SEAM Programme

THE GOVERNORATE OF SOHAG ENVIRONMENTAL PROFILE

Ministry of State for Environmental Affairs
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Entec UK Ltd., ERM
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SOHAG GOVERNORATE

ENVIRONMENTAL

PROFILE

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

i An Environmental Action Plan is a compilation of information including baseline conditions and the views of stakeholders leading to the identification of Policies, Programmes and Projects, (or ACTIONS), to support and implement the overall objectives of the Plan.

ii Experience suggests that reports that contribute to a successful plan include an Environmental Profile of the area, an agreed statement of the key issues of concern and a list of actions. The actions must be linked to and justify a set of priority key issues, which must be based on the consensus views of stakeholders.

iii This document, the Environmental Profile of Sohag, forms one of the elements of the Action Plan. It is based on a large amount of technical scientific data, and has been compiled during a process that has included consultation with a large number of Sohag citizens. Information gathered during this process is summarised in the form of an Environmental Profile which concentrates on the main arguments and key issues. The Profile is presented in four main parts:

- an inventory of Sohag environmental conditions (Chapters 1, 2, and 3);
- vision statement (Chapter 4);
- strategic guidelines (Chapters 5, 6 and 7);
- recommendations (Chapter 8).

iv There are three main types of resources which impinge directly or indirectly upon the nature (extent and condition) of the environment which exists in Sohag, namely:

- natural resources;
- social/human resources;
- economic resources (capital plant, equipment and infrastructure).

v The principal natural resources are land and water, together with the flora (plants) and fauna (animals) which these support. One of the objectives of the National Environmental Action Plan (NEAP) is to ensure that the stocks of these natural resources are conserved, through sustainable use, management and development. At the same time it is important that the management of these resources enables annual outputs (yields) to be at least maintained, but preferably increased. The purpose, therefore, of a Governorate action plan is to integrate the conservation of resources (according to the NEAP) with the development of the economic basis of the Governorate.

vi In seeking to conserve and improve the environment of Sohag Governorate, the interactions and relationships between the resources in terms of their use and management are as, if not more, important than the characteristics of the resources themselves.

vii Human skills and management capabilities, as well as institutional capacities, represent the most important social resources with respect to the environment.

viii This review of the resources of Sohag Governorate includes an examination of both the size and nature of the Governorate population. This acknowledges the prime role played by human resources both in determining the state of the environment at any point in time and in influencing the rate of environmental change, for better or for worse, over time.

ix Distinction needs to be made between the economic resources which contribute respectively to:

- the use, maintenance and conservation/protection of the natural and social resources; and the
- degradation and depletion of these resources.

x These are not necessarily inherent characteristics, but rather a reflection of the manner in which resources are designed, used and managed.

xi The review then proceeds with an outline analysis of the capital stocks, which have a direct bearing on both the state of the environment and its potential for change.

xii Both the social and economic capital resources impact upon the natural resource base. However, it should be recognised that the development potential depends significantly upon the nature, size and condition of the natural resource stocks.

xiii Resource interactions and environmental impacts are described namely:

- the chief negative impacts of the economic and social forces, influencing the depletion and degradation/pollution of natural resource capital stocks;
- the potential inherent in the economic and human capital stocks for assisting the processes of environmental conservation and improvement.

xiv The Profile also includes consideration of the effects of Sohag Strategic Plan and identifies areas where proposals included in this strategic plan overlap with environmental issues.

xv The existing environmental status of the Governorate and the visions explored in the strategic Plan are combined into a series of recommendations and guidelines which need to be addressed in order that the proposed development is sustained.

xvi These recommendations have been utilised in the development of the Action Plan which, although a separate document, is linked very strongly to the Environmental Profile and identifies projects, programmes and policies as actions for the future.

LIST OF ACRONYMS AND GLOSSARY OF TERMS

ODA	Overseas Development Administration: now known as Department for International Development
EEAA	Egyptian Environmental Affairs Agency
TCOE	Technical Cooperation Office for the Environment
NEAP	National Environmental Action Plan
GEAP	Governorate Environmental Action Plan
AHD	Aswan High Dam
BPEO	
CDA	Community Development Association
EAP	Environmental Action Plan
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EMU	Environmental Management Unit
EMP	Environmental Management and Planning
EMPS	Environmental Management and Planning System
EU	Environmental Unit
GDP	Gross Domestic Product
HDI	human development index
MPWWR	Ministry of Public Works and Water Resources
NGO	Non Governmental Organisation
SEC	Supreme Environment Council; together with the EMU and EU making up the Environment Management and Planning System in Sohag
SFD	Social Fund for Development
SWM	Solid Waste Management
SWMS	Solid Waste Management System
TDS	total dissolved solids
WHO	World Health Organisation

Stakeholder	Person or group of persons with an interest in, or likely to be affected by, the action plan
Action Plan	A plan derived by a process of information collection and consultation with interested parties or stakeholders to address environmental issues. The plan must be based on a participatory approach and address the needs of all sectors of the community.
Environmental Profile	Collection of information relating to baseline conditions and circumstances for setting the scene for the development of environmental actions.

Feddan	Measure of area (4200m^2)
kther	Dry year
kafr	Small village
Markaz	District
mesak	Small canal

1. BACKGROUND AND OVERVIEW

Introduction

1.1 After the declaration of the Egyptian National Project of Environmental Protection, which resulted in the publication of the National Environmental Action Plan (NEAP), in 1992, the Egyptian Government has coordinated different donor countries to fund a number of environmental projects in Egypt. The Overseas Development Administration (ODA) of the UK, is funding an integrated project in the Governorate of Sohag, including industrial auditing, development of a Solid Waste Management Strategy and the preparation of an Environmental Action Plan. This document, the Environmental Profile for the Governorate, forms the basis for the identification of the key issues affecting the environment of Sohag, and actions considered to be necessary to protect it. The document is based on technical reports from a largely academic authorship, and extensive consultation with a wide range of Sohag stakeholders/citizens. By adopting information collection by this dual approach, it has been possible to involve a large number of people and to identify a wide range of issues from different perspectives. In this way, the process of developing ownership of the eventual Governorate Environmental Action Plan (GEAP) document has been begun. Furthermore, in identifying issues from different perspectives it has been possible to consider the nature of solutions required to address problems, not only at a technical level, but also from the differing points of view of the different players involved, from the service providers to the public. This is an important facet of the overall GEAP process, which must neither impose solutions in a wholly demand or supply led fashion (top down or bottom up). The GEAP must recognise the needs of the wide spectrum of stakeholders if it is to succeed. This document, the Environmental Profile, consists of eight chapters:

- Chapter One contains basic information on Sohag in terms of its setting and its physical resources.
- Chapter Two contains a review of the availability and use of resources in Sohag.
- Chapter Three considers the environmental effects of resource use in the Governorate and begins to identify the issues that need to be addressed.
- Chapter Four provides a description of the development of Sohag as envisioned by local people. The development plans address strategic concepts to take Sohag into the 21st Century. They do not consider the detail, but identify the long term goals of the Governorate.
- Chapter Five identifies the environmental issues facing Sohag. These issues relate to the need to provide services; the need for improved resource conservation, planning and development; and the need for an environmental planning and management system.
- Chapter Six describes the development of Action Plan projects, which form the driving emphasis of the GEAP.
- Chapter Seven describes the needs for institutional strengthening, one of the key issues identified, in greater detail.
- Chapter Eight provides a link between this document and the GEAP and sets out the goals and objectives. It also considers the steps necessary in the short term to start the process of environmental action in Sohag.

Location

1.2 Sohag is one of the rural governorates in Upper Egypt. Its capital, Sohag city, is located 467 km south of Cairo. Geographically the Governorate is a narrow strip of land along both banks of the River Nile, with a length of 110 km. The cultivated width ranges between 15 and 21 km, but the Governorate boundaries extend according to the recent classification of boundaries to 110 km to the west and east. The Governorate is bounded to the north and south by Assuit and Qena Governorates. (Map 1). To the east it is bounded by the Red-Sea Governorate and the Eastern desert and to the west by the New Valley Governorate and the Western desert.

Geography and Geology

1.3 Land surface features of the valley floor are largely absent and have been much modified to provide a surface suitable for irrigation. Apart from the areas occupied by building and roads, almost all the valley floor surface is utilised for agriculture and associated irrigation requirements. The edges of the valley on both the east and west flanks of the Nile are marked by steep scarps which rise abruptly onto the adjacent plateau lands.

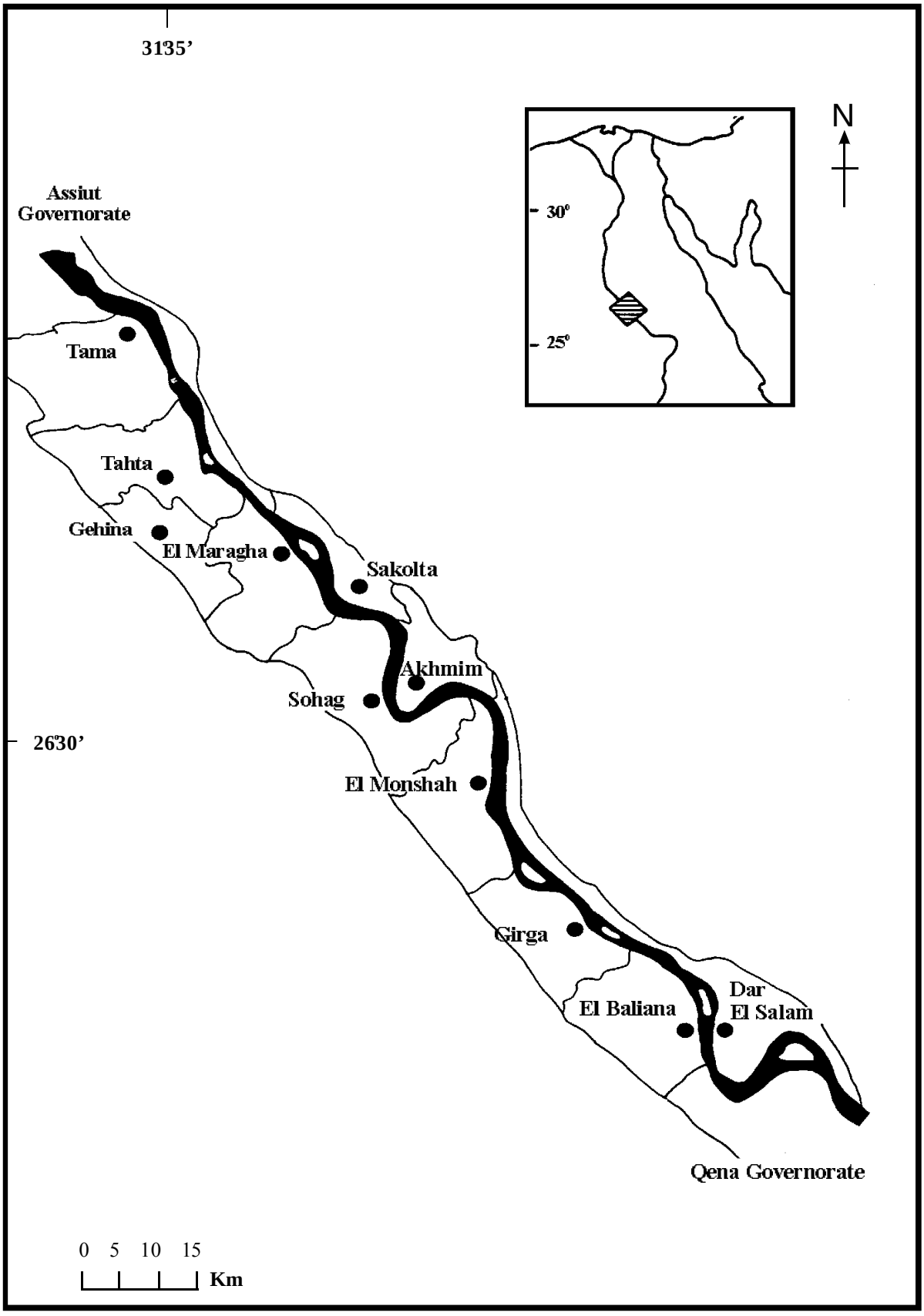
1.4 The flood plain of the River Nile provides a flat area which has been cultivated for many thousands of years. This area has formed the basis of development in the Governorate, although there are areas where development extends into the desert and onto the plateau. The land slopes gently from south to north falling approximately 20m along the length of the Governorate. The land is mainly of sedimentary origin, and its general features can be summarised as a calcareous plateau and its boundary scarps, composed of limestone (of Eocene age); and a Nile channel. Both eastern and western plateaus in the Sohag area are formed from carbonate rocks belonging to the Thebes and Drunka formations to the south and north respectively. The height of the eastern plateau is about 300 metres above sea level and the western one attains a height of about 250 metres above sea level.

1.5 Old alluvial plains of the Nile are present along both sides of the river channel and form the area between the cultivated land and the edges of the limestone plateau. These areas are occupied now by terraces of Post-Eocene ages. The height of these terraces ranges between 65 to 90 metres above sea level. These plains are cut by several wadis running from the top of the limestone plateau towards the Nile. There are about 15 wadis along the eastern side and some of these wadis are cultivated by villagers who use ground water for irrigation, e.g. Wadi Awlad Salama, Wadi Elsalmony and Wadi Qassab. The young alluvial plains of the Nile form the cultivated lands bordering the river channel. These plains are dissected by the irrigation and drainage canals which run generally parallel to the river. In Sohag the Nile tends to occupy the eastern side of the valley.

1.6 The predominantly sedimentary deposits have evolved over a complex period of sea level changes and depositional environments. The Nile began to form in the Upper Miocene age and cut a channel that is much lower than the present sea level. By the Lower Pliocene age this channel had been filled by sediments brought by changing sea levels, and sediments carried by wadis draining the Red Sea hills.

1.7 By the late Pliocene age the original Nile channel was completely filled. The old channel was filled with sediments that now form the groundwater aquifer of the region, known as the Qena sands, the lower region being composed of graded sands and the upper portion recent deposits of clays and silt carried by the flooding Nile. This upper layer of clays and silt forms the cultivated area known as the old cultivated lands. The geology of the area is of great significance in the distribution of land use and the prospect for changes to this use. (Map 2).

Figure 1.1: Location of Sohag Governorate and Districts



Climate

1.8 Climatically, the year falls into two distinct parts, a cool winter from November to April, and a hot summer from May to October. Temperature variations in this region are greater than in the more northern parts of Egypt. The variations are particularly sharp on the surface of the ground, where the mid-day summer temperature may rise above 60°C (140F). In winter the temperature may occasionally fall below freezing, and the minimum temperature recorded for February is -2°C (28 F). June is the hottest month with a monthly maximum of 49°C (120F). Upper Egypt is characterised by an extreme desert climate. The average annual rainfall is 1 millimetre (0.04 of an inch), but is variable; in some years 2, 3 or even 6 millimetres have been known to fall as brief showers during the winter; while in many kther years hardly a single drop is recorded. The average humidity of the air is generally below 60%, and during the spring months falls to 30% or less. Climate indirectly affects development potential by virtue of the need for air conditioning or heating at different times of the year, and it affects health by determining the range of disease vectors.

Administration

1.9 Administratively Sohag Governorate is classified into 11 Markazes (or districts), 10 cities, 270 villages and 1217 kafr (small village). Each Markaz is divided into a number of urban or sub-urban communities (cities), and a number of rural communities (villages or small villages). Three of the Markazes are located to the east of the Nile (Sakolta, Akhmim, and Dar El-Salam) and the rest are located to the west of the Nile (Tama, Tahta, El-Maragha, Geheina, Sohag, El-Monshah, Girga and El-Baliana). See Map 3.

1.10 Appendix 1 shows the administrative skeletons of the Governorate. These diagrams represent the classification of the central units in the Governorate, the responsibilities of each unit and its attachment with the higher authority up to the Governor. In addition, the classification of the village and small local administrative units are also shown.

Population

1.11 The estimated population of Sohag Governorate (in 1995) is 3,156,000. Figure 1 shows the distribution of population in each district, and between rural and urban areas.

1.12 Growing populations and material expectations inevitably place increasing demands on the environment, not only in terms of space and as a source of resources, but also as a sink for wastes. However, to assume a straightforward relationship between the increase in the number of consumers on the one hand and the disruption of the environment on the other is to oversimplify the issue. High population growth rates have implications for future population size; a growth rate of 3%, for example, results in a doubling of population in about 23 years. The age structure of the population has important repercussions and in countries that are undergoing transition from developing to developed, declining fertility rates coupled with increasing life expectancy have the effect of decreasing the number of young, while increasing the numbers of the elderly, whereas the population structure of a developing country or region is dominated by large numbers of the young. The growing labour force has implications for future economic performance, and may also alter the requirements for education to ensure that the labour force is equipped to tackle the demands different agricultural practices or new industrial operations will place upon it. In addition to the ageing of the population, it will be the case that a significant increase in the number and proportion of persons living in urban areas will occur.

1.13 The distribution of people between rural and urban areas has important implications for the type of stress placed on the environment. Urban areas and cities concentrate human activity and thereby create relatively high demands for natural resources (e.g. energy, fresh water and land),

basic services and infrastructure (e.g. sanitation and waste disposal services, education and health care, roads and public transport) and employment. Furthermore, cities typically represent a disproportionate source of pollutant emissions and wastes (liquid and solid) and are thus often associated with high levels of air pollution and other forms of environmental contamination. On the positive side, however, urban areas are an essential part of economic development and can bring major benefits to human well-being by providing health, education and social services to their residents, and the concentration of population lowers the unit cost of supply of many services.

1.14 It is also noted that rural populations that are slowly undergoing change to urban populations retain many rural characteristics, making their assimilation into urban communities difficult. In particular new urban dwellers may retain their animals to improve their economic standing, but in urban circumstances can no longer properly dispose of animal waste. This feature is particularly evident in Sohag.

1.15 It is vital that urban growth is accompanied by the investment needed to support infrastructure and services, especially in the poorer residential areas, and that urban growth is controlled so that illegal or informal settlements, without access to adequate basic services, are prevented. A balanced investment programme that recognises the different needs of stakeholders in different districts is important, and it is as important to maintain levels of provision of services in existing serviced areas as it is to develop services in areas currently not adequately provided for.

Economy

1.16 The population of Sohag Governorate represents 5.26% of the total Egyptian population. However, only 1.8% of the capital investment in industry is spent in Sohag. This reflects the rather underdeveloped economy of the Governorate, compared with other governorates in Egypt, and the importance of agriculture. The total working population in the Governorate is some 742,000 persons which represents 24% of the total population. 15.8% of the total work is in agriculture, 2.5% in commerce, 2.4% in industry, 2.3% in private sectors and 0.8% in governmental work. There are 42 industrial sites and establishments that employ more than 50 employees. Income per capita in Sohag is reported as $560, (US dollars, 1990 data). This can be compared, for example, to figures for Cairo of $890, and for Assuit of $538. In Upper Egypt as a whole the urban population has an income per capita of $821 and the rural $479. In 1990 41.2% of Sohag population were classed as poor, and 8% as ultra poor. Agriculture is the principal form of income for 65.8% of the population.

Legislative Framework

1.17 The administrative framework of the Governorate (see Appendix 1) should support a number of laws that relate to environmental management concepts. Of these the following are significant: Law 116/1983; Law 48/1982; Law 38/1967; Law 31/1976; and Law 4/1994. Housing and industrial development has reduced agricultural land, with losses throughout Egypt estimated at more than 400,000 feddans during the last 30 years (1985 figures). Brick making using alluvial clay bears a large share of responsibility for this situation since top soil skimming, a traditional activity with little or no impact in the past due to silt deposition during annual flooding, now causes serious land losses.

1.18 To address this problem, legislation to control the use of land for non agricultural purpose (Law 116/1983) was introduced. Cities and villages were mapped and construction permits beyond established limits were prohibited; the use of red bricks was also forbidden and no new brick factories were allowed close to the Nile River basin. Nevertheless, the enforcement of the law is difficult. According to the General Authority of the Executive Corporation for Land Improvement

Projects, Department of Land Protection, violations have been recorded for an area of about 30,000 feddans over the period from July 1985 to June 1991. In view of the difficulties of law enforcement, the Government intends to promote market incentives to encourage better natural resource management.

1.19 Law 48, which addresses the protection of the Nile and related waterways from pollution, was enacted in 1982 but it has yet to be enforced; this is most likely due to a lack of a realistic phasing of the introduction of discharge reductions to meet the standards. To enable enforcement in the near future, temporary permits incorporating realistic phasing of reductions and penalties for discharge of pollutants would need to be considered.

1.20 For laws relating to solid waste, different authorities have different responsibilities depending on the type of waste. The basic law for solid waste collection, treatment and disposal is Law No. 38 of 1967, with an amendment by Law 31 of 1976. This law regulates collection and disposal of waste from houses, public places, commercial and industrial areas, and is valid for towns at the discretion of the Governor. Among other points, the law forbids disposal of garbage in any place not specified by the local council. Solid waste collection is regulated by licence delivered by the local council. The Ministry of Housing and Utilities is responsible for the implementation of the law, where solid waste management is the responsibility of municipalities. Law 38 relates to nominated cities and villages only, and thus is not enforceable at all villages.

1.21 There is no specific legislation for management of industrial solid and hazardous solid waste. Various laws and decrees address transport, handling and storage of chemicals. In addition, Law No. 48 of 1982 addresses the prevention of water resource pollution from hazardous solid and liquid waste. The ministries responsible for a certain industry are also responsible for the waste generated by that industry, which introduces a rather confusing situation and counteracts common solutions designed to support several industrial sectors. The management of hospital and laboratory waste is not enforced. Although there are several laws on pesticide use, there is no legislation on waste disposal in the agriculture sector.

1.22 In 1994 Law 4/1994 was enacted which established an Environmental Agency and requires that the environmental impact of establishments requiring licences shall be undertaken. The law applies to new developments, and also to extensions and renovations to existing establishments. This requirement relates to section one of the law, Protection of the Land Environment from Pollution. The law also covers the management of hazardous materials and wastes, and the protection of the air and water environments from pollution.

1.23 Other laws and decrees have environmental management implications, and include Decree 235/1996, issued on the 19 June 1996, establishing environmental units in Markazes and in several different directorates within Sohag.

Future Development

1.24 The Strategic Plan for the future development of Sohag Governorate (1995-2020) is an important document and it includes five main themes. The themes were developed by a working group established to develop ideas for the future of Sohag.

1.25 **Industrial Development:** The plan specifies the fundamentals of industrial activities in Sohag, as well as the area for development. The plan proposes future industries through a planned time-schedule related to other fields of development. The study includes a review of other industrial factors such as quality of product, marketing, environmental impact and development of investment capital. The plan includes five appendices; the first gives a review of the new industries which can be constructed based on the by-products of the sugar factory in Girga. The second is a review of the possibilities for locating industrial communities in Sohag Governorate. The third includes a comprehensive study of constructing

a clay-brick factory which would provide the basic materials for building without depleting agricultural resources. The fourth offers a complete survey of the economic raw materials in the Governorate and their uses in industry, and the fifth includes a study of the role of small industries in the industrial development process.

1.26 **Agricultural Development:** The plan reviews the basic resources of this activity such as the land, the water, the average production per feddan for different crops as well as a survey of animal production. This is followed by the main possibilities for development of desert lands depending on the availability of underground water resources. The plan identifies the places which are suited for reclamation and those which are not. This section is followed by three appendices; the first one includes a feasibility study on the construction of farms for medical and aromatic plants upon which some medical industries could be based. These plants can be used in herbal remedies and in food industries as flavouring materials. The second and third appendices include the results of recent studies carried out on the possibility of increasing crop productivity, especially wheat and sugar cane.

1.27 **Tourism Development:** In this section the plan shows the number, location and importance of monuments and historic sites in Sohag, and reviews the need for an excavation plan for the important sites such as in Akhmim and Batlamia, the Greek city in El-Monshah. These places constitute, among others, the most important Pharonic and Greek monuments in Egypt and could be the base of tourist development in this area. Development in this field could eventually increase job opportunities either in archaeological work or in tourism support activities. The study includes projects which aim at preserving the archaeological heritage. Surveys should be undertaken in order to ensure the planned industrial or agricultural projects will not adversely impact sites. The plan includes consideration of the need for the construction of museums and highlights the importance of preserving historical suburbs in old cities, the construction of suitable tourism services and the marketing of tourist products.

1.28 **Housing Development:** The plan gives a study on the establishment of a new settlement along the Sohag-Red Sea road (and suggests the relocation of Akhmim city to this road in order to allow excavation to discover the artefacts of the old city). The plan also offers a feasibility study for new housing developments, avoiding the areas prone to flooding but utilising rainfall as a water resource. The study includes consideration of the social aspects of housing planning, and suggests a time schedule for the construction of new settlements in reclaimed desert lands.

1.29 **Unemployment:** The plan provides a study which includes data and a statistical treatment of the number of graduates from high schools and university faculties and the percentage of unemployment in each specialisation. It declares the importance of a new education strategy in order to reorient the fields of specialisation in the current education system.

2. AVAILABILITY AND UTILISATION OF RESOURCES

Introduction

2.1 This chapter provides a review of physical resources related to the availability and quality of water and land. The current use of these resources is then discussed in the light of the available data. The social dimensions related to human resources and factors affecting population distribution, employment, education, health and migration are also included.

Water Resources

2.2 Water resources in Sohag Governorate include surface water and the groundwater of the alluvial aquifer.

Surface water

2.3 The surface water resources are represented by the regime of water in the River Nile, the irrigation canals, and the agricultural drains. Sohag gets its irrigation water from the River and the main irrigation canals, namely Nag-Hammadi-El-Gharbia and Nag-Hammadi-El-Sharkia canals. The total length of the two canals is about 130 km and 150 km, respectively. These canals take water from the River Nile at the upstream side of Nag-Hammadi Barrage.

2.4 There are other large irrigation canals to the west of the Nile and they take water from the upstream portion of the regulators constructed on the Nag-Hammadi-El-Gharbia canal. These canals are the El Baliana, El-Kasra, El-Girgawia and El-Tahtawia canals. The total lengths of these canals are 60, 50, 45, and 60 km respectively. In addition, there are a large number of small irrigation canals, mesaks and drains distributed all over the agricultural lands. The main irrigation canals and drains in Sohag Governorate occupy an area of about 8.5 km^2 (about 2023 feddan), and have a direct effect on the hydrologic conditions of the aquifer. The volume of surface water entering the Governorate of Sohag for irrigation purposes into the main canals amounts to 1,950,000m^3/year. The amounts vary on a monthly basis, greatest flows being released during June, July and August at about 250,000m^3/day. There is no canal flow during January. Flows during the remaining months average about 150,000m^3/day. The Nile water level fluctuates by about 2m due to the amount of water released by the High Dam. The main drains in Sohag are represented by the Sohag El-Raessia drain, Tahta El-Raessia drain, Akhmim drain, El-Baliana drain and the lateral minor drains. The main drains run from south to north, parallel to the main irrigation canals. Generally the river and canals are regarded as clean water supplies, whereas the drains take dirty water away.

Surface water quality

2.5 In general the physical and chemical characteristics of river and canal waters in Sohag are within guideline concentrations for drinking water. However, significant variation occurs due to sample location. Bacteriological examination of the surface water shows that it may be highly polluted by coliform organisms and other groups depending on sample location. Dependent upon their location, drains may be highly polluted, representing a health hazard to humans and incapable of supporting aquatic flora and fauna.

Groundwater

2.6 Based on the availability, quantity and quality of the groundwater, Sohag can be divided into four zones;

Zone	Location (distance from Nile)	Depth to Water Table	Dissolved Solid Concentration
Zone I	Nile flood plain	3 - 8m	<500ppm
Zone II	+ 500m	8 - 20m	500 - 1000ppm
Zone III	+ 1000m	20 - 40m	>1500ppm
Zone IV	-	No water	-

2.7 The water bearing formation in Sohag (as throughout the Nile Valley) is represented by Quaternary sediments which are composed of gravels and sands. This is overlain by the semi-permeable Nile silts, and underlain by Pliocene clay and older sediments. Over about 70% of the Sohag Nile valley area the aquifer system is semi-confined; in the remaining parts, especially along the fringes, the system is unconfined where the clay-silt layer is absent. (Map 4)

2.8 Due to the high permeability in both horizontal and vertical directions of the aquifer, water flow is predominantly in the horizontal direction. In the semi-confining layer, which has low horizontal and vertical permeability, water flow is predominantly vertical; in the upper part of the semi-confining layer, flow patterns are more complex due to the effect of drainage systems, leakage from canals and seeps of water to the drains. The aquifer extends horizontally underneath the young alluvial plains of the Nile, and extends laterally into the bottom of the adjacent wadis. The lower boundary of the aquifer may be considered impervious due to the presence of thick deposits of Pliocene clays of very low permeability. The lateral boundaries along the sides of the valley are pervious.

Groundwater quality

2.9 The water contained in the aquifer in the Nile Valley is of good quality and generally is suitable for both irrigation and domestic uses. The total dissolved salt values range between 260 and 1280 ppm. The salinity of water increases in the unconfined part of the aquifer. This is mainly due to the leaching of the lithological formation by water flow from the semi-confined aquifer to the unconfined one. (Map 5).

2.10 According to the TDS values, water in most localities in Sohag has acceptable values and is suitable for drinking. The World Health Organisation (WHO) standard for TDS is 1500ppm. However, in Girga and Dar El Salam, high values of TDS are recorded that make water unsuitable for drinking; (1600 and 1770 ppm respectively). Groundwater in the valley fringes is unsuitable for drinking purposes. The groundwater in the old lands (Nile valley) is characterised as moderately hard water and at the valley fringe water is very hard. Some areas have high iron and manganese concentrations.

2.11 Bacteriological contamination of groundwater depends mainly on the source and location of groundwater extraction. According to recent studies, the water extracted from the aquifer is free from the pathogenic bacteria as long as the proper extraction procedures are used (e.g. well depth criteria, and well development and maintenance).

2.12 There is hydraulic connection between the surface water in both the river and the main irrigation canals, and the groundwater in the aquifer. Generally, the river acts as a discharging body for the aquifer and the irrigation canals act as recharging sources.

Current use of water

Irrigation

2.13 Before the construction of the Aswan High Dam (AHD), only parts of the lands of the Nile Valley were irrigated on a perennial basis. Large areas relied for their water supply on the yearly Nile flood so that crops were grown on residual moisture or groundwater. After the construction of AHD, sufficient surface water supplies became available to allow irrigation throughout the year. Additional lands along the valley fringes were brought under irrigation and a significant horizontal expansion took place in areas adjacent to the old lands. Some cultivation projects were carried out by the Public sector (e.g. West Tahta company where 5,000 feddans were reclaimed and West Girga project and El-Diabat Farm), in addition to other private projects. With the increased supply of surface water, the traditional use of groundwater in irrigation has declined. The natural drainage capacity of the aquifer system is such that water table levels are close to the ground surface.

2.14 The main irrigation canals supply water to other lateral small canals which feed the mesaks. These mesaks are separated by interval distances ranging between 100m and 500m. The rotation for the irrigation system is seven days. Water is allowed to flow in a group of canals for a period long enough to irrigate the area. The water supply period is followed by closing the head regulators on these canals and a turn is given to another group of canals. In many cases, pump stations are also used to ensure irrigation.

2.15 For about three weeks in January, all irrigation canals are closed and discharge of water at Aswan is at its lowest rate, just enough to secure navigation in the course of the river, and to cover industrial, electrical and domestic requirements.

2.16 Before the construction of the High Dam, the need for a drainage system was limited to catching surface water runoff during the flood season. During the majority of the year, river water levels were about 2m below land level, and the river functioned as a major drain. Natural drainage to the river was at its peak during March. Levels of groundwater all over the valley were low enough for vertical drainage. Water-logging and salinity problems were not apparent.

2.17 After the construction of the AHD, the natural drainage capacity of the aquifer system has been found to be generally insufficient to cope with the increase in aquifer recharge due to perennial irrigation. Except in areas near the river, groundwater levels are close to the ground surface. In Sohag, a net of tile drains has been constructed to collect the excess irrigation water. In areas where these drains have been installed, groundwater levels are controlled by the depth of these drains.

Irrigation water use

2.18 Estimates of water use by various crops grown show that sugar cane requires about 12000m^3/feddan; lentils about 1200m^3/feddan; onions about 3000m^3/feddan; cotton about 3500m^3/feddan and cereal about 2000 - 2500m^3/feddan per harvest.

Potable water supplies

2.19 The two sources of potable water supply in the Governorate are groundwater, which is the most common source, and surface water, either from the Nile River or from the main irrigation canals. There are 22 surface water treatment units, seventeen of them serve the population in urban areas and five are in rural areas. Six are located in Sohag City. Such units supply only 10% of the total population in the Governorate with a potable supply.

2.20 Groundwater supplies the majority of the population and supplies both network and individual pumps. There has been an increase in the total amount of water extracted from the aquifer for municipal use from year to year. Changes from 1985 to 1995 in the urban areas of Sohag show extraction has increased by 60% from 19 million m^3 to 52 million m^3. Leakage from the supply network accounts for a considerable proportion of the water supplied; estimates indicate that only 40% of water abstracted, treated and supplied reaches the consumer.

2.21 In the rural areas of Sohag, most people depend on hand pumps or surface water courses. Some rural communities get municipal water supplies from public pumps on the streets which generally supply water of poor quality. Precise details of the numbers served by each type of supply are not available, but it is estimated that 30% of houses do not have a direct supply. (Appendix Two, Table 9.)

2.22 Throughout the Governorate there are some 555 groundwater wells feeding the supply network. The great majority (~80%) are electrical, the remainder powered by diesel.

Fisheries

2.23 There are a number of fisheries in the Governorate and fish production from both river fishing and cultivation during the period from 1989 to 1994 has increased by 70 - 80%. Fish are also raised to help in controlling weed growth in canals and drains.

Industrial

2.24 The use of water for industrial purposes includes processing, washing, and cooling. Some of the factories use groundwater (for example: Pepsi Cola, and Oil Hydrogenation factories), others use water from the potable water supply net (the Weaving/Textile factory, Onion Drying Factory), and others abstract directly from the Nile (Sugar factory).

Land resources

Agricultural

2.25 The expansion of the cultivated area due to land reclamation during the period from 1988-1993 shows an increase equal to 3.5% for 1989/1990, while in the season 1992-1993 the percentage increase was 4.9 %. Reclaimed lands are often allocated to new graduates to reduce the tendency of fragmentation of the old lands (i.e. in the Nile valley), due to distribution of land amongst the sons of farmers. The major part of the cultivated area in Sohag Governorate falls into second class soil type (59.48%).

Industrial

2.26 A limited number of large scale industrial projects are present in the Governorate, the sugar factory at Girga covers an area of 55 feddans. In Sohag Markaz land take by industry is estimated at 182 feddans, including the 61 feddans of Phase I of the new industrial centre at El Kawther. This area is growing and already Phase III is under construction, tripling the land available for industrial use. Forty two industrial enterprises in the Governorate employ more than 50 workers.

Housing

2.27 The type of housing in Sohag Governorate varies from an old classical urban type to a clearly rural type. Old classical urban represents the core of most cities in the Governorate and is built from red bricks, with wooden roofs. These buildings do not usually exceed two floors in height and are often in a poor condition. The residential density is high, (200 - 300 person/feddan). The services and infrastructure provision are under-developed except in newer city centres where most of the commercial services are present. On the boundaries of the city core the residential density decreases to about 100 - 200 person/feddan, and the services provision becomes much better as most of the houses are of recent construction.

2.28 Urban network types predominate in the newly developed areas where the buildings are made of concrete and the streets are perpendicular to each other. The buildings are usually higher than three floors with a residential density of 75 - 100 person/ feddan. Services and building standards are generally much better than with the old classical type.

2.29 A random urban type predominates in the outermost boundaries of urban areas and represents a transition between the rural random and the network urban types. It is considered as semi-urban with buildings made of both red bricks and concrete. The buildings rise to 3-4 floors, with residential density of about 75 - 100 person/feddan.

2.30 Dwellings in rural areas are similar to the random urban type. As time passes, these rural buildings reach the random buildings of the city to form the last phase of the city housing. These buildings are rather poor and made up of mud bricks with roofs of plant material. The residential density is about 50 - 100 person per feddan.

Infrastructure

2.31 The internal roads network comprises both paved and unpaved roads. Highways connect Sohag to Assuit in the north and Qena in the south. Generally the roads are of reasonable quality for local traffic, but are neither wide nor straight.

2.32 There are eleven electrical transformer stations in the Governorate, which transform the high voltage supplies provided by the High Dam transmission lines. With a total capacity of some 240Mw/hours, the stations are located in Tama (2), Tahta, Girga (2), El Baliana (2), Dar El Salam, Akhmim, and Sohag (2).

2.33 There is only one operational waste water treatment station in Sohag which serves the population of Sohag city to the west of the Nile, with a capacity of 15000m^3/day. Other waste water treatment projects are under construction, to serve eastern Sohag and Akhmim with a capacity of 83000m^3/day, Girga at 65000m^3/day, and for Tahta with a capacity of 35000m^3/day. Others are understood to be at the planning stage for Tama and El Baliana.

2.34 Potable water supply is described above in paragraphs 2.19 - 2.22.

Archaeology

2.35 The archaeological locations in the Governorate can be divided into the following categories: Ancient Egyptian monuments; Roman and Greek monuments; Coptic and Islamic monuments. The locations of these monuments are shown in Maps 6-9.

Wildlife

2.36 Within the Governorate farmland and associated irrigation-drainage systems are the two main habitats, whilst desert systems are also important.

2.37 Farmland supports a wide range of habitats which are distinct in their floristic, edaphic, and structural criteria. The most important are: cultivated land, waste land, roadsides, canal bank habitat types and aquatic habitat. For cultivated land it is possible to distinguish three types of vegetation, namely: cultivated species, garden plants and wild species. There are 93 different plant species currently cultivated in the Governorate. The weed flora has a Mediterranean origin, and includes tropical species of recent introduction and naturalisation; these are confined to the Nile basin where they are characteristic in fields of summer crops.

2.38 Waste land can be distinguished into two types: countryside and urban waste lands; the former are cultivated areas which have been abandoned due to salinisation or inadequate drainage. Plant communities are dominated by *Alhaqi maurorum* and associated species include *Cynodon dactylon* and *Convolvulus arvensis.* Urban waste lands include sites of neglected gardens, demolished houses and yards of factories.

2.39 The roadside habitat favours the growth of rhizomatous species. Leading species include *Impetrata cylindrica; Desmostachya bipinnata;* and *Pluchea disosceridis.*

2.40 The muddy banks of the Nile, irrigation canals and drains support the growth populations of hydrophilic species including tall reeds. Shrubby species include *Pluchea dioscorides; Ambrosia martina and Sesbania sesban*. Herbaceous species include *Ageratum cozynoides* and *Gnaphalium luteo-album*. Generally, about 31 species are recorded in the above-mentioned habitats.

2.41 The vegetation of the wadi areas located to the east and west sides of the Nile includes about 52 species.

2.42 Ten molluscan species are common in the freshwater ecosystems in Sohag including the host organism for bilharsia. In aquatic ecosystems 12 species of fish are recorded. Of amphibian species recorded the most common is the toad *Bufo regularis.* In Sohag Governorate 15 species of reptiles are recorded

2.43 Extensive long term data are not available for bird assemblages in Sohag but, based on opportunistic surveys, 31 bird species have been identified. The most common are *Egretta ibis*(cattle egret), *Alopochen aegyptiacus*, *Gallinula chloropus*, *Bubo bubo* (eagle owl), *Chettusia leucura*, *Motacilla flava* (yellow wagtail), and *Upupa epops* (hoopoe). The common breeding birds of the Nile system include 66 species (Goodman et al., 1989).

2.44 At the present time, 9 mammalian species are known to occur in Sohag. Among these the most common characteristic species are *Canis aureus* (jackal), *Vulpes vulpes aegyptiaca* (fox), *Rattus rattus* (rat), *Rousettus aegyptiacus aegyptiacus* and *Herpestes ichneumon ichneumon.*

Recreation Facilities

2.45 The most important sports centre is the Sohag Stadium in Sohag City, where facilities for most sports are available. A few open gardens are distributed throughout the Governorate. In the capital there is Karaman island located in the middle of the Nile, the official clubs on the river Nile shore, Sohag sporting club and a limited number of green yards in the city. As regards the other cities of the Governorate, the number of open gardens is thought to be small; however, it is known that some have converted filled dump sites into public gardens. In the area located at El-Kawther new city (7 km to the south east of Sohag City) the planners took this shortfall into account and included open space facilities, including a camping area and a sporting club. In the villages of the Governorate there are no formal recreational facilities

Mineral Resources

2.46 The deserts of Sohag Governorate, have a plentiful supply of minerals, especially those used in building (e.g. shale, limestone, sand and marble). The amounts are sufficient for local needs and, in addition, provide exports to other areas. There are no cement factories at present. Map 10 shows existing quarry sites.

Wadis

2.47 In Sohag Governorate several wadis exist, located both on the east and west plateaus. To the east there are four groups of wadis cutting the limestone plateau, namely: Wadi El-Galawia; Wadi Bir El-ain and Siflak; Wadi El Salamony; Abu Gilbana and Wadi El-kawamel and Wadi Qassab. The wadis to the west of the Nile are those located to the west of Tama, Tahta and Geheina cities; extending from the west of Sohag city to the west of El-Baliana city. The potential to reclaim the wadi areas is thought to exist. Map 11 shows the location of these wadis.

Current Use of Land Resources

Farming

2.48 Farming activity is ubiquitous throughout the lands of the Nile Valley. Sohag is no exception. Soil types supporting farming activities are shown in Map 12 and Map 13 shows soil drainage. Figure 2 gives the distribution of cultivated land. Details of the cultivated land in the different districts, according to the depth to the water table and salinity is given in Appendix Two, Table 4.

2.49 The changes in cultivated area by crop type from 1989/90 to 1993/94 shows that the cultivated area for some crops has increased (maize and millet), while for other crops the area has decreased (cotton and sugar cane). Changes in area given over to crop type may be as a result of factors such as local Ministry of Agriculture policy guidance, farmer preference or changes in soil suitability or profit margins. Although the area cultivated for cotton and sugar cane decreased gradually from 1990-1994, the productivity of the crops increased by about 1.7 times for cotton and by some 5 tonnes per feddan for sugar. Maize and millet productivity also increased.

2.50 Crops are sold by farmers in markets or direct to the Government in those cases where certain crops have fixed markets (e.g. cotton). There are some sites utilised for central storage of agricultural materials in larger villages; such storage will include crops, fertilisers and seeds depending upon the season. Similar larger sites are also located in the cities for central collection and storage. Storage is commonly associated with less perishable crops (cotton, grain etc.). Perishable food stuffs are marketed directly.

2.51 Cotton is a significant crop for Sohag, experiencing annual changes in quantities grown due to fluctuations in the fixed sale price. 90% of the cotton grown in Sohag goes to the public sector textile industry throughout Egypt, with the remainder being exported. Figures for the 1995 season reveal overall production of some 4500 tonnes with a total sale price of approximately LE 4.1 million. Estimates for 1996 suggest a significant increase to 10,000 tonnes and LE 9.2 million.

Housing

2.52 The current use of land resources for housing is conducted with high efficiency in Sohag Governorate. There are no vacant sites left for future extension in the cities and the same is true for most villages. Land produced by in-filling old irrigation canals is utilised for low income housing. Any extension in the valley area will be at the expense of the cultivated areas. The alternative is to start the establishment of new settlements in the desert areas, (as in the new El-Kawther city and the other planned settlements as reported in the strategic plan of the Governorate). This has its own drawbacks in terms of dislocated communities.

Waste Disposal

2.53 The use of resources in everyday situations produces wastes. Wastes may be classified as:

- Municipal solid waste from urban, and rural areas;
- Municipal liquid waste;
- Clinical waste from hospitals and other health facilities;
- Industrial solid and liquid waste;
- Hazardous waste;
- Agricultural waste.

2.54 The main sources of solid waste in Sohag include municipal, agricultural and smaller quantities of industrial and clinical waste from hospitals and other medical facilities. Each district in the Governorate has a dump site that caters predominantly for city waste, but waste that is not collected and transported to these sites is disposed of haphazardly along roadsides or other areas deemed to be suitable. The surface area of the dump sites range between 1 and 5 feddans, depending on the population served. In villages and small rural communities almost all the waste is burned in the house ovens. Ash from the ovens may be discarded at the city dump site, but more usually is dumped along the roadside. Hazardous waste is not separately identified in the Governorate at present.

2.55 The individual septic tank (soil absorption system) is the main method of sewage disposal in rural areas in Sohag Governorate, and the provision of such facilities is a major donor-funded activity. In urban areas there is development of central network collection systems, which deliver waste to large central tanks which are emptied by vacuum vans. The long term plan in these areas is to link the tanks to sewage treatment works. Urban areas not served by sewage networks discharge waste into small septic tanks which are emptied by vacuum tanker.

2.56 Most of the industrial factories and units such as the oil hydrogenation factory, onion drying factory, Pepsi Cola factory, weaving and textile factory in Sohag City and the sugar factory at Girga City discharge their liquid effluent, often without treatment, into the surface water bodies (the Nile, irrigation canals, or drains) either directly or indirectly using wastewater vans. Wastewater vans may also discharge into tanks or ditches excavated in the desert or at dump sites.

The sugar factory however will commence operation of a liquid waste management and treatment plant in 1996, and the Pepsi Cola factory has installed a unit which treats effluent prior to discharge.

2.57 Discharge methods and the location of the sewage outlets of the major and minor factories in Sohag Governorate vary; some discharge into the Nile, others into drains and irrigation canals, and others into the sewage network. The majority of discharges do not meet the necessary discharge standards. It is important to note that most of this waste includes both organic and inorganic pollutants. The sewage discharge outlets from the oil hydrogenation and Pepsi factories are located about 1500m upstream of the water treatment station which supplies the citizens of the east side of Sohag city.

2.58 In Sohag there is only one wastewater treatment station located at the West of Sohag city (Der Elanba Shenoda). The present station capacity is about 15000 m^3/day and the treated water is used to irrigate a farm nearby the station. The farm covers an area of 600 feddans and grows citrus fruit and casuarina trees for timber and firewood. The untreated excess water is discharged into the El-Mazalwa canal which drains into the River Nile. Sludge from the treatment works is dried before being sold as soil conditioner.

2.59 More details of solid waste in Sohag can be found in the Solid Waste Management Strategy document prepared for the SEAM project.

2.60 Agricultural solid waste may consist of crop residues of which approximately 60% are burnt as fuel; the remainder are often discarded in the desert where they are left to dry and subsequently are used as soil conditioner. Disposed of in this way they lose some of their value for use as soil conditioner. Other solid waste includes fertiliser and pesticide containers. Fertiliser sacks may be reused. Pesticide containers are burnt or buried in the desert. In disposing of the pesticide containers by burial in the desert it is important to ensure that the disposal point is well away from other existing or potential land uses, and that the containers are flattened or otherwise prevented from being reused which may introduce a contamination route. Proper recycling of such containers would be the preferred route of disposal, but would need to ensure contamination was prevented. Animal waste is used as fuel, for building or as soil conditioner in rural areas, but in urban areas, where residents may still keep animals but have no land on which to dispose of waste, waste accumulates and becomes a source of nuisance; waste from animal drawn street traffic is a similar problem. In rural areas, interim storage of animal waste outside dwellings prior to use as a soil conditioner is cited as a source of environmental nuisance.

Tourism

2.61 The tourism activities in Sohag Governorate are limited in spite of the potential. Throughout the Governorate there are archaeological locations representing important elements for tourism; however, the infrastructure necessary to support tourism is not well developed. Tourist numbers have decreased and numbers visiting Abydos fell from a reported 145,792 in 1990 to 70,000 in 1994. This fall was due principally to security problems, which are beginning to be resolved; once the security issues are resolved requirements for increased management will become apparent. A similar pattern is exhibited by internal tourism with visitor numbers falling significantly. Currently the Sohag Museum is under construction and it is hoped that this will act as a magnet and attract tourists to the Governorate. The Department of Tourism in Sohag is attempting to increase potential and has produced maps and brochures depicting the attractions of Sohag.

Human Resources

Population distribution

2.62 The distribution of population according to sex in both rural and urban locations are given in Figure 1.

Education

2.63 There are sufficient schools in the Governorate to adequately serve between 60-80% of the population. The schools are of two principal types: general schools (including primary, preparatory, and secondary) and technical (including commercial, agricultural and industrial). A number of Community schools have been established to serve small communities in isolated hamlets. Thirty seven such schools exist in Dar El Salam, Sakolta and Geheina. They are run on the basis that children attending have family duties that may prevent them attending the mainstream schools, either because they are main breadwinners in single parent families, or because they are living in very remote locations and cannot afford the time to attend traditionally run schools. In addition, the religious Azhar education for boys and girls is popular in Sohag Governorate and covers primary, preparatory and secondary schools. It is estimated however that some 106,000 children escape the education system in Sohag, and this is likely to be a significant factor in attempts to improve the environmental quality of life. A branch of the South Valley University is found in Sohag city and includes faculties of Education, Arts, Science, Commerce and Medicine.

2.64 Notwithstanding the good tertiary education support available in the Governorate, literacy rates are poor with illiteracy reaching an average of about 37%. Figures show the record for Dar El Salam to be particularly poor. Similarly, it is often apparent that the skills taught in schools do not match those required for daily life. A comment voiced by both factory managers in Sohag and academic staff is that the curriculum should be modified so that students are equipped to allow them to maximise the opportunities available to them locally. Additional data on education can be found in Appendix Two, Table 6.

Public health facilities

2.65 As in any of the Upper Egypt Governorates, public health services are limited. Records showing health care facilities, the numbers of medically trained staff and immunisation coverage are given in Appendix Two, Table 5. Figure 3 shows health care facilities per head of population for Sohag and how they are distributed throughout the Governorate.

Migration

2.66 Sohag Governorate is considered historically as a centre of outward migration. This is due to the narrow width of the valley, fragmentation of agricultural land and the limited number of alternative economic activities and, consequently, a lower potential income. The net flow of people from the Governorate to elsewhere in Egypt amounted to 259,000 persons in 1994. Cairo was the reported destination for 28.1% of this number. Some 18,500 people were recorded as migrating to other Arab countries in 1994. Migration patterns are such that people often return having amassed a reasonable level of funds. On their return they may help their home villages to improve standards of facilities or improve their homes, or buy consumer items not usually connected with village communities. Returning migrants have a significant economic impact, but the impact is not limited to boosting local spending power. Migrants are often exposed to improved personal hygiene and environmental service provision which provide an example of how local conditions might be improved.

2.67 96.8% of the migrating labour forces are male, 89.5% of them with an age ranging between 20 - 24 years. The majority of those migrating are married, with single persons contributing about 36.3%. Usually, married people are migrating to improve their living conditions, whilst single people migrate to obtain the money and facilities required for marriage.

2.68 4.5% of those who migrate are farmers and they travel mainly to Jordan and Libya. Construction workers constitute 21.9% and they migrate to Gulf countries. There is also outward migration of people trained to higher education levels, who leave to become teachers or doctors outside Sohag. High School graduates represent the greatest number of the migrating labour force (30.5%) followed by university graduates (24.4%). Illiterates constitute some 22% of the migrating labour force. This classification reflects the market needs in the Arab Countries together with the unemployed categories of educated people in Egypt.

2.69 Unemployment registration in 1993 was some 60,000; highest numbers were registered in Sohag and in El Maragha, and 72% of those registered were male.

Human Development

2.70 In a recent report from the Institute of National Planning (INP, 1994), the concept of human development was defined as the process of increasing available human choice, in economic, social, cultural and political sectors.

2.71 Human development can be measured by an index which is a combined relative measurement of three key components: longevity; knowledge; and income.

2.72 According to this human development index (HDI), countries can be classified into:

High HDI	over 0.8
Medium HDI	between 0.5-0.8
Low HDI	below 0.5

2.73 Based on 1990 data the HDI for Egypt ranges between 0.677 and 0.328. Sohag Governorate has the lowest HDI category with a score of only 0.328. This figure is based on a life expectancy at birth of 60.3 years, an adult literacy rate of 30.3% and a per capita income of $560. Clearly an improvement in this criteria is an objective that the GEAP should attempt to address.

2.74 The three indicators of HDI show how the Governorate is affected by poverty, which in turn leads to malnutrition. The traditional role of the woman is reflected in the score, in particular as a result of poor education due both to children being important income generators and perceived differences in the need to educate girls and boys.

2.75 Since 1990 steps have been undertaken in introducing change in the health of the Governorate population and in improving the level of education. The HDI index is likely to be increasing as a result of this. It is expected that the HDI could be used as an indicator of the beneficial effects of the implementation of the Strategic Development Strategy and the GEAP.

3. ENVIRONMENTAL IMPACTS OF RESOURCE USE IN SOHAG

Introduction

3.1 This chapter considers the environmental impacts associated with the development of Sohag in terms of the existing situation. Impacts likely to occur if the plans to develop Sohag are realised are considered in Chapter Four. The plans are designed to take Sohag from its present low profile position to a higher profile using development that is sustainable, thereby attracting business, tourism and investment to support the future population and its interests in agriculture, tourism and industry.

Impacts Arising due to the Existing Situation

3.2 This section describes the impacts associated with the existing situation within Sohag, due to the pattern of resource use described in the previous Chapter. The impacts described give rise in some circumstances to recommendations for improvements; these need to be acted upon and have been carried forward to the actions identified in the GEAP, the sister document to this Environmental Profile.

Water Quality

3.3 As in previous sections, it is necessary to consider water quality associated within the two divisions of surface and groundwater. Although it must be recognised that the two water systems are linked hydrologically, it helps in the overall understanding of impacts to consider them separately. Furthermore, the quality of water may be considered at a local scale, for example in the immediate vicinity of an abstraction point or discharge point, or in terms of quality of a supply system (piped network or aquifer system), or in the wider sense of Governorate-wide quality of surface or ground waters. In considering the various quality constraints which arise as a result of environmental degradation, pollution or other negative impacts, it is important to consider the resultant impacts at all appropriate levels.

Surface Water

3.4 Water flows into the Governorate in the form of the River Nile, in canals and irrigation channels and in surface drains. This water is used in a variety of ways, for example: drinking; washing; irrigation; livestock watering; livestock washing; fishing; transport; industrial process waters; industrial cooling waters; waste disposal. Each of the listed uses has an impact on the quality of surface water; the scale of the impact depends to a large extent on the scale of the use and its juxtaposition with other uses.

Drinking water

3.5 Drinking water does not have a direct environmental impact. However, the treatment of water to make it fit for consumption may; the distribution network may cause impacts and the quality of the water may have an impact on the consumer which must also be taken into account.

3.6 In the Governorate of Sohag, surface water is used for drinking in a formal way by abstracting water from the Nile, main canal, or ground, treating it and distributing it in a supply network to consumers.

3.7 Such abstraction points are found in Sohag where consumers are supplied by a network fed by 22 abstraction points and treatment plants. Surface water is also abstracted and supplied in a network to consumers in Tahta.

3.8 Waters are chlorinated prior to entering the supply pipework, and each treatment plant maintains a supply of liquid chlorine in pressurised containers.

3.9 Impacts associated with the supply of water relate to the need to maintain the supply network to prevent leakage, which has the effect of raising groundwater levels, and to establish the value of the supply so that it is used and conserved appropriately. It is estimated that some 60% of the water supplied to the distribution network is lost prior to reaching consumers. Because water is supplied at costs below the actual cost of treatment and supply, it is undervalued by the consumer. It is estimated that it costs LE 0.80 for each cubic metre of water supplied, but charges for supply are only LE 0.23 - 0.30/m^3 depending on usage.

3.10 The piped network supplies water of potable quality that is also used for flushing and washing purposes. The price of water treatment is not accurately reflected in the (nominal) charges levied for the supply; meters are connected at some consumer outlets, but they are not used to calculate charges, hence the value of clean potable water is underestimated by consumers.

3.11 Surface waters may also be used for drinking on an opportunistic basis, although people are aware of the health problems that may result from this practice.

Washing

3.12 Washing in surface waters occurs in various localities along the Nile, and also at other surface water courses where villagers make use of the accessibility of the banks for washing themselves, their cooking pots and utensils and clothing. These locations are also used for watering and washing livestock. Where the quality of the water at these locations is good, this would not be associated with impact. However, where the quality of surface water is not sufficient to support these uses, the practice leads to adverse public health impact, particularly associated with the spread of pathogens and parasites. Advantage is also taken of ease of access to the banks of surface water courses for recreational bathing. Impact may arise due to these uses, particularly where washing very dirty or contaminated clothing and animals leads to pathogens being introduced into the water course, coupled with nearby water use or abstraction. The spread of bilharsia will also occur as a result of contact with contaminated water.

3.13 However, it must be realised that washing in the canals and surface water courses in this way forms an important social function, allowing the women of the villages time to converse and exchange views. Any attempt to eliminate the practice and hence control a probable environmental health hazard, needs to address the social needs of the women who continue with this practice. Furthermore, the use of canals as washing locations arises as a result of a coping strategy designed to deal with controlling septic tank contents and emptying frequency.

Irrigation

3.14 Irrigation is the prime use of surface waters. Ideally the majority of water applied to fields for irrigation should be taken up by the growth of vegetation. However, where irrigation is inefficient water drains away, either as surface or subsurface flows, or is evaporated from the surface. Where flood irrigation techniques are practised evaporation losses can exceed 50% of the water applied. Changes in irrigation practice, as a result of the perennial availability of water provided by the High Dam, have caused adverse impacts which are explained in the following section on groundwater. In terms of impact to surface waters, the potential impact relates to drainage from agricultural lands carrying suspended solids, pesticide and fertiliser residue into the main surface water channels. The ability to crop on a year-round basis has increased the application rates of these soil supplements and control agents and, notwithstanding the price of such chemicals, there is the tendency for overuse. Furthermore, contamination may arise as a result of oil leaking from water supply pumps.

3.15 The effects of contaminated runoff are twofold; toxic chemicals enter the water system and affect non-target organisms, and excess nutrients upset the balance of vegetation growth in water channels.

3.16 Water availability coupled with the practice of removing surface soil, either as a means to improve water flows or as a raw material for brick making, has increased water application rates, and the level of the water table, and is leading to an increase in salinity of soil and water-logging, both of which lead to a reduction in crop production. Evidence for water-logging and salinisation exist throughout the Governorate, although there are some areas were subsurface conditions have led to a higher potential for such conditions to occur, and in these areas the effects of the problems are manifest in reduced productivity.

Fishing

3.17 Fishing occurs throughout the Governorate; small boats net fish in the Nile and main canals and rod fishing is widespread in most surface water courses. Fish are thought to constitute only a small part of the diet in Sohag, but this is likely to vary locally as a function of income, access to fishable reaches of surface water and tradition.

3.18 Impacts associated with fishing are those linked to over-fishing a limited resource, and removing juvenile fish, thereby reducing reproduction and sustainability of the supply. Conversely, impacts associated with consumption of fish relate back to water quality effects; fish stocks may increase in the vicinity of waste and its associated pollutants including pathogens; fish may become unsuitable for human consumption, particularly where concentrations of pollutants and pathogens in the water column are high enough to pass from the fish gut to the muscle. Bio-accumulation effects can also play an important role. Tainting of fish flesh may also occur and, whilst this may not prevent its consumption *per se*, it reduces the value of the fish. The Fisheries Department and the Nile Police enforce limits on net mesh size and control resource utilisation.

3.19 Fish farming has been introduced in Sohag, and farms have been established at six different locations, two in Sakolta and one in El Maragha, Girga, Dar El Salam and El Monshah. Total fish production in the Governorate was estimated at 1171 tonnes for 1994.

3.20 Potential impacts associated with fish culture include spread of disease and pests from cultivated stocks to wild stock, reduced water quality downstream due to wastes from the fish cultivation area, etc. The farms in Sohag have been introduced following studies by the National Institute of Oceanography and

Fisheries and followed guidelines established by them. Fish are also cultivated as a means for biological control of water weed, and the Fisheries and Irrigation Departments cooperate in this venture.

3.21 Some privately run fish farms work on the principle of catching stock from the Nile and merely growing them on in tanks. Clearly there is limited scope for development of such husbandry practices, as the initial stock represents an outlay that, together with food, may not be wholly recoverable. Furthermore, the removal of juvenile fish from the River could affect the breeding capacity of the wild stock.

Transport

3.22 Transport usage of the surface water courses is not well advanced in the Governorate, although there are freight barges, ferries and small boats usually visible at any one time from the banks of the Nile. Tourist boats are increasing their activities, after an enforced security-related absence. Some industries make use of the river for transporting goods, notably the sugar factory at Girga.

3.23 Impacts associated with transport use of the Nile stem from potential fuel spills, exhaust emissions from internal combustion engines, and discharges from the vessel of liquid waste and solid waste including sewage, litter and the like. Other potential impacts include a proliferation of piers and quays, which could interfere with existing bank-side land use, and spills during loading and unloading.

3.24 At the present level of activity, none of the potential problems are manifest; however, it is apparent that significant benefits could be derived if river transport could be promoted and replace, for example, some freight transport from the road system.

Industry

3.25 Industry does not play a large role in the economy of Sohag at the present time, although there are plans to increase industrial activity in the future to provide a basis for economic growth. The main factories within the Governorate include oil and soap, onion drying, Pepsi Cola, sugar, spinning and textile plants. A new industrial estate has been constructed to attract new industries to Sohag, (Kawther City, near Akhmim), but the land available has not yet been fully occupied, although some units have started production (notably biscuit and ice cream factories). The new industrial area is not connected to the water supply and sewage collection networks, and so any proposed development will require careful consideration with regard to its potential effects on water use and discharge. It is not considered likely that this new area will have any adverse direct impact on water quality, provided adequate treatment can be assured and water supplies are provided and maintained.

3.26 In this regard care should be exercised in allocating new factories to the industrial estate.

3.27 The older, established factories have not had the benefit of planning to control water use, discharge and pollution control. They are located in close proximity to surface water courses and have direct adverse impact on the quality of these courses due to discharge of waste water into them. Water use in the factories for washing, cooling and the like is high. Monitoring discharges is undertaken to assess compatibility with Law 48/1992; few discharges comply.

3.28. Some factories discharge into the sewer network or septic tanks. In most cases these are small factory units, including bakeries, car maintenance and washing facilities and plating workshops. The majority of factories and production units are located in Sohag Markaz, with only the sugar factory (Girga) and grinding mills in Tahta, El Monshah and El Baliana being listed outside Sohag Markaz. The sugar factory meets water quality discharge requirements but others do not, and there is unacceptable impact on water quality at the point of discharge. Some factories that discharge into the sewage network are

likely to contain pollutants that are not removed by the treatment process at the sewage treatment plant (i.e. primary and secondary treatment). In particular, the plating workshops are likely to discharge metals that are not removed during treatment.

3.29 Water is abstracted from surface water courses for factory cooling purposes. Where this water does not become contaminated by either the process or associated waste streams, the only alteration it has undergone is likely to be an increase in temperature. It is usually considered better that such water be kept separate from other water flows within the factory; it is easier to treat a concentrated effluent to achieve a high efficiency of clean up than a dilute effluent, and downstream treatment plants are not presented with an unnecessarily high flow rate.

3.30 Water courses have a natural capacity to reduce pollution and this occurs by oxidation. If sufficient oxygen is present in the water body and the effluent is well mixed, the polluting load is reduced as it disperses downstream. This natural capacity will reduce the impact of a discharge insofar as the organic load is concerned, but some pollutants discharged will remain and may be accumulated by some riverine organisms. If the assimilative capacity is overloaded, the water body becomes devoid of oxygen, is unable to support fish and other waterborne life and becomes odorous and noxious.

Waste Disposal

3.31 The final use of water considered in this section is as a means of waste disposal. Surface water courses are used as a means of disposal of liquid effluent, the effluent being agricultural runoff, municipal liquid waste (sewage) and industrial liquid waste. It is also the case that solid refuse is dumped into or beside water courses for it to be carried away; animal carcasses are often visible. Drains are designed to carry contaminated or used water whereas the canals and River are regarded as clean water supply.

Agricultural waste

3.32 Agricultural runoff is likely to contain silt, and residues of agrochemicals. Usually the disposal is unintentional; however, adverse impacts are associated with dredging and weed clearance in order to maintain irrigation and drainage efficiency. Clearing canals and drainage channels by dredging is a continuous process, that disrupts agriculture in adjacent fields. Adverse impacts are likely to be associated with agrochemical residues, including fertilisers, pesticides and herbicides. Residues of fertiliser can increase the growth rate of waterborne weeds which clog drains and canals. Pesticide and herbicide residues may have unacceptable impacts on natural organisms, and may accumulate in the food chain. Excessive overuse may lead to them becoming ineffective for the target population, resulting in higher rates of application to achieve the same level of control or the use of new control chemicals, together with increased costs etc. Increases in application rates increase the stocks necessary to be held at stores, which in turn increases the risk of spills and the potential extent of environmental damage associated with such a spill. In Sohag, however, pesticide use is being replaced by biological control methods which will reduce the potential adverse effects of agricultural runoff.

Liquid waste

3.33 As indicated earlier, some communities in Sohag City are linked to sewage networks which take municipal liquid waste to a treatment plant. A complaint associated with the sewage network is that blockages frequently occur, due to misuse of the system to dispose of solid waste. Other communities dispose of sewage effluent by means of cesspits and septic tanks. These are periodically emptied and it is routine for the contents to be tankered to some suitable discharge point, often a surface water course or desert disposal trench. In some cases there is little or no control over the point of discharge, and the polluting load may affect nearby downstream abstraction points. Indeed, it has been noted that farmers

request tankers to discharge in their fields. Such activities are likely to have significant effects and, in particular, there is potential for adverse health effects. The new dump site at Akhmim has receiving tanks for disposal of such collected liquid wastes. Tankering of liquid wastes for uncontrolled discharge into surface water courses is a common practice throughout Egypt, and is more likely to result in greater environmental damage where the waste is industrial, hazardous or toxic. In Sohag, where industry is relatively small scale, the practice is not widespread.

3.34 The management and treatment of septic tank contents is an area that requires improvement. At present waste entering a tank may be from both domestic and industrial sources. The industrial source may contain contaminants, which may either hinder treatment of the liquid waste or reduce the use potential of either the treated effluent or the sludge from the treatment process. This would allow easier long term management and a wider range of potential technical solutions. In addition to these problems, the use of septic tanks introduces other problems by virtue of their size, and the desire by the public to reduce the frequency of emptying. Sullage is often disposed of in the streets to prevent the tanks filling up too quickly. Sullage is often highly polluted and adversely affects its disposal environment, either directly or indirectly if, for example, disposed of in areas where children play.

Solid Waste

3.35 Solid waste is also discarded into surface water courses, either by deliberate action or due to the proximity of a waste dumping site to a surface water course.

3.36 Solid waste disposal is a central issue to environmental management and is dealt with in detail elsewhere (Solid Waste Management Strategy). Litter in surface water courses is unsightly, may lead to unacceptable water quality due to decomposition processes, and may clog drainage channels, canals, water intakes and abstraction points. The presence of litter also undermines any awareness campaign attempting to control environmental pollution.

Surface Water Quality

3.37 Surface water quality is highly variable along the lengths of water courses, and is directly affected by the size of the diluting flow and pollution discharges. It may also be expected to vary on an annual basis as flow rates and landward activities vary according to seasonal demands. Spot sampling, therefore, provides only snap-shot data specific to the sample time. It is considered that useful data may be gained by undertaking intensive sampling to obtain a data set of Nile and main irrigation canal water quality indicators over a long period, to determine the change in the chosen indicator parameters as the waters flow downstream.

Groundwater

3.38 Groundwater is an important resource in Sohag, and the aquifer extends throughout the Governorate, although it varies in depth from between about 1.5 and 5.0m below the ground surface. In some locations the water table is higher and adversely affects soil quality and drainage (see Table 4 in Appendix 2). Water within the aquifer flows predominantly in a northerly direction. The aquifer has a high permeability and water is generally of good quality suitable for both irrigation and domestic water supply. Salinity increases towards the valley edges where the aquifer becomes unconfined due to the absence of the overlaying Nile silts; salinity also results from the leaching of surface sediment formations by water.

3.39 Groundwater is officially regarded as of sufficient quality for drinking purposes in most localities in Sohag, but in Girga and Dar El Salam the dissolved solid load exceeds acceptable quality standards.

Similarly, groundwater abstracted at the valley fringe has a high dissolved solids load that exceeds acceptable quality standards. Water from the aquifer is hard, and the hardness increases towards the valley fringe.

3.40 Adverse water quality issues that arise due to the utilisation of groundwater are due to inappropriate control measures on the positioning of waste disposal sites and, in particular, septic tanks and the juxtaposition of abstraction wells.

3.41 Adverse water quality as a result of pathogen contamination occurs locally at a number of different villages. Water quality from private hand wells that supply villages is not routinely sampled, but sampling shows that the risk associated with pathogen contamination in such supplies is high. Villages supplied by public wells fare better, as such wells meet installation criteria with regard to abstraction depth, but hygiene practices associated with well use are a constraint to water quality.

3.42 Groundwater is also abstracted and mixed with surface water supplies for distribution in the water supply networks. According to official sources the water quality of the network supply is generally good and meets necessary standards and guidelines; it is routinely monitored to ensure quality is maintained. That water is generally available of sufficient quality to meet demands has itself caused adverse impacts. This is described later in section 3.80 salinisation and water-logging.

Atmospheric Quality

Particulates

3.43 The climatic and geographical features of Sohag Governorate mean that the atmosphere has a high particulate load, resulting from wind blown dust, originating from desert sands. This natural load is deposited onto surfaces throughout the Governorate where it becomes available as a secondary source This source is exacerbated by the road system which, although consisting for the most part of paved roads, includes lengths that are unpaved, and lengths that have unmade berms and shoulders. Furthermore, the road surface is sometimes poor and in need of maintenance. Building activities, particularly in towns, illustrate poor control over building materials which spill over road surfaces during loading and unloading. All such fugitive sources add to industrial, domestic and vehicular particulate emissions, increasing the atmospheric particulate load. Locally, concentrations are high.

Gases

3.44 Gaseous emissions occur from a variety of different sources, including in particular, industrial units, vehicular exhausts, and domestic and commercial sources. These sources include sulphur dioxide, oxides of nitrogen, oxides of carbon, hydrocarbons and, depending on fuel and process conditions, other pollutants may also be expected, including complex organic species and metals. The fuel used in many industrial sites contains high levels of sulphur; the same fuel is also used in city bakeries which are commonly situated close to dwellings. In villages domestic bread ovens are fuelled by the combustible portion of household waste. This category includes plastics and local pollution may, therefore, contain a variety of complex organic species.

Industrial

3.45 The Governorate economy is not based on industry and so industrial emissions are not extensive; however, where they occur, local atmospheric concentrations of the above mentioned pollutants may be expected to be raised over background concentrations. Local brick kilns are often mentioned as a source of pollution; emissions are uncontrolled but generally are emitted at height from stacks, which helps to reduce the level of impact close to these factories.

Brick Works

3.46 Smaller quantities of bricks are often made and fired in kamayen, i.e. a pile is built consisting of approximate dimensions of 3 x 3 x 3m and used oil and wood used to fire the pile. This results in baked clay bricks which are more durable than sun dried bricks. It is usual for villages to have such a supply. The kamayen are usually constructed close to the village centre and provide a local source of pollution, which is likely to contain high concentrations of noxious pollutants resulting in short term exposure to pollutants thought likely to be above pollutant concentration guidelines. This source of air pollution is locally significant, but the plume is quickly dispersed and is not considered to be significant in Governorate-wide air pollution.

Vehicle

3.47 Vehicle emissions are also likely to generate locally high concentrations of carbon monoxide and nitrogen oxide, which is oxidised by low level ozone to nitrogen dioxide. The volume of traffic is not considered to be sufficient at present to give rise to unacceptable concentrations of these pollutants, except in locally confined dispersion conditions, for example in narrow city centre streets with high traffic flow rates.

3.48 However, the vehicle fleet consists mainly of older vehicles which have poor emission characteristics. Furthermore, the rate of growth of vehicle ownership is high (reported figures are expected to be an under-reporting of the actual case) and it is expected that vehicle emissions could soon be a significant factor in air quality.

Waste Disposal

3.49 Types of solid waste generated in the Governorate are as follows:

- domestic waste;
- street waste;
- industrial waste;
- commercial waste;
- clinical waste (from hospitals, clinics, pharmacies and dental surgeries);
- institutional waste (from Government offices, schools etc.);
- demolition and construction waste;
- agricultural waste.

3.50 Liquid wastes such as domestic sewage and industrial effluent are considered in paragraphs 3.34 - 3.35.

3.51 The quantities of each type of waste that arise throughout the Governorate are not accurately known. However, based on locally collected data it is possible to estimate the quantity as 1070 tonnes per day, 373 t/d from urban areas and 697 t/d from rural areas; this is equivalent to almost 400,000 tonnes per year requiring a satisfactory means of disposal. There is some discrepancy in the amount of waste generated on a per capita basis in the data collected, but the figures are considered to form a reasonable basis for consideration of the waste arisings.

3.52 Waste disposal practices vary, but in general each city has a waste collection system which results in waste being collected from communal containers and transported to dumpsites. However, the system results in amounts of uncollected waste due to a mismatch between the waste collected and the wastes arising. In the villages there are usually no collection systems, although some 32 villages are reported to have formalised collection systems. However the quantity of wastes in villages is reduced due to the practices of:

- feeding food waste to animals or poultry;
- using paper and other combustibles as household oven fuel;
- using animal manure as fuel;
- using agricultural waste as fuel;
- using vegetable and animal waste as compost.

3.53 The disposal of residues after this reuse and recycling is usually undertaken by villagers and may take place at any vacant site deemed suitable within the village, or along roadsides.

3.54 Dumpsites for Dar El Salam, Akhmim and Sakolta cities are located to the east of the cultivated lands in the desert. The dumpsite for Geheina city is in the western desert. Girga and El Monshah city dumpsites are located on land along the banks of the Nile in areas that have become available as a result of changes in the flow patterns of the Nile due to the Aswan High Dam. Dumpsites for Sohag, El Maragha, Tahta and Tama cities are located in unused canals. These canals were previously used to store water in the wet season to allow irrigation in the dry season. With the construction of the AHD and year round availability of irrigation waters, these canals have become unnecessary water carriers. Each dumpsite contains burning wastes to some extent. Dumpsites often also take liquid wastes from collection vans either in dedicated tanks or ditches or simply mixed with solid waste. Such tanks or ditches are not lined to protect ground or nearby water quality.

3.55 The dump sites at Sohag, El Baliana, Girga and El Monshah are all nearing capacity and replacements will soon become necessary.

3.56 Clinical waste is collected with municipal waste and is disposed of together with municipal waste. The quantity of waste is small compared to municipal refuse and amounts to an estimated 500 kg/day. However, the waste represents a highly hazardous fraction and, as it is mixed with municipal waste, is subject to the same degree of scavenging as is municipal waste. This figure excludes non-hazardous waste arising in hospitals which can be estimated in the region of 1kg/bed/day. The total waste from hospitals can be estimated as about 2 tonnes/day. Generally there is no segregation of hospital wastes from general refuse although some Markazes (notably Dar El Salam) collect and dispose of such waste separately.

3.57 Institutional and commercial wastes, for example, from offices, schools and hotels, will also arise in varying quantities. Hotel waste will also include food waste from the kitchens. The number of hotels is small and waste from them is not considered likely to exceed about 0.25 tonnes/day.

3.58 Industrial waste is mostly utilised as a raw material for other industrial operations.

3.59 Slaughter house waste such as blood and intestines is reportedly disposed of at dump sites; estimates suggest quantities in the region of 1.5t/d. Animal carcasses (including those associated with road traffic accidents) also represent a disposal problem, often being dumped into surface water courses.

3.60 Overall solid waste management systems in Sohag have evolved with some degree of planning; however, there are a number of shortfalls in the planning which means that waste is not consistently well managed. The main issues that need resolution are:

- segregation and disposal of clinical waste;
- location of dumpsites;
- need to cater for new and proposed developments;
- combined disposal of solid and liquid waste;
- waste collection vehicle operability.

Contaminated Land

3.61 Contamination of land may be considered to exist where land is of insufficient quality to support a land use which in other cases would be possible. Such conditions are often associated with former land use and, in particular, polluting industries, waste disposal, or as a result of spills or loss of containment. In the context of agricultural land use, contamination may be as a result of an increase in soil salinity.

3.62 Sohag has a relatively small number of industrial units, and hence the level of contaminated land due to industrial land use is expected to be similarly low. At the present time the main industrial units are located in areas that have either been long associated with that particular industry, or else on land that has been specifically identified for industry. Contaminated land due to industrial use has not, so far, been associated with prevention of an activity. Land users may have been displaced, but this has been due to physical presence rather than contamination.

3.63 It is understood that in some locations waste has been used to infill redundant canals which have subsequently been used as building plots. The practice of burning waste is likely to reduce the impact of subsidence following settlement of deposited waste, but it is unlikely to remove the risk completely. It is not known whether any problems due to this have occurred to date or, indeed, to what extent this practice has been undertaken and what legacies may remain.

3.64 Contamination may also occur as a result of spillage or loss of containment of toxic materials. This may occur during storage and transport operations. For Sohag this source of contamination is considered to be most associated with central storage of agricultural chemicals, where there is a risk due to the storage of quantities of materials which may be vulnerable to fire, and hence damage to containers. The most significant risk is associated with pesticide, and where fire fighting may include the use of fire water. In circumstances where the chemicals are totally burnt, the risk of contaminated land is reduced.

3.65 The risk of contamination of land due to underground oil/fuel storage is also apparent. Almost all petrol stations, for example, utilise underground tanks and are in close proximity to agricultural land.

3.66 In the context of transport, accidents involving tankered liquids pose a risk for contaminating land. However, the risk is limited by the quantity of liquids transported. The main areas of concern will be associated with the main highways.

Noise

3.67 Problems associated with noise may be divided principally into two types; those that occur due to exposure to high levels (usually as a result of workplace exposure) for extended periods which may lead to hearing loss, and environmental noise nuisance, which causes dissatisfaction for the general population in terms of their living conditions, and reduces environmental quality. Environmental noise may affect sleep patterns, and increase stress levels in the exposed population, and may have a direct effect on educational and health facilities.

3.68 Environmental noise may be due to residual factory boundary noise, and may be of particular concern where dwellings are developed in close proximity to industrial areas. However, noise related to transport is likely to affect a great number of individuals who are exposed to road and rail transport noise sources. In particular problems occur where there is a mismatch between the rate of growth in vehicle numbers and the rate of growth in road carrying capacity, and additional development of dwellings close to main road systems and networks. In general, as congestion increases so does the level of noise, particularly with the driving style prevalent in Egypt. In Sohag noise from traffic is not a universal problem, but is likely to adversely affect growing numbers, as both population numbers and numbers of vehicles increase.

3.69 Noise issues also include problems that stem from overcrowding, and urban populations are beginning to be aware of noise from their neighbours. Problems voiced by primary stakeholders reflect two extremes, one where the risk of being overheard by neighbours forces them to increase the volume of televisions and radios so that they may hold private conversations, and those where noise from neighbouring activities, particularly small workshops or coffee houses, is disturbing.

Non-Availability of Land

3.70 In the context of this report this section has been interpreted as covering the problems associated with urban and industrial encroachment onto agricultural land and also the loss of agricultural land due to salinisation and water-logging.

Urban Encroachment

3.71 The rate of population growth in Sohag is estimated at 2.7% 1994 figures. This means that some 10,000 new dwellings are needed yearly to accommodate new families. Whereas a number of new dwellings are built in areas newly reclaimed to serve the new agricultural land, some building will inevitably take place on the fringes of existing cities and villages which will encroach onto agricultural land. Population growth figures are not broken down finely enough to allow detailed information in terms of localities where this is most likely to happen. However, it is to be assumed that existing cities will be subject to growth at least equivalent to the Governorate average.

Industrial Growth

3.72 It is clear that the present policy for new development to be located in desert areas minimises the amount of agricultural land take. However, at the present time the development appears to be piecemeal with no clear vision to provide infrastructural support except by yet more planned development. Although this will provide long term benefits, in the short term it may lead to uncontrolled development occurring as the local population struggles to provide local support facilities, or *ad hoc* development occurs along opened up corridors.

3.73 It is apparent that some industrial units are sized to provide Governorate-wide capabilities; for example, the sugar factory at Girga is able to process the whole of the Governorate sugar cane crop. Whilst this may allow economies of scale, such large units distort local development and provision of services. This imbalance is likely to have repercussions throughout the Governorate which become difficult to resolve, except at regional level where the local population will need to seek assistance from outside their immediate environment and solutions are more likely to be imposed.

3.74 The provision of industrial units should match local requirements or be carefully developed to provide an exportable commodity and to balance employment, support infrastructure, community development (schools, additional housing, medical care etc.), and transport requirements in a sustainable way.

3.75 Industry to support local requirements is not immune from locational issues, particularly when as small scale developments grow they impact more and more on their neighbours; a development that may have once matched its location can very quickly become a bad neighbour if demand outpaces sustainable growth.

3.76 The solutions to such issues may be guided by Governorate wide policy, but the implementation of the policy is best done at a local level to ensure that specific local issues are accommodated in an equitable manner.

Salinisation and Water-Logging

3.77 Such issues are of considerable importance in Sohag as the Governorate relies on agriculture almost exclusively for economic income. Salinisation occurs where evaporative losses are such that the net flow of water in the surface soils is upward, so that dissolved salts are carried to the ground surface. It is a particular problem where waters have a high dissolved solids content that provides a source of salt to the ground in addition to that which may be leached from the local soils. One means of reducing the salinity of soil is to increase the application of water so that the net flow of water is downwards, which provides a leaching effect and salts are carried away from the root zone. Disadvantages of this technique are that nutrients are also carried away from the root zone, increasing the requirements for fertilisers to support crop production. Where the water table is high, the leaching potential is reduced. Where subsurface permeability rates change, a build up of salts and hard pans may also occur, increasing the potential damage possible. In areas where permeability is low and water is added to the soils at a rate greater than it can drain away, water-logging results, leading to salinisation.

3.78 The change in the hydrology of the Nile valley due to the construction and operation of the High Dam has been significant, and many sustainable agricultural and irrigation practices of the past are no longer appropriate. It is important that any solutions that are identified as suited to control of the problems of salinisation and water-logging are solutions both in the near and far field, and in the short and long term. The solution to salinisation must consider the hydrological regimes of both the surface deposits and the deeper aquifer.

Human Health

3.79 The state of human health is in many ways a reflection of the environment. Health is the result of interactions between humans and the full range of factors in their physical, socio-economic, cultural and political environments. The physical environment consists of the natural and built environment, comprising physical, chemical and biological conditions within the home, workplace and neighbourhood. The social environment includes such aspects as access to health care and level of development, which in turn has a bearing on access to safe water and sanitation.

3.80 It is increasingly recognised that the health of populations is at risk from a variety of environmental and pollution hazards, although the interactions are still not wholly understood and direct links are difficult to establish. The high prevalence of infectious disease in developing countries and regions is linked to malnutrition, inadequate water supply and sanitation, poor hygiene practices and overcrowded living conditions as well as poor immunisation coverage and resistance of disease vectors to pesticides. Waterborne diseases are a major contributor to infant mortality. Although the relationships between health, development and the environment are complex, health can be related to wealth. Wealth in this context is not only income, but access to health care, education and other services. The wealthiest nations, and especially the most advantaged citizens, generally enjoy the best health and well being. The wealthiest citizens have greater access to medical attention, eat more nutritiously, smoke less and have the opportunity to live removed from the effects of environmental degradation. Conversely, poverty and other disadvantages can be associated with ill health and premature death. Malnutrition, poor hygiene and sanitation, lack of safe water, inadequate shelter and housing, and illiteracy all contribute towards disease and ill health.

Vulnerable Groups

3.81 Women and children and the elderly are particularly vulnerable to the risks associated with environmental degradation, inadequate standards of living, poverty, poor education, discriminatory economic and social practices, early marriage and early and multiple pregnancies. General status indicators can be used to gauge the relative importance of such effects; indicators range from economic, to health specific, to population related. For example, percentage of gross national product spent on health, percentage of population having access to safe water, or receiving immunisation, infant mortality rate, literacy rates, and life expectancies. For Egypt as a whole public expenditure on health as a percentage of GDP is 5%. But other indicators have suggested that this expenditure may not have been efficiently spent, particularly as evidenced by high infant mortality rates. Sohag in particular shows a 38% increase over average infant mortality rates for Egypt as a whole.

3.82 Health statistics are more informative if based on incidence rates and, for the elucidation of trends, age specific rates are appropriate. Such data are not routinely collected in Sohag. Furthermore, such data that does exist is likely to suffer from under-reporting. Many communicable diseases are associated with water and can be classified according to the various aspects of the environment that human intervention can alter. In Sohag evidence suggests that the health status of the population is improving, although there is still considerable improvement that could be achieved.

3.83 In addressing the needs of the vulnerable groups and in implementing the improvements, it is important to consider the provision of adequate food, water, shelter, health, knowledge and skills in terms of the life support resources. It is important to recognise that, in attempting to provide these basic needs, the perceived needs of the disadvantaged must receive attention and the provision of resources must reach the poorest of the poor and the most disadvantaged sectors of society. In order that these goals can be achieved it is necessary to encourage participation of all stakeholder groups.

Access to Health Care

3.84 One measure of public health is access to health care. Throughout Egypt primary healthcare facilities serve large numbers of the population; in rural areas there is one facility for every 11,000 people and, although numbers served per facility in urban areas are higher, (22,000-26,000), the access is easier due to the reduced travel distances involved. Sohag has figures of 10,892 and 18,802 respectively.

3.85 Despite the numbers of population served by health care facilities, immunisation coverage is reported to be good.

3.86 Table 5 (Appendix 2) shows the reported population public health facilities in Sohag. The table below shows infant mortality rates have declined dramatically since 1986; however, the data suffer from under-reporting and corrected rates, although showing a decline, are poor when compared against national and international data.

Sohag Governorate	Infant Deaths				Infant Mortality Rate			
	Urban		Rural		Urban		Rural	
	Male	Female	Male	Female	Male	Female	Male	Female
1986	1229	1055	2372	2270	87	79	53	53
1994	520	582	1101	1276	41	46	29	32

3.87 Data relating to the incidence of diarrhoea in children show a decline in the recent past. Data for 1993/1994, however, illustrate a reversal of the trend, but the incidence rate continues its broad decline. Intervention in the course of the illness reduces the severity of the attack and reduces the likelihood of recurrence, providing additional benefit over the data as reported. Acute respiratory infection is commonly reported and can be attributed to overcrowded conditions. Industrial or vehicular pollution which may increase the severity of symptoms of respiratory illness are not considered to be particularly significant throughout Sohag, although they may be local factors.

3.88 Parasitic infections occur although, due to control measures, have shown a decline in the incidence over the recent past. From an incidence of a little over 13% in school children in 1989, bilharsia had fallen to about 6.5% by 1993. For ascaris (round worm) the fall is less dramatic but still evident, whereas for anchylostomiasis (hook worm) a floor seems to have been reached suggesting that additional control or major change in living conditions and habits is required to further reduce the level of infection.

3.89 A specific, location-related, health issue related to water quality is the high concentration of manganese in some groundwater supplies, which has been linked to goitre. This is controlled by the addition of potassium iodide to salt. This control measure occurs at a national level.

Service Provision

3.90 Water supply is provided to a high percentage of urban dwellers in Sohag, but to a much lower figure in rural areas. Where the water supply is piped from a network its quality in general is good. Where it is drawn from wells the quality is not assured and in small villages in particular hand dug wells provide contaminated water supply. The source of contamination may be at subsurface levels, or poor hygiene practice at the pump head.

3.91 The situation with regard to sanitary drainage is similar in that urban dwellers are connected to a sewage network, or waste is conveyed to tanks which can be regularly emptied (although they may not be serviced adequately). In rural areas sanitary waste may be collected by tanker and conveyed for disposal; more usually septic tank is the means of collection, but the tanks are infrequently emptied leading to ground contamination and, more importantly, water contamination. However, there is a proportion of the rural community who do not have access to any form of sanitation. Table 9 of Appendix 2 shows that some 2% of houses may not be served by a sanitation system. This figure may be distorted where houses have been developed illegally. In the absence of sanitary services, people cope in a variety of ways; men may make use of facilities provided by mosques, women are likely to utilise animal sheds or fields and children the streets or fields.

Malnutrition

3.92 There is evidence of malnutrition in Sohag which affects not only the ease with which individuals may succumb to disease, but may also lead to an increase in the severity of symptoms, increase in the recovery period, decrease in the effectiveness of drugs, and an increase in the rate of recurrence.

Overcrowding

3.93 Overcrowding in rural areas occurs both in the home and, in areas served by schools in old buildings, at school.

4. THE FUTURE

Impacts Due to Proposed Development

4.1 The main features for consideration in this section are the impacts that will arise due to the growth in population in Sohag, and changes that will occur as a result of this growth such as land fragmentation, and the planned changes proposed in the strategic plan, designed to cope with increasing population pressures, demand for services, industrial growth and agricultural demands.

4.2 The impacts may be considered to occur as a result of several scenarios:

- do nothing;
- do minimum;
- implementation of basic strategic plan;
- implementation of strategic plan in conjunction with Environmental Action Plan.

Do Nothing

4.3 In such a scenario population would continue to grow in line with past growth rate. Without commensurate growth in the support infrastructure it is easy to predict that an overload situation would quickly occur, with polluted water and waste management issues being of particular concern. In Sohag, the water treatment plant would become less able to meet the load imposed by larger households discharging into the sewage collection network; larger amounts of untreated waste water would be discharged into the watercourses and water intake points would start to become affected, particularly where outfalls and intakes are in close proximity. As the pollutant load increases the natural assimilative capacity of the surface water courses would be surpassed and waters would become unable to support any life. Once this stage of critical pollutant load is reached, the surface waters require a considerable degree of clean up to reinstate their prior quality.

4.4 Poorly treated water and increased sludge load would further influence the capability of the plant to be well managed and the plant would cease to function.

4.5 At present solid waste arisings in the Governorate amount to about 300,000 tonnes per year. This quantity is difficult to deal with efficiently by the present system. Based on per capita generation rates of 0.25kg/person/day (Sohag Governorate Solid Waste Management Strategy Report, Draft Report, 1996) and a population growth rate of 2.7% per annum, by the year 2000 some 310,000 tonnes/year of waste will be generated and will need to be disposed of safely.

4.6 Waste management will break down as populations increase so that the existing management efforts fail. For example, the rural practice of burning rubbish in bread ovens at present levels of population and numbers of dwellings broadly keeps pace with arisings; however, if population increases and the size of households increases but not the number of dwellings, the disposal of waste in this way will no longer be sufficient to keep pace. Burning of waste will result in air pollution but with no benefit (as in the present case burning of refuse provides fuel for cooking)

Do Minimum

4.7 This scenario assumes that the current policies of water and waste management are extended to maintain the existing level of service. It is probable, however, that the rate of population growth will put greater

pressures on the pollution control systems than can be accommodated by a do minimum approach. Indeed, this is recognised by the Strategic plan which identifies the need for proactive development.

Implementation of Basic Strategic Plan

4.8 The strategic plan recognises the need for pollution control to deal with the development pressures. It identifies several key elements which put distance between pollution and sensitive receivers, thereby reducing the level of impact. For example, a new industrial city has been developed which is available for occupation by major industries. In principle the separation of industry from major population centres is a good thing, although the necessary arrangements must be made to cater for work-force transport. It seems there are no clear criteria for identifying the types of industry that would be acceptable to the new area, although it is clear that there is a desire to minimise occupancy by heavy polluters. However, economic pressures may undermine this. In the near vicinity of the industrial city are other developments which include a dairy producing milk and yoghurt, and a school. Overlooking the industrial city is the new tourist development, Kawther City, located on the limestone ridge and providing a splendid view of the Nile plain. At about 5km distance a new dump site facility has been located which provides facilities for solid and liquid waste disposal.

4.9 In each case the development has occurred to try and reduce the impact of pollution from the bad neighbour industry and waste disposal facility. In siting these developments at their new locations there will be the need for infrastructure support, including roads, electrical and water supplies, connection to waste water networks and a waste collection and disposal/management system. At the present time the new industrial city does not have water treatment facilities, and so it will be necessary to require on-site treatment for new industries so that the waste waters do not lead to pollution. It is suggested that a set of guideline criteria are drawn up against which prospective site developers can be judged. The guidelines would need to pay particular attention to air pollution as dispersion of such pollutants from high stacks could impact adversely on Kawther City in some meteorological conditions.

4.10 Other key developments proposed by the strategic plan are:

- construction of a road between Sohag and Hurghada;
- eight new settlements;
- industrial expansion;
- electrical supply station;
- water supply;
- sewage collection.

4.11 Each of these developments are elaborated in the strategic plan. It is evident that at the present time the plans exist in outline only. Nevertheless, the plans have the potential for environmental impact and must be developed with due recognition for environmental impact studies (as required under Law 4 of 1994). If these studies work hand in hand with the environmental action plan, sustainable development that is internationally supportable will be the outcome.

Implementation of Strategic Plan in Conjunction with Environmental Action Plan

4.12 The road between Sohag and Hurghada is beneficial to Sohag on several counts. It opens up an important transport corridor which would provide a route for industrial goods, ease trade and improve communications. In particular it could provide a means for tourists to combine the mainstay of Egypt attractions, that is the Red Sea and archaeological antiquities, in a visit that includes the attractions of

Sohag, Luxor and the Red Sea. However, the road must be planned carefully to ensure that potential issues such as:

- construction workers camp and facilities;
- uncontrolled ribbon and illegal development;
- effects of air quality, noise and waste disposal;
- effects on wildlife populations;
- fuel transport;
- service station provision;
- disturbance to religious/archaeological/cultural heritage;
- driver fatigue,

are taken into account at the appropriate stage, and that the requirements of the road do not unbalance the requirements of the existing communities and distort the economic balance of other necessary development. Considering such issues and potential conflicts at the outset allows opportunities for mitigation.

4.13 The eight new settlements will be major projects covering an extensive area, and will cater for growing population numbers. The settlements will need significant investment in order for them to be built, but to allow them to properly function as self-sustainable and supportable communities will need attention to detail. The new settlements will be located away from existing infrastructure and, therefore, this will also need to be developed. This must include not only potable water supply and sewage collection but also solid and liquid waste management systems. Thought should be directed at developing plans for sewage treatment plant and the use of treated water; bio-gas plants could be an alternative viable technology depending on specific local circumstances. In each case it will be important to size the facilities appropriate for the expected occupancy rate, or to allow stage-wise development as the settlement grows ensuring that adequate facilities exist. The provision of new facilities must go hand in hand with a continuing supply or upgrading of supplies to existing communities.

4.14 Social support infrastructure must also be given careful consideration as new settlements will need schools, medical facilities, markets and the like. If the settlements are to be populated by relocating existing communities, attention must be given to ensuring that the social order or hierarchy is not distorted during the move. This will provide help in establishing a self supporting new town in the short term. If the new settlements are to be populated by people from different areas, thought must be given to maintaining community structures so that there is no conflict between different groups nor rivalry for positions of authority. Consideration would also have to be given to the needs of different groups within the new communities, particularly women needs. Consideration of all such issues must be addressed to ensure that the development of new settlements does not present further problems for lower income groups. Such problems may result from the move taking them far from their employment opportunities and being unable to afford the cost of travelling to low-priced markets for their goods etc.

4.15 Employment in new settlements is an important issue as new settlements are likely to be located away from the old cultivated lands of the Nile valley. Therefore, the reclamation of associated lands for the new settlements must be planned well in advance so that they have reached the stage where production of crops from them is practicable. In reclaiming land for agriculture, the quantity and quality of irrigation water should be assured.

4.16 In any interim period, when the new land is not able to support farmers, it may be necessary to provide assistance for transport to new lands.

4.17 If industry is to form the background for employment in the new settlements, the availability of labour and the need for training will be important considerations.

4.18 Guidelines for the type of industry to match the settlement and any environmental constraints should be developed at an early stage and should include:

- location;
- size;
- waste management;
- effluent treatment;

considerations to ensure that the industry does not have unacceptable adverse impacts on the community (for example odour or noise nuisance, air pollution, solid waste storage, effluent discharge) that it supports.

4.19 It is intended that the industrial base of the Governorate be expanded. Such an expansion is designed to improve the economic footing of the Governorate and provide the balancing factor providing income for the indigenous population as population numbers increase and outstrip that which can be supported by an agricultural economy. This is sound economic planning, but must be managed so that the new does not conflict with the existing agriculture of the area. This means that the guidelines for industrial development mentioned above, including consideration of location, size, and solid, liquid and gaseous waste management, must be rigorously applied to prevent industries adversely impacting on agricultural land use. Environmental impact assessment often is directed at individual projects; with the benefit of an environmental action plan that acknowledges an industrial expansion policy, it should be possible to consider the overall effects of proposed developments, and hence keep the balance. Appropriate training for the work-force to be employed must be given consideration. The introduction of new industries that need to be staffed by skilled labour from outside the Governorate will not address local employment or economic issues. Small scale businesses may require special consideration and assistance in complying with environmental requirements, particularly in the short term, to ensure that they are not disadvantaged by overly expensive compliance requirements.

4.20 A new electrical supply station is identified in the strategic plan. The use of wind-power, as a sustainable, renewable energy source, should be carefully considered against the alternative fossil fuel supplies. Wind power could supply some of the necessary energy requirements without any air quality issues of the type associated with fossil fuel stations. Wind turbines located on top of the limestone plateau could be a viable means of providing power to Sohag.

4.21 Increased water supply is a goal of the strategic plan. It should be realised that the satisfactory supply of water of appropriate quality is essential if Sohag is to succeed in the future. This covers not only water for human consumption but should also consider water requirements such as animals, crops and industry. The supply of water should go hand in hand with provision of sewage management, collection and treatment. Piped water supplies lead to an increase in water use and an increase in sewage. It is important to size new sewage facilities with due regard to this fact, as well as natural growth in population. Sewage treatment should be considered rather than merely collection. Consideration should also be given to small and medium sized facilities rather than to facilities designed to cater for whole cities or very large villages. In this way, groups of dwellings can be connected without waiting for major capital expenditure. Such small or medium plants would be appropriate for villages and should also

include simple treatment technologies including septic tanks, bio gas generators and reed beds, for example. These sorts of equipment provide reasonable cost solutions to a ubiquitous problem, but education in their use and maintenance is also required, particularly where there could be a tendency to discard inappropriate waste to such facilities.

Costs

Direct Financial Costs

4.22 If environmental issues are considered at the outset of project design, the costs of environmental control/mitigation are a small part of the total cost.

4.23 Where mitigation measures are identified at a late stage, the additional costs may become a significant feature of the overall budget allocation. Therefore, it is clear that environmental issues should be taken into account at the earliest opportunity.

4.24 Where development has not included environmental issues or where development has exceeded the capacity of the environmental measures that were in place, overloading the treatment or control capabilities, there is a financial penalty to be paid in cleaning up the consequent pollution. In assigning costs to environmental clean up, the Polluter Pays Principle is often adopted. However, where the polluter cannot pay or the pollution is historical and the source no longer exists, it is difficult to obtain satisfactory cost recovery and a central body is likely to be required to cover the costs.

Indirect Financial Costs

4.25 Of course, it is not only direct costs which should be considered in the economic evaluation of poor environmental quality. Environmental impacts result in indirect costs which can account for much larger sums. These must be taken into account in any full economic appraisal of environmental action. For example, if access to a good quality water supply is not available and population health suffers as a result, costs will accrue as follows:

- health care/hospital/doctor fees and expenses;
- loss of income in short, or long term or even permanently;
- reduced income if unable to work full time;
- reduced income to other family members if sick require nursing;
- costs of preventive medicine.

If animals become sick or die due to poor quality water a high economic burden is placed on the owner. If a factory or industry abstracts polluted or contaminated waters to use as process, washing or cooling waters, the water:

- may need to be treated prior to use;
- may adversely affect the quality of the product;
- may adversely affect productivity of factory;
- may adversely affect the selling price of the product;

all of which have a detrimental effect on the cost effectiveness of the industry.

4.26 Agricultural productivity may also be adversely affected; if the quality of water is such that it affects the growth rate and/or appearance of the crop, it will have a detrimental economic cost. Reduced production will reduce the overall income on crop sale, reduced quality will reduce the retail value of the crop. Attempts to rectify these factors by the use of fertilisers will add further economic cost.

Technical Solutions

4.27 The list of problems associated with environmental degradation is considerable, and detailed analysis of the problems often reveals links to more problems that can form a seemingly depressing load that is impossible to solve.

4.28 However, with appropriate planning new problems can be avoided or mitigated to acceptable levels, and solutions to existing problems can be found. With high rates of population growth and limited income, the balancing of the demands of growth and development in a sustainable way becomes a significant task. However, unless the task is attempted the legacy has serious repercussions for the future.

4.29 In solving some of the issues, it is not always necessary to resort to high cost, complex technology; indeed in some cases these often result in more problems associated with, for example, spare part acquisition, and costs, training and maintenance. In some instances a change in habit will reduce the risks associated with a particular practice. In such instances costs will be associated with an awareness campaign, including handouts or public meetings. Disposal of sullage is a particular example. Sullage water (i.e. water arising from domestic use such as bathing water, washing water etc. but excluding body waste) is highly polluted. Its disposal is the responsibility of village women, and common practice is to throw it in the streets or adjacent canals where people walk, children play and where clothes and dishes are often washed. Examination of sullage water shows it to be contaminated by faecal coliform and ponds of sullage also create breeding grounds for mosquitoes and fleas which carry disease. Indiscriminate disposal of sullage, therefore, contributes to poor environmental conditions. Guidance on better disposal practices and ideas for appropriate disposal locations to suit particular villages and their land use would significantly reduce the hazards to health posed by indiscriminate disposal.

4.30 In other cases where a technological solution is required, it is important to consider the local conditions and practices, and any barriers to the implementation of the proposed solution.

4.31 At this stage in the development of Sohag, it is considered that the barriers to change are most likely to exist at the social and the institutional level. At the social level this means the way in which the various stakeholders interact, and at the institutional level in terms of how the various policies and programmes can be supported and implemented by the administrative infrastructure of the Governorate. These two issues are examined in the following chapters.

5. IDENTIFICATION OF ISSUES

Introduction

5.1 The stakeholders of Sohag will play an important role in ensuring that actions proposed by the GEAP are Tackling both the real and perceived environmental problems and adopting an approach that demonstrably addresses the problem will help to involve stakeholders at all levels and promote confidence in the actions identified.

5.2 During the course of the preparation of this report the opinions of numerous residents of Sohag have been sought.

5.3 The groups canvassed have spanned Governorate Officers and other officials and their advisers, local village unit leaders, members of the industrial and farming communities, providers of services, research institutes, those involved in cultural and tourist issues, Ministry Directorates and members of the public.

5.4 Throughout the discussions, the aim has been to identify the environmental issues that affect most people, and the issues that most people are aware of. These issues have been used to develop the threads for further consideration in the identification of possible solutions that will address current issues and help to prevent others from developing.

5.5 The process of collection of information on which the Environmental Profile and Action Plan are based has been approached at several different levels:

- technical reports by local specialists;
- integration of these and development of the themes identified by working groups on specific issues of interest;
- consultation with a wide range of local Sohag stakeholder groups including Governorate and local level officials, industry, service providers, NGO and CDA groups, institutions and local people.

5.6 At each of these levels or stages, issues have been identified by the different parties involved as being of particular importance from an environmental perspective. The issues noted by each of the groups are listed in Appendix 3.

5.7 It has been necessary to undertake the overall assessment of conditions in Sohag at these different levels because knowledge and perceptions of environmental concerns differs. In order to ensure that the Profile and the GEAP address problems in a way that is compatible with perceived concerns and therefore is a useful document in the management of scarce resources, it is important that the range of perceived concerns and related issues is understood. In addressing the issues collectively, as far as possible in ways that acknowledge the perceived concerns, a wide audience will be able to perceive the benefits of the GEAP and the process by which the Action plan has been derived. This will allow ready acknowledgement of the need to update the plan on a regular basis. Widespread dissemination of the benefits associated with pollution prevention, control and remediation will not only raise awareness amongst stakeholders of environmental issues but also provide demonstration of the benefits to be derived, whether at community health/well-being level or reduced costs due to environmental compliance level.

5.8 The comments and issues raised during information collection have been distilled and used to derive the key issues identified as:

- solid waste management;
- pollution prevention and control;
- potable water supply;
- sanitary drainage and treatment;
- public health;
- conservation and use of soils;
- use of agrochemicals and crop protection;
- planning for urban, industrial and rural development;
- institutional strengthening;
- public awareness.

5.9 It is these key issues which have received consideration in identifying the actions required and developed in the GEAP. The key issues cover the broad spectrum of issues identified during the consultation and those that are described in the preceding sections of this report.

5.10 Clearly the Actions (projects, programmes and the development of policies and a system for implementing the GEAP actions) may be divided into a hierarchy by consideration of how well they address a key issue, how many beneficiaries will be affected by the proposal, the ability of replication, the costs involved, sustainability of the project in the long term and the timescale for implementation etc. Such considerations have been used to screen project proposals to identify their suitability for inclusion in the GEAP.

5.11 In view of the fact that the social development perspectives are particularly important, special studies were undertaken to ensure that the local issues are properly reflected in the Profile and Action Plan. The work has been undertaken specifically linked into a number of the key issues identified. A range of factors were identified which need to be taken into consideration in developing the actions of the Action Plan.

5.12 There is a general awareness of environmental issues among primary stakeholders; this indicates that past environmental campaigns have had an impact.

5.13 The lack of services is a main cause of environmentally detrimental practices.

5.14 The supply of services is constrained by organisational/management arrangements.

5.15 NGOs and CDAs often provide such services or support to the poorer communities.

5.16 The demand for services far outweighs the supply.

5.17 Very often it is only certain areas, higher income or main streets that receive attention from the authorities.

5.18 People have adopted various ways of coping (coping strategies) to provide the resource services they need.

5.19 A lack of proper facilities for disposal of waste of various kinds results in the misuse of any existing waste facility.

5.20 Water is the main issue of concern in terms of its quantity, quality, pressure, colour, taste and disposal. In dealing with water supply shortages, alternatives identified by consumers can often be untreated or contaminated.

Solid waste

5.21 From the perspective of solid waste it is apparent that the informal sector provides an important role in the management of solid waste, but that this sector is not always recognised. In making any new arrangements or in modifying existing practice it is likely that conflicts will arise, either as a result of competition between private and public sector organisations, or as a result of disadvantaged sectors of the community being further disadvantaged due to their coping strategy not being recognised.

5.22 In particular the very poor goat herders and dump site scavengers and the farmers utilising land in the disused irrigation canals would be severely disadvantaged if their roles and practices are not recognised by the formal waste management sector.

5.23 An important factor is that the public sector waste management infrastructure works inefficiently and the work-force, including supervisors, is demotivated. The resourceful private sector could provide local knowledge that could improve the effectiveness of waste management.

Potable Water

5.24 For potable water, issues relate to a complex web of supply and demand. Furthermore, water quality issues affect both the urban and rural populations, although for different reasons. In addition, there is a notable discrepancy between the official opinion and the opinions of lower echelon workers within the supply organisation relating to quality. It is also reported that public sector worker moral and motivation is low. The reasons for this include lack of resources and lack of acknowledgement of responsibilities.

5.25 The supply and demand web is affected by high installation costs which are prohibitive for villagers; supply networks which are at the limit of effective supply capacity; perceptions of water quality and cultural and traditional habits.

5.26 Most villages have access to pumped ground water. In a number of instances the quality of this water is poor, contaminated by pathogens and other pollutants that often exceed WHO potable water quality standards. On occasion, where access to both groundwater pump and network supplies exist, villagers express a preference for pumped ground water perceiving it as cool and pure. This perception may be far from reality. Such perceptions are changed, however, often as a result of awareness campaigns undertaken by NGOs. It may be that similar misconceptions can be easily corrected by public awareness campaigns that, for relatively little outlay, achieve considerable benefits in terms of public health.

5.27 Analytical capabilities within Governmental Laboratories are questionable, and it would seem that analysis for pathogenic bacteria in particular is poor. Governorate resources for even routine water treatment are in short supply and it would also appear that analytical data that show quality shortfalls cannot be acted upon. The supply infrastructure is old and in need of maintenance and upgrading. Routine maintenance is reportedly not carried out as frequently as required and causes indirect problems due to disposal of wastes generated during the cleaning and maintenance routines. Operational

guidelines would seem to be necessary as facilities would appear to be operated by rote with no ability to question mal-operation or the willingness to take responsibility for decision making/taking.

Waste Water

5.28 Waste water may be dealt with by one of several methods; discharge into a sewerage network connected to a treatment plant, or storage tank, the latter requiring emptying at frequent intervals. Discharge into a septic tank system which also requires emptying and is common in urban areas. In rural areas, the

solids are broken down by bacterial action but cesspits eventually fill up and require emptying and/or replacement.

5.29 Problems are associated with all three systems although in Sohag there is only one waste water treatment plant. Problems seem to stem principally from emptying requirements, and blockages.

5.30 Emptying is undertaken by public sector employees, but it would appear that availability of vacuum tankers falls short of requirements. Similarly, the arrangements for emptying vacuum tankers are not well controlled. Solids from cesspits are removed by manual workers. Some solids from septic tanks are removed by the vacuum tankers but not all, and it is anticipated that solids accumulation accounts for many of the emptying requirements problem.

5.31 Primary stakeholders are faced with problems associated with call-out of vacuum vans, and the costs of the service.

5.32 Problems associated with the sewerage network are linked to blockages, which are ascribed to system misuse, and in particular using the system for disposing solid waste. Awareness campaigns are suggested as a necessary part of system use education.

Water and Land Resources

5.33 The Ministry of Public Works and Water Resources (MPWWR) has responsibility for the Nile and the irrigation and drainage canals, and includes guaranteeing the flow of water for irrigation of agricultural land and the drainage of land that requires it.

5.34 The two tasks of irrigation and drainage have completely separate administrations and, unlike the majority of the other ministries, the jurisdictions at the local level have very little to do with the administrative classification of the boundaries of the district. Furthermore, although the irrigation and drainage departments have similar hierarchies their jurisdiction boundaries are different. There is a central supervising Directorate with three monitoring Inspectorates which oversee the local Engineering Departments, of which there are twelve for irrigation and eight for drainage.

5.35 Problems associated with surface water courses including irrigation and drainage canals are linked to illicit discharges including solid waste, and the disposal of dredged silt/mud from canal cleaning practices. Spoil dredged from canals is piled onto the banks, which are considered to be part of the canal. However, little regard is paid to the maintenance of this canal maintenance area and it is encroached by footpaths, house building, and crop growing at the community level, and other Governorate Departments may use it for telegraph poles, water pipes and electricity supplies. Dredging activities may, therefore, cause damage such as crop spoilage, tree breaking etc. Weed removal is strictly associated by the community with MPWWR and local villages do not consider undertaking such tasks.

5.36 The cleaning and maintenance of drainage canals takes place on a regular basis, but according to local residents not frequently enough.

5.37 Villagers acknowledge the risk of bilharsia and drainage canals, but do not associate the disease with irrigation supplies.

Overview

5.38 In conclusion, the environmental issues and social dynamics of Sohag Governorate are a complex web, grown out of a strict hierarchy of delineated responsibilities that make intervention across the formal/informal links difficult. The traditional village level hierarchies are also significant features in determining what is and is not possible. The effects of religion and cultural traditions and requirements similarly place significant constraints on what is and what is not possible. Furthermore, men and women perceive somewhat different concerns, with women focusing particularly on issues in and around the home.

5.39 These constraints and barriers must be taken into account in identifying means of implementation of actions identified. In particular, it is imperative that village and family hierarchies are not disrupted in the short term and that the development of equality of status is given time to be accepted.

5.40 -
points in the system and, therefore, must be accommodated in any solution proposed.

5.41
Government through to village elder or family head) not to be discredited. In this way the bottom up support consideration can be subtly included.

5.42 There is a significant mismatch, however, between resources and requirements which is heightened by misconceptions about service provision by and within the different levels of Governorate organisation. The operators and service providers recognise constraints and the mismatch of requirements against services provided and have adapted mechanisms to cope with this, but the studies have underlined the findings that there are not municipal services as such (fully working, funded and maintained resource services provided to the general population). Operators as well as residents are often trying to make the most of a difficult job. Water quality provides a specific example where the following incompatibilities confound the supply of basic human commodity:

- Insufficient infrastructure;
- Ageing infrastructure;
- Resource allocation (e.g. who is responsible for purchase of water treatment chemical supplies);
- Local education (e.g. about water quality);
- Local hygiene practices (e.g. about water storage);
- Poor laboratory facilities;
- Poor results reporting;
- Inability to resolve reported quality issues;
- Consumer dissatisfaction with supply;
- Supply not effectively costed/charged;

- Disagreement between responsible departments, and concerns about quality;
- Pollution/contamination;
- Enforcement/policing of safeguards;
- Discontinuous supply (particularly during peak periods).

5.43 The barriers to change are considerable, and it may be the case that, in the short term, actions or projects identified by the action plan should be designed, not only to address specific environmental issues but also to promote the benefits of environmental management such that they are perceived by the public and other interested parties alike. In taking into account such issues as public acceptability and support, a set of criteria for project choice can begin to be drawn up. Social factors should play a large part in the decision-making criterion particularly in the early days where conflicts between status and aid may be at their most critical in identifying projects that tackle key issues. It is clear from work and discussions undertaken to date that the concept of planning an integrated response to issues is not common, and that piecemeal response by taking up aid as it becomes available has been the way of addressing and tackling problems in the past. However, it needs to be made clear that this response neither addresses the real problems or issues in a sustainable way, nor addresses the problems as they are perceived by the primary stakeholders.

5.44 It is apparent that resource services and support can be limited, of poor quality, only partially provided, in poor repair, and only benefiting some residents. There are a wide range of mechanisms that are adopted by men, women and children to cope with the shortcomings, to address some of the inevitable environmental problems or how informal alternative solutions are found to their problems and needs. However, it is clear that residents who face shortfalls are faced with a very limited range of potential solutions, and perceive some situations as being beyond their capabilities to change or influence.

5.45 They are unable to conceive a solution which may, erroneously, be interpreted as them therefore being satisfied with their situation. This provides a constraint to service provision as communities that are not vocal in their requirements are passed over for those that are. In the absence of a comprehensive plan for service provision, the poor and vulnerable components of the community will continue to be so.

6. ACTION PLAN PROJECT IDENTIFICATION AND DEVELOPMENT

6.1 One of the roles of the Action Plan is to develop projects which help to address the key issues that affect the local population.

6.2 During the course of collecting information for the Profile and the Action Plan, recommendations and ideas for solutions to particular environmental concerns were suggested. Where practicable these have been developed as project proposals by relevant stakeholders; for example, the stakeholders suggesting the project, or those stakeholder groups considered to be most appropriate to run with or champion the proposal. Some recommendations relate to wider issues and relate to development of programmes that address key issues.

6.3 Criteria for action plan project choice are suggested below; whereas not all may be appropriate for all projects, and as the action plan matures the criteria may change, those outlined below in the schedules provide the basis for initial evaluation and screening.

6.4 Criteria will be applied at different stages of possible project identification and development; criteria will initially be used to screen projects prior to them being fully developed and those that pass the screening process will then go on to be fully appraised by the use of comprehensive eligibility criteria, to establish their place in the action plan.

6.5 These criteria will be used for the first tranche of projects being developed as part of the first GEAP report. It is important that mechanisms are developed that will allow projects to continue to be put forward and developed in the same way in years to come. This process will continue to occur and will be the central role of the EMP system.

SCHEDULE 1: SCREENING CRITERIA

1	Direct link between project and key issue identified by stakeholders.
2	No constraints to the implementation of the project.
3	Short term implementation of the project is feasible.
4	Availability of funding is assured/highly probable.
5	A significant range and level of benefits is available in the short, medium and long term.
6	The range and numbers of beneficiaries is predicted to be large.
7	Fulfilment of financial performance criteria is highly probable.
8	Local capacity to plan and manage environmental improvement projects will be increased.
9	Sustainability is predicted.

SCHEDULE 2: ELIGIBILITY CRITERIA

1	ENVIRONMENTAL IMPACTS	1.1	Is pollution prevented, remedied or significantly diminished as a result of the project?
		1.2	Are significant habitat improvements likely?
		1.3	Will the stocks of natural resource capital be enhanced?
		1.4	Will there be any negative impacts and has their mitigation been adequately addressed?
2	TECHNICAL IMPACTS	2.1	Is the technology used in the project appropriate for local conditions?
		2.2	Do the combined technology and management proposals represent the best practicable environmental option?
		2.3	Does the project introduce improved or innovative practices?
		2.4	Will there be any negative impacts and has their mitigation been adequately addressed?
3	SOCIAL IMPACTS	3.1	Does the project offer scope for improving local technical, craft or management skills?
		3.2	Will employment opportunities be increased?
		3.3	Will stakeholders (the disadvantaged or vulnerable in particular) benefit significantly?
		3.4	Will there be any negative impacts and has their mitigation been adequately addressed?
4	ECONOMIC IMPACTS	4.1	Will economic growth of the Governorate/local economy be enhanced through exports, multiplier effects generated by the project?
		4.2	Will economic diversification be assisted?
		4.3	Will the comparative advantage of the Governorate be realised/upheld?
		4.4	Will there be any negative impacts and has their mitigation been adequately addressed?
5	FINANCIAL	5.1	Will the project meet normal financial performance yardsticks?
		5.2	Is the project dependent upon donor funding?
		5.3	Will there be any negative impacts and has their mitigation been adequately addressed?
6	SUSTAINED MANAGEMENT AND MAINTENANCE	6.1	Will the resources required for effective and sustained management be provided by the combined stakeholders?
		6.2	Has full physical and financial provision been made for ongoing maintenance?
		6.3	Will there be any negative impacts and has their mitigation been adequately addressed?

7. INSTITUTIONAL STRENGTHENING

Introduction

7.1 In addition to the projects that have been identified at this stage, it is also necessary to identify the supporting measures that will help stakeholders with environmental responsibilities to undertake their duties. These supporting measures themselves will require to be supported by a management system, that is designed to support and allow environmental issues to be properly dealt with in the day to day running of the Governorate. The framework for administration in the Governorate is shown in the form of organisation diagrams in Appendix 1. These show the departments tasked with the infrastructural support of running the Governorate.

7.2 It is clear from the charts that a central planning function that operates to coordinate the development and control of existing land-use at regional level is absent, and planning is undertaken at a local city council and village unit level.

7.3 Whereas this structure provides a good local support base and local level prioritisation, it does not allow a region-wide overview that could help to allocate additional resources in an equitable and justifiable manner. This structure introduces a significant gap at regional level by preventing an integrated Governorate-wide planned provision of services to meet Governorate-wide demands.

7.4 This leads to an inequitable transfer of purchasing power, as there is no central/regional overview to ensure balance is maintained by an even distribution of resources. As a result, development occurs on a piecemeal basis and there is little opportunity for economies of scale because each district tends to work in isolation and according to specific areas of interest rather than towards a common goal.

7.5 The Strategic Plan for Sohag provides the long term planning for the Governorate, but does not consider in detail the means by which the plan will allow integrated, sustainable development to allow the long term goals to be achieved.

7.6 This gap will be filled in part by the Action Plan, as it provides short, medium and long term actions necessary to provide services to the population. The provision of services, in particular potable water and a means of sanitary liquid and solid waste disposal will allow improvement in environmental quality. This, coupled with pollution prevention and, where possible, clean up, will provide a firm basis for continuing development and growth.

7.7 The overview of these goals must be sufficiently removed from local pressures to allow a comprehensive vision to develop and become sustainable. The present action plan should be coupled with a regional planning policy that acknowledges both the environmental and economic challenges and pressures facing development.

7.8 Whilst there is significant variation in the status of the districts, there is a requirement for them to lobby for the necessary service provision, and to provide adequate information to the regional offices to monitor progress in remedying shortfalls. Often, although the local office may know with much greater certainty the detail of what development or actions are necessary, some actions should come from, and can only be funded by, a centrally placed system.

7.9 It must be recognised that areas that currently enjoy service provision should have that level of service maintained in the short term and increased in the medium and long term, but that the overall goal should be to improve the level of service throughout.

7.10 Knowing the starting point and the desired destination, to allow a route to be planned. The route planning should be by regional planning policy strategy devolved to the district level for the detail necessary.

Institutional Weaknesses

7.11 The various studies undertaken during the course of compiling data and investigating organisational practices in Sohag have been instructive in identifying where strengthening may be required before a GEAP can be fully implemented.

7.12 The formal organisational framework of the Governorate is shown in Appendix one. However, the informal links between Governmental departments are not shown. Such informal links are powerful in allowing information exchange between departments, but are less able to allow that information to be acted upon.

7.13 It is also clear, particularly in the field of solid waste management, that the formal (predominantly public) sector is supported by an informal sector that is little recognised. However, it is also clear that without the assistance that the informal sector provides the formal sector is substantially inadequate.

7.14 The inadequacy of services provided by the public sector is manifest throughout the key disciplines of:

- solid waste management;
- potable water;
- sanitary waste;
- irrigation and drainage;
- social affairs;

and permeates through other disciplines that encompass:

- education;
- agriculture;
- fisheries;
- tourism;
- antiquities.

7.15 The inadequate services provided is due in part to lack of resources, but that is not the complete picture and efficient use of what does exist and is available would help. However, strengthening is required to allow effective resource management of key resources to increase the provision of quality service. Resources in this context should be interpreted in a broad sense covering not only physical resources but capital and human resources also.

7.16 Strengthening is required not only in the field of environmental management, which is the key area promoted by the GEAP, but in other sectors not only to allow the necessary response to the new environmental challenges but also to help manage key, primary discipline responsibilities.

7.17 The Governorate system that employs large numbers of people who are set in a strict hierarchy stifles initiative and is significantly demotivating. It results in an inefficient system. Furthermore, there is

evidence to suggest that the system can be corrupted, wages are poor and employees require tips or secondary jobs to supplement their income.

7.18 Strengthening does not necessarily mean the introduction of new departments; it means the integration of services already provided so that activity is complementary rather than duplicated. It means forward planning to include preventive maintenance measures on a proactive basis rather than reaction to demands piecemeal. It means enforcement of laws on a fair and equitable basis, and empowering staff so that they can properly police their areas of responsibility. It means devolving power to the appropriate level and it means providing services to all levels of society not just those that are most vocal.

7.19 Key problems that have been identified that will need resolution include:

- resource planning;
- communication between Governorate Departments and exchange of technical concerns;
- development of consensus programmes that incorporate best option solutions from all perspectives;
- acknowledgement of responsibilities;
- acknowledgement of all sectors of stakeholders;
- community based perceptions and responses;
- involvement of the public, private companies and NGOs in the future provision of services;
- an approach based on demand led rather than supply led basis;
- affordability.

7.20 An issue of particular concern is that solutions match requirements, not only in terms of service provision but also in terms of ability to pay, if necessary, for the services. Although it is stated by some sectors (urban middle class) that there is a willingness to pay, it is probable that some sectors would be unable to pay even a token amount without incurring financial hardship. Therefore, charges cannot be imposed across the board and an equitable system must be developed.

7.21 Strengthening will take a concerted effort looking at short, medium, and long term requirements.

7.22 In the short term training will be a key requirement and this should include upgrading knowledge in specific technical areas as well as broad-based environmental issues. Training should include development of interdepartmental cooperation and awareness raising. Training should also focus on efficient resource allocation and utilisation, forward planning, prioritisation and community/ stakeholder awareness and staff development. In the medium term empowering the law enforcement arms of the departments is likely to become a key issue.

7.23 In the longer term monitoring the effectiveness of strengthening programmes and policies will be critical.

7.24 Departmental flexibility and awareness of internal and external strengths, weaknesses, opportunities and threats will help the Governorate rise to the challenge of the future.

7.25 The need for institutional strengthening was recognised by the relevant parties as a key issue that needs resolution, and the beginnings of a system to encourage participation by all stakeholders in the management of environmental responsibilities at all levels is outlined in the GEAP.

8. THE NEXT STEPS

8.1 The key issues, some projects that start to address some of the issues, and supporting programmes to help the projects work are identified in the GEAP. These actions, including projects and programmes to address the needs identified during the development of the environmental profile leading to the compilation of the GEAP, are thoroughly developed in the GEAP. The reasons for these actions are based on the findings of this environmental profile. The projects, programmes and policies and the key issues that they are designed to address are explained in the GEAP. They can be considered as the necessary building blocks required for a successful GEAP; in a similar vein the consultation and participation by stakeholders can be viewed as the mortar that keeps the bricks together. The next steps are the implementation of these within a framework which allows the environmental needs of the Governorate to be addressed. This is the function of the Environmental Planning and Management System that is being developed. The steps do not end there, however, and there is a strong need for the GEAP to be regularly reviewed and updated to take into account the changes that occur as a result of its implementation, and the growing skills of environmental management in Sohag.

8.2 The key issues identified during the process are identified and explained below. These key issues are a distillation of all of the concerns raised by stakeholders within the Governorate. In addressing the issues, a supporting system of policies and programmes will be necessary. This system should be integrated with the daily operation of the Governorate to ensure that environmental considerations are taken into account in every decision that is made.

SOLID WASTE MANAGEMENT: This addresses concerns expressed at all stages of the waste management cycle, from collection to transfer and disposal, and includes problems such as litter, vehicle suitability and maintenance, dump site management, control of scavengers, reuse and recycling of materials etc. The issue covers the wide spectrum of waste generated in the Governorate, including that from domestic sources, but also from health care facilities.

POLLUTION PREVENTION AND CONTROL: Concern was expressed by stakeholders about industrial pollution sources which, although relatively few in Sohag (compared to other Egyptian Governorates), are seen by locals as significant problems. However, sources such as vehicles and local brick manufacture should not be overlooked. Related issues included in this category include the need for monitoring of environmental quality and emissions from polluting sources to help in prevention and control requirements. Law enforcement was often cited as a means of improving the level of pollution control.

RESOURCE DEVELOPMENT AND CONSERVATION: As a Governorate Sohag has plentiful mineral, cultural, natural and human resources that can be effectively harnessed in the future to allow economic development. A central theme that requires to be developed for the GEAP is to develop and conserve resources so that development can be sustained. There are many ideas, including those from the Strategic Plan and stakeholders, for development and, in order to ensure that these are compatible with the whole range of demands placed on the environment, this issue is a vital component.

PLANNING: INDUSTRIAL, URBAN AND RURAL: Planning for development control was a theme highlighted by stakeholders in terms of incompatible neighbouring land uses, including industrial workshops and overcrowding affecting the quality of urban life. Other factors such as provision of recreation services may be considered in this category, as may requirements relating to the visual attributes of new buildings.

POTABLE WATER SUPPLY: This issue causes considerable concern throughout Sohag, in urban, rural and all economic sectors of the population. Supply shortfalls exist in terms of quantity,

physical, chemical and biological quality, and reliability, and relate to ground, surface, pumped and network supplies alike. The degree of severity of the problems vary from district to district and community to community, but most users are dissatisfied for one reason or another.

SANITARY DRAINAGE AND TREATMENT: At present the collection and treatment of sanitary waste water is at an early stage of development in the Governorate. The concerns range from connection requirements to networks in areas where networks exist, blockages, costs of maintaining the system, problems associated with communities that rely on septic tanks in terms of the capacity of collecting tanks, frequency and cost of emptying, and disposal of tank contents, to communities and families with no access to any facilities whatsoever. Treatment works overloading is a problem both in terms of quantity and quality of influent. The use of effluent (treated and untreated) as a source of irrigation water is recognised as a potential benefit, as is the use of sludge as organic fertiliser. The risks associated with contamination of such resources, with pathogens or bacteria in particular, is not well recognised.

CONSERVATION AND USE OF SOILS: Soil is a vital natural resource to Sohag and, with the advent of the AHD, is no longer annually replenished by the flood waters of the Nile. Soil conservation is, therefore, an important issue. Quality problems relate principally to agricultural practices, particularly irrigation and reclamation practices. Soil salinisation and an increasing groundwater level are particular issues.

USE OF AGROCHEMICALS/CROP PROTECTION: Closely linked to the above issue, the use of fertilisers, pesticides and herbicides is an important issue. Sohag has significantly increased the use of biological control replacing chemical use, but the benefits of this need to be promoted to a wider audience. The issue is related to pollution prevention and control and to public health.

PUBLIC HEALTH: Public health is generally poor in Sohag because of the level of poverty in the Governorate. Although access to health care is improving, malnutrition, cost of treatment and traditions serve to compound the effects of inadequate levels of service provision.

INSTITUTIONAL DEVELOPMENT: This issue is linked to the need to strengthen the capacity of local Governorate officials and others to deal effectively with their role and environmental responsibilities.

ENVIRONMENTAL AWARENESS: There is a strong need to increase the level of understanding of environmental issues throughout the wider population of the Governorate.

8.3 These key issues are not presented in order of priority. Priorities change in accordance with stakeholder perceptions and needs. Furthermore, the issues do not stand in isolation and there are substantial links between issues. In particular all can be linked to public health either directly or indirectly, and all are linked in some way to controlling pollution of the Nile.

8.4 In trying to determine where priorities lie, consideration must be given to ensuring sustainability of the plan and actions identified in it. This means that, in the first instance, priority should be given to capacity building and environmental awareness building to help in ensuring that as many people as is possible fully understand the reasons for environmental improvement and management and, therefore, support the actions suggested and that require involvement in due course.

8.5 Included in this document are recommendations. These are picked up in the GEAP where appropriate, but some of the recommendations need to be carried forward for future GEAP revisions. A list of such recommendations is provided below.

Recommendations

1. Urban growth must be accompanied by the investment necessary to support infrastructure and service provision.

2. Informal or illegal settlements without access to adequate basic services prevented.

3. Balanced investment recognising different needs of stakeholders.

4. Maintain level of service provision whilst developing service provision in inadequately provisioned areas.

5. Introduce legislation in a phased way matching realistic pollution reduction targets with the ability of industry to comply, together with penalties for non compliance with agreed targets.

6. Solutions must recognise diverse needs of different sectors of the communities.

7. Adhere to appropriate guidelines for development.

8. Develop new guidelines for development control as necessary (in particular for El Kawther).

9. Introduce separate collection systems for liquid wastes from industrial and domestic premises (in particular to separate organic from inorganic pollutants).

10. Collect Nile water quality data to evaluate change in Nile water quality as it passes through Governorate.

11. Develop use of Nile River as means of transport, require guidelines to help control development and reduce adverse environmental impact.

12. Map waste disposal sites (including municipal refuse sites and pesticide container disposal sites) to ensure incompatible after-use is controlled.

13. Collect traffic data, including information on the transport of potentially hazardous loads.

14. Plan development in conjunction with consideration of soil quality.

15. Plan new development to take into account local needs, including schools, housing, transport requirements.

8.6 Other ideas and recommendations that were highlighted during the course of compiling this document have been developed into the projects contained in the GEAP. Some still remain as ideas, requiring additional development before they can become project proposals. The next steps to consider include how future projects, programmes and ideas for environmental improvement can be integrated into the GEAP process so that the documentation continues to reflect current concerns and priorities. Similarly, there is a need to make sure that the good ideas that are being developed become part of the local system for environmental control in Sohag; this includes documenting them and informing stakeholders of the system and its processes so that they can obtain access to it.

8.7 In the longer term other issues will need to be included in the overall Governorate response to environmental management. These will include matters of global importance such as carbon dioxide emissions and chlorofluorocarbon impacts on climate change.

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Contributors:

Sohag Governorate

His Excellency the Governor, General Ahmed Abdel Aziz Bakr
His Excellency the Secretary General, General Yehia Abdel Latif
His Excellency the Deputy Secretary General, General Abdel Atti Ghazali

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Sohag Environmental Management Unit

Mohamed Mahmoud Mezeid
Mr. Rashad

Local Technical Coordinator

Professor Dr. Ahmed Kamal Shafei

Technical Authors

Dr. Abd El Maguid Ragab Fouda
Dr. Ahmed A El Khatib
Dr. Ahmed Aziz Abdel Moneim
Professor F M El Sheikh
Dr. Ahmed Soliman
Dr. Nader K Wasif
Dr. Emad A Ghattas
Professor Dr. Nashaat F Mohammed
Professor Dr. Hammam Mohamed Hammam
Dr. A El Shater
Professor Dr. Mohamed Abdul Sattar Othman
Dr. Abu Al Qasem Mohammed Kamel Zahra
Dr. Mounir Boushra
SPAAC
Dr. Laila Gamal

SEAM Team (Support for Environmental Assessment and Management)

Dr. Tareq Genena	(TCOE/EEAA)
Dr. Ahmed Ragheb	(TCOE/EEAA)
Dr Dina El Naggar	(TCOE/EEAA)
Rasha Abulazm	(TCOE/EEAA)
Philip Jago	(Entec)
John Warburton	(ODA)
Dr. Janet Williams	(Entec)
Ralph Cobham	(SWRC)
Susan Jones	(Social Development Advisor)
Hossam Aziz	(Entec)
Farag Farag	(Entec)
John Sidwick	(Entec)
Derek George	(Entec)

APPENDIX ONE

ORGANISATION CHARTS

APPENDIX TWO

SOHAG IN STATISTICS

TABLE 1 POPULATION STATISTICS

	URBAN	RURAL	TOTAL	MALE	FEMALE	AREA	POPULATION DENSITY	NUMBER OF VILLAGES
TAMA	60 005	227 670	287 675	149 609	138 066	145	2005	139
TAHTA	74 913	243 427	318 340	165 832	152 508	161	1970	117
EL MARAGHA	30 382	232 735	263 117	136 756	126 361	130	2026	82
GEHEINA	43 635	126 956	170 591	88 071	82 520	181	940	80
SAKOLTA	17 544	115 687	133 231	68 062	65 169	66	2020	65
SOHAG	169 989	322 692	492 681	253 906	238 775	180	2739	158
AKHMIM	90 338	157 449	247 837	129 052	118 785	180	1376	84
EL MONSHAH	41 987	277 948	325 935	164 169	161 766	174	1876	191
GIRGA	90 588	242 607	333 195	165 923	167 272	148	2255	218
DAR EL SALAM	42 685	224 056	244 329	123 239	121 090	164	1493	150
EL BALIANA	19 253	276 256	318 941	154 013	164 928	160	1994	203
TOTAL	688 339	2 447 533	3 135 872	1 598 632	1537 240	1687		1487
AVERAGE							1881	

TABLE 2 WATER USE

	GROUND WATER WELLS	% POPULATION SERVED BY WATER SUPPLY NETWORK				POTABLE WATER SUPPLY		WATER USE LITRES/HEAD/DAY	
	FEEDING SUPPLY NETWORK	URBAN		RURAL		GROUND WATER	SURFACE	URBAN	RURAL
		1986	1995	1986	1995				
TAMA	56	89.8	98.3	43.5	69.0	6 135 650	-	123	60
TAHTA	63	90.8	84.3	44.7	68.9	7 665 000	3467500	172	60
EL MARAGHA	54	87.3	100.0	31.7	67.9	9675500	-	112	60
GEHEINA	34	72.5	84.5	28.0	66.3	5 000 500	-	123	60
SAKOLTA	28	51.0	96.0	23.9	61.0	4 745 000	365000	112	60
SOHAG	94	96.3	99.1	25.2	69.9	15 585 500	7665000	190	60
AKHMIM	32	81.6	93.1	37.5	63.4	7 409 500	2190000	172	60
EL MONSHAH	49	43.7	98.7	18.4	70.0	8 176 000	1095000	112	60
GIRGA	47	90.6	81.9	24.3	78.1	9 800 250	730000	172	60
DAR EL SALAM	44	6.4	100.0	4.7	48.4	7 208 750	730000	112	60
EL BALIANA	54	72.1	98.7	36.4	60.6	8 632 250	-	112	60
TOTAL	555	82.1		29.0		90 033 900	16242500		
AVERAGE								137	60

TABLE 3 AGRICULTURAL AND INDUSTRIAL LAND USE

	CULTIVATED AREA FEDDANS							NUMBER OF SMALL INDUSTRY	NUMBER OF WORK SHOPS
	TOTAL	CLASS 1	CLASS 2	CLASS 3	CLASS 4	CLASS 5	CLASS 6		
TAMA	29 529	3 020	25 247	1 030	227	2 044	4 006	24	125
TAHTA	30 732	1 008	27 534	1 882	308	3 353	3 958	43	440
EL MARAGHA	26 290	1 878	23 728	205	479	3 072	2 949	10	210
GEHEINA	16 077	63	14 880	634	500	3 023	2 106	6	386
SAKOLTA	13 797	991	12 238	506	63	291	2 131	4	30
SOHAG	36 040	4 495	27 214	1 013	3 318	2 044	6 213	86	610
AKHMIM	13 025	1 319	10 687	1 005	14	2 440	4 103	24	185
EL MONSHAH	35 046	801	19 630	10 929	3 686	3 101	6 080	13	109
GIRGA	29 110	588	13 326	11 775	3 421	4 849	3 598	41	405
DAR EL SALAM	33 197	4 393	23 238	4 404	1 162	1 688	6 595	8	110
EL BALIANA	32 755	3 170	21 640	6 714	1 226	1 082	4 485	15	28
TOTAL	295 600	21726	219368	90102	14404	26987	46221		
%		7.3	74.2	30.5	4.9	9.1	15.6		

TABLE 4 GROUND QUALITY INDICATORS

	STUDIED AREA		DEPTH TO WATER TABLE						LEVEL OF SALINITY							
	TOTAL	CULTI-VATED	L1 (>120cm)		L2 (70-120cm)		L3 (<70cm)		S1 (<0.2%)		S2 (0.2% - 0.5%)		S3 (0.5% - 1.0%)		S4 (>1.0%)	
	FED	FED	FED	%	FED	%	FED	%	FED	%	FED	%	FED	%	FED	%
TAHTA	12020	11803	527	4.3	11276	93.8	-		6294	52.4	4498	37.4	787	6.5	224	1.9
EL MARAGHA	10980	10828	10611	96.6	217	1.9	-		9113	82.9	1653	15.1	62	0.5	-	
GEHEINA																
SAKOLTA	7354	7235	-		7235	98.4	-		6435	87.5	800	10.8	-		-	
SOHAG	6126	6126	2365	38.6	2836	46.3	925	15.1	4157	67.9	1219	19.9	384	6.3	366	6.0
AKHMIM	6496	6277	5253	80.9	994	15.3	30	0.5	5694	87.7	583	9.0	-		-	
	7142	6936	1357	19.0	5239	73.4	340	4.8	6876	96.3	60	0.8	-		-	
EL MONSHAH	6317	5428	2251		3177		-		4716	74.7	437	6.9	275	4.4	-	
GIRGA	7472	4428	101	1.4	3771	50.5	556	7.4	3339	44.7	878	11.8	66	0.8	155	2.1
	14630	12657	-		12657	86.5	-		11934	81.6	723	5.9	-		-	
EL BALIANA	10822	8922	-		8922	82.4	-		7841	72.5	1081	10.0	-		-	

TABLE 5 HEALTH

	NUMBER OF HOSPITAL BEDS	FAMILY PLANNING CENTRES	PHARMACY	DOCTORS	NURSES	RURAL HEALTH UNITS	FULL IMMU NITY	PART IMMU NITY	INFANT MORTA LITY
TAMA	327	28	34	156	207	17	57.1	36.3	
TAHTA	345	23	64	146	107	11	38.7	51.4	
EL MARAGHA	135	24	29	103	64	14	65.2	29.5	
GEHEINA	99	15	17	48	42	10	44.4	47.7	
SAKOLTA	105	15	12	50	23	9	ND	ND	
SOHAG	1150	32	143	878	348	9	51.4	45.0	
AKHMIM	195	18	13	162	85	11	71.1	28.9	
EL MONSHAH	200	30	40	118	46	19	36.0	58.9	
GIRGA	547	28	65	207	75	17	43.8	54.0	
DAR EL SALAM	82	22	17	70	15	17	28.4	61.9	
EL BALIANA	256	26	41	127	76	18	18.9	76.9	
TOTAL	3441	261	175	2065	1088	152	455.0	490.5	88/1000

TABLE 6 EDUCATION

	PRIMARY SCHOOLS		PREPARA-TORY SCHOOLS		GENERAL SECONDARY SCHOOLS		INDUSTRIAL SECONDARY SCHOOLS		COMMERCIAL SECONDARY SCHOOLS		AGRICULTURAL SECONDARY SCHOOLS		ILLITERACY RATE
	NUM	STUD	NUM	STUD	NUM	STUD	NUM	STUD	NUM	STUD	NUM	STUD	
TAMA	81	31651	23	14577	3	2016	1	2831	1	2938			36%
TAHTA	82	30175	26	14085	5	2660	5	6530	2	2544	1	2815	36%
EL MARAGHA							1	312	2	3772			36%
GEHEINA	39	15649	16	8279	3	1229	4	8322	2	1203	1	1275	37%
SAKOLTA	41	14630	12	7207	1	1029	-	-	2	1914			36%
SOHAG	115	52822	47	28632	12	6604	6	11641	7	7237	1	2268	28%
AKHMIM	74	29214	19	13314	3	1781	4	3791	3	3020			35%
EL MONSHAH	91	35241	26	13891	4	1642	2	3185	4	3324			40%
GIRGA	103	38986	30	17264	4	1647	3	3921	2	3774	1	1830	38%
DAR EL SALAM	52	18866	21	7920	2	773	1	827	2	1788	1	1371	46%
EL BALIANA	75	32187	23	11744	3	1609	3	3429	2	3469			39%
AVERAGE													36.5%

TABLE 7 CAPITAL INVESTMENT

	ELECTRICITY SERVICES		POTABLE WATER SUPPLIES			WASTE WATER TREATMENT WORKS	
YEAR	92/93	93/94	92/93	93/94	94/95	92/93	93/94
TAMA	1002	450	200	460	645	-	-
TAHTA	992	965	350	1065	344	-	-
EL MARAGHA	1053	375	200	200	200	-	-
GEHEINA	1052	1136	200	450	650	-	-
SAKOLTA	805	550	150	1445	100	-	-
SOHAG	1443	4372	500	775	1938	-	2179
AKHMIM	761	600	430	995	-	-	-
EL MONSHAH	946	1245	150	318	543	-	-
GIRGA	620	1040	460	1480	282	-	-
DAR EL SALAM	578	1535	1200	600	100	-	-
EL BALIANA	590	350	200	380	100	-	-
EL KAWTHER	-	2690	-	3103	1865	-	-
TOTAL	9842	15308	4040	11271	7087	-	2179

TABLE 8 WATER SUPPLY

	URBAN WATER SUPPLY FROM GROUNDWATER			URBAN POPULATION 1995		
	1985	1990	1995	NUMBER		
TAMA	2061666	3365414	1945650	60005		
TAHTA	1908585	3688324	4015000	74913		
EL MARAGHA	2055573	3787605	5295500	30383		
GEHEINA	1008495	2885106	2080500	43635		
SAKOLTA	507861	690404	3832500	17544		
SOHAG	3445865	3564165	10110500	169989		
AKHMIM	1084237	2327544	3759500	990338		
EL MONSHAH	1907416	2223668	6351000	41987		
GIRGA	2014362	3186486	3960250	90588		
DAR EL SALAM	1120842	1828640	3559750	42685		
EL BALIANA	2306405	3083201	5091750	19253		
TOTAL	19421487	30630557	52000900	688339		
AVERAGE						

TABLE 9 SERVICE PROVISION

SERVICED HOUSING UNITS 1986										
	NETWORK		OTHER		NONE		UNCLEAR		TOTAL UNITS	
	NUMBER	%	NUMBER	%	NUMBER	%	NUMBER	%	NUMBER	%
WATER	45412	64	3832	5	21184	30	538	<1	70966	100
ELECTRICITY	55951	79	723	1	13998	20	294	4	70966	100
SANITATION	6077	9	63320	89	-	-	1569	2	70966	100

APPENDIX THREE

ISSUES

Issues Raised by Technical Authors and Working Groups

- Solid waste arisings from municipal, agricultural and industrial sources, including aspects of collection, sorting, reuse and recycling, and disposal.
- Air quality, control of emissions from vehicles, brick manufacture and industries.
- Water quality, provision of good quality potable supplies, provision of sewage collection and treatment facilities, groundwater table.
- Agriculture, irrigation, use of chemicals, (including fertiliser), animal husbandry.
- Population education and migration, health and recreation.
- Development, integration of development goals and objectives with environmental strategy, provision of infrastructure to all new development sites and areas.
- Tourism, mapping of sites of interest.
- Land use mapping, including identification of contamination (from industry, agriculture, waste disposal etc.), development of zoning to control development, identification and mapping of threatened wildlife species and habitats.

Issues Raised by Stakeholder Meetings

- Water abstraction point juxtaposition with discharge points (both pipe discharge and septic tank vacuum lorries discharge).
- Sanitary waste vacuum lorries discharge in a haphazard way.
- Industrial plants should have own liquid effluent treatment plant.
- Animal carcass disposal into canals.
- Use animal manure as soil conditioner both for existing farmland (e.g. where animals are owned by rural population), or for new lands (where animals belong to urban/city dwellers).
- Potable water quality and availability.
- Manganese and salinity levels in potable water supplies.
- Greater consultation between Governorate Departments.
- Clinical waste disposal and segregation.
- Health, education, environmental, hygiene, etc. awareness.
- Urban growth around bad neighbour land use.
- Effluent in channels that subsequently pass through habited areas.
- Waste reuse and recycling.
- Soil salinisation.
- Tree plantations.
- Water weed in irrigation channels. Note fish known locally as Mabruck introduced to help control weed growth; however, also thought by some (erroneously) to prey on native Nile stocks to the detriment of fisheries. Need to properly publicise effort.
- Sanitation, some villages lack even septic tanks.
- Local air pollution from bakeries, brick piles, etc.
- Misuse of agricultural chemicals, promote use of biological controls.

- Problems associated with passing recommendations through long chain of bureaucratic requirements from e.g. research findings and recommendations to the local end user e.g. farmer; close gaps and get research into field.
- Tile drainage needs maintenance and extension to new areas, considered to be locally effective at controlling salinisation.
- Village encroachment onto agricultural lands.
- Law enforcement, equitably, and fines for non compliance.
- Operation and maintenance budgets.
- experts know any better.
- Simple technology, simple solutions, stepwise approach.
- Ensure that at planning stage all environmental issues are considered, i.e. comply with Law 4.
- What about decrease in Taxes as an incentive to non polluting industries? Note, though, that new industries have a ten-year tax free incentive to set up.
- Provide incentives for environmental control, increase staff motivation for good quality, good management and awareness.
- Maintenance of compact units, and groundwater storage tanks, and also piping network; many pipes suffer from furring.
- Vehicle pollution, licensing to check on pollution, e.g. MOT-type test.
- Septic tanks and water abstraction, increase awareness about incompatibilities.
- Food hygiene inspection at local cafes and eating houses.
- Small workshops in middle of housing areas.
- Make sure all development initiatives (e.g. including those funded by SFD) are environmentally sound, and occupationally safe, or at least make beneficiaries aware of their responsibilities and legal requirements.
- Get Ministry Departments talking to each other.
- Those that can afford to pay should be required to pay for local environmental services.
- Manage septic tanks properly.
- Solid waste collection and disposal, including consideration of street sweeping and dust suppression.
- Bio gas projects.
- Village heads keen on Law Enforcement.
- Get NGOs and CDAs to cooperate.
- Need to boost confidence in ability to do things locally.
- Acknowledge that different actions will be priority issues in rural and urban areas.
- Insect control.

Issues Raised by Social Dynamics Study

- Inadequate water supplies.
- Communities aware of poor water quality.
- Mismanagement and inadequate supervision of maintenance operations.

- Sewerage systems often do not work properly, (clogging).
- Rural people do not see waste water disposal as a problem.
- Unaware of health issues.
- Need for public awareness campaigns.
- Domestic solid waste a problem in urban areas.
- Need for more disposal bins.
- Participatory arrangements for street cleaning.
- Farmers not knowledgeable about drainage.
- Weed control (in drains) is problematical.
- Technical support needed.
- Farmers do not perceive pollution control as their business.
- Non-existent dialogue between managers of services and people they supply.
- Limited and incomplete understanding about linkages between environmental issues and problems.
- Communal action hampered by sense of neighbours right to privacy.
- Women have to participate.
- Requires review and assessment of potable water supply and quality and health.
- Villages need access to appropriate waste water management techniques.
- Increase number of bins (and collection).
- Reinforce licensing of small workshops.
- Plans (and implementation) for city greening.
- Rural leaders (informal and formal) should be educated about water channel pollutants.
- Agricultural extension workers transmit more information on drainage and irrigation to farmers.
- Farmers should participate in weed control activities; pilot project could involve unemployed and manual clearing.