

THE GOVERNORATE OF DAKAHLEYA

ENVIRONMENTAL PROFILE

Compiled by

Egyptian Environmental Affairs Agency (EEAA)
Technical Cooperation Office for the Environment (TCOE)
and
Entec UK Ltd

Based on surveys of the Governorate by

Working Group Specialists
National Consultants and
Local Stakeholders

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GLOSSARY/ACRONYMS

AOYE	The Arab Office for Youth and Environment
a.s.l	above sea level
BPEO	Best Practical Environmental Option
BOD	Biological Oxygen Demand
CDA	Community Development Association
COD	Chemical Oxygen Demand
dB	decibel
DFID	Department for International Development (UK)
EA	Environmental Audit
EC	Electrical Conductivity
EEAA	Egyptian Environmental Affairs Agency
EIA	Environmental Impact Assessment
ELO	Environmental Liaison Office
EMD	Environmental Management Department
EMED	Environmental Monitoring and Enforcement Department
EMS	Environmental Management System
EMU	Environmental Management Unit
EPAP	Environmental Pollution Abatement Programme
EMPS	Environmental Management and Planning System
EQI	Environmental Quality International
ET	Environmental Tribunal
Feddan	Area of Land (4,200 m ²)
GDP	Gross Domestic Product
GEAP	Governorate Environmental Action Plan
GIS	Geographical Information System
GOE	General Office of the Environment
GOFI	General Organisation for Industries
GOPP	General Organisation for Physical Planning
K	One thousand
km	kilometre
LE	Abbreviation for Egyptian pound
M	One million
Markaz	Administrative District
MCM	Million cubic metres
mmhos/cm	millimhos per centimetre
NA	Not Applicable
na	not available
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organisation
NO ₂	Nitrogen Dioxide
NOPWASD	National Organisation of Potable Water and Sanitary Drainage
ODA	Overseas Development Administration
PEA	Public Economic Authority
ppm	parts per million
RBO	Regional Branch Office
RPC	Regional Planning Centre
SEAM	Support For Environmental Assessment and Management
SEC	Supreme Environmental Council
STW	Sewage Treatment Works
SWM	Solid Waste Management
TCOE	Technical Co-ordination Office for the Environment
TDS	Total Dissolved Solids

TOR	Terms of Reference
TSP	Total Suspended Particles
WHO	World Health Organisation
WTP	Treatment Plant
WWTP	Waste Water Treatment Plant

PREFACE

Background

- i. In 1995 the Egyptian Environmental Affairs Agency concluded an agreement with the UK Department for International Development (DFID) for funding a 3-year 'Support for Environmental Assessment and Management Project, colloquially referred to as the SEAM Project. The execution of the Project is jointly undertaken by the Technical Co-ordination Office for the Environment (TCOE) and a UK environmental consultancy, ENTEC.
- ii. The Project entails several components, which include the preparation of both solid waste management strategies and environmental action plans for the Governorates of Dakahleya and Sohag. In addition, there are national programmes for environmental impact assessment, for industrial auditing in food, textiles, oil and soaps, as well as establishing an environmental database. Demonstration projects covering solid waste management and pollution control are planned. Capacity building, including training, is also a significant component of the entire Project. The National Environmental Action Plan (NEAP) was launched in 1992. This Project was initiated in support of that National Plan.
- iii. This Environmental Profile of Dakahleya Governorate has been prepared as part of the SEAM Project. It is intended to serve as a companion document to the Governorate Environmental Action Plan (GEAP) for Dakahleya.
- iv. The Environmental Profile comprises two parts. The first, Part A, is a summary of resource surveys conducted by local and national technical specialists. The second, Part B, presents the perceptions of stakeholder groups concerning the top priority issues to be addressed in preparing a Governorate Environmental Action Plan for implementation. It provides insights into the social dynamics of the Governorate. The strategic approach agreed for managing solid wastes throughout the Governorate is also outlined.
- v. The process used to compile this document is indicated by the Flow Process Chart presented in Box i.i.

Dakahleya

- vi. Dakahleya Governorate is, as shown in Box i.ii, located in the Delta area. It has a population of over 4 million in rural and urban areas, and is one of the most densely populated Governorates of Egypt. Administratively, as indicated in Box i.iii, it is divided into Markazes (local District Authorities), which incorporate 17 cities, 109 main villages and 336 satellite villages.
- vii. Whilst industry is expanding, agriculture is the predominant activity. Rice, wheat, cotton, maize, beans, fruit and vegetables are the principal crops. The larger industrial factories include textiles, fertiliser, particle board, bricks, oil and soaps, as well as dairy foods. Only 28 firms employ more than 50 workers.
- viii. Box i.iv provides an overview of the principal issues respectively described and addressed in this Profile and the companion GEAP.

Objectives

- ix. The compilation of an Environmental Profile is required to provide a firm basis for preparation of a Governorate Environmental Action Plan (GEAP). Experience suggests that the most useful form of Environmental Profile consists of two components, namely:
- a Summary of, and commentary on, the Social, Economic and Natural Environmental Resources of the area concerned; and
 - a generally agreed Statement concerning the key Environmental Issues, which need to be addressed in preparing a GEAP. These issues relate in many instances to problems, which differ according to whether they are purely local or whether they have wider regional or national perspectives and significance.
- x. This document attempts to cover both components. The first one has been drafted primarily on the basis of the reports prepared by the ten specialist members of the Working Group. Their inputs are gratefully acknowledged.
- xi. At the same time it must be pointed out that this document covers only general information for the layman. For the specialist reader, reference should be made to the full reports prepared by the Working Group members. These are available upon request from either TCOE or Entec in Cairo.
- xii. The second component is based primarily on consultations with both local and national stakeholder groups. The specialists referred to above constitute one of these groups.
- xiii. The focus of the GEAP will be upon finding solutions to the priority problems and opportunities so that, as soon as is practicable, they can be integrated into the economic development plan for the Governorate.

Approach and Types of Resources

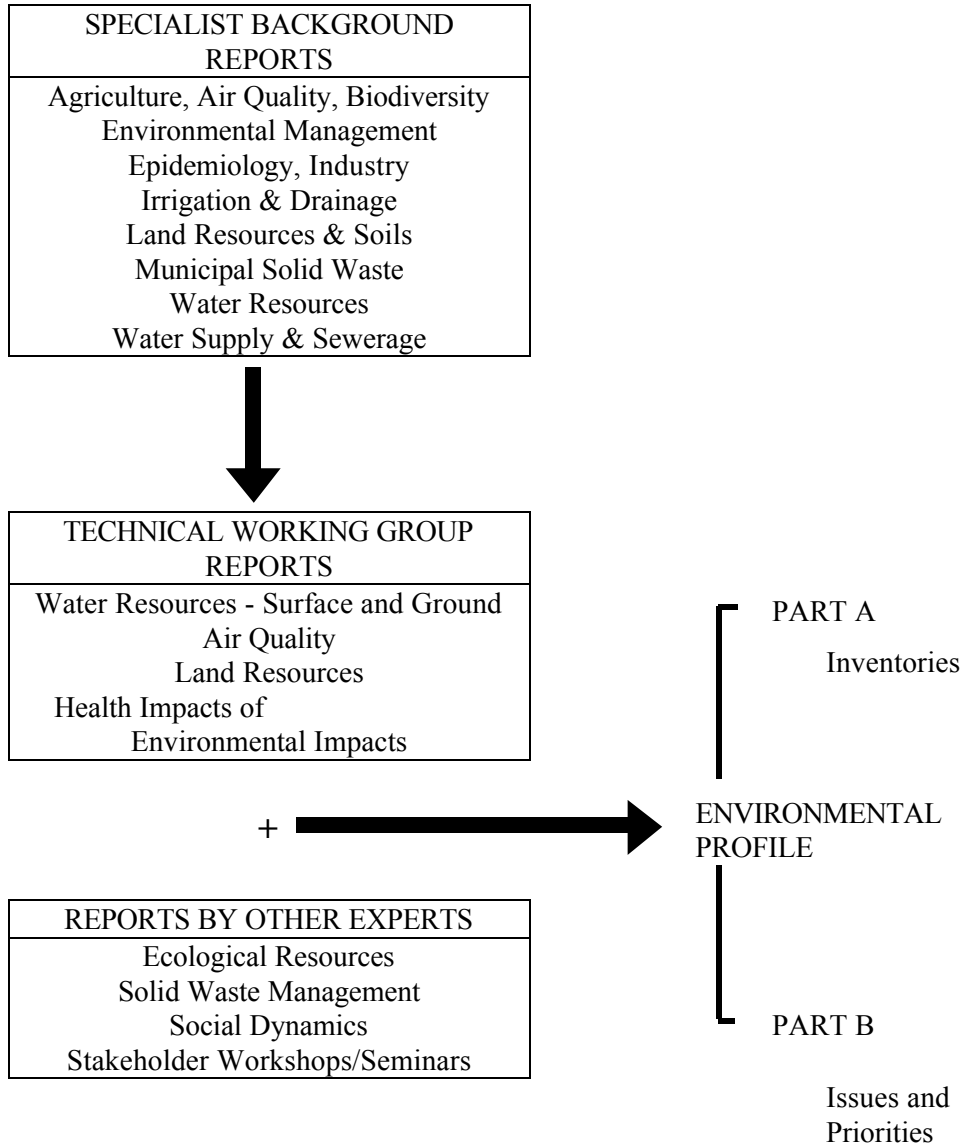
- xiv. There are **three** main types of resources, which impinge directly and indirectly upon the nature (extent and condition) of the environment which exists in Dakahleya, namely:
- natural resources;
 - economic resources (capital plant, equipment and infrastructure);
 - social/human resources.
- xv. The principal natural resources are land and water, together with the flora (plants) and fauna (animals) which these support. One of the objectives of the NEAP is to ensure that the stocks of these natural resources are conserved through sustained use, management and development. At the same time it is important that their management enables the annual outputs (yields) at least to be maintained and preferably to be increased.
- xvi. A distinction needs to be made between economic resources, which contribute respectively to:
- the use, maintenance and conservation/protection of the natural and social resources; and in some cases
 - degradation and depletion of these resources.
- These are not necessarily inherent characteristics, but rather a reflection of the manner in which they are designed, used and managed.
- xvii. Human skills and management capabilities, as well as institutional capacities, represent the most important social resources with respect to the environment.

- xviii. In seeking to conserve and improve the environment of Dakahleya Governorate, or any Governorate, the inter-actions and relationships **between** the resources - in terms of their use and management - are as, if not more, important than the characteristics of the resources themselves.

Review Process

- xix. This "vital resource statistics" review of Dakahleya commences with a review of the capital stocks of natural resources. It is recognised that the development potential - especially of such an agriculturally-dominated Governorate as Dakahleya - depends significantly upon the nature, size and condition of the natural resource stocks.
- xx. The review then proceeds with an outline analysis of the economic capital stocks which have a direct bearing on both the state of the environment and its potential for change.
- xxi. This is followed by examination of both the size and nature of the Governorate,s social capital stocks. This acknowledges the prime role played by human resources both in determining the state of the environment at any point in time and in influencing the rate of environmental change - for better, for worse - over time.
- xxii. Logically, following this tri-partite review, attention focuses upon the resource interactions and environmental impacts. Two facets in particular are assessed, namely:
- economic and social forces, in influencing the depletion and degradation/pollution of the natural resource base;
 - the potential, inherent in the economic and human capital stocks, for assisting the processes of environmental conservation and improvement.
- xxiii. Locationally, as will be seen from the accompanying Boxes, the Governorate comprises part of the coastal belt of the Nile Delta, between the Rashid (Rosetta) and Dumyat (Damietta) Branches. It extends inland for about 100 kms.
- xxiv. It is against this background that the review of the Governorate,s resources is conducted.

BOX i.i: COMPONENTS OF THE ENVIRONMENTAL PROFILE FOR DAKAHLEYA



BOX iii LOCATION MAPS OF DAKAHLEA GOVERNORATE

BOX i.iii GENERAL MAP OF DAKAHLEYA GOVERNORATE AND COMPONENT MARKAZES

BOX i.iv

**DAKAHLEYA GOVERNORATE: LAND/WATER PROBLEMS AND
DEGRADATION**

PART A

RESOURCE SURVEY RESULTS

1 THE NATURAL CAPITAL RESOURCES

Introduction

- 1.1 The natural resources capital of the Governorate comprises its climate, air, water, soils, flora and fauna, landscape and visual features, as well as its cultural and natural tourist assets.
- 1.2 As expected, the characteristics of many of these natural resources are a function of their location within the Governorate, which itself is located within two main sub-Regions: the Nile System and the Deltaic Mediterranean coast.
- 1.3 The Nile System sub-Region of Egypt encompasses the lands affected mainly by the River Nile and its associated extensive and intricate irrigation network of canals and ditches. The former run along the higher tongues of land, with the latter lying in the hollows. It includes the length and breadth of the Nile valley from Aswan to the Delta Barrages, and the Nile Delta between the Delta Barrages northwards to the inland border of the Mediterranean coastal belt.
- 1.4 In contrast, the Deltaic Mediterranean coast is a narrow belt influenced by the sea. It runs from Abu Qir eastwards to Port Said: 180 km from west to east and approximately 15 km landwards from the sea.

Climate

- 1.5 The climate of Dakahleya is "semi-arid"; annual rainfall averages less than 100mm and decreases southwards. Winters are mild with rain, followed by hot dry summers. Meteorological data, based on Mansoura Station records for the past 50 years, are as follows:

Parameter	Annual Mean
Air Temperature	21.3° C
Relative Humidity	62.0 %
Evapo-transpiration	100.0 mm
Rainfall	60.0 mm

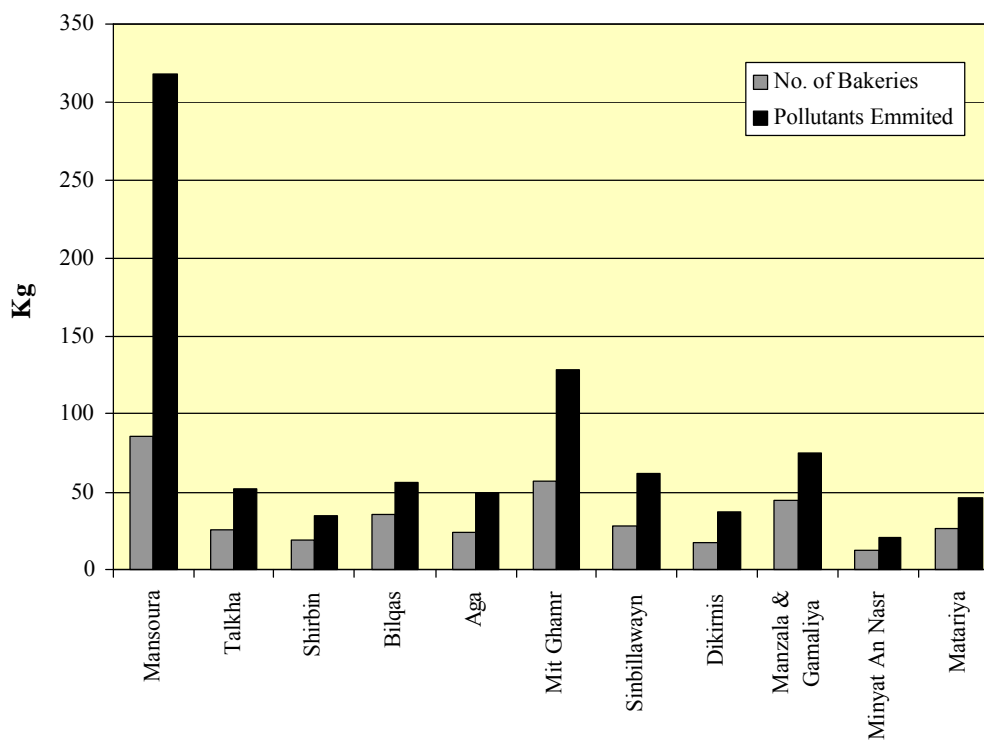
- 1.6 Dakahleya is part of a climatic province which can be sub-divided into a coastal belt under the maritime influence of the Mediterranean, with a shorter dry summer, and the inland area with a longer dry period. Reflecting this, the Governorate can be classified into two main sub-regions - the Deltaic Mediterranean coast and the Nile System.

Air in Urban Areas

- 1.7 Air quality is a function of community activities and weather conditions, including time. Climatic conditions in Dakahleya during both late autumn and winter favour the incidence of ground level temperature inversions. These lead to an aggravation of local pollution levels in certain urban centres, as does the fact that average wind speeds do not normally exceed 5.5 km/hour.
- 1.8 It is reported (Noweir, K & Youssef, A-F. 1995) that "the quality of air in Dakahleya is not satisfactory, although about 20 years ago this Governorate was known as a pleasant district in which to live". The seriousness of air pollution in the Governorate as a whole is evidenced by the following average statistics for the period 1989-94: Total Suspended Particles (TSP) (micrograms per cubic metre) have risen from 2.5 times the WHO standard to almost 3.5 times; in relation to

smoke the corresponding figures are 2.3 and 2.0 times, i.e. a slight reduction. In the case of sulphur dioxide, there has also been some reduction (from 2.4 times to 1.6 times), but still the WHO standard continues to be exceeded. In short, particulates generally represent the main ambient air pollutant in the Governorate. These are emitted as a result of a whole array of activities: fuel combustion, industrial processes (especially those used in brick kilns, foundries and workshops), construction works and the fly-tipping and burning of solid wastes in open areas. However, in some cities, such as Mit Ghamr, sulphur dioxide is the main pollutant.

- 1.0 The causes for this deterioration in air quality are many: "the rapid growth of industrialisation, greater dependence on fossil fuels, high rates of construction, poor pollution control and other human activities". The levels of pollution associated with just three of the sources are displayed in Boxes 1.1, 1.2 and 1.3.
- 1.10 The types of pollutants differ across the Governorate depending upon the activities:
- industrial areas, such as Talkha City, have a fertiliser plant and electric power station; the main pollutants are ammonia, nitrogen oxides and particulates;
 - in Mansoura City the main pollutants are particulates, sulphur dioxide and nitrogen oxides emitted from industrial plants and heavy traffic;
 - the settlement which suffers the highest pollution levels within the Governorate is Mit Ghamr; the main pollutants are particulates, sulphur dioxide and carbon dioxide emitted from kilns and foundry workshops;
 - in rural areas, particulates originating from fertiliser and pesticide dust and plant residues are the main pollutants.
- 1.11 Recent establishment of three new air quality monitoring stations in Mansoura has revealed that both TSP and lead concentrations exceeded national ambient air quality standards (by 225% and 26% respectively) over a one year period. The Egyptian standards for ambient air quality are as presented in Box 1.4.

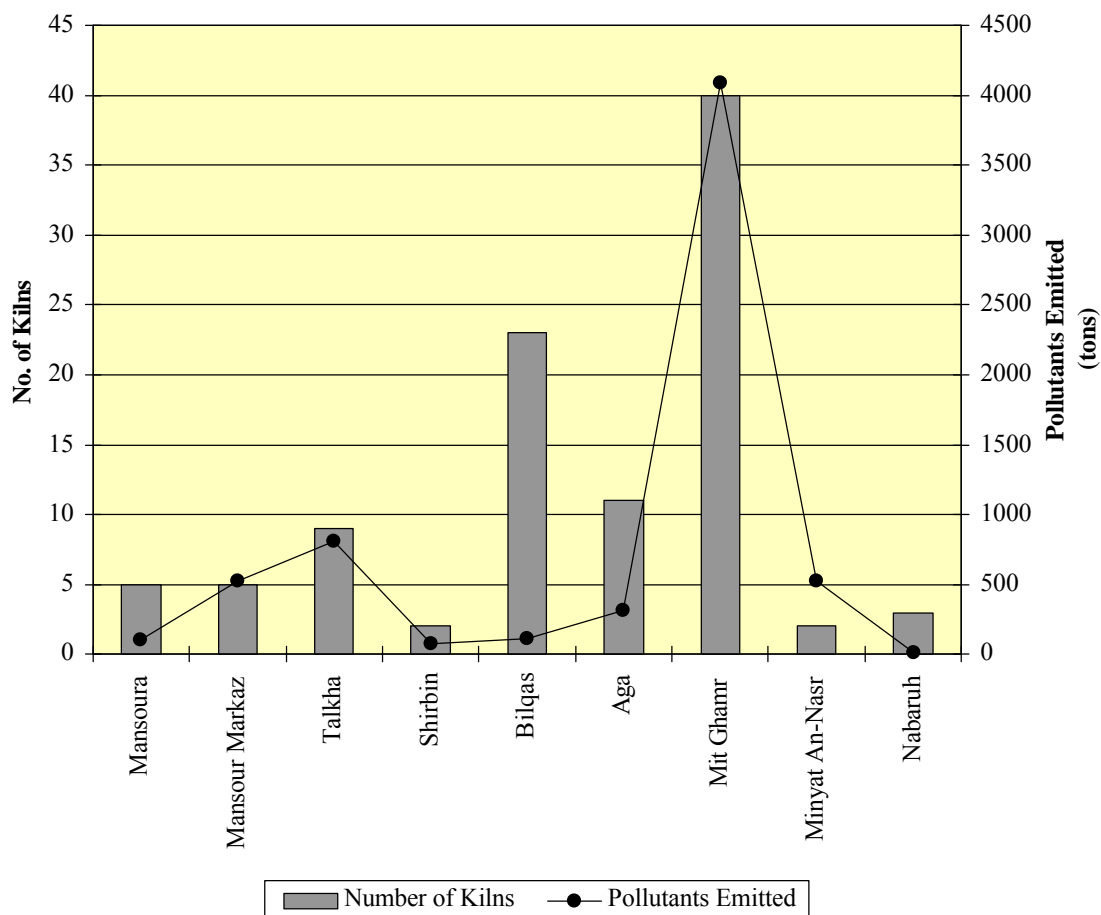
BOX 1.1
DAKAHLEYA GOVERNORATE: ESTIMATED TOTAL POLLUTANTS EMITTED DAILY FROM BAKERIES


District	Number of Bakeries	Total Daily Pollutants Emitted (Kg)
Mansoura	86	318.5
Talkha	26	52.1
Shirbin	19	34.3
Bilqas	36	56.2
Aga	24	49.3
Mit Ghamr	57	128.9
Sinbillawayn	28	62.1
Dikirmis	18	37.5
Manzala and Gamaliya	45	74.9
Minyat An Nasr	13	20.9
Matariya	27	46.1
Total	379	880.8

Source: Kamal Noweir, H. and Abdel-Fattah Youssef (1995), Dakahleya Governorate Environmental Action Plan: Air Quality. TCOE/Entec

BOX 1.2

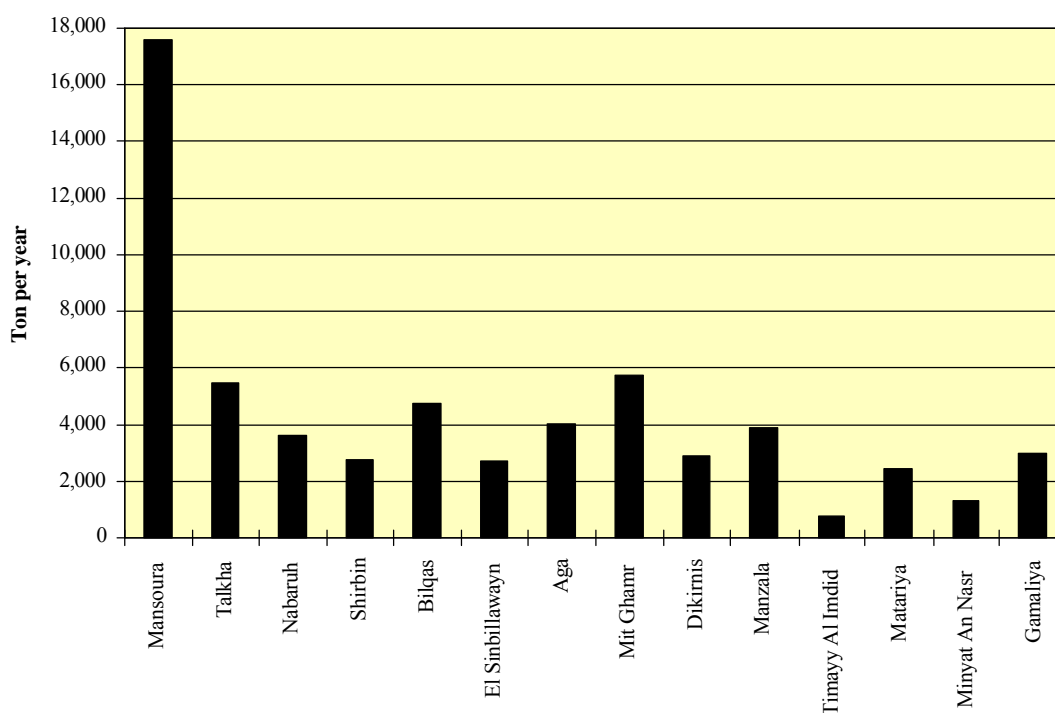
DAKAHLEYA GOVERNORATE: ESTIMATED TOTAL POLLUTANTS EMITTED ANNUALLY FROM BRICK KILNS



District	Number of Kilns	Total Pollutants Emitted (tons)
Mansoura	5	104.2
Mansour Markaz	5	520.9
Talkha	9	807.3
Shirbin	2	78.7
Bilqas	23	109.4
Aga	11	312.6
Mit Ghamr	40	4092.6
Minyat An-Nasr	2	520.9
Nabaruh	3	13
Total	100	6559.6

Source: Kamal Noweir, H and Abdel-Fattah Youssef (1995) Ibid

BOX 1.3 DAKAHLEYA GOVERNORATE: ESTIMATED TOTAL POLLUTANTS EMITTED FROM VEHICLES 1994 (based on daily average)



District	Total Emitted Pollutants (tons per year)
Mansoura	17,630
Talkha	5,486
Nabaruh	3,618
Shirbin	2,803
Bilqas	4,756
Sinbillawayn	2,685
Aga	4,015
Mit Ghamr	5,728
Dikirmis	2,910
Manzala	3,894
Timayy Al Imdid	788
Matariya	2,450
Minyat An Nasr	1,319
Gamaliya	2,977
TOTAL	61,063

The pollutants are Hydrocarbons, CO₂, SO₂, NO₂, Aldehydes and Particulates

BOX 1.4: EGYPTIAN AMBIENT AIR QUALITY STANDARDS

Substance	Maximum Level (micro grams/cubic metre)	Exposure Time
Sulphur Dioxide	350 150 60	1 hour 24 hours 1 year
Carbon monoxide	30 (milligrams) 10 (")	1 hour 8 hours
Nitrogen dioxide	400 150	1 hour 24 hours
Ozone	200 120	1 hour 8 hours
Total Suspended Particulates	230 90	24 hours 1 year
Black Smoke	150 60	24 hours 1 year
Respirable Particulates (PM10)	70	24 hours
Lead	1	1 year

Source: Kamal Noweir, H. and Abdul Fattah Youssef (1995) Ibid.

- 1.12 The annual average ambient air quality statistics specific to Mansoura and Mit Ghamr, relative to WHO standards, were in 1992 as shown in Box 1.5.

BOX 1.5: AIR QUALITY STATISTICS RELATIVE TO STANDARDS

Pollutant	Mansoura	Mit Ghamr	WHO
	micrograms per cubic metre		
Sulphur dioxide	129	69	60
Total suspended particles (TSP)	299	300	90
Smoke	83	49	60

Source: Ministry of Health, National Air Pollution Monitoring Network.

- 1.13 It has been reported that "the emitted pollutants from the small-scale industries and workshops differ [as is to be expected] according to the activity, raw materials and fuel used. The main small-scale industries and workshops are primitive and virtually excluded from any environmental control. No data concerning the emission of air pollutants are available. Thus the workers are exposed to different types of hazards over which they have practically no control". The Governorate contains many brick kilns and bakeries which specifically represent a major source of air pollution.
- 1.14 Finally, mention must be made of the annual fuel consumption of industries in the cities of Dakahleya. This, together with the quantities of gasoline and diesel consumed by vehicles, is another source of air pollution, especially regarding sulphur dioxide and particulates.

Air in Rural Areas

- 1.15 Aerial application of fertilisers and pesticides, as well as by conventional methods, has been a major source of pollution.

Water Resources

- 1.16 The surface water resources of the Governorate comprise the River Nile (Dumyat Branch), the main irrigation canals, the irrigation-drainage network and open ditches. In total, under the 1959 Treaty, the Nile contributes approximately 55.5 billion m³/year. Groundwater resources (sand dune water, subsoil water and groundwater) by comparison amount to only 4.5% of that figure, of which about 50% is infiltration water from the Nile.
- 1.17 The groundwater source is a confined aquifer, which has an average thickness of more than 700 metres. Further details are displayed in Box 1.6. The aquifer is dominated by permeable sands and gravels with minor clay lenses. Deep percolation from flooded irrigation fields plays a major role in aquifer re-charge.

BOX .6 DAKAHLEYA GOVERNORATE: CONTOUR MAP OF AQUIFER THICKNESS

1.18 For the whole Nile Delta there is a positive groundwater balance. Indeed, it is estimated that an additional 450 million m³/year are available for use. Approximately 25% of the total water supply within the Governorate is contributed by groundwater. About one third of the Governorate's population is dependent upon this water for drinking and domestic uses.

1.19 Groundwater, an important water source in the southern part of the Governorate, is deteriorating in quality which in part may relate to increased abstraction rates and pollution from agrochemicals and domestic sewage. The quality of both surface and groundwater resources cannot be relied upon, in relation to WHO and other standards. As is to be expected, the salinity levels of groundwater resources vary according to location as follows (in parts per million):

- at Mit Ghamr from 390 to c. 800 ppm
- at Sinbillawayn " 340 " 1,820 ppm
- at Aga " 380 " 1,000 ppm
- at Mansoura " 1,400 " 1,600 ppm
- at Bilqas up to 5,000 ppm
- at Shirbin " 10,000 ppm
- at Manzala/the coast " 30,000 ppm

In three main locations (Mit Ghamr, Sinbillawayn and Aga), where groundwater is used for drinking, high concentrations of iron and manganese exist. Box 1.7 provides information on the manganese levels of well water for several different parts of the Governorate. To counter this problem the Ministry of Housing, through NOPWASD, has recently built a pilot water treatment plant to remove iron and manganese.

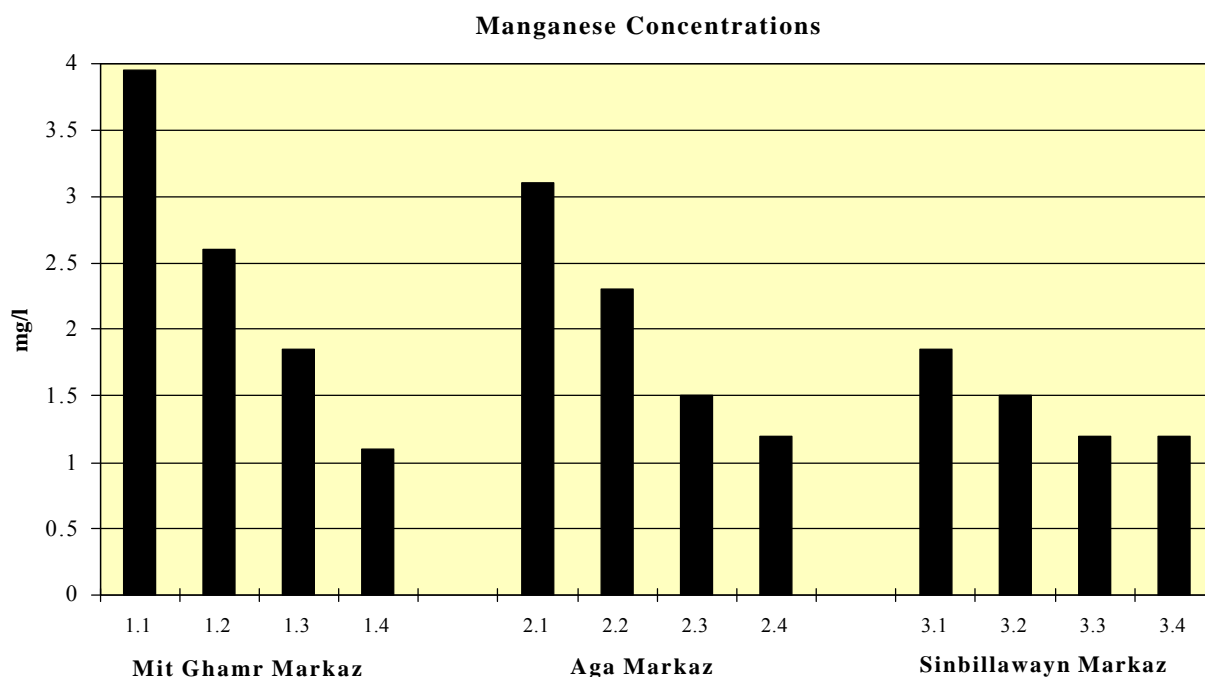
1.20 The quality of the groundwater for irrigating a broad range of plants is generally satisfactory. However, as is to be expected in the case of both the sub-soil and sand dune water, cropping is restricted to salt tolerant plants. The salinity levels for drainage water throughout the Delta Region are displayed in Box 1.8.

1.21 It is reported that "groundwater aquifers are threatened by salinisation and pollution from agricultural (nitrates and pesticide residues) practices as well as, in some cases, industrial activities. Irrigation canals and agricultural drains experience eutrophication, excessive growth of weeds and accumulation of pesticides. Coastal wetlands and shorelines are also being threatened" by a variety of pollutants which affect fishing and tourist activities.

1.22 The depth to groundwater resources varies across the Governorate, as indicated by Box 1.9. As will be observed, the water table in the Governorate, particularly in its northern half, is close to ground level. As a result evaporation rates are high, leading to capillary rise and progressive salinisation/deterioration of both soils and groundwater resources.

BOX 1.7

DAKAHLEYA GOVERNORATE: WELL WATER CONCENTRATIONS OF MANGANESE



		mg/l
Mit Ghamr Markaz		
1.1	Mit El Faramawy well	3.95
1.2	Mit Mohsen well	2.6
1.3	El Maasara well	1.85
1.4	El Mohamadiya well	1.1
Aga Markaz		
2.1	El Derris well	3.1
2.2	Minyet Sammanoud	2.3
2.3	Mit Abu El Hussein	1.5
2.4	Mit El Aamel	1.2
Sinbillawayn Markaz		
3.1	Fanboul	1.85
3.2	Kafr El Shorafa	1.5
3.3	El Bashniny	1.2
3.4	El Bustan	1.2

Source: Abu Mandour, A Abdel-Daiem (1995), Water Resources: Groundwater, Ibid

BOX 1.8

BOX 1.9

- 1.23 In the case of most of the River Nile and irrigation canals, however, water is reported to be "still relatively unpolluted". Indeed, monitoring results obtained by NRC for the Dumyat Branch indicate that water quality parameters are within the permissible limits. Furthermore, there were some indications that between 1991 and 1992 water quality in the Branch actually improved. However, there are no grounds for complacency, especially in view of the fact that:
- due to industrial processes and a variety of environmentally unfriendly practices (the discharge of both untreated industrial effluents and raw sewage to drains), "progress towards implementing pollution control abatement facilities to meet the effluent standards of Law 48-1982 has been limited to-date";
 - the cation levels of the irrigation water may be detrimental to soil structure and related physical properties;
 - the faecal coliform counts grossly exceed the standards applied in Western countries;
 - in terms of total dissolved solids, sulphates and COD, there is evidence that the quality of the Dumyat Branch water is deteriorating.
- 1.24 Although the Ministry of Health in Dakahleya has shown that the quality of potable water at the treatment plants meets the specified standards, in terms of ammonia, nitrites, iron and magnesium, there is other evidence which suggests that the water supplied by the compact units is sub-standard.
- 1.25 Some areas of the Governorate suffer from a shortage of public water supply, notably Bilqas, Shirbin, Talkha and Sinbillawayn Markazes. There agricultural drainage waters are a potential source of irrigation water. However, the conductivity of that water, coupled with pesticide and fertiliser residues, does in some locations give cause for concern. Indeed, there is evidence that in both the southern and northern parts of the Governorate the salinity of the drainage water exceeds acceptable levels for the normal suite of agricultural crops.
- 1.26 The biggest single environmental problem in the Governorate is the poor quality of potable water. There is a high incidence of water supply leakages which are responsible for contamination by raw sewage, industrial and other effluents.
- 1.27 Water quality is said to be deteriorating in association with "increased population and industrialisation, more intensive agricultural practices, accompanied by inadequate treatment of industrial and municipal wastewaters, agricultural run-off and solid waste disposal along the Dumyat Branch banks".
- 1.28 The water quality of Lake Manzala is a good example of this deterioration; the recorded levels of several heavy metals exceed permissible limits by more than a factor of 20. In terms of most of the standard chemical parameters (TDS, COD, BOD, sulphates) the recorded levels show excesses of between 3 and 10 times the permissible limits. The increase in phosphate levels associated with the use of detergents, as well as agricultural/industrial practices, is another disturbing trend.
- 1.29 Most of the problem is thought to be related to two factors, notably the pollution loads of the inlet waters and the reduced levels of sea water entering the Lake since the sea connections were restricted in 1967.
- 1.30 Generally less than 50% of the rural population has access to clean water, compared with urban areas where 80%-100% are connected to a water supply network.

Land Resources and Soils

- 1.31 Generally, the Governorate is flat, with a gentle slope to the north. The topography has been described thus: "elevation varies from about 12 metres above sea level (a.s.l) in the south to less than 1 metre a.s.l near the shore. The cultivated lands possess a network of irrigation and drainage channels related to the Dumyat Branch of the Nile. It contains wide areas, which are less than 1 metre a.s.l. Some parts in the north, including the coastal lagoons, are below sea level. High sand dunes protect some localities, but others are flooded by winter surges".
- 1.32 The coastal belt consists of 3 units: extensive back-shore flats, flooded low lands (sabkhas, salinas and marshes) and coastal, fore- and back-shore sand dunes (which are low and narrow).
- 1.33 Much of the land within the Governorate, especially along the eastern and western banks of the Dumyat Branch, is based on fine deltaic deposits of silt and clay. It is high in both organic matter and nitrogen. Good fertility is thus assured. Furthermore, most of these soils are non-saline.
- 1.34 The land resources are classified according to their suitability for cultivation. In total, 636,970 feddans or nearly 79% of the total land area of the Governorate (3,471 km²) is presently cultivated. Of the suitable agricultural land, the classification - based on potential productivity - is as shown in Box 1.10.

BOX 1.10: DAKAHLEYA GOVERNORATE - AGRICULTURAL LAND CLASSIFICATION

Category of Soils	Area (Feddans)	% Area
1	6,370	1.0
2	238,146	37.4
3	320,379	50.3
4	72,075	11.3
Total	636,970	100.0

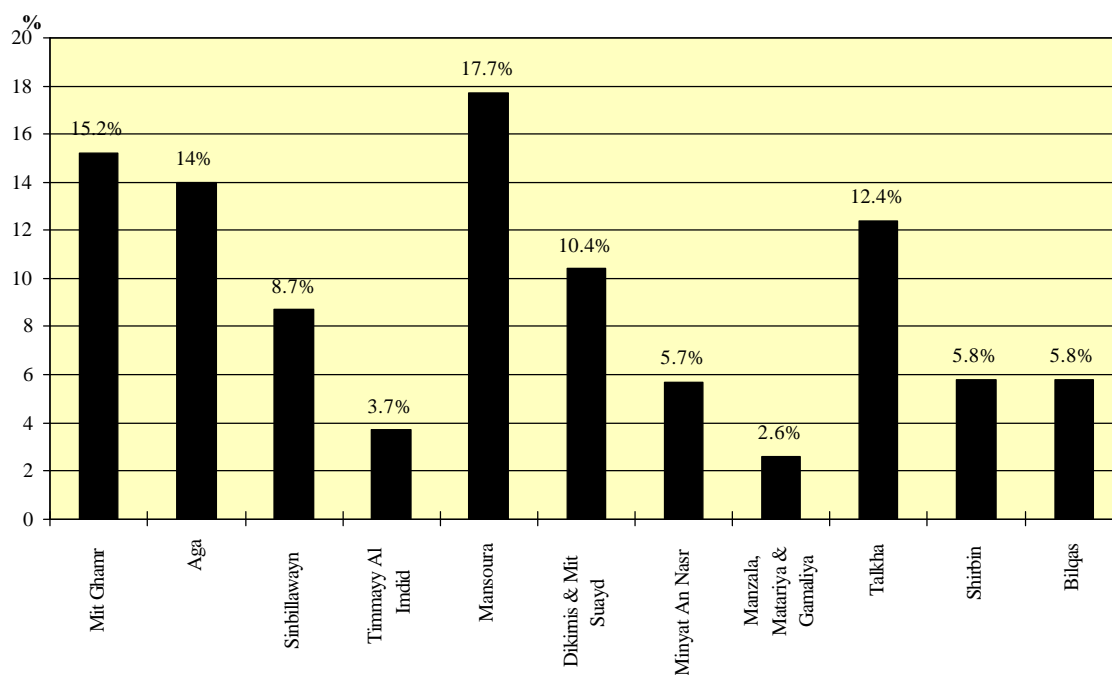
Source: Dakahleya Agriculture Under Secretary, 1993.

- 1.35 Extreme diversity exists between Markazes in terms of the incidence of the four categories, with the highest percentages of categories 1 and 2 (38% of the total cultivated land) being found in the following Markazes: Mit Ghamr, Aga, Mansoura and Talkha; as shown in Box 1.11. The highest incidences of categories 3 and 4 are found in Bilqas, Dikrnis and Mit Suayd, Manzala, Matariya and Gamaliya (ref Box 1.12).
- 1.36 In terms of soil salinity the worst soils are located nearest to the coast and Lake Manzala, as indicated in Box 1.13.

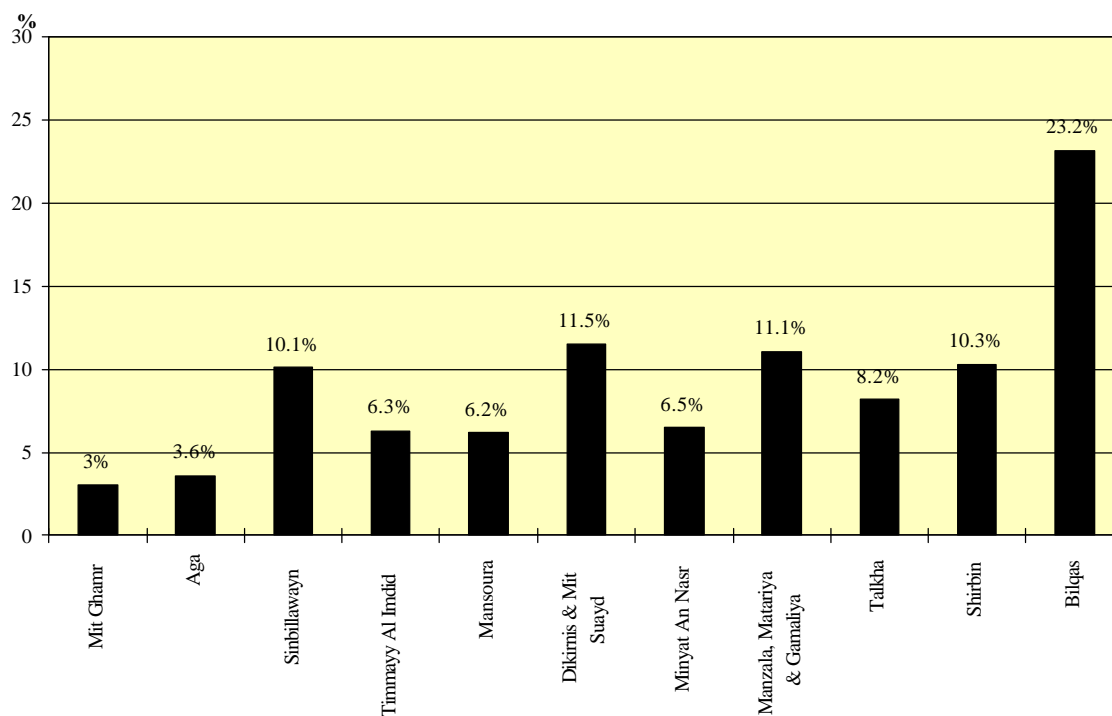
BOX 1.11

BOX 1.12: DAKAHLEYA GOVERNORATE: INCIDENCE OF 1st, 2nd, 3rd AND 4th CLASS CULTIVATED LAND (Percentages)

1st and 2nd Class **Feddans**
238,146 **%**
38



3rd and 4th Class **Feddans**
392,454 **%**
62



BOX 1.13

resistant, as well as being rich in nutritive value as green or dry fodder for livestock. Canal and drain banks are usually cleared of weeds once or twice each year, with shrubs such as tamarix being cut to ground level for fuel and making mats or shelters. Cutting weeds or pulling them at an early stage promotes the bank retainers and smotherers, thereby both reducing the chances of aquatic weeds establishing and preventing the serious problem of bank slip.

- 1.44 Cultivated and irrigated lands form the largest single habitat in Dakahleya, with the majority of the water being supplied through a perennial irrigation system. Rain-fed agriculture is restricted to the winter and spring months, as well as being confined to a narrow strip of land (approx. 25 km wide in Dakahleya) running parallel to the Mediterranean coast. Two crops are grown annually. Among each set of crops, there is at least a cereal and a leguminous or oil crop. Most of the weeds of these crops are short-lived herbs.
- 1.45 Lake Manzala is separated from the Mediterranean Sea by a narrow strip of land, although there is one main breach at El Gamil and several smaller openings which connect the Lake with the sea. The area of the Lake has decreased progressively since records commenced in 1799. This has been due to siltation and man-made desiccation through closing some of the drains into the Lake and the construction of levees. The current area of the Lake is approximately 230,000 feddans (1993). Its water depth ranges between 0.7 and 1.5 metres.
- 1.46 The Dumyat Branch of the Nile flows adjacent to, but not into, Lake Manzala. The Lake receives water inputs along its southern coast via six main deltaic drains, particularly the Bahr el Baqar and the Bahr Hadous drains which carry largely untreated sewage from Cairo and other cities. The sheer volume of untreated sewage effluent together with industrial pollution is now threatening the viability of the fisheries and the general ecology of the Lake. Recorded changes since 1960 include a general reduction in oxygen concentration, increased phosphate and nitrate levels, and the disappearance of submerged aquatic vegetation from large parts of the Lake. Since the 1920s, the increased flow of drainage water into the Lake has decreased the overall salinity, which ranges between 0.8 and 1.0% (the corresponding figures for the Mediterranean are 3.3 and 3.9%). Since 1960 the increased nutrient loading and diminished salinity have transformed the dominant fish community from brackish to fresh water species (*Tilapia*). The latter is of much lower value, economically. Pesticide run-offs and industrial effluent are implicated in the increase of tumours and other illnesses observed in the fish catches. In addition to pollution, the ecology of the Lake is threatened by the ongoing reclamation of marshes and mudflats, as well as by coastal erosion.
- 1.47 Lake Manzala is extremely important ornithologically. It is of international significance for water birds as a staging, wintering and breeding area. International wildlife organisations are lobbying the Egyptian Government to designate the Lake as a Ramsar Convention site. Unfortunately, bird populations are further threatened by extensive and poorly controlled hunting.
- 1.48 The Lake is situated in five autonomous Governorates. The absence of an overall co-ordinating agency to monitor water standards, manage land use and address the priorities for sustainable human development on the Lake is strikingly evident.

Landscape and Cultural Features

- 1.53 Landscape and cultural features are particularly important with respect to the sustainable development of tourism facilities. Although formal visual or cultural surveys have yet to be conducted, it is readily apparent that the Governorate is well endowed with both landscape and cultural assets. These include:
- vertical elements, such as sand dunes, eucalyptus trees and casuarina shelter belts, farm-houses and pigeon towers, mosques and minarets, electricity pylons, brick factory chimneys and even industrial plants which, when well sited, provide variety in otherwise generally flat landscapes;
 - vernacular architecture, including traditional rural and urban buildings, construction methods and materials, water towers, bridges etc., many of which are to be seen in Mansoura City;
 - historic sites, such as the Monastery of Saint Demiana, near Bilqas and others, yet to be specified by the Curator of the Mansoura Museum;
 - Manzala Lake, as a potential tourist attraction;
 - the Gamasa Resort.
- 1.54 To date, such features have not received prominent attention except in the case of official Monuments and Antiquities. However, there are many features of contemporary rural and urban landscapes which merit both conservation and appreciation. In the face of seemingly more pressing environmental priorities, it is easy for the touristic, educational and inspirational benefits of cultural heritage to be overlooked. Reference to them as part of this Profile is intended to ensure that they receive increasing attention as the GEAP evolves and is periodically updated.

BOX 2.1: DAKAHLEYA GOVERNORATE: NUMBERS OF URBAN AND RURAL SETTLEMENTS BY MARKAZ

Country (Markaz)	No of Settlement			
	City	Main Village	Satellite Village	Total
Mansoura	1	11	51	62
Talkha	2	7	35	42
Shirbin	1	7	18	25
Bilqas	2	8	16	24
Sinbillawayn	1	17	44	61
Timayy Al Imdid	1	6	14	20
Mit Ghamr	1	17	35	52
Aga	1	12	43	55
Dikirmis	2	9	35	44
Minyat An-Nasr	1	7	11	18
Manzala	2	8	30	38
Matariya	1	1	2	3
Gamaliya	1	1	-	1
Total	17	109	336	445

Source: Maksoud, FA and Meshref H (1995) Ibid. Based on Local Authorities of Dakahleya Governorate, 1994

Urban and rural settlements are classified according to the CAPMAS classification 1986, and updated modifications carried out until 1. Main Village: A village where a village council is located.

BOX 2.2

BOX 2.4: DAKAHLEYA GOVERNORATE - THE INDUSTRIAL PROFILE

Markaz	Industrial Establishments No.	Workshops No.	Brick Kilns No.
Mansoura ¹	11	278	11
Talkha ²	2	86	13
Mit Ghamr	2	124	40
Aga	2	73	11
Sinbillawayn	1	99	-
Timayy Al Imdid	-	15	2
Dikirnis ³	1	94	1
Minyat An-Nasr	-	19	-
Shirbin	1	61	2
Bilqas	1	39	23
Manzala ⁴	-	111	-
Total	21	949	103

Source: Kamal Noweir, H. and Abdel-Fattah Youssef (1995) Ibid.

1 Mansoura and Sandoub

2 Talkha and Nabaruh

3 Dikirnis Bani Ibayd

4 Manzala, Matariya, Gamaliya and Mit Salsil

BOX 2.5: LARGE-SCALE INDUSTRIES AND THEIR POLLUTION HAZARDS

COMPANY AND LOCATION	OCCUPATIONAL EXPOSURES	AMBIENT AIR POLLUTANTS
El-Nasr Fertiliser Company and Chemical Industry (Talkha)	Particulates, noise, gases and vapours (ammonia, nitrogen dioxide, sulphur dioxide, methanol, carbon monoxide and hydrocarbons);	Particulates, gases and vapours
El-Nasr Particle Board and Resins Factory (Sandoub)	Heat, noise, particulates and hazardous vapours	Particulates, sulphur dioxide, NO ₂ , formalene and methanol vapours
Misr Company for Oil and Soap (Sandoub)	Heat and hazardous vapours	Soot particulates, hydrocarbons, sulphur dioxide and nitrogen dioxide
Dakahleya Textile Mills (Mansoura, Mit Ghamr, Aga and Dikirmis)	Noise and cotton dust	Particulates, sulphur dioxide and NO ₂
Cotton Gins (Mansoura, Aga, Sinbillawayn, Shirbin, Mit Ghamr and Sandoub)	Noise and cotton dust	Particulates
Rice Mills (Mansoura and Bilqas)	Noise and dust	Particulates
Wheat Mills (Mansoura-East)	Noise, flour dust and wet-heat	Sulphur dioxide, NO ₂ and particulates
Misr Company for Milk and Foods (Sandoub)	-	Sulphur dioxide, NO ₂ and particulates
El-Nasr Soft Drinks	-	Ditto
Electric Power Station (Talkha)	Noise, microwave radiation and heat	Particulates, sulphur dioxide NO ₂

Source: Kamal Noweir, H. and Abdel-Fattah Youssef (1995) Ibid

BOX 2.6 DAKAHLEYA GOVERNORATE: SPATIAL DISTRIBUTION OF INDUSTRIAL ESTABLISHMENTS, WORKSHOPS, BRICK KILNS AND BAKERIES

Reticulated Drinking Water Supplies

2.9 These supplies are neither universal nor complete; the current reticulated coverage of water supplies to urban and rural areas respectively range between 76%-100% and 26%-69%, as displayed in Box 2.7. Main areas suffering from shortages of potable water are shown in Box 2.8. The most recent assessment of drinking water supply services covering the Governorate as a whole has been summarised as follows:

- provision of potable water supplies within the Governorate is presently and will continue to be a high priority. Indeed, over 40% of the current total production of potable water of 722,140 m³ per day has been installed in the last seven years. The Governorate has recently

assistance of USAID, is currently undertaking a major upgrade of the municipal water sanitation and sewage systems in the City of Mansoura. This includes the construction of a new 200,000 m³/day water treatment plant to serve Mansoura City and the surrounding rural areas in Mansoura and Talkha Markazes.

- drinking water in the Governorate is presently supplied from five sources:

System	Units	Production m ³ /day	Percentage
Large regional systems	Shirbin and Boosat Karim El-Din	200,000	27.7%
District systems	4 operational, 2 under construction	153,000	21.1%
City municipal systems	Mansoura and Sinbillawayn	130,000	18.0%
Compact units	111 operational	179,200	24.8%
Groundwater wells	Southern part of Governorate	59,940	8.3%
	Total	722,140	100.0%

Water Supply System Problem

2.10 A major problem is associated with the high incidence of water pipes with cracks/leaks and malfunctioning joints. In part this is a manifestation of a lack of both rehabilitation and maintenance operations. It is estimated that between 35 and 60% of the potable water supply leaks to the soil. Furthermore the problem is compounded by the fact that polluted ground/sub-soil water enters aggressive programme in leak detection and system rehabilitation could provide 20%, or more, the scope for improving water supply and distribution services is undoubtedly large, particularly in the rural sector.

Water Treatment Services

2.11 Five WTPs exist, which are generally well sited upstream of pollutant discharge points. In addition, four large regional water treatment works are under construction through the National Organisation of Potable Water and Sanitary Drainage (NOPWASD). 51 Compact Units are provided in rural areas. A well system, comprising 59 independent supply systems exists in the south. This principally services the Markazes of Mit Ghamr, Aga and Sinbillawayn.

2.12 The regional treatment works, commissioned in the 1950s, and their trunk mains require some rehabilitation while the associated booster stations and elevated tanks are in poor condition. The booster stations which are used to restore pressure for the remotest areas receive intermittent and limited water. Raw water intakes also pose problems with the Kafr El Dabosi pump station, which lifts water to the Shirbin treatment works, being located 1.9 kms downstream from the El Nasr Fertiliser factory discharge. As a result ammonia is present in the plant influent and is still present in the treated water.

- 2.13 Compact units were installed in the late 1980s and early 1990 water problems in villages and remote areas. However, current production is only 67% of capacity. Lack of both maintenance and training, power cuts and inadequate chemical and dosing is adversely affecting the efficiency of these units.

Water Quality Monitoring Facilities

- 2.14 Continuous and comprehensive monitoring is essential, but the present facilities fall short of this requirement, even allowing for the Mansoura University laboratories.

Drainage and Irrigation Networks

- 2.15 These are extensive, as indicated by Boxes 2.9 and 2.10, but - owing to present practices - much of it is seriously polluted; particularly the main canals, which are used for the following functions: washing clothes and utensils (70% of population); ablutions (40%); washing animals (40%); human toilet (60%); solid and liquid waste disposal (80%). Box 2.11A and B display the main drains, which are sources of pollution in the Governorate.

Sanitation Services

- 2.16 These exist, but are seriously inadequate in the case of the treatment facilities for both liquid effluents and solid wastes.
- 2.17 In the case of **liquid effluents**: there is a shortage of sewage treatment plants: only two exist. Despite improvements planned under the Secondary Cities Project, inadequate capacities are forecast for the years 2010 and 2020 (48% and 37% respectively). Boxes 2.12 and 2.13 respectively show the locations of the existing waste water treatment plants, and the current position on the numbers of Main Villages within each Markaz which are without sewage treatment systems. It was estimated in 1995 that in Mansoura approximately 27,000 m³ per day of untreated industrial effluent was discharged directly into the drains. Of the 26 pump stations that support the sewage network in Mansoura, 10 stations pump 40% of the wastewater into the drains without treatment. In the case of other towns within the Governorate, the corresponding figure was 50,000 m³ of waste water per day. Overall, only 67% (urban areas) and 12% (rural areas) of the population is connected to a public sewage treatment facility. Many of the sewage collection systems suffer from leaks, especially those which were not installed either by contractors or under supervision by sanitary engineers. Some of these leaks have polluted groundwater resources, such that the use of well water has had to be stopped. Bo2.14 summarises the places where sanitation projects are either planned or under construction.
- 2.18 The extent of additional infrastructure provision required, not only to accommodate current shortfalls but the future needs of a fast growing population, is indicated by the following forecast: the volumes of waste-water requiring treatment are expected to double between 1994 and 2020 - from 656K m³ per day to 1,257K.
- 2.19 **Solid wastes** represent a similarly large problem. The total quantity of solid municipal waste generated within the Governorate is estimated to be as shown in Box 2.15. More recent estimates of waste generation for urban cities and rural areas respectively are 1,435 and 1,373 tons per day. Mansoura City and Talkha together account for 35% of the urban total.

BOX 2.8 DAKAHLEYA GOVERNORATE: AREAS SUFFERING FROM SHORTAGES OF POTABLE WATER

BOX 2.9 DAKAHLEYA GOVERNORATE: DRAINAGE NETWORK IN EASTERN DELTA

BOX 2.10 DAKAHLEYA GOVERNORATE: IRRIGATION NETWORK

BOX 2.11A DAKAHLEYA GOVERNORATE: DRAINS - MAJOR SOURCES OF POLLUTION

BOX 2.11B: DRAINS USED FOR SANITARY DISPOSAL

Drain Name	Type of Disposal
A-Bahary El-Mansoura	
1- Badaway El-Gedeed	Waste Water Treatment Plant
2- Negeer	Domestic Disposal
3- Mit El-Nahal	Private Sewers
4- Higher Sirw	El-Khiriah WWTP *
5- Radwan	WWTP *
B-East Manzala	
1- El-Aziza	El-Aziza P.S
2- Mit Khodeer	El-Bosratt P.S
3- El-Amrah	El-Manzala P.S
4- Botteen	Botteen P.S
5- El-Taweel El-Bahary	El-Matariya P.S
6- El-Taweel El-Bahary	El-Assafarah
C-West Manzala	
1- El-Gamaliya	El-Gamaliya P.S
2- El-Gawaber	El-Kafr El-Gedeed P.S
3- El-Bawalis	Mit Salsil P.S
4- Brimbil	El-Riad P.S
D-Dikirnis	
1- El-Bashmour	El-Manzala P.S
2- Minyat An-Nasr	Minyat An-Nasr P.S
3- Tal Bellah	Dikirnis P.S
E-Qebly El-Mansoura	
1- El-Nezzam	El-Mansoura Oil Factory Sewers
2- Upper Bahr Tanah	Ezba El-Halawany Sewers
3- Bedin	Bedin Sewers

* WWTP = Waste Water Treatment Plant

Source: Tosson, M.S and Abu Mandour A Daiem (1995) Ibid

BOX 2.12: DAKAHLEYA GOVERNORATE: WASTE WATER TREATMENT PLANT LOCATIONS

City or Markaz	WWTP	
	Existing	Capacity m ³ /day
El-Mansoura City	1	135,000
Mit Mazah Village	2	625

Source: Tosson, M.S. and Abu Mandour A Daiem (1995) Ibid.

Note: At present there are only two sewage treatment plants in operation in Dakahleya. One serves Mansoura City and is located at the western section of Mansoura; the other is located at Mit Mazah, 10 km from Mansoura City.

BOX 2.13: DAKAHLEYA GOVERNORATE: NUMBER OF MAIN VILLAGES IN EACH MARKAZ WITH AND WITHOUT SEWERAGE SYSTEMS/PUMPING STATIONS

BOX 2.14 EXISTING PROPOSALS FOR IMPROVING SANITATION AND SEWERAGE SERVICES

Objective	Targets Additional Capacity m³/day	Number of Pump Stations Proposed
Building additional WWTPs and pump stations in the following cities:		
Dikirmis	20,000	4
Bani Ibayd	10,000	3
Minyat An-Nasr	20,000	3
Mit Salsil	10,000	4
Gamaliya	20,000	16
El Manzala	20,000	4
Matariya	40,000	3
Bilqas	20,000	4
Shirbin	20,000	5
El Sinbillawayn	20,000	4
Timayy Al Imdid	20,000	3
Talkha	20,000	4
Nabaruh	10,000	3
Gamasa	40,000	3
Aga	10,000	1
TOTAL	300,000	64

BOX 2.15: DAKAHLEYA GOVERNORATE - SOLID WASTE GENERATION

Locality	No. Cities and Markazes	Population	Tons/day
Urban Cities	4	1.23M	1,222
Rural Markazes	9	3.07M	2,303
TOTAL	13	4.30M	3,523

Source: Maksoud, F.A. and Meshref, H. (1995) Ibid

- 2.20 A detailed study of municipal solid waste management, undertaken by Drs Kamal and Salama in 1996, revealed that disposal of solid waste in open permanent or temporary dump sites is prevalent. Such sites include the banks of the River Nile, as well as drainage and irrigation canals. On land the waste is usually left to burn, causing local air pollution (smoke and odours). Fly tipping, in the absence of alternative acceptable and convenient facilities, is increasing. The practice of separation at source is strong among households, institutional and commercial waste generators. This applies particularly in the case of rural households. Re-use, recovery and recycling are also part of traditional rural lifestyles. Most of the organic waste is either fed to animals or used as a fuel.
- 2.21 In urban areas, these functions are undertaken through the informal sector. There scavengers, drawn from the poorest sectors of society and working usually in unsanitary conditions, recover paper, cartons, plastics, metal, glass and textiles. A robust trade in the recovered materials exists to service re-manufacturing industries, many of which, as in the case of scrap metal recycling, are centred in Mit Ghamr. In 1995, comparative waste disposal quantities per head were estimated to be follows:
- Mansoura 0.70 kg
 - Other Cities 0.60 kg
 - Rural Areas 0.06 kg
- 2.22 In contrast to rural areas, where there are no formal collection services, the high and middle income areas of some of the larger cities have reasonable waste collection services. However, collection vehicles and containers have left a lot to be desired. Furthermore, whilst some rudimentary collection points exist, in the past these were usually poorly designed, maintained and serviced. Since 1995 steps have been taken towards rectifying this. In 1996 a new fleet of 20 waste collection trucks was purchased for Mansoura City. This was followed in 1997 by the provision of additional funds for new collection equipment at Markaz level. New disposal sites have been designated for Mansoura, Shirbin and Matariya. In Mansoura not only has the previous burning tip site been remediated, but heavy equipment has been purchased to control tipping practices at the new site. Recycling and composting are now the preferred solutions. During 1997 the construction of two 150 tons per day plants commenced in Sandoub, coupled with a smaller plant for Matariya.
- 2.23 By comparison with the estimates in Box 2.15, the quantities of clinical wastes (approx. 5.1 tons per day) are small. Some major hospitals have incinerator facilities for safe disposal. However, like hazardous industrial wastes, there is no segregation for special incineration treatment in the case of many hospitals. Instead disposal takes place in open waste tips, where it represents a serious health risk. Thus, as throughout Egypt, clinical waste is a major problem. Even where incineration is undertaken, disposal problems arise as a result of both increased air pollution and the toxicity of the ash. The latter presents problems for sanitary landfill. Cost-effectiveness and management issues require careful consideration, especially in relation to initiating segregation of the different types of clinical wastes. The economic value associated with resource recovery is a major factor in this regard.
- 2.24 No integrated waste management systems currently exist, though a solid waste management strategy has been prepared jointly by ENTEC, TCOE, Mansoura University and the Dakahleya EMD, following the study by Kamel and Salama. It is founded upon the adoption of resource conservation and sustainable practices, involving minimisation, segregation, cost-effective collection, transportation and final disposal, including composting, recycling and recovery. Whilst one aim of the strategy is to dispense with unhealthy and hazardous scavenging activities, there is a strong desire to provide employment opportunities for all those currently involved in informal sector waste collection and disposal tasks. These informal sector workers are additional

to the public sector workers formally employed in solid waste management in the urban areas of the Governorate. The latter are summarised in Box 2.16.

- 2.25 The solid waste management waste scene is also typified by the lack of standardised equipment for collection and disposal of waste. The extent of the inadequate facilities summarised in Box 2.17 fails to indicate the wide range of equipment used, much of which is ill-suited to the tasks which need to be performed. However, such deficiencies are comprehensively addressed in the Solid Waste Management Strategy, the implementation of which is already underway.

Road Network and Building F

- 2.26 The Governorate is in general serviced by a good road network, comprising the features displayed in Boxes 2.18 and 2.19. In total there are 3,067 km of roads in the Governorate (67% paved) carrying over 94,000 licensed vehicles. The exact numbers of vehicles are itemised in Box 2.20. The operation of these vehicles involves the levels of fuel consumption displayed in Box 2.21 for the different Markazes.
- 2.27 Whilst undoubtedly this network is economically important, it also serves as a further source of pollution by virtue of the population (1994) of 28,406 private cars, 12,218 cabs, 787 buses, 1,596 mini-buses, 24,278 trucks, 1,050 tractors, 3,496 containers and 23,210 motor cycles. Environmental and health impacts include effects on physical infrastructure and land use, air pollution from motor vehicle emissions, energy use and noise. Highway traffic studies have shown reduced crop yields of greater than 40% within 10 m of selected roads. Pollution will persist until catalytic converters and better quality fuels are widely used.
- 2.28 Finally, much of the built fabric in rural areas appears to provide unhealthy living conditions, owing to poor air circulation, rising damp, the presence of livestock and parasites, poor drainage and sanitation.
- 2.29 The environmental, as well as the socio-economic, impacts of many of the infrastructural deficiencies summarised above are amongst the priority issues to be addressed in preparing and implementing the Dakahleya GEAP.

**BOX 2.16 DAKAHLEYA GOVERNORATE: MANPOWER RESOURCES USED IN THE
MANAGEMENT OF SOLID WASTE IN URBAN AREAS**

No.	Urban Area	Manpower No.	Shifts Per Day No.
1.	Mansoura	399	3
2.	Talkha	150	1
3.	Shirbin	65	1
4.	Bilqas	56	1
5.	Aga	115	1
6.	Mit Ghamr	351	3
7.	El-Sinbillawayn	109	1
8.	Timayy Al Imdid	15	1
9.	Dikirnis	140	2
10.	Minyat An-Nasr	42	1
11.	El Gamaliya	36	1
12.	El Manzala	110	2
13.	El Matariya	45	1
14.	Nabaruh	12	1
15.	Gamasa	75	1
16.	Bani Ibayd	25	1
17.	Mit Salsil	7	1
TOTAL		1,692	na

Source: Wolstenholme, R. (1995) Solid Waste Management in the Governorate of Dakahleya

BOX 2.17: DAKAHLEYA GOVERNORATE: COLLECTION AND TRANSPORT SYSTEMS FOR SOLID WASTE IN URBAN AREAS

No.	Urban Area	Collection Boxes No.	Tractors No.	Trucks No.
1.	Mansoura	380	31	5
2.	Talkha	120	13	2
3.	Shirbin	na	na	na
4.	Bilqas	115	6	1
5.	Aga	85	6	2
6.	Mit Ghamr	110	11	2
7.	El Sinbillawayn	25	8	1
8.	Timayy Al Imdid	-	1	-
9.	Dikirmis	na	11	3
10.	Minyat An Nasr	20	13	1
11.	El Gamaliya	na	8	-
12.	El Manzala	na	7	1
13.	El Matariya	na	17	2
14.	Nabaruh	-	9	2
15.	Gamasa	20	4	3
16.	Bani Ibayd	63	3	-
17.	Mit Salsil	na	8	-
TOTAL		938	156	25

Source: Wolstenholme, R. (1995) Solid Waste Management in the Governorate of Dakahleya

BOX 2.18: DAKAHLEYA GOVERNORATE - ROAD NETWORK

Feature	No.	Km
Main Roads	50	1168
Regional Roads	51	291
Local Roads: Paved	54	880
Local Roads: Unpaved	157	688
TOTAL	312	3067

BOX 2.19 DAKAHLEYA GOVERNORATE: TYPES AND LENGTHS OF ROADS BY MARKAZ

**BOX 2.20 DAKAHLEYA GOVERNORATE: NUMBERS AND TYPES OF VEHICLES
IN 1994**

BOX 2.21 DAKAHLEYA GOVERNORATE: MAIN CITIES - ANNUAL FUEL CONSUMPTION

3 THE SOCIAL/HUMAN CAPITAL RESOURCES

Introduction

- 3.1 This section of the review is based upon statistics compiled by the Technical Specialists, together with the results of a Social Dynamics Study and a SWM Study conducted respectively by Environmental Quality International Consultants, EQI, and Drs Kamel and Salama, CID. The former was based on twelve focus group discussions with primary stakeholders, plus twenty individual and group interviews with formal and informal environmental service providers.

Demographic and Locational Trends

- 3.2 The total population of the Governorate in 1994 was estimated to be 4,197,640, with an approximate rural:urban split of 3:1. The total population is forecast to grow from 4.2 million to just over 8.0 million by 2020. The rural:urban split is predicted to remain broadly 78:22. The urban population is concentrated in 17 centres, in contrast to approximately 445 rural settlements (109 main villages and 336 satellite villages) dispersed throughout the Governorate. A significant trend is the change in the size and character of many previously rural villages, which are in the process of becoming towns. As a result, the encroachment on agricultural land has been growing.
- 3.3 The demographic trends, in terms of rates of births, deaths, infant mortalities, family size etc., all confirm the expectation that population pressures will grow significantly over the next 25 years. Already population density, as indicated in Boxes 3.1 and 3.2, is high; indeed, it is amongst the highest in rural Egypt. Within the Delta region, Dakahleya has the third highest population density, as displayed in Box 3.3. The population densities of the individual Markazes differ significantly, as indicated in Box 3.4.

BOX 3.1: DAKAHLEYA GOVERNORATE: TRENDS IN POPULATION DENSITIES AND GROWTH RATES: 1960-1994

Item	Year			
	1960	1976	1986	1994
Persons/ km ²	582	789	1006	1392
Rate of Increase	26.2%	21.6%	38.4%	

Source: Maksoud, F.A. & Meshref, H. (1995) Ibid

**BOX 3.2 DAKAHLEYA GOVERNORATE: POPULATION GROWTH, CULTIVATED
AREA AND PER CAPITA CULTIVATED AREA**

BOX 3.3: POPULATION DENSITIES OF DELTA REGION GOVERNORATES

BOX 3.4: POPULATION DENSITIES OF DAKAHLEYA GOVERNORATE MARKAZES

Country and Markaz	Population	Area (Km²)	Population Density (Person/Km²)
Mansoura	756,961	346.6	2184
Talkha and (Nabaruh)	431,034	298.7	1443
Shirbin	275,419	268.1	1027
Bilqas	354,424	761.2	466
Aga	337,529	233.6	1445
Sinbillawayn and Timayy Al Imdid	478,049	443.2	1079
Mit Ghamr	520,968	244.8	2128
Dikirnis and (Bani Ibayd)	323,229	359.6	899
Minyat An Nasr	195,352	189.2	1033
Manzala/Matariya/Gamaliya and Mit Salsil	440,414	3142.3	140
Total	4,113,379	6287.1	654
Total without Manzala and Bilqas	3,318,541	2383.7	1392

Source: Maksoud, F.A and Meshref, H. (1995) Ibid. Based on Dakahleya Environmental Affairs Department Information Unit, 1995

Skills, Aptitudes and Attitudes

- 3.4 The employment profile indicates the importance of agriculture, relatively large-scale manufacturing industry and the small to medium sized workshop units. However, that is only part of the picture. Both the social dynamics and solid waste management studies, respectively conducted by EQI and Drs Kamel and Salama, revealed that in many respects the poorer sectors of the Governorate are extremely resourceful. Specifically, in relation to environmental problems, local communities display significant skill and fortitude in coping with the lack of reliable environmental infrastructure and public services.
- 3.5 Social customs and traditions are evidently responsible for some of the environmental and associated health problems experienced in the Governorate, e.g.:
- storage and use of drinking water;
 - washing clothes and utensils;
 - lack of hand washing;
 - disposal of sewage and sullage in canals;
 - unclean practices employed in preparing food;
 - use of canals for washing livestock;
 - unhygienic house-keeping practices.
- 3.6 However, in many cases these practices and their associated problems mask the fact that there is generally a good level of awareness concerning environmental problems amongst all sectors of society. The cause of the problems stems fundamentally from the lack of key solid waste management, sanitation, potable water drainage, slaughterhouse etc. facilities and services, as well as from inadequate management. In general there is a strong desire to participate in self-help
- missin dump site or the basic sewage treatment facilities once a local community has contributed the land. Malpractices, such as the deliberate puncturing of septic tanks, to reduce the frequency and thus cost of emptying, do not stem from a lack of awareness about public health dangers and environmental problems. Personal enchoices and trade-off decisions are driven by the harsh realities of the immediate needs for family survival. Longer- l enhancement, are invariably accorded a lower priority.
- 3.7 As noted by EQI, many local communities, in the absence of effective municipal services, display an impressive degree of initiative. Box 3.5 records an array of makeshift solutions adopted by people, **as measures of last resort**, in meeting their environmental service needs. This resourcefulness clearly needs to be harnessed in ways which yield collective environmental benefits.

- 3.8 The survey conducted by EQI provided insights into some disturbing underlying reasons for the due to a shrinking work force caused by dissatisfaction with wages and with working conditions. This situation is causing a significant amount of frustration that is often translated into friction between service operators and beneficiaries. While the former complain that people abuse the service and are not co-operative, the latter object that operators treat the visible areas as their exacerbated by what is said to be a lack of communication and co-ordination between the sectors responsible for infrastructural services.
- 3.9 Ironically, there is widespread evidence of a willingness on the part of local residents to pay reasonable fees, provided that sewage and solid waste services are efficient. It is reported that private waste collection services have had to be aborted because of a failure on the part of the authorities to provide adequate dump sites. In other cases the service has been discontinued because it was unreliable.

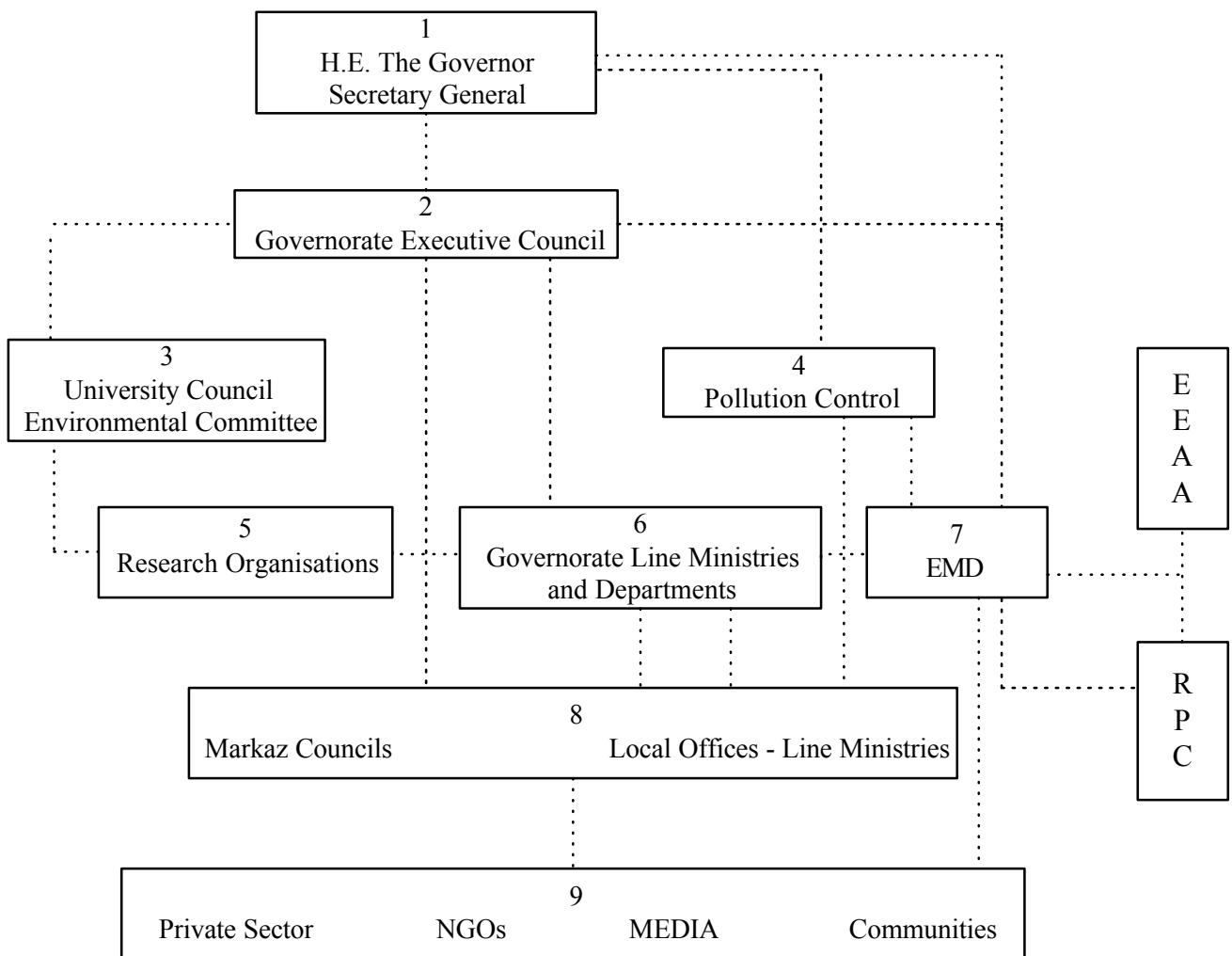
Institutional Structures, Resources and Performances

- 3.10 ment and Planning System (EMPS) exists within the Governorate. Boxes 3.6 and 3.7 respectively indicate its structure and roles within the overall organogram for the Governorate (ref Box 3.8). The System is seemingly complicated - unnecessarily so on first inspection - in that there are two advisory Committees, one University-based, the other a Pollution Prevention and Control Committee drawn from local Directorates and Departments. However, the very fact that it is possible to present such Boxes indicates that a foundation exists upon which the compilers of the GEAP can base institutional initiatives for the future.
- 3.11 Hitherto environmental planning, as distinct from management, functions have not received very much attention. This is somewhat surprising in view of the extensive network of planning departments and sections that exist in the following broad locations throughout the Governorate:
- the Governorate Planning Department in Mansoura (40 staff);
 - the Planning Sections in the Line Ministries and Directorates in Mansoura;
 - the Planning Sections in the Council Offices of the Markazes.
- Together the last two employ a further 105 planning staff. Whilst these numbers may look impressive, it has to be borne in mind that almost all planning functions are project-orientated. As a result, the preparation of strategic, structure and subject plans receives little or no attention. This is a serious deficiency which will need to be rectified progressively through the GEAP process. It is noteworthy in passing that the Director of the Planning Department expressed a strong interest in adding the missing skills and resources to the Department.
- 3.12 An item of particular concern is the apparent minimal level of liaison between the Regional Planning Centre (RPC) at Tanta, which has been commissioned to prepare a Physical Development Plan for the Governorate, and the Dakahleya Planning Department. This is a further serious deficiency, as is the lack of environmental inputs to the physical planning process.
- 3.13 The lack of environmental planning resources is not, however, an isolated feature. Both social and economic development dimensions from an environmental standpoint have also been neglected and need to be strengthened.

BOX 3.5: DAKAHLEYA GOVERNORATE: MAKESHIFT SOLUTIONS ADOPTED TO MEET PERSONAL ENVIRONMENTAL NEEDS

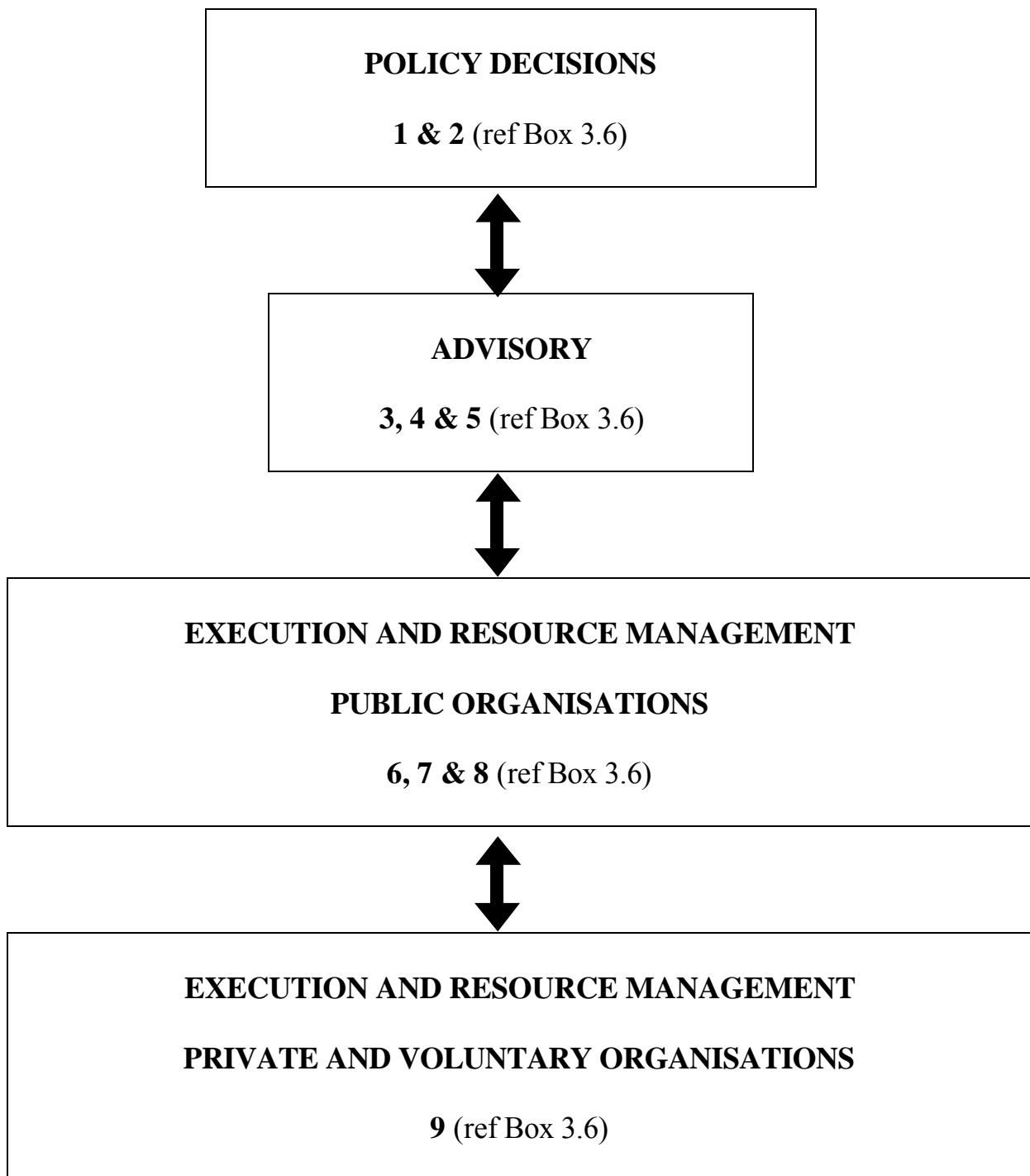
Service	
<i>Reliable Water Provision</i>	<ul style="list-style-type: none"> • People make their own connections from the main pipes, or dig water wells. • People resort to water from water wells because the flow is more constant and the quality/taste is better (chlorine free) than from the main pipes. • On a limited scale (because of the high costs entailed) people use motorised pumps to increase their water pressure.
<i>Good Quality Potable Water</i>	<ul style="list-style-type: none"> • Rare use of filters (because of the high costs entailed) to remove sewage and other contaminants; use of cotton wool as a filter sometimes on taps. • The water is frozen in the belief that harmful microbes are killed. • Storage of water for drinking in containers, which allow sediments to settle. • Use of neighbouring water pumps.
<i>Disposal of Solid/Household Waste</i>	<ul style="list-style-type: none"> • People throw waste onto nearby empty land or onto canal banks, or set on fire. • Use of the organic component as a fuel for traditional ovens, when available. • Farmers mix it with mud to provide a fertiliser. • Urban residents throw it into municipal waste containers, if available; when not, they throw it in street corners to await collection, unless scavengers intervene. • Some urban residents paid for garbage collection service, until these were discontinued. • Hospital and clinical waste thrown into sewage pipes.
<i>Disposal of Sewage and Waste Water</i>	<ul style="list-style-type: none"> • Abuse of sewage pipes for disposal of garbage, plastic bags etc.

BOX 3.6: DAKAHLEYA GOVERNORATE: EXISTING ENVIRONMENTAL MANAGEMENT SYSTEM - ORGANOGRAM



- Key:
- EEAA = Egyptian Environmental Affairs Agency
 - EMD = Environmental Management Department
 - RPC = Regional Planning Centre (based in Tanta)
 - = Lines of liaison and reporting

BOX 3.7: COMPONENTS OF THE TYPE OF ENVIRONMENTAL MANAGEMENT STRUCTURE REQUIRED



Signifies communication/liaison

BOX 3.9 DAKAHLEYA GOVERNORATE: NGOs PARTICIPATING IN ENVIRONMENTAL AWARENESS DEVELOPMENT PROGRAMME

1. Environment Development Protection Society of Dakahleya (Mansoura University)
2. Women,s Society for Health Improvement at Dikirnis
3. Holy Quran Preservation Society at Shirbin
4. Local Community Development Society at Bilqas Village
5. Local Community Development Society at Bilqas City
6. Holy Quran Preservation Society at Bilqas City
7. Community Development Society at Touk Al-Aqlam, Sinbillawayn Markaz
8. Dakahleya
9. Women,s Society for Health Improvement at Talkha
10. Community Development Society at Nusa Al-Gheit, Aga Markaz
11. Child Care and Family Upgrading Society at Talkha
12. Islamic Charity Society at Brembal Al-Qadima, Minyat An Nasr Markaz
13. Residential Community Development Society at Aga
14. Community Development Society at Shoha, Mansoura Markaz
15. Community Development Society at Danabeik, Mansoura Markaz
16. Community Development Society, Mit Tareif, Dikirnis
17. Child Care and Family Upgrading at Manzala
18. Local Community Development Society at Gamaliya
19. Local Community Development Society at Matariya
20. Local Community Development Society at Al-Muqata, Sinbillawayn Markaz
21. Islamic Care Society at Mit Ghamr
22. Holy Quran Preservation Society at Mansoura

The above societies can be reached via the Regional Federation of NGOs at Mansoura, Nuqrashi St, Mit Hadar. Telephone: 325008

- 3.14 However, the institutional shortcomings are not particular to local Government offices. They extend to NGOs. Although Box 3.9 suggests that the list of NGOs assisting in environmental awareness campaigns is quite large, the reality is that, overall, NGOs have not been strong when it comes to addressing environmental issues and achieving significant improvements. With respect to institutional structures, neither liaison nor co-ordination of environmental improvement operations within Government and between Government and external organisations (NGOs, private industries) has been very effective.
- 3.15 Measures which seek to enforce environmental laws are currently carried out by a variety of organisations. They include the Directorate/Department of Security (Traffic, Water Surface and Infrastructure Police), the Magistrates, the Line Ministries (especially the Department of Industrial safety in the Manpower Directorate), the University's Department of Engineering, the El Nasr Fertiliser Company (Analytical Laboratories), and the EMD, on behalf of the Governor/Council.
- 3.16 It is evident that the resources available to undertake the policing functions in all of the Markazes are seriously inadequate by a factor of 300% - 400%. The position concerning the administration of enforcement in the case of violations is no better, though this has been exacerbated by the fact that there is said to be some uncertainty still concerning the procedures for implementing Law 4 (1994).
- 3.17 Both the Security Directorate and the EMD have attempted to undertake the inspection, policing and legal enforcement roles. However, until recently neither has been successful in bringing cases to court which result in effective prosecutions.
- 3.18 Before Law 4 (1994) can be fully effective, substantial training in its administration is required, not least with regard to the determination of penalties which are appropriate to the violations. The training of magistrates and legal officials will be particularly important.
- 3.19 To date there has been only limited involvement of the EMD in Industrial Audit and EIA work.
- 3.20 Undoubtedly the biggest contribution that the EMD has made so far relates both to the inspection of degradation and associated clean-up/restoration projects. This applies particularly to the management and restoration of solid waste sites.
- 3.21 Overall, the EMD seems to have been more involved in enforcement than advisory functions. However, there is little evidence that either Governorate-wide co-ordination or strategic planning roles are being undertaken by the Department.

Environmental Management Skills and Capacities

- 3.22 The Environmental Management Skills vary significantly according to the different facets of the environment, as follows:
- The City of Mansoura is renowned for the skills and expertise associated with both its medical facilities, particularly concerning the treatment of renal problems, and its University.
 - Abundant, traditional skills exist for management of rural environment in the case of the production of food and raw materials for industry.

- Skills are largely limited to engineering, technology, chemical and biological/earth sciences and research in the case of manufacturing, secondary and service industries. Pollution prevention and control skills are limited.
- A good range of community health care services exists in all the Markazes of the Governorate. In total approximately 900 health care units are operating (6.9 per 100,000 population, while the national average is 5.9), employing more than 9,000 personnel, in addition to the services provided by the University Hospital in Mansoura.
- Inadequate personal hygiene skills are evident in the rural areas.
- Insufficient skills exist for the efficient provision and management of public utilities.
- There is a real shortage of integrated planning and design skills to cover the needs of both the broad regional/national scale and the built environment at a detailed level.
- Mansoura enjoys an international reputation for certain specialist medical services and facilities.
- Environmental Extension Services are strong in the agricultural sector:
 - The Extension and Rural Sociology Department in the Faculty of Agriculture at Mansoura University has five Professors who co-ordinate the extension activities of some 500 staff;
 - The Dakahleya Department of Agriculture employs a total of 578 staff deployed as follows: 80 at Governorate level; 73 at Markaz level; and 425 at village level.

These are impressive numbers. Furthermore, the co-operation and co-ordination links which Governorate Extension Service and the University Department are also encouraging. Laboratories and experts are shared, likewise field officers. Two joint programmes are underway. They are geared towards improving the overall effectiveness of the agricultural services within the Governorate. However, by comparison the industrial sector overall is not so well endowed in terms of environmental extension services. This is being addressed in relation to the medium-scale enterprises through a current Canadian-Egyptian joint venture project agreement. For small and micro-enterprises, the position is even better. The Regional Centre for Rural Development, under the aegis of the Dakahleya Businessmen,s Association, provides an advisory service to the enterprise operators. This is organised through a Technical Office, supported by the Social Fund for Development and the Industrial Safety Department. The Office administers a Field Support Unit, comprising ten Engineers and ten University experts.

3.23

2-3 no.) of the Governorate,s Environmental Management Department. Understandably such small staff numbers are not able to cover the full spectrum of environmental extension needs. The primary fields currently covered are SWM, air pollution abatement, water and sewage treatments, as well as afforestation for shelter and amenity purposes. Resources do not permit the Department to fulfil the essential co-ordination role sought by many stakeholder groups. This is hardly surprising, bearing in mind that the EMD has no annual budget, no vehicles and no monitoring or surveillance equipment.

- 3.24 Preliminary assessments of the existing environmental management capacities within the Governorate suggest that they are underdeveloped with respect to:
- Government, NGO and voluntary sectors. This concerns the quantity and in most cases the quality of environmental management resources available.
 - The public and private corporate sector, in terms of the broad environmental management skills. However, with respect to technical environmental skills, the shortfalls in some industries, e.g. fertilisers, are far less.
 - Community and social services. The deficiencies relate in particular to the poor application of realistic environmental standards and practices.
 - Individual, especially the poorer, members of society. In many cases public health and hygiene practices leave much to be desired.
 - Formal education establishments: schools, Colleges and Universities. Although the technical aspects of environmental subjects may be covered, the important topics of environmental planning, remediation, conservation, enhancement and overall management are largely missing.
 - Members of the professions and extension services. They are not well equipped to conduct state of the environment reviews, EIAs or Environmental Audits.
- 3.25 It will be important that, progressively, as part of the GEAP, the above shortcomings will be rectified. This will entail looking at the "agents of change", such as the extent to which public awareness campaigns are organised and sustained through the media and in schools, as well as in working environments and women,s meeting places. In the course of preparing this Environmental Profile, the need for an additional study has readily become apparent. This is a study, specifically orientated towards identifying the leaders of change within each of the stakeholder organisations across the Governorate.

Summary

- 3.26 In seeking to summarise the challenge facing those concerned with rectifying the combined shortcomings in infrastructural and social capital, EQI is best placed to provide an overallperspective:
- the main problem in the Governorate of Dakahleya, as in almost all Egyptian Governorates, is related to deficiencies in water supply, waste-water disposal and solid waste management services. These deficiencies are due to many factors. Lack of funds, ineffective management and administration of existing resources, and neglect of civil society potential combine to render service extension a losing proposition. Self-help initiatives are for the most part constrained by bureaucratic procedures resulting from the centralisation of the decision-making process. Similarly, the leverage of NGOs is greatly diminished by the centralisation of authority. Consequently, residents resort to temporary or make-shift solutions that add to environmental degradation and are often the cause of friction between the residents themselves and the service
- 3.27 The challenge is **not** perceived as being one of improving environmental awareness, but rather of providing the community with affordable and viable alternatives.

4 USES MADE OF SOCIAL, ECONOMIC AND NATURAL CAPITAL RESOURCES

Land Uses

4.1 The land-use profile for the Governorate is broadly as shown in Box 4.1A and Box 4.1B.

BOX 4.1A DAKAHLEYA GOVERNORATE: LAND USE PROFILE

Use	Feddans (K)	%
Cultivated	634.0	78.6
Uncultivated	173.6	21.6
Cultivable	83.7	10.3
Public Utilities	80.0	9.9
Water Covered	9.7	1.2
Uncultivable	0.2	< 0.1
TOTAL	810.2	100.0

Source: Maksoud, F.A. and Meshref, H. (1995) Dakahleya Governorate Environmental Action Plan - Land Resources and Problems, TCOE and ENTEC

4.2 The distribution of cultivable land across the Governorate,s Markazes is displayed in Box 4.2.

Agricultural Land Uses

4.3 The crop profile (area and production levels rounded) for the Governorate is displayed in Box 4.3 (one item is missing, namely the area of fodder crops grown - principally alfalfa). Agricultural productivity increased for the main crops over the period 1989-1994. However, in the case of some vegetable and fruit crops the converse applied.

4.4 Special soil problems are experienced in many places. These relate to increasing salinity levels and a high and rising water-table, where land drains do not exist. Significant soil improvement programmes, involving the application (as well as effective storage) of gypsum, land drainage and the use of organic dressings (dung and compost), are required in order to raise productivity levels.

4.5 Another important feature is the fish harvest of Lake Manzala. This Lake used to occupy 470K feddans. However, its size has decreased by more than 50% to approx. 213K feddans (1993), as a result of construction and reclamation processes. The water quality of Lake Manzala has also declined, due to pollution principally from adjacent Governorates (ref Box 4.4).

4.6 In spite of the high pollution levels, it is claimed that Lake Manzala contributes 30% of total fish production in Egypt and 39% of all fish caught from lakes.

4.7 Also "it is estimated that at least 200 out of 35,000-40,000 of the Lake,s fishermen are bird hunters", with 100 of them being fully involved in bird hunting. The annual catch of waterfowl is estimated to range between 98,000 and 162,000 birds. The approximate annual value of these birds ranges between LE 60,000 and LE 85,000. However, this is a modest contribution (0.5%) when compared with the value of the fish contributed to the national income, the annual production of which reaches LE 225 million (60,000 tonnes).

BOX 4.1B

BOX 4.2

BOX 4.3: DAKAHLEYA GOVERNORATE - CROP AREA AND PRODUCTION PROFILE

CROP	1989-1990		1991-1992		1993-1994	
	Area feddans 000	Units 000	Area feddans 000	Units 000	Area feddans 000	Units 000
Main Crop						
Cotton	154	682	127	736	125	915
Rice	283	571	324	992	370	1,142
Summer Maize	121	1,943	115	-	87	1,658
Wheat	172	2,422	206	3,129	218	4,191
Beans	34	215	31	220	38	388
Vegetables						
Tomatoes	26	172	14	130	9	65
Cabbage	1	13	4	15	0.6	6
Zucchini	0.4	3	0.5	4	0.2	1
Egg Plant	0.6	5	0.6	7	0.5	4
Green Pepper	1	6	0.6	4	0.6	3
Fruits						
Grapes	12	73	12	63	8	49
Citrus	6	25	6	42	5	43
Guava	0.6	4	0.6	5	0.4	3
Banana	2	15	1	15	1	14
Peach	2	13	2	16	2	14

Source: Dakahleya Agriculture Directorate, 1994

BOX 4.4: LAKE MANZALA AND THE SURROUNDING GOVERNORATES

5 CHIEF NEGATIVE IMPACTS OF THE USE/MANAGEMENT OF THE THREE TYPES OF CAPITAL RESOURCE

Introduction

- 5.1 Inevitably the main negative impacts are associated with all forms of pollution and their principal sources. These are summarised first, in terms of intermediate or indirect human impacts. They are followed by an outline of the direct human impacts as manifest by ill-health and food production losses.
- 5.2 There are three principal areas which are polluted by industrial activities, notably: the Middle Governorate (Mansoura, Talkha and Sandoub); Southern part (Mit Ghamr) and the North (Abou Madi and Lake Manzala).

Intermediate or Indirect Impacts

- 5.3 The impacts of **air pollution** are difficult to determine with any degree of precision. In certain areas plants show evidence of pollution through the bleaching and yellowing of leaves, as well as growth reductions. It may not be possible, though, to determine the associated level of yield reduction.
- 5.4 In the case of **water pollution**, Lake Manzala is a good example. There, the negative impacts occur on the land surrounding the Lake as well as the Lake itself through industrial and sewage effluents. However, the pollution concerns go beyond that, due to the use made of the Lake for livestock watering and washing. As a result, fishermen in particular are at risk through parasitic infection.
- 5.5 It is known that "the principal fresh water flowing to the Lake comes from polluted drains (Bahr El-Baqar, Hadous, Ramsis and Faraskor). These, together with untreated wastewater discharges from Port Said, Dumyat, Sharqiya, Qaliubiya and Cairo, expose the Lake to serious pollution inputs (...) High concentrations of some heavy metals, e.g. cadmium, at levels of more than 10 micrograms per litre are found in the southern part of the Lake, mainly as a result of a high input from the Bahr El-Baqar drain". Again, the health of fishermen is at risk; the blood levels of heavy metals in the case of fishermen has been found to exceed the norm by 40%, 161% and 22% respectively in relation to lead, cadmium and mercury.
- 5.6 The sources of pollution cited above serve to illustrate that regional, as well as local, solutions will need to be sought.
- 5.7 Extensive reference has already been made to water pollution through the inadequate provision of water, effluent and solid waste treatment facilities. Thus no further mention is made to the impacts of these misuses here.
- 5.8 The **loss of land** is a controversial matter, especially regarding the possible impacts of subsidence and inundation due to sea level rise. There is also controversy about the future level of land loss that may or will arise as a result of the establishment of "informal housing areas", which contravene the law, but have nonetheless been tolerated within the Governorate. The extent of the problem cannot be ignored, bearing in mind that c. 53% of the Governorate's urban population is estimated to live in such areas. Over the past 24 years up to 5,500 feddans of rural land have been lost to these informal housing areas. This is further emphasised by forecasts which point to additional losses of c. 6,692 feddans of agricultural land by 2020.

5.9 Other harmful impacts arise from the **unauthorised dumping and burning of wastes**, especially solid wastes due to lack of infrastructure.

5.10 **Pollution of land**, in addition to its loss, is another serious intermediate impact. This arises through a whole series of agricultural activities, namely:

- degradation of soils, due to salinisation stemming from faulty [flood] irrigation and drainage practices (involving excess application of irrigation water in some months and shortages in others), sea water intrusion, tidal flooding and a naturally high water table in the northern parts of the Gover;
- contamination of both surface and groundwater through over-use of fertilisers and pesticides/ insecticides. There has been a complete lack of import controls for all types of agricultural chemicals, as well as irresponsible use in the total absence of any cost-effectiveness data/guidelines. Indeed, there is evidence of much wastage of the active ingredients, since the levels of crop losses due to pests are still high. The media have failed to alert people to the dangers. Moreover, farm workers responsible for the application of chemicals are largely unsupervised.

Direct Human Impacts

5.11 These are mainly associated with reductions in public health. The principal impacts of the environmental deficiencies outlined in this review, are:

Diarrhoeal diseases and gastro-enteritis, parasitic infections, other intestinal problems and water-borne infections (dysentery, cholera, typhoid and hepatitis) associated with:

- pollution of both surface and undergroundwater supplies and soils from a myriad of sources, including hospital and other hazardous wastes;
- unsanitary sewage disposal (it is reported that in rural areas only 12% of the population is connected to the sewage system and 88% has no access to any latrine facilities; waste-water and latrine deposits are discharged into canals and drains, or are directly absorbed into the ground);
- lack of solid waste disposal facilities;
- poor quality housing, over-crowding and poverty;
- the poor location of water treatment plants, relative to sewage drains, and the erratic use of chlorine in the treatment process;
- social attitudes/customs and human behaviour, concerning personal and civic hygiene.

Respiratory tract diseases (e.g., a high incidence reported in Diast Village [1991/2]), as well as **liver and kidney malfunctions**, arising from a wide range of air pollutants. The latter include:

- industrial emissions;
- the burning of solid waste;
- the inhalation of toxic pesticides and chemicals.

Acute respiratory infectious (ARI) diseases are reported to be on the increase in Mansoura and Mit Ghamr as a result of pollution: "ARI is the leading cause of death in infants and young children in Dakahleya". Deaths from this cause increased by 12% between 1982 to 1987;

Bilharzia, which is endemic and associated with perennial irrigation practices;

Industrial occupational hazards, which occur or may occur due to a wide array of causal factors, including: deafness associated with excessive noise levels, chronic respiratory diseases (asthma and bronchitis), skin infections, secondary hyperuricemia, gout, liver mal-functions, chronic lung disorders arising from cotton dust, possible genetic mutations through exposure to electro-magnetic fields and carcinogens (pesticides). The last hazard is particular to agricultural workers.

- 5.12 The impacts of poor sanitation and polluted potable water supplies are more acute in rural areas, where 72% of the population resides. In contrast, urban dwellers tend to suffer more from air and noise pollution, solid waste disposal problems and chronic illnesses associated with industrial activities.
- 5.13 The trends in patient numbers suffering from water-borne diseases between 1984 and 1992 in three main Markazes of the Governorate are generally not encouraging, as indicated by the rates of change displayed in Box 5.1. All figures for 1984-85 equal 100 (=index level) in order to compare them more easily with the figures for 1991-92. For example, Box 5.1 shows that the level of renal infection and failure increased to more than twice its level in 1991-92.
- 5.14 Food production losses remain to be estimated.

BOX 5.1 DAKAHLEYA GOVERNORATE - CHANGE IN WATER-BORNE DISEASE PATIENTS

Markaz/Disease	Indices 1984-85 Average	Rates of Change 1991-92 Average
El Manzala		
Renal Infection and Failure	100	207
Liver Infection and Failure	100	135
Parasitic Diseases	100	134
Fish Poisoning	100	203
El-Matariya		
Renal Infection and Failure	100	700
Liver Infection and Failure	100	266
Parasitic Diseases	100	219
Fish Poisoning	100	384
Aga		
Renal Infection and Failure	100	636
Liver Infection and Failure	100	71
Parasitic Diseases	100	57
Fish Poisoning	100	13

Source: Wagida. A.A. and Ahmed Niazi (1985) Health Impact of Environmental Pollution in Dakahleya Governorate. ENTEC/TCOE

6 ECONOMIC IMPLICATIONS OF ENVIRONMENTAL IMPACTS

The Challenge and Inevitable Caveat

- 6.1 An attempt has been made to estimate, albeit in an exploratory manner - with the aid of some "heroic assumptions" - the impacts of existing (often negative) environmental practices. Estimation of the benefits associated with their rectification is also required. That is well recognised, but can only come later once further insights and - where possible - data are available. There is widespread recognition, confirmed by the figures presented in Box 6.1, that the social environment and its determinants - including local traditions and social customs - can and do vary significantly. Where the awareness of the environmental and public health impacts of such behaviour is poor, the detrimental consequences can be significant. This points to the need to improve the connections between environmental conditions and public health.

Air Pollution Impacts

- 6.2 The impacts which beg quantification are numerous. They relate to the diverse damage caused by air pollution, namely:

"residents of the Governorate breathe the polluted air, and suffer respiratory damage; the pollution settles on crops and food is ingested, potentially causing health problems; the pollution causes damage to materials and buildings, requiring additional maintenance and replacement; it increases cleaning and laundry costs, damages statues and antiquities, reduces visibility, and a host of other effects. Adopting measures to reduce the magnitude of air pollution will in turn reduce these damages, resulting in benefits for residents of the Dakahleya Governorate".

- 6.3 Responding to this challenge is daunting, because of a number of problems, which include:

- the difficulty of estimating the associated physical damage;
- the possible synergistic effects arising from the presence of other pollutants;
- the time-lags which frequently occur between cause and effect, as in the case of the erosion caused to both historic and contemporary buildings;
- the only data available to assist quantification comes from international, albeit other developing country, sources.

- 6.4 Gamaleldin and Sarhan estimate the annual costs of air pollution, particularly in Mansoura, to be in excess of LE 44 million in terms of Restricted Activity Days (RDA) and medical costs arising from high concentrations of particulates and lead pollution.

Water Pollution Impacts

- 6.5 In general the deterioration of water quality has severe impacts on both the ecosystem and public health.
- 6.6 For evaluation purposes the following hierarchy of pollutants has been assumed: pathogens and parasites; bio-cides; heavy metals; and finally salinity.

6.7 The different impact dimensions are considered to be:

- the medical care costs associated with water-borne diseases;
- the working days and thus output lost, due to water related diseases;
- the associated loss of income;
- the clearance of weed growth from irrigation canals;
- the loss of agricultural production induced by soil and salinity problems;
- the decline in groundwater quality.

6.8 Gamaleldin and Sarhan estimate the medical costs for just treating renal failure caused by water pollution to be in the range of LE 5.5 - 10.0 million per year. Impacts on Lake Manzala have also caused potential losses of LE 27.7 million per annum.

BOX 6.1: DAKAHLEYA GOVERNORATE: DISTRIBUTION OF HUMAN BEHAVIOUR RELATED TO THE ENVIRONMENT

Outdoor Environment			Indoor Environment			
Practice Human Behaviour	P (%)	NP (%)	Rank Human Behaviour	FH (%)	A (%)	UH (%)
A. Water Usage			Household water supply	40	40	20
Directly from canals for domestic use	20	80	Water storage	35	35	30
Washing clothes and utensils in canals	70	30	Food hygiene (cooking and storage)	60	10	30
Bathing in canals	40	60	Indoor biomass fuel combustion	1	30	69
Ablution in canals	40	60	Animal and poultry breeding	35	30	35
Bathing of animals in canals	40	60	Waste and excreta disposal	35	30	35
B. Waste Disposal			Housekeeping	35	30	35
Human excretion practice in canals	60	40	Concern for insects and rodents	35	30	35
Solid and liquid waste disposal in canals	80	20				
Sewage disposal in canals	20	80				
C. Air Pollution						
Biomass fuel burning	45	55				
Brick manufacture	30	70				
Refuse burning	40	60				

Key: P = % Practised
 NP = % Not Practised
 FH = Fairly Hygienic
 A = Accepted
 UH = Unhygienic

Source: Wagida, A. Anwar and Ahmed Niazi (1995), Health Impact of Environmental Pollution in Dakahleya Governorate, ENTEC/TCOE.

7 IMPLICATIONS OF IMPACTS IN TERMS OF CAPACITY BUILDING

- 7.1 It is clear that much effort needs to be devoted to helping to develop a strong Environmental Management and Planning System (EMPS) for the Governorate. This will entail the evolution of a collaborative relationship between the existing EMD and the Regional Branch Office of EEAA, which is to be established in Mansoura.
- 7.2 Two additional elements of strengthening will be required, namely:
- The relationship between the EMUs, EEAA and the Line Ministries, especially regarding the preparation and evaluation of EIAs.
 - The services of the General Organisation for Industries (GOFI) in the Governorate.
- 7.3 However, an effective EMPS will depend on more than just developing the links between the official organisations. The environmental management capacities of all other stakeholder groups, particularly those involving NGOs, the local communities and women,s groups, also need to be significantly improved.

8 AN OVERVIEW

8.1 What are the main impressions which emerge from this review; a review of the stocks of the three types of capital resources? This is an important question, because it is upon these very resources that the improvements of the Governorate's environment - BY ITS OWN CITIZENS - depend.

8.2 Preliminary reflections suggest that the Governorate presents three very different faces to the world, namely those of:

- A rich set of natural resources, which represent the physical and cultural heritage of the Governorate and its rural communities. Yet there is evidence that, due to population and economic pressures, these resources - which are primarily devoted to farming - are under stress. Their undoubted potential for servicing the sustained development of niche tourism and other diversification opportunities has yet to be harnessed. The availability of reasonably priced land for the siting of improved environmental facilities, such as sewage treatment plants, solid waste management processing equipment and public open space, is very limited. This represents a serious constraint.
- A set of economic resources, which - as reflected by industrial plant and infrastructures - are variously obsolete, starved of finance for refurbishment/replacement and appear to be at least partly incapable of meeting the multiple and growing needs of the Governorate.
- An energetic population, which - apart from traditional agrarian skills and some industrial expertise - is ill-equipped in terms of technical and managerial skills to manage an increasingly complex environment, in the face of growing population/development pressures and human aspirations. Civic and personal hygiene practices cry out for change through assistance. Generally, environmental NGOs are not yet well developed. Yet there are grounds for optimism, since the potential for self-help at community level appears to be high. There is growing evidence of a desire to find and invest in technical solutions to pollution problems, within both the private and public business communities. The administrative infrastructure, required to address environmental issues effectively, has recently been improved through both national and local initiatives. Respectively, these are:
 - the introduction of Law 4 (1994), which, despite some deficiencies, has raised public awareness of the need to reduce pollution levels;
 - the finalisation of a Governorate-wide strategy for solid waste management.

Finally, there is strong evidence that survival skills amongst the poorer sections of the community are well developed. Although at times these militate against environmental improvement, they represent a potential which is there to be harnessed. The biggest single management resources required in future are co-ordination and leadership skills.

8.3 The cumulative environmental impacts of the combined pressures and stresses make the preparation and implementation of a GEAP not only timely, but a compelling activity for Dakahleyans, one and all.