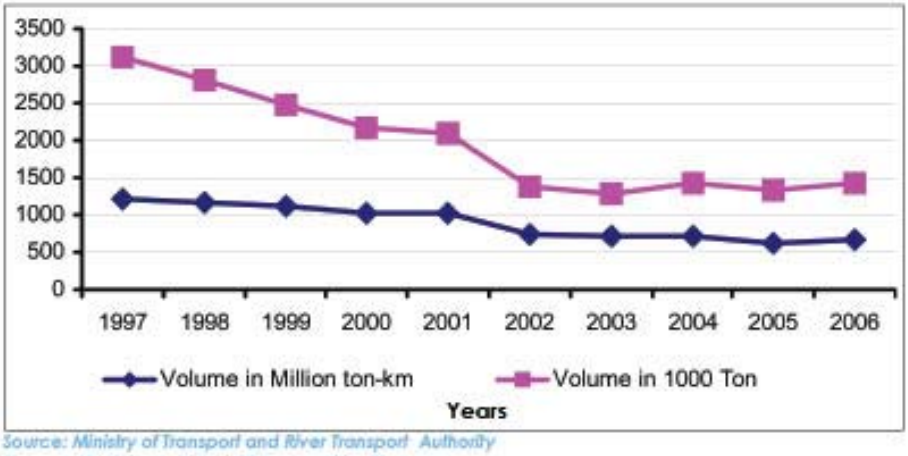
Comments on Tables and Figures

Freight transport on river is declining. It is assumed that the modal shift is to road transport raising concerns since river transport is considered an environmentally friendly mode of transport.

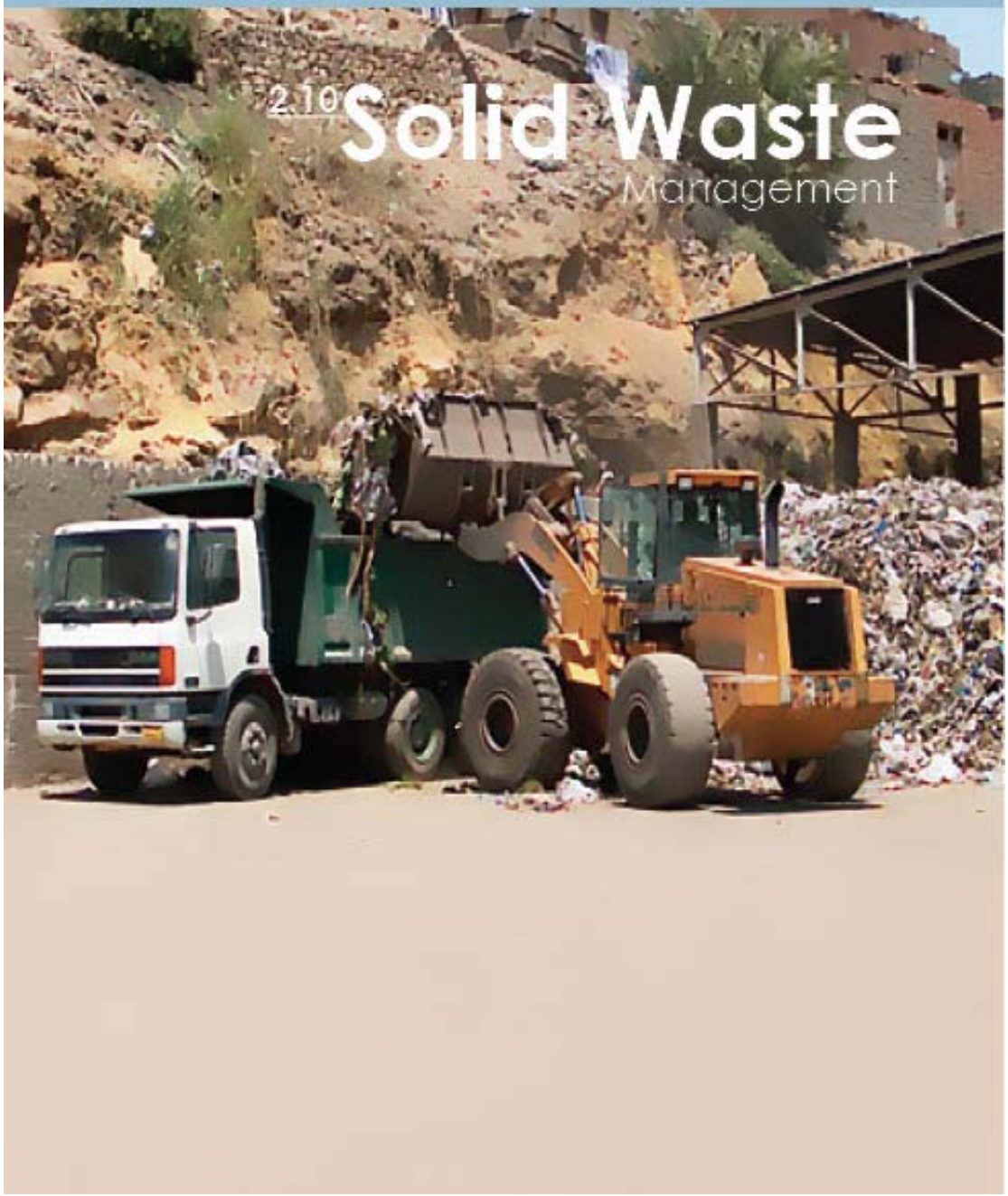
Table 2.31: Volume of Freight Transport By River

Year	Volume	Volume
	1000 ton	Million / ton-km
1997	3110	1209
1998	2810	1167
1999	2480	1108
2000	2160	1032
2001	2090	1013
2002	1380	735
2003	1280	706
2004	1420	717
2005	1340	613
2006	1420	672

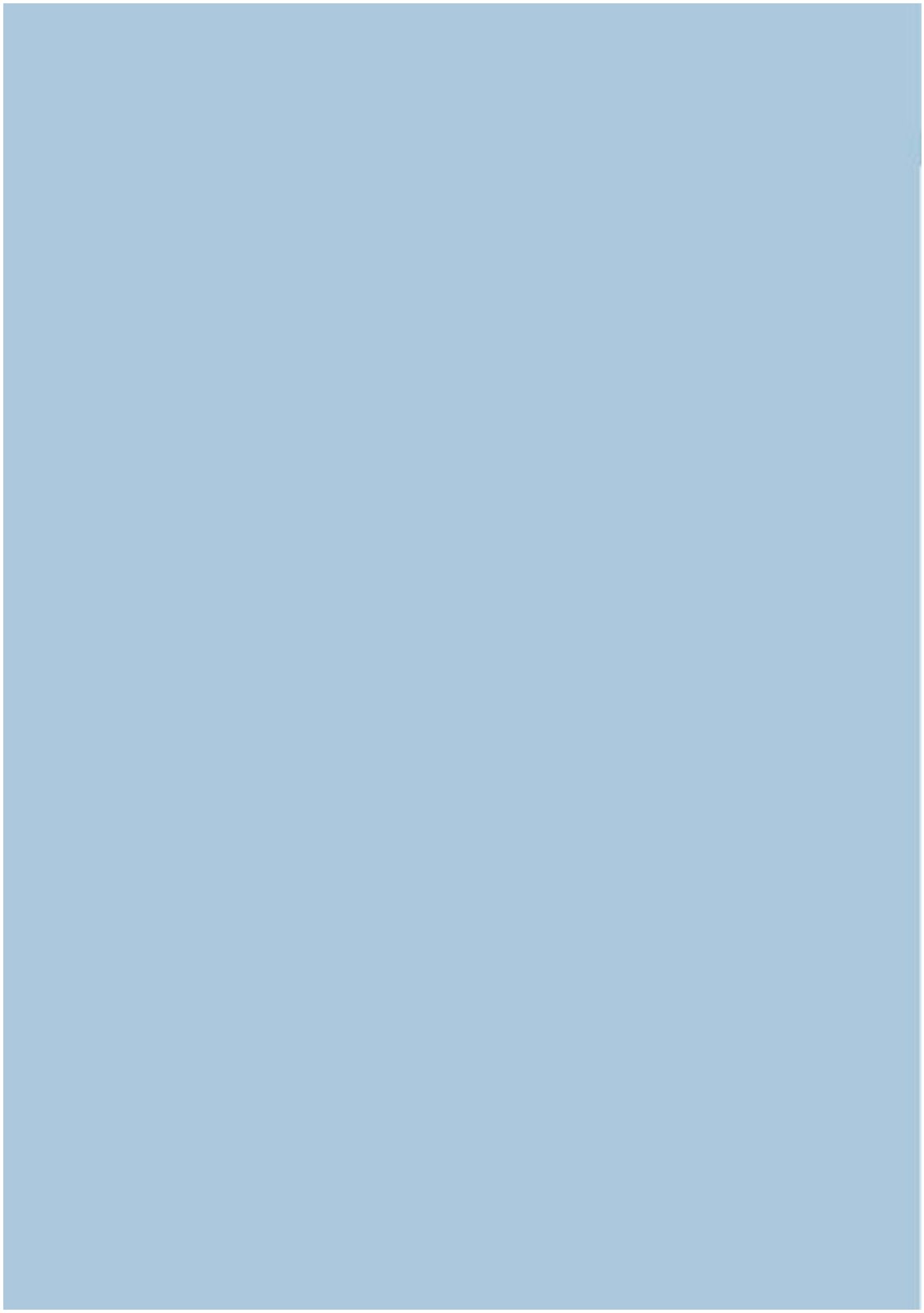
Source: Ministry of Transport and River Transport Authority



Source: Ministry of Transport and River Transport Authority
Figure 2.42: Volume of Freight Transport by River



2.10 Solid Waste Management



2.10 Solid Waste Management

Introduction

Sound solid waste management needs to deal with the perspective of multisided, multi-component and closely-linked integrated system, in a chain of linked events with each link being subsequent to the link before and forming the basis for the link to follow. In all cases, it is essential for each stage to use adequate means appropriate to prevailing circumstances, available resources and existing determinants. This is embodied in the adoption of best options consistent with technical standards, environmental safety, and social acceptance, as well as, with least possible costs, highest possible resource recovery, adherence to legislation and status together with marked flexibility and good understanding of the complete life cycle.

Solid Waste in Egypt is estimated to be 66 million tons annually, based on 2006 estimates. Types of waste include solid, industrial, agricultural, sludge generated from wastewater treatment processes, hospital wastes, construction demolition debris and wastes from cleaning of canals and drains. It includes as well, solid municipal wastes (garbage) and household wastes (accounting for 60%), and waste from shops, commercial markets, service institutions such as schools, educational institutes, utilities, hospitals, administrative buildings, streets, gardens, markets, hotels and recreational facilities, and consisting also wastes of some small factories and camps.

Bibliography

- *National Waste Management Strategy*
- *http://www.eeaa.gov.eg/*
- *http://www.eeaa.gov.eg/arabic/info/report_soe2007.asp*

INDICATOR: TOTAL MUNICIPAL WASTE GENERATED

Description

The Total municipal solid waste indicator measures the total amount of municipal waste. Municipal waste includes household waste, which includes waste from shops, commercial markets, service institutions such as schools, educational institutes, utilities, hospitals (non- hazardous waste), administrative buildings, streets, gardens, markets, hotels and recreational facilities not to mention waste of some small factories and camps.

Unit of Measurement

Tons (t)

Information Sources

Governorates and EEAA

Indicator Update Frequency

Municipal Solid Waste is estimated on annual basis

Quality of Information

Can not rely on the accuracy of this data as it is estimated data. The temporal coverage is seven years.

Purpose

To measure the total amount of municipal solid waste generated and its correlation to small population growth.

Target Fixed by Law

Environmental Law No. 4 /1994 and its executive directives are working in the area of identification and selection of health burial sites Law No. 38 /1967 on public hygiene.

Assessment of State and Trend

The problem lies in the fact that the present system can not satisfy the served community needs with its various strata for a reasonably acceptable level, as well as, in reducing the adverse health and environmental impacts, or in improving the general aesthetic appearance.

The symptoms of the problem are:

- Various levels of waste accumulations at various places and locations that became liable to various vectors (rodents and insects) and foci for environmental pollution, bad smell and appearance aside from frequent uncontrolled open burning that all contribute to adverse health and environmental impacts.
- Frequent resorting to ineffective and environmentally unfriendly handling, treatment and recycling techniques that may pose health risks.

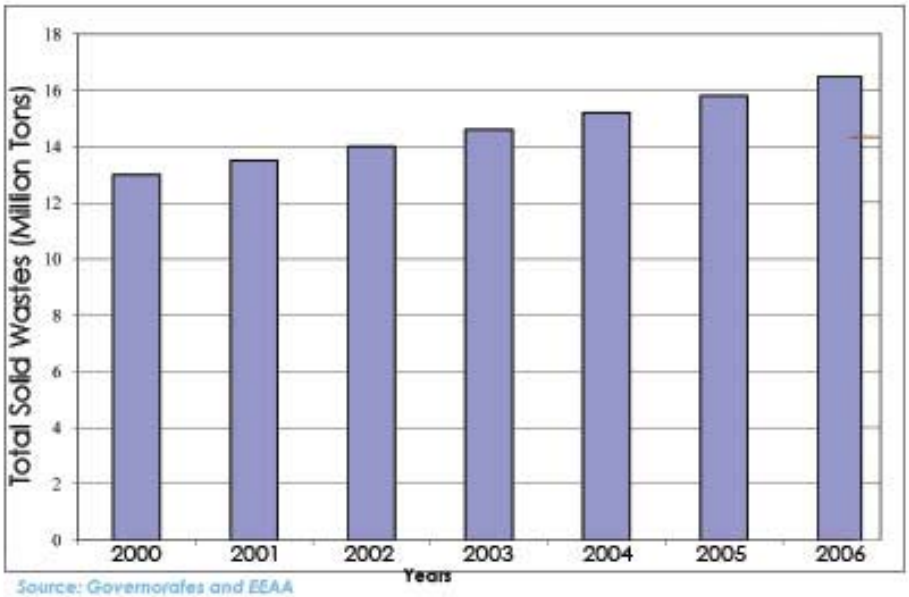
Prevalent open-dump type of random solid waste disposal, as well as, indiscrimination dumping leading to various associated health and environmental hazards.

Comments on Tables and Figures

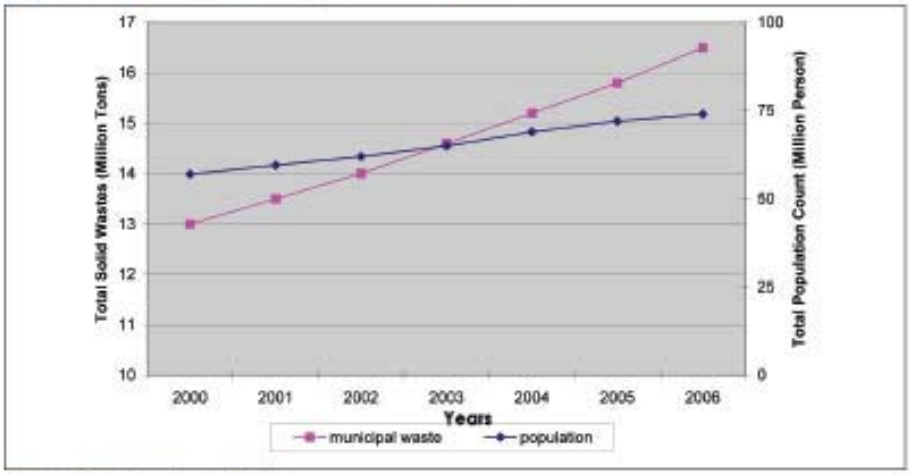
The total amount of municipal solid waste generated in 2000 was about 13million ton.

Examining the data, classified by type of waste, it is noted that, between 2000 and 2006 there was an increase in municipal waste by about 4 % annually.

Between 2000 and 2006, Municipal waste increased by (27%) and Population by (30%). In the last period (2005 - 2006) the municipal waste increased by (44%) while population by (28%).



Source: Governorates and EEAA
Figure 2.43: Total Amount of Municipal Solid Wastes Generated



Source: Governorates and EEAA
Figure 2.44: Municipal Solid Wastes Generated and Population Trend

INDICATOR: NUMBER OF LANDFILLS

Description

This indicator supplies the information about the number of landfills established in the different Governorates. These kinds of landfills called "Sanitary Dumps Sites" are land sites designated to healthy and environmentally safe waste disposal.
In these sites the wastes are spread in layers and adequately pressed and covered with inert substance.

Unit of Measurement

Number (n.)

Information Sources

Governorates, EEAA, Ministry of Housing, Utilities, and Urban Development and a Project with European Union.

Indicator Update Frequency

Variable frequencies.

Quality of Information

We have only the data for one year, instead the comparability between locations is high because we have the data for 24 Governorates and the methodology used to collect the data for each Governorates is the same
These data confirmed that burial sites has already been chosen and identified within the governorates in collaboration with provinces and the Ministry of Housing, Utilities, and Urban Development, as well as, in collaboration with the joint project with the European Union.

Purpose

To collect information on the number of landfills throughout the Governorates.

Target Fixed by Law

Environmental Law No. 4 /1994 and its executive directives aim to the identification and selection of health burial sites.

Assessment of State and Trend

The situation is inadequate since after the identification and selection of the 56 burial sites of wastes of health departments within the Arab Republic of Egypt only five sites were established.

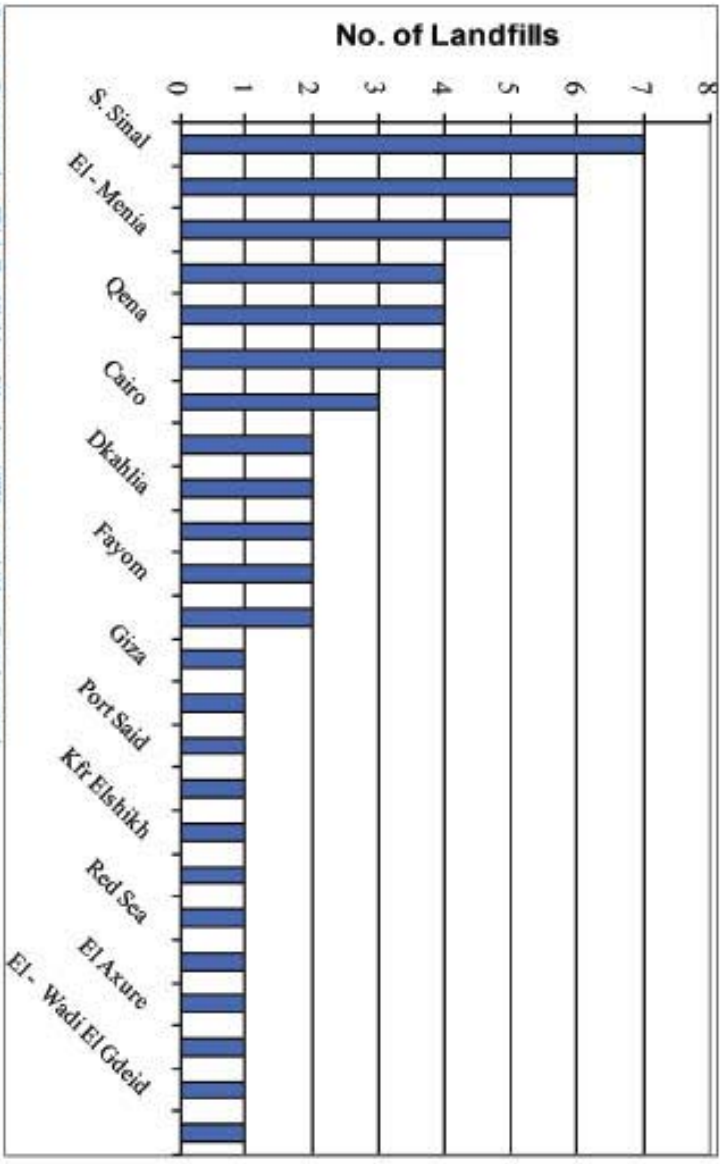
Comments on Tables and Figures

Since 2001, 56 sites of landfills (sanitary dump sites) have been identified by the EEAA in all governorates. Only 5 of them were established and are working and they are located in Alexandria, Cairo, Port Said, Suez and in Gharbia.
Regarding the number of sites selected as landfills (56 sanitary dump sites) and its distribution all over the governorates, 7 sites are located in available desert areas at the governorate as in Assiut and Minya governorates.

Table 2.32: Number of Lanfills Sites in the Egyptian Governorates 2001

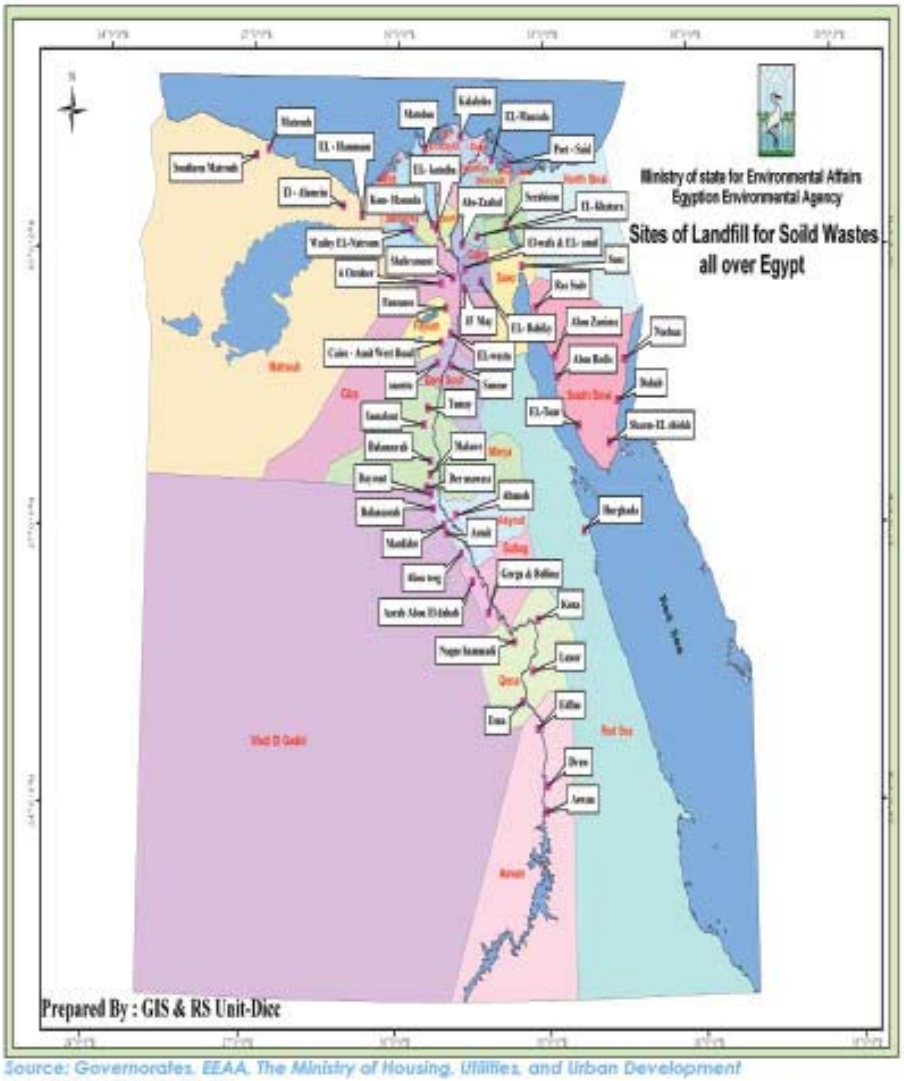
Governorates	Landfills
	n.
S.Sainai	7
Assiut	6
El-Menia	5
Matrouh	4
Qena	4
Bani Suwaif	4
Cairo	3
Behyra	2
Dakahlia	2
Sharkia	2
Fayom	2
Sowhag	2
Giza	1
Qalubia	1
Port Said	1
Monofia	1
Kafr Elshikh	1
Esmailia	1
Red Sea	1
Suez	1
Luxur	1
Alexandria	1
El Wadi El Gedeid	1
El Gharbia	1

Source: Governorates, EEAA, The Ministry of Housing, Utilities, and Urban Development



Source: Governorates, EEAA, The Ministry of Housing, Utilities and Urban Development

Figure 2.45: Sites of Landfill



Source: Governorates, EEAA, The Ministry of Housing, Utilities, and Urban Development
Figure 2.46: Sites of Landfills

Synoptic Table

Table of Indicators

Synoptic Table

Topic Area	Indicator	DPSIR	Aim
Fresh water Quality	COD concentration in the Nile River, its branches and main canals	S	The purpose of the indicator is to describe the Nile River water quality by the COD concentration, giving the c hance to take corrective action in case there are any deviation from the permissible level.
	Cumulative number of industrial facilities in compliance with industrial effluent discharge standards	R	This driving force indicator quantitatively describes the changes over time in the pressure excreted on the Nile water quality by the industrial sector. The indicator assesses of the progress of the measures aiming at improving the quality of the Nile River water.
Coastal Water Quality	Total Nitrogen concentration in the Egyptian Red Sea Coastal waters	S	This indicator describes the quality of the Egyptian Red Sea Coastal water to guide future planning or trigger corrective actions
	Total Nitrogen concentration in the Egyptian Mediterranean Coastal waters	S	This indicator describes the quality of the Egyptian Mediterranean Coastal water in term of eutrophication guiding future planning or trigger corrective actions if the indicator level exceed the established guideline.
	Total Phosphorus concentration in the Egyptian Red Sea Coastal waters	S	This indicator describes the quality of the Egyptian Red Sea Coastal water to guide future planning or trigger corrective actions
	Total Phosphorus concentration in the Egyptian Mediterranean Coastal waters	S	This indicator describes the quality of the Egyptian Mediterranean Coastal water in term of eutrophication guiding future planning or trigger corrective actions if the indicator level exceed the established guideline

Topic Area	Indicator	DPSIR	Aim
Biodiversity and protected areas	Protected areas	R	To value the level and temporal (time) trend of protected areas declaration.
	Protected Areas According to IUCN Classification	S/R	To describe the peculiarity of the Egyptian Protected Areas according to an international classification (IUCN).
	Biodiversity in Protected Areas	S/R	To value the protection of species carried out by protected areas.
Land use management	Per-capita share of cultivated land	S/R	To monitor the cultivated land per capita share.
	Soil Salinity and Sodicity	S, I, R	To define and assess the areas of cultivated lands affected by soil salinity and sodicity (state) to estimate productivity losses (impacts) and design mitigation efforts (Response).
	Urban Encroachment on Cultivated Land.	I	To monitor the urban encroachment on cultivated lands.
Afforestation	Total Forest Area	D/P	To measure the total areas planted with forests and its correlation with treated sewage water according to the Egyptian code.
Air Quality	PM_{10} concentration	S	To measure the PM_{10} in ambient air and the share of pollution in each governorate.
	SO_2 concentration	S	To measure the SO_2 in ambient air and the share of pollution in each governorate.
	NO_2 concentration	S	To measure the NO_2 in ambient air and the share of pollution in each governorate.
	O_3 concentration	S	To measure the O_3 in ambient air and the share of pollution in each governorate.
	CO concentration	S	To measure the CO in ambient air and the share of pollution in each governorate.
	Pb concentration	S	To measure the Pb in ambient air and the share of pollution in each governorate.

Topic Area	Indicator	DPSIR	Aim
Noise	Noise level according to the Environmental National Law no. 4 / 1994	S/R	To measure the noise level (LAeq) in the monitored sites, describing the state of the acoustic environment, compare it with the limit values expressed by Environmental National Law no.4 / 1994, and according to this indicator, taking the necessary measurement for noise abatement.
Energy	Electrical Energy consumption per economic sector	D	To evaluate the trend of final consumed energy in national level in economic sector with aim to reduce energy use.
Transport	Release from Oil Tankers	P	To measure the oil pollution frequency related to oil tankers.
	Hazardous Release from Vessels (Non Oil Tankers)	P	To measure the hazardous pollution frequency related to release from non-oil tankers.
	Energy Consumption in Transport Sector	D	To monitor energy consumption levels of transport sector comparing with the all energy consumption of other sectors.
	Volume of Freight Transport on Roads	D	To indicate the increase of volume of freight transport by Road, it reflect the increase of CO2 emissions also pollution rate
	Volume of Freight Transport on railways	D	To indicate the changes of volume of freight transport by railway, it reflect the decrease of CO2 emissions also pollution rate
	Volume of Freight Transport on River	D	To indicate the changes of volume of freight transport by river, it reflect the decrease of CO2 emissions also pollution rate
Solid waste	Total waste generation	P	To measure the total amount of municipal solid waste generated and its correlation with Population growth.
	Number of landfills	P/R	To collect information on the number of landfills throughout the Governorates.

Annexes

Contributors

The different sections of the Annual Guide have been implemented by the Egyptian Task Force of the EEAA,along with the technical support of the Italian Task Force from APAT, Italy. The overall coordination for the project was ensured by **Dr. HODA EL SHAYEB** (EEAA) and **Dr. MARIA DALLA COSTA** (APAT). The two Task Forces were headed respectively by: Mrs. Laila Kandil (EEAA), Dr. Mariaconcetta Giunta (APAT). A special thanks is due to Ms. Claudia Berretta from the Italian Ministry of the Environment's office in Cairo, who patiently provided the needed liaison between the Egyptian and Italian teams for the local seminars, and to Mrs. Stefania Fusani from APAT who supported the coordination work in APAT.

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