SEAM Programme

Damietta Governorate Environmental Profile

Ministry of State for Environmental Affairs
Egyptian Environmental Affairs Agency
Entec UK Ltd., ERM
UK Department for International Development

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GLOSSARY & LIST OF ACRONYMS

Alum	Aluminum Sulfate
AEWA	African-Eurasian Waterfowl Agreement
AGL	Above Ground Level
AMSL	Above Mean Sea Level
BOD	Biological Oxygen Demand
CAAs	Competent Administrative Authorities
CAPMAS	Central Agency for Public Mobilisation and Statistics
CDSDR	Comprehensive Development Strategy for the Delta Region
CBD	Biodiversity Convention
CITES	Convention for International Trade in Endangered Species of Flora and Fauna
CDA	Community Development Association
CDSDR	Comprehensive Development Strategy for the Delta Region
CMS	Convention for the Conservation of Migratory Species of Wild Animal
COD	Chemical Oxygen Demand
DDWC	Damietta Drinking Water Company
DFID	Department for International Development
DRS	Damietta Regional Strategy
EAP	Environmental Action Plan
EEAA	Egyptian Environmental Affairs Agency
EHDR	Egyptian Human Development Report
EIA	Environmental Impact Assessment
EIMP	Environmental Information and Monitoring Programme
ELO	Environmental Liaison Officer
EMU	Environmental Management Unit
FAO	Food and Agriculture Organization
FC	Fecal Coliform
Feddan	Unit of Land Area (4,200 m^2)
GAFI	General Authority for Investment and Free Zones
GAFRD	General Authority for Fish Resources Development
GDP	Gross Domestic Product
GEAP	Governorate Environmental Action Plan
GIS	Geographic information System
GOPP	Government Office for Physical Planning
HCE	Higher Committee for Environment
HCF	Health Care Facilities
IBA	Important Bird Area
IDSC	Information and Decision Support Centre
IPM	Integrated Pest Management
K	Potassium
kg	Kilogramme

km	Kilometre
KVA	Kilo Volt Ampere
LE	Abbreviation for Egyptian Pound
M	metre
MALR	Ministry of Agriculture and Land Reclamation
Markaz	Administrative District
MDG	Millennium Development Goal
Mg/l	milligram per litre
MLD	Ministry of Local Development
MSMEs	Micro, Small and Medium Enterprises
N	Nitrogen
NEAP	National Environmental Action Plan
NGO	Non-Government Organisation
NOPWASD	National Organisation for Potable Water and Sanitary Drainage
NO_x	Nitrogen Oxides (common air pollutants)
NRI	National River Institute
NUCA	New Urban Communities Authority
NUPS	National Urban Planning Strategy
NWRC	National Water Research Centre
NWRP	National Water Resources Plan
P	Phosphorus
Pa	per annum
Piastre	Egyptian Curency Unit (100 Piastres = 1 Egyptian Pound)
PPM	Parts Per Million
RAMSAR	Convention for Wetlands of International Importance
RDSDG	Damietta Governorate's Regional Development Strategy
RBO	Regional Branch Office of EEAA
SCA	Supreme Council of Antiquities
SDF	Social Development Fund
SEAM	Support for Environmental Assessment and Management
SEGAS	Spanish Natural Gas
SWM	Solid Waste Management
T/f	Ton per feddan
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UNDP	United Nations Development Programme
VOCS	Volatile Organic Compounds
WHO	World Health Organization
WWTP	Wastewater Treatment Plant

SECTION: I
INTRODUCTION & OVERVIEW
OF
DAMIETTA GOVERNORATE

1. CONTEXT

Damietta Governorate is preparing a Governorate Environmental Action Plan (or GEAP), in partnership with the Egyptian Environmental Affairs Agency (EEAA) and the UK's Department for International Development (DFID] with technical support from SEAM consultants. Preparation of this plan is part of a broader programme to improve environmental management and access to environmental services in a number of selected Egyptian governorates.

Environmental Action Plans (EAPs) represent a well-established process to identify environmental issues and priorities and agree how resources should be allocated to address them (see following box). They provide a framework for integrated planning and use of resources that:

- Promotes the development of a strategic vision for real environment and public health improvements that will guide future investment on issues that concern the environment.
- Supports improved coordination of environmental management activities among government departments.
- Provides an opportunity for all major stakeholders to contribute to the identification and prioritisation of development activities that address the governorates most critical environmental concerns.
- Facilitates the implementation of a series of targeted actions that aim to improve the quality and coverage of environmental services currently enjoyed by communities.
- Increases public awareness of environmental issues and raises their understanding of their roles and responsibilities for achieving a better environment for all.

The Environmental Action Planning Process

Environmental action planning is a participatory process that:

- Assesses the existing state of the environment and identifies trends;
- Diagnoses the pressures that lead to environmental degradation (e.g. poorly planned or unregulated economic development, population growth etc) and estimates the potential impact and cost of associated degradation;
- Engages a wide range of stakeholders to identify and prioritise key environmental issues in order to allocate resources in the most effective way (financial, human, and institutional);
- Through continuous stakeholder involvement, develops actions which target the identified environmental priorities of beneficiary groups (such as the very poor), prepares investment and financing proposals and assigns responsibilities for implementation; and
- Develops monitoring mechanisms for undertaken actions, and activates supporting programmes that enhance the prospects of a successful outcome (e.g. awareness, training).

1.1 EGYPT'S NATIONAL ENVIRONMENTAL ACTION PLAN

Completed in October 2003, the National Environmental Action Plan (NEAP) sets out Egypt's National environmental agenda and provides a framework that supports the implementation of locally prioritized environmental strategies and actions at Governorate level through GEAP's. It is expected that lessons learned from the GEAP experience will be used to continually inform the NEAP process. To date, GEAPs have been implemented in 2 governorates, Sohag and Dakahleya, and are currently being prepared in a further 4 governorates (including Damietta). The GEAP process reflects the Egyptian Environmental Affairs Agencies (EEAA) aim to encourage the decentralisation of environmental management.

1.2 THE GEAP PROCESS

Damietta's Governorate Environmental Action Plan or GEAP aims to provide the Governorate with a set of locally prioritised environmental strategies and actions that will result in real environment and public health improvements. The plan is developed on a participatory basis and stakeholder consultation and participation are key aspects of the process. Sector working group and community focus group discussions, stakeholder analysis, community surveys, targeted meetings and structured interviews are all methods used to gather views and opinions from a wide cross section of stakeholders. The end result of this highly participatory and consultative process should be a practical environmental action plan that all stakeholders [whether at city or village level] have been involved in and own.

Damietta's GEAP is supported by EEAA's SEAM programme which aims to build the capacity of the governorate's administration and other stakeholders such as CDAs[1] and the private sector so that prioritised environmental actions identified in the GEAP can be effectively implemented.

1.3 THE ENVIRONMENTAL PROFILE

The Environmental Profile (EP) outlines the status of Damietta's environment. Relevant environmental information is gathered across every Markez in the Governorate through:

- Structured sector working group discussions (which comprise of relevant government staff involved in or associated with the sector) where baseline conditions and key environmental issues and concerns are identified;
- A community consultation where community focus group discussions, stakeholder analysis, community surveys and structured interviews are

[1] Community Development Associations

used to identify and prioritise the communities main environmental concerns and;
- Targeted meetings with other active stakeholders (i.e. government officials, utility companies, industry, private sector firms etc.).

By collecting and analaysing information from a number of different sources, it is possible to identify a wide range of issues from people with different presepectives. As well as ensuring that the profile is accurate and representative, the approach also helps Damietta's stakeholders develop ownership of the GEAP's processes and outputs. Unlike Environmental Profiles in other governorates where the process of gathering information from sector working group discussions, stakeholder consultations and report writing was is largely managed by external consultants, in Damietta, the process was largely left to the working groups themselves. This was purposefully done to create stronger local ownership of both the process and outcomes of the Environmental Profile and GEAP.

As there is no one central source or database of environmental information at the local or Governorate level in Egypt, and there exists a lack of systematic monitoring for many environmentally significant parameters, the data compiled for this environmental Environmental Profile essentially comprises of the following:

- Reports from the sectoral GEAP Working Groups compiled with the help of local consultants when required;
- Information from the local line Ministries;
- National statistics [CAPMAS, IDSC, EHDR etc];
- Information from Governorate statistics and the Damietta Governorate Information Centre;
- Outputs from the GEAP Questionnaire survey; and
- Data specifically collected by SEAM staff.

Damietta governorates **Environmental Profile** is divided into the following sections:

- **Section I** – *Context* (introductory remarks, and overview of Damietta);
- **Section II** – *Status of the Natural Environment* (Geology, Geomorphology and Landscape; Agricultural and Fisheries, Biodiversity);
- **Section III** – *Status of the Built Environment* (Urban Development, Industry, Water Resources and Sanitation, Solid Waste Management, Cultural Heritage); and
- **Section IV** – *Environmental Policy, Legislation and Administration* (Key issues, and priorities for Damietta GEAP)

2. AN OVERVIEW OF THE GOVERNORATE OF DAMIETTA

2.1 GEOGRAPHICAL LOCATION AND PHYSICAL CHARACTERISTICS

Situated in Lower Egypt, Damietta Governorate consists of four Markazes and covers an area of 1,029 km^2. The governorates population density is 926.56 $ppkm^2$ and 57% of the land area is inhabited. It occupies a peninsula and is bordered on all sides by Dakahleya Governorate except for its northern border, which faces the Mediterranean Sea (*Map 1*). The eastern part of the Governorate is occupied by Lake Manzala, which covers roughly 20% of the Governorates surface area.

The Governorate was formed by relatively flat fluvial deposits over a millennia ago. Its dominant geographical features include the river Nile and the Delta, which occupy 5% of the Governorate, whilst sand banks and salt marshes can be found along the coast. Sand dunes run parallel to the Delta's northern coast from east of El Burlus to the northern borders of Kafr El Bateikh. This area is bordered from the south by dense palm trees. Moving inland from the Delta's northern coast, prairie areas including marshland and ponds predominate.

The Nile system started during the late Miocene with deep canyon incisions being made into pre-existing Cenozoic/Mesozoic sequences. Resulting soil erosion was then transported as river sediment upstream into the Mediterranean and gradually contributed to the formation of the Nile Delta. Over the last 7,000 years the Delta has gone through a series of growth and accretion phases, however over the last 150 years the construction of Dams and barrages along the upper and lower reaches of the Nile have contributed to subsidence and a gradual shrinkage of the Delta's size.

Roughly 74% of the Governorate is cultivated whilst 19% is covered by water. The Nile splits the Governorate in two, carrying water along its eastern branch through the Delta from Cairo to the Mediterranean Sea. The Delta region situated on either side of the Nile is responsible for producing most of Damietta's crops and although a wide variety of crops are grown, long cover and wheat crops are dominant during winter, whilst rice is dominant during summer. The region's alluvial soils are generally sandy [calcareous in nature] and poorly drained with water table levels often less than 150cm below ground level , which results in high levels of soil salinity.

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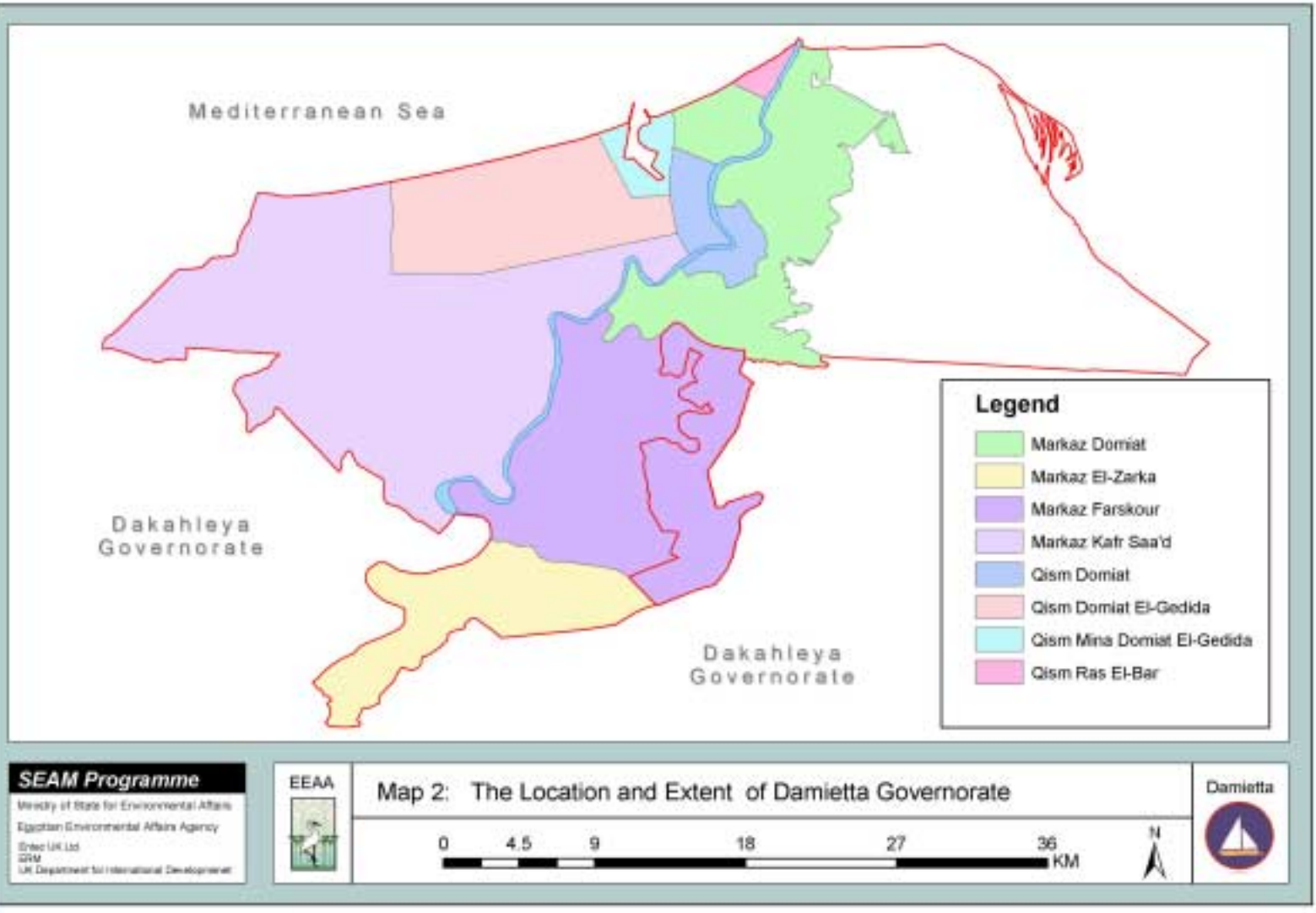
Damietta

Map 1: Location of Damietta Governorate

International | Governorate | Damietta Governorate

N

0 50 100 200 300 400 KM


Mediterranean Sea
Dakahleya Governorate
Dakahleya Governorate
Legend
Markaz Domiat
Markaz El-Zarka
Markaz Farskour
Markaz Kafr Saa'd
Qism Domiat
Qism Domiat El-Gedida
Qism Mina Domiat El-Gedida
Qism Ras El-Bar
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Map 2: The Location and Extent of Damietta Governorate
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Damietta

2.2 POPULATION CHARACTERISTICS

According to the Information and Decision Support Centre (IDSC) Damietta Governorates 1999 population amounted to 9,534,200 with an annual growth rate of 2.09%[1]. Egypt's population over the same period was 59,313,000 with a slightly higher growth rate of 2.1%. *Table 2.1* provides 1999 estimates for the population of Damietta Governorate by Markaz and respective estimates for population growth rates.

Table 2-1: Estimated Population and Population Growth of Damietta Governorate Rates [1999]

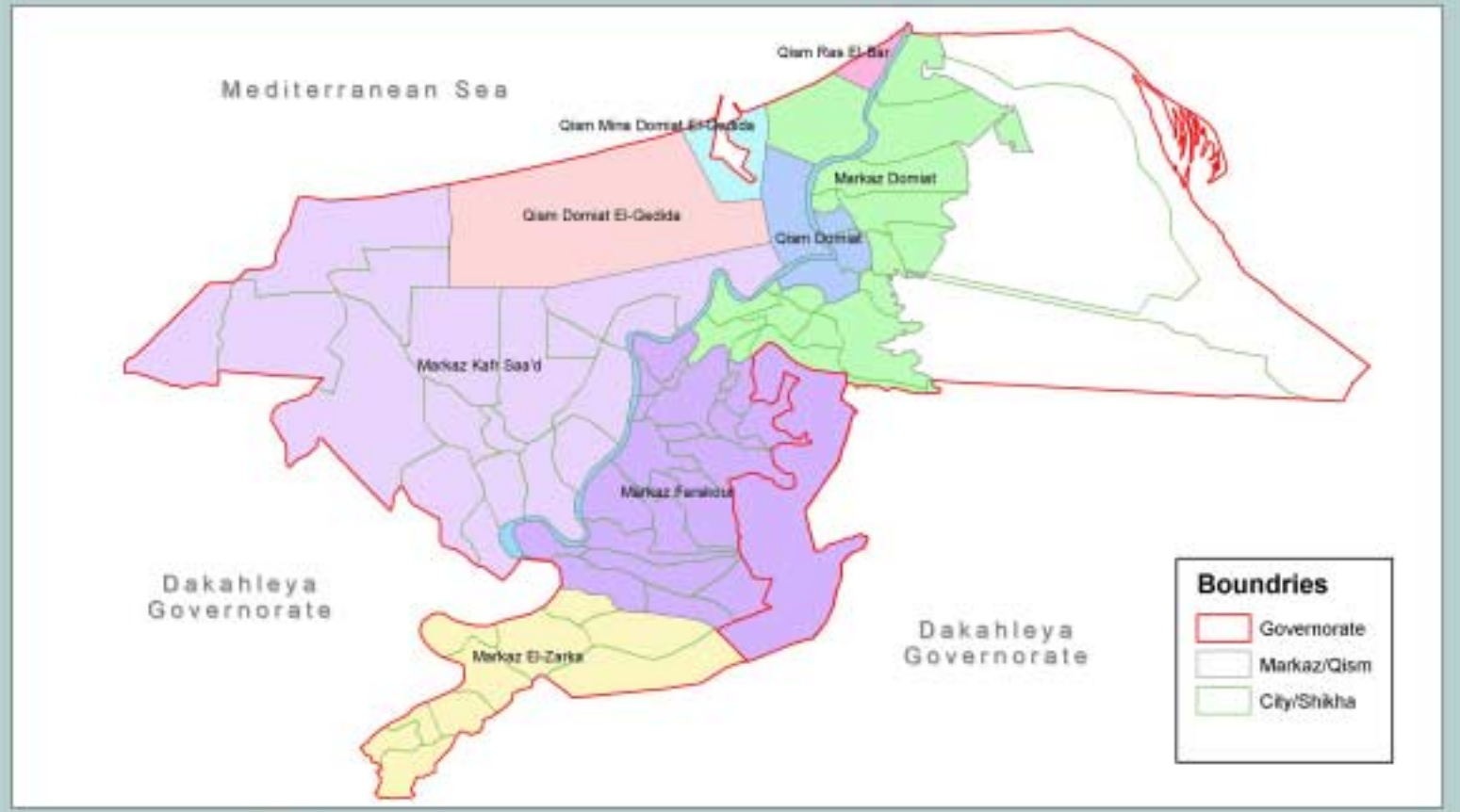
Markaz	Estimated Population	Annual Population Growth Rate (%)
Damietta	4,176,200	1.87
Farasqur	1,806,400	2.13
Kafr Saad	2,513,400	2.33
El Zarka	1,038,200	1.99
Total	**9,53.4,200**	**2.09**

[Source: Information and Decision Support Centre, IDSC 1999]

Damietta Governorates population density is approximately 926 persons per km^2 increasing to approximately 1,618 p/km^2 in inhabited areas. Roughly 27.4% of the population live in urban areas whilst 72.6% live in rural areas[2] however, this distinction is becoming increasingly blurred with agricultural and non-agricultural land activities moving closer to urban areas.

[1] Information and Decision Support Centre (IDSC)

[2] Ibid



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Map 3: Local Administrative Boundries in Damietta Governorate

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Damietta

2.3 SOCIAL CHARACTERISTICS

2.3.1 Household Structure

The average number of individuals per household in Damietta Governorate is 4.0, varying from 4.0 in urban areas to 4.3 in rural areas. The density or number of individuals per room ranges from an average of 1.06 in urban areas to 1.17 in rural areas, often higher figures are associated with a poorer standard of living. Across Damietta's Markazes, the highest residential density was recorded in Kafr Saad Markaz (1.18) and lowest in Farasqur Markaz (1.09) whilst across the governorate the average residential density is approximately 1.14 persons per room.

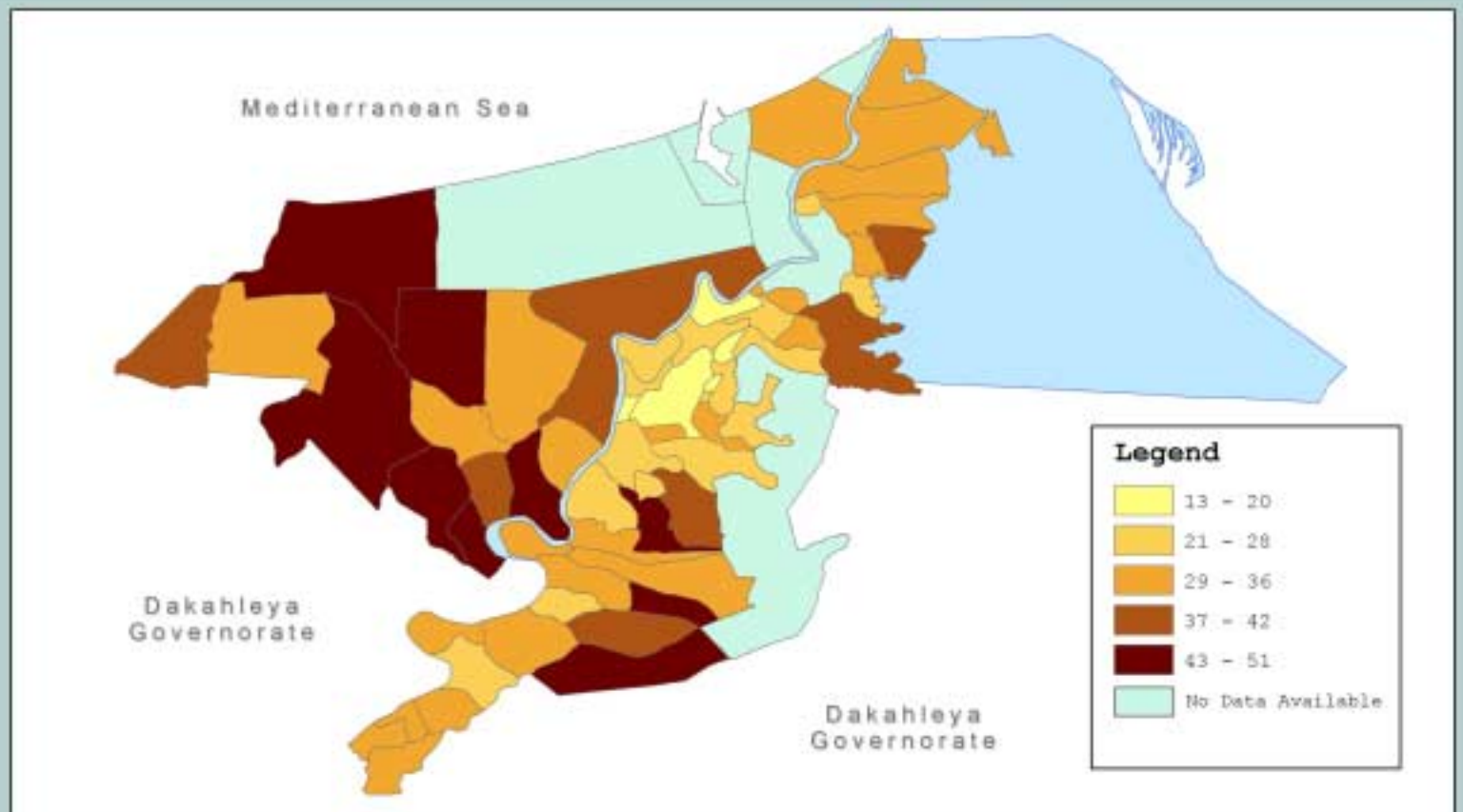
2.3.2 Age and Sex Structure

Damietta's age structure data indicates that over half of the population (60%) are between the ages of 15-60, whilst just over 35% are under the age of 15 and approximately 10.5% of the population are in the 0-5 years age group. The Governorate's sex structure is fairly balanced between women (49%) and men (51%), with small variations registered between urban and rural areas and different Markazes. The average age of women marrying for the first time is 23 years old.

2.3.3 Education

Egypt's adult literacy rate for those above 15 years old has increased from 25.8% in 1960 to 65% in 2001[1]. Comparative educational data from Damietta Governorate over a twenty year period from 1976 to 1996 (*Table 2.2*) clearly demonstrates a similar trend, with the largest improvements being in reduced levels of illiteracy and increased levels of secondary education. By 2001 Damietta's literacy rate had reached 70.1%, which is similar to the average literacy rate for all the Frontier Governorates (70.2%), but higher than the average rate for Lower (64.8%) or Upper Egypt (56.4%)[2]. Disaggregated UNDP Governorate data shows that differences in literacy rates among Markazes are significant ranging from 59.7% in the Markaz and City of Kafr Saad to 82.7% in the Markaz and City of Damietta. Illiteracy rates by village across the Governorate are presented in *Map 4*.

[1] Egyptian Human Development Report [EHDR, 2003, p23].
[2] EHDR, 2003, p.133.



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Map 4: Illiteracy Rates in Damietta Governorate by Village

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Damietta

Table 2-2: Comparative Education Data in Damietta Governorate [1976, 1986 and 1996]

Number of Population (> 10 years old)	**1976**	**%**	**1986**	**%**	**1996**	**%**
Illiterate	217,283	51.66	244527	44.81	233107	32.85
Read & Write*	122,732	29.18	153198	28.07	190336	26.82
Primary Education	36,239	8.62	39363	7.21	65584	9.24
Basic Education	19,151	4.55	32568	5.97	57053	8.04
Secondary	19,965	4.75	64638	11.85	132840	18.72
University Graduate	5111	1.22	11285	2.07	30042	4.23
University Post-Graduate	98	.023	105	.02	596	.084
Total	**420,579**		**545,684**		**709,558**	

** = Those people who can read and write received no further education past primary education.*
[Source: CAPMAS]

2.3.4 Access to Basic Services

The extent to which Damietta citizens have access to basic services is a good indicator of measuring poverty. Although it is out of the scope of this profile to provide an indepth poverty profile, a brief summary of the extent to which people have access to basic services is provided below.

Access to Water

Damietta depends almost entirely on Nile water for all its water needs whilst ground water, which is extremely saline and brakish in nature, is not used for drinking water purposes and is only partially used for irrigation in some areas[1]. A summary of different modes of access to water is given in *Table 2.3*.

[1] The provision of water supply is described in more detail in *Section III*

Table 2-3: Access to Water in Damietta Governorate by Markaz [% of population]

		Public Network						
		In House	In Building	Outside Building	Total	Pump	Other	Total
Damietta Markaz	Urban	98.58	0.45	0.85	99.88	0.12	0.00	30.61
	Rural	97.06	0.90	1.20	99.15	0.32	0.52	69.39
	Total	97.52	0.74	1.09	99.37	0.26	0.36	100.00
Farasqur Markaz	Urban	98.98	0.26	0.73	99.96	0.04	0.00	28.56
	Rural	92.01	2.38	2.21	96.60	0.82	2.58	71.44
	Total	94.00	1.77	1.79	97.56	0.60	1.84	100.00
Kafr Saad Markaz	Urban	94.77	0.82	4.41	99.99	0.01	0.00	17.92
	Rural	87.87	3.45	7.60	98.92	0.27	0.81	82.08
	Total	89.11	2.98	7.03	99.11	0.22	0.66	100.00
El Zarka Markaz	Urban	98.18	0.83	0.99	100.00	0.00	0.00	34.10
	Rural	89.92	6.45	3.37	99.74	0.20	0.06	65.90
	Total	92.74	4.53	2.56	99.83	0.13	0.04	100.00
Total	**Urban**	**97.96**	**0.53**	**1.44**	**99.93**	**0.07**	**0.00**	**27.34**
	Rural	**92.74**	**2.46**	**3.46**	**98.67**	**0.39**	**0.95**	**72.66**
	Total	**94.17**	**1.94**	**2.91**	**99.01**	**0.30**	**0.69**	**100.00**

[Source: CAPMAS 1999]

Generally people access water through treated water pipes (either in their home, in their building or outside their building), or hand pumps and a few "other" sources i.e. from wells, the Nile or irrigation canals etc. The distribution of people in each Markaz with no access to water in the home is shown in *Map 5*.

Access to Electricity

Every village in Egypt has access to electricity and electric light but not everybody has access to electricity in their homes. In Damietta Governorate 0.47% of the urban population do not have access to household electricity, whilst the amount of rural people without access to household electricity is 1.47%. *Table 2.4* provides a breakdown of access to electricity.

Table 2-4: Population with Access to Electricity on Markaz level 1996

Domiat Governorate	Access to Electricity	%	No Access to Electricity	%	Total	%
Urban	2,48,031	99.53	1,171	0.47	2,49,202	27.34
Rural	652,262	98.46	10,189	1.54	6,62,451	72.66
Total	**900,293**	**98.75**	**11,360**	**1.25**	**9,11,653**	**100.00**

[Source: CAPMAS 1999]

Access to Sanitation

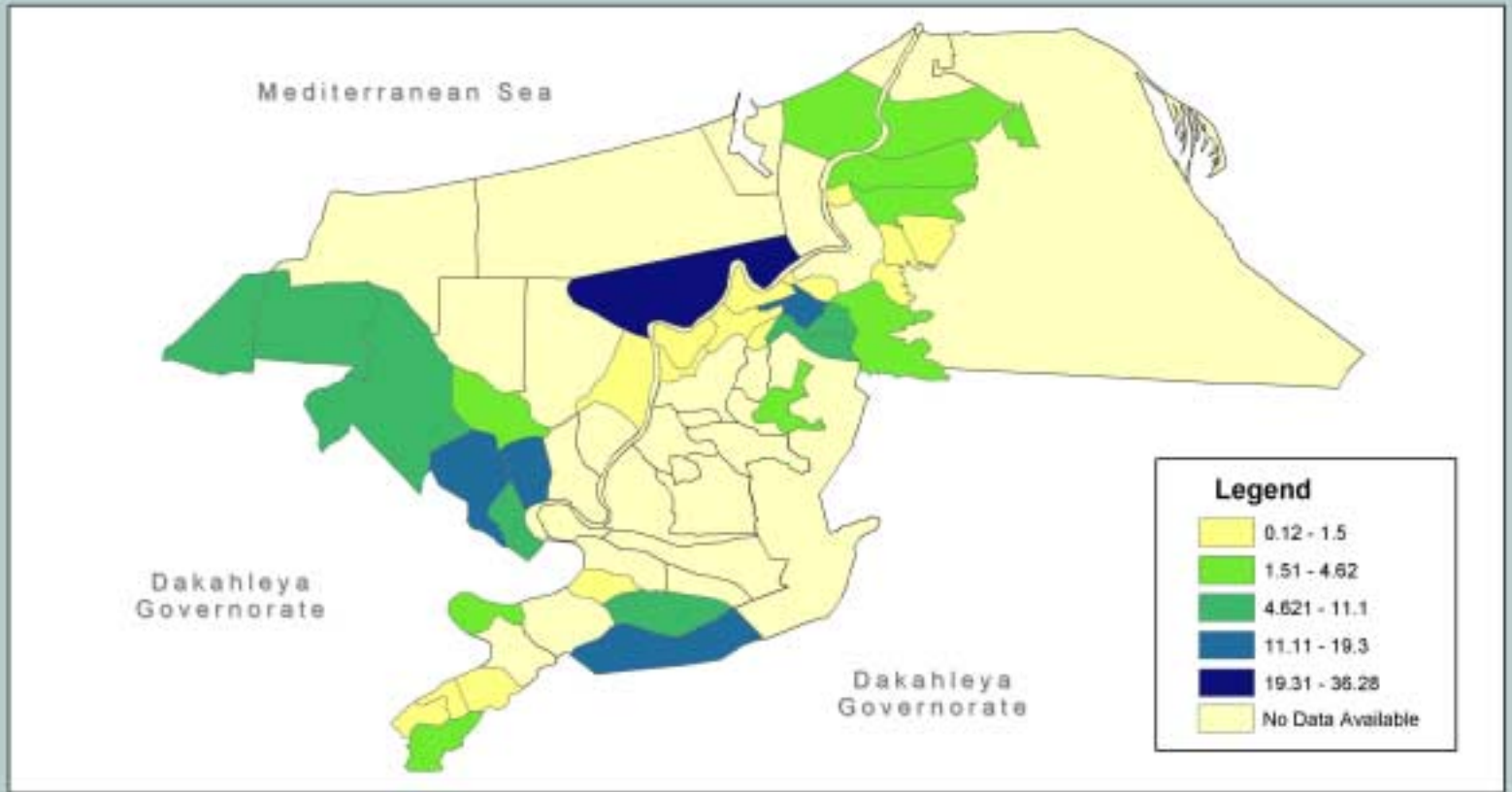
Approximately 51%[1] of Damietta Governorate is currently covered by sanitation services. These include gravity sewers, pumping stations, and sewage treatment plants. However, it is worth noting that according to CAPMAS[2] data sources in 1999, roughly 59% of those living in rural areas as opposed to 22% of those living in urban areas did not have access to sanitation coverage. According to 1999 data, the largest disparity in access to sanitation occurred in Kafr Saad Markaz where the split between those with access to sanitation coverage versus those with no access to sanitation was 34% to 66%, respectively. Villages that do not have access to integrated sanitation services rely on septic tanks, which are emptied periodically by vacuum tankers. Water and sanitation coverage in Damietta, however, is higher than the National average.

2.3.5 Health

Life Expectancy

Life expectancy at birth is another basic indicator of human development. In 1976 average life expectancy in Egypt was 55 years old but by 2000, it had increased to 67.1 years[3] reflecting an improvement in health status. Average life expectancy for Damietta Governorate in 1976, on the other hand, was 57.5 years old, slightly a little higher than the National average. By 2000, average life expectancy figures for the Governorate were 68.6 years old, above the National average of 67.1 years old[4].

[1] CAPMAS 1999
[2] CAPMAS 1999
[3] EHDR 2000/2001
[4] EHDR, 2000/2001



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Map 5: No Water Access (in house) as a % of the Population in Damietta Governorate

0 5 10 20 30 40 KM

N

Damietta

Mortality

In 2000 Damietta Governorates the total mortality rate was 6.04‰, comprising of 11.76‰ for urban areas and 3.88‰ for rural areas. These compare to a 1998 National crude death rate of 6.5‰ and 7.2‰ for Upper Egypt. If data for Damietta is disaggregated, the highest rate was in Damietta Markaz (6.99‰) and the lowest in Kafr Saad Markaz (5.06‰). *Table 2.5* summarises the rates across all Damietta Markazes.

Table 2-5: Adult Mortality Rates (‰) in Damietta Governorate [2000]

Markaz	Urban	Rural	Total
Damietta	16.00	2.96	6.99
Faraskour	6.65	4.99	5.47
Kafr Saad	9.29	4.14	5.06
El Zarka	6.32	4.94	5.41
Total	**11.76**	**3.88**	**6.04**

[Source: IDSC]

Child Mortality

According to the 2003 Egyptian Human Development Report (EHDR), the Child mortality rate per 1000 live births in 2001 was 31.0 demonstrating a slight improvement on 1996 figures, which stood at 30.6. Infant mortality figures during the same period however, show greater variance (infant mortality in 1996 was 26.5 as opposed to 17.7 in 2001). In Damietta, female child mortality rates were lower than males in the age group less than 28 days, but higher in the age group 28 days to one year. However, Child mortality rates for ages one to five years in 2000 (*Table 2.6*) indicate that female mortality rates were a little lower than male mortality rates.

Table 2-6: Comparative Child Mortality Rates [‰ live births] by Age

Damietta Governorate	1998	1999	2000
< 7 days	5.43	4.16	5.53
7 – 28 days	2.89	2.73	3.58
28 days – < 1 year	8.4	8.01	7.25
1 year - < 5 years	4.69	4.68	4.23
			M 5.1 F 3.3

[Source: Health Directorate - Damietta Governorate]

Table 2.6 demonstrates that all age groups except the 28 days<1year and 1 year< 5 years age groups have shown increases in child mortality. According to Damietta's Health Directorate *Table 2.7*, the highest total mortality can be found in Damietta (24.2 ‰), but this is not surprising as Damietta has the highest amount of live births by a considerable margin. What is perhaps more interesting, however, are figures for total mortality in Zarka (23.7‰) which,

relative to the number of registered live births (2,992), would seem to have a higher mortality rate than Damietta. According to Egypt's Human Development Report (UNDP 2003), the child mortality rate (under 5) in 2001 was 20% less than the Egyptian average.

Table 2-7: Child Mortality by Markaz - Damietta Governorate, [2000].

Markaz	Live Births	Mortality (%)			
	Total	< 28 days	28 days- 1 yr	1yr - 5 yrs	Total
Damietta	11,072	1.43	0.67	0.33	24.2
Faraskour	5,267	0.30	0.74	0.38	12.6
Kafr Saad	6,879	0.58	0.68	0.57	14.2
Zarka	2,992	1.09	1.00	0.53	23.7
Total	**26,210**				

[Source: Health Directorate - Damietta Governorate]

Maternal Mortality

Maternal mortality rates (per 100,000 live births) for 1992, 2000 and 2001 were 146, 75.9 and 24.8, respectively, demonstrating a significant improvement in the Governorates maternal mortality rates. National figures over the same period of 174 (1992), 90.5 (2000) and 60.7 (2001), show a similar trend in improved mortality rates. In 2001 Damietta's figures were found to be the lower than any other Governorate. Rates across the Governorate are presented in *Table 2.8*.

Table 2-8: Maternal Mortality rate [per 100,000 live births] by Markaz - Damietta Governorate, [2001].

Markaz	Maternal Mortality
Damietta	24.8
Faraskor	25.1
Kafr Saad	27.2
Al Zarka	30.3
Total	**24.8**

[Source: EDHR 2001]

Morbidity

Table 2.9 provides information on disease related morbity for each Markaz. In 2001, the highest recorded killing disease was Bilharzia with 3,174 recorded cases with the highest numbers being recorded in Kafr Saad Markaz. The proliferation of bilharzhia snails in irrigation canals where farmers lack protective clothing is largely to blame.

Table 2-9: Morbidity Data for Damietta by Markaz (No of People)

Disease	Damietta	Kafr Saad	Faraskour	Zarka	Total
Leprosy	0	1	1	0	2
Hepatitis A	80	35	64	33	212
Hepatitis B	55	17	7	1	80
Hepatitis C	3	2	2	0	7
TB	111	37	32	1	181
Typhoid	16	10	42	16	84
Measles	2	0	0	0	2
Dysentery	0	0	0	0	0
Tetanus	1	0	0	0	1
Polio	0	0	0	0	0
Meningitis	0	0	0	1	1
Cholera	0	0	0	0	0
Diphtheria	0	0	0	0	0
Mumps	8	4	8	3	23
Rubella	2	0	0	0	2
Malaria	0	0	0	0	0
Rabies	0	0	0	0	0
HIV/AIDS	0	0	0	0	0
Bilharzia	544	1,136	756	738	3,174

[Source: Health Directorate, [2001]

2.4 ECONOMIC CHARACTERISTICS

Employment is an important economic indicator, which helps us measure the relationship between individuals and the economy. In the following *Table 2.10,* it is clear that in Damietta's case, transformational industries, agriculture and fisheries are the main employment sectors in the governorates economy. Agriculture employs almost 25% of the workforce (EHDR-UNDP2003) whilst Industry employs 35% of the labour force in contrast to the national average, which is only 23%. The importance of small manufacturing industries in Damietta is likely to increase. It is also worth noting that out of all the sectors showing a growth between 1996 and 2001, the financial brokerage, real estate and business services sectors seem to have grown most.

Table 2-10: Employment by Sector

Activity	1996 Census			2001 Estimates		
	Male	Female	Total	Male	Female	Total
Transformational industries	60,368	1,366	61,734	62,842	-	-
Agriculture & fishing	52,955	969	53,924	51,312	1,129	52,441
Education	8,846	9,633	18,479	7,780	8,676	16,456
Wholesalers/ retailers	12,118	1,035	13,153	10,104	941	11,045
General administration	8,532	3,743	12,275	7,433	3,378	10,811
Transportation/ communication	8,365	340	8,705	6,401	499	6,900
Financial brokera real estate, & business service	2,235	1,907	4,142	7,897	7,650	15,547
Health	1,509	2,589	4,098	1,403	2,393	3,796
Total working population	**1,67,731**	**27,108**	**194,839**	**260,049**	**30,271**	**290,320**

[Source: Information from MLD, Village Profile Data]

Despite proposals in the Governorates Economic Development Plan (1996-2017) to create a further 17,050 jobs in the agricultural and fish production sectors, limited agricultural land and a dominant manufacturing sector indicate that these figures are likely to be overestimated. The decline in the share of agricultural employment and growth of the manufacturing employment is expected to continue in the future as development policies begin centering on the new regional growth poles namely, the Damietta's New City and Damietta Port.

Egypts Human Development Report (EHDR-UNDP 2003) provides an account of GDP per capita at the Governorate level (*Table 2.11*). In terms of GDP/ capita, Damietta ranks 9th out of 21 other Governorates in Egypt with a GDP/capita of 6,250 Egyptian Pounds or approximately $US 1,000 using approximate exchange rates. Although this is still lower than GDP rates in Urban and Frontier Governorates, it is almost 25% higher than the average GDP per capita in lower and upper Egypt (EHDR-UNDP 2003).

Table 2-11: Income Distribution and Poverty in Egyptian Governorates

Governorate	GDP/Capita (L.E)
Port- Said	12,098.8
South Sinai	11,557.8
Cairo	10,167.7
Suez	9,157.0
Alexandria	8,066.6
Red Sea	8,011.6
Matrouh	6,369.1
North Sinai	6,259.1
Damietta	6,250.9
Giza	6,153.4
Ismailia	5,989.3
New Valley	5,676.2
Kalyoubia	5,391.8
Gharbia	5,314.8
Kafr-El Sheikh	5,037.8
Aswan	4,780.6
Behera	4,672.9
Dakhaleya	4,373.6
Menoufia	4,212.7
Sharkia	4,181.9
Qena	3,930.3
Menia	3,916.0
Fayoum	3,612.8
Beni-Suef	3,331.1
Sohag	3,278.1
Assyout	3,008.8

[Source: EHDR-UNDP 2003].

SECTION: II
STATUS OF THE NATURAL ENVIRONMENT

3. GEOLOGY, GEOMORPHOLOGY AND LANDSCAPE

3.1 CONTEXT

The formation of Damietta Governorate land mass is the result of a series of complex geological processes that have occurred over a significant period of time. The Nile Delta is the most significant geological feature in the region and owes its formation to two competing processes, firstly progradation by the river Niles load and secondly erosion or dispersion of sediment by marine parameters. Factors that have contributed to the progradation process which takes place when the sea level drops include; the level of water discharge and sediment supply and the shape and type of Nile distributaries whilst waves, currents and tidal flows represent agents of marine erosion. Other factors, which include wind and changes in sea level have also been important agents of change.

3.2 THE DELTA'S GEOLOGICAL HISTORY

The geological history of the Nile Delta area during the pre and early Tertiary period is not well known as deposits from these periods have not been found in any great quantity in Nile Delta wells. What is known however, is that from the Jurassic to Cretaceous period, a carbonate shelf developed along an east - west line through the middle part of the Nile delta. Embedded platform carbonates are found to the south and these change to finer grained basinal faced rock to the north. Although no penetrations exist across the north delta, Mesozoic strata were probably deposited in slope and deep oceanic environments north of the carbonate shelf line. During the early tertiary period Oligocene sediments are reported mainly in the middle and eastern delta, while towards the south basalt formations from the Oligocene age caps Oligocene or Eocene strata are prevalent.

The early Neogene history of the Nile Delta, which includes the continental shelf, continental slope and submarine fan or Nile cone, is far better known. It began in the middle Miocene period, 15 million years ago when the Delta area was part of the Mediterrainean sea. Since then three main cycles (Miocene, Plio-Pleistocene and Holocene) of sedimentary deposition have been responsible for the geological development of the Nile Delta. The Miocene period is characterised by a regressive [retreating] sea cycle, the early Pliocene period by a regressive sea cycle, whilst late Pliocene and Holocene periods are characterised by transgressive [advancing] sea cycles. Figure 3.1 split into geological eras illustrates how the Delta was formed.

The Eonile (Miocene Cycle)

The beginning of the early Messinian era was marked by a dramatic drop in sea level. During this period an increase in rainfall on the Eastern Desert mountains led to the [south north] creation of the Eonile or river Nile. In response to a drop in sea level and related erosion, the river cut its course forming a canyon and a sandy shaly sequence of fluvio-deltaic sediments began to accumulate. These deposits which form the Eonile's deltaic fan, created the Qawasim formation. During this early Messinian period in the depressions not affected by fluviatile fresh water, evaporitic sedimentation began to take place. Where present, these sediments consist of massive beds of anhydrite and subordinate salt interbedded with clay and carbonate, which do not usually exceed 10 to 20 metres. These evaporite deposits, which overlie the Qawasim formation created the Rosetta Formation.

Marine Gulf Phase (Pliocene Cycle)

This phase is characterized by a period of significant uplift and erosion on a regional scale. The phase consists of cyclic deposits of sandstone interbedded with shale. One of the most significant formations of this phase is the Abu Madi Formation, which represents the base of the lower Pliocene that overlays the Rosetta Anhydrite.

Paleonite (Pliocene Cycle)

The onset of more humid conditions during the late Pliocene period increased the effect of fresh water on marine gulf sediments, which turned an estuary into a river channel, known as the Paleonile. In the north Delta embayment, sediments belonging to this river system represent the upper part of the Kafr El Sheikh Formation.

Protonile (Pliocene Cycle)

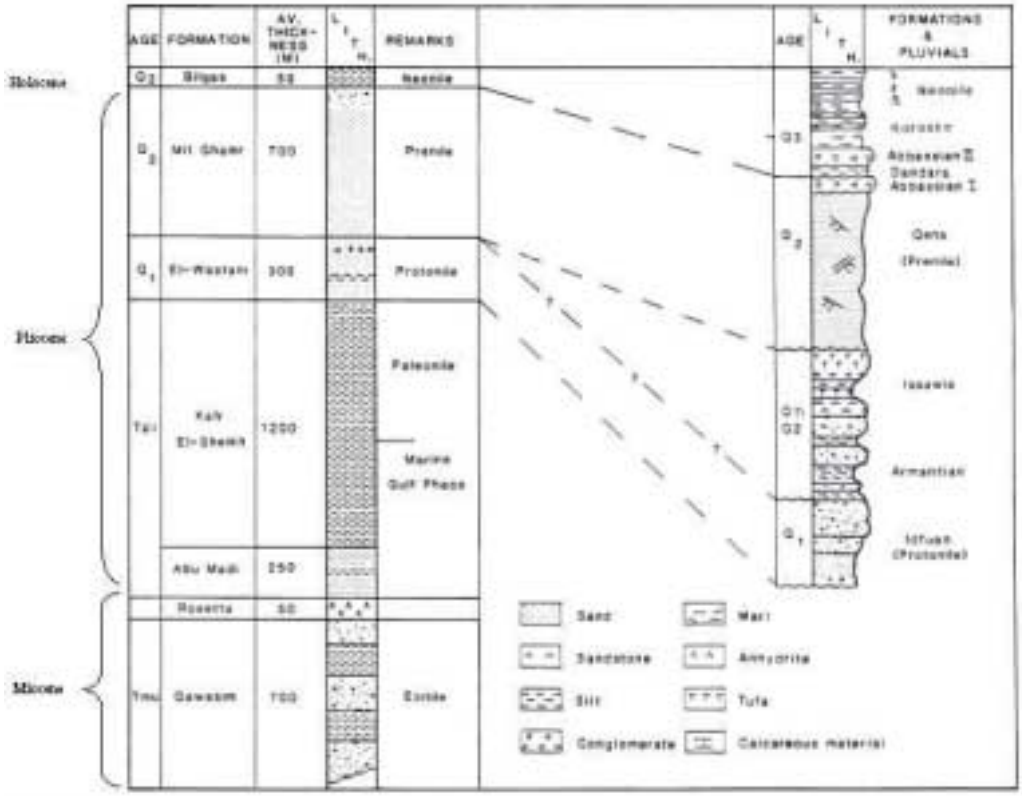
By the end of the Pliocene, a period of aridity occurred which led to the end of the Paleonile system. The water flowed in a wide gorge or canyon in the form of a braided stream called the Protonile. It superimposed an alluvial fan or scree fan into the sea at its distal end. The phased deposits consist of sandy clay sediments representing the El- Wastani Formation, which occurred under regressive sea conditions.

Prenile (Pliocene Cycle)

The advent of the middle Quaternary 1 million years ago, was marked by a pluvial phase, which led to the formation of the Prenile river. The Prenile flowed northward over sandy clay sediments of the El-Wastani Formation debouching detrital material into the sea. These fluvio-marine deposts mostly made up of coarse sands created Mit Ghamr Formation. During the middle to

late Pleistocene, most of the delta was built up under continental to fluvio-marine conditions adding more material to the Mit Ghamr Formation.

Figure 3.1 : Compostion Columnar Section of Nile Sediments



[Source: Said.R 1990, Geology of Egypt Netherlands, p.488]

Neonile (Holocene Cycle)

Around 27,500 years ago river water from Africa formed the Neonile system. This river was weaker than former rivers due to the prevalence of swamps. Depositional events during this period relate to a time of aggradation by the main Nile interrupted by episodes of rapid down cutting. The deposits are represented by one or two metres of silt alternating sand.

Between 12,000 to 27,500 years ago (late Pleistocene), a drastic change in sea level occurred. This phase marks a significant stage of construction in the Delta's History. During this phase, Delta progradation was at its highest reaching a distance some way north of the modern delta's position and the coastal plain advanced northward close to the limit of the continental shelf to form the subaqueous Nile cone.

3.3 SEISMIC ACTIVITY

The distributions of seismic intensities from former delta earthquakes have been affected by the nature of the relationship between the Delta and east Mediterranean tectonics and the thickness of clastic sediments in the Delta's basin. The Nile cone's alluvium front has also been a significant factor. Damietta has two zones that have been historically active, which include an offshore zone near the Nile's Damietta Branch estuary and one around Gamasa. Both areas are part of the offshore Mediterranean dislocation zone where activity has been related to the shelf, continental slope and the Nile cone.

4. COASTAL ZONE MANAGEMENT

Damietta Governorate's Mediterranean coastline extends for some 61 km from El-Diba in the east to Gamasa in the west. The coastline is part of the Nile Delta which experienced decreased deltaic deposition and related coastal erosion during the early 20th Centuary (i.e. Ras El-Bar). Today much of the delta's coastal sand belt (1 to 10km) still remains largely undeveloped because of threats to shoreline erosion and poor connections with the rest of Egypt. However, this situation is steadily changing since the construction of the new international coastal road from El Saloum to Rafah which has done much to improve the areas connectivity.

The Governorate is rich in natural and economic resources, which has led to increased levels of investment in agriculture, urban and industrial development, oil and gas exploration, and refining and tourism. The area also benefits from a growing fishing industry, which obtains most of its catch from the Mediterranean Sea [20.6%] and to a lesser extent Lake Manzala [4.39%]. But as the figure 1 demonstrates growing population and continued economic exploitation of this coastal zone has undoubtedly placed great strain on this rich but fragile environment.

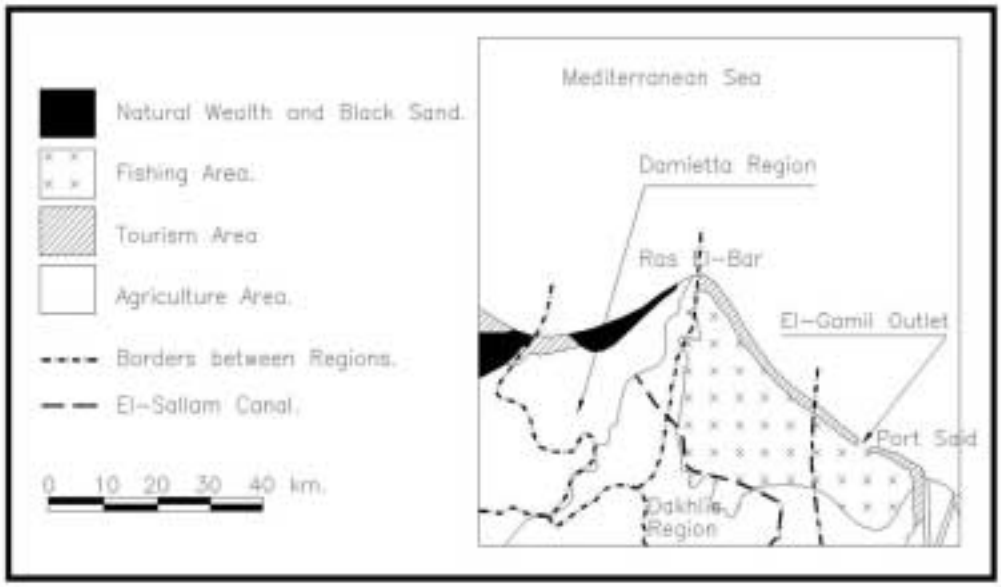
4.1 RECENT DEVELOPMENT AND LANDUSE REGULATIONS

Recent coastal developments in the past two decades include:

- The construction of Damietta port and associated developments (e.g. the Union Fenosa and United Company Gas Derivatives Project).
- The establishment of New Damietta City and the international coastal road.
- Mining activities especially for black sand, quarries and exploitation of sand dunes.
- Fishing, fish and shrimp farming and seawater salt extraction.
- Offshore exploratory activities, and
- Tourist development along Damietta's coastal zone (i.e. Ras El Bar)

However, much of this development has been poorly planned and unmanaged which has resulted in the insensitive use of coastal zone lands and natural resources including marine areas. As a consequence the zones fragile environment has deteriorated, beaches now suffer from erosion and sedimentation, coastal water sources have seen an increase in salinity levels (from 800 ppm inland to 30,000 ppm around the coast) due to salt water intrusion and the rise in ground water levels and discharge from drains and changes in coastal currents has negatively affected the water quality, fish stocks and wildlife habitats. The following figure 4.1 provides and indication of expected development in Damietta up until 2020.

Figure 4-1: Expected Development in Damietta up to 2020



(Source: EEAA, 1996 "Integrated Coastal Zone Management in Egypt, Towards and Egyptian Framework ICZM Programme)

The task of planning, management and protection of coastal zones in Egypt is distributed among various ministries and bodies and governed by a number of national regulations. As a consequence there is often insufficient cooperation and dialogue, which results in regulatory inconsistencies regarding planning, management and development of coastal zones. The following section focuses on the most significant regulations concerning the protection of the environment, coastal zone planning, urban planning and the existing situation.

Building Regulations

The most significant law regarding the control of building activity in the coastal zone is laid down by Law No4 [1994], which prohibits the construction of any building less than 200m from the coast unless approved by the Egyptian Shores Protection Authority [SPA] in coordination with the Egyptian Environmental Affairs Department [EEAA].

Neither Law 106/1973 on the steering and regulation of building works nor its amendments thereto incorporates provisions with respect to the measures and standards to be observed in order to protect the beach environment and areas. However, the 1996 Prime Ministerial decree No 30086 initially introduced in Alexandria City and now applicable in Damietta governorate does lay a restriction on building height. The Decree states that it is prohibited to explicitly or implicitly approve a request for a license to increase the height of a building if the building was constructed prior to the date of the decree becoming a law [i.e. 1996 Law No 101]. This amended some of the provisions laid down in the 1976 Law No 106.

The Building Process

Executive legal regulations define licensing procedures for the construction of facilities. License applicants need to submit a request in writing to the concerned coastal governorate specifying the type of establishment to be constructed within the prohibited zone and attached to the application a full EIA study, which assesses the developments potential impact on the coastal zone and shoreline. Areas of particular importance that should be covered include matters relating to erosion, sedimentation, tourists' influx and pollution by the project or works as well as a statement of works and detailed remediation activities, if any.

The coastal governorate then refers the application to the Egyptian Shores Protection Authority/EEAA for their technical opinion, which must be given within 60 days of receiving the application. If permission to build within the restricted zone is granted it is issued by the Minister of Environment. Article 75 stipulates that government representatives from relevant departments should monitor building activity in the restricted zone and if building activities are found to be in violation of the law the right to build in this area can be withdrawn from the applicant and any costs associated with restoring the land to its original state must be borne by the applicant. However, license issuing remains entrusted to the engineering department concerned with coastal zones districts, most of which lack environmental awareness and aesthetics. With this in mind buildings that violate the above restrictions and laws are often built.

Law No 2 [1973] provides the Ministry of Tourism with control over the level and nature of tourist development, which it sets out in its comprehensive tourism development plan.

Existing Situation

Lack of environmental controls and standards, and lack of environmental awareness amongst building licensing authorities, as well as absence of a National Land Use Plan have led to unplanned urban growth which has in turn placed a burden on coastal zone environments, contributed to traffic congestion and increased population densities.

Regrettably, the long awaited Law No. 4 of 1994 on the Environment does not, as other foreign regulations did, incorporate any provisions with respect to regional and cadastral planning that aimed to introduce sustainable development, safeguard the environment and prevent conflict between different coastal zones applications

To date, there is no broad and comprehensive coastal zone planning in Egypt that seriously considers the environmental fragility of such areas, and the potential impacts of development in the agricultural, industrial and tourism sectors. This will not be achieved without revision of the law on Urban

Planning, development of the capacity of local administrative units in the land use planning.

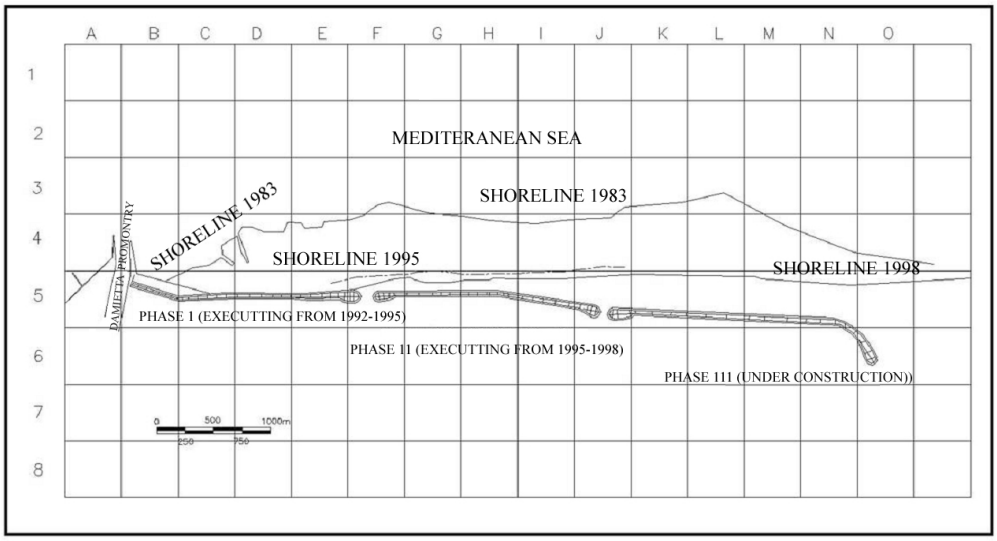
4.2 ENVIRONMENTAL ISSUES

Shoreline Erosion and Flooding

Continued and steadily intensified human activity along Damietta's coastline has affected the shores profile significantly. Activities such as the construction of the High Dam, the establishment of barriers and breakers, and the development of the New Damietta City and Harbour have all had an impact on the coastline and surrounding areas, including shoreline sediments, water quality and biodiversity.

The Aswan High Dam built to retain Nile water that once used to flood annually, has increased Egypt's cultivatable land by 30% and doubled its electricity output. However, these improvements have come at an environmental cost. The dam now traps silt that once used to replenish top-soil [approximately 12 million tones pa] on cultivated fields during the Nile's annual floods. With little silt in water leaving the High Dam the Delta and northern coast have experienced significant erosion of river and shoreline profiles. Figure 4.2 clearly illustrates that some sections of the shoreline east of Damietta promontory have retreated more than 500m between 1983 and 1995. The construction of sea barrages along this stretch of coastline has done much to protect the coast from further erosion.

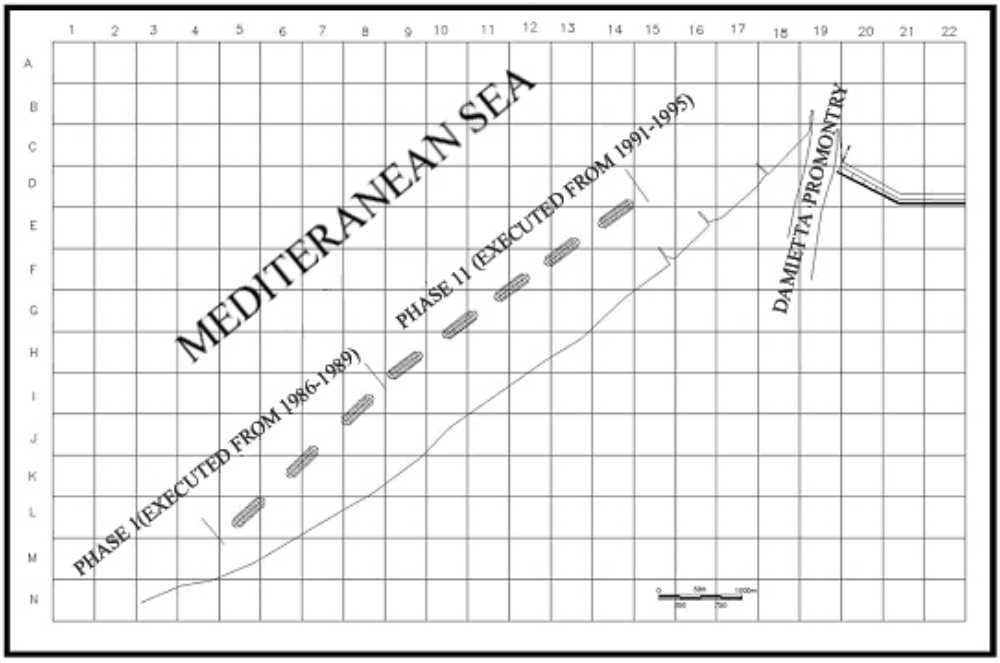
Figure 4-2: Shoreline erosion east of Dameitta promontory and protection works



(Source: Shoreline Protection Agency)

The following figure (fig 4.3) illustrates what coastal defences have been constructed to the west of Damietta promontory.

Figure 4-3: Characteristics of the coastline along the coast of Damietta.



(Source: EEAA, 1996 " Integrated Coastal Zone Management in Egypt, Towards and Egyptian Framework ICZM Programme)

Water Pollution

The largest local source of pollution comes from pollution flowing into the Damietta Branch of the Nile, which not only impacts negatively on fish and water quality but also poses a health impact on communities living close to the river and fish consumers. Most of this derives from unsanitary or unplanned drainage (i.e. sewage, solid waste etc), which flows from cities, villages and tourist resorts, which either have partial or non-existent drainage treatment plants. Pollution into this branch of the Nile comes from a number of major sources, which include;

- The High Dam,
- The High Serw Power Station,
- The High Serw Drain,
- The Edifina Fertilizer Factory,
- Treated sewage discharged from Ras El- Bar sewage treatment plant [30,000 to 35,000m^3/day] through the navigational canal between Damietta Port and the mouth of the Nile and

- Drain No 6, which carries industrial drainage from Damietta's industrial area in new Damietta.

Another significant source of pollution comes from Damietta Port where the level of commercial activity (1997 the port handled 13.2 million tons) together with the agglomerated industries it has attracted (which includes at some future date a gas transportation quay) continue to pose a risk to the environment. Furthermore deposition of maintenance dredging activity around the ports entrance (over 1000 000 cubic meters pa) also poses a threat to off shore water quality.

External sources of pollution include pollution from sewage and industrial and agricultural drainage sources. Three particular sources worth noting include:

- Mixed drainage from the Gamasa Drain, which serves villages in Damietta, Shebin and Belqas Markazes in Dakahleya Governorate that causes water pollution from heavy elements and pesticides, which negatively affect fish stocks and other marine life around the drain.
- Port Said's sewage drainage close to the Ashtum El-Gamil Strait, which connects Lake Manzala to the Mediterranean that has led to negative environmental side effects around the north coasts Diba area.
- Water and waste high in heavy metals [cadmium, copper and zinc] carried through the Bahr Al-Baqar Drain from Easter Cairo 170 km north to Lake Manzala which discharges 1.4b cm/pa of wastewater into the lake each year (USAID, 2000) has resulted in deformed and deteriorating fish stocks. Levels of Ammonia, hydrogen sulphide gases and chemical toxicity are now reaching hazardous levels.

In its latest report (2003) the Governments Environmental Monitoring and Information Programmme (EMIP)[1] showed that seawater between Alexandria to Damietta is contaminated with coliform bacteria counts ranging from 500 to 100,000, (MPN/100 ml) much higher than permitted levels of between 100-500 (MPN/100ml). In the same report ammonia and nitrate levels from Alexandria through to Damietta and Port Said were also found to exceed permissible limits indicating that the area suffers from higher than average waste water discharge levels.

Other external sources of pollution include; pollution from the oil and gas industry and related activities in the Mediterranean, drainage and waste from tourist resorts located along the north coast, waste from Mediterranean fishing fleets and illegal dumping of hazardous waste from ships operating off the coast. Furthermore extraction, transportation and oil refining whether through

[1] The Environmental Information and monitoring programme (EIMP) is run by the Egyptian Environmental Affairs Agency.

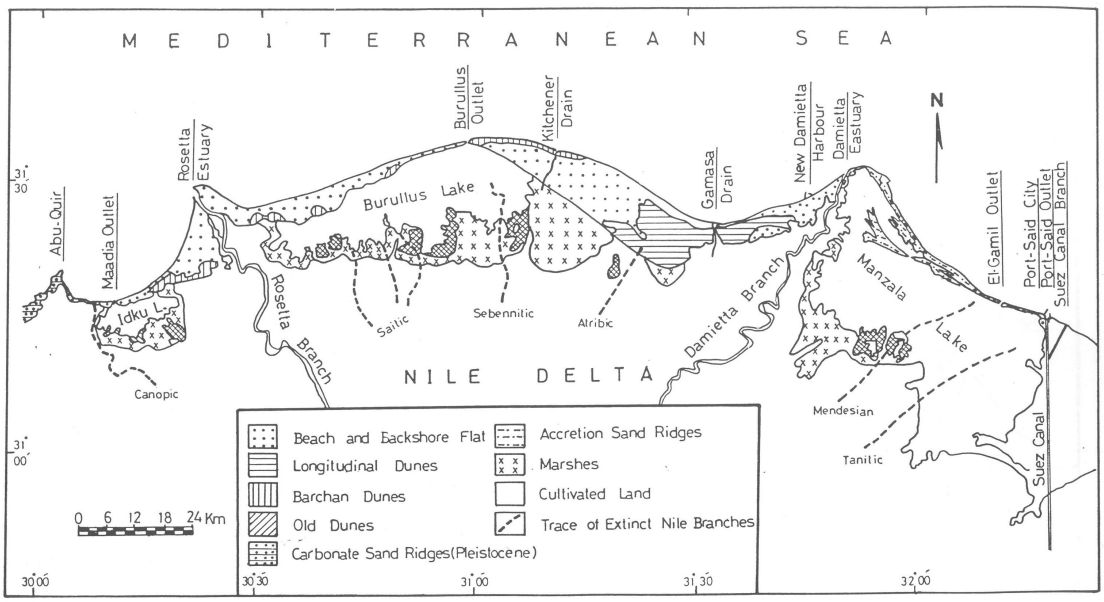
pipelines or the 3000 or more ships that operate in the area also has a significant impact on marine water and soil pollution.

Deterioration of Natural Resources and Habitats

The coast of Dameitta can be divided environmentally and geo-morphologically into three main sectors (Fig 4.4) characterized by the following environments:

- Reed Swamps Environment,
- Salt Marshes Environment,
- Sand Dunes Environment,
- Rocky Ridges environment and
- Coastal plains each with very distinct flora and fauna.

Figure 4-4: Damietta's Geo-morphological Features



(Source: EEAA, 1996 " Integrated Coastal Zone Management in Egypt, Towards and Egyptian Framework ICZM Programme)

Increasing levels of development and persistent sources of pollution have had an impact on the coastal zones ecosystem and the level of biodiversity. The rise in pollution from a variety of sources has led to the appearance and dominance in some species and the disappearance or migration of other species. This can be particularly seen with respect to marine life where the numbers of some species like the Anguilla anguilla eels, Piniidae crustaceans, crabs and Dicentrarchus labrax from the sparidack family have declined whilst other marine species like the Mugilidae from the grey Mullet family, and Cardium snails have grown in numbers. Similarly Phytoplankton and Zooplankton and other pollution endurant algae like ulva have grown in abundance whilst a large amount of marine algae species have either

declined or become extinct. Furthermore studies have shown that fish like those from the Clupiidae family have migrated hundreds of metres from the shoreline.

Accretion along the Nile delta coasts, which resulted from the construction of Aswan High Dam, has in turn caused a change in the size and composition of shore sediments, which has affected the type and number of shellfish species. Steep shoreline angles often range between 10 to 15% and typical shoreline sediments comprise of sand (96%), mud (2%) and carbonates (2%) with finer sands located further inland. A further negative side effect is that soil fertility has been reduced which has forced many farmers in the region to use lime nitrate [approximately 13,000 tonnes pa] and Nitrokima fertilizers which have now entered the food chain. The resulting perennial irrigation has increased soil salinity while rising water tables have increased the incidence of salt encrustation. Manzala Lake has also shrunk (1950 lake size 700,000 feddans, Today 150,000 feddans, [Alahram weekly]) at an average rate of 5.2km^2 pa mainly as a result of land reclamation and siltation processes (Frihy, O. E, Kh. M. Dewidar, S. M. Nasr, and M. M. El Raey, 2000, Changes detection on the northern Nile Delta of Egypt shoreline changes, spit evolution, margin changes of Manzala and its islands, Taylor & Francis).

4.3 MEASURES TO PROTECT THE ENVIRONMENT

Coastal Zone Management in Egypt

In 1996 Egypt launched a framework programme for Integrated Coastal Zone Management (ICZM) and a definition for Egypt's coastal zone was agreed.

"The coastal zone is the domain of land-sea interface. It encompasses the territorial water and extending to areas of active interactions with the marine environment for at least 30 kilometres in the desert areas, unless major topographic features interrupt this stretch, while in the lower Nile delta region the terrestrial part would be extended up to contour +3.00 meters".

The framework focuses on four main areas; shoreline erosion and flooding, irrational land use, Water Pollution and the deterioration of natural resources in habitats. Unfortunately ICZM's 10 year framework programme has not yet been developed. This is primarily due to the fact that the National Committee for ICZM responsible for developing the framework plan has been relatively inactive for the past 4 years. Until such time as this programme is implemented it is difficult to see how comprehensive coastal zone management can be achieved.

The Shoreline Protection Authority (SPA)

The Shoreline Protection Authority (SPA) is under the Ministry of Public works and Water Resources. Established by Presidential Decree No. 261 of 1988, its mandate is to protect Egyptian coastlines particularly the Mediterranean and delta shores against the risk of erosion problems aggravated by the lack of natural compensatory silting. The Authority is also responsible for controlling shoreline development within the set back line. The width of the restriction zone or the location of the set back line in each region is determined by the SPA after the appropriate studies and is set initially as 200 m from the shoreline. Two particular cases worth noting where the SPA has introduced a number of mitigation measures to protect the shoreline from erosion include Ras El-Bar and Ezbet El-Borg.

Ras El-Bar

1. The establishment of a basalt bridge between 2, 3 pilot groins to stop continuous erosion in the narrow strip between the sea and Nile [from street 32 to 18]. This groins has since been extended by 70m to the west of the third pilot groin to prevent further erosion.
2. Restored the basalt bridge between capes 1 and 2 protect Ras EL-Bar from collapsing as a result of huge wave surges, which used to flood Ras El-Bar Streets.
3. The establishment of 5 detached breakwaters (Fig 4.3) as 'phase 1' and 3 detached breakwaters as 'phase 2' at a depth of 4m and 500m in length to prevent erosion. This solution had resulted in building up new land and develops the shore. Today this increased sedimentation has increased the average shore width to 150m. A third phase which consists of a submerged detached breakwater at a depth of 4m and a length of 950m has also been introduced, it covers the first breakwater eastwards to Ras El-Bar's groin. New concrete tiles have recently been added as a strengthening measure to Ras El-Bar's existing groins.

Ezbet El-Borg

1. The SPA is currently in the process of building a 6.5 km protective marine wall in three phases (Fig 4.2) to control the annual erosion rates of 60-70m pa. The project is in three phases.

a) Phase 1: A 2 km long and 6m deep marine wall has been built parallel to the shoreline. The top of the wall is covered with layers of graded stones upon which a shield layer of 4 ton concrete blocks have been added bring the protective wall to more than 6 m above sea level.
b) Phase 2: A 2 km long wall similar to that built in phase 1. Mosalas El-Diba strait [Diba Triangle] has also been built at EL-Borg between phase 1 and 2 to replenish Lake Manzala with clean water and fish.
c) Phase 3: This phase is currently underway and includes the installation of polyester and graded stone layers covered by protective 9 tonne concrete block Armour units.

Another potentially significant initiative worth noting involves the construction of a 100 hectare engineered wetland facility in Port Said which was launched

by the Global Environmental Facility, the United Nations Development Program, and the Egyptian Government (Egyptian Environmental Affairs Agency) in 2001. The wetland is designed to treat 25,000 cubic meters per day of polluted drain water from the Bahr El Baqar drain and assess the feasibility of wetland treatment as an alternative for improving water quality in Lake Manzala and the Mediterranean Sea. The facility includes intake screw pumps, sediment basins, surface treatment cells, subsurface reciprocating cells, pilot test cells, fish rearing facility, and effluent reuse area.

5. AGRICULTURE AND FISHERIES

5.1 LAND USES

Damietta's land use profile is broadly illustrated in *Table 5.1*. The cultivated area has increased from 112,208 feddans in 1997/98 to 115,893 feddans in 1999/2000. This is mainly due to the reclamation of government owned land, which is leased to individuals until the land reaches maximum productivity, at which point, individuals are allowed to acquire legal possession of the land by means of a letter of Agreement issued by the Government property Authority. Most of this land is characteristically sandy and located in the Governorates Kafr Saad region. The existing reclaimed area amounts to 3,685 feddans although a further 13,000 feddans is currently under reclamation. There are currently no land reclamation cooperatives in Damietta Governorate. Common land use problems relate to;

- increased levels of salinity/ alkalinity
- high/ rising water-tables where land drains do not exist
- high levels of salt in Nile irrigation water and using mixed drainage and Nile water for irrigation.

Some basin grounds are also lower than the adjacent ground level, which causes problems during the summer growing season.

Table.5-1: Land-Use Profile, Damietta Governorate [1999-2001]

Land use	Feddan	%
Cultivated	115,893	73.41
Uncultivated	11,959*	7.58
Water covered (excuding the Nile)	30,000**	19.01
Total	**157,852**	**100.00**

[Source: Damietta Agricultural Directorate] * Public utilities, roads… etc, ** Manzala lake approximate, area in Damietta Governorate.

Soil Productivity

There are six types of soil in Egypt classified according to their profile and properties. A brief description of each class and its prevalence in Damietta Governorate is provided in *Table 5.2*. The table demonstrates that 69% of Damietta's soils are either 3rd or 4th class soils.

Table 5-2: Soil Productivity Classification for Damietta Governorate [2001]

Soil Classes	Area (feddan)	%	Remarks
First [highly productive soil characterised by clays and loams with moderate to rapid permeability, often occurring adjacent to the river or on islands]	0.00	0.00	
Second [above average productivity, often composed of clays. Generally have little problem with salinity or alkalinity]	23,348	18.26	Old land
Third [average productivity, often poorly drained with water table at less than 150cm below ground level. Salinity and alkalinity problems are common, soils are often sandy and calcareous in nature]	55,826	43.66	Old land
Fourth [poor productivity, found in scattered areas with a water table at less than 80cm below ground level]	33,034	25.84	Old land
Sub Total Cultivated	112,208		
Fifth [unproductive areas]	3,685	2.88	New land
Sixth [areas that have been developed for housing, roads or other utilities]	11,959	9.36	Uncultivated
Total	**127,852**	**100.00**	

[Source: Damietta Agricultural Directorate].

5.2 CROPS AND CROPPING PATTERNS

Compulsory cropping patterns do not exist in Egypt which means that farmers are free to choose what crops they grow. However, the Ministry of Agriculture and Land Reclamation (MALR) usually announce an annual target-cropping pattern for each Governorate. There are three distinct planting seasons in Damietta: winter, summer and Nili[1] season [late July to early November], *Table 5.3* provides a breakdown of the most important crops grown in each of these seasons. As the Table demonstrates, Damietta 's dominant winter crops are long clover (59.7%) and wheat (21.3%), whilst in summer, rice is more prevalent (73.6%), followed by vegetables which occupy more than 21% of the summer cropped area. Other vegetables and maize are respectively cultivated in approximately 70% and 24% of Nili cropped area. *Table 5.4* illustrates the area covered by fruit cultivation in 1999.

[1] Nili takes its name from agricultural practices, which date back the High Aswan Dam and other barrages were built when the river used to flood annually.

Table 5-3: Seasonal Crops in Damietta Governorate [2000/2001].

Winter		%	Summer		%	Nili		%
Long Clover	53,952	*59.7*	Maize	3,888	*4.8*	Maize	1,434	*24.0*
Wheat	19,241	*21.3*	Rice	60,001	*73.6*	Potatoes	169	
Barley	14		Onion	35		Tomatoes	208	
Beoad beans	8,182	*9.0*	Potatoes			Others *	4159	*69.7*
Lentil	10		Tomatoes	1.9				
Fenugreek	2		Others *	1,414	*1.7*			
Flax	1,313			14,640	*18.0*			
Onion	79							
Garlic	49							
Sugarbeet	3,612							
Potatoes	1,971							
Tomatoes	1,340							
Other Vegs	660							
Total	90,425	*100*	Total	81493	*100*	Total	5970	*100*
Grown	Sugarcane		Cotton	Fruits		Palms	Total	19259
Permanently	32		12785	6419		23	*100.0*	
%			*66.4*	*33.3*				

* Other: means other vegetables.

[Source: Agricultural Statistic, Economic Affairs Sector, MALR].

Table 5-4: Areas of Fruit Cultivation [1999]

Fruit Crop	*Area (feddans)*	*%*
Guava	4,371	76
Lemon	1,034	18.0
Grapes	240	4.1
Banana	35	
Mango	30	
Palm (only cultivated palms)	23	
Orange	13	
Total	**5,746**	**100**

[Source: Damietta Agricultural Directorate]

The cropped and cultivated area for 2001/2002 is detailed in *Table 5.5*. The main crops grown are: rice, long clover, cotton and vegtables and *Table* 5.6 illustrates how the area and yield of these crops and others has changed over a five year period from 1995 to 2000. The governorate enjoys a comparative and competitive advantage in growing long staple (1 3/8") and medium long staple (1 1/8") cotton varieties such as cv. Giza 45, and 98. This is due to the Governorate's microclimate and relative high humidity. Both clover and rice are salt tolerant crops which give good economic yields and net returns in the North Delta salt affected soils. Clover, a dominant winter crop (59.7%) is used

by the Governorates large livestock and dairy farming sector, whilst rice fetches high local market prices compared to maize, and other summer crops (e.g. vegetables), that are sold to surrounding Governorates like Port Said, Sharqiya and Dakahleya, where demand for vegtables is high. Rice is also grown to maintain the salt balance as it is a salt tolerant and reclamation crop. Each year farmers often violate the rice target areas for cultivation in order to benefit from the crops high selling price.

Table 5-5: Cropped and Cultivated Areas in Damietta Governorate [2003]

Item	Area (Feddans)
Total Winter Crop	90,425
Total Permanent Crop Area	19,259
Total Cultivated Area	109,684
Total Summer Crop Area	81,493
Total Nil Crop Area	5,970
Short Clover Area	10,487
Total Cropped Area	**207,634**

[Source: MARL Agricultural Statistics 2003 Vol II Summer, Nili Crops June 2003]

Table 5-6: Area, Yield (t/f) and Egypt Average Yield (t/f), Dumiat Governorate

	1995		2000		
Crop	Area feddan	Yield t/f	Area feddan	Yield t/f	Egypt Av. Yield t/f
Winter Crops:					
Long Clover	56,984	21.86	49,877	21.65	27.33
Short Clover	10,567	7.56	12,546	7.76	12.57
Wheat	19,939	2.12	21,220	2.51	2.82
Faba bean	6,842	1.20	3,801	1.12	0.95
Tomatoes	1,248	6.58	1,525	7.77	16.60
Sugar beet*	-	-	2,091	17.81	20.24
Summer Crops:					
Rice	63,448	3.023	61,318	3.5	3.74
Corn	4,748	2.46	2,695	2.9	3.33
Tomatoes	4,535	7.92	2,798	9.35	14.64
Nili Crops:					
Corn	3,528	1.95	2,222	1.96	2.39
Potatoes	1,709	7.82	1,022	7.52	8.12
Cotton	9,728	0.95	15,076	0.63	0.956

*[Source: Damietta Agricultural Directorate, 2003] * Sugar Beet is a recently introduced crop]*

5.3 IRRIGATION AND DRAINAGE.

5.3.1 Irrigation

The quality of irrigation water for most of the Governorate is good except in Kafour El-Ghab and Kafr Saad Markazes, where extremely salty agricultural drainage water from the Gamasa weir is mixed with Nile water before use. During peak season (June, July, August) no mix is recommended.

The quality of *groundwater* is deteriorating due in part due to agrichemical and domestic sewage pollution. Salinity levels range from 800ppmm inland to 30,000ppmm around the coast and Lake Manzala. In the Delta, drainage water salinity levels range from 1 to 3000 ppmm. Although this presents a worrying trend, most Nile and irrigation canal water is still said to be relatively unpolluted. However, there should be no grounds for complacency, especially in view of the fact that;

- Progress towards implementing pollution control abatement has been limited to-date;
- Increased levels of industrial activity and intensified agricultural practices together with inadequate treatment of related waste is having a damaging effect on water quality [i.e. rising phosphate levels];
- The total amount of dissolved solids, sulphates and Chemical Oxygen Demand (COD) are increasing which is leading to a deterioration in the Nile's water quality;
- Cation levels in irrigation water may be detrimental to soil structure and related physical properties; and
- Faecal coliform counts grossly exceed the standards applied in Western countries.

Water quality in Lake Manzala

Water quality in Lake Manzala is deteriorating. 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 (Total dissolved solids (TDS), COD, Biochemical Oxygen Demand (BOD), sulphates) the recorded levels show excesses of between 3 and 10 times the permissible limits. The main problem responsible for the decline in water quality is thought to be related to two factors: the pollution loads of inlet waters and the reduced levels of seawater entering the lake since the sea connections were restricted in 1967.

5.3.2 Drainage

The Governorate's drainage system consists of a series of subsurface lateral and collector drains (tile drainage), open drains and pumping stations. Water reaches the drainage system in five possible ways:

- Through subsurface drainage from irrigated land;
- Through surface runoff from poor land levelling;
- Losses from tail end and irrigation canals connected to open drains;
- From cultivated land or irrigation canals running parallel to secondary or main drains; and
- Municipal and industrial wastewater. It is roughly estimated that 70 to 80% of municipal supply and 90 to 95% of industrial demand returns back to either the Nile or the irrigation networks and drainage system.

Open Drains

The Governorate's drainage system consists of 38 open main drain catchments, each of which either consist of a single or multiple drainage zone catchment. The length of these drains range from 0.6 to 19.4 km with the longest being the Farskour main drain which serves an area of 50,000 feddans, and the shortest being Zaghloula main drain, which serves an area of 4 feddans. In total, these drains serve an area of 123,270 feddans.

Tile Drainage

These drains serve an area of around 44,000 feddans, although 65,000 feddans actually need covering.

Drainage Reuse

Drainage water reuse is huge in Damietta governorate and occurs in the following ways;

- By capturing main drain drainage flow and mixing it with Nile water.
- By directly pumping drainage water from a nearby drain.

Pumping Stations

In addition to the open drains, there are five drainage pump stations that pump drainage water into Lake Manzala.

Drainage in Lake Manzala

Lake Manzala lies north east of the Nile Delta and is surrounded by 4 Governorates: Port Said, Damietta, Sharkeya and Dakahleya. The absence of an overall co-ordinating human development government body on the Lake is strikingly evident.

The lake 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 to the sea. The current surface area of the lake is

121,000 feddans, about 30,000 to 40,000 feddans lie in Damietta Governorate.

The Lake's water sources (*Table 5.7*) largely come from a] agricultural drains and canals that carry fresh water into the lake, b] the straits that carry sea water from the Mediterranean, and c] drains that carry liquid waste from cities like Cairo, Port Said, Damietta, Materya, Manzala and Gamaleya. Bahr Hadous drain provides 48.8% of the lakes water, while Bahr El Baqar drain provides 25.5% and the El Gameel strait near Port Said city activates water circulation and reduces pollution within the lake. Water in this western sector is less saline because it is connected with the El Ananeia canal and Farskour drain. This sector is under the jurisdiction of Damietta Governarate. Since the 1920s, the increased flow of drainage water into the Lake has decreased the overall salinity, which now ranges from 0.8 to 1.0% (the corresponding figures for the Mediterranean are 3.3 and 3.9%). However, the imminent diversion of drainage water into the El Salam Canal will reduce inflows into the Lake, which will result in a probable increase of the lake's salinity. It is not clear what impact this will have on fish stocks.

Table 5-7: Water Sources Discharging into Lake Manzala [in million cm/pa]

Water Source	Discharging Area	Annual Water Quality	Water Types	Governorates
Bahr El Baqar Drain	The southern area	1678 **	Sanitation & Agricultural drainage	Sharkeya
Ramsis Drain	The southern area	252.4	Agricultural drainage	Sharkeya
Bahr Hadous Drain	The south west area	3257.6	Agricultural drainage	Sharkeya
El- Sarw Drain	The south west area	847.2	Agricultural drainage	Dakahelya
Mataria pumping stataion	The south west area	154.3	Agricultural drainage	Dakahelya
Farskour pumping station	The western area	292.5	Agriculture drainage	Damietta
Ananya-saqare-bartama canal	The western area	868	Fresh water	Damietta

** Includes 300 million m^2 sanitation.

[Source: Damietta Water Resources and Irrigation Directorate]

These 6 drainage systems, of which the Bahr El Baqar and Bahr Hadous Drains are the largest, discharge around 6 million m^3 of fresh water into the lake each year.

5.4 AGRICHEMICALS

Agrichemicals are used to increase or improve crop productivity. They may be divided into *fertilizers* that improve the nutrient status of the soil and increase productivity through improving yields and *pesticides*, which reduce damage to crops from insect infestation and disease infection.

5.4.1 Fertilizers

Organic Fertilizers

Farmers in Damietta Governorate utilise animal waste [poultry dung 5m^3/feddans] as an organic soil conditioner and fertiliser and regularly add manure [average 10m^3/feddans/pa, normally in Feburary/March] to the fields they cultivate.

The advantage of this practice is that it improves soil structure and water holding capacity which is especially important in hot and arid climates such as Egypt's. It also provides a slow release of nutrients and adds trace elements, which help balance carbon/nitrogen (C/N) ratios. There are however, a number of disadvantages; with a slow release the fertilizer is not immediately available to plants, the use of dung/manure can result in the spread of weed-seeds and microbes and bacteria can transfer some soil born-diseases. The possibility of nitrogen depletion is another drawback of using organic fertilizers as the addition of a large amount of organic material complete with complex bacterial action can cause temporary nitrogen depletion in the soil and therefore plants.

Chemical Fertilizers

Nitrogen (N), hosphorus (P) and potassium (K) are the three major plant nutrients that are required in fertilizers. The principal element requiring addition to the soil as a chemical fertilizer is Nitrogen (N).

Approximately 57,783 metric tonnes of N fertilizer (either in the form of urea, ammonium nitrate, calcium nitrate or ammonium sulphate) is used in Damietta Governorate each year.

Phosphate (either in the form of Triple Super phosphate or Calcium phosphate) is required during land preparation and approximately 24,075 metric tons is used each year.

Potassium fertilizers are added to vegetables and fruit trees in 2 or 3 doses (application rate is 48 kg/k/feddans) during the growing season. Approximately 1429 metric tonnes (mainly in the form of potassium sulphate) is used each year.

An advantage of using chemical fertilizers is that exact amounts of a given element can be given to a plant. A major disadvantage of chemical fertilizers is that overly heavy applications can build up toxic concentrations of salts resulting in a chemical imbalance.

5.4.2 Pesticides

Pesticide use in Damietta Governorate is generally widespread. There are several factors responsible for the intensive use of pesticides including:

- Cotton is grown in the Governorate, which requires regular pesticide application;
- Biological control is not used to control the majority of pests and an integrated pest management (IPM) approach does not yet exist;
- During 2001, more than 40 different kinds of pesticides were used in the Governorate [at a rate of more than one kg/feddan]. In 2001, a total of 154 tons of pesticide and 64 tons of mineral oil were used in combating pests.
- The following figures provide a more detailed breakdown of some of the major pesticide uses;
  - 3,633kg of zinc phosphide to control vermin [i.e. rodents].
  - 39,653kg of insecticides for cotton pest control
  - 34,868kg for rice pest and disease control
  - 45,969kg for beans
  - 18,317kg for fruit and 63,954kg of mineral oils for scale insect control on fruit trees.

5.4.3 Environmental Impact of Pesticide Use

Adverse impacts of increased chemical pesticides usage include: increased immunity of pests to pesticides, pest outbreaks and increased levels of toxicity. With this in mind, an integrated pest control program must be introduced to improve farmer awareness in the safe use of pesticides, so that the future livelihoods of farmers and crop productivity do not become compromised. Current problems associated with increased levels of pesticide use include;

- Health problems associated with the watermelon crop in Rukabeya and Gamasa, which some attribute to residual pesticides in irrigation water; and
- Increased liver, renal and cancer infections in workers and farmers, which some people attribute to the effect of pesticides.

5.5 AGRICULTURAL RESIDUE

Agriculture residues are generated from most field crops especially cotton. Farmers use approximately 60% of the residue as animal feed, animal bedding, fuel, in brick manufacture or as mulch in fields. The remainder is either burnt (which leads to significant localised air pollution) or stored (which tends to provide shelter for rodents and can pose a serious fire risk). Agricultural waste recycling has great potential but this is yet to be fully exploited.

5.5.1 Livestock

Damietta Governorate is one of the countries leading livestock and dairy producers. *Table 5.8* provides an indication of the different kinds of livestock found in Damietta governorate.

Table 5-8: Livestock Wealth in Damietta Governorate [2001].

Species	Number
Buffalos	28,118
Local (Baladi) Cows	7,039
Hybrid Cows	58,563
Foreign Cows	6,326
Sheep	26,506
Goats	10,745
Poultry:	
Hens	10828625
Ducks	16500

[Source: Damietta Agricultural Directorate, Livestock Inventory 2001]

It is estimated that 15 to 20% of village livestock slaughtering is not carried out in designated slaughter-houses. In order to protect livestock and public health, such violations are controlled through inspection campaigns. There are 13 livestock and two poultry slaughter-houses in Damietta Governorate. (*Livestock*: three in Maskaz Damietta, four in Maskaz Kafr Saad, three in Maskaz Farskour, and three in Maskaz El-Zarka, *Poultry*: one in Shemessah, El – Zarqa and one in Awlad Hamam, Damietta District).

The Governorate aims to enhance its livestock and poultry production by:

- Expanding breeding and fattening of male buffalo's (veal);
- Enhancing high quality fodder production;
- Disseminating artificial insemination (cross breeding) within the governorate; and

- Encouraging training and upgrading skills of animal breeders, specialists and farmers.

5.5.2 *Milk Production*

Damietta produces approximately 110,860 tons of milk a year, which is used to process a variety of dairy products. The Governorate also receives a large quanity of milk from other Governorates, which is used to produce cheese, cream and butter for local and export markets. *Table 5.9* provides information on the number and location of dairy laboratories in Damietta governorate. Many of these dairies are poorly maintained and lack proper hygiene.

Table 5-9: Total Number of Dairy Laboratories in different Markazes

Markaz	Number of Dairies
Farskour	55
El – Zarka	18
Kafr Saad	38
Damietta	27
Total	**138**

[Source: Damietta Agricultural Directorate 2001]

Fodder production mainly depends on long and short clover during winter season and green forages during summer. During 2001, 53,952 feddans were under long clover cultivation, representing 59.7% of the Governorate's winter crop area, whilst 10,487 feddans were under short clover. The patterns and quantities of fodder used in the Governorate during 2001 are shown in *Table 5.10.*

Table 5-10: Patterns and Quantities of Fodder Utilized in the Governorate, [2001].

	Pattern	Quantity
1	Clover	9,92,391 tons in all reaps
2	Green fodder (during summer)	37,154 tons of all kinds
3	Hay	1,836 tons of all kinds
4	Concentrated fodder for cattle	34,000 tons produced kafr-saad factery and the majority big farms are composing fodder
5	Poultry fodder	January-October 2001, 3,300 tons were produced in the fodder manufacturing units, eight licensed units added to squashing and mixing units
6	Fish fodder	A licensed unit with a capacity of 600 tons/year affiliated to the fodder factory of The Egyptian Co. for oil and soap in Kafr-Saad.

[Source: Damietta Agricultural Directorate].

5.5.3 *Agricultural Credit and Cooperatives.*

Approximately 83 cooperatives existed in Damietta in 2001. These included 78 local multi-purpose co-ops of which 35 were located in Kafer Saad Markaz, 16 in Farskour Markaz, 15 in Damietta Markaz, and 11 in El-zarka Markaz, one centralized coop in Damietta City and four specialized coops; two in Damietta Markaz, and one at each Markaz of Kafr Saad and Farskour.

The type of services provided by cooperatives include:

- Providing fertilizers, seeds and pesticides;
- Offering animal wealth loans;
- Providing needed agri-equipment;
- Contributing to reduced unemployment by employing workers;
- Contributing to the marketing of agricultural crops; and
- Contributing to Food security by helping to establish agricultural business.

Types of services provided by the Agricultural Credit Bank:

- Providing loans [including SDF loans] and investment credit to farmers;
- Providing fertilizers and seeds;
- Participating in marketing cotton and other crops like wheat and corn
- Providing foreign currency needed for importation.

5.6 *FISHERIES AND AQUACULTURE*

Fish production in Damietta Governorate

Fish production comes from three main sources; aquaculture (69.48%), inland fisheries (10.36%) and marine fisheries (20.16%). Whilst all three are quite different in nature they are all privately owned and labour intensive. During 2000, the Governorate's fish production amounted to 98,700 thousand tons or 13.6% of Egypt's total National production (724,300 thousand tons).

Marine fisheries in Damietta Governorate.

The majority of Damietta's Mediterranean fish catch comes from its Ebet El Borg fishing fleet (700 boats, 10,000 fishermen representing 70% of Egypt's fishing fleet). Between 1991-2000, the Governorate's marine fisheries caught 34-40% of the total Mediterranean fish catch. In 2000, Damietta's Mediterranean catch amounted to 19,900 tons which represents 36.18% of a 54,900 ton Mediterranean sea catch (*Table 5.11*).

Inland water Fisheries.

Inland water fisheries include Lake Manzala, canals and ditches and Damietta's Nile branch. In 2000, 4,337 tons of fish (or 5.86% of the lakes total fish catch) were caught in Damietta's portion of the lake (*Table 5.11*). Catches from the Nile, canals and others waterways in 2000 amounted to 6,000 tons (*Table 5.11*), approximately 6% of the Governorate's fisheries production or 1.12% of Egypt's production.

The northern part of Lake Manzala is now a marine lagoon occuping approximately 13,000 feddans (El Dibba Triangle). In 1999, the lakes open water fish production amounted to 65,000 tons, or 20% of the total inland fish catch. Twenty-seven species (24 fish and three crustacean) have been identified in the Lake's open-fishery catch. Tilapia account for about 34,000 tons or 52% of the Lake's total annual catch.

However, the sheer volume of untreated sewage effluent together with industrial pollution is now threatening the viability of fisheries and the Lake's general ecology. 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. In addition, concentrations of heavy metals are increasing while untreated sewage is causing anaerobic conditions and organochemical agrocompounds are inducing mutations in fish species, which ultimately endangers human health. Higher levels of lead, cadmium and mercury have also been found in many fishermen using the lake and pesticide run-off and industrial effluent have been implicated in the increase of tumours and other illnesses observed in the fish catches. Furthermore according to the National Environmental Action Plan 2002 levels of mercury in Red Mullet from Lake Manzala and Barullus were reported at 1,295 ppm significantly higher than the WHO standard of 1ppm.

Aquaculture "Fish Farming"

There are 3 types of fish farming in the Governorate. They include marine fish farming in the Musallas region (Brakish water), fresh water fish farming south east of Lake Manzala and mixed water fish farming. Other farming methods include fish farming in rice fields (50,000 carp fries distributed pa), drain and canal fishing (8,000 tons of fresh water fish such as Tilapia, Mullet and white Fish) and cage fish farming (4,000-6,000 ton of Talapia pa). In 2000, the Governorates total recorded acquaculture catch amounted to 68,574 tons representing 69.48% of Damietta total production, or 21.18% of Egypt's annual catch. Most aquaculture activities are located around Lake Manzala region and the Musallas region (or triangle area).

The Mussallas region bordered by Damietta, the Meditteranean Sea and Lake Manzala is responsible for the majority of Egypt's aquacultural production. The total productive area covers around 20,000 feddans (including hosha[1] systems) and produces an estimated 3,000 tonnes of fish per year. Almost all farms use extensive polyculture ponds, comprising of wild fry and a number of main species which include; mullet (*Mugil cephalus-bouri* and *Mugil capito-tobar*), seabass (*Dicentrarchus labrax*) and gilthead seabream (*Sparus aurata*).

Fresh water fish farming covers approximately 10,000 feddans (in El Basatra-El Ananya-Gheitt El Nasarah- El Sayalah- Shattah) and produces a number of varieties of Tilapia, Mullet and catfish.

Fresh and mixed water fish farming covers approximately 5,000 feddans and is only found south of the international Shatta-Port Said road in Damietta. Saline water passes through the Bughdady Bridge mixes with fresh water coming from El-Ananya and discharge canals. The different types of fresh and mixed water fish farming include:

- Agriculture drainage pools, which have been enclosed and leased out to fish farmers by the Directorate. The pools are high in silt and sand rich nutrients, which produce roughly 500 kilo's of fish each year most from the Tilapia and Mullet fish families;
- Unconventional Fish Farming common where water depth is around 3 to 10 metres.

Common problems experienced by fish farmers in the region include:

- Low levels of technology resulting in high mortality, low yields and marginal levels of profitability;
- Poor and variable water quality; high salinity (up to 50ppt due to soil conditions and high rates of evaporation);
- Organic pollution from Lake Manzala and land drains. In 2001, the GAFRD (General Authority for Fish Resources Development) completed a new canal bringing seawater from the mouth of the Nile. Farmers report a significant improvement in inlet water quality as they now rely less on land drains and Lake Manzala;
- Insufficient fry to enable an increase in stocking levels;
- Use of low price and low quality protein feeds;
- Presence of *Tilapia zilli* (which consumes feed to produce biomass) with efforts to control limited by poor design and construction of most

[1] A Hosha is an enclosed water system, which provides a suitable fish habitat.

ponds. However, this product does find a market at low prices, including as a feed for culture of carnivorous fish; and

- High percentage of illegal farms, resulting in high uncertainty and under investment.

Table 5-11: ***Governorate Versus National Fish production in Damietta in tons [1992-2000]***.

Source	Damietta Governorate (tons)	National (tons)	% of National	% of Damietta
Sea fisheries				
Mediterranean	19,900	54,900	36.18	20.16
Red Sea		76,000		
Lakes				
Manzala	4,337	74,100	5.86	4.39
Burullus		51,700		
Bardawil		3,300		
Idku		8,900		
Maryut		6,400		
Qarun		1,800		
Nasser		19,000		
Fouad		100		
Elrian		1,900		
Rivers & canals				
Nile, canals and others	5,895	80,300	1.12	5.97
Fish farming	68,574	323,700	21.18	69.48
Rice fields	N.A.	16,400		
Morra and Timsah		5,800		
Total Production	**98,706**	**724,300**	**13.62**	**100.00**

[Source: General Authority For Fish Resources Development (GAFRD) ,2001, Fisheries Staities Static Yearbook] N.A. not available.

6. BIODIVERSITY OF DAMIETTA GOVERNORATE

6.1 HABITATS

Damietta Governorate has four distinctive habitats: marine and coastal environments, wetland and arable land and urban landscapes, each with their own unique set of fauna and flora (*Map 6*).

6.1.1 Marine and Coastal Environments

With its entire northern boundary along the Mediterranean Sea, Damietta has extensive marine and coastal resources. The most unique feature of the marine environment is the Nile's Damietta Branch outflow, which flows into the Mediterranean Sea. Mediterranean fisheries provide an important source of livelihood to the Governorate and are a vital source of high quality fish. The mouth of the Damietta Branch of the Nile was formerly an important feeding ground for Mediterranean fisheries, but this has changed in recent years. Seabirds, mainly gulls winter in the offshore waters.

There is a narrow coastal belt along the sea, which consists of beaches lined by sabkha, saltmarshes and sand dunes. The coastal belt contains relicts of desert flora and fauna associated with sand dune and saltmarsh habitats with affinities to communities in deserts to the east. Most of this area has been reclaimed for agriculture, industry or urbanization so little natural habitat remains. Having said this however, the Governorate still has a high percentage of wetland habitats.

6.1.2 Lake Manzalla

Lake Manzalla covers 20% of the Governorate's surface area. The lake is a shallow, brackish coastal lagoon connected to the sea via three main bugas (sea outlets). Fresh water input into the lake is comprised of drainage water primarily from five major drains. The lake is fresher in the south and more saline in the north.

Last century large parts of Manzalla were reclaimed which reduced the lake's area by 40%. However, although it has been significantly reduced in size, it continues to provide an important refuge for wildlife in the Nile Basin, though its importance as a wintering station for waterbirds has certainly diminished in recent years. Roughly 1,256 waterbirds of some 21 species were counted in eastern Manzalla in the winter of 2002 compared to a total of 233,901 birds of 60 species during surveys of the entire lake in the winter of 1989/90. Only small numbers of waders and ducks were observed.

From a fisheries perspective, the lake is considered to be an important nursery for Mediterranean fisheries and its northern part has been extensively

modified for fish farming. However, the wetland is severely polluted as a result of untreated industrial, agricultural and domestic wastewater, which is dumped into the lake on a daily basis. Furthermore, roads have been constructed through the lake, which has altered the lakes water hydrology.

6.1.3 Nile River

The Damietta Branch of the Nile River runs south to northeast through the Governorate emptying into the Mediterranean Sea at Ras El Bahr. The amount of fresh water and silt discharged into the sea has been significantly reduced since the building of the Aswan High Dam. The water level is subject to annual and seasonal fluctuations, highest in summer and lowest in winter, playing an important role in the ecology of the river ecosystem.

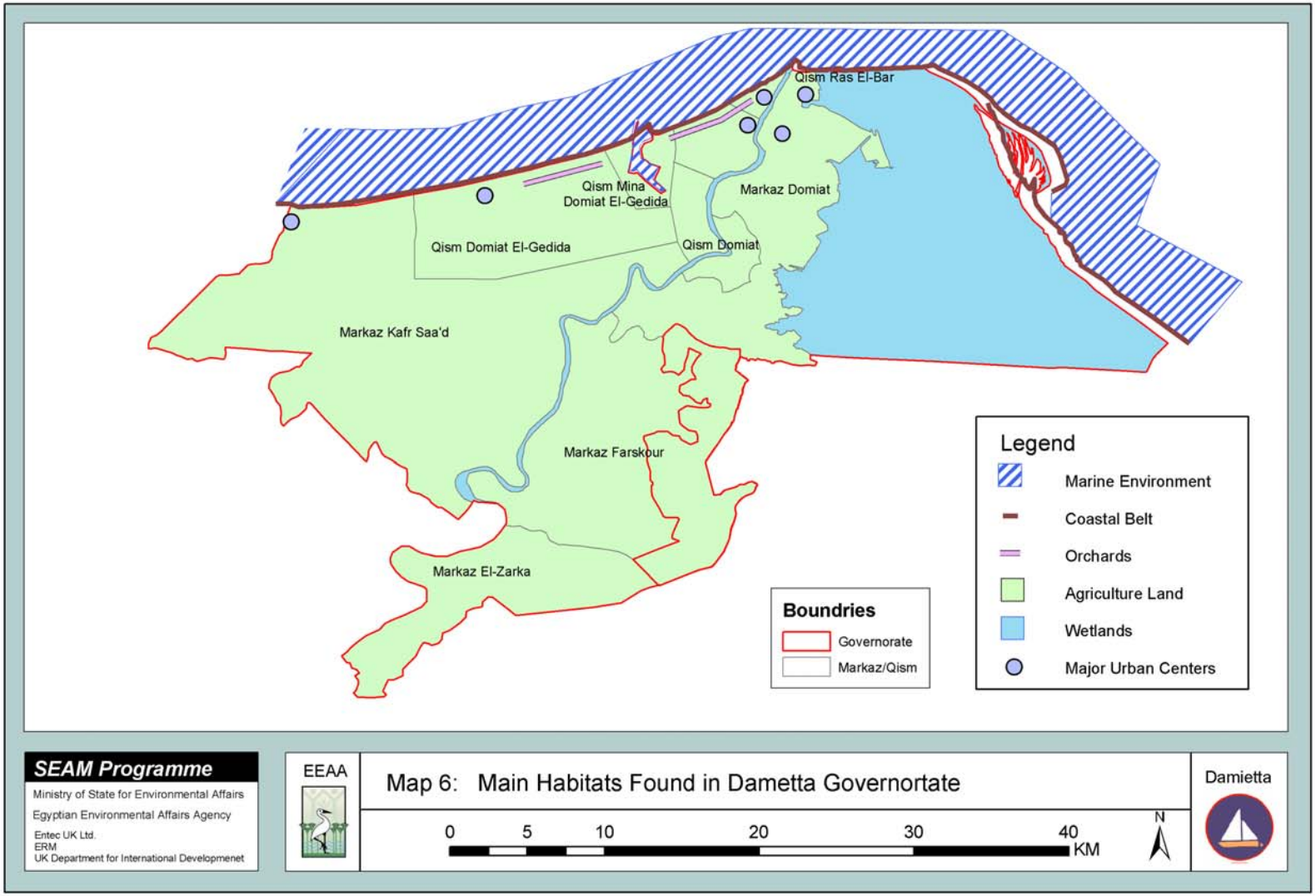
There is a considerable amount of urbanization along the Nile, particularly in the north where extensive stretches of banks have been sealed with concrete and limestone or sandstone blocks to protect them from erosion. A barrage has been built across the river south of Damietta, which was constructed to balance the water level before being fed into the El Salam Canal. South of the barrages fish cages extend along the length of the river. There is a large cultivated island at the southern boundary of the Governorate.

6.1.4 Man-made Wetlands

There are extensive man-made wetlands in the Governorate, including canals and drains, fish farms and rice fields, the latter is grown seasonally in the summer. These man-made environments have similar fauna and flora to the Nile River and Lake Manzalla and although much lower in biodiversity richness than natural wetlands, they provide vital habitats for amphibians and other micro-fauna.

6.1.5 Arable Lands

Arable lands are some of the Governorate's most productive habitats. Land use in the Nile Delta is intensive and nearly all arable land is either cultivated or built upon. The only substantive feral lands are patches along canals, roads, railroad tracks and field edges. Although of limited proportions, these feral patches usually contain only native vegetation, thus act as a reservoir for native species and wildlife refuges.



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Map 6: Main Habitats Found in Dametta Governortate

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Damietta

6.2 SPECIES

6.2.1 Flora

Except for wetland habitats, little native vegetation remains in Damietta, since most wetlands are exotic species cultivated for food. Natural vegetation and feral lands are much more prominent in northern Damietta than in the southern parts of the Governorate.

The rich Mediterranean coastal vegetation has been mostly eradicated, with only degraded patches remaining. Coastal dunes are dominated by *Zygophyllum aegyptium* with *Calligonum comosum*, *Salsola kali* and *Tamarix tetragyna* co-dominants whilst halophytes (i.e.*Halocnemum strobilaceum* and *Arthrocnemum macrostachyum*) dominate coastal saltmarshes and *Phragmites australis* and *Typha domingensis* vegetation dominate inland wetlands and large parts of lake Manzalla.

Canals, drains and rivers and their banks support important microhabitats for native flora, including several locally rare species, such as *Pistia stratiotes* and *Nymphaea lotus*. *Willows Salix sp*. are common along the Nile River and some of the larger canals. The introduced water haycinth *Eichhornia crassipes* is widespread in inland wetlands. Recently, a wide stand of *Cyperus papyrus* was recorded in the wetlands associated with the downstream section of the Damietta Branch of the Nile. This papyrus stand represents one of the only known remaining wild populations of this species in Egypt.

Date palm *Phoenix dactylifera* is the most common native tree mainly found in the northern part of the Governorate and contributes to the local economy. Most of the trees and scrubs are introduced species, such *Casuarina* and *Eucalyptus sp*. used around field edges as wind breaks and *Ficus sp*. planted for decoration.

6.2.2 Fauna

Mammals

Damietta has ten recorded mammals comprising mainly of rodents and bats. Larger mammals are fewer in number but include the rare Jungle Cat *Felis chaus*.

Birds

Birds are the most prominent and diverse vertebrate fauna. Several hundred species of birds reside in the Governorate though none are unique to the Governorate. Resident birds comprise less than 30% of the total species; the majority are passage migrants, winter visitors and summer breeding visitors. Some 43 species are presumed to be resident breeders in Damietta

(*Annexure A, Table 14.1*) whilst a small number migrate north from Africa to breed in Damietta during the summer months (*Annexure A, Table 14.2*).

Damietta's primary biodiversity importance is that the Governorate is situated on internationally important migration routes for birds travelling between breeding grounds in Eurasia and winter quarters in Africa. With this in mind large congregations of birds including significant numbers of waterbird species (*Annexure A Table 14.3*) migrate through Damietta every autumn and spring or spend winter in the area. Lake Manzalla is considered an important staging and refuleing site for migratory waterbirds.

Reptiles and Amphibians

At least 14 species of reptiles and six amphibians have been reported in Damietta Governorate (*Annexure A, Table 14.4)*. There is one endemic amphibian, the Nile Valley Toad *Bufo kassasii*, which is found throughout the Delta and Nile Valley. There are three species of sea turtle found in the Egyptian Mediterranean Sea: Leatherback Turtle *Dermochelys coriacea*, Green Turtle *Chelonia mydas* and Loggerhead *Caretta caretta*, the latter two are recorded breeding along the Egyptian coast. Loggerhead is the only species documented from Damietta, but no breeding records are known.

6.3 INTERNATIONAL AND NATIONAL STATUS

6.3.1 Habitats

Bird Life International has listed Lake Manzalla as an Important Bird Area (IBA) due to its international and regional significance as a wintering and refuelling station for migratory waterbirds. The Mediterranean Sea and its resources are listed under international conventions to which Egypt is party (see section 6.7.1). The Nile Basin initiatives in which ten riparian countries are participating, seeks to protect the river and its resources.

6.3.2 Species

A number of globally threatened species occur in Damietta, most of which are migratory birds (*Annexure A, Table 14.5*). The Governorate has limited importance for these species. Migratory and wintering birds are listed under the provisions of international conventions to which Egypt is a signatory. A large number of species are protected under Egyptian law as either species beneficial to agriculture or threatened. (see section 6.7.1)

6.4 BIODIVERSITY VALUE

Fishing is a major source of livelihood in the Governorate. Fish is an important food stable for the people of Damietta and an essential part of their diet, probably more so than in any other Governorate in the country.

Natural vegetation has commercial and practical applications, as well as important ecological functions contributing to the lives of the people of Damietta. Livestock grazing is a widespread activity throughout the Governorate, mostly by Bedouins-Arabs, including in the coastal belt, as well as in feral lands and wetlands. The fruits of the Date Palm *Phoenix dactylifera* are harvested for commercial sale and wild vegeation is collected to make crates, fencing and building materials. Vegetation also has other ecological functions that benefit man, such as natural water purification properties, soil stablization and providing food and shelter for wildlife. Birds are hunted for food, sport and commercial sale (*Annexure A, Table 14.6*).

Predators function as natural biological controls controlling agricultural pests. Birds of prey, snakes and many mammals, such as the Egyptian Mongoose *Herpestes ichneumon* feed on rodents and insects that cause crop damage.

6.5 ECOLOGICAL CHANGES

Drastic ecological changes have taken place in the Nile Valley and Delta over the past one hundred years, as a direct result of intensive human interventions (i.e. the Aswan High Dam) and manipulation of the natural environment, as well as a growth in population and associated environmental deterioration. Subsequently, many species have either changed their distribution or disappeared completely.

Observations and information collected indicate that there have been significant ecological changes in Lake Manzalla. A decline in the diversity and number of water birds and proliferation of water hyacinth, indicate that the health of the wetland has deteriorated. Furthermore, coastal development is also leading to a loss of habitat. In contrast, there would seem to have been an expansion of some resident birds due to ecological changes in agricultural land. In addition the expansion of orchards in the northern part of the Governorate seems to have played a key role in the spread and colonization of a number of species from the south.

Ecological changes continue to take place as a result of local and national policies and corresponding development activities, most notably the Toshka and El Salam Canals.

6.6 THREATS

6.6.1 Lake Manzalla

All indications are that Lake Manzalla is a wetland in distress. The lake is subjected to a host of human activities that have cumulative impacts that are difficult to assess.

Major environment problems affecting the lake include:

- A reduction in the size of wetland due to land reclamation, land fill, fish farming, garbage disposal and road construction;
- Pollution, which is contaminating the lake with heavy metals, pesticides and other harmful substances.
- A reduction in the carrying capacity of the lake to treat pollution.[1]
- Increasing sedimentation of the lake and siltation of the bugazes and channels;
- Changes in the water circulation and salinity regime due to the siltation of the bugaz, construction of roads, reduction of fresh water into the lake such as from the El Salam Canal and partitioning of the lake into pans for fish farming;
- Proliferation of reed beds, water hyacinth *Eichhornia crassipes* and other aquatic vegetation;
- Coastal erosion which is moving the lake sand bar inland; and
- Deteriorating water quality, which is leading to eutrophication.

The net impact of these threats will undoubtedly affect the lakes future economic productivity.

6.6.2 Bird Hunting

Bird hunting is a serious problem in the Damietta Governorate, perhaps more so than any other Governorate in the country. Damietta is unique in the fact that bird hunting takes place year around and is indiscriminate with resident birds being hunted as well as winter visitors and passage migrants.

Bird trapping takes place from late august to early september primarily along the Mediterranean coast. Quail *Corturnix coturnix* is one of the main target species of autumn bird hunting, but all species of bird including the globally threatened Corncrake *Crex crex*, song birds and birds of prey are trapped. Waterbird hunting takes place at Lake Manzalla from autumn into spring, with the main hunting season during winter. While ducks are among the most

[1] Industries, agriculture and municipalities in Damietta discharge wastewater untreated into the lake and other wetlands contributing to water pollution. The pollution also originates from sources further south; for example, the Bahr Baker Drain, the largest drain on the lake discharges untreated industrial and domestic wastewater from Cairo.

desirable species sought by the hunters, the nets catch all species of birds and appear to be raised all the time.

Other wildlife is possibly being caught in the Governorate, primarily for commercial sale. But the status of these practices in Damietta is difficult to ascertain.

6.6.3 Fisheries Issues

Excessive and indiscriminate fishing occurs both in the marine and inland wetlands environment potentially threatening the sustainability of the Governorate's fisheries. Fisheries issues are addressed in a separate section of this Environmental Profile. A summary of the main environmental problems facing this sector is presented below:

Summary of the Main Problems with Inland Fisheries

- **Over fishing.** There are difficulties enforcing the rules restricting fishing on the lake.
- **Use of illegal fishing methods.** Nets with mesh smaller than the legal limit are being used. There are also reports of dynamite, and other destructive and indiscriminate practices being utilized for fishing.
- **Fish farming.** Illegal fish farming is occurring without proper permits contributing to wetland reclamation. There are also pollution problems associated with fish farms, such as in relation to food supplements. One major concern of the Governorate is the pollution of the Nile caused by the fish cages. Plans are under discussion to move the fish cages in the river to Lake Manzalla, which would transport pollution to the lake. In addition, there are unsustainable fishing practices such as wild fish fry (i.e. mullet) being caught and used to stock fish farms. Many of the fish fry die during transport. There are concerns that the numbers of fish fry collected are higher than the replacement ratio of the wild stock.
- **Pollution.** Fish affected by pollution from the lake exhibit a range of diseases. There are concerns about the consumption of fish and the digestion of harmful contaminants. Fishing communities are suffering from a variety of health problems associated with pollution.
- **Increase in fishermen.** Given the high numbers of fishermen on the lake, there is over fishing and high disturbance to wildlife, particularly birds.
- **Changes in the lake.** There has been a decline in the high value saltwater fisheries due to the increase in fresh water. The reduction in the area of the lake, deteriorating water quality and other changes are negatively impacting the lake's fisheries.

6.6.4 Invasive Species

Several invasive species occur in the Governorate. The most serious and prevalent of these is water hyacinth *Eichhornia crassipes*, which was originally introduced into Egypt from South America. Water hyacinth represents one of the most serious environmental problems threatening Lake Manzalla. The infestation at the lake is one of the worst cases of this invasive species known in the country and perhaps even in the Middle East/North Africa. Furthermore, it is contributing to the eutrophication and sedimentation of this wetland

affecting its viability. Fishing is severely obstructed by the plant affecting thelivelihoods of local fisherman. Water hyacinths are also noted to be a problem along the Nile River and in the canal-drainage network in the Governorate.

Potental Negative Impacts of Water Hyacinth

- Loss of native plants;
- Loss of fish production and income for fishermen through inability to access sites and potential impacts to fish stocks;
- Clogging of water treatment stations intakes ;
- Microhabitat for a variety of disease vectors including bilharzias;
- Deterioration of the water quality and eutrophication of the lake

6.6.5 Pesticides

Pesticides are known to have detrimental impacts on biodiversity, particularly birds. During the 1980s, due to the widespread misuse of rodenticides, a sharp decline in bird populations occurred throughout the arable lands of Egypt. While the Ministry of Agriculture has made great strides in reducing the use of pesticides, particularly toxic substances, pesticides harmful to the environment continue to be applied. Cotton is one crop that is noted for its intensive use of pesticides.

6.7 BIODIVERSITY MANAGEMENT AND CONSERVATION

6.7.1 Internaitonal and National Legislation

There are a number of international conventions signed by Egypt applicable to the conservation of habitats and species in Damietta, including the following:

- Convention for Wetlands of International Importance (RAMSAR) (RAMSAR 1971).
- Convention for International Trade in Endangered Species of Flora and Fauna (CITES)
- Biodiversity Convention (CBD) (Rio 1992)
- Convention for the Conservation of Migratory Species of Wild Animal (CMS) (Bonn 1983)
- African-Eurasian Waterfowl Agreement (AEWA) (1998)
- Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona)
- Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (1995)

There are four main articles of legislation for habitat and species protection in Egypt (Baha El Din 1996) which include the following:

- Law 53/1966 for Agriculture.
- Law 102/1983 for the Natural Protectorates.
- Law 124/1983 on Catching Fish and Aquatic Life.
- Law 4/1994 for the Environment.

6.7.2 Protected Areas

Dahab Island is potentially a Protected Area under Decree 1969/1998 pursuant to Law 102/1983 for the Natural Protectorates. This decree was issued jointly by the Ministry of State for the Environment and Ministry of Water Resources and Irrigation and is to be implemented together by them. To date, the Nile islands have been protected in name only. Dahab Island is settled and intensively cultivated so little natural habitat remains.

6.7.3 Management Status

Biodiversity conservation is largely absent in Damietta as there is no department at the local level clearly identified to address biodiversity issues. Except for fisheries management, there is little in the way of enforcement of the conventions and laws protecting habitats and species. As a result conservation and ecological awareness in the Governorate is lacking. While the Damietta branch of Monsoura University could be an important institution for biodiversity research, monitoring and training, the expertise, facilities and resources at the university are limited. There are also are no local NGOs currently active in biodiversity related issues.

SECTION: III
STATUS OF THE BUILT ENVIRONMENT

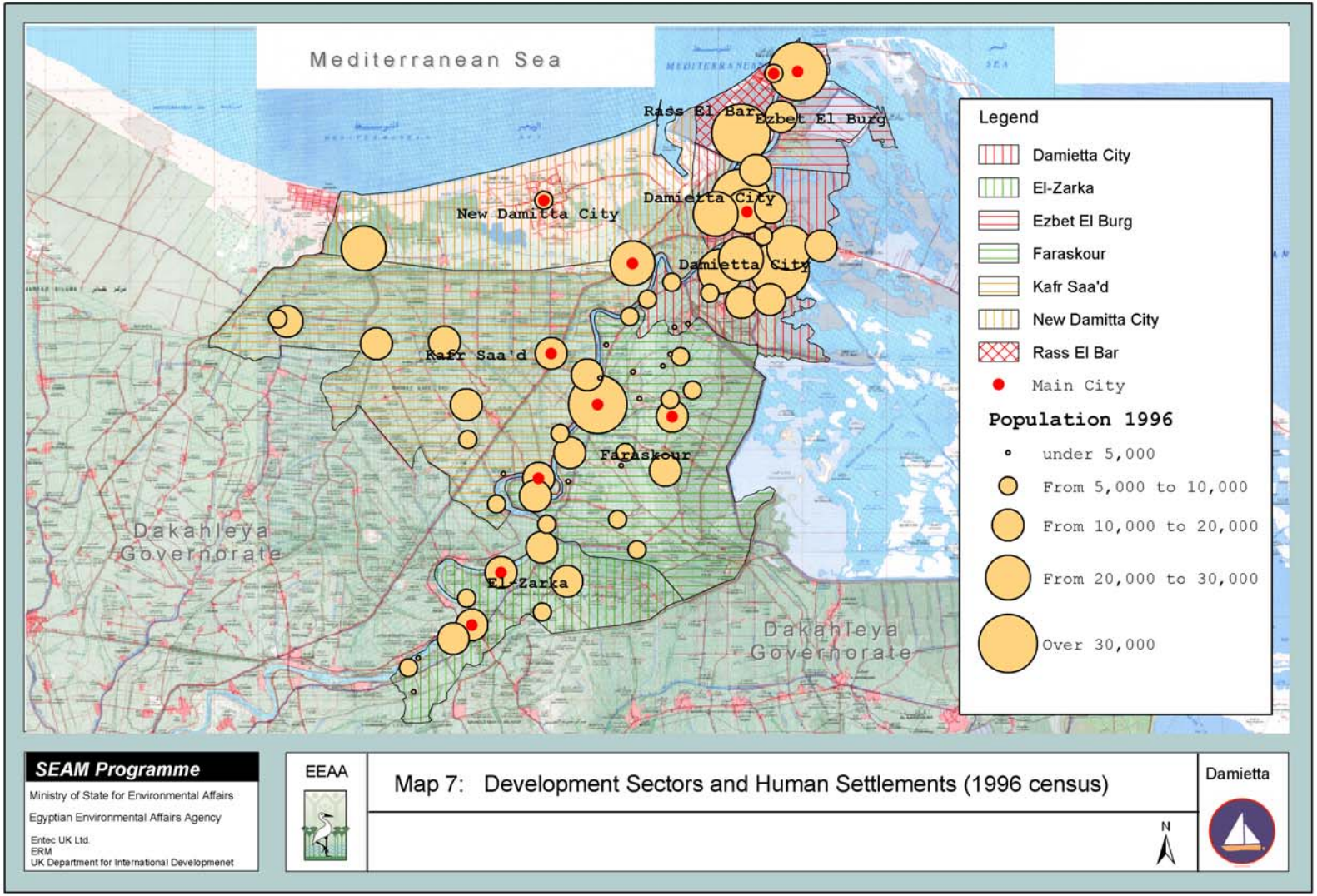
7. URBAN DEVELOPMENT

7.1 OVERVIEW

The distribution of human settlements in Damietta has been largely shaped by natural elements and more recently, by major development projects including large land reclamation projects in Kafr Saad in the 1960s, the construction of the Damietta Port and new city in the 1980s, and the international highway in the 1990s. Other projects such as expanding the regional road network and extending infrastructure and utilities have been initiated to support the Port's activities.

There is a clear imbalance in the geographical distribution of population in the Damietta Governorate. Human settlements form a linear axis along both sides of the Damietta branch attracting high population densities (*Map 7*). About $^2/_3$ of all human settlements in the Governorate are located on its eastern border and about $^1/_3$ on its western border. Densities decline as one moves east to west reaching the lowest densities along the shores of Lake Manzala (in Markaz Faraskour) and the prairies area in the northwestern part of the governorate.

Damietta remains predominately a rural Governorate with an urban population accounting for only 28.8% of the total population in 1996 (*Table 7.1*). Damietta City, is the only large city with a population of 78,000 in 1996 accounting for about 30% of Damietta's urban population. Most cities have less than 50,000 inhabitants. The population of rural settlements, on the other hand, vary in size with relatively larger village settlements (i.e 10,000) to the northeast around Damietta City and smaller village settlements to the northwest around Kafr Saad.



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Map 7: Development Sectors and Human Settlements (1996 census)

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Damietta

Table 7-1: Population Growth Trends (1960-1996)[1]

Year	Rural Pop.	Urban Pop.	Total Pop.	% Urban	Rural % Change	Urban % Change	Total % Change
1960	2,57,921	134,771	392,692	34.19			
1966	3,00,519	144,348	444,867	32.44	2.58	1.15	2.1
1976	409,939	166,387	576,326	28.87	3.15	1.43	2.62
1986	554,200	187,100	741,300	25.24	3.1	1.2	2.55
1996	649,759	263,796	913,555	28.88	1.6	3.5	2.13

(Governorate of Damietta – Statistics Year Book 2000)

In recent years however, rural areas have experienced relatively higher population growth rates than urban areas. This increase in urban population has largely been due to the transformation of rural areas into cities. Recent population trends also indicate that some cities are loosing population or growing slowly while surrounding rural areas are growing rapidly posing a major threat to limited agricultural land.

There is a high population concentration in Damietta Markaz, the smallest Markaz in terms of land area. Kafr Saad is the largest Markaz in terms of land area and accounts for 26.4% of total population. Urbanization rates in the Governorate and the predominance of rural character are evident in the percent of urban population (*Table 7.2*)

Damietta International Port was built in the mid 1980s, and is located on the Mediterranean Sea about 8.5 km west of Damietta Branch outfall. Connecting Damietta and Egypt with international markets, the development of the Port has lead to increased trade (imports and exports) and concomitant expansion of agricultural and industrial production in the region and the country. To support port related activities, the Governorate has witnessed major investments and improvements in the regional road network, which strengthened its linkages with other Delta governorates. New Damietta city, located in the northern part of the Governorate, has been built to accommodate expected population growth stimulated by the Port's activities. Moreover, the international highway, which extends parallel to the Mediterranean coastline, has strengthened inter-regional linkages between Damietta City, the Port and New city and other northern Governorates in the east and west.

[1] National Census Data

Table.7-2: Damietta Administrative Subdivisions

Markaz	Cities	Local Units	Villages	Area km^2	% Pop 1996	% Urban
Damietta	Damietta Ras El Bar Ezbet El Burg	9	16	133.7	43.7	29.6
Faraskour	Faraskour El Rouda	13	23	207.3	19	28.6
El Zarka	El Zarka El Serw	6	10	152.9	10.9	34.1
Kafr Saad	Kafr Saad Kafr El Bateikh Miet Abu Ghaleb New Damietta	14	31	535.1	26.4	25.7
Governorate	11	42	80	1029	100	100

(Governorate of Damietta – Statistics Year Book 2000)

The construction of Damietta Port in the mid 1980s has greatly changed development prospects with out migration slowing during the 1986-1996 period (*Table 7.3*).

Table.7-3: Migration Trends[1]

	1976	1986	1996
Out-migration	55,545	70,249	42,884
In Migration	35,519	22,771	34,069
Net Migration	-20,026	-47,478	-8,815

In addition to port related activities, Damietta Governorate benefits from a diverse economic base allowing economic development to focus on a variety of sectors namely, agriculture, trade, manufacturing, and tourism. Similar to national trends between1976-1996, Damietta experienced a continuous decline in the relative importance of agriculture and growth in manufacturing and services. During this period, the share of employment in agriculture declined significantly from 42% to 24% and since 1996, manufacturing has replaced agriculture as the lead sector in terms of employment.

The decline in the share of agriculture employment and growth of manufacturing and services is expected to continue in the future as

[1] National Census Data

development policies are centred on an ambitions industrial development strategy which aims to create 28,000 new jobs in the sector by 2017. New jobs will be absorbed into established industrial zones in the new city and Port and the four planned industrial zones in Marakaz Damietta, El Zarka, Kafr Saad and Faraskour. Moreover, the strategy centres on promoting existing sectors (wood, textile, food, metal and engineering), targeting labor-intensive small and micro enterprises, and utilizing local agricultural resources and materials.

7.1.1 Informal Areas in Damietta Governorate

The most significant environmental threat is the growth of rural and urban areas beyond their boundaries on agricultural land, especially in the Damietta City Region. While there is no data on informal growth in rural areas, data published in the Governorate's statistical year book (*Table 7.4*) illustrates that there are a total of 78 informal areas within the boundaries of urban areas (Cordons), five of which need complete demolition. These settlements provide housing for a total of 166,368 persons, which represents 18.2% of Damietta's total population and 63.1% of the total urban population in 1996.

Table 7-4: Informal Areas in Damietta Cities

City	Number of informal settlements			Area- km^2		Estimated 1999 population		Informal Area Density /acre
	Upgrading	Demolition	Total	Informal area	City	Informal area	City	
Damietta	32	1	33	0.95	10.6	57,216	83,300	252.95
Ras El Bar	0	2	2	0.03	8.5	692	8,292	96.88
Ezbet el Borg	1	0	1	1.89	1.6	37,352	34,322	83.00
Faraskour	22	2	24	0.251	5.54	24,604	32,672	411.70
El Rouda	1	0	1	9.6	9.6	18,045	20,174	7.89
El Zarka	2	0	2	0.023	0.4	3,500	15,664	639.13
Kafr Saad	11	0	11	0.118	6.23	3,672	25,915	130.70
Kafr El Bateikh	4	0	4	2.57	3	21,287	25,827	34.79
Total	73	5	78	15.432	37.47	166,368	246,166	45.28

(Source: Damietta Governorate Statistical Year Book – 2000)

The data provided needs clarification since there is no clear distinction among informal areas, deteriorated areas in the city (slums) and villages that have been transformed to cities. Moreover, the area of informal settlements appears relatively large, if densities are calculated. The total area of informal settlements is 15.432 km^2 (3,674 acres) with an average population density of 45.28 persons/acre. In spite of data problems, several observations are worth noting:

- Informal growth on agricultural land poses a major and continuous threat to land resources, especially in the areas surrounding Damietta City and in cities located along the major roads leading to the Port and New City.
- Damietta city has 33 informal areas surrounding it from all directions with a total area of about 1 km^2, accounting for about 50% of the city's population, resulting in a high population density of 253 persons/ acre.
- Informal urban growth on agricultural land is evident in the cities of Kafr El Bateikh and Kafr Saad, which are strategically located along the major highways leading to Damietta city, the Port and New Damietta City. Both areas have been decreasing in population since 1986[1], which may be partially explained by the increase in informal housing which represents a more affordable alternative to the high land values in urban areas.
- Whole cities classified as informal areas include: Ezbet El Burg, El Serw City in Markaz El Zarka and El Rouda in Markaz Faraskour, largely due to their deteriorating urban and environmental conditions
- In order to meet the housing needs of lower-income groups, several informal housing developments have emerged at various locations including: south and west of New Damietta City, south of the industrial zone, east of the Port's navigation canal, and south of the Port. Such housing developments total an area of about 550 acres.

If left uncontrolled, informal growth will lead to the emergence of a large unplanned urban sprawl in the Damietta City region. In addition to loss of agricultural land, these areas will place greater pressure on the environment requiring extensive environmental services (water, sanitation, solid waste), which are costly and difficult to mange on a large scale.

7.2 DEVELOPMENT PLANS & THEIR IMPACT ON DAMIETTA'S DEVELOPMENT

Past and Current Development Plans

Since the 1980s, Damietta Governorate has developed several plans in order to address development issues at the regional and human settlement levels, as outlined below:

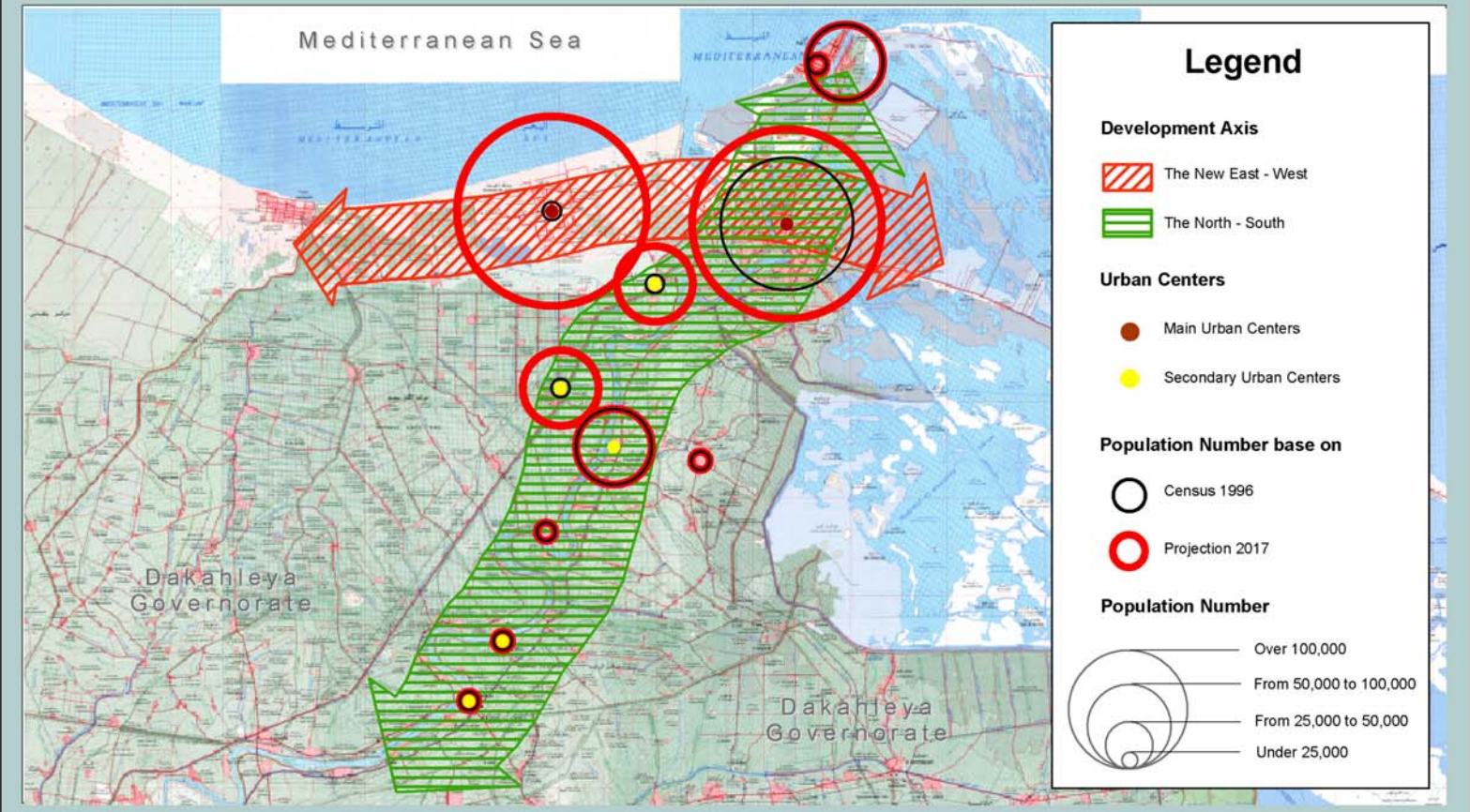
[1] It is worth noting that Kafr Bateikh was still designated as a village in 1986

Development Plans

- The National Urban Planning Strategy (GOPP 1982 – final report)
- Master Plan for New Damietta City (GOPP 1983)
- Master Plan for Damietta City (GOPP 1985)
- The Comprehensive Development Strategy for the Delta Region (GOPP 1992)
- The Regional Development Strategy for Damietta Governorate (GOPP 1998)
- The Comprehensive Development Plan for the Northern Coast of the Delta as a new urban agglomeration (GOPP 2002).
- Master Plan for Faraskour City (GOPP 1992)
- Master Plan for El Zarka City (GOPP 1993)
- Master Plan for Ras El Bar City (GOPP 1982)
- Master Plan for Kafr Saad City (GOPP 1979)

7.2.1 The "National Urban Planning Strategy" (NUPS)

The NUPS was prepared by Government Office of Physical Planning (GOPP) in the late 1970s as Egypt's first plan to integrate a spatial dimension into national economic and social development plans in order to achieve a more balanced distribution of population and economic activity. Main development concerns addressed in the NUPS were centred around the concentration of investments and economic activities in large urban centres, informal urban growth and encroachment on fertile agricultural land in the Delta (*Map 8*).



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Map 8: Urban Development Strategy (2017) in the Damietta Governorate

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Damietta

New towns in desert areas and the development of existing settlements with economic growth potential were proposed as policy mechanisms to address these concerns. The NUPS also stressed the importance of slowing down investments in new cities until it became economically sustainable; diverting new industrial development outside the Delta regions; and defining boundaries for all cities in order to control unplanned urban growth.

7.2.2 The Egyptian Ports Study (early 1980's)

This study identified the need to construct a new international port in Damietta Governorate with the potential to generate approximately 74,000 new jobs including 28,000 port related jobs. The new port would also act as a new growth engine to serve national economic growth objectives. The Ports study also identified that a new city should be built to accommodate the expected population growth triggered by the ports activities, associated expansion and agricultural and industrial production and trade in Damietta and the Delta region.

The study, however, did not forsee the need to locate any manufacturing activities in the New City, keeping them located within the Port's industrial zone.

7.2.3 New Damietta City Master Plan

Prepared by GOPP in 1983, the New Damietta City Master Plan set out to develop the New City and its immediate region, taking into consideration the city's development potential and constraints. The Master Plan identified the need to create a new development zone to alleviate population pressure in Damietta City's existing development zone. The plan also proposed that an industrial zone be built south of the city to support light, non-polluting industrial development. The new city is expected to absorb a large share of the Governorates population and in doing so will avoid further loss of agricultural land from expanding villages.

7.2.4 The Comprehensive Development Strategy for the Delta Region

The Comprehensive Development Strategy was prepared by GOPP in 1992, in order to achieve a more efficient utilization of the region's natural and human resources; improve inter-regional integration; preserve the region's economic inputs (i.e. agricultural land); and protect the environment. Among the strategie's main concerns was the importance of controlling urban and rural growth on agricultural land by setting urban boundaries for all cities and villages, enforcing strict laws and regulations and upgrading deteriorated areas in existing urban areas.

The strategy also stressed the importance of the Damietta Port and its related activities for triggering economic development. The proposed economic development policy centred on expanding Damietta's diverse economic base in manufacturing, agriculture, tourism and trade, with specific emphasis on developing micro and small enterprises.

The strategy also identified that Damietta Governorate had the capacity to absorb 1.9 million people by 2020. In order to do this, it planned to accelerate development in existing urban and rural settlements with Damietta New City absorbing 500,000 people by 2020 – a much larger figure than that identified in the Master Plan of 270,000. However, in view of current Governorate population trends, as well as slow population growth in the New City, it is unlikely that Damietta's population will reach 1.9 million by the 2020 as outlined in the CDS.

7.2.5 Damietta Governorate's Regional Development Strategy (RDSDG) up to 2017

The RDSDG was prepared by GOPP in 1997, taking into consideration the recommendations and policies formulated in the Comprehensive Development Strategy for the Delta Region (CDSDR). The RDSDG represents the most recent plan affecting Damietta development and one which captures existing development potentials and constraints, including detailed Sector Development Strategies - addressing population, economic sector development (agriculture, manufacturing, etc.) and a comprehensive Urban development strategy.

The RDSDG emphasizes the importance of supporting the development of the New Damietta City as the Governorates main growth area, with a projected population of 270,000 by 2017. In order to achieve this, the RDSDG encourages port-related activities such as shipping, transport, and manufacturing; (hotels, restaurant, etc.); and extending the necessary services and infrastructure. The RDSDG also proposes the development of new tourism facilities (5,000 new jobs by 2017, requiring a total investment of 445 million LE) along the Mediterranean coast north of the New City and expanding the capacity of Ras El Bar as a traditional summer resort area. The Strategy estimates that a total of 5,000 new jobs will be created in the tourism sector requiring a total investment of 445 million LE over the 1996-2017 period.

7.2.6 The Comprehensive Development Plan for the Delta's Northern Coast

Prepared by GOPP as a Presidential Decree (No 108/2000), this is the region's most recent Plan. It addresses the Governorate's development potential and constraints related to the construction of the international highway, which extends from Rafah to El Saloum. The international highway

has opened a new development frontier in the northern delta that if left unaddressed, will result in unplanned development and pose major pressures on the environment.

Relative to other Urban Strategy Development sectors, Damietta sector is characterized by a high population density around Damietta City, and major investments in the port and new city area. As Damietta Port represents the areas major growth engine, the Plan recommends channelling investments into projects that complement the Port's activities such as development of industries based on agricultural resources, commercial activities, new tourism facilities, and necessary improvements in road networks and utilities[1].

In order to achieve economic efficiency, the strategy aims to accelerate development in New Damietta so that it is able to reach its planned population target. The strategy also sets in place strict controls to ensure that urban expansion of Damietta City on agricultural land does not merge with the Port and new city, since forming such an unplanned expansion would increase the costs associated with extending utility networks and services.

Moreover, the Plan recommends targeting development in existing small and medium cities in the sector such as Kafr Saad, Kafr El Bateikh, Ezbet el Burg and Ras El Bar. These cities have adequate services and utility networks and the have potential to grow within their defined urban boundaries.

Population Projections

Population studies estimate that Damietta Governorate will reach a population of 1.35 million by 2017. Similarly, by 2017 Damietta New City population is expected to reach a population of 54,000 - well below its planned Cities Master Plan population of 270,000.

Development Plans - Concluding Remarks

Based on this brief review of development plans affecting Damietta, the development outlook for Damietta Governorate has changed from the projections originally outlined in the NUPS. With the development of the Port and new city, the Governorate is expected to play a major role in Egypt's economic development. According to the Plans, the new city will attract residents and private and public investments and unlike many other new cities, has the potential to achieve the NUPS objectives in terms of population growth absorption and securing economic returns on public investments

[1] The total investment cost for implementing proposed projects and increasing the efficiency of existing investments over the next 25 years is about 500 million LE. This investment will result in the creation of some 10000 new jobs and a 90 million LE increase in value added.

allocated to the construction of the Port and New City (economical sustainability). Clearly, growth triggered by the Port and new city is impacting on the development of other human settlements in the Damietta Governorate as well as other Governorates.

7.3 IMPLICATIONS OF POPULATION & ECONOMIC GROWTH TRENDS ON DAMIETTA DEVELOPMENT SECTORS

The urban development strategy divides Damietta Governorate into three homogeneous Development Sectors, separated into seven planning units. It addresses each sector according to its development potential and carrying capacity (*Table 7.5*).

Table 7-5: Development Sectors and Planning Units

Development Sector	Planning Unit	Cities & Villages
Damietta City	Damietta City	Damietta and Kafr El Bateikh Cities & Sanania Village
	Ras El Bar	Ras El Bar
	Ezbet El Burg	Ezbet El Burg City, Shatt el Sheikh Durgham, Shatt el Khyatia Villages
Eastern Sector	*Faraskour*	Faraskour and El Rouda Cities
	El Zarka	El Sarou and El Zarka Cities
Western Sector	*Kafr Saad*	Kafr Saad and Miet Abou Ghaleb Cities
	Damietta Port and New City	New Damietta City

The following *Table* 7.6 illustrates that all Damietta's Development zones except Kafr Saad & New Damietta will exceed their expected populations by 2017.

Table 7-6: Changes in Damietta Markaz Populations (%)

Development Zones	1996 Census	2017 Planned	2017 Projected
Damietta	43.72	37.03	46.88
Faraskour	18.98	15.33	17.53
El Zarka	10.91	9.40	11.17
Kafr Saad & New Damietta	26.39	38.2	25.21
Governorate	100	100	100

7.3.1 Development Sector 1: Damietta City

Markaz Damietta has a high concentration of manufacturing and commercial activity, which accounts for 84.5% and73.2% of the Governorate's total employment in both sectors. Only 42.2% of the labor force is employed in manufacturing, with relatively higher shares in rural areas than urban areas[1]. According to Damietta's Regional Strategy (DRS), relative to its population share, Markaz Damietta will have a disproportionately smaller share of new jobs (22.4 %) created between 1996-2017 (*Table 7.11*)

Damietta City

Damietta City has actually been loosing population since 1976 with a large loss between 1986 and 1996 (-1.28 % population, *Table 7.12*)[2] and if current population growth rates continue, the city will not reach its planned population target of 140,000 by 2017 (*Table 7.13*). However, it should be noted that the population is decreasing due to the relocation of residents from within the city's official boundary to villages immediately surrounding Damietta City, which are essentially urban in character. If this informal growth was absorbed into the city the city's population, it would meet its planned population target. Though manufacturing continues to be the dominant sector in Damietta City (*Table 7.14*), employment is growing in the service and retail trade sectors.

In contrast to Damietta City, surrounding rural areas experienced high annual growth rates between 1986 and 1996. For example, the population of El Sanania village grew at an annual rate of 4.2% between 1986-1996 on agricultural land separating Damietta City and the Port. Should current growth trends continue, it is projected that villages surrounding Damietta city will

[1] National Census Data

[2] The decline in population during this period is evident in all 4 qisms in the city with Qisms 2 and 3 (the oldest parts of the city) experiencing very high negative annual rates (respectively -4.5 % and 1.72 %).

double their population. According to census data, El Sanania's population will exceed that of Damietta city itself in 2017.

Similar to Damietta City, Kafr el Bateikh City, (a secondary growth pole in Damietta's regional development strategy) is also facing lower than planned population growth rates. If current rates continue it will reach a population of 14,229 by 2017 less than the 50,000 targeted (*Table 7.13*).

Ezbet El Borg

Most of this area is covered by lake Manzala and human settlements are scattered along the lake's narrow coastal strip east of the Damietta Branch with little land for growth. Ezbet el Burg is the region's major fish production centre with 63.7 % of its labor force engaged in agriculture and fisheries. If current growth trends continue, Ezbet el Burg will have a population of roughly 37,000 in 2017, which is only slightly lower than the planned target of 45,000 (*Table 7.13*). The city's slow growth may be due, in part, to the fact that the city lacks adequate environmental services.

Shatta is the only settlement in the area that has shown a visible annual growth rate of approximately 8% (*Table 7.12*). With this growth, projected populations are expected to reach 67,726, a population beyond the carrying capacity of 30,000.

Ras El Bar

Whilst Ras El Bar City's economic base has been shifting away from agriculture (28.5% in 1996 compared to 40% in 1976) towards manufacturing (13.9% in 1996 compared to 8.7% in 1976) and services, it has the highest share of employment in hotels and restaurants in the Governorate. Bordered by the sea and agricultural land along the Damietta branch, the only land for urban expansion is southwest, in the direction of the Port. Between 1986-1996, Ras el Bar population grew by 3.7%; this growth is partly explained by the transformation of this seasonal summer resort into a permanent residential community.

The city's future development is likely to centre on expanding tourism facilities, and is expected to capture most of the 1,000 new tourism jobs planned for Markaz Damietta by 2017. The city's future development must therefore be controlled to ensure that coastal areas west of the city are allocated to tourism development. If current trends continue, the city will reach the planned population size of 15,000 in 2017 (*Table 7.13*).

7.3.2 Summary of Development Sector 1's Development Issues

- Damietta Development Sector's population will exceed planned targets by approximately 140,000 persons, most of whom will settle in rural areas threatening fertile agricultural land. This may further accentuate current imbalances in population and economic activities (manufacturing), which could hinder the planned development of Damietta New City. Human settlements will continue to grow, forming a large urban sprawl that will be difficult to manage and supply with necessary infrastructure and utilities.
- Damietta City is losing manufacturing jobs to surrounding villages. If employment trends continue, then industrial pollution problems will increase in rural areas around Damietta city.
- Unplanned development along major highways especially the international highway between Dieba and Damietta must be controlled.
- A new industrial zone has been declared in Damietta Markaz and approximately 5,460 new jobs are projected in the DRDS[1] economic development plan. Given that many manufacturing establishments are small, the new industrial zones must provide suitable and affordable areas for micro enterprise.
- Appropriate measures must be taken by industry to protect the environment.

7.3.3 Summary of Sector 1's Environmental Issues

- Environmental problems related to industrial growth will become more severe pronounced in the rural areas (i.e. EL Sanania, Shat Geriba, Shat Gkhiet El Nasara and Shat Moheb wa El Sayala) surrounding Damietta City.
- If current growth trends continue, rural villages will have doubled their 1996 population size by 2017. Besides loss of agricultural land, population growth will put additional pressure on environmental resources and services (water, sanitation and solid waste management), which are currently inadequate[2].
- At the moment, small industrial workshops in Kafr el Bateikh City do not pose a large environmental problem. However, if industry continues to grow and no adequate controls are put in place environmental problems such as air pollution and solid and hazardous waste will increase.
- Environmental problems in Ezbet el burg are mainly related to the inadequate treatment of liquid and solid wastes discharged from fish production and food processing, into the River Nile. The city also suffers from a lack of adequate environmental services.
- Shatta's rapid growth must be controlled within its maximum carrying capacity (30,000) otherwise population growth and industrial activities will place increased pressure on natural resources (agricultural land & services) and pose serious environmental and public health problems.

[1] Damietta Regional Development Strategy

2 About 50% of HH in rural Markaz Damietta are connected to the sanitary drainage network.

- As Shat el Khayata village is an extension of Damietta City industrial activities, it will face similar environmental problems as those already mentioned above.

7.3.4 Development Sector 2: Eastern Sector

This development sector includes Faraskour and El Zarka Planning Units.

Faraskour

Markaz Faraskour's main cities include Faraskour and El Rouda. Since 1976, there has been a shift in employment from agriculture towards services. Between 1976 and 1996, the Mmarkaz's share of employment in agriculture declined from 52.7% to 27.8 % while employment in services increased from 15.5% to 25.7 % (*Table 7.14*). Between 1986 and 1996, Faraskour's population grew by 1.89 %. The percentage of urban population also declined during this period from 31 % to 29 % as a result of relatively higher population growth rates in rural areas (2.28 %) than in urban areas (1.0 %) (*Table 7.7*).

Relative to its population share, Markaz Faraskour will have a disproportionately smaller share of new jobs created in the Governorate between 1996 and 2017 (10.26 % of all new jobs, *Table 7.11*).

Similarly, if current trends continue, rural areas of Markaz Faraskour will grow beyond planned targets and will have approximately 29,800 more residents in 2017 than originally planned (*Table 7.13*). Accordingly, the Markaz population in 2017 will decline from 18.98 % to 17.53 %, which is higher than the planned 2017 population of 15.33 % (*Table7.6*).

Table 7-7: Development Sector 2 (Faraskour) Projected and Planned 2017 Population Targets

	Annual % Change 1986-1996	Projected 2017	DRDS 2017	Difference
Faraskour City	0.49	34,015	45,000	10,985
El Rouda City	1.89	28,086	20,000	-8,086
Total Urban	1.00	62,101	65,000	2,899
Total Rural	2.28	187,100	154,400	-32,700
Total Markaz	1.89	249,201	219,400	-29,801
% Urban	28.6	24.9	29.6	

Faraskour City

Faraskour city is renowned for its food, plywood, furniture, and shoe industries. It experienced a very slow population growth between 1986 and 1996 of 0.54 %[1]. Growth in manufacturing employment was also very slow between 1976-1996, and as a result the relative importance of manufacturing declined from 19.4 % to 16.15 % over the same period. The plywood factory located north of the city (in Kafr Adma) has been closed down and land for the cities industrial zone has not yet been allocated. According to city officials there is no land for industrial development. Should current trends continue, Faraskour city will have a population of 34,000 by 2017, which is well below its planned population target of 45,000 (*Table 7.13*). This may be partly attributed to a stagnant manufacturing economic base.

El Rouda City

El Rouda City is a rural service community located inland, close to Lake Manzala, and is dominated by agriculture employment (30%, *Table 7.14*). El Rouda city's population grew by 1.98 % annually during 1986-1996. Should current trends continue, the city will reach a population of 28,000, which is slightly higher than its planned population size of 20,000 (*Table 7.13*).

EL Zarka

El Zarka Markaz[2] is located on fertile agricultural land along the eastern bank of the Damietta branch. The area has strong links with Dakhaleya Governorate through the Regional Highway and is relatively isolated from the Damietta city development zone the New City and Port development zone. The main cities include the cities of El Zarka and El Serw.

Between 1976-1996, there was a slight shift in employment from agriculture (43.8 % to 29.2%) towards services (23 % to 29.34 %). El Zarka Markaz has little potential for industrial growth since industry is concentrated in other parts of the Governorate.

In 1996, El Zarka Markaz accounted for the smallest share of the governorate's population (10.9 %), the lowest population density (651 persons/km2) and the highest percent urban population (34.14 %). The urban population grew by 1.73 % annually (*Table 7.8*), which is higher than the Governorate's urban growth rate (0.11 %).

[1] National Census Data

[2] In 1975, El Zaraka village was declared as a city in Markaz Faraskour, in 1986, it was separated from Marakaz Faraskour and established as the capital of a new Markaz named El Zaraka. Several secondary villages that were previously within the jurisdiction of Marakaz Faraskour were annexed to El Zarka City.

Table 7-8: Development Sector 2 (El Zarka) Projected and Planned 2017 Population Targets

	% Change	1996 Pop	DUP[1] 2017	DRS[2] 2017	Difference
El Zarka	1.82	14,717	21,494	25,000	3,506
El Serw	1.81	19,291	28,116	25,000	-3,116
Total Urban	1.73	34,008	49,610	50,000	390
Total Rural	2.12	65,597	97,838	85,000	-12,838
Total Markaz	1.73	99,605	147,448	135,000	-12,448
% Urban		34.14	33.65	37.04	

Relative to its population share, Markaz El Zarka will have a disproportionably smaller share of new jobs created in the Governorate between 1996-2017 (6.21 % of all new jobs and 8.14 % of new manufacturing jobs, *Table 7.11*)
El Zarka City is the Markaz's main administrative and service centre with services accounting for 39.3 % of total employment and agriculture for 17 %. Manufacturing employment declined from 12% in 1986 to 9.14% in 1996 (*Table 7.14*). In order to achieve its planned population targets the city will have to develop its industrial zone.

El Serw City is an agricultural service centre with high shares of employment in agriculture 25.19% and services 31.33% (*Table 7.14*). El Sarou population grew by about 1.8 % annually during the 1986-1996 period and if current trends continue, El Sarou will have a population of 28,116, slightly higher than its planned population size of 25,000 (*Table 7.13*). Rural areas population will also exceed planned targets by approximately 12,838 persons.

7.3.5 Summary of Sector 2's Development & Environmental Issues

- The eastern sectors population will exceed planned 2017 targets by 42,248 persons, which will place additional pressure on existing water and sanitation services.
- Rural areas will accommodate approximately 45,500 more residents by 2017 which will pose a threat to scarce agricultural land.
- The Development Sectors main cities, Faraskour and El Zarka city will not achieve the planned population targets, while El Rouda and El Sarou cities will exceed planned targets and may threaten agricultural land.

[1] Damietta Urban Plan
[2] Damietta Regional Strategy

7.3.6 *Development Sector 3: The Western Sector*

This development sector occupies 52% of the Governorate's total area and includes Kafr Saad and New Damietta City and Port.

Kafr Saad

Kafr Saad's main cities include Kafr Saad City and Miet Abou Ghaleb City. While the major economic activity in Markaz Kafr Saad is agriculture there has been a major shift towards manufacturing and services in recent years (*Table 7.14*). Between 1986-1996, the population of Markaz Kafr Saad grew at an annual rate of 2.82 % which was higher than the Governorate's growth rate. However, much of this growth was in rural areas, which grew at exceptionally high rate (4.5 %) while urban areas decreased in poulation (-1.2 %) (*Table 7.12*). However, relative to its population share (25.7%), Kafr Saad will have a disproportionably smaller share of new jobs created in the Governorate between 1996-2017 (13.21 % of all new jobs and 14.1 % of manufacturing jobs) (*Table 7.11*). A new industrial zone has been planned for the Markaz, but no land has been allocated yet.

Kafr Saad City

The City has been experiencing a major change in economic structure from agriculture to services and manufacturing. Between 1976-1996, agricultural employment declined from 72 % to 30.1 %, while manufacturing employment increased from 6.7 % to 17.6 %; and services employment increased from 13.7 % to 28.4 %.

Despite strong functional linkages with the New city and Port and improved road networks and an expanding industrial base, Kafr Saad City decreased in population between 1986-1996. Should current trends continue, Kafr Saad City will have a population of 14,000 in 2017, which is well below its planned target of 45,000. As such, the city will be unable to assume its role as a secondary urban centre as envisaged in the DRS.

Miet Abo Ghaleb City

Mieta Abo Ghaleb City is a newly established city located on the western border of the Damietta Branch and not considered a city in the DRS. The city's economic structure is dominated by agriculture and construction, accounting respectively for 25.66%, 29.56 % of total employment. Between 1986-1996, the city's population grew by 1.8 % annually and is expected to reach a population of about 20,000 in 2017. Rural areas in Kafr Saad have experienced exceptionally high population growth rates (4.5% pa). Should current growth rates continue, then the rural population in 2017 will reach 257,226 people – a number significantly higher than the planned population of 172,000 by DRS.

New Damietta City and Port

Located in the northwestern part of the Governorate, Damietta New City and the Port, were planned to form a new east-western development axis to alleviate population pressure from the existing south-north development axis along the Damietta Branch. The area enjoys strong linkages with other parts of the Delta and the Governorate through the international high way and the regional road network.

New Damietta City

Located along the northern coast of the Mediterranean Sea, New Damietta city (6,500 acres) has been built to accommodate a population of 270,000 and includes five residential districts and two industrial zones, as well as land for tourism development. New Damietta city's population is well behind its planned population target of 25,500. In 1996, the city had a population of 6,520 residents and in 2000 the city's population was estimated at only 7,058 residents.

In contrast to slow population growth, development in the city's industrial zones is progressing rapidly. The city has two industrial zones, namely the industrial zone and the new industrial zone extension, both located south of the city. The industrial zone has a total area of 341 acres divided into 308 land subdivisions. As reported in the Governorate Statistical Year Book (2000), 291 land parcels have been allocated to investors, 134 projects are under construction, 160 projects are operating, and five have yet to be allocated. *Table 7.9*, illustrates that there are various types of industry in the industrial zone employing 6,688 workers and generating approximately 2,742 new jobs once the 134 projects are completed. However, it must be noted that many of these are heavily polluting industries. The industrial zone extension has an area of 245 acres divided into 351 land subdivisions with areas ranging from 486 m2 and 4000 m2, of which, 305 lots have been allocated. There are no restrictions on the type of projects in the Industrial Zone Extension.

Table 7-9: Type and Number of Workers in New Damietta City Industrial Zone

Activity	Operating	No. of workers	Land area m^2	Under construction	No. of workers	Land allocated to projects
Food, beverage and tobacco	20	598	68,432	21	472	53,932
Spinning, weaving and apparel	5	273	13,405	10	304	16,977
Building materials	14	284	25,983	2	29	1,653
Wood and wood products	38	2,100	186,057	37	899	50,223
Chemicals	14	249	28,728	2	149	972
Paper	3	49	6,095	0	0	0
Electronics and electrical	3	45	2,223	2	74	4,608
Metal products	3	28	8,570	6	97	12,075
Other	60	3,062	346,922	54	718	111,362
Total	**160**	**6,688**	**686,415**	**134**	**2,742**	**251,802**

[Source: Governorate Statistical Year Book 2001]

Damietta Port Industrial Free Zone

Part of the Port's main facilities includes the Industrial Free Zone which is located east of the Port on an area of 190 acres divided into 178 subdivisions. Land has been allocated for 18 projects, ten of which are operating and eight which are under construction. About 3 665 workers are employed in the operating facilities.

According to the DRS, New Damietta City is expected to capture 47.9 % of all new jobs created between 1996-2017 and a similar share of all industrial jobs (*Table 7.10*).

Table 7-10: New Jobs in New Damietta (1996-2017)

Planning Unit 7	New Damietta 1996-2017 New Jobs	Governorate 1996-2017 New Jobs	New Damietta Share of total Jobs
Agriculture		17,050	
Manufacturing	13,900	28,980	47.96
Tourism	4,000	5,000	80.00
Services	2,300	42,300	5.44
Commerce	15,000	26,470	56.67
Transport	9,100	15,830	57.49
Total	65,000	135,630	47.92

While it may be possible to achieve the development plan's employment targets, the major problem relates to whether Damietta New City will be able to achieve its population target of 255,000 by 2017. This is largely dependent on whether Damietta New City will be able to accommodate workers in the city itself.

Population data suggest that most workers in the New City do not live in the city but live elsewhere where land and housing is more affordable. Without strong government commitment to the development of the New City and improving access to affordable housing, it is unlikely that the city will capture population growth triggered by the port and industrial activities and thus will be unable to reach the planned population target of 255,000 by 2017(*Table 7.13*). According to DRS population studies, the population of the New City will be approximately 54,000 residents by 2017.

7.3.7 Summary of Sector 3's Development Issues and Environment Concerns

- Should current trends continue, the western development sector will reach a population of 358,614 by 2017 - well below the planned population target of 547,000 (188,386 fewer residents). Consequently, Kafr Saad population will be much smaller by 2017 (25.22%) than that projected in the plan (38.21%). This gap is mainly due to population decreases in existing urban areas (Kafr Saad City, Kafr el Bateikh) as well as new Damietta City not increasing in population as originally projected.
- Urban areas will have a smaller population than planned targets by about 273,611 residents (200,000 in New Damietta City) by 2017. Environmental problems in the western development zone will be most evident in the new industrial zones. While there is an increase in the relative importance of industry in the cities of Kafr Saad and Kafr el Bateikh, environmental problems will need to also be addressed in parallel.Population growth in rural areas will exceed planned targets by some 85,000 inhabitants, placing additional pressure on land and environmental services.

7.3.8 Summary

The construction of Damietta Port and the international highway and the establishment of Industrial Zones in New Damietta city and Port have greatly changed the development outlook for Damietta Governorate. However, the urban development strategy proposed in Damietta's Regional Strategy has not been very successful at achieving a more balanced distribution of population and economic activity on scarce agricultural land. The new east-west development corridor has not been able to absorb the Governorates population growth or alleviate pressure from the existing north south development axis along the Damietta Branch. This is largely due to the slow population growth of Damietta New City and the failure of Kafr Saad and Kafr

el Bateikh in reaching a population size capable of creating economically viable secondary urban centres.

With a relatively weak Western Development Sector, population growth and economic activity has been largely absorbed by Damietta's Development sector. However, much of this new growth has been in rural areas around the city where manufacturing activities predominate. With this in mind, measures should be taken to ensure that this new rural development around Damietta City does not merge with the port forming a very large urban sprawl. Such urban sprawl would therefore make it difficult to enforce environmental protection and extend utility networks and services. It will therefore be necessary to enforce strict controls on agricultural land uses separating Damietta City and the Port and New City.

Moreover, there is a need to support industrial development in Markaz Kafr Saad, Kafr El Bateikh, El Zarka, and Faraskour to achieve economic efficiency of the urban system. These cities currently have adequate services and utility networks and the potential to grow within their defined urban boundaries. However, the development of these cities is dependent on establishing the planned industrial zones and directing industrial investment to achieve the necessary jobs according to DRS economic development plan.

Table 7-11: New Jobs in Damietta Governorate by Planning Unit (1996-2017)

Sector	Damietta New Jobs	Faraskour New Jobs	El Zarka New Jobs	Kafr Saad New Jobs	New Damietta City New Jobs	Governorate New Jobs	% Share of Total New Jobs				
							Dam	Farask	El Zarka	Kafr Saad	New Damietta
Agriculture	9,550	2,570	1,430	3,500	-	17,050	56.01	15.07	8.39	20.53	-
Manufacturing	5,640	3,000	2,360	4,080	13,900	28,980	19.46	10.35	8.14	14.08	47.96
Tourism	1,000	-	-	-	4,000	5,000	20.00	-	-	-	80.00
Services	7,000	4,800	2,500	5,000	23,000	42,300	16.55	11.35	5.91	11.82	54.37
Commerce	4,600	2,400	1,130	3,340	15,000	26,470	17.38	9.07	4.27	12.62	56.67
Transport	2,580	1,150	1,000	2,000	13,400	15,830	16.30	7.26	6.32	12.63	57.49
Total	**30,370**	**13,920**	**8,420**	**17,920**	**72800**	**135,630**	**22.39**	**10.26**	**6.21**	**13.21**	**47.92**

Table 7-12: Population Trends in Damietta - Planning Units

Planning Unit 1 Damietta	1996 Pop	% Annual Growth 1986-96	Projected 2017 Pop
Damietta City	78,265	**-1.28**	**62,514**
El Sanania	39,390	**4.37**	96,711
Shat Geriaba	10,535	5.38	31,663
Shat Ezbet el Lahem	43,655	2.22	69,229
Ghiet El Nasara	29,006	2.25	46,283
Shat Moheb wa el Sayala	37,843	3.55	78,730
Total Villages	160,429	**3.4**	**322,615**
Kafr El Bateikh	24,266	**-2.5**	**14,229**
Planning Unit 2 - Ezbet El burg	**1996 Pop**	**% Annual Growth 1986-96**	**Projected 2017 Pop**
Ezbet El burg	32,247	0.63	36,,793
Shatta	13,961	7.81	67,726
Shat el Sheikh Dorgham	12,992	1.71	21,977
Khayata	13,172	1.82	23,042
Planning Unit 3 – Ras El Bar	**1996 Pop**	**% Annual Growth 1986-96**	**Projected 2017 Pop**
Ras El Bar	7,79[illegible]	3.[illegible]	17,01[illegible]
Planning Unit 4 - Faraskour	**1996 Pop**	**% Annual Growth 1986-96**	**Projected 2017 Pop**
Faraskour City	30,697	0.49	34,015
El Rouda City	18,955	1.89	28,086
Planning Unit 5 – El Zarka	**1996 Pop**	**% Annual Growth 1986-96**	**Projected 2017 Pop**
El Zarka	14,717	-2.86	21,494
El Serw	19,291	1.86	28,116
Planning Unit 6- Kafr Saad	**1996 Pop**	**% Annual Growth 1986-96**	**Projected 2017 Pop**
Kafr Saad City	17,829	-1.18	13,895
Miet Abou Ghaleb City	13,218	1.81	19,265
Kafr El Bateikh		-2.51	14,229
New Damietta	6,520		54,000

Table.7-13: Urban & Rural Population – Current Trends and Planned Targets 2017

			2017 Population DRS Planned		
		Census 1996	Projected	DRS Planned	Difference Plan & Proj.
Markaz Damietta	Damietta	78,265	62,514	140,000	77,486
	Ras El Bar	7,791	17,016	15,000	-2,016
	Ezbet El Burg	32,247	36,793	45,000	8,207
	Total Urban	**118,303**	**116,323**	**200,000**	**83,677**
	Total Rural	**281,127**	**550,206**	**330,000**	**-220,206**
	Total Markaz	**399,430**	**666,528**	**530,000**	**-136,528**
	% Urban	*29.62*	*17.45*	*37.74*	
Share of ***Governorate***	*Urban Population*	*44.85*	*35.31*	*28.99*	
	Rural Population	*43.27*	*50.37*	*44.51*	
	Total Population	*43.72*	*46.88*	*37.03*	
Markaz Faraskour	Faraskour	30,697	34,015	45,000	10,985
	El Rouda	18,955	28,086	20,000	-8,086
	Total Urban	**49,652**	**62,101**	**65,000**	**2,899**
	Total Rural	**123,781**	**187,100**	**154,400**	**-32,700**
	Total Markaz	**173,433**	**249,201**	**219,400**	**-29,801**
	% Urban	*28.63*	*24.92*	*29.63*	
Share of Governorate	*Urban Population*	*18.82*	*18.85*	*9.42*	
	Rural Population	*19.05*	*17.13*	*20.83*	
	Total Population	*18.98*	*17.53*	*15.33*	
Markaz El Zarka	El Zarka	14,717	21,494	25,000	3,506
	El Serw	19,291	28,116	25,000	-3,116
	Total Urban	**34,008**	**49,610**	**50,000**	**390**
	Total Rural	**65,597**	97,838	**85,000**	**-12,838**
	Total Markaz	**99,605**	**147,448**	**135,000**	**-12,448**
	% Urban	*34.14*	*33.65*	*37.04*	
Share of Governorate	*Urban Population*	*12.89*	*15.06*	*7.25*	
	Rural Population	*10.10*	*8.96*	*11.46*	
	Total Population	*10.90*	*10.37*	*9.43*	
Markaz Kafr Saad					
	Kafr Saad	17,829	13,895	45,000	31,105
	Kafr El Bateikh	24,266	14,229	50,000	35,771
	Miet Abu Ghaleb	13,218	19,265	25,000	5,735
	New Damietta	6,520	54,000	255,000	201,000
	Total Urban	**61,833**	**101,389**	**375,000**	**273,611**
	Total Rural	**179,254**	**257,226**	**172,000**	**-85,226**
	Total Markaz	**241,087**	**358,614**	**547,000**	**188,386**
	% Urban	*25.65*	*28.27*	*68.56*	
Share of Governorate	*Urban Population*	*23.44*	*30.78*	*54.35*	
	Rural Population	*27.59*	*23.55*	*23.20*	
	Total Population	*26.39*	*25.22*	*38.21*	
Governorate	**Total Urban**	**263,796**	**329,423**	**690,000**	**360,577**
	Total Rural	**649,759**	**1,092,369**	**741,400**	**-350,969**
	Total	**913,555**	**1,421,792**	**1,431,400**	**9,608**
	% Urban	***28.88***	***23.17***	***48.20***	

Table 7-14: 1996 % Employment in Damietta Governorate Planning Units

DEVELOPMENT SECTOR 1				
Damietta Planning Unit 1	**Agri.**	**Manuf.**	**Services**	**Wholesale**
Damietta City	0.79	38.37	30.36	16.85
El Sanania	9.58	53.61	16.12	7.77
Shat Geriaba	10.74	58.52	12.63	876
Shat Ezbet el Lahem	2.60	51.23	24.70	878
Shat Ghiet el Nasara	4.85	52.53	20.07	9.44
Shat moheb wa el sayala	5.89	51.51	22.89	8.9
Total villages	5.97	52.57	20.60	11.5
Kafr El Bateikh	27.42	29.17	21.29	7.77
Ezbet El Burg Planning Unit 2	**Agri& Fish**	**Manuf.**	**Services**	
Ezbet El Borg	63.68	9.02	6.92	
Shatta	33.38	31.56	14.16	
Shat el Sheikh Durgham	52.00	14.47	5.92	
Shat el Kheita	19.12	57.84	8.25	
DEVELOPMENT SECTOR 2				
Faraskour Planning Unit 4	**Agri& Fish**	**Manuf.**	**Services**	**Construction**
Faraskour City	4.37	16.15	29.39	24.61
Rouda City	30.09	9.94	26.13	18.70
El Zarka Planning Unit 5	**Agri& Fish**	**Manuf.**	**Services**	**Wholesale**
El Zarka City	17.00	9.14	39.34	14.34
El Serw	25.19	8.21	31.33	10.15
DEVELOPMENT SECTOR 3				
Kafr Saad Planning Unit 6	**Agri& Fish**	**Manuf**	**Services**	**Construction**
Kafr Saad City	28.59	17.56	28.42	4.93
Miet Abo Ghaleb City	25.66	11.19	15.08	29.56
Kafr el Bateikh	27.42	29.17	19.28	5.49
New Damietta	0.97	12.60	43.59	13.40

8. INDUSTRY

8.1 CONTEXT

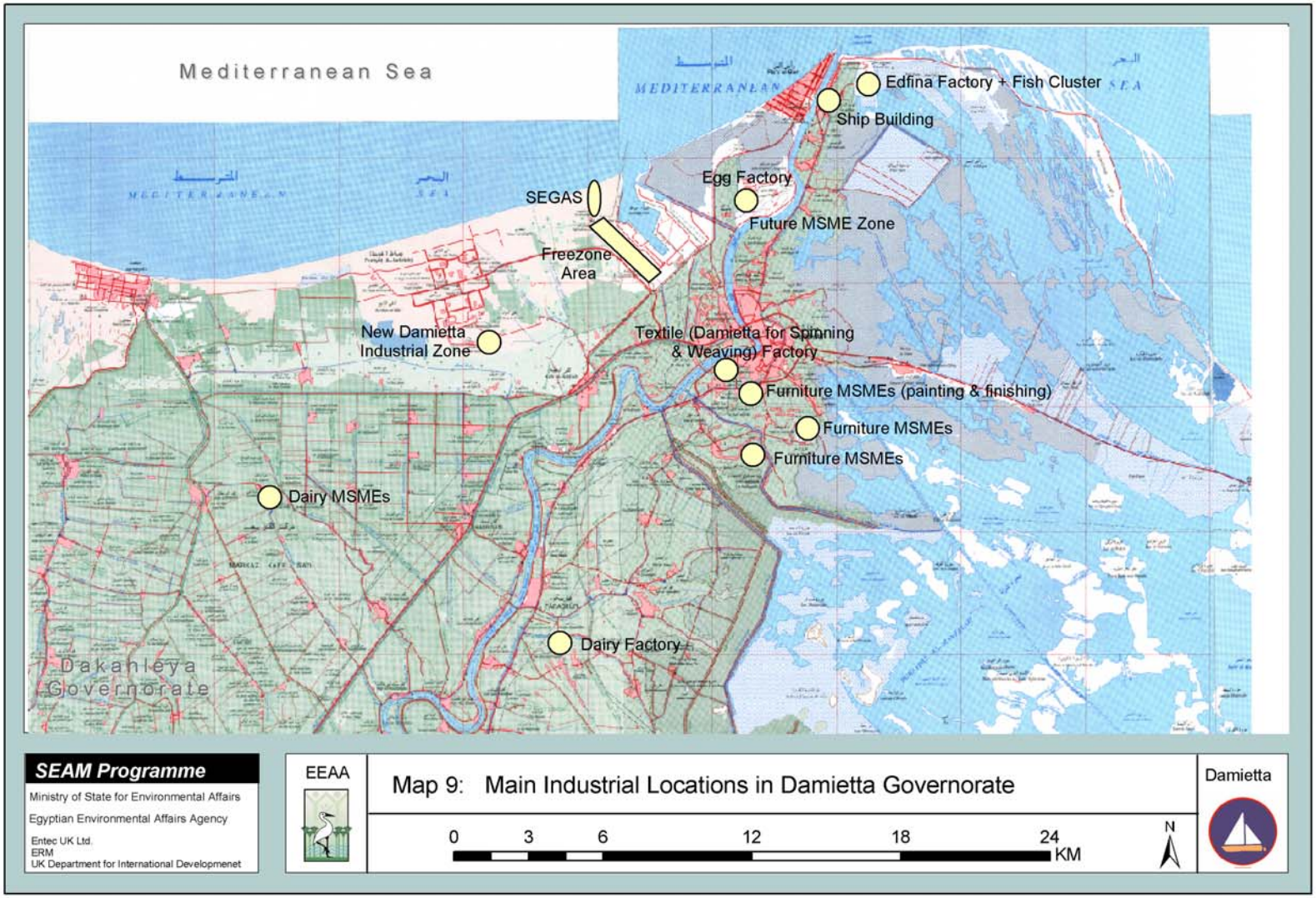
Damietta Governorate incorporates a wide variety of economic activities including agricultural, industrial, tourism, commercial and fishing, enabling the Governorate to attract significant investment. The establishment of a new port and an international coastal road has helped to attract industries that target an international market. This kind of comparative advantage has led to the establishment of New Damietta industrial zone and the industrial free zone around the new port. Furthermore, the availability of natural gas is an attractive feature for many industries that require cheap and cleaner fuel. In addition, suitable industrial project land available in the north and coastal zone and a good supply of skilled labor has also contributed to the establishment and growth of new industries.

Administratively, Damietta Governorate is divided into four Markaz's. In the early eighties, two new divisions were carved out to the north of Markaz Damietta, namely New Damietta City and Damietta Port Area. New Damietta city is divided into several zones, mainly residential, commercial, and industrial, whereas the Damietta Port Area only includes an industrial free zone. While these two divisions are geographically located within Markaz Damietta, they are administratively under the jurisdiction of the Authority of New Urban Communities, and the General Authority for Investment and Free Zones, respectively.

Given the Governorate's diverse economic base, Damietta enjoys a low unemployment rate. According to the 1999 UNDP Egypt Human Development Report, Damietta's unemployment rate of adults between ages 15-29 was only 15.1% compared to 26.6% in neighbouring Dakahleya and 20% for the national average. However, the diverse nature of the Governorates economic base and concentrated development also increases the need to identify and address the environmental impact of industrial development in the Governorate.

8.2 INDUSTRIAL ACTIVITIES

Industrial facilities are located in a number of geographic locations in Damietta governorate. Historically, industrial activities were mixed with other land uses and there were no specific industrial zones. However, the recent establishment of dedicated industrial zones has introduced a new pattern of industrial development in Damietta (*Map 9*).


Mediterranean Sea
MEDITERRANEAN SEA
Edfina Factory + Fish Cluster
Ship Building
Egg Factory
SEGAS
Future MSME Zone
Freezone Area
New Damietta Industrial Zone
Textile (Damietta for Spinning & Weaving) Factory
Furniture MSMEs (painting & finishing)
Furniture MSMEs
Furniture MSMEs
Dairy MSMEs
Dairy Factory
Dakahleya Governorate
SEAM Programme
Ministry of State for Environmental Affairs
Egyptian Environmental Affairs Agency
Entec UK Ltd.
ERM
UK Department for International Developmenet
EEAA
Map 9: Main Industrial Locations in Damietta Governorate
0 3 6 12 18 24 KM
N
Damietta

8.3 DAMIETTA'S TRADITIONAL DEVELOPMENT AREAS

According to 1996 CAPMAS census data, the Governorates industrial enterprises employed around 35% of Damietta's total workforce compared to 23% employed in industry at a national level. This percentage is divided between micro, small and medium enterprises (MSMEs), which employ approximately 50%, and large facilities, which employ approximately 3%[1].

8.3.1 Large Industrial Facilities

There are three major old industrial establishments in Damietta: Misr Dairy, Edfina food industry and Damietta's spinning and weaving industry.

Misr Dairy is a 40,000m^2 factory with a labour force of 580 employees. It consists of four plants: a processed cheese plant (1.8 tons/day of processed cheese), a soft cheese plant (2.5 tons/day of soft cheese), a hard cheese plant (8 tons/day of hard cheese) and a butter/ghee production plant (18 tons/day of ghee and butter). The factory's major processes are continuously performed with some seasonal variations, but the peak production period is in winter.

Edfina food industries are located in "Ezbit El Borg" area, 12 km from Damietta city. The factory consists of three plants (canning plant, oil and fodder plant and ice blocks plant) with a labour force of approximately 250 employees. Its main products include canned fish, fish oil, fish powder and ice blocks as well as frozen fruit juice and vegetables produced in bulk, when fish is not available for processing.

As for Damietta's spinning and weaving factory, it has the largest labor force (4,382 employees) of the three. Its activities do not include preparation and dying, and thus do not include wet processes associated with wastewater. The factory currently uses Mazout as a fuel but the management is interested in using natural gas when it becomes available.

8.3.2 MSMEs

Industrial MSMEs in Damietta are divided by sector and presented in (*Annexure B, Table 15.1*). The furniture and wood manufacturing sectors have the highest share of industrial output, which accounts for 64.7% and 23.3%, respectively, of the total industrial output of establishments in Damietta. This represents 26.1% and 26.3% of Egypt's national output (*Annex B, Table 15.1*).

[1] **Large** are defined as enterprises with work force between 100 and 1000 employees, **Medium** are defined as enterprises with work force between 50 and 100 employees, Small are defined as enterprises with work force between 10 and 50 employees, **Micro** are defined as enterprises with work force less than 10 employees

Damietta's furniture industry depends on small workshops, which cover all stages of furniture production from assembly through to painting and finishing. The latter are mainly clustered in the villages of Al Ananeya, Al Basarta, and Al Shouara in Markaz Damietta, with the highest concentration being in Al Shouara Village. Several raw materials are used in these workshops such as; Polyurethane, Polyester, Gamalaka, and different types of solvents and lining materials.

The other four sectors which make up less than 4% manufacture, clothes (except fur products), food products (i.e. sweets), various metallic products, and shoe making. However, if national distributions are considered, other industries which would take precedence, are the manufacturing of glass and glass products, and the dairy industry. Both of these sectors, however, do not exhibit the same cluster patterns as the furniture finishing industry.

Another clustered activity, although not formally recognised as an industry, is the preparation of sea catch in Ezbet El Borg and its vicinity. Ezbet El Borg harbours a 1/3 of the national fishing fleet. Fish waste from fishing activities is thrown onto the streets and represents a major problem.

8.3.3 Infrastructure

Large-scale industry and MSMEs rely on existing residential infrastructure (i.e. the public sewer system, water supply and electricity). However, in areas where there is no integrated sanitation infrastructure, facilities discharge untreated wastewater into agricultural drains. (e.g. the Misr Dairy discharges its effluent into Moheb & El Sayalah Drains).

Furthermore, despite requests from industries like the spinning and weaving industry, to date, no industry has been connected to the gas network.

8.4 NEW DAMIETTA INDUSTRIAL ZONE

As a part of the New City, this zone is under the jurisdiction of the Authority of New Urban Communities. The zone, which is designed to accommodate 750 industrial activities, covers an area of 300 feddans and has an additional 200 feddans set aside for future expansion. *Table 8.1* illustrates that 28% of the 133 operating facilities are currently occupied but likely to increase to over 35% when including the facilities under construction (*Annexure B, Table 15.3 and Table 15.4*). Once completed, the zone is expected to employ 5,000 people, however a large percentage of them are expected to come from outside Damietta.

Table 8-1: Existing Industries in New Damietta Industrial Zone

Industry	Number of Operating Facilities	Number of Employees	Number of Facilities Under Construction	Number of Employees
Wood and Furniture industries	44	1308	43	670
Electronics industries	2	45	3	43
Plastic products and machines manufacturing	10	325	10	163
Food industries	25	686	19	394
Paper products	4	69	-	-
Textiles industries	7	275	9	256
Chemical industries *	16	336	-	-
Marble and construction material	9	158	4	51
Mechanical and metallic industries	14	346	15	273
Leather	2	47	1	17
Total	**133**	**3,595**	**105**	**1,867**

[Source: Authority of new communities, council for urbanization and development and New Damietta City]
*Chemical industries include: paints, pesticides, detergents, fodder additives, glue, and car oil & grease.

8.4.1 *Large Industrial Facilities*

There are three large industrial establishments in New Damietta industrial zone: the Helb Pesticides & Chemicals Company, the Egyptian American Company and Shouman Company for plastics (*Annexure B, Table 15.2*).

Helb Pesticides & Chemicals Company is mainly concerned with producing and exporting pesticides. Although the company is located in the New Damietta Industrial Zone, it is considered a special Free Zone area to facilitate its exporting activities. It has a small natural gas firing steam boiler, and an industrial wastewater plant.

The Egyptian American Company undertakes dyeing, printing and preparation and prepares dyes and prints fabrics for other companies. It is also capable of printing fabrics up to a width of 2.85 m and dyeing fabrics up to a width of 3.7 m, which is a service not available in other dyeing and printing facilities.

The Shouman plastics company is divided into two sections. The first is responsible for producing plastic bags and sheets and the other is the manufacture and assembly of machines that produce plastic bags.

8.4.2 MSMEs

The majority of industrial activities within New Damietta industrial zone fall into the MSMEs category. The industrial sectors are more varied (*Table 8.1*) than in Damietta where furniture and wood MSMEs dominate. The large number of furniture and wood MSMEs is also reflected in New Damietta, however, this is partially explained by the presence of a large number of storage facilities.

8.4.3 Infrastructure

The industrial zone is connected to the city water and a sewer system that collects both treated industrial effluents and domestic wastewater. The collected wastewater is treated in a compact municipal wastewater treatment unit and the treated effluent is discharged into a side drain (Ezba 5) that eventually discharges into the sea. The treatment unit accepts a level of pretreated industrial effluent compliant with Ministerial Decree 44/2000. Another, wastewater treatment plant is under construction. The first phase began in August 2002 and is expected to be completed by August 2005. The new plant has a larger capacity than the current compact unit in order to accommodate an anticipated increase in occupancy.

Each industrial facility is provided with electric power depending on the area allocated (per m^2). In most cases, available power is less than the required power needed to run the industry, which means that owners have to pay for extra power (some facilities generate the extra power using diesel generators).

Natural gas is also provided to the industrial facilities. It is the responsibility of the Ministry of Petroleum to connect the facilities to the network, with the City Agency having only a coordinating role.

There is a public city dump of about 20 feddans for solid waste disposal. Each facility is responsible for transferring their own solid waste to the dumpsite either by using private facility cars or by hiring garbage collectors. The garbage collectors usually sort out the waste first to recover any recyclable material and disposes of the remaining waste.

8.5 DAMIETTA INDUSTRIAL FREE ZONE

Damietta's industrial free zone has an area of 190 feddans and is designed to accommodate 500 facilities. In this zone, facilities rent the land, whilst in

special zones of which a number are physically located in New Damietta Industrial Zone, the land is owned by the facility. *Table 8.2* presents the main industrial sectors, represented in the general Free Zone Area. With only nine facilities operating, the present occupancy rate of this zone is less than 5%.

Table 8-2: Existing Industries in Damietta Industrial Free Zone

Industry	Number of Operating Facilities	Number of Employees	Number of facilities under construction	Number of Employees
Natural Gas and Petroleum	1	2,100 Egyptian + 900 Foreigner	1	25
Food industries	1	100	1	15
Petroleum services	1	20	1	100
Mechanical and metallic industries	1	50		
Furniture and wood	3	125	1	40
Medical supplies	2	170		
Total	**9**	**3665**	**4**	**155**

[Source: The Authority for Investment and Free Zones]

8.5.1 Large Industrial Facilities

There are two large industrial facilities in Damietta Industrial Free Zone, Admiral for seeds and Spanish Egyptian Natural Gas (SEGAS). SEGAS is responsible for the liquefication of Natural Gas, as well as exporting the Liquefied Gas and its associated by- products through Damietta Port.

8.5.2 MSMEs

Out of the 13 establishments in the Free Zone (operating and under construction), 11 have approximately 100 employees or less and cover industries such as textiles, furniture, metallic, medical, natural gas and petroleum. However, these industries cannot all be considered MSMEs. Some facilities, like the United Gas Derivatives Company (UGD) for instance, which has 25 employees provides the export storage facility for a $ 400 million investment project.

Infrastructure
The industrial zone is supplied with a water network and each industrial facility receives electric power but pays costly fees for any additional power. The zones sewer system is now complete, it collects industrial and domestic wastewater and transport it to Ras El Bar Treatment Facility 10km away for treatment.

Environmental Impact
MSMEs categorized by sector and potential pollution sources together with the waste, effluent and gaseous emissions generated from the large industries can be found in (*Annexure B, Table 15.5*). The impact of these emissions and wastes are described in the following sections.

Damietta's Traditional Development Areas
Large industries in Damietta include the Misr Dairy, Edfina, and Damietta for Spinning and Weaving. Each one of these industries has a different type of waste.

Misr Dairy uses an extensive amount of water (439m^3/day) and generates around 200 m^3 of wastewater per day, which contains high values of BOD, COD, TDS and TSS. The factories wastes mainly originate from the resultant whey drawn from the cheese manufacturing process, where no treatment is undertaken. Although the public sewer system is only 15m away, Misr Dairy is not connected to it because their untreated effluent does not comply with the limits of Law 93/1962 for the discharge of sewers.

Damietta's spinning and weaving Industry does not produce any wastewater but suffers from dust particles in the work environment. Finally, Edfina's main polluting activity is fish processing. The main solid waste from this facility is fish remains which used to be dried and crushed into powder fodder for fish, but the unit is now not operating, though there are plans to rehabilitate and opertate it in the future.

Industrial MSMEs in Damietta are categorized according to the extent of their environmental impact, whether it is high, moderate or low[1] .

[1] **High Impact**: hazardous wastes, chemicals' utilization, substantial air emissions
Moderate Impact: limited air emissions, moderate quantities of wastewater
Low Impact: non-hazardous solid wastes that can be sold, recycled or dumped safely

Table 8-3: Distribution of High, Moderate, and Low Impact Industries

	Location				
Impact	Markaz Damietta Total	Kesm Damietta	Markaz Kafr Saad	Markaz Faraskour	Markaz AlZarkaa
High Impact	16,906	3,476	1,275	851	357
Moderate Impact	485	135	196	195	115
Low Impact	6,999	1,738	546	309	210

[Source: SEAM report on MSMEs in Damietta Governorate 2001]

Table 8.3 indicates that Damietta Markaz has the largest number of high, moderate or low impact MSMEs, followed by Kafr Saad Markaz, Faraskour Markaz, and El Zarka Markaz respectively. In fact, Damietta's most moderate impact industries are agricultural, such as Dairy and Milling.

Sub-sectors contributing to a high number of establishments (above 100) and having high environmental impacts and moderate environmental impacts were considered to be the first and second priority, respectively. The results of this categorization are presented in *Table 8.4*, which demonstrates that the main polluting industries in Damietta are the furniture and wood industries, the food and dairy products industries, various metallic and non-metallic industries, glass and glass products and the milling industries. Wastes, effluents and gaseous emissions generated from these industries are presented in *Annexure B, Table 15.5.*

Table 8-4: First and Second Priority Industries in Damietta

Number of Establishments	High Environmental Impact	Moderate Environmental Impact
Above 100	- Furniture & Wood Manufacturing - Other Various Metallic Products - non-metallic mineral products - Glass & Glass Products	Dairy & Other Food Products Milling
Below 100	- spinning, weaving and finishingdressing and dying of fur - tanning and dressing of leather - manufacture of chemical products - manufacture of structural products, tanks, and steam generators - manufacture of rubber and plastic products - Iron and steel industrymetals smelting - manufacture of motor vehicles	- production, preparation and preservation of meat and fish - beverages industry - tobacco industry - manufacture of engines, generators, and transformers

[Source: SEAM report on MSMEs in Damietta Governorate 2001]

To determine the extent of environmental problems in each sub-region (markaz), the distribution of the above industries is presented in *Table 8.5.*

Table 8-5: Distribution (in each Markaz) of priority MSMEs.

	Damietta Markaz			Kafr	
	Damietta Qesm	Total	Faraskour Markaz	Saad Markaz	Al Zarka Markaz
Furniture & wood products	17.5%	88.3%	3.85%	6.1%	1.57%
Non-metallic mineral products	18.9%	52.8%	19.4%	18.9%	7.2%
Metallic Products	24.3%	47.4%	18.1%	23.1%	10.4%
Glass & glass products	61%	96.2%	3.7%		
Dairy & other food products	16%	51.7%	17.4%	19.2%	7.3%
Milling	1.3%	22.6%	28.5%	22.59%	25.5%

[Source: SEAM report on MSMEs in Damietta Governorate 2001]

Table 8.5 shows that most of the furniture, wood, glass and glass products industries are concentrated in Damietta Kesm and Damietta Markaz, whilst the highest concentration of non-metallic, metallic, dairy and other food industries are located in Damietta Markaz. Finally, milling is evenly distributed over all Markazes.

The most polluting industries are the furniture and wood industries and, to a much lesser extent, the Dairy industry. Other industries, which were not mentioned as a source of environmental pollution include marble cutting and the manufacture of "Kreina" an upholstery material.

The most polluting phase of the furniture and wood industry is the painting and finishing phase where use of polyester, polyurethane and duko leads to the emission of significant amounts of harmful substances. The empty hazardous material containers also cause a disposal problem. Studies in El Shouara Village, which has significant concentrations of small scale furniture and wood industry suggest that use of High Volume Low Pressure (HVLP) spray guns instead of traditional guns would lower the level of harmful emissions. Furthermore, substituting solvent-based by water-based paints would also serve to lower harmful emissions but this is costly.

A solution to the problem of whey in the dairy industry cannot be executed until the dairy industries use pasteurized milk as their raw material.

New Damietta Industrial Zone

Industries located in the zone generate different types of wastewater, as outlined in *Table 8.2.* These industries do not pre-treat their effluent before it mixes with municipal waste, where it is then jointly treated by the cities compact wastewater treatment unit. The cities two largest industrial facilities (i.e. the Helb Pesticides and Chemical Co. and the Egyptian American Company for Dyeing, Printing, and Preparation) both experience waste problems though the former has its own small wastewater treatment unit.

A feasibility study funded by the Canadian funded Egyptian Environmental Initiative Fund (EEIF)[1] has been completed for a larger more effective wastewater treatment unit. The latter generates about 1500-2000 m^3 /month of wastewater loaded with BOD, COD, TSS, toxic substances, and heavy metals. Nevertheless, monitoring information from the Ministry of Health at the output of the compact treatment unit indicates that it complies with threshold

[1] Together with a smaller cosmetics facility, Shararco

values determined by law. This could be due to the limited range of parameters measured by the Ministry of Health or the fact that effluent is highly diluted because of the areas low industrial occupancy. If the occupancy rate increases, problems are likely to arise in pollution loads as well as on the sewer network especially inside the zone. The planned wastewater treatment facility has a larger capacity and should not have a problem in accommodating the increased volume of wastewater. However, the new plant is a municipal wastewater plant and therefore the facilities should follow the values specified in decree no 44/2000 for safe discharge into public sewers.

Helb Company applies necessary safety precautions (i.e. chemical masks, hat covers, safety shoes and gloves) to its internal work environment including regular check ups and blood tests on its employees. However, most of the other facilities like dying, printing and finishing, suffer heat stress, high noise levels, and gaseous emissions that are laden with Volatile Organic Compounds (VOCs).

The third largest facility in New Damietta Industrial Zone is the Shouman Plastics company and the main waste resulting from this facility is solid waste which is taken to the city dump.

In most cases, power provided by the government is less than required. To avoid paying high fees for additional power, a number of the facilities operate diesel engines. With the current low occupancy, the impact of resulting air and noise pollution problems cannot yet be accurately measured. The two largest facilities use natural gas either for steam or power generation and therefore do not cause air pollution.

The size of city dump is sufficient to accommodate existing residential and industrial waste however this may change when the zone reaches full capacity.

Some establishments (i.e. furniture, textile, chemical, mechanical and metallic facilities) in the New Damietta Industrial Zone are potential hazardous waste generators. However, it is clear that with the lack of hazardous waste infrastructure and systems nationwide, the issue of hazardous waste can only be addressed at the individual facility level. Helb Company, for example, has a contract with the Cairo University Hospital to incinerate some of its hazardous waste.

8.5.3 Damietta Industrial Free Zone (Damietta Port)

As the Free Zones occupancy rate is currently low, the area experiences few environmental problems. Nevertheless, the fact that the zone is not yet connected to a wastewater treatment plant is a subject of concern, even

though most waste generated from facilities in the zone is solid. The area also suffers from dust blown from the neighbouring port area where large amounts of klinker are imported and stored in the open air. This has rendered almost 20% of the total area of the Free Zone unusable for investment as well as endangering existing medical or food industries in the area. A further problem associated with the zones hazardous waste generators is that they are subject to constraints that are imposed on importing waste through customs.The largest industrial facility "SEGAS" though, does have its own wastewater treatment unit and disposes its treated effluent deep into the sea by means of a 500m pipe.

8.6 INDUSTRIAL GROWTH & PATTERNS

8.6.1 Industry Size

Historically, industrial activity in Damietta mainly consisted of MSMEs that were located within the cities and villages, with little in the way of large-scale industry. According to the CAPMAS census of 1996, Damietta's MSME sector is characterized by a dominant percentage of micro enterprises that represent 99.45 % of the total industrial enterprises in the Governorate. While small industrial establishments comprise 0.49% of the total, medium establishments account for 0.05% of the total industrial sector in Damietta. The remaining percentage (0.01%) represents the three large industries described in section 8.3.1.

With the establishment of Industrial Centers like the New Damietta City Industrial Zone and the Free Zone Area, the number of large-scale facilities has noticeably increased. Nevertheless, given the parallel growth in MSMEs, Damietta is still characterized by small-scale industry. Reasons contributing to the dominance of small-scale industries include the desire to not want to expand investment in order to preserve know-how, the avoidance of formal procedures and constraints, as well as the proliferation of the spirit of free enterprise in Damietta. It can be therefore concluded that industrial activity will be mainly based on small-scale enterprises for the foreseeable future.

8.6.2 Industrial Sectors

According to CAPMAS census, the number of establishments in the furniture and food sectors witnessed substantial growth from 1976 to 1996, where the growth reached almost 400% and 500%, respectively.

Growth of the furniture industry is currently continuing with most new EIAs related to furniture related establishments. The dairy industry is also growing however one obstacle facing this sector is a Minister of Health decree that will force all the dairy facilities to use pasteurized milk to produce dairy products

by the year 2005. This action has two drawbacks. The first is that Damietta will loose its unique flavour (cheese manufactured from non-pasteurized milk retains more salt) but it also means that more cheese can be produced from the same amount of milk, which could have a substantial effect on production costs. However, the high price of pasteurization units represents a serious obstacle towards compliance to the set deadline.

For other sectors, such as textiles, growth is somewhat irregular. An increase of almost 20% was experienced from 1976 to 1986 and was then followed by a subsequent 10% decrease from 1986 to 1996. According to the Production Manager of the Egyptian American Co. for Dying, Printing and Preparation, the textile industry faces a problem in both the availability of experienced labour, and in high labour wages in Damietta. The Dyeing and Printing Fabrics industries are also facing problems in marketing their products.

As for the leather industry it is expected to cease operating in the near future. Damietta now only has 20 small facilities compared to several hundred a few years ago. There is only one large facility for leather products in New Damietta. This is attributed to the fact that the leather industry has become fully mechanized and therefore needs larger investments, which MSMEs cannot afford.

In general, Damietta seems to be driven towards higher specialization in the furniture industry. The problems faced by the dairy industry could contribute to this trend. The diversification promoted by investments in new industrial zones is not of a magnitude that could counteract this trend. Moreover, investments in these zones face a number of obstacles addressed in the following section.

8.6.3 Geographic Distribution of Industrial Development

Despite attention given to New Damietta industrial zone and Free Zone Area, there are some general obstacles nation-wide, which hinder investment. These obstacles include high interest rates of bank loans, high sale taxes, currency fluctuations, bureaucratic procedures and economic instability.

However, some obstacles are more local in nature. For example, the price of industrial land in New Damietta has increased from 30 LE/m in the early nineties to 180 LE/m in 2003. Also Damietta's high water table places an added burden to the cost of construction. Although New Damietta city agency provides the industrial zone with all its facilities many who wish to install additional electrical power that they often need, must do so at a high cost. Another burden the factories face in New Damietta is the cost of providing housing facilities for their workers. Most of the industrial facilities "import" their workers from other Markazes or Governorates because they can't find the skilled labour (e.g. textile or chemical industries) they need in Damietta.

The extremely low occupancy of the free zone (less than 5%) is due to several factors. Firstly, land in the free zone is infrequently rented by Damiettans since they do not like investing in something they do not own. Therefore all the investors in the Free Zone area are non-Damiettans. Secondly, investors pay a very high rent, \$3.5 per m^2 per year for factories and manufacturing areas and \$7 per m^2 per year for storing areas and other spaces (as opposed to \$1.5 and \$ 3.5, respectively in other Governorates like Ismailia). Furthermore, even though each piece of land is allocated 1KVA for 500 m^2 irrespective of the Industry, for every additional KVA, the facilities must pay LE 360.

The above mentioned obstacles, coupled with more general ones, are causing a number of facilities in both zones to change their activities to now work by batch or order, or to close down.

While growth in dedicated zones face the described constraints, conversely, small and medium industries in Damietta are increasing in number and growing.

An attempt to assimilate the increase in MSMEs outside the residential areas has been undertaken by converting 80 Feddans of land, which used to house an egg factory on the Ras El Bar-Damietta road to a zone for new MSME facilities. There are currently no plans in the Governorate to relocate existing facilities.

In general, the concentration of industrial development in Kesm and Markaz Damietta seems to be a continuing trend. In parallel to the growth of the furniture industry in these areas, all newly or planned established zones are in the same Markaz.

8.7 ENVIRONMENTAL MANAGEMENT

The main Governorate activity in environmental management is undertaken by the EMU, which consists of eight technical staff including the EMU head, and four administrative staff. The EMU is equipped with measuring equipment including a soot analyzer, gas analyzer, wastewater analysis kit and noise meter. In relation to industry, the EMU is especially active in EIA and complaint based inspection but is also part of the licensing committee.

There are two environmental units in both industrial zones that do not follow the usual Governorate system. New Damietta EU is administratively affiliated to the New Urban Communities Authority within the Ministry of Housing. Accordingly, it does not report to the EMU. All EIAs within New Damietta are sent to EEAA via the New Urban Communities Authority. An environmental monitoring unit is under construction inside the City Agency. This unit will have

equipped laboratories for all types of measurement and analysis like gaseous emissions, noise pollution, dust, and wastewater.

The “Free Zone Area” Environmental Unit is under the jurisdiction of the “General Authority for Investment and Free Zones” (GAFI), and does not report to the EMU of the Governorate. For example, it sends Free Zone Area EIAs to EEAA via GAFI. While the New Damietta EU has the judicial power to inspect facilities and enforce laws, the Free Zone EU does not enjoy the same privilege. None of the units has authority over the Port, which is an independent entity.

These parallel systems are a direct result of the “carving out” of development zones in the Governorate to become affiliated to different authorities.

The environmental performance of industries in Damietta reflects a weak enforcement of environmental laws, exacerbated by the lack of an integrated inspection system. By virtue of its representation of EEAA as a national environmental agency, the East Delta RBO is in an organizational position to initiate the establishment of this coordinated system. It is, however, only active in the governorate in terms of individual occasional inspections as well as the review of EIAs.

National laws and decrees govern industrial development and environmental requirements. Only a few decrees are specific to Damietta. The most prominent concerns the Ministry of Health’s National decree which imposes pasteurization has a significant impact Damietta’s dairy industry as it could affect the cheese’s unique taste.

Finally, A Governor’s decree limiting the provision of required measurements and the preparation of the environmental register to the Faculty of Science in Damietta, University of Mansoura, has constrained the market for environmental services in Damietta.

9. WATER RESOURCES, DRINKING WATER AND SANITATION

9.1 WATER RESOURCES

9.1.1 Context

Damietta Governorate depends almost entirely on Nile water for its water needs. However, as the Governorate is located at the end of the Nile's river system its water quality and hydrology are affected by upstream uses. In addition, groundwater is brackish and generally not utilised, whilst rain water is too irregular to be considered a dependable water source. The following section discusses the Governorates available (fresh and non-fresh) water resources both in terms of use and quality.

9.1.2 Rainfall

Rainfall on the Mediterranean coastal strip decreases eastward from 200 mm/year in Alexandria to 75 mm/year in Port Said. It further decreases inland to about 25 mm/year nearer Cairo. The Governorate's average rainfall is approximately 100 mm/year, mainly falling during winter months as irregular showers.

9.1.3 Nile River

Since the construction of the Aswan High Dam, the Nile's water quality has become increasingly dependent on the characteristics of Lake Nasser's ecosystem and less dependent on the water quality fluctuations from the upper reaches of the Nile. Water released from Lake Nasser generally exhibits the same seasonal variation and overall characteristics from one year to another.

Downstream, changes in river water quality are primarily due to a combination of land and water use, as well as water management interventions such as: (a) different hydrodynamic regimes regulated by the Nile barrages, (b) agricultural return flows, and (c) domestic and industrial waste discharge including oil and waste from passenger and river boats. These changes are more pronounced as the river flows through more densely populated urban and industrial centres.

The following data used to assess the Nile's water quality was drawn from a recent (2001/2002) survey work conducted by the National Water Research Centre (NWRC). In order to assess the water quality of agricultural drains, limited recent data was supplemented with older data out of necessity.

9.1.4 Nile River Aswan to Delta Barrage

Agricultural Drain Point Source Discharges

According to Egypt's 2001 National Water Resources Plan (NWRP), 67 agricultural drains discharge wastewater into the Nile's reach between Aswan and the Delta Barrage. Of these, 43 were tested for water quality and only a few were found to comply with regulatory standards set out in Law 48/1982 (Article 65) which regulates the quality of drainage water that can be mixed with fresh water. The poorest water quality was found in the following drains: a] Khour El-Sail Aswan b] Kom Ombo c] Berba and c] Etsa drain which was also found to discharge the highest organic load [i.e. 57.0 ton COD/d; 21.7 ton BOD/d]. Based on an analysis of drain flow rates the 43 drains discharge a daily organic load of around 516 ton COD, 158 ton BOD and 3.4 ton of heavy metals into the Nile upstream of the Delta Barrage

Industrial Point Source Discharges

According to EEAA (2002), all factories along the Aswan and Delta Barrage reach have already constructed either pre-treatment plants which discharge into the sewerage system or complete treatment plants which discharge directly into the Nile's river system.

Assessment of the Quality of Ambient Water from Aswan to the Delta Barrage

The results of a monitoring campaign carried out by the Nationla Rivers Institute (NRI) in 2001 are presented in *Table 9.1*, shaded values denote non-compliance with standards. From the available data, the following can be inferred:

There is a great variation in the spatial distribution of fecal coliform counts along the Aswan to Delta Barrage reach. High counts have been found around the catchment areas of following drains; Kom Ombo, El-Berba, Main Ekleet and Fatera, whilst even higher counts have been taken from drain outlets along the riverbank, which indicates that these drains have concentrations of untreated human waste. There is also gradual build up of salinity as one goes north, but organic loads are still within the natural carrying capacity of the river. Along this reach of the Nile, the river does meet Egyptian Water Quality Standards for most inorganic parameters and is comparable in terms of pollution loading to other major rivers in the World. This is primarily because of the high dilution effect and the fact that sediments tie up trace metals and other constituents.

Table 9-1: River Nile Water Quality Between Aswan High Dam [AHD] and Delta Barrage

Distance from AHD	COD	BOD	TDS	FC
Standard	**10 mg/l**	**6 mg/l**	**500 mg/l**	**NA**
5	7	1.25	171	1.6E+02
21	10	1	170	3.5E+02
53.8	15	1.45	169	6.5E+02
83.4	15	1	175	1.2E+03
110	7	1	188	4.0E+02
148	22	1.46	184	1.2E+03
168	12	1.23	183	5.0E+01
206.9	5	1.37	186	2.5E+03
222	14	1.72	189	3.0E+03
277	6	2.36	190	6.0E+02
311	9	2.86	191	1.6E+02
361	10	2.26	194	4.0E+02
397	12	1.56	197	3.5E+02
448	5	2	198	1.5E+02
489	11	1.92	202	5.0E+02
512	10	2.6	204	5.0E+02
532	9	2.34	208	7.5E+02
545	14	2.46	205	6.0E+02
587	14	2.46	200	8.0E+02
635	14	2.5	204	4.0E+02
683	27	2.19	205	6.5E+02
617.6	18	2.2	209	1.0E+02
748	16	1.86	211	8.0E+01
792	8	1.8	213	9.0E+01
815	12	1.99	216	8.0E+02
832	14	2.37	220	3.0E+01
874	17	2.47	229	3.5E+02
888	15	3.25	231	1.6E+02
902	22	2.51	248	8.0E+02
922	17	3.5	235	1.2E+02
938	15	3.31	235	1.0E+03
967	24	3.28	240	6.5E+02

[Source: National Research Institute 2001]

The Damietta Branch

The Damietta branch begins at the Delta Barrage and ends 220km downstream at Farskour dam near Damietta. Major sources of pollution in this branch come from the Talkha fertilizer factory, the Upper Serw Drain and Upper Serw Power Station. In addition, fish cage culture is also practiced along this stretch of the branch. An assessment of results from a study carried out in February 2001 illustrate that:

- Dissolved oxygen concentration ranged from 7.8 mgO_2/l in its southern section, to 6.2 mgO_2/l in the northern part. This indicates that pollution loading is depleting oxygen levels as the river moves downstream.
- Nutrients concentrations (nitrogen & phosphorus) were within the permissible limits.
- The COD exceeded the standard set by law 48/1982 (*Table 9.2*).
- BOD values complied with Egyptian Water Quality standards, except at one location at the end of the branch. The presence of cage fish culture within this stretch of the branch could be responsible for this specific increase.
- TDS increased from 240 mg/l up to 372 mgO_2/l, but the values are still within the permissible limits.
- FC counts exceeded the World Health Organization (WHO) Guidelines in almost all sampling sites. This is an indication of the discharge of human wastes into Damietta branch.[1]

Table 9-2: Damietta Branch Water Quality.

Distance from HAD	COD	BOD	TDS	FC
Standard	**10 mg/l**	**6 mg/l**	**500 mg/l**	**NA**
1,025	8	2.64	235	3.5E+03
1,058	7	1.91	240	9.0E+02
1,096	14	1.73	279	1.0E+03
1,150	23	2.55	365	1.5E+03
1,166	20	2.26	358	1.2E+03
1,180	13	2.22	357	1.5E+03
1,277	22	7.42	372	1.3E+03

[Source: USAID 2001 'Survey of Nile System Pollution Sources', Report No 64.]

* Shaded values denote non-compliance with standards

[1] USAID 2001 'Survey of Nile System Pollution Sources', Report No 64.

9.1.5 Canals

Four major pumping stations (Bossat, El-Balamon, Kafr Saad and El-Rassassy) are located on the Nile's Damietta Branch (*Map 10*), feeding an intensive system of canals, which cover approximately 470km. The total amount of water extracted from the Nile usually ranges from 700 to 900 Million m^3 per year, however, this may vary due to fluctuations in cropping pattern and water availability.

Water quality at the canal heads and upstream reaches of the main canals is comparable to that found in the Nile's Damietta Branch, however it begins to deteriorate in lower level canals. Main sources of canal pollution include;

a) Solid waste dumping which is especially prevalent in canal reaches which pass through urban areas. However, by covering these canals, urban communities have been able to reduce the problem.

b) The mixing of drain and canal water to augment canal discharge during periods of increased demand (especially near canal ends). However, using mixed water to irrigate certain crops needs to be handled carefully as it can limit their production. Canals receiving drain water include Haggaga, Radi, Bahr Sandila, El-Wastani, El-Rekabia and Om Dongol.

Drinking water abstraction in Damietta is restricted to the Nile's Damietta Branch. Therefore no canal water is used for drinking water purposes in Damietta.

9.1.6 Drains

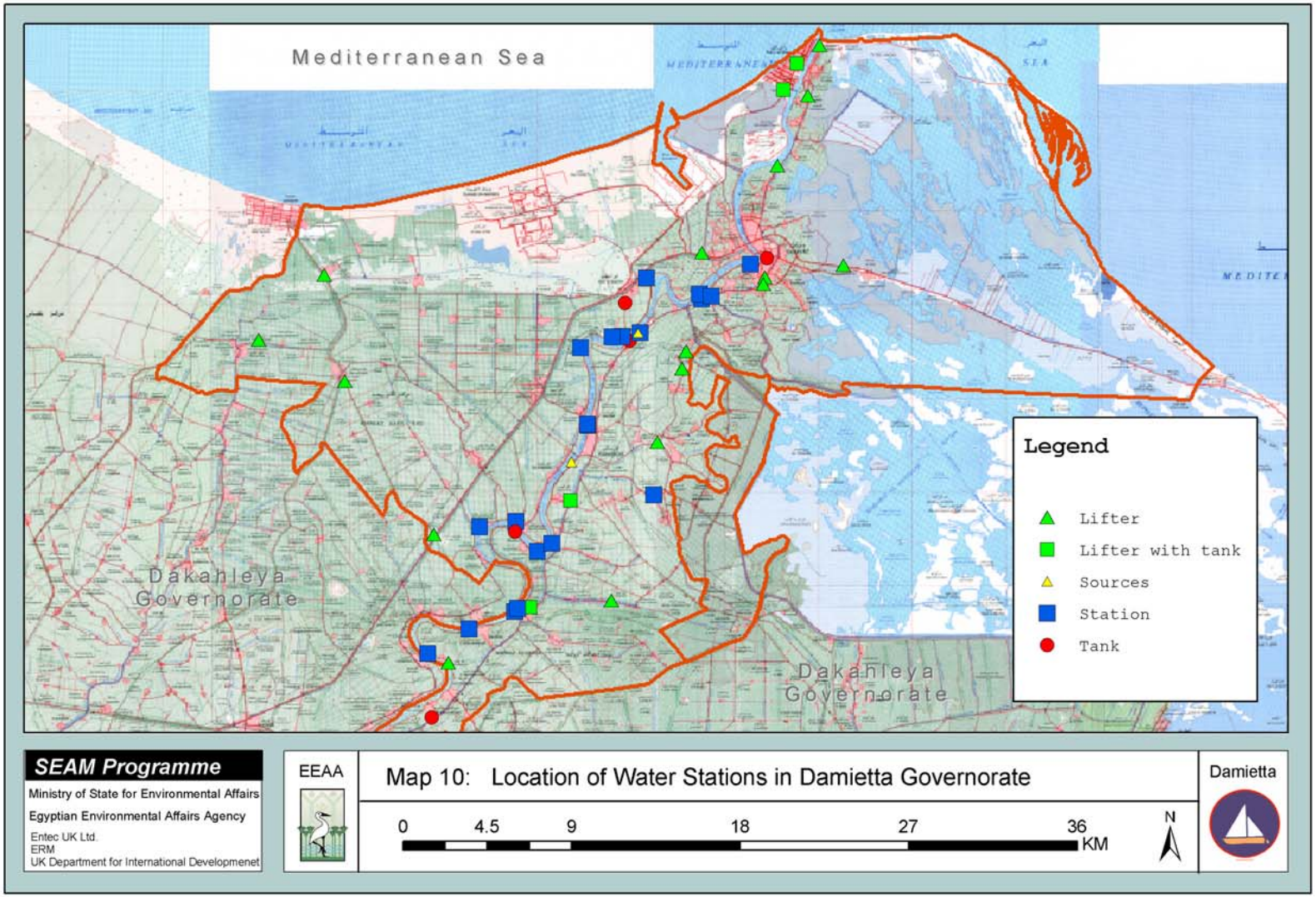
The total length of main drains within the governorate is approximately 310 km. Five main drains exist in Damietta Governorate (*Map 11*), three of which are located on the eastern side of the Dumiat Branch El-Serw El-Ala (Upper Serw), El-Serw El-Asfal (Lower Serw), and Faraskour Drains], while two are located on the western side Nemra Wahed El-Asfal (Lower No. 1) and El-Senania Drains.

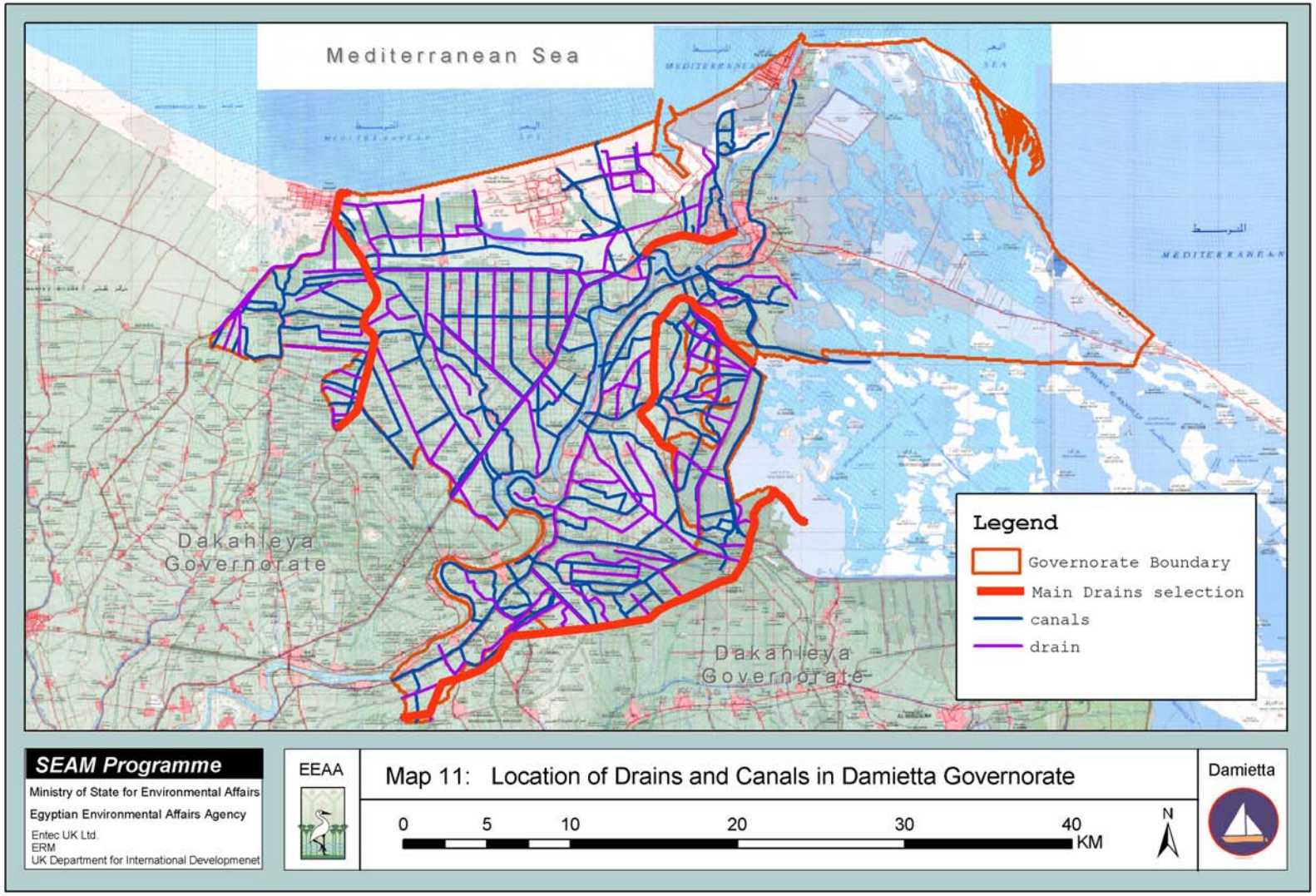
Upper Serw Drain

The Upper Serw drain is located on the east side of Damietta Branch and pumps water into the Nile 172 km north of the Delta Barrage (i.e. just downstream from its entrance point to the Governorate). The average annual amount of water discharged into the Nile from this drain is approximately 214 Million m^3.

Lower Serw Drain

The lower Serw drain is located on the east side of Damietta Branch and has an average annual flow of around 737 Million m^3. Although the drain used to pump its entire contents into Lake Manzala, after the construction of El-Salam Canal, a significant proportion of this drain water is now pumped into this canal whilst the remainder discharges into Lake Manzala. Some of the drain water is utilised to supplement canal ends during periods of water shortage (Haggaga and Radi Canals). Roughly 1,000 feddans of land in the Governorate are directly irrigated from undiluted drain water.


Mediterranean Sea
Dakahleya Governorate
Dakahleya Governorate
Legend
Lifter
Lifter with tank
Sources
Station
Tank
SEAM Programme
Ministry of State for Environmental Affairs
Egyptian Environmental Affairs Agency
Entec UK Ltd.
ERM
UK Department for International Developmenet
EEAA
Map 10: Location of Water Stations in Damietta Governorate
0 4.5 9 18 27 36 KM
N
Damietta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Main Drains selection
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SEAM Programme
Ministry of State for Environmental Affairs
Egyptian Environmental Affairs Agency
Entec UK Ltd.
ERM
UK Department for International Developmenet
EEAA
Map 11: Location of Drains and Canals in Damietta Governorate
0 5 10 20 30 40 KM
N
Damietta

Faraskour Drain

The Faraskour drain is also located on the east side of Damietta Branch, with an average annual flow of 376 Million m^3. The drain receives water from the Attui and Basarta Drains and at its end, a pump station pumps the drain water into Lake Manzala is more prominent. An additional pump station is currently being built 1.92km away from the El-Salam Canal, to feed the Canal with drain water.

Drain No. 1

Drain No. 1 collects drainage water on the west side of Damietta Branch and has an average annual flow of 643 Million m^3 per year. This water is then pumped into the Mediterranean Sea near the coastal city of Gamasa. A weir has been constructed at the end of the drain to raise the water level in order to facilitate water use for irrigation purposes. The drain water feeds the end of Bahr Sandila, El-Wastani and El-Rekabia Canals during periods of water shortage. Furthermore, the drain water supplements the Om Dongol Canal (75,000m^3/year) which helps irrigate 15,000 feddans of reclaimed land west of the Damietta Branch.

El-Sanania Drain

El-Sanania Drain is located on the western side of Damietta Branch. As the drains water quality is poor, it is directly discharged into the Mediterranean Sea.

Drain water parameters for each of these drains have been sampled by the MWRI's Drainage Research Institute and analysis of these samples shown below in *Table 9.3* illustrate that several parameters are according to Law 48 beyond the acceptable limits for mixing with fresh water.

9.1.7 Groundwater

As Damietta Governorate lies on the northern Mediterranean coast, its groundwater aquifer is brackish and strongly affected by seawater intrusion. Salinity levels range from 15,000ppm in the south to 45,000ppm along the Mediterranean coast and Lake Manzala. With this in mind, no groundwater is used for drinking water purposes and very little is used in irrigation.

Table 9-3: Average Water Quality Parameters of Main Damietta Drains

Parameter	Units	Limit Law 48	ES01	ES02	EF01	M116
BOD	mg/l	10	69	67	59	99
COD	mg/l	15	103	95	99	152
Turbidity	NTU		26	36	41	47
TSS	mg/l		170	230	234	296
TVS	mg/l		19	26	26	34
NO3	mg/l		1.687	1.355	1.362	2.080
NH4	mg/l	0.5	2.947	1.980	2.238	4.691
P	mg/l	1.0	0.340	0.351	0.369	0.399
Cd	mg/l	0.01	0.015	0.014	0.014	0.015
Cu	mg/l	1.0	0.043	0.040	0.039	0.049
Fe	mg/l	1.0	0.241	0.248	0.265	0.294
Zn	mg/l	1.0	0.033	0.040	0.042	0.037
Pb	mg/l	0.01	0.014	0.013	0.015	0.015
DO	mg/l	>5	2.72	2.98	2.75	2.89
pH		7-8.5	7.16	7.26	7.25	7.58
EC	dS/m		1.12	1.53	1.35	2.51
TDS	mg/l	500	760	1005	913	1543
Ca	meq/l		3.02	3.52	3.23	4.15
Mg	meq/l		2.73	3.21	3.07	4.99
Na	meq/l		5.34	8.26	7.11	14.88
K	meq/l		0.26	0.30	0.31	0.42
CO3	meq/l		0.0	0.0	0.0	0.0
HCO3	meq/l		3.43	4.15	3.88	4.74
SO4	meq/l		3.52	4.11	4.04	5.18
Cl	meq/l		4.40	7.04	5.79	14.52
SAR			3.04	4.51	4.01	6.96
AdJ SAR			6.55	10.21	8.93	16.72

*[*Source: Ministry of Water Resources and Irrigation [MWRI] Drainage Research Institute*]*

ES01: Upper Serw Pump Station **ES02:** Lower Serw Pump Station
EF01: Farasqur Drain Pump Station
M116: Drain No. 1 Outfall at Mediterranean Sea
* Shaded values are beyond acceptable standards

9.1.8 Lake Manzala

Lake Manzala situated between Damietta Branch of the Nile and the Suez Canal is the largest lake in the Delta. The original surface area was around 1700 km^2, but fish farm development, land reclamation and in lake reed growth have reduced the lake's area to less than 1200 km^2. The lake also acts as a sink for seven main drains which discharge approximately 6 to 7 billion

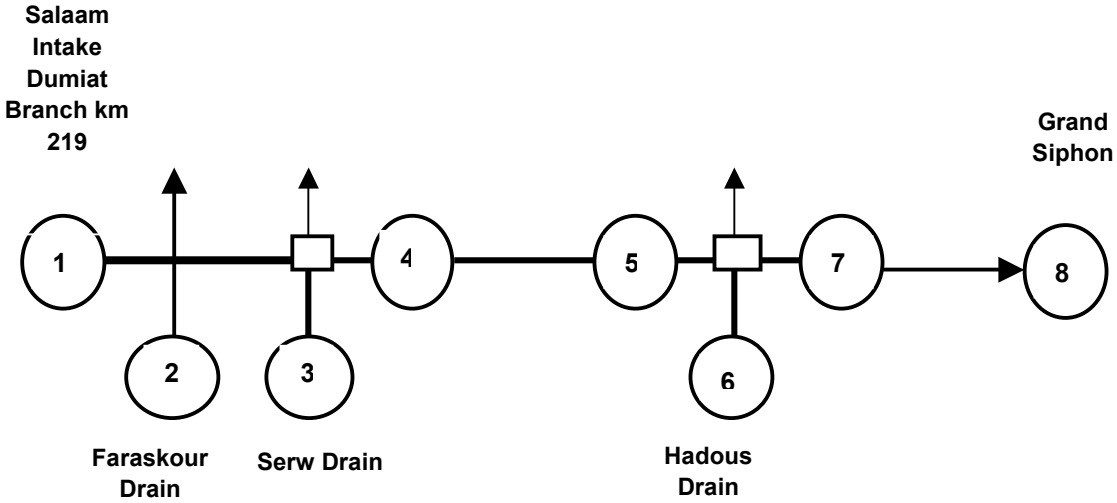
m^3 of wastewater into the lake each year. Bahr El-Baqar and Hadous drains are responsible for 75% of this discharge carrying largely untreated municipal and industrial wastes from Cairo and other Delta cities.

Fisheries is the main economic activity in and around Lake Manzala, either through capture or culture. The discharge of the heavily polluted drain water to the lake leads to the bioaccumulation of toxicants in fish. Levels of Mercury, Lead, Cadmium, Arsenic, as well as pesticides such as BHC, Lindane, Heptachlore, Aldrin, Chlordane, Endrin, DDT and PCBs have been found in concentrations above maximum allowable limits set by Food and Agriculture Organization (FAO) in most fish samples' organs as well as muscle. Some toxicants were detected in concentrations more than ten times the maximum allowable limit (National Water Resources Plan, 2000). After diversion of some of the drainage water to El-Salam Canal, the most polluted drainage water will still continue to reach Manzala (Bahr El-Baqar), so that fish quality, which is already far too low, can be expected to deteriorate even further. Catch in Manzala will further decline due to land reclamation, urban expansion, tourism development and continuing heavy weed growth.

9.1.9 Salam Canal

El-Salam canal is supplied with approximately 2bcm of drainage water each year. This quantity is harvested from Bahr Hadous, Lower and Upper Serw and if needed Farasqour drains (*Figure 9.1*). The drainage water is then mixed with another 2 bcm/pa of freshwater from Damietta Branch to reach a total discharge of 4 bcm/pa, which is enough to supply irrigation water to 200,000 feddans in the western Suez Canal region and 440,000 feddans in north-east of Sinai Governorate.

Figure 9-1: El-Salam Canal Schematic



Since the catchment area of Bahr Hadous, Upper and Lower Serw, and Faraskour drains are located in highly populated areas, all drain systems within the region are susceptible to pollution from the legal and illegal dumping of domestic and industrial wastewater. The current proposed mixing ratio of 1:1 of drainage and freshwater might not be enough to reduce the pollution to acceptable levels.

Most of the water received by Bahr Hadous drain (94.3%) is from agricultural diffuse sources. Although the domestic diffuse sources are only 4% of the total discharge, it contributes 94.7% of the organic load received by Bahr Hadous, (ref: BOD load in *Table 9.4*). Pollution loads received by Faraskour and El-Serw El-Asfal drains are presented in *Table 9.5* and *Table 9.6*, respectively. No information is available on input from industrial sources.

Table 9-4: Pollution Loads Received by Bahr Hadous Drain

	Q	Load (kg/d)			
Source	**m3/d**	**BOD**	**COD**	**SS**	**TDS**
Domestic Point sources	80,000	1,680	3,680	1,600	61,360
Domestic diffuse sources	207,754	77,459	110,211	81,782	179,722
Industrial Point Sources	6,135	1,768	2,606	2,965	61,360
Total	**293,889**	**80,907**	**116,497**	**86,347**	**302,442**

[Source: Ministry of Water Resources and Irrigation [MWRI] Drainage Research Institute]

Table 9-5: Pollution Loads Received by Faraskour Drain

	Q	Load (kg/d)			
Source	**m3/d**	**BOD**	**COD**	**SS**	**TDS**
Domestic Point Sources	2,490	223	377	220	1,657
Domestic diffuse Sources	13,272	6,450	9,356	4,870	10,484
Industrial Point Sources	NA	NA	NA	NA	NA
Total	**15,762**	**6,673**	**9,733**	**5,090**	**12,141**

[Source: Ministry of Water Resources and Irrigation [MWRI] Drainage Research Institute]

Table 9-6: Pollution Loads Received by El-Serw El-Asfal Drain

	Q	Load (kg/d)			
Source	**m3/d**	**BOD**	**COD**	**SS**	**TDS**
Domestic Point Sources	7,710	897	1,402	666	5,203
Domestic diffuse Sources	18,769	8,113	11,823	6,751	15,568
Industrial Point Sources	NA	NA	NA	NA	NA
Total	**26,479**	**9,010**	**13,225**	**7,417**	**20,771**

[Source: Ministry of Water Resources and Irrigation [MWRI] Drainage Research Institute]
NA = No Information Available

The water quality at the ends of Faraskour, Serw and Hadous drains, before mixing with El-Salam canal is presented below in *Table 9.7*.

Table 9-7: Selected Water Quality Parameters, Salaam Canal*

	Monitoring Location	TDS (ppm)	BOD (ppm)	COD (ppm)	FC (count/100 ml)
	Along Salaam Canal				
	Beginning				
1	Faraskor Drain	242	10.0	24.0	4,500
2	Serw drain	812	150.0	256.0	170,000
3	After Serw Drain	1048	48.0	72.0	35,000
4	Before Hadous Drain	408	17.5	22.8	17,000
5	Hadus drain	416	10.0	19.2	200
6	After Hadous Drain	1584	37.0	58.0	92,000
7	End	1171	22.0	37.0	11,000
8		514	14.0	19.2	900

An assessment of the available data indicates that the fecal coliform (FC) counts in all three drains exceeds both WHO and Egyptian standards for the use of water for unrestricted irrigation, especially the Hadous drain which measured very high fecal coliform counts (92,000 MNP/100). All samples show exceedingly high intestinal helminth eggs, particularly Ascaris, Taenia, Hookworms, and Hymenolepis Diminuta (*Table 9.8*), a situation, which needs greater attention and continuous monitoring.

Table 9-8: Intestinal Helminth Eggs, Salaam Canal**

	Intestinal helminth eggs (count/100 ml)								
Monitoring Location	*Ascaris*	*Taenia sp.*	*Hook worm*	*Hymenolepis diminuta*	*Hymenolepis nan*	*Capollaria hepatica*	*Schistosomia mansoni*	*Trichuris trichiura*	*Paragonimus westermani*
									60
Salaam Canal	60	30	60	30					
Beginning	180		144	180	30			-	60
Faraskor Dr*	280	180	720	198		30			
Serw Dr*	720	360						180	
After Serw	180	90		180	30				
Before Hadous Dr	360	144	720	180	216			180	
Hadus Dr*	720	360						180	
After Hadus Dr Before grand siphon	28	72		24	24				

[Source: Damietta Health Directorate]

Dr* = Drain

** Monitored by the MOHP Environ. Health Dept. at Mar-Apr. 2000

9.2. DRINKING WATER

9.2.1. Water Resources

Surface water is the primary water resource in Dumiat Governorate. Groundwater is not utilised as a resource for drinking water and is only used in limited quantities for irrigation water in some villages.

9.2.2. Water Consumption

The Governorate's water consumption can be broken down into the following categories, based on the intended use, *Table 9.9*:

- Domestic consumption (homes);
- Commercial consumption (including shops, restaurants, companies, tourist facilities, and farms); and
- Governmental consumption (including schools, hospitals, and local administrative units).

Table 9-9: Breakdown of Water Consumption by Activity

Consumption Category	Percentage of Total Drinking Water Consumption
Domestic	68%
Commercial	7%
Governmental	25%

[Source: Drinking water working group report – Damietta Water Company]

The consumption rates are different in the eastern and western parts of the governorate (*Table 9.10, Table 9.11*). Average water consumption in the eastern region is approximately 106 liter/person/day whilst in the west consumption varies between winter months when it is around 210 liter/person/day to summer months when it drops to approximately 74 liter/person/day. The Governorates current overall average water consumption is 120 liter/person/day, which is considerably lower than the ideal international average of 200 to 250 liter/person/day.

Table 9-10: Water Consumption in the Eastern Region of Damietta Governorate [2000/2001]

Markaz	Water Treatment Plants	Water Produced (m^3/day)	Population	Losses	Actual Water Delivered (m^3/day)
1. Dumiat	El-Bostan	79,020	440,000	4% wash	140,480
2. Faraskoor	17 compact units	30,357	197,000	22% leakage	(61,133)
3. El-Zarqa	Besat	7,750	113,000	15% others	
	Dumiat treatment plant	23,353			
Total		**140,480**	**750,000**	**61,133**	**79,347**

[Source: Drinking water working group report - Damietta Water Company]

Table 9-11: Water Consumption in the Western Region of Damietta Governorate [2000/2001]

Markaz	Water Treatment Plants	Water Produced (m^3/d)	Population		Losses	Actual Water Delivered (m^3/d)
			Summer	Winter		
1. Kafr Saad	Kafr Soleiman	77,883	770,000	270,000	4% wash	96,270
2. Ras El-Barr & Gamasa	11 compact units	18,387			22% leakage 15% others	(39,470)
Total		**96,270**	**770,000**	**270,000**	**39,470**	**56,800**

[Source: Drinking water working group report - Damietta Water Company]

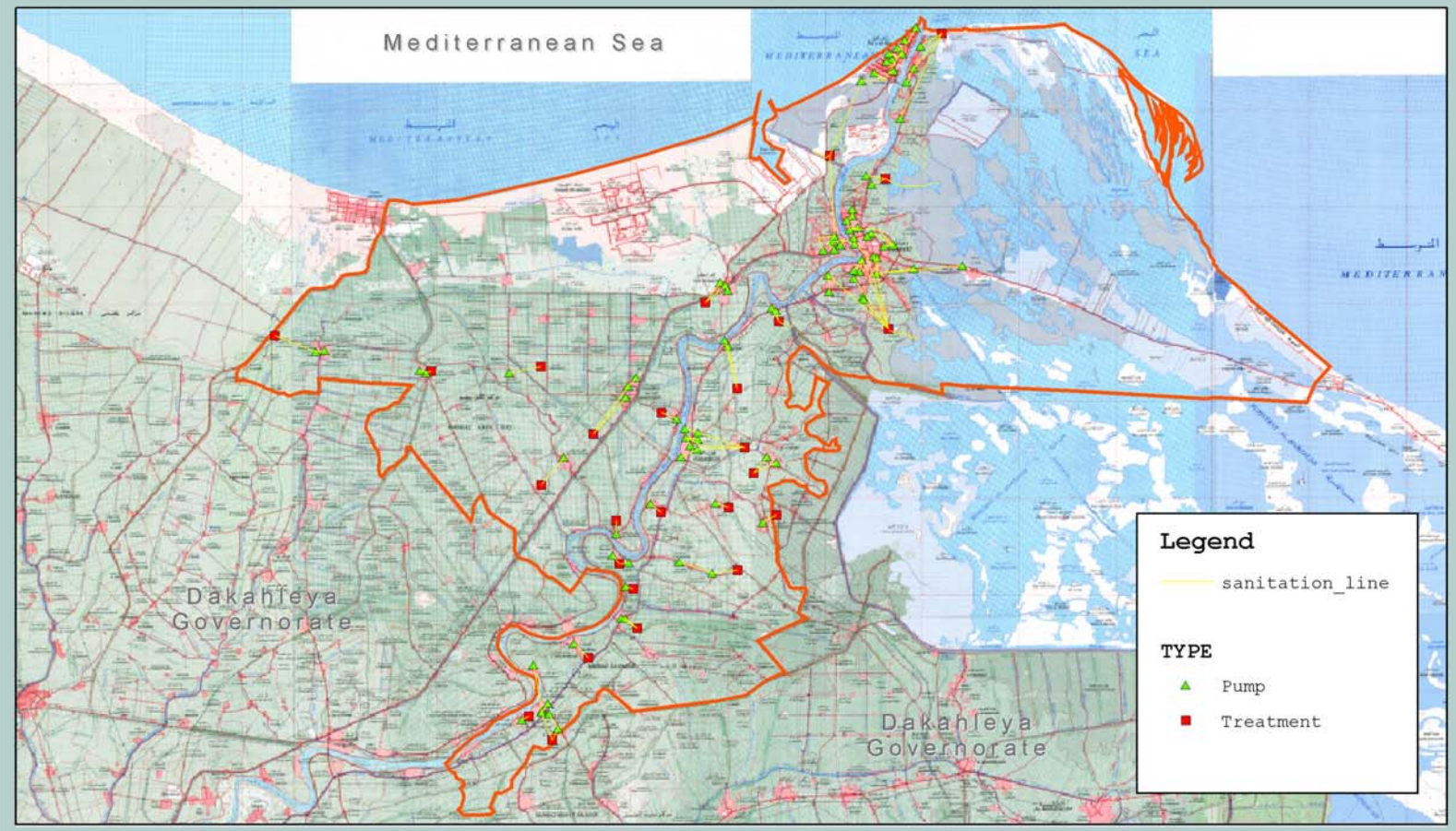
9.2.3. Water Quality

The quality of potable water supplied in different Markaz's varies according to the treatment system. In general, the quality of potable water is acceptable though there are some complaints by residents of excess turbidity, color and odor. Chlorine is added in the water treatment process to disinfect water in the network. Interviews with Damietta Water Company staff revealed that the typical chlorine dose in water treatment plants is low at around 9 mg/l. Chlorine is also injected into the delivery pipes of some booster pumps used along the water supply network. Aluminum sulfate (alum) is added for coagulation with a dose of around 29 mg/l.

9.2.4. Raw Water Abstraction

Sources of Water Abstraction

All of the conventional (large) water treatment plants and compact units abstract water from the Nile, at locations upstream of the Faraskour dam. No abstraction is taken from any canals, which helps ensure a better quality of water, and prevents the risk of reduced water levels from irrigation water transfer. The location of Damietta's conventional and compact water treatment plants is illustrated in *Map 12*.



SEAM Programme

Ministry of State for Environmental Affairs

Egyptian Environmental Affairs Agency

Entec UK Ltd.
ERM
UK Department for International Developmenet

EEAA

Map 12: Sanitation Network in Damietta Governorate

0 5 10 20 30 40 KM

N

Damietta

9.2.5. Water Treatment and Distribution

In 1984 (when the Damietta Water Company was formed) the average loss from the network and accessories was approximately 38%. At present, estimates suggest that losses from leakages in the water supply network are roughly 22%. The following *Table 9.12,* provides details on the total lengths and capacities for the main lines of Dumiat's conventional water treatment plants.

Table 9-12: Total Lengths and Capacities for the Main Lines of Damietta's Main Water Treatment Plants

Water distribution network	Length in meters		Capacity of the network (m^3/yr)	
	1999/2000	2000/2001	1999/2000	2000/2001
Network of Damietta treatment plant	75,777	77,961	12,096,000	12,096,000
Network of El-Bostan treatment plant	691,477	743,156	27,336,960	27,336,960
Network of Kafr Soleiman treatment plant	532,249	584,877	35,078,400	35,078,400
Total	**1,299,503**	**1,405,994**	**74,511,360**	**74,511,360**

[Source: Drinking water working group report and Damietta Water Company]

9.2.6. Water Quality Monitoring

The Damietta Drinking Water Company operates a water analysis laboratory in the main water treatment plants, which is equipped to sample, analyse and monitor water quality. In 1995, a committee was formed (by a Governor decree number 204/1995), with representatives from the Damietta Water Company and Health and Environmental authorities to oversee the sampling of water for quality analyses. Samples are collected from the effluent streams of water treatment plants, the water supply network, and from points of use. Common problems include:

- Breakages in the drinking water supply network, with a resulting leakage of contaminants into the water network;
- Lack of regular cleaning of the water storage tanks in the water supply networks; and
- Lack of regular cleaning of the water storage tanks above houses and stores.

The Company is also constructing wash valves to carry out network washing which uses around 4 million m^3 of water per day.

9.2.7. Management and Maintenance of Water Treatment and Supply infrastructure

Institutional Structure

Historically, Damietta's water supply sector was distributed, technically and administratively, between the housing administration, local units, and the water sector in Dakahleya Governorate. This institutional structure seriously hampered the water sector's operational efficiency until 1984 when the then Governor established the Damietta Drinking Water Company (DDWC) as a public company tasked with the responsibility of producing and distributing water throughout Damietta Governorate.

Existing Conditions

Currently, drinking water service coverage is estimated to be 97%, with the main uncovered area being Ezbas region (e.g. in Kafr Saad), which covers a large area and has a small population. Main water supply problems occur in the summer season, when an estimated 1.5million visitors visit the cities of Gamasa and Ras El-Barr placing an additional strain on drinking water demand.

Over the years DDWC has carried out a number of improvement projects, including the following:

- The rehabilitation and expansion of three main conventional water treatment plants, in Damietta, El-Bostan, and Kafr Soleiman which has resulted in the following respective increases in water production; 130 to 300 liter/sec in Damietta, 600 to 1,200 liter/sec in El-Bostan, and 600 to 1,000 liter/sec in Kafr Soleiman.
- The rehabilitation and replacement of water supply networks, which has resulted in a reduction in leakage losses from 38% in 1984 to 22% in 2003.
- The establishment of 25 compact water treatment plants, using funding from the National Organization of Potable Water and Sanitary Drainage (NOPWASD) and SHOROUK, and 4 compact units using there own funds.

A further water treatment plant with a design capacity of 800 litre/sec exists in El-Adleya but this has been under construction since 1983. When complete, one-third of the potable water from this treatment plant is expected to serve Damietta, the remaining two-thirds will serve Port Said Governorate.

It is estimated that only one elevated tank out of the 11 or so that exist in the entire water supply network is operable which is located in Kafr Saad. To overcome this problem, and stabilize the pressures in the network, booster pumping stations were constructed on the network. Currently, 14 booster

pumping stations exist, with hydraulic heads ranging from 15 to 50 meters. This is in addition to the smaller diesel operated boosters.

Financial Structure

The Damietta Drinking Water Company lacks finance as expenses exceed revenues a fact that is especially aggravated by the discrepancy between the price and cost of water, explained in the following section. The Company main revenues include:

- Funding that comes through the Governorate, NOPWASD, and the Water Companies [DDWC] budget (for emergency projects)
- Revenues from fixing broken water metres.

Water Supply Charges

There is a discrepancy between the average price people pay for water (*Table 9.13*) i.e. LE0.36pcm and how much it costs to produce water i.e. LE0.425pcm.

Table 9-13: Water Tariffs

Use	Price of cubic meter of water (L.E))
Domestic	0.23 to 0.27
Commercial	0.5 to 0.85
Governmental	0.4
Average	0.326

[Source: Drinking water working group report –Damietta Water Company]

Whilst there are approximately 171,111 subscribers throughout the Governorate only 70% of subscribers end up paying. Inoperable meters and highly subsidized water fees for government buildings are some of the main issues that need to be addressed to improve the current situtation. *Table 9.14* shows a sample subscription and water charge data sheet for the Governorate of Damietta on a particular day (28/11/2001). The actual water sales quantities clearly show a discrepancy between actual and charged quantities, in *Table 9.15*.

Table 9-14: A Sample Subscription and Water Charge Data for [28/11/2001]

Economic Unit	No. of Subscribers	Consumption (m^3)	Total Fees
Damietta City 1	15,778	648,799	186,969.12
Damietta City 2	16,187	682,059	187,078.48
Markaz Damietta 1	16,940	713,023	202,670.90
Markaz Damietta 2	10,456	439,328	122,830.40
Ras El-Barr	2,589	185,000	88,783.19
Ezbet El-Borg	10,932	509,694	140,730.65
El-Hoorany	13,237	714,990	191,978.00
Faraskoor	12,398	537,911	143,565.56
Daqahla	11,894	579,849	155,672.08
El-Zarqa	12,263	629,182	167,812.99
El-Rooda	11,044	528,345	142,955.62
Kafr Saad	10,036	521,906	138,319.20
Kafr Saad	19,451	791,927	206,519.67
Kafr El-Bateekh	7,906	433,024	116,616.75
Total	**171,111**	**7,915,037**	**2,192,502.61**

[Source: Drinking water working group report - Damietta Water Company]

Table 9-15: Water Sale Quantities for [2000/2001]

Category of Use	Quantity Provided (m^3)	Quantity Paid (m^3)	Price (Piasters)		Comments
			from	to	
Domestic	41,690	11,034	23	27	Houses
Commercial	3,924	2,697	50	85	Farms, Stores, restaurants, companies
Governmental	15,593	62,37	40	40	Schools, hospitals, awqaf, local units
Service	54	19	35	35	Mosques, churches youth centers, community development agencies
Total	**61,261**	**19,987**			

[Source: Drinking water working group report - Damietta Water Company]

9.3. SANITATION

9.3.1 Existing Level of Sanitation Service

The first sewage treatment plant (in Mit El-Kholy village) became operational in 1986 and had a capacity of 550 m^3/day. Today there are 20 full sewage infrastructure systems, which include gravity sewers, pumping stations, and sewage treatment plants that together provide sanitation services to around 55-60% of the Governorate's population. *Table 9.16* provides a 15-year overview of treated wastewater and demonstrate how the scale of the treatment has changed over the period.

Table 9-16: The Percentage of Treated Wastewater in Damietta

Year	Amount of Treated Wastewater	Amount of Raw Wastewater	% Wastewater Treated
1990	5,000	92,000	0.5
1995	63,000	113,000	55
2000	91,000	152,000	59
		Predicted	
2005	16,600	195,000	85

[Source: Sanitation Working Group Report]

The types of sanitation systems include traditional gravity sewers, combined with pumping stations and sewage treatment plants; or on-site sanitation. Six sewage treatment technologies exist in Damietta Governorate and all are represented by the following 20 integrated sanitation systems, as outlined in *Table 9.17*.

Table 9-17: Type and location of Sewage Treatment Plants in Damietta

Type of Sewage treatment plant	No	Location
Aeration activated sludge plant	10	Dumyat City, Ras El-Barr City, El-Rooda City, Mit El-Kholy, El-Serwe, Mit Aboul-Ghaleb, Sherbas, Kafr El-Azab, El-Westany, El-Ghoneimeya.
Oxidation ditches activated sludge sewage treatment plant	5	Kafr El-Bateekh, El-Hoorany, Kafr-Soleiman, El-Rahamna, El-Kheyateya.
Extended aeration activated sludge sewage treatment plant	1	Kofoor El-Ghab village.
Stig Aqua Life System	2	El-Barasheya and Kaft Saad El-Balad
Aerated lagoon	1	Daqahla village
Stabilisation pond	1	El-Adleya.

[Source: Sanitation Working Group Report]

Villages that are either served and not served by an integrated sanitation system service in Damietta Governorate are illustrated in *Table 9.18* and *Table 9.19*. Some of these villages rely on septic tanks, which are frequently emptied by vacuum trucks, which are in turn discharged into drains. Other villages may have a sewer network and pumping stations which discharge directly into drains.

Table 9-18: Wastewater System Data in Damietta Governorate

Markaz	City or Village	Service [%]	No. of P.S.		Capacity of WWTP	Location of Disposal
			In-System	Main		
Damietta	Dumiat	90%	15	4	60,000	El-Manyal lake
	Ras El-bar	98%	9	1	50,000	Navigation Canal
	Azbat El-Borg	60%	2	3	20,000	El-Safara Canal
	El-Shoara	80%	1	1	To El-Ananeya WWTP	-
	El-Adlia	70%	-	2	350	El-Adlia chain
	Khaet el-Nasara & Shata	90%	1	1	*	
	El Kaeita	70%	-	2	1,250	Manzala lake
	Alsenanya	*	2		El-Gomro	Manzala lake
Faraskour	Faraskour	70%		3		Gwada & Zaglolal chain
	Rawda	90%		2	3,800	Rawda drain to Mangala lake
	Kafr El-Arab	70%		2	550	Nazaz drain to secro Al Asfal
	Al-Rahamnah	80%		2	1,200	Rahmanah drain to sero Al-Asfal drain
	Al-Barashya	60%	1	8	600	Mazay El-Banashya to sero Al-Asfal
	Algnaymyah	70%		2	550	Kanal El-Balad to sero Al Asfal
	Shrbas	70%	3	2	550	Shrabas drain to sero Al-Asfal
	Al Horamy	90%		2	2,000	
	Al-Nasrya			2	2,000	
Kafr Saad	Kafr Saad	*	3	1	20,000	Kafr Soliman drain
	Kafr Al-Batekh	80%	-	3	3,000	Kafr Ek-Batekh drain to Kafr El gab drain
	Meat Abo galeb	60%	-	1	1,700	Kafr Elgab drain (2)
	Alwastany	60%	1	1	550	Drain (1) to Kafr Algab drain
	Kafr saad	50%		1	1,200	Kafr Saad to Elgab drain
	Kafr Soliman Albahary	60%	-	1	920	Alboraay drain to Kafr Elgab drain
	Kfour El-gab	75%	1	1	3,300	Kafr Elgab drain (2)
	Al-Mohamadya	*	-	1	2,000	*
Al Zarka	Al Zarka	90%		1	20,000	El sero Al Aala drain
	Sero	75%		1	3,200	Al Mayaserah drain to sero, Al Aala drain
	Meat Al kholy	70%		1	2,000	Meat Al Kholy to El sero, Al Aala drain
	Dakahla drain	95%		2	2,900	Algayt drain to El sero Al Aala drain
	Shermesah & Zaatrah	70%		1		El sero Alaala drain

[Source: Sanitation Working Group Report]

Table 9-19: A List of the Villages Not Currently Served with Integrated Sanitation Infrastructure Services

Markaz Damietta	Markaz Faraskoor	Markaz Kafr Saad	Markaz El-Zarqa
El-Sayala	El-Dhahra	Kafr El-Menazla	Kafr El-Meyasrah
El-Ananeya	El-Salmeya	Kafr El-Shahateen and Dar El-Salam	Seif El-Deen
El-Basarta	El-Nagareen	El-Rakabeya and Gamasah	El-Kashef El-Gedeed
Awlad Hammam	El-Ghawabeen	El-Basateen	Ezbet El-Baz and its satellite villages
El-Khalifa	El-Atwa	Omm El-Rizq and El-Awamer	Ezbet Alei-ElDeen and its satellite villages
El-Bostan	Awlad Khalaf	El-Ismileya	Teqeyi El-Deen
Shat Greiba	El-Tarha	El-Saadeya El-Qebleya	El-Salam village
The rest of El-Senaneya	El-Ebeideya	El-Swalem	
Ezbet Lahm	Mit El-Sheyookh	El-Zahraa (Kafr Mit Abou-Ghaleb)	
Shata	Kafr El-Shennawy	Omm EL-Reda	
	Abou-Greeda	El-Reyad, Kaheel, and El-Hawamesh	
	El-Azazma	El-Tawfeeqeya	
	Ezbet El-Gendy	El-Saadeya El-Bahareya	
	Haggaga and El-Arbaein	El-Hoseineya	
	Karam and Rezouq	El-Ibrahemeya El-Qebleya	
	Ezbet El-Deidei (Barasheya)	El-Abbaseya	
	Ezbet El-Nil (Sherbas)	El-Ibrahemeya El-Bahareya	
	Ezbet Mansi (Sherbas)	Ezab El-Merabein, El-Dahayma, Abou-Ayyad, and Manshaat Nasser in Kafr El-Ghab	
	Tafteesh Serwe		

[Source: Sanitation Working Group Report]

9.3.2 Reuse of Sludge and Treated Wastewater

There are no plans to reuse the Governorate's treated wastewater as water is generally available and the idea of reuse is perceived to be too costly. In general, sludge from sewage treatment plants is sold to residents and added to soils.

9.3.3 *Planned Sanitation Projects*

Table 9.20 presents a list of sanitation projects, which are scheduled to enter service between 2003 and 2005. These projects are expected to increase the sanitation service level to 96,000m^3/day, which is equivalent to providing service to 85% of the governorates population.

Table 9-20: Sanitation Projects Currently Constructed through NOPWASD in Damietta Governorate

No.	Project Name	Design Capacity (1000 m^3/d)	Effluent Discharge
1	Upgrading and rehabilitation of sanitation in Dumiat City	60	Lake Manzala
2	Sanitation project in Ezbet El-Borg	20	Ek-Sefara canal
3	Sanitation project in Faraskoor	20	Faraskoor drain
4	Sanitation project in El-Zarqa	20	El-Sayala drain
5	Sanitation project in Kafr-Saad	20	Kafr-Saad drain to Kafr El-Ghab drain
6	Sanitation project in El-Mohamadeya	20	Wahdan drain to Kafr El-Ghab, El-Herna drain to lower Serwe
7	Sanitation project in Seyaneya	Connecting to Ras EL-Barr Sewage Treatment Plant, capacity of 50	Navigatinal channel
8	Sanitation project in El-Nassreya	2	Upper Serwe drain

[Source: Sanitation Working Group Report]

9.3.4 *Institutional and Financial Structure of the Sanitation Sector*

Operation and Maintenance of Sanitation projects

The Damietta Governorate's sanitation sector does not have economic units to oversee its work like the water sector does (i.e. Damietta Drinking Water Company). Instead local administrative units are responsible for operating and maintaining sanitation projects in the Governorate's cities, whilst management units do the same in Markazes and villages.

The Governorate's General Authority of Sanitation carries out technical and administrative coordination with the local units whilst the National Organization of Potable Water and Sanitary Drainage (NOPWASD) builds, operates and maintains new sanitation projects until the local administrative units are capable of operating them, through private sector companies, under NOPWASD's supervision.

The budget, which ranges from L.E.4 to 5million for completion and rehabilitation projects is obtained from three sources:

- 3 million L.E. from the Government's Bab III budget;
- 1 million L.E. from NOPWASD; and
- 1 million L.E. for operation and maintenance from the Government's Bab II budget.

Construction of New Sanitation projects

- NOPWASD executes central sanitation projects in the Governorate through funding and supervision;
- The housing and utilities directorate supervises the construction of projects funded by the Governorates Bab III budget, and the budget for rehabilitation and upgrading services from NOPWASD;
- Some local administrative units, through their engineering department, build some sanitation projects within their own jurisdiction; and
- The Governorate's sanitation department takes charge of the regular inspection of constructed sanitation projects.

10. SOLID WASTE MANAGEMENT

10.1. SUMMARY OF CURRENT WASTE MANAGEMENT PRACTICES

Solid waste is one of the major problems facing Damietta Governorate both in urban and rural areas. Problems facing the waste sector include the lack of a proper institutional set-up for solid waste management and the lack of both financial and human resources. This has effectively led to inefficient collection, coupled with unmanaged and unsanitary waste disposal practices in Damietta and hence to an acute accumulations problem.

In the cities and urban centres, formal solid waste management systems exist but are generally inadequate. In rural areas, however, no formal solid waste management systems exist.

10.2. ORGANISATIONAL STRUCTURE OF WASTE MANAGEMENT

There is no single department within the Governorate Administration (central level) responsible for solid waste management in Damietta. At the Markaz level, Solid Waste Management is managed by a standardised organisational structure, however, there is a clear lack of technical expertise at senior management levels, and little or no staff training.

Each Markaz has the following officers and staff responsible for waste management in the main city within their administration:

- Cleansing Director;
- Cleansing supervisors (responsible for operational concerns such as street sweeping/vehicles/collection equipment); and
- A 'fleet' of workers and equipment drivers (permanent or temporary).

Damietta Governorate is currently privatising certain solid waste management services beginning with Damietta City, however, to date, implementation is slow and there are concerns about the ability of the current system to manage and monitor the proposed privatization scheme.

10.3. WASTE GENERATION

The average rate of waste generation in Damietta Governorate varies considerably. The great disparity lies in the difference between the high rate of generation in Damietta city and some of its local units and the low rate of generation in other, less populated parts of Damietta Governorate. It is estimated that Damietta Markaz generates an average of 0.719 Kg/ person/day, compared to only 0.4 Kg/person/day in other areas of the Governorate. Based on these estimates, the aggregate quantity of waste

generated in Damietta would be 862 tons/day. The following table summarises quantities of waste generated per day in each Markaz:

Table 10-1 : Waste Generation in Damietta Governorate

Name of Markaz	Average Amount of Waste Generated/Day
Damietta	**543 ton/day**
Damietta City	380
Izbet El- Borg City	5
Ras El-Bar City	50
Other Local Units	108
Faraskour	**169.5 ton/day**
Faraskour City	45
El- Rawda	40
Other local Units	84.5
Kafr Saad	**85 tons/day**
Kafr Saad City	10
Meit Aboul Ghaleb City	4
Kafr El- Batikh City	12
Other Local Units	59
Zarka Markaz	**63 ton/day**
El- Zarka City	14
El- Sarou City	10
Other Local Units	39
Total	**860.5 ton/day**

[Source: Damietta Solid Waste Management Report -SEAM]

10.4. WASTE COMPOSITION

According to a study undertaken by SEAM, the approximate waste composition in Damietta Governorate is as follows:

- Food Waste 86.59%
- Paper 5.75%
- Plastic bags 2.24%
- Metal 1.53%
- Plastics 1.25%
- Unrecyclables (dust, wood, etc.) 1.13%
- Glass 0.794%
- Bones 0.68%
- Clothes 0.36%

These compositions show some similarities to those listed in the draft National Waste Management Strategy as follows:

- 50-60% organic material;
- 10-20% paper;
- 1-5% glass;
- 3-7% plastics;
- 2-7% metals; and variable amounts of "other" material.

Understanding the composition of waste is an extremely important factor in determining the most appropriate management and disposal system. In certain rural and peri-urban areas, the waste stream has a high organic content, which allows for composting as an option for disposing of waste. However, it is quite different in urban areas, where the composition has less organic content which makes the waste stream potentially more suitable for recycling than composting.

10.5. WASTE COLLECTION

Two methods were used to estimate the average rate of waste collection in Damietta Governorate. The first method used a series of meetings and workshops with the local authorities in Damietta and the second used a more empirical method which weighed collected waste at a number of selected weighing points to compare against the results previously obtained through the first method. The two methods had almost identical results. *Table 10.2* demonstrates the total amount of waste collected by local units.

Table 10-2: Waste Collected by Local Units in Damietta Governorate

City/ Local Unit	Amount collected and transferred to dumpsite (Ton/day)
Shatta dumpsite	
Kafr El Bateekh City	12
Damietta City	350
Local Unit at El Sheikh Dorgham	12
Local Unit at El Basarta	2.5
Local Unit at Gheit El Nassara	18
Local Unit at El Bostan	3.5
Local Unit at Ezbet El Nahda	7.5
Local Unit at El Senania	8
El Anania Local Unit at	27
Local Unit at El Shoaraa	6
Local Unit at El Khiata	22
Total	**475.5**
Abou Grida dumpsite at Faraskour	
Farascour City	45
El Rawda City	40
Local Unit at Sharabas	9
Local Unit at El Rahamna	10
Local Unit at El Abedia	9
Local Unit at El Barbashia	6
Local Unit at Kafr El Arab	9
Local Unit at El Nasseria	8
Local Unit at Karam and Rezouk	8
Local Unit at El Sarow	6
Local Unit at El Hawrany	12
Local Unit at El Ghonaimia	9
Local Unit at El Dahra	9
Local Unit at El Ghawabeen	9
Total	**189**
Abou Grida dumpsite at Faraskour (cont)	
Local Unit at El Atawi	8
Local Unit at El Dakahla	5
Local Unit at Seif El Deen	12
Total	**214**
El Zarka dumpsite	
El Zarka City	15
El Serw City	10
Local unit at Kafr El Meyasara	6

City/ Local Unit	Amount collected and transferred to dumpsite (Ton/day)
El Zarka dumpsite *(continued)*	
Local unit at Shermesah	6
Local unit at El Kashef El Gadid	6
Meet El Kholi Abdallah	10
Total	**53**
New Ras El Bar dumpsite	
Ras El Bar City	77-101
Ezbet El Borg dumpsite	
Ezbet El Borg City	5
Without a dumpsite	
Local Unit at Om El Rezk (new unit)	--
Local Unit at Kafr Saad El Balad	2
Local Unit at Kofoor El Ghab	4
Local Unit at Kafr El Wastani	1
Local Unit at El Mohamadia	1
Local Unit at El Rekabeya	1.5
Local Unit at El Sawalem	2
Local Unit at El Riyad	1
Local Unit at Kafr Soliman El Baheri	2
Local Unit at El Basateen	2
Local Unit at Kafr Shehata	1
Local Unit at El Kafr El Manzala	1
Local Unit at Om El Reda	1
Local Unit at El Zahraa	0.5
Meet Abou Ghaleb City	7
Total	**27**

[Source: Damietta Solid Waste Management Report -SEAM]

10.6. COLLECTION AND TRANSFER SYSTEMS

The standard system of collection in cities usually relies on waste pooling points or the use of old containers on main streets. The waste is then collected from these points by small trailers, trucks or specific refuse collection trucks, which are only available in Damietta and Ras El- Bar cities. In spite of the existence of this system, in practice, it is very inefficient, leading to general inadequacy of the solid waste management (SWM) services even in the cities. Containers are often inappropriate in terms of type and size or do not exist in enough numbers to be effective. Collection coverage is also very poor and the frequency of collection is highly irregular. In narrow streets, there is no collection system, which causes a serious health threat from accumulated waste.

In rural areas, the system is less formal however, trailers are still used in waste collection. Efficiency of the system greatly depends on the availability of resources in each local unit.

10.7. COLLECTION ION EQUIPMENT

There is a general lack of cleansing equipment across the Governorate. The existing equipment is in a very bad state of repair and is not regularly maintained. The equipment is inadequate and inappropriate for collecting waste due to the fact that most of the streets are narrow and therefore difficult to serve. A survey of the age of the equipment used by Damietta local authorities shows that much of the equipment has already depreciated. There is also a serious lack of maintenance workshops (only 10 workshops exist in the entire Governorate). Even the existing equipment suffers as there isn't the technical expertise around to run it properly.

Due to insufficient financial resources, spare part procurement and storage is very limited. With this in mind equipment is often not used for long periods of time. The following map (*Map 13*) and attached tables shows the amount of available equipment in the four different Markazes and serves to demonstrate that most of the equipment is around 20 to 25 years old.

10.8. LABOUR

Labour for waste collection is extremely limited in most Markazes as the work is unpopular and has low prestige. In addition salaries are generally low and the working conditions and wages do not either encourage people to work in this field or remain in this field of work for too long. There are also other more popular sectors competing with the waste sector, for example, furniture.

All Markazas reported extreme difficulty in finding temporary labours, who mostly come on a seasonal basis from Dakahleya Governorate. It is also increasingly difficult to find temporary laborers in the harvesting seasons when working in agriculture pays more than working in waste collection. The Governorate also suffers from a lack of skilled labourers in certain key solid waste technical specializations, especially those related to maintenance workshops, composting plants and disposal sites.

10.9. DISPOSAL

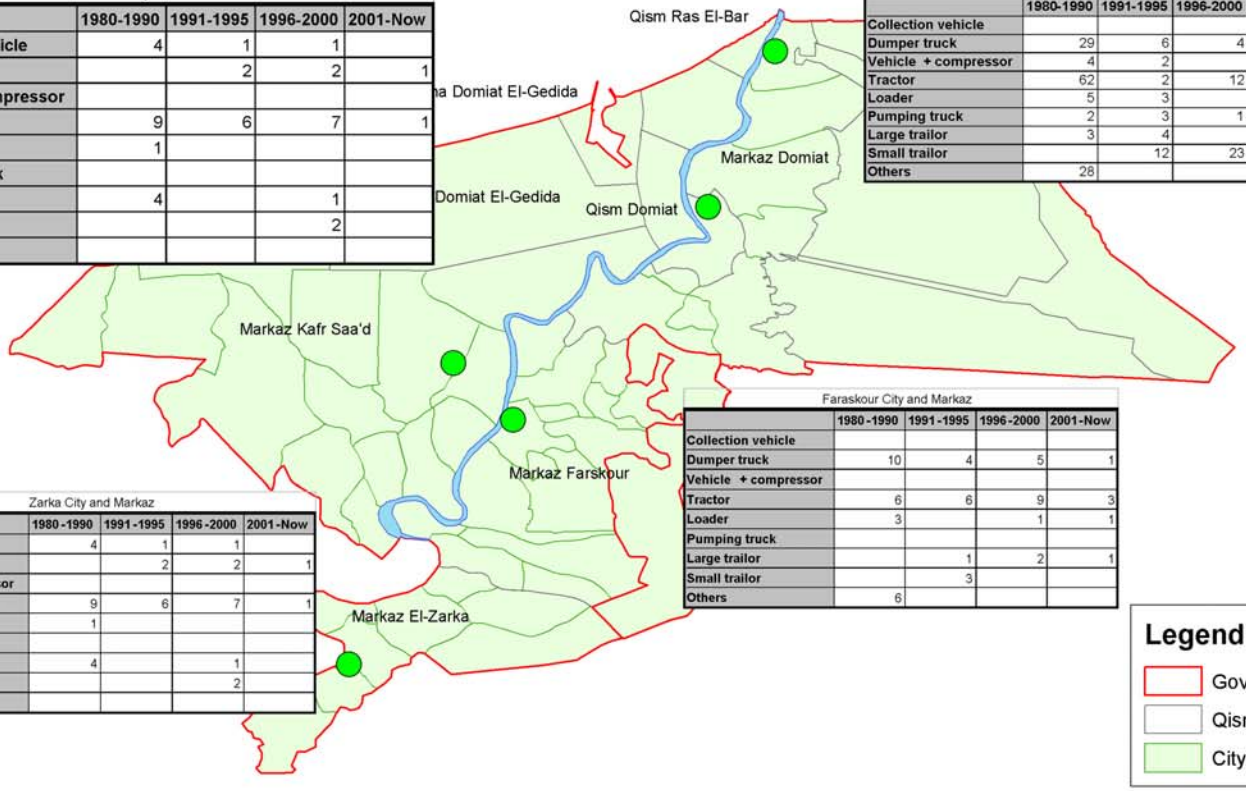
The disposal of waste in Damietta is unregulated. Random dumping of waste in the streets is a common phenomenon, in addition to the increasing trend of tipping waste in canals and irrigation channels. More recently, residents of

Damietta have started to tip their waste in a new tipping site near the old dumping site in Lake Manzala.

There are six main dumpsites in Damietta Governorate. The location and service coverage of these sites is shown in the following Map (*Map 14*).

Zarka City and Markaz

	1980-1990	1991-1995	1996-2000	2001-Now
Collection vehicle	4	1	1	
Dumper truck		2	2	1
Vehicle + compressor				
Tractor	9	6	7	1
Loader	1			
Pumping truck				
Large trailor	4		1	
Small trailor			2	
Others				



Damietta City and Markaz

	1980-1990	1991-1995	1996-2000	2001-Now
Collection vehicle				
Dumper truck	29	6	4	5
Vehicle + compressor	4	2		
Tractor	62	2	12	1
Loader	5	3		
Pumping truck	2	3	1	
Large trailor	3	4		
Small trailor		12	23	
Others	28			

Faraskour City and Markaz

	1980-1990	1991-1995	1996-2000	2001-Now
Collection vehicle				
Dumper truck	10	4	5	1
Vehicle + compressor				
Tractor	6	6	9	3
Loader	3		1	1
Pumping truck				
Large trailor		1	2	1
Small trailor		3		
Others	6			

Zarka City and Markaz

	1980-1990	1991-1995	1996-2000	2001-Now
Collection vehicle	4	1	1	
Dumper truck		2	2	1
Vehicle + compressor				
Tractor	9	6	7	1
Loader	1			
Pumping truck				
Large trailor	4		1	
Small trailor			2	
Others				

Legend

- Governorate
- Qism/Shiakha
- City/Shikha

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Map 13: SWM Equipments by age in Damietta villages

0 5 10 20 30 40 KM

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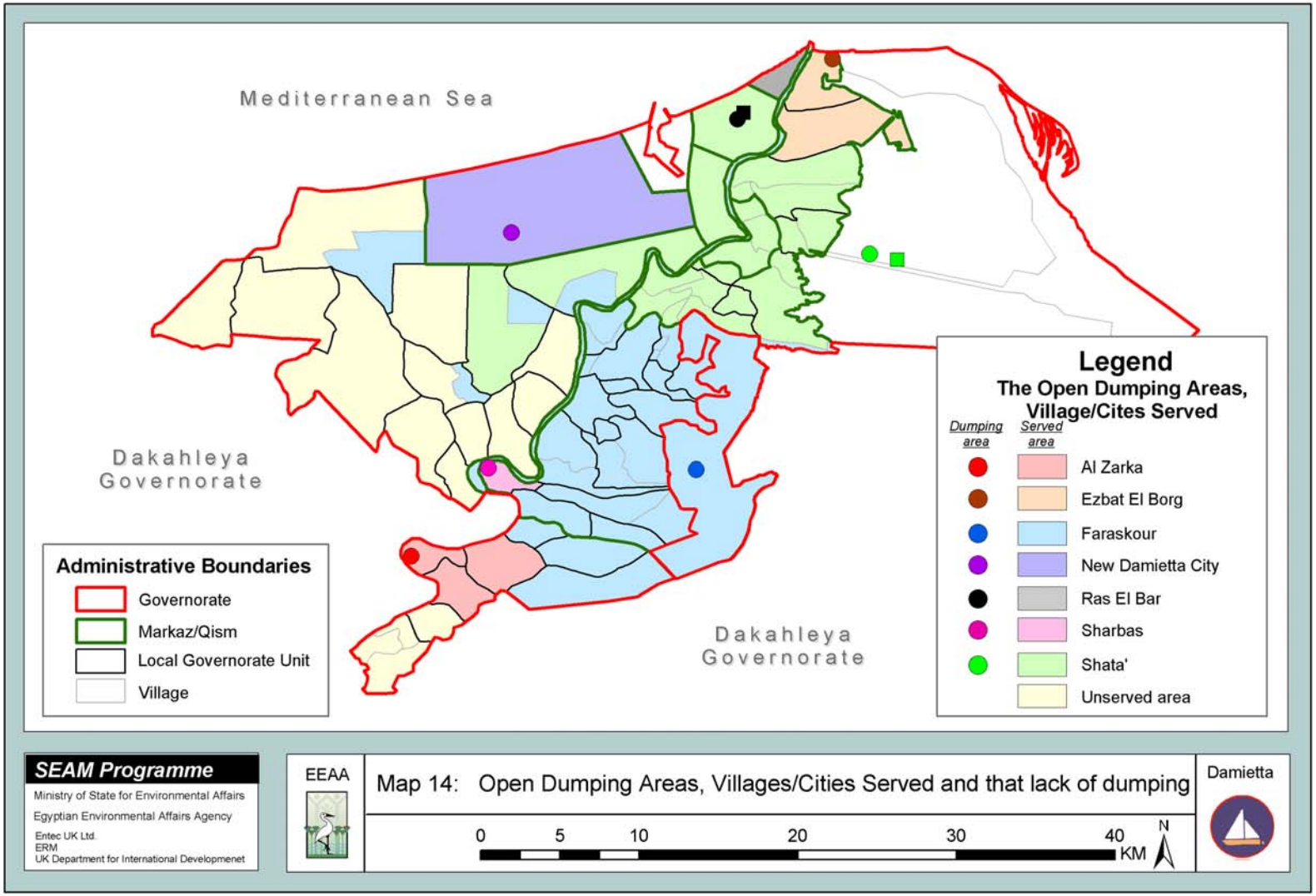
Damietta


Mediterranean Sea
Dakahleya Governorate
Dakahleya Governorate
Legend
The Open Dumping Areas, Village/Cites Served
Dumping area
Served area
Al Zarka
Ezbat El Borg
Faraskour
New Damietta City
Ras El Bar
Sharbas
Shata'
Unserved area
Administrative Boundaries
Governorate
Markaz/Qism
Local Governorate Unit
Village
SEAM Programme
Ministry of State for Environmental Affairs
Egyptian Environmental Affairs Agency
Entec UK Ltd.
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EEAA
Map 14: Open Dumping Areas, Villages/Cities Served and that lack of dumping
0 5 10 20 30 40 KM
N
Damietta

The dumpsites are often uncontrolled with little in the way of site management or any presence from the municipality. This lack of supervision simply encourages free tipping of waste, and allows widespread scavenging on part of the children and wild animals. In addition, it is important to note that regular covering of waste with soil is not practiced in any of the dumpsite, consequently leading to major health hazards.

10.10. FINANCIAL RESOURCES

There are several sources of finance available for solid waste management in the Governorate. Some of the sources are under direct control of the Markaz/City administration and some are granted from Central Government to the Governorate administration. Funds allocated by Central Government and distributed via the central Governorate administration include:

- BAB 1 – general funds for permanent workers within the Governorate, many of whom may be involved ion the solid waste management sector;
- BAB 2 – funds allocated for operation and maintenance of equipment; and
- BAB 3 – funds for capital investment.

Another main source of funding is the cleansing fund. The cleansing budget available to each of the Markazes would appear to be extremely low compared to the required expenditure required to run the system properly. The sources for the cleansing fund include the following;

- 2 % of the leasing value of the property;
- Reconciliation fee; and
- Fines for tipping waste in the streets.

It is very important to acquire additional funding in order to facilitate purchasing of new equipment, raise salaries, hire new labourers and improving the overall general infrastructure.

10.11. PRIORITISATING WASTE PROBLEMS

Table 10.3 reflects the prioritization of waste problems in Damietta Governorate in both cities and local unit level. This prioritisation is based on meetings undertaken with the Head of Markazes, Deputy Head of Markaz and Head of Cleansing Sections.

Table 10-3: Prioritised Waste Problems in Damietta Governorate

City/Unit	Providing new equipment	Establish maint. Workshop	Cover larger space of the village/city	Incinerator to dispose medical wastes	Sanitary landfill	Increase financial Resources	Increase manpower
Damietta Markaz							
Damiette city*	3	6	7	5	4	2	1
Damiette city**	2	7	6	5	4	1	3
Damiette city***	1	4	6	7	3	5	2
Ras El-Bar city	1	2	6	7	6	5	4
Ezbit El-Borg city	1	5	4	7	4	2	3
El-Enabia	2	6	3	7	2	5	1
El-Khaiata	1	7	5	4	5	6	3
El-Basata	3	7	4	6	6	1	2
Ezbit El-Nahda	3	4	5	7	6	2	1
Gheit El-Nasara	3	4	5	7	5	1	2
El-Bostan	1	4	7	6	5	2	3
El-Sinania	1	5	7	6	4	3	2
El-Shoara	1	4	6	7	5	3	2
New Damiette	5	4		1	2		3
Kafr Saad Markaz							
Kafr Saad city	2	4	5	7	1	6	3
Kafr El-Batikh	1	3	6	7	4	4	5
Meit Abou Ghalib	3	5	7	6	1	2	4
El-Rakabia	4	7	5	6	1	2	3
El-Wastani	3	6	5	7	2	4	2
Kafr Soliman El-Bahri	3	6	5	7	1	4	1
Kafr Saad El-Baled	4	7	5	6	3	2	3
Kafr Meit Abou Ghalib	4	5	--		1	1	2
El-Sawlim	2	5	6	7	1	4	3
Kefoor El-Ghab	2	7	5	6	1	4	3
El-Mohammadia	2	5	6	7	1	4	3
Kafr El-Manazla	3	6	7	5	1	4	2
El-Bostan	3	5	7	4	1	6	4
Um El-Rizq	3	5	6	7	1	2	4
Um El-Rida	3	5	7	6	1	2	4
El-Riyad	3	5	7	6	1	2	4
Kafr Shehata	3	4	7	5	1	2	6
Zaraka Markaz							
El-Zarka city*	2	5	7	6	1	4	3
El-Sarou city**	3	4	6	7	1	2	5
Seif El-Dein	2	5	6	7	1	3	4
Kafr El-Maiasra	2	5	6	7	1	3	4
Shermsah	5	1	2	6	7	3	4
Dakahla	4	3	2	7	1	5	6
Meit El-Kholi Abdullah	2	7	3	4	1	6	5
Faraskour Markaz							
Farascour city*	1	7	4	5	6	3	2
Farascour city**	6	5	7	1	2	3	4
El-Rawda city	2	1	3	7	4	5	6
Kafr El-Arab	1	6	7	5	4	3	2
Taftish El-Sarou	1	6	5	7	4	3	2

City/Unit	Providing new equipment	Establish maint. Workshop	Cover larger space of the village/city	Incinerator to dispose medical wastes	Sanitary landfill	Increase financial Resources	Increase manpower
El-Obaidia	7	3	4	5	6	2	1
Karm and Razouq	5	4	6	3	7	1	2
El-Rahamna	6	5	7	4	3	1	2
Sherbas	5	4	6	7	2	1	3
El-Ghanimia	4	5	6	7	3	1	2
El-Nasria	7	4	6	5	3	1	2
El-Brashia	1	5	6	7	4	2	3
El-Horani	4	2	5	7	1	6	3
El-Ghawabin	1	3	6	7	2	4	5
El-Atawi	1		4		5	3	2
El-Dahra	2	4	7	6	5	3	1

** scale 1 to 7 [Source: Damietta Solid Waste Management Report -SEAM]*

10.12. CLINICAL WASTE

Damietta Governorate has 68 public hospitals, 845 primary health care centres, clinics, blood banks and offices, 15 private health care centres, four polyclinics and about 1,026 private clinics. The majority of hospitals and primary health care centres are under the supervision of Damietta Directorate. Generation rate for clinical waste in Damietta Governorate is estimated at 14.5 tons/day. The vast majority of this though is not segregated and is collected with the municipal waste stream. However, with proper segregation, the amount of hazardous clinical waste is projected to be between 3.6- 4.4 tons/ day.

In general, clinical waste management is generally poor. Most hospitals and clinics are not well equipped with hospital tools (bags, trolleys…etc.) and existing incinerators often perform inefficiently. This situation results in environmental hazards to neighbouring communities and occupational safety and health problems for medical staff dealing with the waste.

This poor state of affairs is due to a;

- Lack of a structured formal administrative system responsible for clinical waste management within health facilities
- Lack of human and financial resources allocated to clinical waste management and technical problems relating to the operations of the system (no proper segregation
- Lack of storage facilities and proper incineration and landfilling.

The following table (*Table 10.4*) provides estimated figures for daily generated quantities of Clinical Waste in Damietta Governorate.

Table 10-4: Estimated Quantities of Clinical Waste Generated Daily in Damietta Governorate.

District/ Markaz Health Care Facilities (HCFs)	Damietta	Farskour	El-Zarka	Kafr Saad	TOTAL
I. Public HCFs: IA HCFs Without Beds (centers/units):					
Bilharzia Combating center	18	3	3	3	27
Malaria Combating center	3	3	-	3	9
First aid (main) center	3	3	3	3	12
Urban health center	18	3	-	3	24
Motherhood & Childhood health center	63	-	27	6	96
Rural health unit	39	51	21	39	150
Family planning unit	90	72	33	72	267
Bilharzia Combating unit	39	51	21	39	150
Malaria Combating unit	12	-	-	-	12
First aid points	18	3	3	9	33
Health Office	57	60	27	60	204
Clinic	6	-	-	-	6
Polyclinic	-	3	-	-	3
Laboratories	105	75	30	63	273
Blood bank	15	6	6	6	33
Pharmacies (including private owned)	534	156	78	63	831
Dialysis units	342	72	63	54	531
Premature care units	24	18	15	12	69
Intensive care units	81	-	-	42	123
Ultrasonography units	15	9	6	6	36
Subtotal (I A)	**1,482**	**588**	**336**	**483**	**2,889**
I (B) HCFs With Beds:					
General or Central hospitals	1,060	619	500	469	2,648
Takamoul/ Rural hospitals	101	153	105	280	639
Specialized hospitals (skin, eye, fever, etc.)	1,372	211	-	490	2,073
Rural health group	-	11	-	80	91
Other health service units**	972	15	-	18	1,005
Future additional services ***	630	280	-	420	1,330
Subtotal (IB)	**4,135**	**1,289**	**605**	**1,757**	**7,786**
I (C) Veterinary health Units					
II. Private HCFs:	200	200	200	200	800
I (A) HCFs Without Beds**	1,350	750	270	420	2,790
II (B) HCFs With Beds:	**105**	**56**	**14**	**70**	**245**
Grand Total	**7,272**	**2,883**	**1,425**	**2,930**	**14,510**

[Source: Damietta Solid Waste Management Report -SEAM]

10.13. SLAUGHTERHOUSE WASTE

Public slaughterhouse waste throughout the Governorate is collected and transferred to the same dumpsites (in the same collection vehicles) as those used for all other wastes.

The owners of private slaughterhouses on the other hand generally sell the majority of their waste (leather, hooves, bones) for re-use and application in the agricultural sector.

10.14. DAMIETTA SOLID WASTE MANAGEMENT STRATEGY AND 10 YEAR IMPLEMENTATION PLAN

As part of the GEAP process, Damietta Governorate is also developing an integrated solid waste management strategy and a 10-year implementation plan. Initial work has been done on this activity including background studies on waste practices and preliminary economic analysis for possible technical options for waste management. Priority options were agreed upon and are currently being investigated.

The outcome of this process would be:

- A detailed technical study for the selected priority option and a phased plan for implementing the plan over 10 years; and
- A detailed financial feasibility study for the selected priority option, and developing “utility basis” for calculating tariffs.

The strategy and the implementation plan, when finalised, will represent a sustainable and integrated strategy for solid waste collection and disposal across all urban and rural areas in the Governorate.

11. CULTURAL HERITAGE

11.1. CONTEXT

The ancient archaeological sites are under the authority of the Supreme Council of Antiquities. Excavations have been carried out by the SCA at Tell Ghuzz and Tell Burashiya, where Roman and Islamic artefacts have been found. Other than these excavations, the tells, or mounds, remain untouched. Some are surrounded by agricultural land, and are gradually being reclaimed for farms. At Tell el-Deir (No. 029), the ancient site is under threat from industrial and agricultural expansion. Information on Damietta's Islamic monuments is difficult to obtain. Other lesser known buildings whose condition is variable include, 010 Wekalet Waqf el-Aqbat, 011 El-Badr Mosque, 012 Mausoleum of Gamal Eddin Sheha, 014 Sabil Abu Tassat in Damietta city; 018 Zawiyet el-Ansari, and the domes of Hassan el-Diasty and El-Husseiny (019 and 020) in Fariskur city; 033 Kafr el-Miasra Mosque in Markaz El-Zarka. Table 15.1 in Annexure C provides a full list of Cultural Sites with locations.

Awareness of the regions historical importance in terms of older Islamic monuments does not appear to be widespread, although lack of sufficient funding for their upkeep may be another factor contributing to their extremely poor condition. The Abu el-Maati Mosque and El-Moeni Mosque in Damietta, and the El-Hadidi Mosque in Fariskur in particular are in urgent need of restoration, and a solution to the groundwater infiltration, which is seriously effecting the foundations of many of these monuments, needs to be found urgently before they are irreversibly damaged. Other mosques have been extensively restored some several times however in a number of cases the restoration has obscured the original features of the building, so that they no longer retain their original features.

Lake Manzala is divided between the governorates of Damietta, Dakahleya and Port Said. There are numerous small islands on the lake, all surrounded by reed-beds, which make access to the islands and, therefore, identification of any possible historical sites extremely difficult. In addition, some mounds are very low and almost completely submerged. Without a full scale systematic survey of Lake Manzala, knowledge of the exact locations of ancient sites will remain inaccurate.

11.2. CULTURAL HERITAGE SITES IN DAMIETTA GOVERNORATE

The Governorate has a reasonable breadth of historical monuments that range in age and type (Islamic, Roman, Christian Coptic, Medieval). Apart from the reminants of Oraby Castle, which are said to have been originally built in the medival period during the crusades, the oldest standing building in the Governorate is the Abu el-Maati Mosque built in 1171 AD. Other areas of

archeological importance include a number of sites dating back to Roman times, most notably, is Tell el-Deir, located near the town of Dumyat el-Gedid in new Damietta. Major cultural heritage sites in Damietta are illustrated in *Map 15*.

11.2.1 Dumietta City

001 Abu el-Maati Mosque (Islamic)

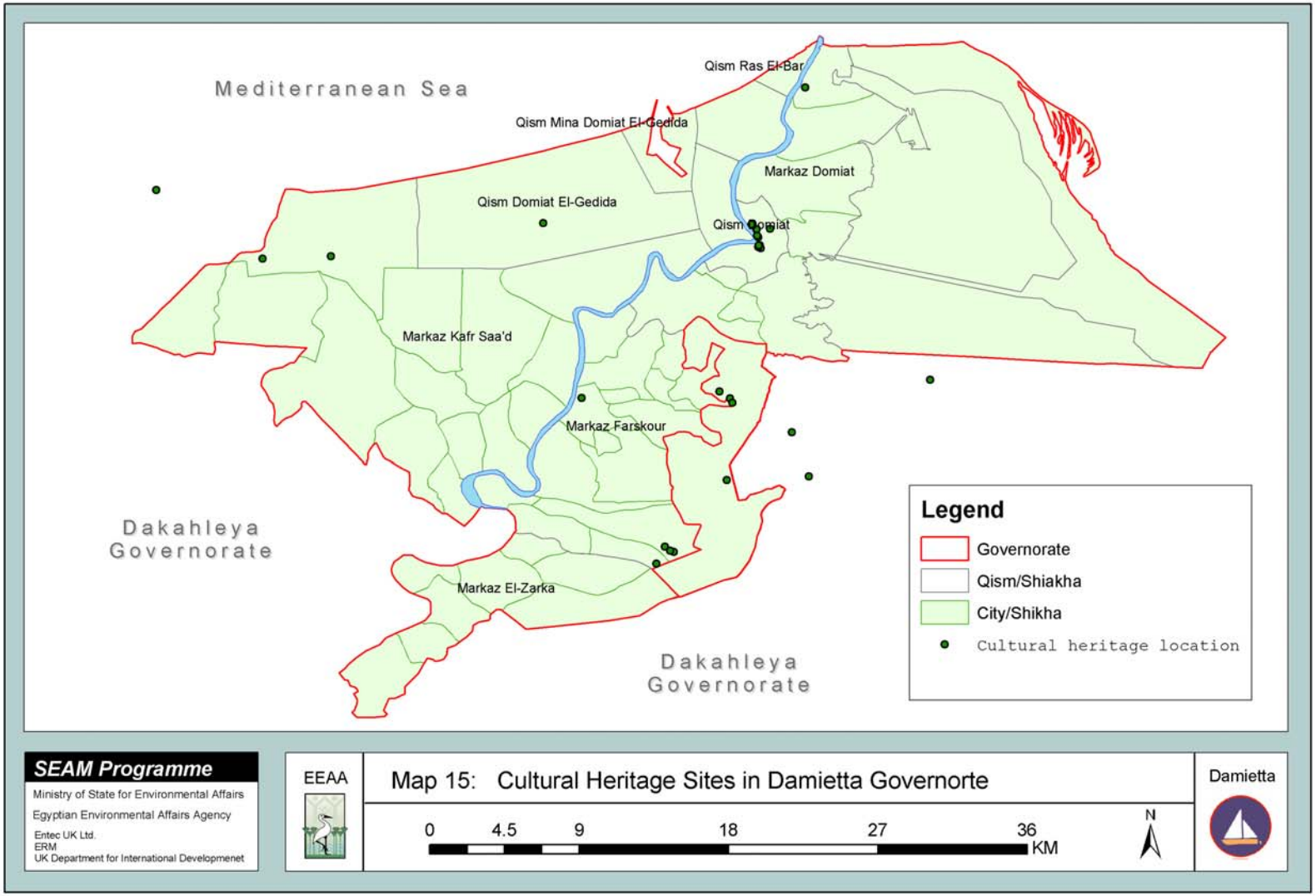
Sometimes also known as the Amr Ibn el-Aas Mosque and built during the Fatimid period (969 – 1171 AD) this mosque is considered to be the oldest and largest in Dumietta. The mosque measures 60 x 54 metres, and was built facing the four cardinal points, so the qibla (direction of Mecca for prayer), is at an unusual angle. The mosque contained 160 pillars of which 144 remain, many of them obviously taken from much older pharaonic and Coptic structures. The inscriptions in the mosque (i.e. 1072 Hj, 1660 AD) record various building restorations, which must have taken place. The mosque is situated in a large cemetery and is currently in very poor condition. Some parts of the mosque are paritially underwater and surrounded by reeds whilst other parts are on the verge of collapse.

002 El-Madbuli Mosque (Islamic)

The Mosque and school were built by Sultan Qaitbay, for the holy man Ibrahim el-Madbuli, in approximately 1475 AD. The mosque was clearly restored during the Ottoman period (18th century AD), and sometime later during the 19th centuary as 1230 Hj, 1814 AD date markings on the doors indicate.

003 Zawiyet el-Radwaniya (Islamic)

This small mosque is on the Nile, a short distance south of the El-Bahr Mosque. It measures 280 metres square, and contains several iwans (alcoves), indicating that it was also a school. The style of the building dates it back to the Mamluk period (1250 – 1517 AD). Behind the eastern iwan is a mausoleum with a dome. The eastern section is adorned with gilded decoration and quotations from the Quran. Above the entrance is a marble plaque with the name of the man who restored the mosque in 1039 Hj, 1629 AD, El-Hag Radwan. The mosque underwent further restoration in 1991.



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Map 15: Cultural Heritage Sites in Damietta Governorte

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Damietta

004 El-Bahr Mosque (Islamic)

This large mosque is called the 'River Mosque' because it stands directly beside the Nile. It was originally constructed during the Ottoman period in the 17th century AD, but has recently been completely restored.

005 El-Moeni Mosque (Islamic)

The El-Moeni Mosque and school were built in 860 Hj, 1456 AD, by Moen Eddin, a well-known merchant from Fariskur, who built several important buildings in Damietta. The founder's domed mausoleum is included in the mosque. Unfortunately the building is in a very poor state of repair. The minaret has collapsed, ground water is a problem and the walls are leaning in places.

006 Church of St. Nicholas (Christian, Greek Orthodox)

The Church which is set in a garden surrounded by a high wall was built in the 15th century AD and was rededicated in 1845 with the unification of two adjacent churches. It contains some noteworthy icons.

007 Church of the Holy Virgin (Christian, Coptic Orthodox)

The new Coptic basilica was officially opened by Pope Shenuda in March, 1992, and apparently stands on the site of an earlier church which dates from The Middle Ages.

008 Ottoman Period Building

Little information was available on this building, but the style of architecture suggests that it may date from the Ottoman period, 18th – 19th century AD. At present it has some small shops on the ground floor, and what appears to be living accommodation above.

009 Church of St. George (Christian, Coptic Orthodox)

This church is sometimes called the 'Old Milk Market Church.' The date of its original construction is unknown, but a plaque by the door suggests that it was rebuilt in 1650 AD. It stands in an enclosed courtyard with trees around it.

010 Wekalet Waqf el-Aqbat (Christian, Coptic Orthodox)

A wekala is a bonded warehouse or caravanserai, with upper floors for rent. This wekala, located in Amir Farouk Street, belongs to the Coptic Patriarchate in Alexandria. It was built for Ethiopians passing through Egypt on their way to Jerusalem. The building dates from the 18th century AD, it consists of a room with domed ceilings and sits in a rectangular courtyard surrounded by arches supported by fine pillars.

011 El-Badr Mosque (Islamic)

This mosque was built in 1106 Hj, 1694 AD, by two brothers, Mohamed and Ibrahim, sons of Youssel Hafagi. The building was renewed by the Ministry of Awqaf (Endowments) in 1936, and almost all traces of the original mosque have disappeared.

012 Mausoleum of Gamal Eddin Sheha (Islamic)

This mausoleum lies to the west of El-Maati Mosque (001). It consists of four arches supporting a dome. The door is decorated with a collection of ten weapons, which suggests that the owner may have fought against the Crusaders. Behind the mausoleum is the tomb of Ahmed Bey Ibn el-Amir Mohamed Agha who died in 1170 Hj, 1750 AD.

013 El-Qantara Bath (Ottoman)

An Arabic reference to this bath states that it is now called El-Naieem Bath, and dates from the Ottoman period. The name of the buildier Hassan 1130 Hj, 1717 AD is inscribed at the entrance. When visiting the supposed site of this bath in May 2003, there was no sign of a bathhouse reflecting that date. However, there is a modern bathhouse, which local residents informed that it had recently been built to replace the older one, which had been pulled down. Unfortunately, there is no way to verify this information.

014 Sabil Abu Tassat (Islamic)

A water-fountain for passers-by, dating from the Ottoman period, and built by Hassan Agha, governor of Damietta, 1238 Hj, 1822 AD.

015 Oraby Castle (Medieval)

This large fortification covering several feddans in Ezbet el-Borg, north of Damietta City, was rumoured to have been built by the Crusaders. It was severely damaged during the Napoleonic period (1798 – 1801), was restored under Mohamed Ali (1805 – 1849), but was then largely abandoned, although some restoration was apparently carried out in the early 1950s. Substantial portions of the outer walls, magazines, and parts of towers survive, but they are generally in a poor condition.

11.2.2 Faraskour City

016 El-Hadidi Mosque (Islamic)

The mosque was built in 1200 Hj, 1784 AD, with alcoves (iwans) and a dome. Several parts have been reconstructed in the past, but the building is now in a bad state of repair, and has been closed for about two years.

017 The Great Mosque (Islamic)

This mosque, also called the 'Kondaky Mosque,' has a large prayer hall with four alcoves (iwans) and two entrances and a fine Mamluk style minaret. A 14th century AD date is inscribed on the marble in the prayer niche, and the mosque was restored in the Ottoman period, 18th – 19th century AD. Further renovation is currentlly being carried out. The mosque is located on Fariskur's main highstreet, and local people refer to it as the Mohamed Ali Mosque, which may refer to the period when it was previously restored.

018 Zawiyet el-Ansari (Islamic)

This has a large dome, two iwans and a chapel of carved wood.

019 Dome of Hassan el-Diasty

This is possibly the dome in the main street of Fariskur, beside the Great Mosque.

020 Dome of El-Hussein

11.2.3 Markaz Faraskour

021 Tell el-Ghuzz (Roman)

Located 1 km northwest of Burashiya, the mound is surrounded by agricultural land, and covers 7-10 feddans. The Supreme Council of Antiquities has carried out annual excavations here since 2000, uncovering evidence of Roman period occupation.

022 Tell el-Arab (a) and (b) (Roman)

This site is approximately 0.5 km south of Tell el-Ghuzz, and actually consists of two mounds, that to the northwest being smaller than the other. The two were probably originally parts of one mound, which covered about 15 feddans, and was subsequently split by a cart-track. Numerous small fragments of granite, limestone and quartzite can be seen on the surface, as well as pieces of slag.

023 Tell Burashiya (Roman, Islamic)

The tell, or mound, rises 6 metres above the surrounding fields, and can be approached by an asphalted road to within 1 km of the site, and then by a dirt track. Excavations were carried out here by the SCA in the 1990s, when a large late-Roman bath complex was discovered, and evidence of early Islamic period occupation. A modern cemetery impinges on the southeastern side of the mound, and goal posts on the western side show that it is occasionally used as a football pitch.

024 Tell Ibwan (Roman)

This site is close to Lake Manzala, and can be reached via the road beside the El-Salam Canal, then via a dirt track through the fields. The mound is low, only 1-2 metres above the level of the fields, and has been cut into two parts by irrigation channels and tracks; the earth dredged from the channels contains potsherds, fired bricks and pieces of limestone. Roman shards, bricks and glass fragments can be seen on the western part of the mound, the southern side of which is being used as a storage area for animal fodder.

025 Tell Naggarein (Roman)

This mound is a short distance southeast of Tell Ibwan, and can be approached on a dirt track. Tell Naggarein and the neighbouring mound of Tell Shawaqfa were almost certainly once parts of one mound covering about 75 feddans, the area between them having been levelled for agriculture. Antiquities are apparently occasionally found between these two mounds, and between Naggarein and Ibwan, indicating that there was originally a huge tell over 1.5 kilometres in diameter. Roman shards, red bricks, glass fragments and quartzite pieces are visible on the surface of Tell Naggarein.

026 Tell Shawaqfa (Roman)

See information on Tell Naggarein above (025). Potsherds can be seen in the banks of the irrigation channels around the mound, and along the path leading to it.

027 Tell Dabalun (Roman)

Tell Dabalun is a large low mound at the edge of Lake Manzala, on the southwest side of the El-Salam Canal, reached by road along the south side of the canal. Potsherds, quartzite fragments and coins are clearly visible on the surface, as well as indications of brick structures. The irrigation channel on the northern side of the site has uncovered part of a cylindrical structure, possibly a well, 2-3 metres below present ground level, and the banks of the channel contain many shards and brick fragments.

028 Tell Zawiya (Roman)

Tell Zawiya is a large low mound surrounded by agricultural land. Potsherds are visible on the surface, and especially in the banks of the irrigation channel on one side of the tell.

029 Tell el-Deir (Roman)

Tell el-Deir is the most important archaeological site in the Damietta Governorate and is located close to an industrial area near the town of Dumyat el-Gedid (New Damietta). Levelling of the site for the town was

prevented by the SCA. The land between the industry and cultivation consists of marshes, sand bars and pools. To the south, land has been reclaimed for a fish-farm. Antiquities, including Roman coffins, have been found here. The mound rises 10 metres high in the center, with low-lying areas on three sides. Some structures of fired brick are visible on the surface of the mound, as well as Roman shards and glass fragments, and pink plaster. The site is under threat from the encroachment of the agricultural area, and from industrial development.

030 Kom el-Ahmar (Roman)

Situated in Markaz Kafr Sa'ad el-Wustani (Central Kafr Sa'ad), this mound is surrounded by rice fields and palm groves. Access is difficult, by means of the narrow ridges running between the rice fields, which were full of water during the visit.

031 Tell Mahgara (Roman)

This low mound is in an agricultural area of rice fields and palm groves. Potsherds, including parts of amphorae, are visible on the surface.

032 Kom el-Hammamat (Roman)

The major part of this site, which is probably Roman, is now apparently in Daqahliya Governorate, Markaz Bilqas, with a small portion possibly still in Dumietta Governorate, Markaz Kafr Sa'ad. The site has been split into two mounds by the new coastal highway from Port Said to Mersa Matruh. The middle section was excavated by the Supreme Council of Antiquities before the road was constructed.

033 Mosque of Kafr el-Miasra (Islamic)

The mosque has this name because it belongs to an Arab tribe, which came to this area between Damietta and Fariskur, where Kafr el-Miasra is situated. The mosque stands on the bank of the Nile. It has recently been restored, and most of the old features have disappeared. The dome apparently dates from 1201 Hj, 1785 AD, according to a date inscribed on the chapel.

11.2.4 Lake Manzala

034 Tell el-Dahab (Roman, Islamic)

This site is an island in Lake Manzala, which is completely hidden by reed-beds. The mound rises to a height of 5 metres above the water, and covers 30-40 feddans. The mound is covered with late Roman shards and pieces from glazed Fatimid wares, as well as corroded coins, pieces of bone, glass, slag and limestone. At the top of the mound is a limestone column capital, and a pit about 3 metres deep in which, part of a stone wall standing in ground water has been uncovered. The tell is a popular picnic spot on public holidays.

035 Tell Sheikh Farid (Roman)

It is understood that thelow mound on an island in Lake Manzala ha only recently been discovered. A few shards and fragments of fired brick are visible on the surface.

036 Tell Bukhseikha

Another island in Lake Manzala, Tell Bukhseikha is some distance northeast of Damietta City. There is no information available regarding size or date.

SECTION: IV
ENVIRONMENTAL POLICY, LEGISLATION AND ADMINISTRATION

12. POLICY, LEGISLATION AND ADMINISTRATION

12.1. INSTITUTIONAL AND ADMINISTRATIVE FRAMEWORK

The Governorate of Damietta

The Governorate of Damietta is responsible for the public administration of the Governorate and is controlled by His Excellency the Governor, assisted by the Secretary General and the Deputy Secretary General.

The Governor is directly responsible for the management of all affairs of the Governorate and has responsibility for the following departments:

- General Directorate of Governorate Affairs;
- Department of Planning and Monitoring;
- Department of Legal Affairs;
- Department of Observation;
- Public Relations Department;
- Complaints Department;
- Communications Department;
- Department of Production and Economic Affairs;
- Department of Investment;
- Department for Companies and Agencies; and
- Department of Economic Research.

The Governor delegates direct responsibility of the following departments to the Secretary General:

- Committees and Conferences Department;
- Financial and Commercial Affairs Department;
- Administrative Affairs Department;
- Personnel Department;
- Co-operation Department;
- Central Statistics Department;
- Organisational Development Department;
- Information and Decision Support Centre; and
- General Department of Engineering Affairs, including:
  - Physical Planning Department;
  - Roads Department;
  - Mining and Quarries Department; and
  - Inland Navigation Department.

The Deputy Secretary General assists the Governor and Secretary General across a wide-range of activities and generally provides support to the management and administration of all Governorate Affairs.

At the local level, each City has a local City administration with a City Council and each Mother Village has a Local Administrative Unit, which manages the administration of the village and all associated satellite villages.

12.2. ENVIRONMENTAL POLICY, PLANNING AND MANAGEMENT

Environmental policy, planning and management are managed centrally by the EEAA from its Head Office in Cairo and through a network of eight Regional Branch Offices. The EEAA is the central policy maker, however, local enforcement and management is delegated to the Governorate through the Governorate Environmental Management Unit or EMU. EEAA also has a co-ordinating role with the other Competent Administrative Authorities (CAAs).

The Governorate has a central Environmental Management Unit, which is responsible for environmental management across the whole Governorate. Specific duties include environmental regulation and enforcement of Law 4, "The Environmental Law".

Each Markaz has an Environmental Unit and each mother Village has an officer known as an Environmental Liaison Officer. The village level officers report to the Markaz level Units, who reports to the City Head who in turn reports to the Governo who delegates tasks down to the EMU. There are however two exceptions, the environmental unit in New Damietta which is affiliated to the New Urban Communities Authority (NUCA) within the Ministry of Housing and the environmental unit in Damietta Free Zone (Damietta Port) which is under the juridiction of the General Authority for investment and Free Zones (GAFI). While the New Damietta EU has the judicial power to inspect facilities and enforce laws, the Free Zone EU does not have the same privilege. None of the units has authority over the Port, which is independent entity. In Damietta Governorate the EMU reports to the Governor via the Secretary General.

Environmental Enforcement

Responsibilities for legislation not covered under Law 4 such as water pollution control rests with the relevant Ministry, which is normally represented at a local level. The "Line Ministries" that have environmentally related responsibilities include:

- Ministry of Water Resources and Irrigation;
- Ministry of Agriculture;
- Ministry of Health;
- Ministry of Industry.
- Ministry of Labour

In addition to the regulation and enforcement responsibilities of Line Ministries, there is a branch of the national police force known as the Environment and Water Police, whose duties include enforcement of environmental regulations such as Law 48[1] – "The Protection of the River Nile and Waterways Against Pollution" aspects of Law 4[2] relating to pollution control including water pollution in the Medetarranean.

The institutional structure, relationships and responsibilities of the EMU with these other Ministries and with the surface water police, are currently under review and a Decree, better defining the role of the EMU, is under development.

The new decree is anticipated to elevate the status of the EMU to a General Office, which would give the EMU its own budget and greater legal powers of enforcement.

EEAA is responsible for auditing the operator's environmental registers on an annual basis. In fulfilling this function, the Agency may take environmental samples, or samples from any emissions and carry out any appropriate tests. If any violations are discovered, the Agency will notify the relevant administrative authority, who will then notifying the operator and demand rectification of the violation. If the facility does not comply within 60 days, the Agency, in co-ordination with the relevant administrative authority may take any of the following actions:

- Close down the facility;
- Suspend the polluting activity; or
- Take the operator to court, demanding suitable compensation to remedy any pollution or damage resulting from the incident.

The legislation does not specify any fines for violations, however, violations may lead to closure of the facility and the facility will be responsible for all costs incurred in relation to any remediation of damage or pollution caused.

12.3. THE ROLE OF THE ENVIRONMENTAL MANAGEMENT UNIT

Environmental Management Units

Environmental Management Units (EMUs) were established in 1982 with the objective to protect the environment from pollution within the Governorate

[1] Law 48 covers the Nile, Canals and Drains
[2] Law 4 coverns the Sea

boundary. The EMUs report administratively to the Governor and technically to the RBO.

The EMUs have the responsibility to follow up the implementation of Law 4 and other environmental laws. The head of the EMU has legal powers for the enforcement of Law 4.

Environmental Units

Environmental Units (EUs) are established at a local or municipal level (city/markaz) and were established by a Governor's decree to assist the EMUs in their activities. Although they report directly to the City Head the EUs work closely with the EMUs in enforcing environmental legislation.

Environmental Liaison Officers

Environmental Liaison Officers are appointed at village level and their contribution varies from activities such as receiving EIAs, to assisting in solid waste management planning, to simply responding to complaints.

Functions related to EIA

Environmental impact assessment is managed and implemented by the Head Office of EEAA in Cairo, the EEAA Regional Branch Offices (RBOs) and by the EMUs at the Governorate level. Specific responsibilities include:

- EEAA centrally is responsible for setting policy and procedures, managing the EIA system, reviewing Category B and C EIAs, reviewing Category A EIAs where the RBO is not operational, setting conditions for projects during construction and operation and providing technical support to the RBOs and EMUs.

- RBOs are responsible for inspection of large and medium facilities and providing technical and laboratory support to EMUs.

- EMUs are responsible for inspecting small facilities (which are large in number), however they actually carry out the majority of inspections on all sizes of facility.

Functions Relating to Investigation of Complaints

EEAA, the RBOs and the EMUs/EUs are responsible for investigating all complaints they receive and for informing the complainant of any results or finding of any investigation. Complaints received that do not fall under the legal responsibility of the EMU, are required to be forwarded to the relevant line ministry where they will be followed up.

Functions Relating to Strategic Environmental Planning

EEAA is centrally responsible for the production of the National Environmental Action Plan or NEAP, which is the strategic plan at the national level.

At a local level the Secretary General or Deputy Secretary General is responsible to a Higher Committee for Environment (HCE), who with technical working groups assisted by the EMU, is responsible for the production of GEAPs or Governorate Environmental Action Plans. GEAPs address issues at a local level although embrace policies defined in the NEAP. Issues defined in GEAPs, which collectively are of national significance, are also embraced by the NEAP through updating and revision.

The Higher Committee for Environment is made up of key stakeholders from the Governorate, local line ministries and other CAAs. Typically the HCE will include the senior official from ministries such Ministry of Water Resources and Irrigation, Ministry of Industry, Ministry of Health, Ministry of Local Development etc.

12.4. CO-ORDINATION OF EMUS AND OTHER ACTORS

Co-ordination with the Governorate Licensing Officer

The EMUs co-ordinate with the Governorate licensing office for the issuing of construction licences and operating licences. Post construction field investigation are undertaken to ensure the implementation of mitigating measures referenced in the EIA. In some cases the EMU may be a member of the licensing committee.

The EMU must ensure that no project is granted a construction licence without preparing an EIA according to the regulations. They must provide the licensing office with the EIA approval with any conditions that are required and participate in any post construction investigations to ensure implementation of any requirements from the EIA.

Co-ordination with the Governorate Citizen's Complaints Office

In the Governorate there is an office responsible for managing complaints from citizens. Where applicable the EMU/EU must provide a complaint form and ensure that the form is completed correctly. The EMU must then inform the Office of the nature of the complaint to ensure that the EMU is dealing with relevant complaints. Finally the EMU must provide the Office with the results of any investigations into the complaint.

Co-ordination with the Governorate Investment Office

The EMU interacts with the Governorate investment office in setting the investment plan in the Governorate and for new projects. Specifically, the EMU must participate in the identification of any industrial areas, participate in the selection of new residential areas and co-ordinate with the investment office to investors who will need to prepare EIAs for new projects.

Co-ordination between EMUs and other Compitent Administrative Authorities (CAAs)

The EMU interacts with a number of other line ministries and CAAs including, but not limited to:

- Ministry of Water Resources and Irrigation;
- Ministry of Health;
- Ministry of Petroleum;
- Ministry of Agriculture;
- Ministry of Manpower;
- Ministry of Electricity;
- Ministry of Tourism;
- Ministry of Housing;
- Ministry of Transportation;
- Ministry of Interior;
- Ministry of Information; and
- Ministry of Youth.

The activities include planning activities such as the preparation of the GEAP, development plans or contingency or emergency plans, production and approval of EIAs, inspection and enforcement activities, management of hazardous wastes, training and awareness and preparation of state of the environment reports.

12.5. ENVIRONMENTAL LEGISLATION

The major environmental licensing requirement is for all industrial facilities to have completed the process of an environmental impact assessment (EIA). Details of an approved EIA including technical specifications and any attached conditions must be recorded on an official register by the facility operator. This effectively then forms an operating permit. The register must be maintained by the operator on an on-going basis, including details of all emissions to the environment and results of any environmental monitoring. Such a register must be kept for a minimum of 10 years. The EEAA audits the register on an annual basis and can prosecute for any non-compliant activities or emissions.

Any industrial/manufacturing facility that must be appropriately sited and require approval by the local authority prior to construction. Once the facility is operating, it must comply with various provisions specified for releases to air, in particular from machines, engines and vehicles, and from fuel-burning sources.

For discharges of wastewater, legislation provides for the protection of the River Nile and other surface water bodies by requiring a permit for the discharge of industrial wastewater. A permit is also required for the operation of any installation within 200 metres of the coast, in order to protect the marine environment. A permit is also required to discharge wastewater to sewer.

Controls over the handling of hazardous waste include the requirement for a permit to be held and for a register detailing the types and quantities of waste generated and disposed of. Import of hazardous waste into Egypt is not prohibited. Incineration of wastes must be in a designated incinerator and land filling of wastes may only be carried out at approved sites.

Noise levels are regulated against ambient noise level standards, which are set according to land use. Levels are set for day-time, evening and night time.

13. THE NEXT STEPS AND DAMIETTA'S FIRST GEAP

13.1 THE GEAP SURVEY

In order to ensure that Damietta's GEAP reflected its residents environmental issues and concerns, a comprehensive survey was undertaken to assess where people ranked environment on their list of priorities and which environmental issues were/are of greatest significance to the general public and civil society.

The survey was carried out between October 2001 and September 2002 and was undertaken in the Governorates cities and villages including local units and satellites, representating a significant sample of the Governorate's geographical area.

13.2 THE GEAP WORKING GROUPS

As previously described, environmental management responsibilities lie across not only the EMU in the Governorate, but also with other Governorate departments, other CAAs and the line ministries. In order to define the environmental priorities and issues that are facing the Governorate, a series of GEAP Working Groups were set up for each major environmental sector:

Water Supply, Sanitation, Coastal Zones, Geology, Health, Planning and Investment, Social Development, Urban Development, Biodiversity, Industry and Cultural Heritage.

Each working group comprised of representatives from specific and related sectors and often academics or other professionals. With the help of a specialised sector consultant, each working group produced a report outlining each sectors main environmental issues. Results from the above survey and the sector reports were then used to form the basis of articulated sector sections in Damietta's GEAP.

Both the Environmental Profile and GEAP constitute Damietta's first Governorate Environmental Action Plan.

14. ANNEX A: BIODIVERSITY

Table 14-1: Resident Breeding Birds of Damietta Governorate

Species / Habitat	Terrestrial	Wetland	Comment
Little Grebe Tachybaptus ruficollis		X	
Little Bittern Ixobraychus minutus		X	
Cattle Egret Egretta ibis *n*	X	X	
Little Egret Egretta garzetta *n*		X	
Night Heron *Nycticoras nycticorus* n		X	
Squacco Heron Ardeola ralloides *n*		X	
Black-shouldered Kite Elanus caeruleus	X		
Kestrel Falco tinnunculus	X		
Water Rail Rallus aquaticus *		X	
Moorhen Gallinula chloropus		X	
Purple Gallinule Porphyrio porphyrio		X	
Senegal Thick-knee Burhinus senegalensis *n*	X	X	
Painted Snipe Rostraltula benghalensis	X	X	
Black-winged Stilt Himantopus himantopus *n*		X	*Presumed to be resident and breeding*
Spur-winged Plover Hoplopterus spinosus	X	X	
Kittlitz's Plover Charadrius pecuarius		X	
Kentish Plover Charadrius alexandrinus		X	
Whiskered Tern Childonias hybridus *n*		X	*Presumed to be resident and breeding*
Rock (Feral) Pigeon Columba livia	X		
Collared Dove Streptopelia decaocto	X		
Palm Dove Streptopelia senegalensis	X		
Senegal Coucal Centropus senegalenis	X	X	
Little Owl Athene noctua *	X		
Egyptian Nightjar Caprimulgus aegyptius	X	X	
Pied Kingfisher Ceryle rudis		X	
White-breasted Kingfisher Halcyon smyrnensis *n*	X	X	
Little Green Bee-Eater Merops orientalis *n*	X		*Not sure if breeding occurs*
Common Bulbul Pyrcnonotus barbatus *n*	X		
Hoopoe Upupa epops	X		
Crested Lark Galerida crisata	X		
Lesser Crested Lark Calandrella rufescens		X	
Egyptian Swallow Hirundo rustica savignii	X	X	

Table 14-2: Summer Breeding Birds

Species	Terrestrial	Wetland	Comments
Little Tern *Sterna albifrons*		X	
Olivaceous Warlber Hippolais pallida *n*	X		
Sand Martin Riparria riparia	X	X	
Blue-cheeked Bee-Eater Merops orientalis	X		
Turtle Dove Streptopelia turtur	X	X	*Found in saltmarsh habitats around Lake Manzalla*
Collared Pratincole Glareola pratincola	X	X	

Table 14-3: Waterbirds Recorded at Lake Manzalla During February 2002 Winter Surveys

Species	Numbers	Comments
Greater Cormorant Phalacrocorax carbo	*1*	
Grey Heron Ardea cinerea	*3*	
Little Egret Egretta garzetta	*36*	
Squacco Heron Ardeola ralloides	*251*	*More common in south*
Northern Shoveler Anas clypeata	*7*	
Common Teal Anas crecca	*30*	
Common Moorhen Gallinula chloropus	*1*	
Ballion's Crake Porzana pusilla	*1*	*Dried in net*
Ruff Philomachus pugnax	*2*	
Common Redshank Tringa totanus	*8*	
Marsh Sandpiper Tringa stagnatilis	*2*	
Common Ringed Plover Charadrius hiaticula	*23*	
Northern Lapwing Vanellus vanellus	*150*	*On island in south*
Spur-winged Plover Vanellus spinosus	*11*	
Small waders (Charadrius/calidris)	*38*	
Black-headed Gull Larus ridibundus	*841*	*More common in north*
Slender-billed Gull Larus genei	*1*	*Live in net*
Yellow-legged Gull Larus cachinnanus	*9*	
Armenian Gull Larus armenicus	*1*	
Small Gulls	*10's*	
Large Gull	*1*	
Whiskered Tern Chlidonias hybridus	*393*	*Most common in south*
Pied Kingfisher Ceryle rudis	*29*	
European Kingfisher	*6*	
Marsh Harrier Circus aeruginosus	*11*	

Table 14-4: Reptiles and Amphibians of Damietta Governorate

Species / Habitat	Marine	Coastal	Arable	Wetland
Green Toad Bufo viridis			X	X
Egyptian Square-marked Toad Bufo regularis			X	X
Nile Valley Toad Bufo kassasii			X	X
Mascarene Frog Ptychadena mascareniensis			X	X
Schiluck Frog Ptychadena schilluckorum			X	X
Green Frog Rana bedriagae				X
Turkish Gecko Hemidactylus turcicus			X	
Bosc's Lizard Acanthodactylus boskianus		X	X	
Nedua Lizard Acanthodactylus scutellatus		X		
Eyed Skink Chalcides ocellatus		X	X	
Bean Skink Mabuya quinqueteniata			X	
African Chameleon Chamaeleo africanus			X	
Flowered Snake Coluber florulentus			X	
Montpelier Snake Malpolon monspessulanus		X		
Diced Water Snake Natrix tessullata			X	X
African Beauty Snake Psammophis sibilans			X	
Cat-eyed Snake Telescopus dhara			X	
Egyptian Cobra Naja haje		X	X	
Sand-boa Eryx jaculusus		X		
Loggerhead Turtle Caretta caretta	X			

Table 14-5: Examples of Globally Threatened Species in Damietta

BIRDS	
SPECIES	***STATUS***
Dalmatian Pelican Pelecanus crispus	*Rare passage migrant*
*Corncrake C*rex crex	*Fairly common to uncommon passage migrant*
Black-winged Pratincole Glarola nordmanni	*Uncommon to rare passage migrant*
Marbled Teal Marmarontta angustirostris	*Extinct breeding bird and former winter visitor, now extremely rare.*
White-headed Duck Oxyura leucocephala	*Extinct winter visitor*
Ferrugenous Duck Aythya nyroca	*Winter visitor, formerly occurring in important numbers, probably now uncommon to rare*
Pallid Harrier Circus macrounus	*Uncommon to rare passage migrant*
Lesser Kestrel Falco naumanni	*Uncommon to rare passage migrant*
Greater Spotted Eagle Aquila clanga	*Uncommon to rare passage migrant. Former winter visitor, could still winter in the area*
Imperial Eagle Aquila heliaca	*Uncommon to rare passage migrant*
REPTILES	
SPECIES	***STATUS***
Leatherback Turtle Dermochelys coriacea	*Potentially occurs in the offshore waters*
Green Turtle Chelonia mydas	*Potentially occurs in the offshore waters*
Loggerhead Caretta caretta	*Potentially occurs in the offshore waters*

(IUCN Red Data 2000)*

Table 14-6: Birds seen for Sale at the Damietta Market

SPECIES	*AMOUNT*
Teal Anas crecca	*Several 100*
Gargeny Anas guerguedula	*10's*
Shoveler Anas clypeata	*100 plus*
Pintail Anas acuta	*20*
Coot Fulica atra	*3*
Black headed Gull Larus ridibundus	*10's*
Greater Cormorant Phalacrocorax carbo	*10 plus*
Senegal Coucal Centropus senegalensis	*1*
Hoopoe Upupa epops	*6*
Little Egret Egretta garzetta	*4*
Palm Dove Streptopelia senegalensis	*Under 10*
European Nightjar Caprimulgus europaeus	*Several*
Lesser Spotted Eagle Aquila pomarina	*1*
Quail *Corturnix coturnix*	*10's*
Blue-cheeked Bee-eater Merops superciliosus	*1*
European Kingfisher Alcedo atthis	*1*
Crested Lark Galerida cristata	*several*
Short-toed Lark Calandrella cinerea	*dozens*
Red-backed Shrike Lanius collurio	*dozens*
Willow Warbler Phylloscopus trochilus	*dozens*
Lesser Whitethroat *Sylvia curruca*	*dozens*
Whinchat Saxicola rubetra	*one*
Plucked small passerines, species indeterminate, but possibly House Sparrow Passer domesticus	*10's*

15. ANNEX B: INDUSTRY

Table 15-1: Micro, Small and Medium Enterprises (MSMEs) in Damietta (Damietta MSME report 2001)

INDUSTRY	NO.OF SMEMS	NATIONAL TOTAL SMEMS	% OF NATIONAL TOTAL
202 Manufacture of wooden, cork and straw products	5518	19251	28.66%
361 Manufacture of furniture	18507	70878	26.11%
201 Wood sawing	1147	6100	18.80%
351 Building and maintenance of ships and moulds	29	232	12.50%
261 Manufacture of glass and glass products	108	1006	10.74%
352 Manufacture of Trains,Trams and equipment	1	10	10.00%
152 Dairy Industry	196	3319	5.91%
155 Beverages Industry	6	111	5.41%
300 Manufacturing of office machinery and calculaters	1	22	4.55%
160 Tobacco Industry	4	102	3.92%
323 Manufacture of radio and television antennas	2	53	3.77%
192 Shoes making	336	9285	3.62%
292 Manufacture of specific purpose machines	53	1496	3.54%
182 Dressing and dyeing of Fur	2	57	3.51%
359 Manufacture of equipment not elsewhere classified	10	348	2.87%
154 Other food products	460	18744	2.45%
272 Manufacture of Precious Metals and Non Ferrous Products	15	654	2.29%
269 Manufacture of non metallic mineral products	180	8934	2.01%
172 Other textiles industry	114	5935	1.92%
181 Manufacturing of clothes except fur products	992	55189	1.80%
151 Production, preparation and preservation of meat and fish	24	1366	1.76%
153 Milling (crops, starch and animal fodder)	235	13986	1.68%
242 Manufacture of other chemical products	15	948	1.58%
293 Manufacture of household equipment non else where classified	5	327	1.53%
311 Manufacture of engines, generators and transformers	27	1832	1.47%
271 Iron and steel indusry	9	617	1.46%
341 Manufacture of motor vehicles	2	140	1.43%
289 Manufacture of other various metallic products	441	32575	1.35%
221 Publishing	4	301	1.33%
281 Manufacture of structural products, tanks and steam generators	45	3768	1.19%
210 Manufacture of paper and paper products	16	1350	1.19%
291 Manufacture of multipurpose machines	4	403	0.99%
343 Manufacture of motor vehicles spare parts	1	105	0.95%

INDUSTRY	NO.OF SMEMS	NATIONAL TOTAL SMEMS	% OF NATIONAL TOTAL
332 Manufacture of optical photographing instruments	1	111	0.90%
313 Manufacture of wires and insulated cables	1	112	0.89%
171 Spining weaving and finishing industry	22	3139	0.70%
222 Printing and services related to it	32	4813	0.66%
252 Manufacture of plastic products	7	1123	0.62%
241 Manufacture of basic chemicals	10	1747	0.57%
273 Metals smellting	2	393	0.51%
191 Tanning and dressing of leather, luggage, handbage and harness	10	2379	0.42%
251 Manufacture of rubber and plastic products	2	500	0.40%
173 Knitting operations	8	2050	0.39%
331 Manufacture of medical measurement instruments	1	306	0.33%
381 Manufacture of products not elsewhere classified	5	2076	0.24%

Table 15-2: Free Zone Industrial Area

Operating Establishment	**Number of employees**
Furniture	
El Ashri	60
Dumyat for manufacturing furniture	30
Wood Commercial Company	35
Food	
International Spice	150
Admiral for Seeds	100
Gas and Petroleum	
Petrojet for pipes	50
SEGAS	3000
Medical	
Cairo for manufacturing medical supplies	19
Establishments under construction	**Number of employees**
Furniture	
Donia enterprise for furniture	38
Food	
Amin for Rice	15
Ahmed Amin Sons	15
Petroleum	
Branch of a sea petroleum services company	100

Table.15-3: New Damietta Industrial Zone - Operating establishments

Industry	No of Establishments	Number of Employees
Furniture		
Wooden furniture	16	528
Door and window	2	38
Furniture	2	57
Furniture supplements and chairs	1	206
Wood manufacturing	4	76
Furniture requirements	1	60
Wood cutting and preparation	1	95
Wood storage	17	262
Food		
Dairy	1	16
Chocolate	1	75
Pasta	1	25
Sweets	1	26
Halawa	2	100
Smoked fish	1	45
Bread	1	10
Bread	1	10
Cooking oil	3	90
Packaging of spices and agricultural products	1	15
Rice	3	65
Ice	1	16
Spices, pickles, and vinegar	2	31
Refrigerator	1	27
Packaging food products	2	45
Electronic		
Electronic and electric appliances	1	20
Electric equipment and supplies	1	25
Plastic Products		
Plastic bags	2	38
Plastic products	1	27
Plastic hoses	1	16
House equipment	1	11
Plastic containers and manufacturing machines	1	150
Artificial sponge	2	48
Plastic containers and jars	2	35
Leather Products		
Leather shoes and bags	2	47
Paper Products		
Carton plates and boxes	1	15
Carton sheets	1	17
Wrapping paper	2	37
Textile		
Dyeing and preparation	1	96
Clothes and accessories	3	110
Weaving cotton fabrics	1	25
Cotton products	2	40

Industry	No of Establishments	Number of Employees
Marble and Construction Material		
Tiles, marble and granite	3	53
Cement blocks	2	38
Marble and granite	2	27
Marble and glass	2	40
Chemical		
Medicine	1	20
Cosmetics	1	27
Pesticides	1	21
Cleaning detergents	5	92
Chemicals and dyes	2	70
Paints	5	92
Veterinary medicine	1	10
Mechanical and Metallic		
Metallic warehouse	1	8
Machine spareparts	1	10
Lathing workshops	1	6
Metallic works	1	29
Aluminium workshops	1	7
Bolts and nuts	2	68
Agricultural pumps and equipment	3	110
Metallic containers	3	66
Pistons and motors	1	42

Table.15-4: New Damietta Industrial Zone (Establishments under construction)

Industry	No of Establishments	Number of Employees
Furniture		
Wooden furniture	18	384
Door and window	5	87
Furniture	6	106
Furniture supplements and chairs	1	206
Wood manufacturing	2	30
Wood cutting and preparation	2	30
Wood storage	8	72
Fiber glass	1	28
Food		
Dairy	4	98
Sweets	2	45
Halawa	1	15
Meat preparation	1	14
Bread	1	12
Ready made meals	1	27
Packaging of spices and agricultural products	1	15
Ice cream	1	16

Industry	No of Establishments	Number of Employees
Rice	1	15
Ice	2	30
Refrigerator	3	68
Packaging food products	1	29
Electronic		
Distributing boards	1	15
Home and electric appliances	1	14
Electric equipment and supplies	1	14
Plastic products		
Plastic bags	1	10
Plastic products	4	58
Plastic pipes	2	60
House equipment	1	10
Plastic containers and jars	2	25
Leather products		
Leather shoes and bags	1	17
Textile		
Clothes and accessories	7	206
Weaving cotton fabrics	1	20
Drapes and covers	1	30
Marble and construction material		
Tiles, marble and granite	2	29
Marble and granite	1	10
Tiles and bricks	1	12
Mechanical and metallic		
Metallic moulds	1	26
Metallic home equipment	2	40
Mechanical workshop	1	10
Metallic scrap warehouse	1	5
Metallic works	3	67
Aluminium workshops	1	9
Bolts and nuts	2	75
Mechanical and metallic		
Agricultural pumps and equipment	1	65
Manufacturing building equipment	1	4
Manufacturing car bodies	1	12
Aluminium Furniture and doors	1	30

Table 15-5: Effluents and Wastes Generated From the Different Types of Industries

Sector	Liquid Wastes	Air Emissions	Solid Waste	Environmental/Health Impact
SMALL AND MEDIUM INDUSTRIES				
Furniture manufacturing	**Not applicable**	**A considerable amount of harmful hazardous volatiles are emitted**	Wooden pieces and saw dust are generated from the wood cutting Empty containers of utilized hazardous material add to the solid waste	**Emissions of hazardous volatiles and particulates from painting material have a toxic nature that affect the human health**
Food Industry: 1) Dairy industry	**Liquid waste effluents originate from:** - Whey generated from cheese manufacturing. - Washing and cleaning of vessels, and tools used. - Spoiled raw materials and products (milk). - Floor washing. - Raw materials spills.	**No serious air emissions.**	**Solid waste is generated from spoiled or rejected products and plastics as well as broken glass bottles and papers.**	Wastewater fermentation (anaerobic decomposition) may cause bad odor When discharged into the sewer system: - Corrosion of the public sewer system - Oxygen depletion in the receiving water body - Poisoning the aquatic life
2) Other Industries	**Liquid waste effluents originate from:** Washing and cleaning of vessels, tools, and equipments used. - Floor washing. Raw materials spills.	**Gaseous emissions released from burning Mazot in furnaces**	**Solid waste is generated from spoiled, broken or returned unsold products (ex biscuits)**	
Textile Industry:				

Sector	Liquid Wastes	Air Emissions	Solid Waste	Environmental/Health Impact
1) Spinning, weaving and finishing	**Wet operations produce wastewater that is characterized with high values of BOD and COD**	**Fibers and dust may originate during cotton spinning**	**Generated solid waste includes fabric and yarn scrap**	**Air emissions could cause respiratory system problems**
2) Knitting Operations	**No wastewater (i.e. dry operation)**	**No air pollution (i.e. dry operation)**	**Generated solid waste includes threads and fibers**	**No health hazard involved**
3) Other Textile Industries	**No wastewater (i.e. dry operation)**	**No air pollution (i.e. dry operation)**	**Generated solid waste includes threads, pieces of textiles and paper**	**No health hazard involved**
Basic metals manufacturing	**No wastewater (i.e. dry operation)**	**No air pollution (i.e. dry operation)**	**Generated solid waste includes metallic scrap**	**No health hazard involved**
LARGE INDUSTRIES				
Misr Dairy	-Wastewater without treatment (480 m^3/day). -Mainly whey and other wastes. Whey BOD 25000-3000 mg/L Other wastes BOD 300 mg/L TDS 1500-2000 mg/L PH 4.5-6.5	-Heavy black smoke from the boilers unit.	-Solid waste accumulation in the form of scrap and dissolved material.	-Air Pollution. -Pollution of the Sayala drain. -Health effects on the employees because of the steam leaks. -Possible effects on the marine life if available.
Damietta for Spinning and weaving	Not Applicable	-High cotton dust concentration in the workplace. -Great amount of smoke is released to the air daily (because of mazot usage).	Not Applicable	-Workers suffer from high dust concentration.
Edfina for food industries	-30-40 m^3 of water per ton of fish processed. -High organic loads. -High levels of oil and grease.	-Emissions of CO2, CO, and NO, (Generally within the limits).	-Accumulation of scrap and discarded material.	-Pollution of the nile Water. -Affect fish and other aquatic organisms. -High sound levels can cause

Sector	Liquid Wastes	Air Emissions	Solid Waste	Environmental/Health Impact
	-High loads of caustic soda. -This untreated wastewater is released to the Nile.			deafness on the long run.
Helb Pesticides and Chemicals Company	No Problem.	No Problem.	Not Applicable.	No Problem
Egyptian American Company for Dyeing and Printing and Preparation – TAG	-Liquid waste loaded with BOD, COD, TSS, toxic substances, and heavy metals.	-Volatile Organic Compounds (VOCs).	- Problem in the disposal of solid waste.	- Depends on the type of VOCs, but in most cases VOCs can cause severe health effects.
Damietta thermal power station (Kafr Al-Batikh)	- Cooling water to the Nile. - Some debate concerning the temperture of the cooling water. - Liquid waste disposal from the water treatment plant to a close by drain.	- Mainly NOx and CO. - Within the acceptable limits.	Not Applicable	- Depends on the temperature of the cooling water.
Misr Dairy	-Wastewater without treatment (480 m^3/day). -Mainly whey and other wastes. Whey BOD 25000-3000 mg/L Other wastes BOD 300 mg/L TDS 1500-2000 mg/L PH 4.5-6.5	-Heavy black smoke from the boilers unit.	-Solid waste accumulation in the form of scrap and dissolved material.	-Air Pollution. -Pollution of the Sayala drain. -Health effects on the employees because of the steam leaks. -Possible effects on the marine life if available.
Damietta for Spinning and weaving	Not Applicable	-High cotton dust concentration in the workplace.	Not Applicable	-Workers suffer from high dust concentration.

Sector	Liquid Wastes	Air Emissions	Solid Waste	Environmental/Health Impact
		-Great amount of smoke is released to the air daily (because of mazot usage).		
Edfina for food industries	-30-40 m^3 of water per ton of fish processed. -High organic loads. -High levels of oil and grease. -High loads of caustic soda. -This untreated wastewater is released to the Nile.	-Emissions of CO2, CO, and NO, (Generally within the limits).	-Accumulation of scrap and discarded material.	-Pollution of the nile Water. -Affect fish and other aquatic organisms. -High sound levels can cause deafness on the long run.

16. ANNEXURE C: CULTURAL HERITAGE SITES

Table.16-1: Cultural Heritage Sites in Damietta Governorate

Site Id	Site Name Size	Markaz/ Qism Name	CAPMAS Code	X coordinates decimal degrees or dd.mmss	Y coordinates decimal degrees or dd.mmss	Type
001	Abu el-Maati Mosque	Dumyat City	1101	31o 25.376’	31o 48.960’	I
002	El-Madbuli Mosque	Dumyat City	1101	31o 25.522’	31o 48.346’	I
003	Zawiyet el-Radwaniya	Dumyat City	1101	31o 25.102’	31o 48.569’	I
004	El-Bahr Mosque	Dumyat City	1101	31o 25.160’	31o 48.536’	I
005	El-Moeni Mosque	Dumyat City	1101	31o 24.837’	31o 48.623’	I
006	Church of St. Nicholas	Dumyat City	1101	31o 24.751’	31o 48.648’	C
007	Church of Holy Virgin	Dumyat City	1101	31o 24.782’	31o 48.574’	C
008	Ottoman Building	Dumyat City	1101	31o 24.837’	31o 48.593’	O
009	Church of St. George	Dumyat City	1101	31o 25.308’	31o 48.521’	C
010	Wekalet Waqf el-Aqbat	Dumyat City	1101	31o 25’	31o 48’	C
011	El-Badr Mosque	Dumyat City	1101	31o 25’	31o 48’	I
012	El-Sheha Mausoleum	Dumyat City	1101	31o 25’	31o 48’	I
013	El-Qantara Bath	Dumyat City	1101	31o 25’	31o 48’	O
014	Sabil Abu Tassat	Dumyat City	1101	31o 25’	31o 48’	I
015	Oraby Castle	Ezbet el-Borg,	110201	31o 29.981’	31o 50.107’	M
016	El-Hadidi Mosque	Fariskur City	1103	31o 19.874’	31o 47.659’	I
017	Great Mosque	Fariskur City	1103	31o 19’	31o 47’	I
018	Zawiyet el-Ansari	Fariskur City	1103	31o 19’	31o 47’	I
019	Dome Hassan el-Diasty	Fariskur City	1103	31o 19’	31o 47’	I
020	Dome el-Husseiny	Fariskur City	1103	31o 19’	31o 47’	I
021	Tell el-Ghuzz c. 8 feddans	Fariskur	1103	31o 15.044’	31o 45.538’	R
022	Tell el-Arab (a) c. 15 feddans	Fariskur	1103	31o 14.869’	31o 45.701’	R
	Tell el-Arab (b)	Fariskur	1103	31o 14.905’	31o 45.823’	R

Site Id	Site Name Size	Markaz/ Qism Name	CAPMAS Code	X coordinates decimal degrees or dd.mmss	Y coordinates decimal degrees or dd.mmss	Type
023	Tell Burashiya c. 13 feddans	Fariskur	110303	31o 14.489’	31o 45.264’	R, I
024	Tell Ibwan c. 27 feddans	Fariskur	1103	31o 20.073’	31o 47.311’	R
025	Tell Naggarein c. 15 feddans	Fariskur	110315	31o 19.854’	31o 47.659’	R
026	Tell Shawaqfa c. 10 feddans	Fariskur	1103	31o 19.708’	31o 47.734’	R
027	Tell Dabalun c. 30 feddans	Fariskur	1103	31o 17.216’	31o 47.553’	R
028	Tell Zawiya c. 12 feddans	Fariskur	1103	31o 17.324’	31o 50.213’	R
029	Tell El-Deir c. 8 feddans	Kafr Sa’ad	1104	31o 25.563’	31o 41.581’	R
030	Kom el-Ahmar c. 3 feddans	Kafr Sa’ad	1104	31o 24.401’	31o 32.454’	R
031	Tell el-Mahgara c. 1.5 feddans	Kafr Sa’ad	1104	31o 24.486’	31o 34.667’	R
032*	Kom el-Hammamat c. 44 feddans	Kafr Sa’ad/Bilqas		31o 26.643’	31o 28.162’	R
033	Kafr el-Miasra Mosque	El-Zarq	110701			I
034	Kom el-Dahab c. 40 feddans	Lake Manzala		31o 18.745	31o 49.668	R, I
035	Tell Sheikh Farid c. 1.5 feddans	Lake Manzala		31o 20.458’	31o 54.162’	R
036**	Tell Bukhseikha	Lake Manzala				

* Most of this site is now in Daqahliya Governorate, Markaz Bilqas, and a small part in Dumyat Governorate, Markaz Kafr Sa’ad

** This site in Lake Manzala was not visited, but is understood to be some distance northeast of Damietta.

Key to Types: R = Roman (30 BC – AD 400); C = Christian (2nd century AD onwards); I = Islamic (AD 641 onwards); M = Medieval (11th – 15th century AD; O = Ottoman (18th – 19th century AD.

SEAM Programme

Damietta Governorate Environmental Profile

Ministry of State for Environmental Affairs
Egyptian Environmental Affairs Agency
Entec UK Ltd., ERM
UK Department for International Development