The National Environmental Action Plan of Egypt 2002/17

Environment at the Center of Modernizing Egypt

Incomplete Draft not for Circulation, Comments are Welcome

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List of Abbreviations

AHED	Association for Health and Environmental Development
ALECSO	Arab League Educational, Cultural and Scientific Organizations
ANC	Authority of New Communities
AOYE	Arab Office for Youth and Environment
APE	Association for the Protection of the Environment
ARFI	Arab Regional Financial Institution
ATM	Air Traffic Management
BCM	Billion Cubic Meter
BOD	Biochemical Oxygen Demand
BOT	Build, Operate, and Transfer
C&D	Construction and Demolition
CAIP	Cairo Air Improvement Project
CAMP	Coastal Areas Management Program
CAPMAS	Central Agency for Public Mobilization and Statistics
CBD	Central Business District
CBO	Central Business Organization
CDA	Community Development Association
CDM	Clean Development Mechanism
CEDARE	Center for Environment and Development for Arab Region and Europe
CEO	Chief Executive Officer
CEOSS	Coptic Evangelist Organization for Social Services
CFCs	Chlorofluorocarbons
CIDA	Canadian International Development Agency
CITES	Convention for International Trade in Endangered Spaces
CMS	Convention on Migratory Species
CNG	Compressed Natural Gas
CNS	Communication & Navigation Systems
CO2	Carbon Dioxide
COD	Chemical Oxygen Demand
CPM	Critical Path Method
DANIDA	Danish International Development Agency
DFID	Department for International Development
DO	Dissolved Oxygen
DRC	Desert Research Center
DRI	Drainage Research Institute
ECEP	Energy Conservation and Environmental Project
ECES	Egyptian Center for Economic Studies
EEAA	Egyptian Environment Affairs Agency
EEC	Energy Efficiency Council
EEHC	Egyptian Electricity Holding Company
EEI	Emerging Environmental Issues
EEIF	Egyptian Environmental Initiatives Fund
EESA	Egyptian Energy Service Association
EHMIMS	Egyptian Hazardous Materials Information and Management System
EIA	Environmental Impact Assessment
EIMP	Environmental Information and Monitoring Project
EMU	Environmental Management Unit
EPAP	Environment Pollution Abatement Project

EPF	Environmental Protection Fund
EPM	Environmental Planning and Management
EQI	Environmental Quality International
ERF	Environmental Revolving Funds
ERSAP	Economic Reform and Structural Adjustment Program
EU	European Union
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investments
FEA	Friends of the Environment in Alexandria
FEDA	Friends of the Environment and Development Association
FEI	Federation of Egyptian Industry
GCR	Greater Cairo Region
GDP	Gross Domestic Products
GEF	Global Environmental Facilities
GHG	Green House Gases
GHGRP	Green House Gases Reduction Project
GIS	Geographic Information System
GMO	Genetically Modified Organisms
GOE	Government of Egypt
GOFI	General Organization for Industry
GOPP	General Organization for Physical Planning
GTZ	German Technical Cooperation Agency
GWS	Ground Water Sector
HCRW	Health Care Risk Wastes
HCW	Health Care Wastes
ICA	Institute of Cultural Affairs
ICARDA	International Center for Agricultural Research in Dry Areas
ICCON	International Consortium for Cooperation on the Nile
ICED	International Center for Environment and Development
ICZM	Integrated Coastal Zone Management
IDB	Islamic Development Bank
IDSC	Information and Decision Support Center
ISI	Import Substitution Industry
ISO	International Standard Organization
IT	Information Technology
JICA	Japanese International Cooperation Agency
LDC	Less Developed Countries
LMO	Living Modified Organisms
LPG	Liquefied Petroleum Gases
M&E	Monitoring and evaluation
MALR	Ministry of Agriculture and Land Reclamation
MAP	Mediterranean Action Plan
MENA	Middle East and North Africa
MHUUC	Ministry of Housing, Utilities, and Urban Communities
MLD	Ministry of Local Development
MLF	Multilateral Fund Secretariat
MOEE	Ministry of Electricity and Energy
MOFA	Ministry of Foreign Affairs
MOHP	Ministry of Health and Population
MOSA	Ministry of Social Affairs
MSEA	Ministry of State for Environmental Affairs
MSWs	Municipal Solid Wastes
MSY	Maximum Sustainable Yield
MWRI	Ministry of Water Resources and Irrigation
NAFTA	North America Free Trade Agreement

NAP	National Action Plan
NAPOE	National Association for Protection of Environment
NARSSS	National Authority for Remote Sensing and Space Sciences
NAWQAM	National Water Quality and Availability Management Project
NBI	Nile Basin Initiative
NC	National Communication
NEAP	National Environmental Action Plan
NEES	National Energy Efficiency Strategy
NGO	Non-Governmental Organization
NIOF	National Institute of Oceanography and Fisheries
NOPWASD	National Organization for Potable Water Sanitation and Drainage
NOU	National Ozone Unit
NRI	Nile Research Institute
NSS	National Spatial Strategy
NWC	National Women Council
NWRC	National Water Research Center
NWRP	National Water Resources Plan
OAU	Organization for African Unity
ODS	Ozone Depleting Substances
OEP	Organization for Energy Planning
OPEC	Oil Producing and Exporting Countries
ORDEV	Organization for Reconstruction and Development of Egyptian Villages
PAH	Poly Aromatic Hydrocarbons
PAP	Priority Action Program
PCB	Polychlorinated Biphenyl
PERSGA	Program for the Environment of the Red Sea and Gulf of Aden
PFTC	Department of Planning, Follow-up and Technical Cooperation
PPC	Policy Planning Committee
PPM	Part Per Million
PPP	Polluter Pays Principle
R&D	Research and Development
RAC	Regional Activity Centers
RBO	Regional Branch Offices
RFP	Request for Proposals
RIGW	Research Institute for Groundwater
RMP	Refrigeration Management Plan
SAP	Strategic Action Program
SCA	Supreme Council for Antiquities
SDU	Sustainable Development Unit
SEDO	Small Enterprise Development Organization
SFD	Social Fund for Development
SGP	Small Grants Program
SHW	Solar Hot Water
SMART	Scientific, Miserable, Attainable, Relevant and Trackable
SME	Small and Micro-Enterprises
SPAMI	Specially Protected Areas of Mediterranean Importance
TDA	Tourism Development Authority
TDS	Total Dissolved Solids
TLV	Threshold Limit Values
TOE	Ton Oil Equivalent
TSM	Total Suspended Matter
TSP	Total Suspended Particles
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification

UNCHS	United Nations Center for Human Settlements
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention for Climate Change
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
VET	Vehicle Emissions Testing
VOC	Volatile Organic Compound
WHO	World Health Organization
WTO	World Trade Organization

Executive Summary

i. Introduction

There are opportunities for Egypt to sustain her development. Liberalization of trade, being an active partner in several economic blocs, such as COMESA, and rapid advances in communication and information technologies provide Egypt with development opportunities. Simultaneously, however, Egypt faces challenges to sustaining her development. Among the threats to the development of Egypt is population growth. At present, the nation is adopting various actions to decline population growth.

Environmental quality is a prime concern to sustain the development of Egypt. Major environmental issues and concerns that challenge Egypt today include limited natural fresh water resources, mainly coming from the Nile. In addition to problems related to scarcity of fresh water, Egypt has a land problem, such as desertification manifested by loss of soil productivity and sacrificing agricultural land to the sprawl of human settlements. Another environmental problem is the deterioration of coral reefs, beaches, and marine habitats as a result of marine pollution. Air pollution in major cities and solid waste generated from human settlements are other major problems that threaten the environment. At present, it is important to enforce the environmental standards to increase the competitiveness of the Egyptian products in the global markets that demand environmentally-friendly products.

The National Environmental Action Plan (NEAP) represents Egypt's agenda for environmental actions for the coming fifteen years. It complements and integrates with sectoral plans for economic growth and social development. NEAP is the basis for the development of local environmental initiatives, actions and activities. It is designed to be the framework that coordinates for future environmental activities in support of sustainable development of Egypt.

ii. Process of Updating the NEAP

The Capacity 21 Unit at the Egyptian Environmental Affairs Agency (EEAA), which UNDP sponsored, prepared an updated NEAP employing a participatory, consultative, gender anchored, holistic planning modality to create an enabling environment. Capacity 21 Unit conducted several workshops and meetings to identify stakeholders, explore their interests, assess assets and resources, and formulate issue-specific working groups to reach consensus on issues and priorities, and directions for future actions as well. The stakeholders include experts, NGOs, youth, media, business community, labor, women and national universities, in updating and implementing the NEAP. Working Groups' meetings followed these workshops. Six issue-specific Working Groups were formed to develop a strategic framework: (1) Water, (2) Air, (3) Land, (4) Waste, (5) Global Environmental Issues, and (6) Supportive Measures. Thus, The NEAP updating process passed through three stages: 1) problem identification, 2) plan formulation, and 3) finance acquisition and mobilization.

iii. The State of the Environment

1. *Water Resources*: scarcity of fresh water resources and protecting them from pollution and wasteful uses is an environmental issue that concerns all Egyptians, and threatens the sustainability of the development of Egypt. As the population grows, and the economy expands holding the amount of water constant, the problem of fresh water availability intensifies. Protecting this limited amount of fresh water is crucial to sustain the development of the nation. Lack of proper sanitation schemes in some of

the human settlements, particularly rural areas is another issue that needs intervention.

2. *Air pollution: it is another problem that affects major urban settlements, such as Cairo.* The low quality of air results from several sources, including inferior industrial production techniques that are not energy efficient and are not environmentally sound; informal activities within human settlements, such as smelters and solid waste dump sites; mobile sources on congested roads; and other natural environmental hazards, such as dust and seasonal sand storms. The problem of air pollution has also extended to some rural areas. The negative effect of substandard air quality affects the health and causes losses to materials and monuments.
3. *Land: (a) Agriculture*: limited cultivated land available to meet the needs of a growing population is another issue that threatens sustaining the development of Egypt; (b) Human settlements: regional disparities and urban primacy along with the spread of informal areas inside and on the fringes of cities are among the environmental concerns facing Egypt at present. Desertification is another environmental issue that challenges the sustainability of the development of Egypt. It results from a combination of the inherent fragility of the ecosystem and excessive use that is beyond the productive capacity of the ecosystem. Egypt faces various forms of desertification such as degrading of irrigated farmland and degrading rain-fed farmland. These threats point to the urgency of combating desertification that increases over time.
4. *Marine environment:* Egypt is very rich with the marine habitats. Pollution and erosion of coastal ecosystems are among the problems facing the environment. Sources of pollution include land-based sources such as harbors, tourism development,…etc.
5. *Waste:* Solid waste include municipal solid waste (MSW), agricultural waste and residues from dredging of waterways, industrial waste, construction and demolition waste and hazardous wastes, including hospital wastes. The accumulated piles of wastes and inefficiency of waste collection and transportation, treatment and disposal is an issue included in the NEAP.
6. *Biological Diversity:* Egypt has a rich natural heritage, having many rare species and unique habitats as well as coastal and marine resources. Biodiversity is of great value to the national economy. Currently, Egypt is experiencing loss of its biological diversity. The root causes for biodiversity degradation include high population growth, a tendency to regard biodiversity problems as less important than other social, economic and environmental problems, lack of public awareness regarding the importance of conserving biodiversity and lack of qualified human resources in this field.
7. *Biosafety and Biotechnology:* they are among emerging environmental issues in the world. They associate with specific risks. Many such risks could be eliminated, or be made acceptable in terms of cost benefit analysis, with proper regulation of the use of biotechnology products and release into the environment.

iv. Recommended Programmes/Activities of the NEAP

NEAP includes programmes and projects that address the aforementioned environmental issues. Each program consists of three major components: information and monitoring; preventive and/or corrective measures; and supportive measures. Most of the information and monitoring activities are that of the Egyptian Environmental Affairs Agency. Some supportive measures, such as awareness and capacity building is also the responsibility of the Egyptian Environmental Affairs Agency Most of the corrective and preventive measures are that of central and local agencies to include in their plans the issue of protecting the environment. For example, combating desertification is central to

the activities of Ministry of Agriculture and Land Reclamation (MALR); while protecting the Nile, canals, drains are that of Ministry of Water Resources and Irrigation (MWRI). The Egyptian Environmental Affairs Agency plays its role as a coordinating body that implements demonstrative pilot projects as prescribed by Law 4/1994.

1. *Water Resources:* The Government of Egypt, through the Ministry of Water Resources and Irrigation (MWRI), is updating a water master plan and initiating a special program for managing water demand. MWRI has embarked on implementing another program for managing water quality. Protecting the coastal waters and shores are also included in the NEAP capitalizing on previous efforts in that area. The working group on the water issue emphasized the need to reform the production and delivery of drinking water as well as executing planned activities to manage wastewater through specialized central authorities and local administrations. However, the working group argued for measures to manage the demand through charging the consumers for recovering the costs of delivering drinking water and encouraging the conservation activities.

2. *Air:* EEAA has begun the development of National Strategy for Air Quality Management to include executable plans, such as relocating small and micro-industrial enterprises outside human settlements, programs for cleaner production techniques and energy conservation.

3. *Land:* (a) Agriculture: sound environmental agricultural development and management of rural settlements is a program that coincides with the plans and efforts of both the Ministry of Agriculture and Land Reclamation (MALR), Ministry of Housing, Utilities and Urban Communities (MHUUC), and the Integrated Rural Development Program (*Sherouq*) that the Ministry of Local Development (MLD) executes. Through these central agencies GOE is implementing plans for sustainable land uses that encourage planning on a scale large enough to maintain the health of regional ecosystems. The implemented plans would also minimize food loses, employ biological control, host-plant resistance as means to reduce costs and conserve the environment. The achievements of *Sherouq* in reconstructing and developing the Egyptian villages are the outcome of participatory decision-making and building partnerships with local stakeholders to own the process and output; (b) Human settlements: the Government is encouraging the development of new cities, such as New Assuit, and secondary cities with desert frontiers, such as Belbais and Sharqia. Allocating investments to develop new industrial estates and direct the development of these medium-size cities will create employment and housing, thus attracting new comers away from major metropolitan areas. Concerning the desertification, three National Action Programs (NAPs) are included in the NEAP. The first is for the North Coastal Belts, the second is for Nile Valley and the reclaimed desert areas that share infrastructures with the land of old valley; and finally yet importantly, is for the oases and Southern remote desert areas. Each proposed NAP fits and suits the ecological conditions and addresses factors that trigger the desertification processes and their social and economic outcomes.

4. *Marine Environment*: the Ministry of Tourism is among the major institutions concerned with protecting the marine environment when planning and developing the country's tourism industry. NEAP includes a program for managing national marine coastal zones. The main objectives of this program include establishing a dynamic process for national comprehensive coastal zoning (land and sea), and achieving sustainable use of marine and coastal resources through a combination of scientific research, appropriate quotas and regulations, active monitoring and enforcement, and pilot projects allowing use of certain resources by local citizens. The responsibility of conserving Egypt's marine life lies mainly with the EEAA, which is responsible for setting the general environmental policy and formulating legislation standards and

guidelines to protect the environment as well as having the authority to initiate national coastal zone management activities.

5. *Waste*: the MSEA and the EEAA have formulated a policy for the proper management of waste in Egypt and this policy is currently under implementation. The National Municipal Solid Waste Program, which the Governor's council that the Prime Minster heads approved in December 2000, presents an integrated management system to be implemented at the national level. User charges for solid waste collection and disposal are among the supportive measures adopted by the EEAA.
6. *Biological Diversity:* EEAA has adopted and implemented various measures and programs to meet the challenges of biodiversity in Egypt. EEAA is currently developing programs and measures to support Egypt's declared natural protectorates, which cover about 8.5 percent of the area of the country. In collaboration with various international donors, GOE is implementing projects to conserve biodiversity, including conserving the wetland and the environmental systems along the Mediterranean shores and a program for conserving Gulf of Aqaba protectorates.
7. *Biosafety:* in this issue, safety is achieved through the provision of transparent information on the product and the process, and conducting adequate risk assessment and risk management by the regulatory authorities in the receiving environment. The NEAP includes a program for regulating the handling and unintentional release of biological material. It also includes a program for regulating intentional release of Genetically Modified Organisms (GMOs) in the environment.

NEAP acknowledges the environmental effects on some social classes more directly than others, either because of their nature, ages, social and cultural aspects, or their direct relation with environmental problems. NEAP includes programs catered for six of these categories: children, youth, women, the elderly, physically disabled and marginalized people that both NGOs and governmental agencies can implement.

The NEAP document also includes economic issues that represent opportunities and threats for the sustainable development of Egypt. Globalization, for example, provides Egypt with development opportunities brought by advances in communication and flow of Foreign Direct Investments (FDI). It also represents a threat to the sustainable development of Egypt where the dictated neoliberal economic policies could possibly deplete the state's ability to control the economy. Furthermore, globalization attempts to link environment to trade, thus putting burden on economic sectors to meet higher standards and putting impediments to Egyptian exports. The NEAP document includes discussion for using environmental and ecological accounting as steps towards a full scale of natural resources accounting. In this respect, NEAP proposes several economic instruments, such as incentives, to encourage inducing behavioral changes. The document also provides a thorough discussion of means to finance the proposed activities.

A plan will not be complete without discussing necessary institutional transformations. The document includes suggestions for institutional development, environmental statistics and information, and environmental education, training and awareness. The NEAP document, then, discusses the international environmental issues and cooperation. The document discusses systemic problems, such as climate change, and its impact on Egypt. It outlines the planned and on-going activities addressing these issues. Then, discusses international, regional and bilateral cooperation. The document ends with implementation arrangements and guide for execution monitoring and verification. This section includes tentative work-plan, recommendations on updating the NEAP, and addressing unforeseen events.

v. The Role of EEAA

According to the environmental Law 4/1994, the mandate of the Egyptian Environmental Affairs Agency (EEAA) is to protect and promote the environment. It is established within the cabinet premier ship. The agency has a public juridical personality and is affiliated to the component Minster for Environmental Affairs with independent budget. It has several branches in the Governorates of Egypt. EEAA formulates the general policy and lays down the necessary plans for protecting and promoting the environment. It follows up the implementation of such plans in coordination with the competent administrative authorities. It also has the authority to implement some pilot projects. The agency is responsible for strengthening environmental relations between Egypt and other countries and regional and international organizations. It recommends taking the necessary legal procedures to adhere to regional and international; conventions related to the environment and prepare the necessary draft laws and decrees required for the implementation of such conventions.

Introduction

The purpose of the National Environmental Action Plan

This NEAP document is the official document representing Egypt's agenda for environmental actions for the coming fifteen years. It was developed in consultation with central and local public bodies, and non-government agencies. It is designed to be one of the three entry points to a strategic coordinating framework for future environmental activities in support of sustainable development. As stated earlier, the plan is an Agenda for Action over the next 15 years. The priorities to be addressed in each 5-year plan will naturally depend on the overall policy set by the government for each of these plans and the NEAP is the main environmental source document for line ministries as they develop their sectorial action plans for the next 5-years.

This document also serves as the foundation for campaigns for raising awareness of local communities. It is also useful as the basis for the development of local environmental initiatives, actions and activities. This NEAP document also shows where Egypt strongly feels the need for international cooperation on sustainable development. It is expected that this document will help in the preparation of the national report on sustainable development to be presented to the upcoming World Summit (Rio+10), Johannesburg, South Africa, June 2002.

The NEAP aims to create an enabling environment conducive to sustain the development of Egypt by introducing a gender anchored, holistic, participatory environmental planning process. This process will create a partnership between stakeholders and development partners, and will enable interested parties to assume ownership and responsibility for plan formulation and implementation. The crux of this planning process is creation of synergy for resource mobilization, which is crucial for achieving the objectives of the plan.

In 1992 Egypt prepared her First National Environmental Action Plan (NEAP) in preparation for the Rio Earth Summit. This updated NEAP reflects the changes that have taken place, both within Egypt and globally, in the intervening years and takes into consideration what was agreed at Rio and beyond, namely that environment is one of the three components of sustainable development (economic growth, social development, environmental protection) and has to be considered within that context.

Among the opportunities and threats to the development of Egypt are changes in her external environment: liberalization of trade, formation of economic blocs, and rapid advances in communication and information technologies. Whether such changes are become threats or opportunities for development depends very much on how the country positions herself on the global arena.

Challenges and barriers are not limited to the external environment, but also emerge from internal pressures. Egypt has successfully implemented a program for economic reform and structural adjustment. Among the outcomes of economic reform are reasonably stable exchange rates, reforms in the financial sector and establishing an active stock market. Direct foreign investments and local investments have increased in several economic sectors, particularly agriculture, manufacturing and tourism. However, the expansion of some economic sectors has put pressure on limited resources and presents problems in managing wastes.

Another dimension transforming the internal environment of the country is the high population growth rate. National education and awareness raising programmes have lead to a one percent decrease in growth rate. However, it is a young population: almost 38 percent are under 15 years of age (1996 Census). Such a demographic structure can be a development opportunity provided new entrants to the workforce are properly

employed. Resources to meet the needs of the growing population are extremely limited and strained. Rapid population growth stretches natural resources beyond reasonable limits, thus threatening the processes of sustainable development.

Major environmental issues and concerns that challenge Egypt today covers the degradation of land, air and water resources and the pressing need to preserve our cultural heritage and natural biodiversity. Land is subject to desertification, loss of soil productivity through salinity and loss of agricultural land to the sprawl of human settlements and other human activities. Air pollution in major cities has reached levels that affect health and could cause economic losses as well as damaging historical sites. Water issues are numerous, as Egypt has limited natural fresh water resources, mainly coming from the Nile. Below the Aswan High Dam water becomes polluted from chemicalized agricultural run-off, raw or only partially treated sewage from river transport and drainage canals, and industrial effluents. Another type of environmental pollution that threatens the natural heritage of Egypt is oil pollution, threatening coral reefs, beaches, and marine habitats, thus affecting the livelihoods of many Egyptians. Solid waste disposal from human settlements is another problem that threatens the environment and requires immediate intervention.

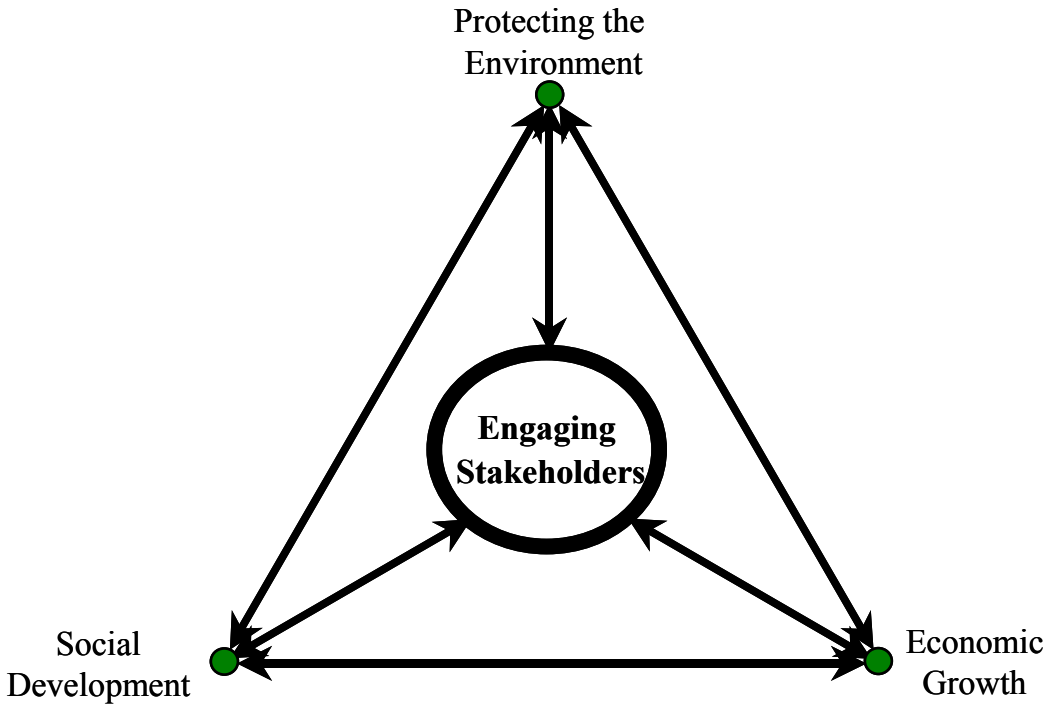
The lack of strict enforcement of environmental standards could negatively affect the competitiveness of the Egyptian products. Today global markets demand environmentally friendly products, to the extent that the World Trade Organization (WTO) has attempted to include environment as an issue governing trade treaties.

Changing development paradigms

In the past, development paradigms generally dealt with the tensions and contradictions between efficiency and equity, i.e. achieving economic growth without offsetting social equity. Today, in response to one of the *de facto* imperatives of globalization, i.e. environmental crisis, sustainable development has evolved as a key concept for current and future development initiatives. The advocates of sustainable development work on integrating the environmental dimension in the processes of development, aiming to achieving economic growth that promotes social equity without negatively affecting environmental resources. At the crux of sustainable development is engaging stakeholders. See Figure (1). Engagement means, first, citizen participation, then building partnerships among various stakeholders, and finally enabling them to propose and evaluate options, implement accepted actions, monitor and follow-up on plans, programs and projects that shape their future. Engaging the various interested parties in the decision-making and implementation processes is among the requisites for sustainable development. Engaging citizens in the decision-making process requires efficient flows of information that are now possible through advances in information technologies. NEAP may be considered as one of Egypt's roadmaps to sustainable development.

Sustainable development requires that social and environmental factors are considered in addition to narrow economic and financial concerns; that they have to be integrated to program and project feasibility analysis. Other considerations can include those of social equity and poverty alleviation in so much as economic development of the whole of society encourages political stability. Social equity also includes the welfare of future generations in so much as today's development should not preclude that of future generations. The Capacity 21 Unit at the Egyptian Environmental Affairs Agency updated the NEAP using participatory planning techniques to protect the environment and complete the triangular framework of sustainable development, which Figure (1) presents.

Figure 1: Engaging stakeholder is at the center of sustainable development



Outline

This document consists of eight parts. Following this introduction, the document presents how NEAP was updated employing participatory planning techniques. The next section of the document (Part One) presents the major environmental issues that are barriers to sustainable development in Egypt. Part Two presents the driving forces that create pressures on the environment. It attempts to show how each economic activity affects, and is affected by, the environment. The section portrays causes and consequences of environmental degradation by tracing the demands and needs of natural resources of each economic activity. Part Three presents proposed responses to each environmental issue. Supporting measures needed for these interventions are presented in the following parts: (Part Four), economic and social measures, (Part Five) institutional requirements, (Part Six) international cooperation and (Part Seven) financial measures. Part Eight outlines mechanisms for monitoring and verifying implementation of the National Environmental Action Plan.

Process of NEAP Update

The Capacity 21 Unit at the Egyptian Environmental Affairs Agency (EEAA) has applied a new, progressive, *modus opperandi* in updating the 1992 NEAP. At the center of the NEAP updating process is engaging stakeholders. The process of updating the NEAP showed real participation and commitment from various parties including governmental organizations, NGOs, national universities, special sub-population groups: women, youth and the leaders of private sector. The formulation of issue-specific Working Groups was essential to the process of composing the present NEAP. The working-group methodology also facilitated prioritizing environmental problems, producing realistic remedies, and suggestions for dealing with these problems. EEAA has formulated this NEAP, yet the responsibility for its implementation falls on all partners in and outside the Government.

Stages of NEAP Update

The three stages of the NEAP updating process are: 1) problem identification, 2) plan formulation, and 3) finance acquisition and mobilization[1]. Figure (2) presents the process of updating the NEAP.

First Stage: Problem Identification and Prioritization

The first stage aimed at assessing environmental issues, identifying key actors (interested groups and development partners) then involving them to gain their commitment towards the NEAP, and finally setting priorities. The output of this phase was *the Environmental Profile of Egypt*, a report that brought together readily available information on the state of the environment, problems and opportunities. The document identified the interactions between resources and development needs. It also examined the institutional framework for environmental management and actions in Egypt that were bottlenecks causing the emergence of environmental problems. This information was used as a major resource for facilitating the participatory and decision-making process.

A key event in the first stage was the First National Consultation, held on 25th of November 1999 at the Cairo International Conference Center.

The objectives of this national consultation were to:

1. Raise awareness and reach common understanding of the key environmental issues;
2. Confirm the identity of interested parties;
3. Build consensus on the prioritized list of issues;
4. Gather commitments for the planning process; and
5. Establish Working Groups, i.e. participatory structures responsible for plan preparation.

More than 300 participants representing various groups of stakeholders attended that event. The First Consultation introduced stakeholders to the Profile and the NEAP process and gained their commitments towards its update. Working Groups reflecting a wide range of society, i.e. those who would be affected by the NEAP, those who control implementation instruments and those who possess information and expertise for its update, were recruited in issue-specific Working Groups. Based on the information within the Profile and the findings of the first consultation, the Working Groups were asked to identify causes for environmental problems, set priorities and agree on actions. The following criteria were agreed as bases for prioritization:

[1] This is an open-ended stage as will be presented later in this s section.

- What are the impacts of the problem on health?
- How much loss in labor productivity was a direct result of the problem?
- How did the problem influence the poor?
- Did the problem lead to irreversible outcome?
- To what extent can local actions significantly affect the problem?

Involving stakeholders

Aiming to integrate the views and interests of other stakeholders in the process of NEAP development and implementation, EEAA's Capacity 21 Unit organized several workshops to explore the roles of various stakeholders. The outputs of these stakeholder meetings became input for the Working Groups. Workshops were organized with 8 categories of stakeholders (see below). In some cases one workshop was held whilst from some others there were 2 or 3 meetings per stakeholder category. The workshop sessions used a card-storming technique where various colored cards were used to represent the problem, the solution and the role that the institution can play in protecting the environment. This technique captured the participants' opinions on how to best update the NEAP to meet the challenges of environmental problems and, most importantly, ensure their commitments.

Figure 2: An avant-guard, pluralistic planning modality for updating the NEAP

Process of updating the neap figure (fishbone)

NGOs

Capacity 21 Unit conducted a workshop with NGOs who represent a major player in the field of development and environmental management. The discussion with them included their ongoing and future projects in the field of environment such as: inducing positive environmental behaviors, cleaning the environment, activating citizen participation, and managing solid wastes projects. NGOs agreed upon the importance of continuation of all current projects in the field of environment mainly recycling, reuse of solid wastes, and extension of all the activities of the ongoing projects to all Governorates of Egypt.

Experts

Experts on environment were consulted as a group concerning updating the NEAP. During the meeting Dr. El-Kholei presented the findings of the NEAP project and distributed among the participants the Environmental Profile that NEAP experts prepared as well as the Environmental Atlas, which the GIS unit at C21 Unit produced. The experts made valuable comments, particularly on the mechanism of NEAP implementation and the main environmental sectors discussed in the Profile. The event was a success whereby the participants accepted the Profile as a promising start for the plan formulation and a good baseline study for the current conditions, both at the development front and area of the environment.

Picture 1: Dr. Mohammed Abdel Fattah El-Kassas, Professor, Faculty of Science, Cairo University explaining the mechanism of the NEAP process during the experts workshop, May 2000.

National Universities

Capacity 21 Unit conducted three meetings with 13 Vice-Presidents of national Egyptian universities. The output of the first two meetings was a formula for means of cooperation between EEAA and Egyptian universities in the field of the environment. They will serve as think-tanks to support EEAA and as communication channels to the local community through their out-reach programs[1]. In addition, they will play the role of consulting firms in preparing Environmental Impact Assessment (EIAs) for new projects, and inspecting and monitoring existing establishments.

Picture 2: Clean streets and green trees in Kafr Wahb and Kafr Abdo: A bright image of Egyptian villages.

[1] These include vocation training, awareness, community support and so forth.

The participants agreed on a mechanism for conducting quarterly meetings to ensure coordination and continuous cooperation. Participating universities forwarded to Capacity 21 Unit environmental initiatives and projects they would like to have included in the NEAP. The third meeting discussed the environmental initiatives that Menofia University proposed. The meeting included a field visit to two villages, Kafr Wahb and Kafr Abdo of Governorate of Menofia, which have acted on a number of environmental principles and their residents have demonstrated a real willingness to keep the local environment clean. These two villages are examples of Egyptian Environmentally Friendly Villages Program proposed later in the document.

Business community

To explore the role of the private sector in environmental management, the Capacity 21 Unit Coordinator, through the American Chamber of Commerce, met with private sector representatives to explore the ideas and means of future cooperation among the private sector on environmental issues. It was agreed that representatives of Federation of Egyptian Industries (FEI) serve as members of the working groups. The working groups explored means for strengthening the role of the private sector, especially Small- and Micro-Enterprises (SMEs), in environmental protection. This would be mainly achieved through facilitating their access to technical and financial support.

Labor

Through the Capacity 21 Unit, a workshop was held at the National Center for the Studies of Industrial Safety. Staff of the Center and representatives of public and private industrial firms attended the meeting. Most of the attendees agreed upon the importance of unifying the inspection body responsible for industrial institutions and enhancing coordination between various inspecting and monitoring agencies. The participants documented their visions on the environmental problems facing Egypt and proper actions and suggestions to overcome these problems on separate cards to be integrated in the NEAP document.

Youth

A meeting was held with representatives of the Ministry of Youth and Sport, and representatives of NGOs of youth, including Boys Scouts Organizations, as another important sector in the society that has a role in shaping the environmental plan. The CEO of Agency for Youth and Sports and his deputy attended the meeting. The attendees expressed their views regarding various environmental issues as well as suitable solutions for these environmental concerns. Participants shared the same vision with the representatives of the national universities regarding the importance of adopting one environmental issue every year and gathering the efforts and funds to solve this specific issue. They expressed their willingness to participate in any environmental project given its financial feasibility.

The participants documented their visions on the environmental problems facing Egypt

Picture 3: One of the facilitators using the score-card technique in organising the ideas and participation in the youth workshop, June 2001.

and proper actions and suggestions to overcome these problems on separate colored cards to be integrated in the NEAP document.

Media

Capacity 21 Unit organized a workshop with media personnel. The media can have a significant role in inducing behavioral change regarding environmental issues and practices. The meeting crystallized the general outline of the environmental awareness campaign required for complementing the NEAP activities. The campaign would include positive environmental practices, and techniques of behavioral changes required for enhancing the image and concepts of clean environment among the public.

Picture 4: Ms. Randa Fouad, Media Advisor, in discussion with media personnel to formaulate the awareness campaign in support of the NEAP.

Gender

Capacity 21 Unit also organized a workshop to explore the role of men and women in updating and implementing the NEAP. The meeting included 58 renowned experts in the field of gender and community development. It emphasized the role of women in protecting the natural resources. The meeting clarified the relation between women and environmental issues and their role in collaboration with men in dealing with these concerns and avoiding their negative effects. Participants made valuable interventions on the process of NEAP updating and means of conserving natural resources through adopting new consumption patterns. The various groups described above came together during the Second Consultation, 10th October 2000.

Picture 5: Dr. Samia Galal and Dr. Ahmed O. El-Kholei addressing women on ways to deal properly with Egypt's environmental problems and avoid their negative impacts, gender workshop, January 2001.

Second Stage: Plan Formulation

During the second stage of the NEAP update, the issue-specific Working Groups developed a strategic framework. They negotiated issue-specific strategies, means for coordinating overall environmental management strategies, and reaching consensus on environmental action plans.

The Working Groups engaged in three various levels of discussion: 1) strategic/sectoral, such as agriculture and water resources, industry, human settlements, etc; 2) the issue-specific level, concerned with specific problems and tasks, such as solid waste management, water treatment etc. and 3) the third level was project design, i.e. formulating and developing specific projects. Overlap between the three levels was an opportunity to assure consensus on issues and actions at the strategic/sectoral and action levels. Working Groups consisted of representatives of line ministries (nominated

by respective Minister), selected individuals from interested parties, such as women, youth…etc. and representatives of EEAA divisions. The Working Groups updated information and data pertaining to different environmental aspects to be included in the NEAP. They were also to support execution of line ministries' plans and EEAA's role as a coordinating body.

A coordinator who acted as a technical secretariat facilitated working group meetings. S/He organized, conducted, and reported on the groups' accomplishments. Capacity 21 Unit set terms of references for groups with a pre-determined meeting schedule. The experts of NEAP led the discussions and prepared the working papers for the participants and representatives of various ministries and institutions. In the meetings, the participants gave valuable comments on the work, activities, responsible parties, time frame, and success criteria included in the draft. Moreover, many of the representatives of ministries exchanged information about the interventions, which their institutions had planned in each sector.

In October 2000, NEAP conducted a second consultation to discuss and provide feedback on the programs that the working groups had formulated. The event that included more than 62 participants was a chance to consider comments, questions and opinions of all participants, who had been selected to represent various stakeholders in addition to the NEAP experts. The main recommendation that came out of the meeting was to revisit some other important environmental issues, such as marine environment and energy policies.

Based on the Consultation, Capacity 21 Unit formed six task forces of EEAA staff members, including staff from donor funded projects: 1) Water, 2) Air, 3) Land, 4) Waste, 5) Global Environmental Issues, and 6) Supportive Measures. The Task Forces interfaced with the Working Groups to review the output of the NEAP. Their tasks were to confirm that programs and projects incorporated in the NEAP document are compatible with the priorities of various stakeholders, and most importantly, are within their implementation capacities of EEAA and other stakeholders.

Capacity 21 National Coordinator gathered the NEAP experts at three retreats, one in Alexandria and the other two in Fayed to initiate and continue the process of identifying and suggesting the main features of the NEAP. The CEO of EEAA, Dr. Ibrahim Abdel Gelil, and the two senior advisors, Dr. Mustafa Tolba and Dr. Mohamed Kassas, attended the third retreat. They reviewed the NEAP documents and gave valuable comments to be integrated in the document.

Third Stage: Finance and Resource Mobilization

This phase of the NEAP is open-ended. The final phase began with the October 2000 consultation of the 2nd phase. That consultation was carefully prepared and managed, to bring together the widest possible spectrum of existing and potential participants and partners, including donors. Representatives of investors, governmental bodies, and potential donors will be invited to participate in implementing the NEAP. The objective of this phase is to provide stakeholder identification and analysis, so as to eventually develop full stakeholder ownership and commitment to the NEAP.

The NEAP project has already undertaken a number of capacity building activities in fields, such as Environmental Impact Assessment, Environmental Planning and Management (EPM) and training course for police officers and district attorneys in the Governorates of Port-Said and Assuit. Through these capacity building activities, NEAP has identified the needs of these groups and included these needs and ways of meeting them in the NEAP document.

Supporting NGOs proposals targeting various environmental aspects is another feature of the NEAP. In collaboration with Tree Lovers Association, the project supported a

proposal for improving the environmental situation through planning Maadi *corniche* (boulevard). The proposal aimed at planting 1,200 trees on the two sides of the Boulevard to improve the air quality in this area. Number of beneficiaries would reach 500,000.

NEAP has also supported the Green Schools Project that is developed in collaboration with the Institute of Cultural Affairs in the Middle East and North Africa. The project aims at selecting 28 schools in Upper Egypt and implementing an environmental awareness program at these schools. NEAP is currently negotiating with the Social Fund for Development to arrange possible ways of funding this project.

Capacity 21 Unit has also prepared a proposal for upgrading the Gannabeya area, Tanta, Governorate of Gharbia. The project aimed at building the capacities of the local administrators in the areas of environmental management and upgrading and developing the Gannabeya area. It is proposed that the project will be implemented by: the Governorate of Gharbia, the Ministry of *Awqaf (*Islamic Trust Funds*)*, as well as the General Organization of Physical Planning (GOPP).

NEAP has developed several investment packages for implementation of identified projects. Two profitable investment packages in the field of solid waste management have been finalized and both are being proposed to the private sector. One is predicted to show a rate of return of around 32 percent and the other 28 percent. The latter is a program designed for supermarket chains in upper income residential areas. The concept is to encourage customers to bring their packaging waste (plastics, tins, papers…etc.) to the supermarkets in return for a discount coupon at that store. Supermarket staff would sort the waste and a waste-processing contractor would pay for the sorted waste and remove it from the supermarket site.

Once NEAP is approved three continuous activities have to be undertaken at EEAA. First is to follow-up on investment programs and projects formulated, funded and initiated. Second is to enhance environmental planning and management capacities. And third, integrate “Working Group” concept into day-to-day planning and monitoring functions of the EEAA.

Part One: Environmental Issues

1.1 Fresh Water Resources and Water Pollution

1.1.1 Water Quantity

Egypt's water requirements increase by time as a result of population increase, improvement of living standards as well as the Government's policy to reclaim new land and encourage industrialization. Accordingly, a major challenge facing Egypt is to close the rapidly increasing gap between the limited water resources and the escalating demand for water that various economic sectors created. Egypt is optimizing the use of freshwater and exploring the use of new non- conventional sources of freshwater, such as desalinization.

Available Water Resources in Egypt

i. Conventional Water Resources

The conventional water resources in Egypt are limited to mainly the Nile River, groundwater in the Nile Delta, the deserts and Sinai. Limited rainfall and flash floods are also available. The Nile is the main and almost the exclusive source of fresh water in Egypt. The country relies on the available water stored in Lake Nasser to meet needs within Egypt's annual share of water, which is fixed at 55.5 Billion Cubic Meters (BCM) by agreement with Sudan in 1959.

The renewable groundwater aquifer of the Nile basin covers the large spatial areas of the Nile Valley and Delta. This aquifer is recharged from the excess irrigation water as well as leakages from the Nile and the distribution network as well. The Ministry of Water Resources and Irrigation (MWRI) approach in utilizing this aquifer is based on sustainability rather than mining, i.e., annual withdrawal rates do not exceed those of the recharge, implying the dependence of this resource on the Nile water. Nevertheless, the fact remains that this aquifer stores vast amounts of water that may be mined if deemed necessary.

Groundwater in the Western Desert is in the Nubian sandstone aquifer that extends below the vast area of the Governorate of the New Valley and its sub-region East of Awaynaat. This aquifer stores huge amount of water estimated in hundreds of billion of cubic meter. However, groundwater occurs at great depths and the aquifer is generally non-renewable.

Groundwater in Sinai is mainly formed in three different water-bearing formations: the shallow aquifers in northern Sinai; the valley aquifers; and the deep aquifers. Rainfall on the Mediterranean coastal strip occurs only during the winter season in the form of scattered showers, therefore cannot be considered a dependable source of water. Nevertheless, people living at the northern coast to the west of Alexandria and in Sinai utilize these small amounts of water in some seasonal rain-fed agriculture.

Floods occurring due, in part, to short period of heavy storms and terrain attribute s are source of environmental damage especially in the Red Sea area and the southern Sinai Peninsula. This environmental hazard could be a development opportunity once properly utilized.

ii. Non-Conventional Water Resources

This includes agricultural drainage water, treated wastewater, and desalinization of seawater. Each resource has its limitations on use. These limitations relate to quantity, quality, space, time, and/or cost of use. It is worth mentioning such as water sources cannot be considered independent resources and cannot be added to Egypt 's fresh water resources. In fact, using these sources is a recycling process of the previously used fresh Nile water in a way that improves the overall efficiency of the system for water distribution. These types of sources should be used and managed with care, and their environmental and health impacts must be evaluated carefully.

Desalinization of seawater in Egypt, as a source of water, has been given low priority due, in part, to its high cost (£E 3-7/m3). Nevertheless, sometimes it is feasible to use this method to produce and supply drinking water, particularly in remote areas where the cost of constructing pipelines to deliver Nile water is relatively high.

iii. Water Balance

The Nile Basin inside Egypt is a closed system as far as water is concerned. Water balance for the year 1995/1996 is a representative of a typical year of the dam release of 55.5 BCM/year. More recent years represent exceptional case where Egypt had series of high floods and the water balance will be quite different. The release from the High Aswan Dam is almost the only input to the system executing the amount of rainfall on the northern coast and the amount of deep groundwater from outside the basin, which are insignificant inputs. The overall efficiency of the system is relatively high because of the recycling of water along the system. From the total amount of water used through the system about 12.97 BCM come from reused agricultural drainage, 4.8 BCM from groundwater abstraction out of the renewable aquifer in the Valley and Delta, and 0.7 BCM from reuse of treated domestic sewage.

iv. Drainage Water to the Sea and Lakes

The drained water lost to the sea was about 12.41 BCM in year 1995/1996. This water constitutes the collection of agricultural drainage water, seepage from canal networks, and a part of the municipal and industrial wastewater. This amount also includes about 2.0 BCM of the seawater that seeps to the drainage system through seawater intrusion at northern Delta. A considerable portion of that water is to maintain the salt balance and should be disposed to the sea.

1.1.2 Water Quality

Water quality problems in Egypt vary among various water bodies depending on: flow, pattern of use, population density, extent of industrialization, availability of sanitation systems and the social and economic conditions. Discharge of untreated, or partially treated, industrial and domestic wastewater, leaching of pesticides and residues of fertilizer and navigation are often factors that affect the quality of water.

i. National Water Quality Monitoring Network

Programs of water quality monitoring started early on both the Nile and agriculture drains. However, all these programs were not fully coordinated together to describe the overall water quality status of Egypt. Additionally, irrigation canals and groundwater were not included. To remedy the situation, a jointly funded project National Water Quality and Availability Management Project (NAWQAM) with Canadian International Development Agency (CIDA) is being conducted by the National Water Research Center (NWRC) of MWRI for seven years period starting from 1998. The objective of the National Water

Quality Monitoring component of this project is to rationalize water quality monitoring activities into a sustainable national monitoring program.

ii. Nile River from Aswan to Cairo

Water Quality Index[1] was calculated and used to describe the overall water quality status along River Nile. Computing the Water Quality Index is an outcome of the results of two monitoring campaigns that Nile Research Institute (NRI) conducted during winter (February 2000) and summer (September 2000). The index calculation includes nine parameters (DO, pH, TS, BOD, NO3, T-P, Turbidity, Feacal coliform and temperature deviation). It has been proven that about 71 percent of the sampling sites along the River Nile during winter season show good quality of water, while the remaining sites indicate a medium quality of water. On the other hand the WQI calculation during summer shows that only 43 percent of the sampling sites have good water quality while the rest of the sites have medium water quality.

Ministry of Health and Population (MOHP) published results of monitoring the Nile and its branches in 1999. According to this report, the organic pollution load, such as ammonia, nitrate and phosphate, in the Nile is within permissible limits. The report shows that the E-coli bacteria are also below limits.

iii. The Dammitta and Rosetta Branches

The Dammitta Branch receives nutrients and organic loads, as a result of discharges from the Talkha fertilizer industry and agricultural drains especially near the Faraskour dam. The drainage at Meet Al-Kholei village also receives sewage water that population residing in this area disposes. This sewage water finally discharges in the Dammitta branch.

Rosetta branch starting from downstream Delta barrage up to Kafr El-Zayat receives high concentrations of organic contaminants and nutrients. This is a result of the discharge of partially treated wastewater from Giza through Muheet and Rahawy drains. The industrial area at Kafr El-Zayat city discharges some toxic chemicals. It is also worth mentioning that both branches receive huge amounts of raw or partly treated sewage disposed from sanitary drainage plants located in some cities and villages near the River Nile.

The WQI for Dammitta and Rosetta branches during winter and summer seasons of the year 2000 shows that during winter, water enters the Dammitta branch from the Nile with good quality and then it deteriorates downstream the branch till it become in the medium condition. The extremely low flow condition, which occurs during low demand wintertime, in addition to discharging wastes from different pollution source along the branch can explain changes in WQI along the branch.

The same trend of water quality index occurs in Rosetta branch where the water deteriorates in the downstream and reaches the worst condition at the site located 120 km downstream the branch. The branch at that receives pollutants from five drains (El Rahawy, Sabel, El-Tahreer, Zaweit El-Bahr and Tala) as well as from industrial effluents.

iv. Irrigation Canals Water Quality

The water quality in the irrigation canals depends to a large extent on the quality of Nile water at the withdrawal point, due, in part, to wastewater discharges from both domestic

[1] Water Quality Index combines the data from several parameters into one common numeric indicator of water quality. It classifies the quality of water into five numeric ranges: 0-25(very bad), 26-50 (bad), 51-70 (medium), 71-90 (good) and 91-100 (excellent.

and industrial activities, in addition to uncontrolled mix of wastewater from polluted drains, the quality in the canals gradually deteriorates in the downstream direction. The generated data from the NAWQAM Project - baseline phase show that the first order canals are of relatively good quality. Some sites down stream, which are the location reuse activities negatively affect water quality.

v. Agriculture Drains Water Quality

These drainage water-monitoring programs clearly reveal that the drainage water quantity associate with quality, and vary with time during the year. The annual variations are primarily dependant on water use policies and the management of the main supply system, particularly the releases of the High Aswan Dam.

The salt concentration in the drainage water depends on the quantity and salinity of irrigation water supplied to irrigated fields, local soil salinity, shallow groundwater salinity, distance from saline northern lakes or sea, climatic conditions, and water management practices. For more details, refer to Volume One: Environmental Profile.

With respect to the drainage water quality within each drainage catchments area in the Nile Delta the drainage water salinity in the southern part (first belt) of the Nile Delta is low and ranges between 700-900 ppm. In the Middle part of Delta (second belt), most of soils are clay soils with moderate salt content. In this part of Delta, most of drainage water generated from the first belt is reused by mixing with fresh water bodies, the drainage water generated within the belt has salinity level ranges from 1000-2000 ppm. For the northern part of the Nile Delta (third belt), which is parallel to the sea coast, the salinity of drainage water is relatively high and could be above 3,000 ppm in some locations. Evaporative enrichment due to the repeated use of the water in agriculture is not the only factor causing high salt content but seawater intrusion and brackish shallow groundwater are also responsible. These high values of salt content for the drainage water along the northern coasts form a limitation to the reuse of the water in irrigation. For more details, refer to the Environmental Profile, NEAP, 2000.

vi. Groundwater Quality

The Research Institute for Groundwater, as a representative of the MWRI, in cooperation with the Government of the Netherland has established a Groundwater Quality Monitoring Network. General trends and overall picture of the groundwater quality were withdrawn from the results of analyzing samples from the 230 wells constituting the network. High concentrations of Total Dissolved Solids (TDS), sulphate, and nitrate have been observed in the reclaimed areas towards the fringes of the Nile Basin. The high salinity front from those areas show a clear trend of moving towards the central parts of the old land. The central parts of the Nile Delta and Valley as well as the deserts show better quality. Few numbers of samples exceeded the WHO drinking water limits. The main attribute of these areas is high formation-inherited iron and manganese concentrations resulting as a result of the highly reduced environment of the confined aquifer of the Nile Basin. The Western Desert shows the least exceeding of the quality standards. High salinity was the main quality problem for the groundwater of the Eastern Desert and Sinai.

vii. Lake Nasser water quality

The monitoring program of the River Nile within the NAWQAM project includes monitoring of Lake Nasser through collecting water samples from four sites located inside the Egyptian part of the Lake during winter and summer seasons. Additionally, the Nile Research Institute in co-operation with the authority for High Dam of Aswan conduct two campaigns yearly for monitoring the Lake in both Sudanese and Egyptian segments of the Lake. All the analyzed data were found within the standard value of Law 48/1982 indicating that Lake Nasser has a good quality of water.

1.1.3 Water Uses

i. Water for Agriculture

The agricultural sector is the largest user and consumer of water in Egypt. Its share exceeding 85 percent of the total gross demand for water. On a consumptive use basis, the share of agricultural demands is even higher than 95 percent. For more details, refer to Volume One: Environmental Profile.

During the period (1980-1996/97) the cultivated land increased from 5.8 million acre to 7.8 million acre the amount of water consumed per acre increased from 5,70 to 5,30 m^3. This increase is due to increased crop intensity, about 180 percent in 1996 and/or increase in the cultivation of high water consuming crops, such as rice and sugarcane. Including the new horizontal expansion areas, the total cultivated area is about 8.5 million acres in the year 1999[1].

The future increase in overall irrigation supply will depend on changes in the priority demands for the municipal and industrial sectors. It will also depend on the development of new groundwater resources, and measures to reduce the outflow (terminal drainage) from the Nile system. Any water becoming additionally available will primarily be used to irrigate new development areas and not to increase the supply to existing land.

ii. Potable water supply

Despite the rapid population growth in Egypt, the percentage of the population with access to municipal water supply has increased over the past two decades due to large investments in the water sector. Based on the Statistical Year Book 1993-1999[2], an estimated 90 percent of households in urban areas and almost 72 percent of households in rural areas have access to piped water. In populous cities, such as Cairo, Alexandria, Port Said and Suez, 91.8 percent of households have access to piped water, whereas this is the case for 85.8 percent of urban households in Upper Egypt. Rural areas, and especially those of Upper Egypt, are the most inadequately served. Only 59.2 percent of households in rural Upper Egypt have access to piped water. The parts of the population that have no access to piped water obtain their water from public standpipes (often connected to groundwater wells), street vendors or directly from canals and the river Nile.

iii. Fresh water to the Sea

This is the amount of water that is released during the winter closure period to maintain sufficient water depths for navigation in the main Nile. Most of this fresh water spills directly to the sea through Edfina barrage on the Rosetta branch. During the year 1995/1996, the fresh water discharged to sea is estimated to be

iv. Industrial Water Consumption

Losing a small amount of industrial water requirements is responsible for evaporation during industrial processes. This amount of water does not return back to the system and is estimated to be 0.45 BCM 1995/1996.

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[1] Data from MWRI, Widely accepted measure of agricultural land in Egypt is feddans, which is about 4,200,83 square meter, An acre is about 4050 Sq.m.

[2] The Statistical Year Book 1993-1999, Arab Re[public of Egypt, Central Agency for Public Mobilization and Statistics, June 2000.

v. Sanitation

Even though the development in the overall water supply coverage has been rapid and impressive, the service coverage varies widely throughout the country. Coverage rates for sanitation systems are much less than those for water supply, but have improved for urban areas. Based on the Statistical Year Book 1993-1999, 54 percent of urban households are connected to general sanitation network and 46 percent have access to sanitation in the form of some kind of toilet facilities while 9 percent of rural households have access to general sanitation network and 91 percent have access to sanitation in the form of some kind of toilet facilities. Urban Governorates (Cairo, Alexandria, Port Said and Suez) have the highest sanitation coverage 71.8 percent are connected to general sanitation network and 28.2 percent have access to sanitation in the form of some kind of toilet facilities, whereas the sanitation coverage in the rural areas of Upper Egypt is the lowest 1.7 percent are connected to general sanitation network and 98.3 percent have access to sanitation in the form of some kind of toilet facilities. Only a fraction of households with access to sanitation are actually connected to sewer systems. Regional variations in sewerage connections are profound.

These rates have been sustained over the past decades despite large population growth, particularly in Cairo. Although rural population densities are often high, there is almost no sewerage coverage in rural areas, which have an estimated coverage of less than 5 percent with sewers network. In areas without sewerage network, wastewater is often collected in septic tanks or other forms of on-site disposal systems. These installations are frequently leaking and overflowing due to poor construction and lack of maintenance. They are a major source of water pollution and unhygienic living conditions.

1.2 Air Pollution

Most sources of air pollution in Egypt are anthropic origin. These are divided into two main types: stationary and mobile sources. Stationary sources of air pollution include industrial facilities, thermal power stations and some commercial and residential activities. Mobile sources include passenger cars, buses, trucks and motorcycles. Air pollutants also arise from open burning of garbage and agricultural residues. Other pollutants include natural sources, such as sand. The main pollutants produced are sulfur dioxide, nitrogen oxides, carbon monoxide, and particulates, volatile organic compounds (VOCs) and lead.

1.2.1 Ambient Air Quality

The published air quality data through EEAA projects (EIMP[1], CAIP[2]), Ministry of Health and Population (MOHP[3]) and the National Research Center show clearly that poor air quality prevails in some urban and industrial centers of Egypt. Air pollution severely affects areas adjacent to industrial activities as well as around heavy traffic highways, such as the Cairo-Alexandria Agricultural Road[4].

Medium and small industrial activities, such as foundries, secondary smelters, pottery workshops, the brick industry, mechanical workshops, lime crushers, charcoal producers, etc. are scattered within and close to urban areas, especially Greater Cairo, Alexandria, Tanta and several other cities in Egypt. Often these activities are located in informal settlements, using very old technologies with few precautions for air pollution control. They use heavy oil, coal, wood, and rubber and even waste materials as fuel, causing the release of harmful pollutants into the atmosphere.

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[1] Environmental Information and Monitoring Project, Annual Report 2000.

[2] Cairo Air Improvement Project, Annual Reports 2000.

[3] Ministry of Health and Population, Air quality in Egypt, Annual Reports, 1995-2000.

[4] Refer to the Environmental Profile, NEAP, 2000.

1.2.2 Indoor Air Quality

Indoor air quality is important because people spend at least 40-50 percent of their time inside buildings. Moreover, young children and housewives spend more than 80 percent of their time at their homes. Sources of indoor air pollution include outdoor pollution as well as indoor activities, such as cooking and use of insecticides. Research work indicates that in Egypt 40 to 90 percent of outdoor pollutant concentrations are found indoors.

Indoor pollution arises from smoking, burning of agricultural waste, fuel burning, particularly kitchen and bathroom heaters in poorly ventilated houses, excessive use of domestic insecticides, and static sources, such as building materials including paints. For example aldehydes were found in high concentrations in some Cairo houses and public buildings where synthetically painted wood and furniture are used. Poor ventilation also plays a major role in the accumulation of indoor air pollution. Other sources of indoor pollution are the Radon gas found due to the materials like stones used in the buildings. Noise is another type of indoor air pollution; for instance light appliances, radios, loud speakers T.V, children's and adult voices, and neighbors' activities can all contribute to noise pollution at unacceptable levels.

The emissions resulting from industrial production processes that have concentrations exceeding the TLV limits are source of air pollution inside the work environment. The inefficient use of air pollution control equipments increase the pollution rates inside the working environment, and accordingly, affect the health of the people inside the place.

1.3 Land

1.3.1 Agriculture

The limited availability of adequate, productive agricultural land to meet the needs of a growing population is one of the major problems that face Egypt. The gap between agricultural production and food demands of a growing population will increase in the future. Government efforts to close the gap include projects to optimize utilizing available land by cultivating high value products that meet global specifications, thus earning export revenues that can support importing strategic products to Egypt. Attracting the population to migrate outside the congested Delta and Valley is another objective of the policies of the Government. Refer to Volume One: Environmental Profile.

Technologically advanced cultivation practices, together with the availability of better quality seed, and decrease resistant varieties have led to improved crop yields in Egypt over the past two decades. However, modern agriculture techniques require reform in land holdings. The majority of land holdings are fragmented, which hampers mechanization and causes diseconomies of scale in production.

i. Sprawl of Human Settlements over Agricultural Land

A major reason for the loss of agricultural land is the expansion of human settlements over cultivated land. Informal housing at the hinterland of Egyptian cities develop over agricultural land. These settlements follow the distributions of cultivated land following irrigation and drainage infrastructures. Villages stretch along roads. Most of the first 25 Km of the Cairo-Alexandria Agricultural Road has been transformed into an urban corridor with factories and commercial establishments. The new ring road around the Greater Cairo Region is also attracting informal settlements around it. An estimated 3,000 feddans were host to the development of the ring road. Martial Decree No.1/1996 intended to control urban sprawl over agricultural land. Other laws and regulations, such as Law 3/1982 organize the process of planning human settlements. However, growing population is putting pressures on available land, thus increasing the price of land with

access to proper physical and social infrastructures, with a consequent further increase in informal settlements.

ii. Soil Degradation and Contamination

The term 'soil degradation' refers to weakening the current and future capability of soil to produce agricultural products. There are various forms of soil degradation:

- Displacement of soil material by water and wind, which is significant in Egypt.
- Chemical degradation of soil from loss of nutrients or organic matter, salinization, and pollution.
- Physical degradation of soil where the physical process that caused soil degradation is compaction, sealing and crusting, water logging, and subsidence of organic soils.

According to published research, vehicle emissions affect the soil of the agricultural land around traffic roads. A strip of at least 40 m parallel to the Cairo-Alexandria Agricultural Road receives air pollutants, mainly lead, carbon monoxide, nitrogen oxides and sulfur dioxide. These pollutants fall on the plants as well as passing directly into the soil. Pollutants carried by irrigation water are also a major source of soil pollution.

An estimated 50 percent loss of productivity of agricultural land was recorded at Helwan and Shoubrah El-Kheima. Severe damage to plants has been reported in areas close to the industry in Kafr El-Zayat, Edfu, Abu Za'abal and others. Toxic heavy metals accumulate in the tissues of vegetation grown adjacent to sources of air pollution, such as lead smelters, and near traffic roads.

iii. Erosion

The shores of the Delta are being eroded. This can be observed from time-series aeriel photographs produced by NARSS. After the construction of Aswan High Dam, the River Nile is not able to bring sediments to the shores of the Delta. That region is below sea level and is prown to be submerged with rising sea levels due, in part, to global warming.

1.3.2 Human Settlements

The basic problem for human settlements is that population growth rate is faster than rate of developing services for them. Many people find the major cities particularly, Cairo and Alexandria, the most attractive place to work and live. The Egyptian urban system, as other urban systems of many developing countries, is suffering from the primacy problem that negatively affects the distribution of resources and investments, and hence, the national development policy. Urban population is not evenly distributed among the 219 cities, in which they live. According to 1996 census, there are 15,762 million persons living in the Greater Cairo Region (GCR).

The existence of primate cities reflects wide regional disparities and could be the reason for informality. Egypt's two primary cities i.e. Cairo and Alexandria have 43 percent of the total urban population (17 percent of the total population of Egypt) while 77 cities have 4 percent of the urban population[1]. Often regional disparities and urban primacy associate with social ills and economic problems, such as unemployment, poverty, environmental degradation, and denying marginalized sub-populations access to power and wealth. Uneven regional development often equates with under utilization of national resources, ruralization of urban areas, and excessive growth rates of villages without provision of adequate infrastructures and social services.

[1] General Organization for Physical Planning, Development and Construction Map for Egypt 2017, June 1998.

The dramatic spread of informal areas inside and on the fringes of Egyptian cities took off in the early 1970s. The causes may be found in sustained high rates of population growth, high levels of residential densities, shortage in the supply of adequately developed land, an insufficiency in provision of low-cost dwelling units and the influx of rural migrants to urban centers in search of job opportunities.

For the residents of informal areas, to live outside the formal structures is a way to sustain their livelihoods, meet their immediate housing needs, and do so at a price, which they can afford. About 84 percent of dwellings in Cairo are informal to a certain degree, e.g. violating building codes, zoning variances and unregistered or illegal holding of the real estate are among the measures of informality[1].

In 1996, an ECES study estimated the value of informal holdings in Egypt at US $241 billion, where the poor held 70 percent of these assets. A very large percentage of rural settlements are held informally, with densities ranging from 400 – 600 persons per feddans. Currently there are no actions underway to address informal settlements in rural areas.

1.4 Cultural Heritage

Egypt's cultural heritage is a major economic asset as well as providing many of the components of national identity and sense of continuity. The major touristic attractions are the Pyramids, the Sphinx, Thebes and the Nubian monuments of the Pharaonic era and Coptic and Islamic monuments. Egypt is the home to 5 sites that are on the UNESCO list of World Cultural Heritage.

A majority of Egypt's cultural heritage sites are being damaged by one or several of the following problems: sprawl of human settlements; air pollution; rising water table; industrial and vehicular vibrations; garbage pollution. The Sphinx, for example, which has stood for millennia, has been deteriorating at a vastly increased rate during the last 50 or so years. Increased levels of pollution, trigger chemical and biological reactions that weaken the limestone make it more susceptible to wind erosion[2]. Air pollution, whether from industrial activity, from road transport, or from burning of waste as human settlements and industrial activity have spread to engulf what were formerly remote areas. Nazlaa el Saman in Giza is an example of an informal settlement that is causing visual blight and garbage pollution in the vicinity of the Great Pyramid. Accumulated solid wastes are not only unsightly but can be a hazard for monuments. For example, during burning of municipal solid waste adjacent to the building of Al-Musaferkhana, which caught alight and burned to the ground.

Problems of inadequate housing lack of social and physical infrastructures and unemployment are challenges for both central and local authorities. These problems negatively impact cultural heritage, where authorities, such as the Supreme Council for Antiquities (SCA), which is responsible for monuments, do not have the mandate and power to address such issues. Few of Egypt's many historic monuments are managed properly with a view to their long-term preservation.

1.5 Desertification

The issue of desertification has been recognized as a major economic, social and environmental problem of global dimensions. Possible implications range from human malnutrition to social instability involving community dislocation and forced emigration. The high rate of population growth in the dry land associate with poor economic

[1] Refer to the Environmental Profile, NEAP, 2000.

[2] Ibid.

performance, exacerbated by degrading natural resources and, consequently, adding to the causes and effects of the desertification problem.

Egypt is an arid country, although its aridity varies from one region to another, making it prone to desertification. In the southern and western parts of Egypt, a combination of climatic conditions and fragile ecosystems accentuate wind erosion especially at the fringes of the desert where topsoil is sandy and thin. Desertification results from a combination of inherent fragility of the ecosystem and excessive use that is beyond the productive capacity of the ecosystem itself. The increasing exploitation of the environment in Egypt is mainly due to the increase in the population and resultant expanding human needs. Another cause of the excessive use of the ecosystem is poverty and pressures that urge rural communities to direct their production towards national and international markets, and enhance the productivity per unit area regardless of the food needs of the local population.

Egypt faces the following forms of desertification:

- Degradation of irrigated farmland as a result of using low quality water in irrigation,
- Degradation of rain-fed farmland (northern coastal belt and northern Sinai rainfall 100-250mm),
- Degradation of rangeland (northern coastal belt) through overgrazing, degradation of plant cover,
- Encroachment of sand formations, especially from the Western desert, on the Nile Valley land (southern Egypt) and on the High Aswan Dam reservoir (in Egypt and Sudan).

The growing Egyptian population is crowded in the Nile Valley and Delta. The high population density has placed the land resources under serious pressure. Most land is overexploited, with only short periods of being left fallow, coupled with high doses of fertilizers in agricultural production. Other forms of exploitation are overuse of pesticides and urban encroachment on productive land.

In some places where subsurface drainage facilities are absent or inefficient, water logging, concomitant salinity and sodicity degrade the soil. These threats point to the urgency of combating desertification, particularly as they increase over time. Furthermore, policies and measures of combating desertification are long-term and costly.

1.6 Marine Environment

1.6.1 Mediterranean Sea

The Egyptian Mediterranean coast and marine environment include interesting habitats existing in open deep waters, islands, costal dunes, bays, sandy shores line the date palm beaches in Al-Arish, salt marshes, Nile Delta wetland, Bardawil lake, coastal ridges (bars), drainage systems, wadis,… etc. The fauna and flora of these habitats and eco-system have evolved during millions of years into a unique mixture of temperate are subtropical biotopes[1].

The state of the open waters in the Mediterranean Sea is considered to be generally good. In coastal areas, the presence of pollution hotspots, located in semi-enclosed bays (e.g. Abu Kier), near important harbors, large cities and industrial areas, is probably the

[1] Refer to the Environmntal Profile, NEAP, 2000.

major problem. Waters in the open sea are classified among the poorest of the world in nutrients. Marine ecosystem still seam to function well, however.

Current threats such as localized eutrofication, heavy metals, organic and microbial pollution, oil spills, introduction of non-indigenous species are mainly the results of pressures from anthropogenic activities. Hence more attention to their management control is needed. Land-based activities such as urbanization, industry, and agriculture represent the main source of pollution of the Mediterranean Sea. In case of urban and industrialized pollution, the main problem is the rapid population growth where there are few legal and economic instruments applied and inadequate environmental infrastructure investment.

The pressure from tourism is one of the problems that have to be managed effectively to avoid further degradation of the marine and coastal environment that includes for instance habitat destruction, changes in species composition and loss of endangered species, such as sea turtles. The potential impacts of climate change in the Egyptian Mediterranean region, especially Nile delta include increased coastal erosion, overtopping of coastal defenses and increased flooding, damage to port and city infrastructure, retreat of barrier dunes, decreased soil moisture, increased soil and lagoon water salinity, and decreased fisheries production.

Coastal Waters of the Mediterranean Sea in 1999/2000

Visual observations indicate that about half of Egypt's Mediterranean shore is clean and the rest needs remediation or cleaning. In 1998 the most polluted beaches were Salloum, Rommel Island, Nubaria, El-Mex, West Harbor, National Institute for Oceanography and Fisheries (NIOF) near to the Greek and Yacht clubs, East Harbor, East Abu-Qir, Ma'adia outlet, and El-Arish.

On the western part of the Mediterranean coast, low population densities, in addition to low levels of industrial and agricultural activities explain the low levels of all measured, physical, chemical and bacteriological parameters. The level of bacterial contamination of water remains, with few exceptions, below the acceptable levels on the monitored stations.

Towards the east and much closer to Alexandria from El-Mex outlet to Sidi Gabber, the levels of all measured parameters increase dramatically. A clear biological signal to these high nutrient values can be found at higher levels of chlorophyll in these areas. In Alexandria, where several popular beaches exist, the levels of most parameters are low with respect to measured bacteriological parameters. However, from Abu-Qir, and eastward to Ma'adia outlet concentrations of all parameters increase with very high level of nutrients. The level of the bacteriological measures increase to well-above the acceptable levels at most stations in this area.

As for the concentration of the eutrophication parameters including nutrients and chlorophyll, it is relatively high from New Dammitta to Port Said. This is a result of discharges from fresh water outlets from the River Nile, Lake Manzala and due, in part, to sewage discharged from Port Said.

The bacteriological measurements indicate that most of the investigated areas have low levels of measured bacteria, such as Ras El-Kanayes, Marina, Al-Agamy, El-Montazah, El-Mamoura, and El-Arish. Areas with very high degree of contamination were also recorded, for example, El-Mex and the inner part of the harbor of Alexandria and National Institute for Oceanography and Fisheries (NIOF) outfalls.

1.6.2 Northern Lakes

Northern Lakes also, receive industrial discharges. According to the Drainage Research Institute (DRI), in 1995 there were 17 factories discharging their wastewater directly to Lake Mariut through pipelines. Another 4 factories collected their wastewater in trenches, which are desludged by tractors to the lake. Another 41 factories discharged indirectly to the lake through nearby drains and/or treatment plants.

In the case of Lake Manzala, at least one drain could be identified where industrial discharge takes place close to the outfall of the drain to the lake that is Faraskour Drain. Indirectly, the water quality of Lake Manzala is heavily polluted by discharge of contaminated water from Bahr Baquar drain. Also Lake Burullus indirectly receives industrial effluent, mainly through Nashart Drain that passes by Kafr Al-Zayat and Desuq.

1.6.3 Red Sea

The Egyptian Red sea and its two gulfs (Aqaba and Suez) warrant special attention because they contain a wide range of environmental conditions; and are not buffered by large oceans of deeper waters. The region is arid, with large seasonal fluctuations of air and water temperatures, then the greatest extremes in tropical marine climates. The biota has undergone selection for survival under high stressed conditions. Many endemic species are capable of tolerating high water temperature although those may be close to their physiological limits. Any additional stress imposed by climate change or directs human activities may cause significant impacts on biota[1].

The most conspicuous shallow water marine habitats in the Red sea is formed by the extensive coral reefs, which fringe much of the coastline and often external offshore for many kilometers. Coral cover is usually less than 50 percent, but in sheltered areas one or two species cover 80 percent of the substrate. The complexity of the ecosystem is illustrated by its high diversity, approximately 230 species of story canals of 180 species of soft corals and even higher diversity of fishes (more than 1000 species) may be found in Red sea coral reefs.

Coastal and marine environment of the Red sea are becoming subjected to increasing pressures, most of which resulted in harmful environmental effects. More acute ecological problems have arisen from loss and degradation of coastal habitats. Pollution can be listed under three major sources: urbanization associated with tourism, oil exploitation and transport, and other types of industries. Sewage and industrial waters are increasing and usually discharge below the intertidal zone with considerable inputs around the cities. Considerable amount of garbage, especially plastics enter the sea for urban areas and ship traffic.

Coastal tourism is increasing and plays a major economic role. Tourism is the second revenue earner with approximately 5 million tourist annually visiting marine protected areas such as Ras Mohammed and Gufter Island. Hotels and other infrastructures are depleting the quality of the amenities that attract tourists (i.e clean beaches and reefs). In addition, degradation of coral reefs from heavy collection and other recreational uses is becoming widespread in the Red sea. There is an increasing evidence of coral damage by endemic population of sea urchin, malleus and the crown of thorn starfish. They erode the living coral tissues or attack them directly.

Among the possible long-term ecological impacts on marine life are increasing global warming, sea level rise and large-scale marine ecosystem instability. Thus, the environmental issues concerning the coral reefs and other marine habitats of the Red sea

[1] Refer to the Environmntal Profile, NEAP, 2000.

are numerous and interrelated. Although reefs may be consequently experiencing natural stresses, there is increasing evidence that human impacts combined with natural disturbance, may significantly slow the recovery rate of a reef particularly since man induced change is often chronic rather than temporary.

Environmental impacts resulting from stresses include extremes in temperature, bioregion, episodic rainfall and massive discharge of flood waters, wave turbulence, turbidity and sedimentation. Environmental impacts resulting from human activities include loss of coral areas and mangroves because of coastal construction, decline in fish and invertebrance abundance because of tourist activities, coral degradation and alteration of coastal communities, charges in water quality, habitat reduction for breading turtles, and local eutrofication.

Coastal Waters of the Gulf of Suez, Gulf of Aqaba and Red Sea Proper in 1999/2000

According to the EIMP annual reports, visual observations at the shore reveal that lumps of old tar are found in moderate quantities at Ras-Gharib City and Ras-Sudr. Small quantities are found at the beach of Ras-Gharib Harbor in the Gulf of Suez. Various quantities of thin oil films; feces, sewage, and general litter were found in Suez, and Ras-Gharib. The coastal water of the Red Sea proper and the Gulf of Aqaba region was found clean, except in few locations, such as Safaga in the Red sea and Sharm El-Sheikh harbor and Sharm El-Sheikh, and Na ama bay at the Gulf of Aqaba.

Data demonstrates that wastewater discharge strongly influences the hydrographical and eutrofication conditions at the northern part of the Gulf of Suez. On the other hand, the Red Sea region has low levels of the measured physical, chemical and bacteriological parameters. Levels of nutrients like nitrate, nitrite, and ammonia, at the northern part of the Gulf of Suez, are much higher in comparison to the rest of the Gulf of Suez including the Red Sea proper and the Gulf of Aqaba. The biological response to these high levels of nutrients is found in the relative higher levels of phytoplankton biomass in the area measured as chlorophyll. The high levels of Total Suspended Matter (TSM) and low levels of clarity near the city of Suez support these findings. This is a result of discharging untreated, or partly untreated wastewater from Suez and the heavy maritime transportation in the area.

With regard to the level of reactive phosphate in the investigated regions, it appeared to be very low throughout the year. Few exceptions of higher levels were found in Suez in February, in Ras-Suheir in November, and in Ain-Sukhna and Abu-Zenima in April. In the Red Sea proper a relative increase in phosphorus was observed.

1.7 Solid Waste Management

The National Program for Solid Waste Management that MSEA/EEAA issued in December 2000 and approved by the Governors' Council, which the Prime Minister heads, is the framework to regulate the collection and disposal processes. It addresses issues, such as the shortage of landfill sites for final disposal of waste and financing of waste management as between the public budget, which is the main source of finance for waste management, and user-fee complements. There is shortage of financial and human resources to deal with the volumes of waste that are generated on a daily basis as well as the need to remove the accumulated wastes of the streets. The absence of landfills and the shortage of collecting and transporting methods have increased the accumulated MSW to 97 million tons[1] (until December 2001)[2].

[1] The source of all figures in this section is "The National Program for Solid Waste Management", EEAA, 2000.

[2] Refer to the Environmntal Profile, NEAP, 2000.

1.7.1 Municipal Solid Waste (MSW)

Homes and businesses produce wastes as a consequence of everyday activities. In Egyptian municipal solid waste (MSW), organic waste constitutes about 60 percent of MSW, paper averages 11 percent, and glass, plastic, textiles, bones and metal, etc. account for the rest. The average solid waste generation rate of Egyptians varies from 0.3 kg/person/day in rural areas to 1.0 kg/person/day in large cities. Specific establishments like hotels and tourist resorts may have generation rates as high as 1.5 kg/person/day.

Of the 15 million tons of MSW generated annually, about 65 percent is in urban areas and the rest is from rural areas. Waste collection efficiency ranges from 90 percent in high-income areas to 10 percent in rural low-income areas where solid waste is, at best, dumped in the Government-designated sites or in the adjacent land where it putrefies and self-ignites. Waste is also sometimes burned or disposed into agricultural drains and irrigation canals, thus significantly degrading water quality and aggravating health problems.

1.7.2 Agricultural Residue

Agricultural residues are estimated to be around 25 million tons yearly, and most are re-used for agricultural purposes as organic fertilizers or animal fodder. About 3.5 million tons are burned either in the open or in polluting, low efficiency, open fire stoves and ovens.

1.7.3 Industrial and Hazardous Waste

Estimates of industrial waste range from 4 to 6 million tons per year. Hazardous industrial waste is estimated at 100–300 thousands ton per year and hazardous wastes are often disposed along with general industrial waste. At present, Egypt has no facility for disposal of hazardous industrial waste. DANIDA has recently completed a feasibility study for Industrial Hazardous Waste Management in Greater Cairo, and Finnida is funding an ongoing project for integrated management of industrial hazardous waste in Alexandria. Currently, such wastes are deposited in dumpsites, which may be relatively safe in dry climates or areas with low water tables in that they do not pose a high risk of contaminating groundwater. However, mixing toxic industrial waste with general waste in dumpsites poses a significant risk in areas, such as the Delta region, where the water table is high.

Hazardous waste generates from other sources. Empty containers of pesticides used in agricultural activities, together with those of hazardous chemicals, are considered as hazardous waste, and usually disposed off with MSW.

Furthermore, medical wastes are often included in the MSW stream and these may include hazardous items, such as infectious material, pathogen- contaminated tissues, sharp objects…etc. The presence of such wastes in the general MSW stream poses risks to public health, especially to those involved in collecting and transporting wastes to dumpsites, along with the scavengers at these sites.

Hospitals and health care firms produce about 100 thousand tons of non-hazardous wastes and 25 thousand tons of hazardous wastes annually. Open dumping and open burning are currently the prevailing methods of disposing the hazardous waste.

1.7.4 Construction Waste

Construction and demolition debris is not MSW because it does not contain organic materials. It is suitable for re-use or it may be crushed into base materials for road

building. It is estimated that about 4 million tons of construction waste is produced yearly. Construction and demolition waste may be seen disposed randomly on the banks of canals or on roadsides throughout Egypt. It is a traffic hazard on highways, and degrades air quality on windy days.

1.7.5 Waterway Dredging Residues

The annual volume of material dredged from Egypt's waterways is estimated to be 29.4 million tons (94 million cm^3). The bulk of these wastes result from maintenance and widening of canals. Initially the dredged material is dumped on the sides of the canals and substantial quantities are subsequently moved to low-level land as a top-dressing. Whilst this recycling may appear to be beneficial, it is important to take care when dealing with such wastes as they may contain heavy metals or non-analyzed organic materials.

1.7.6 Sewage Sludge

It is estimated that around 2 million tons of sludge are produced annually from sewage treatment facilities. There are plans to construct sewage sludge drying and treatment units to produce organic fertilizers.

1.8 Biological Diversity

Egypt has a rich natural heritage. It possesses many rare species, e.g. Dugong and special habitats, e.g. coral reefs, sand dunes, mangroves, oasis as well as coastal and marine resources. The country has recognized the value of its natural resources. Accordingly, it has taken many active steps towards conserving biodiversity and preserving natural resources and heritage.

Each of these habitats has its unique fauna and flora and numerous land and marine areas are listed as protected sites[1]. An estimated 18,000 species of flora and fauna are in the Egypt. With regard to flora, there are 44 species of viruses, 238 bacteria, 1,260 fungi, 1,148 algae, 369 non-flowering vascular plants and 2,072 flowering plants species. The fauna include 10,000 species of insects, 1,422 other vertebrates, 755 fishes, 105 reptiles and amphibians, 470 birds and 126 species of mammals[2]. However, to date, there are no clear statistics that quantify the rate of biodiversity loss in Egypt.

Reasons for Biodiversity Degradation

- Destruction of habitat is a major cause of loss of biodiversity in Egypt. Land reclamation, urbanization, and industrial activities destroy and alter critical natural habitats along with their plant and animal life.
- Pollution causes deterioration of critical habitats and species loss. A concrete example here is the Delta wetland.
- Excessive use and misapplication of pesticides also causes loss of rare species including those that act as natural biological control agents.
- Over grazing and over fishing contribute to biological degradation in Egypt.
- Wildlife utilization is, for the most part, unregulated in Egypt and excessive numbers of wild animals are being hunted.
- Lack of a sustainable and effective system to address natural heritage management issues is hampering the nation's ability to conserve and manage its unique and critical resources.

[1] Egypt National Strategy and Action Plan for Biodiversity Conservation, MSEA, Department of Nature. Conservation, National Biodiversity Unit, January 1998.

[2] Country Study of Biological Diversity, 1995.

- Lack of sufficient coordination and cooperation among all concerned parties in Egypt for data collection, storage and analysis of biodiversity.
- Absence of comprehensive legal protection for natural heritage resources outside the Protected Areas.
- Egypt's wetland is subject to a variety of human induced threats, which are leading to the degradation of this valuable national resource.
- Degradation of the country's marine and coastal resources threatens future sustainable return from these resources.
- Most desert regions in Egypt are coming under threat as a result of rapid and inappropriate development. Many areas having high natural heritage value and importance for biodiversity are being destroyed and degraded as a consequence of uncontrolled tourism, land reclamation, quarrying and solid waste dumping. Over grazing and collection of vegetation is a problem in most rangeland threatening the livelihood of the local population.

Lack of sufficient regulation of marine tourism, lack of adequate infrastructure to protect the natural resources and insufficient regulation of desert tourism are causing the destruction and degradation of natural habitats, landscapes, cultural heritage sites and other resources[1].

All of these are compounded by the fact that few economic incentives are for biodiversity conservation. Damaging Egypt's natural resources means degrading the environment and eventually losing Egypt's international and may be even local tourists in the future. On the other hand, regulating tourism and controlling the infrastructure expansion so that it does not cause environmental damage will protect the environment and eventually guarantee continuous prolonged flow of tourists causing Egypt's economy to grow. Tourism as an economic activity has closely related to globalization and links to the global economy, and has a direct impact on the country's biological and natural resources. Insufficient regulation of marine tourism and lack of adequate infrastructures is damaging the natural resources, which attract the tourists, in particular the coral reefs of the Red Sea. Thus, the two main consequences of biodiversity degradation would be deterioration of Egypt's natural resources and economic losses.

1.9 Natural Environmental Hazards

1.9.1 Earthquakes

Sudden movements along geological faults in rocks comparatively near the surface of the earth result in earthquakes. Most movements are preceded by the slow build-up of tectonic strain that progressively deforms the crustal rocks and produces stored elastic energy. When the imposed stress exceeds the strength of the rock, it fractures, usually along a pre-existing fault. The point of sudden rupture, known as the focus, can occur anywhere between the surface of earth and a depth of 600-700 km. Shallow-focus earthquakes (less than 40 km below the surface) are the most damaging events, accounting for about 75 percent of the global seismic energy release. The source point for earthquake measurement is the epicenter, which lies on the surface of the earth directly above the focus.

The geology of Egypt, and its tectonic setting and seismic records indicate that there are at least three main lines of seismic activity: (i) Northern Red Sea -Gulf of Suez -Cairo-Alexandria trend; (ii) Eastern Mediterranean-Cairo-Fayoum depression trend; and (iii) Gulf of Aqaba trend. In addition to these trends there are several areas known to be

[1] Refer to the Environmntal Profile, NEAP, 2000.

active, such as Southwest of Aswan. Time series data record 83 noticeable earthquakes in and around Egypt causing damage of variable degrees.

Earthquakes have been traditionally considered as natural disasters. However, it is now recognized that human activities could enhance the occurrence and impacts of natural hazards. Human-made earthquakes have been known since Carder in 1945 documented the occurrence of about 860 local tremors during the 10 years following the formation of Lake Mead, in Arizona and Nevada, by Hoover Dam in 1935. Other human activities that have enhanced the occurrence of earthquakes are the injection of fluids into deep wells and the underground nuclear tests.

1.9.2 Flash Floods

Flash floods occurring due to short-period heavy storms are among the sources of environmental damage especially in the Red Sea area and southern Sinai. Floodwater velocity depends mainly on the topography of the basin (height, slope and drainage network capacity), and its soil type and characteristics. In 1979 a flash flood over El-Quseir and Mersa Alam region led to destructing both the Red Sea Coastal Road and Qena-El-Quseir Road. As a result of the flood, authorities reported 19 deaths. In 1991 another flash flood hit Mersa Alam where about 37,000 m^3 of water were received in a very short period of time. In 1993 Alexandria City received a heavy storm with losses including 21 deaths. In November 1994 the Governorate of Assiut suffered one of the most severe and dangerous floods during this decade in which the heavy storm caused fires and loss infrastructure as well as loss of life.

Many studies have been undertaken to determine possible measures to avoid hazards that flash floods cause. Engineers have developed mechanisms to harvest flash floods water. This water could be directly used to meet part of the water requirements, or recharge the shallow groundwater aquifers. Based on statistics, an estimated one BCM of water on average can be utilized annually by harvesting flash floods.

1.9.3 Dust and Sand Storms

Among significant natural sources of air pollution in Egypt are dust and sand storms, decay of organic materials and sea spray. Dust and land storms can result in high concentrations of particulate matters affecting visibility and contributing to increased road accidents and negatively affecting air travel. Dust and sand storms are common phenomenon in Egypt during the spring and late winter seasons.

Part Two: Pressures and Driving Forces

2.1 Population Growth

One of the major causes of environmental problems in Egypt is the rapid population growth. In 1996 the population of Egypt reached 59.183 million. The annual growth rate of population between 1986 and 1996 was 2.1 percent per annum, which is a substantial reduction from the 2.8 percent of the preceding 10 years. The demographic dependency ratio (number of people not in the workforce as a percentage of the workforce) was 69.7 percent These high rates for natural population growth put profound pressures on both the environment and the economy given the limited available natural resources, thus requiring meticulous planning and management[1].

The majority of the population engages in services and agricultural activities. Rapid population growth has endowed Egypt with a large and young population, and even though population growth has slowed in recent years, population momentum continues to be considerably high. Investing in human resources, by allocating funds for physical and social infrastructures is among the key avenues for sustaining the development of Egypt. Population characteristics and distribution among various localities of Egypt can be a proxy for locations of several environmental problems.

Environment has become a major issue and a vital component in the structure of the Egyptian society. It affects directly some of the social strata because of their relationship to nature, their age, and/or certain cultural aspects. Accordingly, it is important to focus on six sub-population groups: children, youth, women, the elderly, and the physically disabled and marginalized population. This is clearly presented in Part Four.

A closer look at the social dimension of the above pattern of population distribution, especially in low-income areas and informal settlements, indicates that residents of such areas suffer from harsh economic and environmental conditions. Residents of informal settlements are insecure because some legislation and regulations prohibit the existence of these settlements and state the need to clear these sites.

Many of the daily activities in such low-income communities depend on using and managing environmental resources, such as water and fuel. These communities are not expected to solve their environmental problems alone; thus, certain interventions to improve their environment should be taken, such as projects associated with serving the community.

2.2 Agriculture and Fisheries

2.2.1 Agriculture

The agricultural sector is one of the most important sectors of the Egyptian economy. An estimated 50 percent of the population lives in rural areas, and agricultural activities account for about one third of the total labor force. Agricultural production constitutes about 18 percent of total GDP and 20 percent of commodity exports. The agricultural sector is primarily oriented toward the domestic food market but also represents a source of raw materials for some industries, and plays an important role in Egyptian foreign

[1] Refer to the Environmental Profile, NEAP, 2000.

trade. The agricultural land base consists of old land in the Nile Valley and Delta, rain fed areas, several oases and land reclaimed from the desert since 1952. In spite of efforts to increase cultivated and cropped land, the per capita share of both decreased as a result of faster rates of population growth. Scarcity of adequate land resources, which leads to:

- Rural to urban migration deprives the agricultural sector from needed labor contributes to land degradation.
- Trade deficit because of increase in the imports of food requirements; and
- Unemployment and underemployment leading to the decrease in the marginal productivity of labor to levels not far from zero and sporadic.

Agricultural practices have had the greatest impact on soil degradation. In recent decades, however, human management of agro-ecosystems has been steadily intensified, through irrigation and drainage, heavy inputs of energy and chemicals, and improved crop varieties led to some general growth in agricultural production, this process has made agro-ecosystems more and more artificial and often unstable and prone to rapid degradation.

- Irrigation: Limited water resources required for matching agricultural expansion and the inappropriate utilization of available resources is an obstacle for horizontal expansion. The use of traditional efficient irrigation techniques and the inadequacy of drainage systems have led to the increase in water logging and salinization. Salinity is a potential limiting factor that stifles land productivity in Egypt. Over-exploitation of water for irrigation has led to the depletion of groundwater resources, which has resulted in excessive intrusion of salt water from sea into ground water aquifers.
- Fertilizers: Technological advanced cultivation practices, together with the availability of high yield varieties have led to improved crop yields in Egypt over the past two decades. The increased application of chemical fertilizers to supply nutrients is another unsustainable practice in agricultural production. The consumption of the chemical fertilizers in the last years is about one ton per feddan of the cultivated area. The expansion in consumption of fertilizers has been encouraged by the fact that their market is free, and this led to excessive and inefficient application, with consequent economic losses and increased environmental damage.
- Pesticides: Pesticides use in Egypt is extremely difficult to assess, simply because there is no possible supervision on small growers and their use of these chemicals. Pests do not only affect the quantitative yield crops both pre-harvest and post-harvest infestations also affect food and feed quality.
- Soil Erosion: Further constraints include physical ones, like wind erosion, which affects vast areas on the fringe of desert where the topsoil is sandy and thin. It is one of the serious problems because the fertility depletion through decline in soil organic matter and reduction in nutrient reserves by crop removal, leaching and acidification.

Vertical agricultural expansion due, in part, to intensive cultivation with shortening of rest periods in traditional cultivation systems often results in rapid land degradation and decline in production as well. Inadequate investment in agriculture sector and insufficient funds allocated to the agriculture sector in spite of its crucial importance.

The dynamic economic and social transformations in rural areas that drastically affect the standard of living and patterns of consumption have impact on the agricultural production. These patterns emerged in response to the return of Egyptian labor from neighboring oil-producing countries. Furthermore, favoring the urban consumer over the rural producer, orientation of the production of rural communities towards the markets in urban centers at low price levels, and escalate the prices of imports needed by rural people play a very

important role leading to more land degradation and loss of soil fertility in Egypt. There is evidence that both social, economic and political returns from investing in rehabilitating degraded irrigated areas, and protecting them from further degradation, are the highest priority and would provide for the growth of food production to keep ahead of population growth. Thus, it is proposed to prevent degradation of non-affected or slightly affected irrigated land and to reclaim all degraded irrigated cropland as a first priority in combating desertification.

The gap between agricultural production and the needs of a growing population is expected to increase in the coming twenty years. Thus, the Government is adopting new mega-national projects, such as Toshki, to fully utilize the available land resources in an attempt to achieve the highest economic rate of return derived from the agricultural sector. Government policies in the sphere of agriculture include controlling and reducing the amount of fertilizers, pesticides, and other added chemicals used in agriculture. New types of fertilizers and pesticides that contain fewer amounts of harmful chemicals for the environment will be introduced and farmers should be encouraged to use them. However, some plans and strategies require further efforts in their details. Egypt cultivates two water-demanding crops, namely rice and sugarcane, which put pressure on the limited amount of water available for irrigation.

2.2.2 Fisheries

Fish is a traditional and important component of the Egyptian diet. Its contribution to protein supply is approximately the same as that derived from beef. However, some varieties of fish, such as *Boulti*, are inexpensive compared to beef, and constitute the major source of nutrition and livelihoods to the poor in several Governorates, such as Dammitta and Kafr El-Sheikh.

The aquatic resource base in Egypt is extensive. It consists of marine water, fresh water, and brackish water. Marine water fish base comes mainly from the Mediterranean and Red Sea, the Suez Canal and the Great Bitter Lakes. Fresh water resources are the Nile River with its canals and Lake Nasser in Upper Egypt. Brackish water resources are: lakes of Manzala, Burullus, Edku, and Mariut in addition to the two lagoons of Bardawil and Port Fouad to the West of the Delta. In addition to three important drainage basins that are present in the Fayoum Region: lake Qaroun and Wadi El-Ryan Depressions (I) and (III), and various smaller lakes that are scattered around the country plus fish farms[1].

Virtually all-present Egyptian water bodies are fished to the maximum and some overexploited already; potential production increase is marginal. Without additional production systems, either the percentage of self-sufficiency or the consumption per capita will decrease. The plan to maintain per capita consumption levels at 10 kg (or even to increase t o over 14 kg in 2017) are not realistic, unless present production levels of existing resources are preserved, and strong expansion of aquaculture and/or import takes place. Production levels are endangered already in a number of the current production areas by developments in other sectors: e.g land reclamation in Lake Manzala, hyper-salinization in Lake Qarun. Fish production from all aquatic resources has increased by 69 percent in the period between 1989 and 1998.

Applied fishing techniques also have adverse impact on fish production. They have affected the aquatic environment in many ways. Fishermen use inappropriate techniques to increase their catch. This has caused the killing of the small traits and hence, decreased production. The use of huge nets causes the death of large numbers of non-target species through habitat destruction and being accidentally engulfed by the net.

[1] Refer to the Environmental Profile, NEAP, 2000.

The quality of water available has a substantial bearing on fisheries. Pollution caused some fish species to extinct and others to decrease (Sardine). Highest toxicant residues were found where drainwater is present (Northern lakes, fish farms), and in canals close to agricultural land. Toxic substances can build up in the tissues of the fish causing health hazards that are passed to the fish consumer.

Fresh water aquaculture has a number of environmental impacts. Ponds occupy a land and consume water by evaporation that could have been used in a number of other ways. Aquaculture then competes with agriculture in the utilization of these resources. The present system of "temporary farms" cannot be expected to resulting sustainable production increase. New water resources for aquaculture development may be found in the huge brackish water aquifers in the Western Desert, along the Nile Valley, and in the Sinai Peninsula.

2.2.3 Livestock and Poultry

Most livestock and poultry production is relatively intensive and concentrated on small subsistence farms on the old agricultural land. These intensive village-based systems favor cows, water buffalo, and small ruminants. Local production of milk and dairy products often meet the demand in Egypt. Water buffalo milk, with its high butterfat content, is the preferred milk for drinking and for making ghee. There is a need to allocate significant portion of land in Lower Egypt for animal fodder to sustain current production levels of milk and dairy products. The alternative would be to use this land for the production of high value varieties. Proper management of land is needed to support better economic and environmental returns.

Traditionally chickens are kept mainly for their eggs while pigeons, duck, turkey and geese, along with rabbits, provide meat for the household. Farmyard poultry flocks consist of small, hardy breeds that command a premium price for their meat and eggs. The availability of crop residues limit growth of these farm flocks–their major source of food. Commercial production of chicken depends more on imported feeds and other inputs, a dependency that has spread to a lesser extent to the production of ducks, geese, rabbits, and turkey for the urban market.

Increased demand for livestock products due to a growing population places increased demands on the natural resources supporting livestock production and increased competition for land use. Such competition can lead to pollution, erosion, degradation, and loss of plant and animal biodiversity. Livestock and poultry compete with crop production for direct food use because they consume corn, barely, wheat, and pulses. Livestock also compete directly for land because during the winter a large portion of land is devoted to the production of clover and Alfa-alfa. This land could otherwise be used for wheat, beans, and winter vegetable crops. During the summer, forage is not produced as extensively and there is often a seasonal shortage of animal roughage.

Livestock and poultry as part of the agriculture activity not only consume environmental resources but also produce waste in such quantities as to have a significant negative impact on the environment. Peasants store the manure to use it as a fertilizer and soil conditioner. During storage methane and other green house gases, which pollute the atmosphere are released. Piles of manure are also a fertile ground for breeding rodents and pests that constitute an economic and health hazards. Most peasants keep their livestock and poultry inside the house, thus increasing the possibility of transfer of diseases from animals to human beings.

Slaughterhouses are often a source of pollution in urban settlements. Liquid and solid waste generated from these establishments, contain considerable amounts of hazardous wastes. Some of these wastes are used as inputs for other industries, while others are mixed with municipal solid waste and wastewater.

2.3 Manufacturing and Mining

In 1999 manufacturing output represented more than 30 percent of the Gross Domestic Product (GDP), employing about 20 percent of the active labor power (population 15 years and over). The major outputs of the manufacturing sector are chemicals, then food, beverages and tobacco, followed by textiles and foot wear, metal products, machinery and equipment, then basic metals, and non-metallic products.

This important sector faces many challenges from globalization of trade. As the various clauses of the WTO become operative, quotas and protected markets are eliminated. Egypt's comparative advantage has traditionally been an abundance of labor but now Egyptian manufacturing is facing cut-throat competition in labor-intensive industries from countries of the Middle East and North Africa (MENA) region and Asia. Technologically-advanced, low polluting, industries are still in their infancy in Egypt.

Manufacturing activities are among the major users of both renewable and nonrenewable natural resources to obtain raw materials and energy. Industrial activities are among the major contributors to pollution of water, air and soil. Industrial facilities are numerous and vary from large-scale industrial enterprises to small facilities. In addition, the production pattern may differ seasonally as in the textile industry, or in production type as in the paper industry. Variable conditions may be encountered as upgrading and expansion of some production lines, closure of lines causing environmental pollution problems, or converting/substituting open systems to semi-closed or closed systems with regard to water consumption.

2.3.1 Industries Need for Resources

i. Water

Industrial consumption of water was assessed in 1990 when the General Organization for Industry (GOFI) surveyed public sector major industrial establishments to estimate industrial needs and requirements. A small portion of the water for industrial requirement is consumed through evaporation during industrial processes while most of that water returns back to the system. With the expected growth in manufacturing activities, the use of water in industries will increase consequently, increasing the volume of effluents.

ii. Oil and Gas

The industry sector is a major energy consumer. Currently, most industrial activities in Egypt depend on traditional fossil fuels derived from petroleum, including fuel oil (a heavy fuel oil characterized by high sulfur content). Unlike natural gas, the burning of these oil fuels results in high levels of SO_2 and particulate emissions.

The intensity of final energy use in terms of Kg Oil Equivalent used to generate LE 1,000 of GDP is an important indicator to show the effectiveness of energy use from the economic standpoint. The ratio between industry and country intensities indicates, that industry is growing in energy consumption by 15 percent more than the country average. It also indicates that it is less efficient with respect to the country average.[1]

2.3.2 Industrial Pollution

i. Air Pollution

Industrial activity is a major source of air pollution in Egypt. Industry emits common air pollutants, such as sulfur dioxide, particulate matters, hydrocarbons, nitrogen oxides,

[1] Refer to the Environmental Profile, NEAP, 2000.

ammonia, hydrogen sulphides, carbon monoxide, fluorides, chlorine, lead, nickel and beryllium as well as other specific pollutants relating to raw materials, processes and products. Medium and small size industrial activities, such as foundries, secondary smelters pottery, brick industry, workshops, crusher's lime, charcoal ...etc are scattered within and close to urban areas especially Greater Cairo, Alexandria, Tanta and several other big cities in Egypt. Most are using very old technologies and don't have any air pollution control precautions. As a result, air pollution causes very serious damaging effects on health, material, monuments, and tourist activities.

ii. Water Pollution

Industrial wastewater is a major source of non-biodegradable organic and inorganic compounds. Once discharged to water ways, the compounds attach to sediment particles from where they are taken up by bottom-dwelling organisms. The subsequent consumption of these organisms by other organisms produces successively higher concentrations so that, at the top of the food chain, they are sufficiently high to cause toxicity. Crops irrigated with contaminated water may take up contaminants through the soil and roots, or may retain the contaminants on the crop surface after contract with irrigation water that subsequently evaporates.

iii. Solid Waste

It is estimated that Egyptian industries produce solid wastes in the range of 4 to 4.5 million tons per year. Hazardous industrial waste is estimated at 100-150 thousand tons per year. Effective control of the generation, storage, treatment, recycle and reuse, transport, recovery, and disposal is of paramount importance for health and environmental protection, natural resource management, and sustainable development. This will require the active cooperation and participation of governmental authorities and industry.

2.4 Energy

A variety of, but limited, primary energy resources are available in Egypt, with varying potentials. The conventional resources include oil, natural gas, and hydropower, while the non-conventional renewable energy resources include solar, wind, and biomass energies[1].

i. Petroleum

For the last two decades, Egypt has been a net oil exporter. The energy sector, particularly its petroleum sub-sector played a key role in the Egyptian economy. At present, the Egyptian Government is exerting efforts to encourage energy exploration activities. Accordingly, many concessions contract were signed covering most of Egypt onshore and offshore areas.

Several natural gas and oil explorations materialized and enhanced. This is manifested in the reserves of crude oil and natural gas that have tripled in a short period of time. Natural gas production has increased significantly in the last few years and is expected to continue to increase even more in the near future.

Currently, the petroleum sector is promoting and encouraging more applications using natural gas in local market for substituting of oil and freeing it for export purposes. The largest applications are the usage of natural gas for electricity generation followed by other applications for industrial processes. Other applications include using CNG in vehicles air-conditioning and expanding its use in households.

[1] Refer to the Environmental Profile, NEAP, 2000.

The GOE is currently adopting new strategies coping with the general policy directions to encourage the role of the private sector in various petroleum activities and in the expansion of gas network and use of natural gas.

More plants and projects are being materialized, such as implementing natural gas applications in a wide range of economic areas. This would lead to efficiently utilize natural resources through adequate use of distribution and transportation grids that connect production fields to energy markets.

ii. Hydropower

The River Nile is the main source of surface water in Egypt. There are potential of some mini-hydro power plants at several sites along the Nile branches and its main canals. In addition, the feasibility of pumped storage projects at El-Agalala and Attaka sites on the west coast of the Gulf of Suez are examined with a plan to operate it as peak load pump storage stations.

iii. Coal

Coal deposits have been discovered in Sinai with estimated reserves of about 80 million tons. Out of this amount, only the Maghara deposits have been commercially started due to their economic recovery feasibility.

iv. Solar Energy

Solar energy is the main source of renewable energy in Egypt, which enjoys about 2300-4000 hour/year of sunshine. Two industrial Solar Hot Water systems (SHW) projects were constructed. One for a slaughterhouse and the other at a spinning and weaving company. These pilot projects in the Egyptian industry are introduced to diffuse applications of solar technology in industrial processes and thus contributing to improve energy efficiency.

v. Wind Energy

Some regions in Egypt have particularly high average wind speeds suitable to generate electrical energy by windmills and wind farms. The important regions are the coast of the Red Sea between Safaga and Zaafaranaa, the north west coast, and east of El-Owainate in the south west region of Egypt, where the average wind speed reach about 8m/sec. These areas are considered suitable for generating electricity.

vi. Biomass Energy

Biomass energy potentials based on agricultural residues, animal waste and solid wastes are high in Egypt. These can be utilized as cheap thermal energy resources, and fertilizers for land cultivation. They can also be used to improve the environment as a safe method of waste disposal.

2.4.1 Energy Consumption

The commercial primary energy consumption of Egypt has increased during the period (1982/83 – 1998/99) from 20.5 Mtoe to nearly 42.2 Mtoe with an average annual growth rate of 4.6 percent. The hydropower share in 1998/99 accounts for nearly 8 percent. The traditional energy sources are extensively used in rural areas with potential estimated to be 4 Mtoe. These sources include agricultural residues and dry dung cakes that are directly burnt in primitive stoves and ovens to provide thermal energy to households for purposes of cooking, baking, water heating, and space heating. This fuel causes many health problems and indoors local environmental pollution during its collection, transportation and burning process.

Prediction of Future Energy Demand

Egypt is striving to climb up the ladder of development to raise the standard of living of its citizens. Economic development comprises the expansion of natural resources and maximizes the agricultural and industrial production. Agricultural production from the land in the Nile valley needs to be increased through applying new techniques. Beside such vertical expansion, it is imperative to launch on horizontal expansion by reclaiming new desert land. Expanding industry is the main pillar of economic development. Establishing new industries in addition to modernizing the existing industries is crucial at this stage of economic development.

Services and infrastructure need to be timely set to ensure the smooth growth of the economy. In addition these economic activities, the social development has to go hand in hand with economic growth. The achievement of these goals requires substantial expansion of energy supply as projected by the Initial National Communication for Climate Change submitted by Egypt to the United Nations Framework Convention on Climate Change (UNFCCC) in July 1999, from 52.1 to 96.3 million TOE of primary energy annually by the year 2017. Egypt is, therefore, seeking to diversify and alter its current mix of energy sources, such as wind and solar energy.

2.4.2 National Energy Efficiency Strategy (NEES) of Egypt

Energy efficiency offers Egypt a sustainable path to meet its ambitious growth targets in an economic and environmentally sound manner. Market studies estimate that Egypt can generate considerable economic and environmental benefits from energy efficiency investments. The main strategic goals concerning electricity sector are supplying high quality electricity to meet the demand of all consumer categories; taking into consideration the issue of environmental protection in the processes of generation, transmission and end-use.

The policies include but are not limited to:

- ✓ Maximizing the utilization of all hydropower resources, through electrification of suitable barrages on the River Nile and its branches, and on major canals.
- ✓ Maximizing natural gas utilization for energy production, since natural gas is an environmentally-friendly fuel.
- ✓ Promoting new and renewable energy utilization to increase its share in the energy mix.
- ✓ Encouraging electric interconnections with neighboring countries towards the east and west.
- ✓ Permitting independent power producers to share electricity generation and encouraging them through mechanisms of investment incentives.
- ✓ Improving efficiency of energy production and use, by adopting energy efficiency policies and implementation measures.
- ✓ Adopting suitable environmental protection measures in electricity generation, transmission, distribution and end-use.

The concept of energy conservation has been introduced since 1981. Several prototype projects were financed and implemented using financial foreign assistance. The involved working entities include former Egyptian Electricity Authority succeeded now by Egyptian Electricity Holding Company (EEHC), Organization for Energy Planning (OEP) and Energy Conservation and Environmental Project (ECEP), as well as Green House Gases Reduction Project (GHGRP).

Project's achievements, according to the above-mentioned activities, yielded:

- ✓ Performing required maintenance and rehabilitation of old generating units. This would reduce rates of fuel consumption.

- ✓ Utilizing large size generation units, which have lower fuel consumption rates per energy unit produced.
- ✓ Converting the gas turbine units into combined cycle operation mode to produce excess energy without additional fuel, thus improving energy efficiency and reducing emissions.
- ✓ Utilizing new technologies in the industry sector; thus reducing its energy intensity level.

Also Demonstration programs are being implemented to:

- ✓ Utilize efficient lighting applications in some municipality building in Cairo and Alexandria.
- ✓ Introduce highly efficient motors in some major factories.
- ✓ Use co-generation units to produce combined heat and power in some major factories in Cairo and Alexandria.
- ✓ Introducing solar water heating in some major textiles, pharmaceutical factories and slaughterhouses.
- ✓ Installing reactive power compensators for power factor correction on the distribution networks of factories.

The more recent, GEF/UNDP and the Egyptian Government jointly financed a four-year project to assist Egypt in improving energy efficiency and removing barriers to its successful implementation. This would also assist in reducing the long-term Greenhouse Gas (GHG) emissions from power generation. This will be achieved through the adoption of polices that promote demand side management and energy conservation activities. It will also be achieved through the creation of an enabling environment for energy efficiency codes and standards. The project started in 1999 and will continue till 2004.

Barriers to the wide spread of energy efficiency applications exist in Egypt in different domains (institutional, financial, and market). However, in the past few years, several market development and economic factors began to drive the business community to recognize the importance and the need for energy efficiency.

To capture the significant benefits associated with energy efficiency, the Egyptian Energy Efficiency Council (EEC), recently found is a voluntary consortium of public and private sector organizations associated with the generation, distribution, and use of energy resources in Egypt. It was formed to foster inter-agency cooperation for promoting and guiding energy efficiency practices in Egypt. The council currently includes 12 organizations representing seven Ministers (Electricity and Energy, Petroleum, Environment, Industry, Transportation, Water resources, and Planning) and two organizations, which are the Federation of Egyptian Industries: a forum representing most Egyptian industries, and the Egyptian Energy Service Business Association (EESB) a non-government organization representing providers of energy efficiency products and services.

The main vision of the council is to create an enabling framework that allows a wise adoption of energy efficiency in Egypt. Its aim is to oversee the development of national energy efficiency strategy that will be used as a roadmap to increase Egypt's efficient use of its natural resources. The strategy also satisfies both short and long-term objectives. While short-term issues focus on removing barriers facing the development of the filed of energy efficiency, long-term issues focus on the sustainability of the energy efficiency field. The strategy in general takes into account the local business culture, and maintains a high degree of flexibility to accommodate the changing needs of Egypt's emerging economy.

The objectives of the strategy come in three tiers reflecting national priorities. The first tier, which is economic, the energy efficiency aims to support and augment national economic growth plans, and enhance the competitiveness or Egyptian industries. The second tier is

to ensure the sustainability of energy supply. This target will be achieved by strategically shifting reliance on energy production and consumption towards natural gas; and increasing deployment or energy-efficiency and renewable energy applications. The third tier is to protect the environment by reducing emissions of both atmospheric pollutants (nitrogen oxide, particulates, and sulfur oxides) and GHG, mainly carbon dioxide.

The Kyoto Protocol provides several mechanisms that could be used to reduce GHG emissions to meet the reduction targets. The clean Development Mechanism (CDM) holds the potential to assist developing countries in achieving sustainable development, while contributing to the ultimate objectives of stabilizing GHG levels in the atmosphere.

The Ministry of Electricity and Energy (MOEE) with its affiliated companies and authorities has adopted a set of projects coping the concept of CDM. These projects will secure highly efficient energy utilization. These projects include: (i) combined cycle power generation projects of 3000 MW capacity; and (ii) new and renewable energy utilization with 650 MW wind farms and 600 MW integrated solar thermal generation. Energy efficiency improvement would be achieved through: (i) local manufacturing of highly lighting appliances as well as highly efficient motors; and (ii) installations of laboratory test to measure the efficient energy saving, and confirm the applications of EE codes and standards.

2.5 Transport

With the rapid population growth and an expanding economy, more pressures are being put on the transportation sector. Timely, smooth and efficient movement of both people and freight from one place to another is a necessary condition to maintain economic growth. Yet, as presented earlier, transportation is the second most 'energy-hungry' economic sector, following manufacturing. Its impact on environment is quite significant and clear.[1]

2.5.1 Marine and Inland Water Transport

The GOE has formulated plans to raise efficiency of existing transport networks to attain optimum use; and expand transport networks by adding suitable connections to new urban and development areas, thereby bringing about an integrated transport system that can be competitive at regional and global levels under current international agreements. The efforts of GOE extend to upgrading and raising efficiency of road networks, airports, railways, and ports, adding new facilities to promote tourism and enhance creating new economic zones to attract further investments in various activities. The strategy of GOE with respect to transportation calls for adopting a multimedia transport system, in line with that used in other developed countries; make cargo-handling stations services available within and outside seaports, and encourage volume of container-handling operations to be closer to international rates. To maximize the volume of export traffic through Egyptian ports, GOE has attempted to improve efficiency and competitiveness of seaports; and carry out financial and administrative reform for various units of the transport sector; adopt modern, scientific methods in management and operation. The successful implementation of the above-described strategy depends on involving the private sector, via attractive investment packages.

The environmental problems associated with marine and inland water transport emerge from land-based sources of pollution, such as industrial activities, or water-based sources of pollution, such as oil spills. The construction of ports and other berthing facilities have impact on the quality of water, and usually are the site of solid wastes. If the planned

[1] Refer to the Environmental Profile, NEAP, 2000.

expansions are not implemented abiding with environmental standards, the problems that associate with marine and inland water transport will intensify.

2.5.2 Railway Transport

Railway transit has often been expensive to construct but also durable and efficient. Egypt has revamped existing railways and developed new ones, such as the railroad connecting Ismailia and Rafah. Improvements to the existing system include electrifying the Cairo-Alexandria railway, which project will provide energy efficiency gains, be less polluting to the environment than the existing trains, in addition to other economic gains. Other efforts include developing the Ferdan Swing Bridge across the Suez Canal, relocating railway outside centers of the city and over hauling locomotives and carriages. Adding new railway stations, such as Shoubrah El-Kheima, is part of the efforts to improve railway transportation system.

In an attempt to solve congestion in the Greater Cairo Region, the Government has developed three-subway systems. There are plans to develop another 3 lines in the Greater Cairo Region. The success of subway system in Cairo encouraged considering the development of a subway system for Alexandria.

The environmental impact of rail transport on land is taking rights of way and terminals. Abandoned lines, equipment and rolling stock turn to be major solid waste problem and an eye soar causing visual blight in human settlements. The negative impact of rail transport is noise and vibration around terminals and along railway lines. Another effect of rail transport is dividing human settlements that could negatively affect neighborhoods. The newly developed network in the desert could possibly destruct natural habitats and wild life.

2.5.3 Road Transport

Installing subway systems is not the only means of improving transportation within and between human settlements. The Government has completed several vital roads. To increase the carrying capacity of the networks, the expansion means losing land for roads.

Buses are an important means of transport for the people of Egypt. Mini buses and micro busses account for 50 percent of bus usage in Cairo and on regional routes. Road transport is among the major sources of air pollution, especially nitrogen oxides and carbon dioxide. These air pollutants end up polluting both surface and ground water and soil as well. Soon Vehicle Emissions Testing (VET) will apply to taxis, busses, pickup trucks etc, not just to private cars.

Often informal developments grow nearby major routes. The new informal developments around the ring road of the Greater Cairo Region is an example of how agricultural land was lost to improve road transportation in the region. Constructing elevated routes and bridges, such 15th of May and Sixth of October in Cairo are another visual blight that damages the image of the city and add to her degraded air quality.

2.5.4 Air Transport

With an expanding economy, the need for airport facilities increases. Today work is under way for establishing the new passenger terminal at Cairo International Airport. Air pollution is among the major environmental costs of air transport. Land allocated for airports and buffer zones is another environmental cost that must be paid for the advance of this vital sector of the economy. Noise is another environmental hazard associated with air transport. There is a need for a sound contour map of the areas around airports and to use that in developing a system for fining planes that are over 25 years old and exceed permissible sound levels. The development of new airports, particularly at tourist

attractions, should be carefully planned and developed to avoid harmful impact on wild life and natural habitat. It is GOE policy to increase the number of airports from 17 to 30.

2.6 Tourism

Egypt, for over seventy centuries, maintained a world culture and civilization that has generously contributed to the rest of the world. Tourism continues to be a main source of hard currency for the country, playing an important role in the balance of payments. The industry currently ranks second among Egypt's major sources of foreign currency. Tourism is a fast growing sector in the Egyptian economy. More growth is expected in the tourism industry in the coming years as foreign investments continue to increase.

Tourism and the Environment

Tourism depends on the environment to sustain it as it relies on the utilization of natural, historical, cultural, and human resources in the local environments. The current boom in the tourism industry is expected to be sustained by developing new types of tourist activities such as safari tourism and eco-tourism.

i. Positive Impact

The generated income from tourism assists in the development and improvements of facilities for protecting and regenerating environmental resources that benefits both the residents and tourists as well. However, in order to reap these benefits better management of tourism is needed and the industry should operate within an overall plan that preserves the natural and cultural heritage of Egypt, upon which the tourist industry depends.

ii. Negative Impact

The quality of the environment is frequently the primary attraction of tourists. However, their presence in increasing numbers accelerates all the problems caused by human recreational activities. This can lead to a considerable pressure on the environment that attracted tourists in the first place and in particular on the local environment where tourists visit.

The phenomenal coral reef formation is vulnerable to environmental changes, such as climate change. Harmful activities also threaten the existence of coral reefs, such as sewage discharge, spillage and human handling. In addition, fast development of tourism in Hurghada, Sharm El-Sheikh and on the Gulf of Aqaba has led to building more hotels to accommodate for the increase in number of local and international tourists put more pressure on the fragile eco-systems in these areas. Thus, there is a threat to Egypt's coral reefs and immediate action is required protect this precious natural gift.

2.7 Human Settlements

The human settlements of Egypt are suffering from many interrelated problems: population distribution, housing problems, growing informal areas, traffic congestion, inadequate provision of social services and utilities, inadequate urban and regional planning systems and degrading sites of cultural heritage. These problems are the major concerns of this environmental action plan as they affect not only the human settlements but environmental issues in general. [1]

[1] Refer to the Environmental Profile, NEAP, 2000.

2.7.1 Causes of the Problem

i. Natural Population Growth

In 1996, the year of the last National Census, the population of Egypt exceeded sixty million. The annual population growth rate of between 1986 and 1996 was 2.1 percent per annum and it is unlikely that natural population growth will be drastically curbed in the near future. Population distribution, as presented in Part one, shows that most of the population lives on about 4 percent of the gross area of the country. This percentage increases over the time because of the huge projects implemented by the Government to increase the populated area in the country.

ii. Inequities

The gap in the distribution of power, status and wealth between Cairo and the countryside can be traced to Cairo exploiting the resources of the countryside. This has led to a condition of excessive primacy in which Cairo dominates the remainder of the country and hinders other parts from developing. Within the Cairo metropolitan area formal and informal settlements co-exist close to each other. The diverse of modes of transportation is another physical manifestation of this relationship between those who have and those who have not.

iii. Rural-Urban Migration

Waves of rural migrants move to urban centers due, in part, to disparities in income and physical and social services. The infrastructures of Egyptian urban settlements were not ready to accommodate those new comers. Rural to urban migration coupled with the natural population growth led to rates of very rapid urban growth in population size and spatially as well without a proportionate increase in the growth rate of jobs, social services and utilities.

The rapidly increasing urban population required a commensurate increase in the number of jobs. However, the manufacturing sector has lagged behind population growth, especially where the leaders of the sector favored imported capital-intensive technologies. Most of the urbanization that occurred in Egypt was not the result of industrial growth and economic development, but rather the outcome of population growth. The result has been inflation in the service sector of the urban economy.

2.7.2 Consequences

i. Housing Problems

The need for housing is one of the most pressing problems in urban Egypt, and the urban housing shortage has reached a critical point, especially in the low-income category. This situation has become increasingly worse since the role of the Government in providing adequate housing has been limited, due to scarcity of funds. The combination of rapid urban growth, regressive housing legislation such as rent control, scarcity of adequate developed urban land, and rising costs of construction have combined to create this situation. With privatization, the unequal accumulation of wealth has led, and continues to lead to a growth in land prices that made it increasingly difficult to meet the housing needs of low-income people. This has created a situation where a large proportion of urban population became unable to afford basic shelter legally.

Having reviewed the results of the 1996 census, it would seem that Egypt does not suffer a short- or long-term shortage of housing services. The problem is horizontal disequilibria of the distribution of housing services among individuals, i.e., few persons consume many housing services, and many people do not consume enough housing services. The

analysis of this situation is clearly presented in the Environmental profile produced by the NEAP at year 2000.

ii. Informal Areas

Informal settlements came into existence as the inevitable outcome of the housing needs of low-income groups. An informal settlement is an area that does not meet either the minimum planning standards nor the building codes or even the legal recognition. These areas lack physical and social infrastructures and their economic viability is based on the informal sector. The overwhelming spread of informal areas inside and on the fringes of cities is the result of a number of interrelated factors. This includes steady high rates of population growth over a long period, high levels of residential densities, and shortage in the supply of both developed urban land and sufficient number of affordable dwelling units. Furthermore, successive influx of rural migrants to urban centers complicates the matter. For the residents of these informal areas**,** informality is the only way to secure jobs for the poor that meets their housing needs at an adequate price.[1]

There are number of locations housing garbage collectors around the Greater Cairo Region including Ezbet El-Nakhl, Mansheit Nasser, Ein El-Serra, Tohra, , Al-Barageel, , and Mo'ttammadia. All these settlements developed informally as a function of the technology used in collecting solid wastes, such as pick-ups, a donkey and a cart…etc. from the dwellings and establishments that fall within their domain.

iii. Inadequate Provision of Social and Physical Infrastructures

Rapid population growth strains physical and social infrastructures. Densities build up in existing housing and cause rapid deterioration to the built environment. The relationship between social services and the environment is critical. Inadequate provision of social services leads to poor environmental behavior and continuous environmental degradation. Egyptian human settlements suffer from inadequate provision of social services, such as education, health, and green areas. Some schools operate more than one shift a day and classes are overloaded. In response to this problem, the Ministry of Education has launched an ambitious program to build a school each day. The program has eased the situation, yet population growth is far above the rate of execution of this program.

Health services are also stretched beyond their limits. The Ministry of Health and Population has embarked on improving the levels of service delivery, and expand and develop new clinics and hospitals to meet the needs of a growing population. In the sphere of physical utilities, the Ministry of Housing, Utilities and Urban Communities in collaboration with local administrations have plans to provide almost all human settlements with safe drinking water. Their plans include expanding networks for collecting wastewater and develop treatments plants within the coming three five-year plans. The Ministry of Electricity and Power plans to improve the capacities of electric networks to meet the growing need for energy. The Ministry of Petroleum has already launched a program to use natural gas in residential districts in many urban settlements. The major source of financing these interventions is the Government budget, which often operates on deficit.

iv. Traffic Congestion

Most Egyptian settlements suffer from traffic congestion, which creates many economic, social, and environmental problems. Traffic congestion results from unmanaged land uses within the country and the metropolis. The volume of trips generated that networks

[1] Refer to the Environmental Profile, NEAP, 2000.

distribute is a function of land uses. Congestion is also a function of modes of transportation on the network and the size of links as well.

Environmental problems can be expressed in terms of air pollution, noise, and deterioration of urban environment and historical areas. The main reasons for these problems are inefficient use of land, too many cars and minibuses relative to the capacity of the road network, and the polluting emissions that result.

v. Noise

Although not listed as a major pollutant, noise can be regarded as an atmospheric pollutant since it depends upon the ability of air to transmit sound waves. Moreover, noise pollution is an increasing feature of urban life and has received growing attention in recent years. The major sources of noise pollution in Egypt are road traffic, general neighborhood noise, and social, cultural and leisure activities. Other significant sources of noise include manufacturing and handicraft activities, construction work, railway traffic, and aircrafts. Noise pollution can have an effect over human health and welfare. Long-term exposure to noise may result in the permanent impairment of hearing ability.

vi. Visual Blight

Almost all villages and cities in Egypt suffer from visual blight of varying degrees. This problem arises from the fact that there is no uniformity in the use of architectural styles, from the unarticulated distribution of pavements or plants, and above all from the ugly advertisements along the streets and over the roofs of buildings. This chaos of colors, shapes and styles hurts the perception of users and degrades the attractiveness of the cities for residents and visitors. Visual blight results from violating laws and regulations that govern placing an advertisement and failure to enforce land use plans.

vii. Gender Related Issues

Women have a role in the development of the community because they are responsible for reproduction of labor, they work inside and outside the house, and they have a role in the management of the community. Women predominate among rural urban migrants. They often migrate with their spouses, or as members of large families, searching for jobs. Few women can find opportunities in the formal sector so the majority joins the informal sector. According to the National Council for Women, the Egyptian women frequently encounter long working hours for low earnings, with wages that are below the average rate and below the wages for men doing the same job. Long working hours conflict with women's household obligations. Nevertheless, they work because they aspire to have an income sufficient to meet their families' needs.

2.8 Difficulties facing Environmental Policy Making

The institutional setup within which environmental policy is implemented in Egypt faces a number of difficulties. The lack of comprehensive data and up-to-date information is a severe limitation on decision-making and monitoring. The major problem is the multiplicity of implementing organizations that require coordination to achieve effective delivery of environmental policy. Furthermore, there are cultural constraints. Another barrier is that Egypt's human resources are weak in terms of environmental expertise, thus posing another difficulty for implementation of environmental policy.

Each of these weaknesses in the prevailing system is improving gradually over time and one of the reasons for undertaking planning exercises such as the NEAP updating is to transform the institutional structure within which problems are raised. The NEAP provides substantive guidelines for the planning procedures that the various stakeholders in implementation of environmental policy can use.

2.8.1 Coordination Overload

The amount of coordination that is required to attain comprehensive and integrated environmental activities is enormous because of the cross-sectoral nature of environmental issues. The institutional structure for implementation of environmental policy is described in Part V. Three layers of government are involved (central ministerial departments, Governorate level authorities, and local level public administration), and numerous governmental agencies such as GOFI, GOPP, etc. In addition, the private sector has a role to play, as does academia, NGOs and donor agencies.

It is clear that considerable coordination is required in the environmental field and, although EEAA has primary responsibility for coordination, numerous other committees and organizations are also charged with coordination of environmental policies, implementation and/or monitoring[1].

i. Policy Coordination

The nature of decision-making varies according to its level in Egypt. At the top policy level there are Cabinet Committees on each of the major cross-cutting environmental issues (such as water, energy, air pollution…etc). Once government policy is set MSEA and EEAA still face considerable obstacles to coordinating national environmental policy. Environmental policy often generates contentious policy questions. These conflicts manifest the property contradiction of environmental assets i.e. the contradiction between the use value of the resource, which the society appreciates, and the market value of the natural resource. The market value is often the basis for evaluating alternative policy, strategic, planning and project options.

ii. Coordination of Implementation

Practical difficulties with coordination emerge at lower levels of decision-making due to the large number of implementation bodies that are named as 'responsible' by the many laws and decrees that have environmental implications (see Annex VII). The situation that faces many administrators is that if they were to undertake all the coordination that is recommended for all the projects and activities that they are responsible for, they could be in coordination meetings all their working hours and still not be able to attend all the recommended coordination meetings. Hence the *de facto* situation is that line responsibilities take priority.

Addressing inadequate coordination by asking for more coordination adds another layer of coordination and makes matters worse. Better solutions are likely to emerge from new ways of addressing the planning process, such as by encouraging more involvement by local stakeholders, by giving them rights in local implementation decisions. Just how this will impact coordination bottlenecks higher up the system is an empirical matter that can be studied when the picture emerges.

iii. Coordination and Data Sharing for Monitoring

To operationalize the current environmental policy, the NEAP tries to change the emphasis of environmental planning in Egypt from emphasis on project level activities resulting essentially a project driven approach that donor priorities shape on one hand. On the other hand, NEAP tries to change the sectoral nature of Government ministries that did not benefit from an integrated plan on the other changing that strategy type of planning into an issue-specific integrated plan.

A prime constraint on environmental decision-making is the erratic quality and coverage of data. Some environmental data is collected regularly and accurately but may not be

[1] Refer to the Environmental Profile, NEAP, 2000.

available to EEAA. Some other data collection processes were developed with project funding and are widely available but the data sets cease when project funding was terminated. There is no nation-wide agreement on metadata so comparability of available data is compromised. These and numerous other problems with availability of data for environmental analysis and decision-making are hampering the national capability for optimum use of its environmental resources.

2.8.2 Knowledge Gaps

Markets and monitoring both depend on reliable and regularly collected data and information. Market mechanisms operate best when property rights are well defined, exclusive, secure, transferable and enforceable and are attached to all resources, goods and services. Currently environmental resources do not meet these criteria.

i. Pricing Environmental Resources

Natural resources need to be priced for their social value not for their market value. Currently those resources that have a market price are carrying a distorted price, usually much undervalued. The question of how to price natural resources is the subject of an extensive debate in the economics literature, and Egypt must necessarily move into social pricing of environmental resources with care.

ii. Data Deficiencies that Hinder Monitoring

The essential components for effective environmental monitoring are consistency and continuity. If the database or collection system from one source is inconsistent with the base or system used by another source of data, conclusions cannot (or should not) be made based on comparison of the two data sets. In Egypt there are many governmental and academic bodies collecting data but it is rare to find full comparability between any two sources.

Furthermore, environmental data need consistency and continuity over time because it is generally changes, deterioration or improvement that are of interest. Many Egyptian data sets have begun as part of a development project supported by donor funds. Unfortunately many lapses once the foreign-assisted project is finished. For decision-making purposes, monitoring the state of the environment over time needs to be supplemented with information concerning violations of the laws. Data concerning violations is not available because of lack of enforcement of existing laws. Insufficient personnel devoted to enforcement are the primary cause of this situation. The precondition for having sufficient people engaged in enforcement activities is that funds are available to pay their salaries and transport and equipment costs. The post-hiring requirement is that good training is given, which is far easier to deal with than the precondition.

2.8.3 Legal Problems

The knowledge deficiencies for decision-making that have been mentioned above also have legal implications, particularly the pricing of natural resources. However, the two more immediately apparent legal issues are the need to rationalize environmental legislation and to adjust the standards that are nominated in accompanying regulations.

i. Rationalizing Environmental Legislation

There is much duplication and overlap in legislation related to environment, as mentioned previously (and can be seen from the tables in Annex VII). A major rationalization of Egypt's environment-related legislation is required, and to do so will require a great deal of coordination and persistence. A study of international experience in coordination and rationalization of environmental legislation should be the first step. Even when duplications have been eliminated and all current issues are addressed, there must be a

system in place for regular review. New issues, especially in genetic engineering and information technology, mean that updating of environmental legislation will need to continue, even when the current situation is fully covered.

ii. Style and Standards

Traditionally Egyptian environment-related legislation has provided command and control style of regulations dealing with end-of-pipe situations. Nowadays economic instruments are seen to be a more flexible and effective means of attaining environmentally desirable ends. Thus the re-vamping of environmental legislation also needs to provide more scope for the introduction of economic instruments. Also the standards that have been nominated in executive regulations accompanying various laws are sometimes outdated and need to be brought into line with current conditions.

2.9 Costs of Environmental Degradation

Pollution is closely associated with health problems and it negatively affects the economy, thus threatening the sustainability of the development of Egypt. This section draws conclusions of the impact of environmental pollution from a wide range of studies[1]. Although these studies are not comprehensive due to the lack of sufficient reliable and creditable data, yet the findings indicate the seriousness of the association between environmental pollution and health problems in Egypt.

2.9.1 Impact on Human Health

i. Water Pollution

Unsafe drinking water can be a carrier of communicable diseases (cholera, typhoid, paratyphoid, diarrhea, dysentery, infective hepatitis) and some parasitic diseases (e.g. ascaris, giardiasis). The indiscriminate discharge of human wastes into water bodies has created significant pollution problems with serious health implications. The major pathways of concern are to groundwater, internal or external contamination of crops, and translocation to grazing animals. Egypt's major water quality problems are pathogenic bacteria/parasites, heavy metals and pesticides.[2] Waste water reuse in Agriculture

Egyptian legislation prohibits the use of effluent waters for the cultivation of vegetables or fruits, except citrus fruits. However, as a result of the scarcity of clean water and the need to increase food production, water is extensively reused. Pesticides enter the hydrosphere via many pathways: direct application; discharge of wastewater, runoff from non-point sources, and leaching through the soil. Crops irrigated with contaminated water may take up contaminants through the soil and roots, or may retain the contaminants on the crop surface after contact with irrigation water that subsequently evaporates. During 1998 approximately 5,300 pesticide-poisoning cases were reported.

Health risks from the use of untreated and partially treated wastewater in agriculture include bacterial infections (typhoid, paratyphoid, cholera); viral infections (viral diarrhea, hepatitis A); intestinal nematodes, trematodes, cestode infections and accumulation of heavy metals and organic toxins in the soil.

Industrial wastewater is a major source of heavy metals. Once discharged to waterways, heavy metals attach to sediment particles from where they are taken up by bottom-dwelling organisms. The subsequent consumption of these organisms by others produces successively higher concentrations, until the concentrations in the organisms at

[1] Refer to the Environmental Profile, NEAP, 2000.

[2] Ibid

the top of the food chain are toxic to humans. The condition of Lake Manzala a few years ago illustrates the impact of heavy metals, where fish were dying by the thousands.

ii. Air Pollution

Air-borne pollutants from vehicle emissions, electricity generation and industrial production frequently exceed levels considered safe for health. Depending on their size, particulates can influence visibility as well as human respiratory functions. The fifteen million Egyptians living in Cairo and Alexandria, for example, are exposed to levels of dust and smoke in which total suspended particulates (TSP) exceed WHO standards. For more details refer to Volume One: Environmental Profile.

Air-borne pollution particles may contain several toxic and carcinogenic chemicals. Combined with other pollutants, they can cause serious lung diseases. The most serious health effect of carbon monoxide is its ability to enter the blood stream by displacing oxygen carried to the cells. Carbon monoxide-laden blood can weaken heart contractions thereby decreasing the volume of blood being pumped and significantly reducing the normal performance of an otherwise healthy person. For more details refer to Volume One: Environmental Profile.

Lead in the air has received particular attention because of its health impacts, particularly on children. Exposure to lead in childhood associates with retarded central nervous system functioning, which persists into adulthood. Attempts are being made to relocate lead smelters to more remote areas. Lead concentrations in the air from mobile sources have recently decreased considerably due to expansion in use of Compressed Natural Gas (CNG) and the introduction of unleaded fuel. However, there are now debates on the health effects of additives to unleaded fuel.

The "SMOG" episodes that Cairo experienced in the falls of 1999 and 2000 resulted from high levels of air pollutants in the atmosphere of Greater Cairo. Average annual wind speed in Greater Cairo is only six knots and the frequency of inversions is high, especially at night during winter. This means that Cairo weather conditions will continue to facilitate such SMOG episodes if air quality is not improved.

In rural areas health damage from air-borne pollution is primarily associated with open-air incineration and proximity to industrial establishments, although the toxicity of paint fumes, adhesives and suchlike products also pose health risks. Significant percentage of reported cases of pneumonia disease were detected in rural areas.

iii. Solid Waste

The major health dangers of solid waste pollution arise from the toxic materials included in the waste stream, which then leach into groundwater or become air-borne through burning. In addition, the organic matter in municipal solid waste is a breeding ground for germs and attracts pests, rodents, and snakes. Organic material combined with plastics creates the conditions for self-combustion, creating fire hazards and releasing toxins into the atmosphere.

2.9.2 Impact on the Economy

The effects of pollution are not limited to human health but extend to monuments and materials of economic value. Air-borne sulfur dioxide, for example, is a major factor in the deterioration of the Sphinx (see section on cultural heritage).

Tourism development on the Red Sea coast and in South Sinai are generating new jobs and increasing Egypt's share of the global tourism market. However, without enforcing environmental regulations on new development activities to save the natural habitat and

preserve the monuments of Egypt, the tourism industry will lose its main assets, and consequently face a decline in income from that sector.

Agricultural exports are also threatened by environmental degradation. Without controlling the use of pesticides and chemical fertilizers, rationalizing water use, and improving other farming conditions, Egypt could lose its market share in agricultural exports such as onions and potatoes. Industrial establishments have to acquire ISO 14000 or similar certificates to export their products abroad as eco-labeling will soon be a requirement to export to European countries.

Valuing the Environment

Most opinions attribute environmental degradation and practices that could abort sustainable development to unmanaged economic expansion, rapid population growth, poverty…etc. However, these are the apparent causes. From the perspective of Western economic analysis, the underlying explanatory factor for most environmental problems is the failure of markets, institutions and public policies to provide adequate incentives for investments in efficient and sustainable management of natural capital. Public policies fail to achieve their aim in two cases: (i) when the Government intervenes in a way that disturbs market mechanisms; and (ii) when Government decisions or policies are themselves responsible for excessive environmental degradation.

Fiscal, monetary, international and sectoral policies provide examples of how macroeconomic and sectoral policies can encourage processes for environmental management and show that the relationship between income generation and environmental degradation is significantly affected by national and local policies. Appropriate Government intervention can bring about more desirable, more efficient economic and environmental outcomes.

Economic statistics and independent reports suggest that the momentum of economic growth that Egypt has experienced lately will continue into the coming decades. To accelerate and sustain rates of economic growth, there will be efforts needed in the spheres of social development and regeneration of environmental resources. Continued current rates of economic growth will exert more pressures on human and natural resources of Egypt.

Achievement of environmentally sustainable development requires that there are appropriate incentives, regulations, and capacities in place to protect the environment and maintain the requisite ecological balance[1].

[1] Refer to Section Four "Financing to NEAP"; Section Five "Institutional Building and Legislation".

Part Three: Agenda for Action

3.1 Water

One of the major challenges facing the water sector in Egypt is to close the rapidly increasing gap between the limited water resources and the escalating demand for water, which is created because of development in various economic sectors. To meet the increasing demand and at the same time ensure the sustainable use of water resources, Egypt has to optimize the use of conventional resources and make the use of non-conventional resources more feasible.

The Ministry of Water Resources and Irrigation (MWRI) is mandated to control and manage all fresh water resources in Egypt, including surface and subsurface water. Other mandates include constructing, supervising, operating, and maintaining all the irrigation structures and drainage networks. The Ministry is also responsible for providing all other sectors with their needs of fresh water in due time.

The Environment Law No. 4/1994 has been issued to protect the environment in Egypt in general. The law refers to Law 48/1982 that deals with pollution abatement in all water resources in Egypt. It also mandates the MWRI to implement the law in collaboration with other concerned ministries. The mandate of law 12/1984 is different as it is concerned with governing the management and operation of the irrigation and drainage systems in Egypt.

3.1.1 Water Quantity and Quality

The Ministry of Water Resources and Irrigation has prepared a National Water Policy till the year 2017 including three main themes: (i) optimal use of available water resources; (ii) development of water resources; and (iii) protection of water quality and pollution abatement. Various affected stakeholders individuals, organizations, or governmental entities have participated in policy development prior approval by the Cabinet of Miniseries and People's Assembly.

At present, Egypt is addressing the issue of limited water quantity by managing the demand side. MWRI formulated a water master plan in 1981. This plan is currently updated. The process of updating the water master plan aims to allocate available water resources according to various needs and demands that are feasible from the economic perspective. It also aims to gain social acceptance and political support. The Water Master Plan is updated through the National Water Resources Plan (NWRP) project. The NWRP has been operated since 1998 and jointly funded between MWRI and the Netherlands Government. This project is directed towards developing a National Water Resources Plan that describes how Egypt will safeguard its water resources both quantity and quality and how it will optimize the use these resources in response to the socio-economic and environmental conditions. The project will be completed by end of year 2002.

i. Water Policy Themes

1. Optimal use of available water resources

The optimum use of all available water resources can be achieved through an integrated future plan at both national and local levels. This plan should translate the overall policy targets into long-term programs. It is important to examine and review the impacts of

these programs on the socio-economic development of Egypt. In the mean time, the government of Egypt intends to reclaim an area of 3.4 million acre to increase the current 8.0 million acre of agriculture land.

To implement these ambitious policy themes, MWRI has embarked on several programs including the improvement of the irrigation systems on the level of branch and field canal in an area of around 400,000 acre in the old land. It is expected that this outcome of this program will help saving the irrigation water by 5-10 percent. Installation of the Nile drainage systems in an area of five million acre and rehabilitation of old drainage network in another 1.5 million acre. This would leach salt from the soil profile and improve the soil fertility. Other programs are the rehabilitation of irrigation and drainage pumping stations Introducing new crop varieties as early mature and salt tolerant; and replacing and rehabiliting the existing grand barrages and structure on the Nile and main canals. The following is the set of proposed strategies to achieve optimum use of all the available water resources.

Minimize water losses

The main proposed actions to minimize water losses are as follows:

- Use of pipelines to transfer water in the new land especially at the locations of high porosity soils.
- Gradual expansion of groundwater wells for use as a secondary source of water on the farm level to decrease conveyance losses in third order canals.
- Replacement of the level-based water distribution system to the flow-based water distribution system through calibration of control structures.
- Introduction of new technologies for canal maintenance and weed resistance.
- Improvement of the River Nile navigation path and facilities to reduce and eliminate the additional amount of water that is released for that purpose during the winter season.

Irrigation improvement project

The main objective of the irrigation improvement project in the old land is to improve the efficiency of water use at the *mesqa* and farm levels. It also initiates the user participation in the operation and maintenance of the irrigation system.

The framework of the irrigation improvement project in Egypt includes rehabilitation and renewal of water structures, use of pipeline and raised *mesqas*, use of one point collective pumping from branch canal into *mesqas*, and land leveling using modern techniques. Other actions include redesign of the field irrigation systems. It is crucial in that regard to consider the formulation of water user associations that reflects the new vision for the water distribution management process.

Cost recovery

The Ministry of Water Resources and Irrigation is responsible for entirely allocating the required financial budget to operate, maintain, and rehabilitate the irrigation and drainage systems. Increasing demands for water by all users will need continuous improvement and rehabilitation of the water system, which adds more burdens to the government budget. Therefore, it is essential to set up a mechanism to enhance the farmers' participation in the operation and maintenance of the water system. Furthermore, the participation of the private sector is also crucial for the system management.

Cropping pattern shifts

Economic analysis demonstrated that there are substantial differences in the total economic returns of different crops cultivated in Egypt. It also indicated that water productivity in some regions is low according to the high water consumptive crops that

have low value added. The following policies are proposed to reduce agriculture water consumption:

- Gradual Replacement of sugar factories with sugar beat factories, as they were designed to process sugarcane.
- Reduce rice cultivated area to about 900,000 or one million feddans which should be sufficient to satisfy national demand, provide some potential for export, and prevent soil salinization and seawater intrusion.
- Replace currently used varieties of rice with the new shorter-life rice varieties, which have higher productivity, and require less water due to their shorter growing season.
- Develop new crop varieties using genetic engineering that have higher productivity and less water consumption and salt tolerant.
- Design an indicative cropping pattern for each region in the country based on climatologically conditions, soil characteristics, and water resources availability in terms of quantity and quality. Farmers could be advised to follow the indicative cropping pattern or pay for excess water if they deviate.

Groundwater development strategies

The groundwater policy aims to encourage agricultural development of desert areas. These areas will be the basis for initiating new communities that can absorb part of the highly concentrated population in the Nile valley and Delta. The expected increase in the future demands for groundwater requires continuous monitoring and evaluation of the groundwater aquifers to avoid any possible deterioration in these aquifers due to miss or over use.

<u>The Renewable aquifer underlying the Nile Valley and Delta</u>

The groundwater in the Nile valley and Delta region cannot be considered an independent resource as it gets recharged only from seepage losses, the River Nile canal and drainage networks; and from deep percolation losses of irrigated land. The strategy of groundwater depends on the conjunctive use of Nile surface and groundwater through:

- Utilization of the aquifer as a storage reservoir used to supplement surface water supply during peak periods and recharged during the minimum demand periods.
- Use the vertical wells drainage system in Upper Egypt to prevent the groundwater table from reaching the root zone avoiding water logging and increasing productivity.
- Groundwater could be used as a source of water for fish farms as it has consistent and steady temperature and good quality.
- Augment the canal water supply by pumping groundwater from low capacity private wells at tail ends of long *mesqas* where water shortage is experienced.

<u>Groundwater aquifers in Western Desert and Sinai</u>

Groundwater in parts of the Western Desert and Sinai is very deep and this needs huge investments to be utilized. Therefore, future strategies for best utilizing groundwater in the Western desert and Sinai include:

- Use of the modern technologies for determining the main characteristics of each aquifer, its maximum capacity and safe yield. This data should be the basic criteria for selecting the most suitable projects that could use such aquifers as a sustainable source of water.
- Use of non-conventional sources of energy, such as solar and wind energy to minimize the costs of pumping.
- Use of new technologies for farm irrigation in desert areas to minimize field losses especially deep percolation due, in part, to the high porosity of such soils.

Reuse of agricultural drainage water

MWRI is considering drainage water reuse as a main source to meet part of the irrigation water demands. The reuse of drainage water increases the overall efficiency of the water system; but it must be regulated to prevent future environmental impacts. Future strategies for drainage water reuse are as follows:

- Increase the amount of drainage water reuse from about 5.0 BCM/ year in the year 2000 to around 9.0 BCM/year by year 2017 with average salinity about 1170 ppm. This could be achieved through implementing several projects to expand the reuse capacity at different areas. Main future projects include El-Salam canal project, El-Umoum Drain project, and El-Batts Drain project.
- Establish an integrated information system for water quality monitoring in drains using the existing data collection network.
- Continuous monitoring and evaluation of the environmental impacts due to the implementation of drainage water reuse policy especially on soil characteristics, cultivated crops, and health conditions.

Reuse of sewage water

The MWRI future policy for utilization of such source could be summarized as follows:

- Increase the amount of secondarily treated wastewater use from 0.26 to 2.8 BCM/year by year 2002 and to 4.5 BCM/year by year 2017.
- Limit the use of treated wastewater to cultivate non-eatable crops, such as cotton and flax.
- Separate industrial wastewater from domestic sewage, so that it would be easier to treat domestic sewage with minimum costs and avoid the intensive chemical treatment needed for industrial wastewater.

2. Water resources development

In addition to achieving best utilization of available water resources, the MWRI is investigating the possibilities of developing new water resources or increasing the availability of existing resources to meet future increasing demands. In that regard, the future water policy for Egypt will include the following strategies.

Increase Egypt's share of the Nile water

Almost 85 percent of the Nile water originates from the Ethiopian highland through the Sobat River, the Blue River Nile, and the Attbara River. The rest originates from the Equatorial Lakes Plateau through Bahr El-Ghabal. A very small portion comes from Western Sudan through Bahr El-Ghazal. According to the Nile water treaty with Sudan, Egypt's share of the water was fixed at 55.5 BCM/year by the 1959.

Bilateral cooperation with the River Riparian started through joint agreements to develop the River-shared resources. Studies clarified that large amounts of Nile water is lost before it reaches Aswan. Accordingly, there is a modest potential to decrease these losses through implementing joint projects with other countries in the Nile basin. Three projects had been identified, namely, Jongli Canal, Bahr El-Ghazal, and Mashar Marshes projects, which will add about 9 BCM/year to Egypt's share of Nile water. However, the MWRI does not entirely depend on these projects, as they will be implemented outside the borders of the country and require great efforts in the sphere of political negotiation and cooperation among the countries of the River Nile.

Since the cooperative development holds the greatest prospect of bringing mutual benefits to the region, the Nile riparian, including Egypt, has taken a historic step in the establishment of the Nile Basin Initiative (NBI). The Council of Ministers of Water Affairs of the Nile Basin States formally launched the Initiative in February 1999. The initiative

includes all Nile countries; and provides an agreed basin-wide framework to fight poverty and promote socio-economic development in the region. The Nile countries seek to realize their shared vision through a Strategic Action Program, comprising basin-wide projects, as well as sub-basin joint investment projects. The basin-wide Shared Vision Program, a broad based program of collaborative action aims at exchanging experience and promoting capacity building activities. At the same time, group of other countries, one in the Eastern Nile and another in the Nile Equatorial Lakes region, have identified joint, mutually beneficial investment opportunities at the sub-basin level. To raise broader donor support for the Nile Basin Initiative and its portfolio of cooperative projects, a first meeting of the International Consortium for Cooperation on the Nile (ICCON) was conducted during June 26-28, 2001 in Geneva through which the donor community pledged around 140 million USD to support the NBI programs.

Desalination of Brackish water

The MWRI is looking for the utilization of the low salinity brackish groundwater in irrigating certain seasonal crops. This amount of water is available at shallow depths in the Western and Eastern Deserts and at the borders of the Nile valley. The average salinity of such water varies from 3000 to 12000 ppm. The future strategy of the MWRI in that regard takes the following into consideration:

- This source of water can be considered an independent resource that can be used as a supplementary water supply source to meet part of the water demands in desert areas, especially near to the northern shoreline. The level of treatment of this water will depend on the type of use whether it will be for municipal or agriculture needs. This amount of water could be used with minimum treatment to irrigate certain perennial or seasonal crops.
- Non-conventional sources of energy, such as solar and wind energies could be used in the treatment process to minimize the cost and increase its economic value.
- This source will be used as a supplementary source to rainfall water to increase land productivity by cultivating two crops per year instead of one.

Harvesting of rainfall and flash floods water

Studies indicate the possibility to conserve about 2.0 BCM/year from flash floods. MWRI considers the flash flood on the top priorities of the national agenda, because of its economic benefits and negative social impacts. The future strategies of the MWRI for flash flood risk assessment and utilization considers the following:

- Use of modern technology in remote sensing areas and GIS to examine the basic characteristics of the stream network that contribute to flash floods.
- Adjust High Aswan Dam daily release during the occurrence of flash floods over a certain area that drains its water to the River Nile.
- Avoid hazards from flash floods by designing risk zone maps for major bottlenecks on the basin streamlines. Furthermore, identify areas that lie in risk zones to take proper precautions to avoid any possible hazards.

3. Water quality protection and pollution abatement

Policy theme

The policy theme is realized through preventive measures and long-term policies. The preventive measures are carried out through the regular assessment of the water quality status and suitability for various uses. Moreover preventive measures include enforcement of laws to protect water resources from pollution. The Ministry of Water Resources and Irrigation formulated a National Program for Water Quality Monitoring in the Nile, canals and drains and Lake Nasser. The Central Laboratory carries out the

substantial lab work for Environmental Quality Management affiliated to National Water Research Center. The monitoring program includes 300 locations for surface water and 230 locations for groundwater. The long term policies to control pollution include covering open conveyance system passing through urban system to closed conduits; coordinating with other concerned ministries to set priorities for wastewater treatment plants due to budget limitation; introducing environmentally safe weed control methods either mechanical, biological or manual and banning the use of chemical herbicides. Subsidies on fertilizers and pesticides were removed and some long lasting effect agricultural chemicals were also banned. Public awareness programs are introduced to promote the issue of conserving Egypt's water resources in terms of quality and quantity.

Water quality management

As the quality of water gets worse, its scope of use narrows, reducing supplies and intensifying shortages. The MWRI in coordination with the other concerned ministries and authorities are implementing a long-term strategy for preventing pollutants from discharging to the Nile and other water bodies. The implementation of this strategy requires a comprehensive database that includes maps, and also an electronic database, a design for landfill sites based on sound hydro geologic information and impact assessment. The MWRI will establish a Water Quality Management Unit in co-operation with the Netherlands Government. The objectives of this unit are as follows:

- To co-ordinate between all related activities within the Ministry and its research institutes and the executive departments and authorities;
- To develop and execute training packages;
- To develop public awareness campaigns directed to other governmental sectors, stakeholders and the public;
- To develop strategic water quality plans on the regional and national level in co-operation with other ministries and stakeholders;
- To develop water quality database.

Other major project implemented by the MWRI, previously mentioned earlier in part "1.1", is the National Water Quality and Availability Management (NAWQAM) project. This project is directed towards developing a coordinated national system for sustainable water resources management in Egypt. The Egyptian institutions, in particular the MWRI have the capacity to manage water resources from a national perspective through the participation of other stakeholders and the usage of collaborative techniques. This includes the following activities:

- Building the MWRI capacity to prepare sustainable and comprehensive environmental analysis with regard to water quality and availability.
- Developing the management and professional capacity of organizations working in the issue of water quality and availability to effectively prepare policy options, make operational decisions based on improved "national level" data, and incorporate environmental analysis.
- Rationalizing water quality monitoring activities in a sustainable manner.
- Utilizing applied research and pilot projects to prepare guidelines towards implementing national strategies and action plans.

Groundwater quality management and protection in general is a complex task. Its complexity is rising from its multi-disciplinary institutional and regulatory requirements, socio-economic impacts, as well as its technical requirements. In Egypt, the protection efforts were ignored for many reasons; nevertheless, the issue has attracted the attention since the beginning of the 1990's. Since then efforts of protecting groundwater have been gaining momentum. During this period many actions were taken under the broad umbrella of groundwater protection. Among these actions two steps were achieved by the end of the 1990s, which are major milestones in the direction of protecting the

groundwater. Those are the establishment of the Groundwater Sector (GWS) with the mandate of protecting groundwater resources; and the preparation of the conceptual and technical frameworks for protecting groundwater by the Research Institute for Groundwater (RIGW) in cooperation with the UNDP and UNESCO.

Economic instruments

Using economic instruments is a powerful tool for proper utilization of water resources. Some implemented and suggested economic instruments include:

1. Encouraging private sector participation of in the environmental management through financial packages for industrial compliance.
2. Adopting the polluter pay principle.
3. Introducing incentives and tax exemption for promoting the adoption of clean technologies.
4. Removing of subsidies for agrochemicals.
5. Encouraging recycling efforts through the deposit recycling schemes, tax incentives for recycled material, grants and loans for recycling industries and reduction of custom tariffs on recycled raw material.
6. Reducing fresh water pollution resulting from industrial effluents through effluent charges, soft loans, and grants to finance the purchase of wastewater treatment equipment and tradable emission permits.

3.1.2 Managing Lakes

Degradation of the water quality of Egyptian lakes[1] is due, in part, to the uncontrolled discharge of human, industrial and agricultural wastewater. See Box (1). Polluted water is the reason for the decline in the fish-catch production and disappearance of many fish species. Fish production from the lakes along the Mediterranean coastal plain is estimated to be about 38 percent of the total fish production. The primary water concern is to prevent the water quality from deteriorating to the point of threatening fisheries production. Most vulnerable are the brackish Northern Coastal Lakes, where they are located at the end of the Nile system and have been exposed to changes in salinity. In addition, these lakes are losing their attraction as recreational resorts. These circumstances negatively affect the livelihoods of the population who depend on these lakes.

i. Coastal Lakes Assessment

- High mercury concentrations are measured in the coastal waters of Alexandria, which mainly originate from a chlorine-alkali plant and the agricultural drain. The average amount from the drain amounts to about 1.3 tons Hg/year.
- The main fresh water inflow in Lake Manzala originates from the tail ends of polluted drains.

Box 1: Lake Maryut

Lake Maryut is exposed to high inputs of industrial and domestic wastewater. The total BOD load into the lake amounts to about 150 tons/day. Part of the lake is anaerobic with bad odors as a result of hydrosulfide. Additional measures such as diversion of outfalls and drain outlets are necessary. Because the lake was exposed to industrial effluent for a long period of time, conducting a detailed survey on the toxicity of sediments and their potential impact on fish seems necessary for the restoration of the lake and its resources. High levels of mercury (Hg) were found in Mullus barbatus (1295 ppm, while 1 ppm is the WHO standard).

[1] Activities presented in this issue are not within the mandate of MWRI. However, MWRI is responsible for all the canals and drains that feed fresh water to lakes and delineating the shore line protection through the Shore Protection Agency, which also carry all the protection works.

- Together with untreated wastewater discharges from Port Said, the lake is exposed to serious pollution inputs. Despite these threats, the lake still provides the most important fish yields of Egypt (60,000 tons/y). Studies on the water quality of the lake show that the assimilative capacity of the lake is sufficient to take care of the organic pollution (BOD, COD).
- Oxygen concentration recovers rapidly to acceptable values outside the mixing zone of the main pollution inputs. However, the concentrations of some heavy metals (e.g. cadmium, copper and zinc) in bottom sediments remain far above natural values. Cadmium concentrations of more than 10 g/g are found in the Southern part of the lake, mainly as a result of a high input from the Bahr El-Baqar drain.

ii. Lake Quality Management Program

The Ministry of Water Resources and Irrigation and the EEAA have developed a program listed in National Strategy for Lakes rehabilitation and conservation with the full support of the communities living around these lakes. The activities of this program are to design and implement a monitoring program and to identify and control sources of pollution.

iii. Future Restoration Measures

- Pollution charges and taxes such as effluents, solid waste, and sewage charges should be used to discourage lake pollution that results from industrial activities and stimulate the shift to clean production technology.
- Marketable permits are highly effective when the damage per unit of pollution varies with the amount of pollution. Using marketable permits on Fisheries access, effluents and emissions help to provide limits to pollution and encourage the use of new technology.
- In order to manage lakes water quality and support the decision making at various levels of policy and planning formulation, implementation and follow up, we need to establish a database for the sources of pollution.
- An essential prerequisite for the successful lake management is the presence of supportive and sustainable financing mechanisms. The private sector has an important role to play in financing the restoration schemes.
- Establishing institutional body responsible for the management of the lakes consisting of the different agencies that have stakes in the lake.

3.1.3 Protecting Coastal Water

Pollution of coastal areas originates from land-based resources including towns and cities, industries, construction, agriculture and tourism. The contaminants that pose the greatest threat to the marine environment are sewage, chemicals, sediments, litter, plastics, and oil. Some of the materials are toxic and tend to accumulate in living creatures. See Box (2).

Pollution also originates from shipping, accidental spills of oil and chemicals and offshore activities. Therefore, an integrated management scheme to address marine pollution from land based and sea-based sources are required. This scheme should provide a framework within which the role of each stakeholder is identified.

Box 2: Coastal water quality

The Mediterranean Coast

According to the hydrological and eutrophication data collected during 1999-2000, the Mediterranean coast can be generally divided into three distinct areas: The area west of Alexandria, the area east of port Said, and the area falling between Alexandria and Port Said.

The collected data for the first two areas demonstrate low levels of chemical and bacteriological contamination, in accordance with the low level of agricultural and industrial activities in these areas. For the third area, substantial chemical and bacteriological contamination has been detected. Of particular concern is the west and east Alexandria areas where high levels of chlorophyll-a indicate high nutrient concentrations, as a result of the discharge of untreated and partly treated domestic sewage.

The Red Sea Coast

Collected hydrographical and eutrophication data during 1999-2000 generally indicate low levels of chemical and bacteriological contamination in the Red Sea, with the exception of some spots where water quality features contamination likely resulting from the discharge of untreated domestic sewage and industrial wastewater.

In order to assist decision making at all levels, we need to consider further measures. These include establishing a database system for coastal water quality and sources of pollution, producing maps for different coastal water and marine environment in Egypt and expanding appropriate monitoring and assessment programs.

Coastal Water Management Scheme

The MWRI developed a sustainable management scheme for coastal waters in Egypt. An integrated plan for managing and protecting coastal water quality is the output of this program. The expected results of implementing this plan are improved water quality that will have positive economic and financial returns on the cost of the program formulation and implementation. The activities of this scheme include:

- Update and extend existing contingency plans.
- In collaboration with relevant authorities, develop a system to control sources of pollution.
- Set criteria for brine disposal to the marine environment.
- Support wider ratification and implementation of relevant shipping conventions and protocol.

3.1.4 Drinking Water

Despite the rapid population growth in Egypt, the percentage of the population with access to municipal water supply has increased over the past two decades due to large investment in the water sector[1]. However, even though the development in the overall water supply coverage has been rapid and impressive, the service coverage varies widely throughout the country.[2] The parts of the population that have no access to piped water obtain their water from public standpipes (often connected to groundwater wells), street vendors or directly from canals and the river Nile.

i. Technical Assessment

Water losses

One of the major problems in potable water supply is the estimated 50 percent loss of water in the distribution networks. This problem costs the Government a huge amount of money every year. The annual amount of lost water in networks is estimated at 2.95 BCM. If the estimated cost of operation and maintenance for one cubic meter is L.E. 0.45, the annual wasted fund is almost L.E. 1.3 billion. This amount is equivalent to the total

[1] Refer to Environmental Profile, NEAP, 2000.

[2] Ibid.

annual investment of the National Organization for Potable Water, And Sanitation Drainage (NOPWASD).

Poor quality of drinking water

Poor quality of drinking water is a concern in many parts of Egypt. This is due, in part, to the fact that sources of raw water for many areas have become increasingly polluted, and therefore require more sophisticated treatment to produce drinking water of adequate quality. Furthermore, water treatment units are not always functioning properly as a result of lacking maintenance and proper operation. Even when water treatment is satisfactory, drinking water is sometimes contaminated in leaking distribution network, which are infiltrated for example by sewage. Rooftop water storage tanks have also been identified as another source of bacterial contamination of drinking water.

High domestic water consumption

Water has traditionally been viewed as a free commodity in Egypt. Government subsidies encourage wasteful practices. The price of water does not reflect the actual cost for providing it. Therefore, there has been no strong incentive for consumers to use water rationally and consequently the per capita water consumption is high, especially in areas where the water supply systems are well functioning.

The general policy of the government of Egypt with regard to the water supply sub-sector is to increase the efficiency of water utilities and shift from service beneficiaries to utility income. In order to achieve this target we need to establish a database for the uncovered areas. This will help planning for the full coverage with safe drinking water to all rural and urban formal and informal settlements.

ii. Water Quality Management Program

The Ministry of Water Resources and Irrigation has developed a program that aims to improve the quality of drinking water in Egypt? This program will minimize the potential health hazards resulting from water borne diseases. The program can generate financial returns plus its economic impact on the Egyptian society. The success of the program requires a progressive financial system to encourage the involvement of the private sector and non-government organizations to play a leading role in producing and/or distributing safe, running drinking water. The project is favorable for its social benefits driven from lowering rates of morbidity closely related to lack of adequate safe drinking water. The activities of this program will be as follows:

- To provide uncovered areas with safe drinking water.
- To develop an alternative system for production and distribution of drinking water employing user pay principle.
- To evaluate the use of compact systems.
- To develop appropriate systems for iron and manganese removal.
- To develop appropriate systems for micro-pollutants removal.
- To provide technical support for institutional structure.
- To develop training programs on operation, maintenance, analysis and record keeping, etc.

Enhancing the performance of treatment and distribution systems is an expected outcome of this program. Full coverage with safe drinking water will be achieved according to GOE plans.

iii. Economic Instruments

Drinking water fees

Water is not a free resource, but rather a rare commodity that should be priced to avoid inefficient use in car wash, swimming pools, and gardens watering. Water fees are important to rationalize water usage by raising Government revenues to cover the costs of expanding the water services to all uncovered areas in Egypt.

3.1.5 Wastewater Management

An assessment of water quality in Egypt indicated that the major water quality problems are pathogenic bacteria/parasites; heavy metals and pesticides. Major sources of these pollutants are the uncontrolled discharge of human, industrial and agricultural wastes. See Box (3).

Box 3: Gradual program for terminating the discharge of polluted industrial wastewater

The MSEA has launched a gradual program for terminating the discharge of industrial wastewater in various sources of fresh water. The first stage targets the River Nile. The second stage targets mixing the wastewater with drinking water. The third stage targets the lakes and the fourth stage targets the seawater. The timeframe of this program is from 1996-2008.

By February1999, the quality of the River Nile in the Greater Cairo Region had been monitored by the National Center fort Environmental Monitoring in Tokyo, and the results indicated that the water quality in this region was not polluted according to the Egyptian Environmental standards.

Inspections and auditing of 70 Nile cruise boats has been undertaken in order to check the compliance with the standards and laws.

Five wastewater reception facilities have been built along the Nile in the cities of Assuit, Aswan, Sohag, Minia and Cairo.

The total amount of domestic wastewater has been estimated at 3.6 BCM for the year 1995/96. Approximately 24 percent of the population of Egypt is connected to sewerage services, however this value is expected to grow rapidly, due to works under construction. The population without connection to sewerage systems relies on individual means of treatment and disposal, mainly on-site treatment such as septic tanks. Often on-site solutions are ill designed and poorly maintained. There is, however, little information available to support this argument.

The constituents of concern in domestic and municipal wastewater are pathogens, nutrients, and oxygen demanding compounds and suspended solids. In Greater Cairo and other cities, the sewerage systems also serve industrial and commercial activities. Therefore, high levels of toxic substances in wastewater have often been reported. As these toxic substances, particularly heavy metals and organic micro-pollutants, are mainly attached to suspended material, most of it accumulates in the sludge. Improper sludge disposal and/or reuse hence may lead to contamination of surface and ground water. In general, the bulk of treated and untreated domestic wastewater is discharged into agricultural drains. It is important to mention that all drains of Upper Egypt flow back into the Nile. Moreover, it has become a national policy to maximize the reuse of drainage water by mixing it with canal water. Many irrigation canals then are probably contaminated with pollutants from domestic sources.

Agriculture is also a major water polluter. Wastewater seeping from agriculture fields is considered non-point sources of pollution. These non-point sources are, however, concentrated through collecting agricultural drains from point sources of pollution for the River Nile, the Northern Lakes or irrigation canals in case of mixing water for reuse. Moreover, these non-point sources of pollution may also influence the groundwater quality. Major pollutants in agricultural drains are salts; nutrients (phosphorus and nitrogen); pesticide residues (from irrigated fields), pathogens (from domestic

wastewater), and toxic organic and inorganic pollutants (from domestic and industrial sources).

Industrial use of water in Egypt is estimated at 7.5 BCM/year in 1999. The industrial use of water is expected to increase. Consequently, an increase in the volume of effluents is expected. Industrial wastewater contains a variety of toxic organic and inorganic chemicals, which are potential health and environmental hazard.

1. Corrective Actions

As a result, aquatic ecosystems are disturbed and living freshwater resources are threatened. The development and implementation of mitigation measures to control sources of pollution is crucial to avoid costly subsequent measures to rehabilitate, treat, and develop new water supplies.

2. Supportive Measures

Water Fees: the Government of Egypt is to impose fees on households and business for discharges of wastewater into publicly owned treatment works. Wastewater discharges are not directly metered in most cases, rather they are assumed to be equal in volume to waster consumption, which is measured. Discharge fees for larger businesses should be based not only on water used, but also on discharge toxicity. Higher water charges will be an incentive for large industrial facilities to reduce the toxicity volume on their discharged water and consequently reduce water pollution.

Incentives: tax incentives and loans for environmental management should be increased by the Government to encourage businesses on favoring cleaner production technologies. More efficient production processes and reduction in the use of harmful chemicals reduce harmful wastewater charges and ensure better quality of water.

3.1.6 Improving Sanitation Coverage For Urban And Rural Areas

Box 4: Lack of proper operation and maintenance of sanitation systems

> Wastewater collection systems, sewers and treatment plants are often poorly operated and maintained due to shortage of financial resources and technically skilled staff. The lack of proper operation and maintenance leads to deteriorating systems and furthermore contribute to unhygienic living conditions in many poor rural and urban communities.

At present, the nationwide coverage for household sewerage connections for urban areas ranges between 10 to 60 percent. Although rural population densities are often high, coverage rates are very low. In areas without sewerage networks, wastewater is often collected in septic tanks or other forms of on-site disposable system. These installations are frequently leaking due to poor construction and maintenance and are major sources of water pollution and unhygienic living conditions. See Box (4). The information needed is an evaluation of the Environmental Health Impact and socio-economic impact of improving the sanitation on women, men, and children.

Sanitation Management Program

The Ministry of Health and Population in collaboration with the Ministry of Housing, Utilities and Urban communities and other local agencies have developed a program to protect the environment and public health through a comprehensive, integrated scheme for wastewater collection and treatment. This program aims mainly to induce institutional reforms that promote the implementation of non-conventional low-cost technology, simplification of procedures, changes in both attitudes and behavior, and participation of major population groups, particularly women. Other objectives include evaluating the

environmental health and socio-economic impacts; and determining the socio-economic benefits of sewerage treatment.

The activities of this program include:

- ✓ Develop and implement low cost technologies for domestic wastewater treatment taking into account some traditional and indigenous practices.
- ✓ Development and implementation of decentralized systems to increase the potentiality for reuse taking into account some traditional and indigenous practices.
- ✓ Prepare training packages for engineers, chemists, technical operators, and workers associated with the developed wastewater management activities.
- ✓ Devise an equitable system to finance the cost of extending sanitation services to non-served areas, to close the gap between rural and urban areas.
- ✓ Strengthen the institutional structure.

The output of this program is serving areas that lack sanitation, thus improving the quality of life. This will have its own economic and financial gains, once a system that deals with sanitation as a revenue generating activity is in gear. The supportive measures for this program include addressing the existing institutional and financial constraints to enhance the inspection authority of the EEAA to ensure the effective implementation of the law.

3.2 Air

3.2.1 Ambient Air Quality

As mentioned earlier in Parts One and Two, the problems of air pollution in Egypt arise from human activities, not from natural causes except for some seasonal dust problems. The GOE, through the MSEA and EEAA and relevant ministries, such as the Ministry of Transportation, is currently adopting various measures to control air pollution sources. The working groups recommended five major programs to be implemented by 2017 with regard to ambient air quality:

1. Forming a strategy for controlling pollution and preventing smog episodes (in preparation).
2. Managing auto exhausts in urban and rural areas (in progress).
3. Protecting air quality in rural areas.
4. Reducing pollution from industrial activities within human settlements (in progress)
5. Managing and controlling air pollution from existing large industrial facilities and electricity power stations.

i. Forming a Strategy for Controlling Pollution and Smog Episodes

1. Information, Monitoring, and Assessment

Poor air quality in urban and industrial centers of Egypt has been confirmed by published air quality data gathered by EEAA projects, the Environmental Information and Monitoring Program (EIMP), the Cairo Air Improvement Project (CAIP), the Ministry of Health and Population and the National Research Center. In fact, particulate matter, sulfur dioxide and ozone exceed the annual mean air-quality standards (Egyptian and international) and exceed the maximum allowable concentrations for several days per month. Air pollution is also affecting rural areas adjacent to industrial activities as well as areas around heavy traffic highways.

Existing data is not comprehensive, however, so additional efforts are needed to improve data coverage and comparability. EEAA efforts in this area include establishing 41 air monitoring stations that are distributed all over the Governorates of Egypt through the EIMP and a survey for monitoring particulates, especially lead in the Greater Cairo

Region, through the activities of the CAIP project. Part of the Air Pollution Abatement Strategy is to redesign and supplement the existing ambient air pollution monitoring system. The additional data will help in forming a comprehensive strategy to control air pollution in Egypt that would, in turn, protect the existing and newly developed urban and rural areas.

2. Corrective Actions

EEAA is currently formulating a strategy for controlling air pollution. International funding agencies (DANIDA and USAID) are assisting the EEAA in forming this strategy through two major projects (EIMP and CAIP).

Among the corrective measures recommended in the NEAP is the formulation of this program " Forming a Strategy for Controlling Pollution and Episode". The main objectives of this program are to formulate a comprehensive air pollution control and air quality projects through strengthening the capabilities of Governorates and EEAA in the field of air quality management.

Part of this program activities is running and supported by the NEAP. These ongoing activities include improving the air-quality monitoring network programs, enhancing the research studies examining the impact of air pollution on health, vegetation, and economic material, revising executive regulations of Law 4 for 1994 concerning air quality and emission standards, and improving the capabilities of departments of inspection on central, regional, and local levels.

Other suggested NEAP activities to be implemented on the national level include:

- ✓ Establish a "pollution sources" inventory for urban and industrial centers.
- ✓ Formulate a control program for emission reduction, control equipment, upgrading of industrial processes, using energy efficiently, fuel change and procedures for choosing alternatives.
- ✓ Impose self-monitoring programs for air quality around large sources of pollution by applying the law, such as having an environmental registry for example.
- ✓ Establish technical agencies on regional and central levels.
- ✓ Use available funds, such as EPF, to encourage the use of control technologies.
- ✓ Implement public awareness and education modules.
- ✓ Follow up the improvement in air quality and form action plans for air pollution control.
- ✓ Complete the undertaken actions to avoid and control air pollution episodes in Greater Cairo and set actions for other industrial and crowded urban centers.

3. Supportive Measures

Strengthening the capacity of experts in air pollution, control advisors, industrial experts, planners, engineers, chemists, programmers and technicians would help in completing the execution of this program.

ii. Managing Auto Exhausts in Urban and Rural Areas

1. Information, Monitoring and Assessment

Available information on emissions from vehicles indicates that this problem is a major threat facing the air quality in Egypt. Currently, The GOE is emphasizing the importance and promoting the use of Compressed Natural Gas (CNG) as a vehicle fuel. This comes through the efforts of EEAA, and other concerned ministries, mainly the Ministry of Petroleum. However, more efforts to encourage the use of CNG are needed. There is also a need to encourage research and surveys that reflect the intensity of this problem.

2. Corrective Actions

EEAA is currently running a program for managing auto exhausts in urban and rural areas. Based on the Summary Profile of Initiatives, 2000-2001 published by the Ministry of State for Environmental Affairs, great success has been achieved in this regard. Lead-free gasoline has been introduced in the Greater Cairo Region and 85 percent lead-free gasoline has been introduced in the rest of the country. The vehicle emission-testing program is being implemented in full coordination with the Ministry of Interior based on the protocol of cooperation that was signed between the two ministries to that end. By January 2000, an average of 700-800 vehicles per day were being temporarily withdrawn due to emissions that exceed the legal environmental standards. There are also successful steps taken to issue an emission standard for motorcycles based on an assessment of the condition of a sample of 2,000 motorcycles and measurement of their emissions using the latest technology.

The use of CNG as a vehicle fuel is being promoted. To date, 35,000 private cars are using CNG and twenty-eight CNG refueling stations have been established nation wide and more are planned. Twenty buses in Cairo City are using CNG as fuel with one refueling station. In addition, a station for technical maintenance for vehicles using CNG has been established in Shoubra El-Kheima and more are planned for Cairo and Giza Governorates. Extending legislation covering auto exhaust emissions from diesel and petrol engines and from motorcycles needs to be enforced. This effort has started through CAIP; however, it needs more support from EEAA and other responsible parties.

The major objectives of the program recommended by the NEAP to manage auto exhausts in Egypt are formulating a comprehensive program toward reducing air pollutants in the atmosphere of urban areas and around traffic roads, developing auto exhaust management programs that improve traffic flow and encouraging the use of public means of transportation and clean fuel, strengthening the relevant legislation and increasing public awareness.

The ongoing activities that are encouraged by the NEAP include improving the master plan of land uses for streets and roads and improving traffic flow through different steps, such as construction of ring roads, introducing one way street systems and building tunnels and bridges wherever needed. Other activities include increasing the use of public transportation between cities, increasing the number of comfortable buses for public use, and encouraging the use of private buses for firms, schools, and governmental employees. The number of underground metro lines in Cairo will be increased and also the number of trains. The GOE is also encouraging the construction of underground metro in Alexandria and the use of electrified surface trams wherever possible.

Other uncompleted activities that NEAP aims to complete include encouraging the participation of the private sector and the community, especially youth, to promote the use of vehicles that use gas through exempting these vehicles from taxes and providing them with testing machines. Completing the phasing out of lead additives in all Egyptian regions and the conversion of all buses to use CNG are other targets to be accomplished in the coming period. NEAP is also encouraging efforts undertaken by CAIP to improve the legislation of auto exhaust emissions from diesel and petrol engines.

Re-planning the rural settlements around major traffic roads is also important to reduce the exposure of inhabitants to noise and air pollutants (minimum of 30-40 m from roads). Furthermore, only buses that use CNG or electric power should be allowed to move in tourist, antiquities and protected areas.

The NEAP activities to be adopted on the national level include:

- ✓ Establish a green belt around major roads to protect inhabitants and cultivated land from air pollution and noise.

- ✓ Reduce the sulfur content of the oil fuel used by diesel engines. The impact of such emissions on urban environment should be studied and reduced.
- ✓ Reduce taxes on private cars using CNG.
- ✓ Set and implement a plan to force taxis to only use CNG fuel within urban areas by 2005.
- ✓ Conduct a comprehensive epidemiological study to evaluate the impact of auto exhaust pollutants on health.
- ✓ Evaluate source emissions and model the impact of traffics in polluting the urban environment and study the impact on the air and on other materials of economic value.
- ✓ Prohibit the use of two-stroke motorcycles using an oil/petrol mixture as fuel.
- ✓ Reduce customs duties on spare parts for CNG vehicles to conform to the Action Plan of 1992; and encourage local manufacture of these parts.
- ✓ Investigate the possibilities of using cleaner fuel energy for means of transportation.
- ✓ Set and implement a plan for increasing public awareness to encourage public participation in the area of air quality protection.

3. Supportive Measures

EEAA should adopt measures to:

1. Reduce taxes on private cars using CNG.
2. Set and implement a plan to oblige taxis[1], including mini- and micro-buses, to only use CNG fuel within urban areas by 2005.
3. Increase and encourage the CNG fuel stations in Greater Cairo, Alexandria and other crowded urban centers.

iii. Protection of Air Quality in Rural Areas

1. Information, Monitoring and Assessment

Rural areas are exposed to air pollution resulting from motor vehicles and industrial activities. Protection of rural areas against emission of these polluting activities has been fully considered in the NEAP programs. However, rural inhabitants are also exposed to air pollutants due to agricultural activities and agricultural products' processing. Increasing the research studies and data collection regarding these types of pollutants and the intensity of the problem is crucial for undertaking the program activities.

2. Corrective Actions

The major objectives of this program are formulating air quality management programs in rural areas, developing a control program and implementing control methods to reduce air pollutants resulting from agricultural products and developing a strategy for air pollution episodes in rural areas.

The uncompleted activities of this program that NEAP aims to accomplish are assessing air pollutants resulting from agricultural activities in terms of soil preparation, application of pesticides and herbicides, open burning, fruit and vegetable growing, animals feed dehydration, preparation and sludge and animal and poultry production. Assessment procedures should also include air pollution emitted from processing agricultural products such as grain milling and handling, cotton processing, and meat, fish, fruit and vegetable processing.

[1] Micro-and mini buses are classified as taxis for licensing purposes.

Other activities proposed by the NEAP to be executed on the national level include:

- ✓ Set and apply a management program to reduce exposure to pesticides and herbicides.
- ✓ Set a program for solid waste recycling and prohibit open incineration of agricultural waste.
- ✓ Set episode control planning for agricultural products' processing operations.

3. Supporting Measures

1. The GOE along with local NGOs should support the processes of recycling agricultural wastes and promote the processes of waste recycling for biogas products.
2. The GOE should continue supporting efforts of the rural communities in using biological means for pest control.
3. Impose taxes on pesticide use based on polluter pays principle.

iv. Reducing Pollution from Industrial Activities within Human Settlements

1. Information, Monitoring and Assessment

Industrial activity is a major source of air pollution in both urban and rural areas. Human settlements adjacent to industrial activities suffer from the air pollutants emitted from factories that lack air pollution control precautions; thus they have very serious damaging effects on health. Accurate and reliable measures of these emissions are required in order to effectively control the industrial activities. The GOE should also use this data in prohibiting the industrial establishments from using old technologies and encourage new investors to locate their medium and small size industrial activities away from human settlements. EIAs should be conducted on the land proposed for industrial zones and the zones should be supplied with the necessary infrastructure.

2. Corrective Actions

EEAA is currently supporting the formulation of the National Environmental Action Plan (NEAP). Part of this plan is to address the problems of air quality in Egypt and to put appropriate remedies for this problem. NEAP is formulating programs and projects that radically reduce sources of air pollution in Egypt. "Reducing pollution from industrial activities within human settlements" is a program that aims at upgrading and improving the air quality in human settlements, developing better and integrated urban planning, protecting public health, tourist areas, monuments, ...etc., conserving energy, and finally strengthening the capabilities of local administrations in the field of air quality management.

The activities of this program that are in process and supported by the NEAP include upgrading the industrial processes and fuel combustion processes in small industrial businesses, encouraging industrial investment in the new defined zones, and conducting EIAs and defining buffer zones with green belts between new industrial zones and residential settlements.

Other NEAP activities for the implementation of this program are:

- ✓ Use efficient control technologies and clean fuel to reduce the rates of emitted pollutants from small and medium establishments.
- ✓ Develop criteria for locating, planning, erecting and managing industrial zones.
- ✓ Prepare these areas and supply them with all needed infrastructure.
- ✓ Remove all scattered industries within urban areas and relocate them in the defined industrial zones after upgrading and imposing pollution control measures.
- ✓ Complete the initiated activity of upgrading and relocation of lead smelters outside residential areas.

- ✓ Rehabilitate the evacuated location, such as develop open parks to protect the environment and upgrade quality of life.
- ✓ Implement a public awareness program to help the execution of the whole program.

Line ministries concerned with the issue of air pollution should act in parallel to the NEAP program and issue measures to remove all scattered medium-and small-size industrial activities such as foundries, secondary smelters, pottery workshops, brick industry, lime crushers, charcoal production ...etc; and relocate them in defined industrial zones after upgrading and imposing pollution control measures.

3. Supportive Measures

1. The legislation that supports the previous program includes:
   - Law 453/1954 is responsible for regulating industrial and commercial activities and is executed by the Ministry of Industry.
   - Labor Law 137/1981 and its executive regulations and the decision of the Minister of Labor 55/1983 to protect the working environment.
   - Law 4/1994 for environmental protection regulates the activities causing pollution and degradation of the Egyptian Environment. The Egyptian Environmental Affairs Agency is the key responsible party for executing the aforementioned law and has the authority to monitor and implement it.
   - Law 2/1993, which is concerned with organizing tourist activities and their usage as well as Law 59/1960, which limits radioactive usage and is executed by the Ministry of Health.
   - Law 3/1982 for the proper planning of industrial zones and the responsible party for executing it is the Ministry of Planning.
2. Introducing public awareness campaigns through issuing booklets, seminars, conferences and NGOs activities will play a positive role in these campaigns.
3. Building the capacities of urban planners at local levels. This will be achieved through the cooperation of EEAA and research institutes in supporting EIA studies, planning, innovation of control technologies, energy conservation, adopting new and renewable energy sources and promoting the process of monitoring.

v. Managing and Controlling Air Pollution from Existing Large Industrial Facilities and Electricity Power Stations

1. Information, Monitoring and Assessment

Shoubra Elkhema (Qalubiya), Helwan (Cairo), Kafr El Zayat (Gharbia), Ameria, Max and Abu-Keir (Alexandria), the industrial area in Suez…etc are huge industrial areas that emit pollutants that aggravate the problem of air pollution in Egypt. Few industries put serious efforts to control this pollution. Furthermore, control and management programs have not been seriously implemented to control emissions. Power stations are another major source emitting excessive amounts of pollution into the atmosphere. Emissions of pollutants from these power stations, although greatly reduced through the use of natural gas, could be reduced further by greater use of this clean fuel. Encouraging the EIAs for new industrial pollution sources and power stations is required.

There is a need to increase source monitoring to detect rates of pollution emitted from these huge industrial establishments. Furthermore, we need comprehensive database information about existing industrial areas, locations of the industries in all Governorates, new industrial areas in the satellite cities such as 10^{th} Ramadan, 6^{th} October, Sadat City...etc, in addition to electricity power stations and fuel use in various areas. An environmental information system based on a GIS to follow up on the environmental

compliance of the industries in these cities is also required. There is also a need to conduct environmental auditing for all existing industrial establishments and power stations. This will provide the policy makers and executing authorities with enough data on the real situation of pollution discharge points, air pollution control technologies, where they exist, industrial processes and technologies that need to be upgraded, research needs and other important items.

2. Corrective Actions

EEAA and other concerned ministries, mainly the Ministry of Petroleum, have made previous efforts to control air pollution emitted from huge industrial establishments. See Box (5). EEAA has an on-going program for establishing new environmentally friendly industrial cities. According to the "Summary Profile of Initiatives, 2000-2001" published by the MSEA, December 2001, Egypt's first environmentally friendly industrial zone in one of the five cities currently enrolled in Phase 1 of the program will be announced. The five cities are: Borg Al-Arab, Al-Sadat, Al-Obour, 10th of Ramadan and the 6th of October. On February 2000, more than 70 percent of industrial establishments in the five cities had complied with the required environmental standards, while ten percent of establishments are currently implementing pollution control projects.

The program presented by the NEAP "Managing and Controlling Air Pollution of Existing Large Industrial Facilities and Electricity Power Stations" aims at formulating management schemes for sustainable development in the existing and new industrial areas of the satellite cities, developing control programs and implementing control technologies to reduce pollution emissions from their sources, adopting new and renewable sources of energy to reduce the environmental degradation, and finally strengthening the air quality management programs for industrial areas.

The major activities of this program that are in process and supported by the NEAP include developing and encouraging local industries that use air pollution control technologies, considering the EIA study as a precondition of licensing new industries and choosing the location for power stations and industrial activities, developing buffer zones and use of clean technology as well as air pollution control measures according to the air pollution control program in the location and the region, and encouraging the use of solar energy and wind forces in generating electricity. This will result in reducing the emissions of air pollutants from thermal electricity power stations.

Other NEAP activities to be implemented on the national level include:

- ✓ Establish a comprehensive database that would provide information about existing industrial areas, locations of the industries in all Governorates, new industrial areas in the satellite cities. e.g. 10th Ramadan, 6th October, Sadat City...etc, electricity power stations and fuel use in various areas.
- ✓ Implement a comprehensive program to conserve and use energy efficiently in the industrial furnaces, boilers ...etc. The same activity will include increasing and improving power generation in electricity power stations.
- ✓ Use low sulfur fuel and natural gas for industries located within two kilometers of inhabited areas.
- ✓ Modify the legislation to include the efficient use of fuel, housekeeping and storage of raw materials, products and wastes.
- ✓ Establish and support education and training programmes to train personal capable to run and maintain air pollution control equipment.
- ✓ Control gaseous emissions through fuel change and usage of control technologies such as scrubbers, absorption, condensation, recycling and reuse. Enforce legislation that requires use of suitable technologies and limiting the discharge of pollutants through stocks and vents for fugitive emissions.

Box 5: Examples of corrective measures that GOE adopted to reduce air pollution emitted from large-scale industries.

Institutional: an agreement has been signed between the Ministry of Petroleum and the Ministry of Electricity stipulating that power plants should use natural gas as a fuel.
Economic and Financial Instruments: the proposed economic instruments for reducing and managing cement dust aim at supporting increased investments into environmentally friendly and eco-efficient technologies in the cement industry. This encompasses a number of major activities mainly imposing a differential product charge on each ton of cement produced according to the environmental performance of each cement plant, applying tradable TSP emission permits for cement firms, tax incentives for cement firms investing in mitigation measures and soft loans for cleaner technologies. The main outcome of this proposal would be improving the competitiveness of Egyptian cement in international markets through implementation of cost-effective PPMs.
Internationally: the Global Environmental Facility (GEF) is being approached to access the Clean Development Mechanism (CDM) to supply these industries with up-to date technologies to protect the atmosphere.

- ✓ Prepare guidelines for energy conservation, air pollution control, good house keeping compliance and inspection and other needed items. This would help the success of the program and the follow up of the activities.
- ✓ Make EIAs a precondition for licensing new industries and then carry out an audit to monitor pollution emissions at the start of production to see if they comply with undertakings made in the EIA and other documents. If adjustments are required, continued operation should be conditional upon making the adjustments.
- ✓ Increase the supply of natural gas to power stations to reach more than 80 percent of the fuel used in all stations by year 2002 and 100 percent by the year 2005.
- ✓ Introduce technologies to reduce identified dust emissions for all dust discharge points in all industries before 2005. This will significantly reduce the fine particulate in the air of industrial regions and affected urban areas.
- ✓ Apply efficient economic instruments to reduce emitted TSP.

3. Supportive Measures

1. Supporting measures include introducing education and training programs to train personnel capable of running and maintaining air pollution control equipment. In addition, adopting legislation to include the use of suitable technologies and limit the discharge of these pollutants through stacks and vents for fugitive emissions.
2. The same laws and regulations as mentioned under the previous program also support this initiative. There are adequate legislative measures and the required step at present is to enforce these laws.
3. Building the capacities of the air pollution experts, industrial experts, chemists, energy experts and technicians involved in implementing such programs. This could be done through establishing an institute to graduate trained technicians, which would also have research departments in the field of environment and energy. The GOE has to encourage and support the establishment of new local industries to produce control equipment.

3.2.2 Indoor Air Quality

i. Conserving Indoor Air Quality

1. Information, Monitoring and Assessment

Indoor air quality is included in the National Environmental Action Plan because it affects the major proportion of the population. People spend at least 40–50 percent of their time in their homes. Indoor air pollution sources include the outdoor pollution as well as indoor activities. Indoor polluting sources are mainly smoking, fuel burning (kitchen and bathroom heaters), building materials and other causes. As has been presented earlier in the section on livestock and poultry in Part Two, raising cattle, livestock and poultry inside homes is a major source of indoor pollution in rural areas. Poor ventilation of indoor spaces also plays a major role in the accumulation of air pollution inside houses and public buildings. The misuse of pesticides and other sprays can cause indoor pollution problems as well as malfunctioning air conditioning systems. Research work in Egypt indicated that 40-90 percent of the outdoor pollutant concentrations were found indoors. Moreover, aldehydes were found in high concentrations in some Cairo houses and public buildings where synthetic wood and furniture are used. Research on this issue especially in low-income and rural areas where the residents lack simple environmental and health information needs to be undertaken. Increasing data would also help in detecting causes of pollution and appropriate ways of dealing with their environmental and health consequences.

2. Corrective Actions

NEAP includes a program for facing this problem. The program "Conserving Indoor Air Quality" aims at formulating a comprehensive program to protect indoor air quality, developing planning and building criteria for protection of indoor air quality, protecting public health, and strengthening public awareness regarding causes of indoor air pollution and ways of conserving indoor air quality.

The main activities of this program that are in process include improving closed residential spaces in houses in the inner city, increasing the ratio of green areas to built areas in residential settlements, encouraging the use of renewable sources of energy such as solar heaters and locating new residential settlements in properly planned areas.

Other NEAP activities to be implemented on the national level include:

- ✓ Reduce outdoor air contaminants resulting from combustion processes, industrial activities, and vehicles, …etc.
- ✓ Conduct comprehensive research work to fill the gap of knowledge on indoor air quality in both urban and rural residential settlements.
- ✓ Establish specific criteria and introduce measures to protect air quality and ensure proper ventilation rates included in the Egyptian buildings codes.
- ✓ Change appliances that use solid and liquid fuel for others that use natural gas or electricity.
- ✓ Establish a public awareness campaign to raise awareness concerning the negative effects of indoor smoking, misuse of pesticides and other sprays and volatile materials.
- ✓ Minimize the use of building and furniture materials causing indoor pollution.
- ✓ Prohibit smoking in indoor public places.
- ✓ Prohibit the use of materials containing asbestos for insulation and other purposes where asbestos fibers can enter the air.

Local NGOs, especially in rural areas, should play a role in increasing public awareness regarding sources of indoor air pollution and enhancing the residents' efforts to change their social and environmental behavior, for instance, to remove the livestock from their homes, and redesign their inner kitchens in a way that allows proper ventilation.

3.2.3 Other Issues Related to Air Pollution

i. Abating Noise Pollution in Populated Areas

1. Information, Monitoring and Assessment

Law 4/1994 recognizes the problem of community noise in the Egyptian environment. For example the executive regulation set the limits of Leq 45-55^{o} db during daytime and Leq 40-50^{o} db during the evening for residential areas. High levels of noise have been recorded in several Egyptian urban districts. For example, the equivalent continuous noise level during a period of measurement in 1990 recorded Leq 79^{o} db close to a major street passing the SE residential area of Giza. Much higher levels of Leq 90^{o} db were recorded in Cairo city center streets. Studies show that the main sources of high noise levels in Egyptian communities are traffic, trains, aircraft, industry, construction work, workshops, street markets, domestic light appliances, neighbor's impact, children, adults voices, radio, TV, loudspeakers, coffee shops, unnecessary use of horns and wedding parties.

2. Corrective Actions

NEAP has tackled this problem through formulating a program that reduces the exposure to high levels of noise in the Egyptian populated areas. Abating noise pollution in populated areas is a program that aims at formulating a comprehensive noise abatement scheme, developing integrated urban planning and strengthening the legislation and the capabilities of EEAA and Governorates in the field of environmental protection.

The main activities of this program include the use of noise abatement technologies planning, establishing criteria and improving land use planning in terms of developing buffer zones around railways, streets and intersections, as well as locations of workshops, industries and other noise sources, improving traffic flow and street conditions setting standards and imposing noise measurements for moving vehicles as a requisite for vehicle registration, establishing buffer distances and green belts around traffic roads, conduct EIAs for new sources and new industrial zones and establish buffer areas, relocate workshops and scattered industrial activities in well defined planned, and prepared new industrial areas, setting criteria and establish noise breakers around heavy traffic roads and streets, establishing and implementing criteria for location of airports and their runways, introduce noise limits in the legislation and penalties for noise pollution causes such as the use of loud speakers, misuse of horns, coffee shops, radio, TV, and other activities causing high levels of noise, implementing public awareness and education modules.

3. Supportive Measures

1. Building capacities of urban planners at local levels on proper land use planning.
2. Improving and increasing the public's awareness through media campaigns.
3. Training programs for policemen, engineers, local administrators and others involved in the execution of the noise control program.

ii. Using Tree Leaves as Bio Indicators for Atmospheric Pollution

Heavy metals, mainly (Fe, PB, Cd, Ni and Cr) were monitored in Cairo air. A cheap and simple indicator of heavy metal pollution has emerged from this research. The leaves of a tree that is common in Cairo, the vicus tree, show a straight-line relationship between the concentrations of metals in the atmosphere and in the leaves. Pollutants were presumed to have been absorbed from air-borne particles deposited on the leaves.

Samples of vicus tree leaves for analysis were collected from various parts of Cairo city. Clean vicus leaves were also analyzed. The results of statistical analyses indicate a strong correlation between heavy metals in atmospheric pollution (as indicated by their

presence in soils, street dust and dust falls on leaves) and concentrations of heavy metals in leaves. This kind of research work to find simple and cheap ways of air pollution monitoring in Egyptian urban areas is encouraged and supported by the NEAP.

3.3 Land

Population growth and an expanding economy create competition for land uses and tensions between various interests. The sustainable use of land means finding a balance that attains the greatest benefits for social and economic development whilst still protecting and enhancing the environment.

The Government of Egypt has developed a National Spatial Strategy (NSS) through the Ministry of Planning, with the support of UNDP, for land uses and spatial economic development. This strategy divides Egypt into seven planning regions. Regional economic plans were discussed and approved at the Cabinet, *Shura* (Consultative) Council and the People's Assembly. The General Organization for Physical Planning (GOPP) then developed a detailed land use map that was presented as the Investment Map of Egypt at the Economic Forum held in Cairo during 1997. Currently, the Cabinet of Ministers is updating the Investment Map of Egypt with the support of the Armed Forces.

Proper land management is necessary to protect biological diversity and to utilize the land in a sustainable way. Securing property rights, accounting for protected areas and habitats, and the rights of local communities, including the local indigenous groups, such as the Nubians and the nomads, is a necessary part of the process of reaching sustainable uses of land. One aspect of the land question –desertification- is of such importance that a separate section is devoted to it "Desertification 3.4".

3.3.1 Sound Environmental Management of Agriculture and Rural Development

Sound Environmental Development of Rural Settlements

1. Information, Monitoring and Assessment

MALR and CAPMAS collect data on human and natural resources in rural areas. IDSC also has local offices that collect data and information for the decision-making process. It would be of great use to integrate environmental statistics, as will be described later in Part Five, linked to the Department of Information at EEAA to ease monitoring and decision-making concerning agricultural and rural development.

2. Corrective Actions

GOE, through MALR, Ministry of Housing, Utilities and Urban Communities (MHUUC) and local administrations, adopted policies for sustainable land uses that encourage planning on a scale large enough to maintain the health of regional ecosystems. GOE is giving titles for land ownership in newly reclaimed land. See Box (6).

In 1997, the GOE lifted controls on holdings in old land after lifting controls and liberalizing rents of agricultural land. GOE is also providing new land developments with necessary infrastructures to enable the people to access resources and means to market their products at fair prices, and last but not least, GOE is providing them with finance and tax holidays essential for the people to attract them to these new frontiers. The strategy of the Ministry of Agriculture and Land Reclamation aims to secure food for a growing population and resources for an expanding economy. Rising productivity of cultivated land, and horizontal expansion by adding new land to the cultivated land without depleting and polluting natural resource bases are the two strategic pillars of Egypt's sustainable agricultural development. MALR is encouraging and facilitating adopting techniques for

increasing production, reducing food spoilage and loss to pests. MALR in collaboration with the MWRI are providing services to conserve soil and water resources. MALR has formulated food policies based on awareness of the environmental costs and benefits of various policy choices.

Box 6: The successful story of El-Safa Project

> The successful story of upgrading the informal area of Al Safa, Ismailia proves that good governance is one of the factors for sustainable urban development. The project improved the urban environment, created job opportunities for dwellers, and provided the inhabitants with a healthy shelter that suit the needs of poor families. Citizen partnership in decision-making is one of the reasons for success of the project. Other reasons include good planning, sharing information, and homogeneity of the society, good management and investment commitment. This example was followed in Nasseriya, Manshiet Nasser and can be replicated in other informal areas all over Egypt.

MALR, through its extension services, and in collaboration with the Organization for Reconstruction and Development of Egyptian Villages (ORDEV) at the Ministry of Local Development (MLD), which is implementing the Integrated Rural Development Program known as *Sherouq*, is providing the rural population with needed advice and training in the use of technologies and farming systems that conserve and rehabilitate land while increasing production. See Box (7). This includes crop rotation, use of plant nutrients (including organic fertilizers) and mixed cropping. In this endeavor, GOE mixes traditional, indigenous conservation techniques with modern ones.

Box 7: The integrated program for rural development (Sherouq)

> Developing the Egyptian village is a real challenge. Poverty has lead to poor housing and inadequate communal management of solid waste. This unhealthy environment had adverse implications on the health of the population as a whole and particularly for women and young children.
> The past few years have witnessed a strong commitment by the Government of Egypt to environmental protection. The objective of NEAP coincides with the purpose of the Sherouq program, which is to attain healthy physical environment for Egyptian villages and at the same time to increase the employment opportunities.
> The Sherouq program includes 4,405 village and satellite in 1,087 local village administrations, plus 22 human settlements. The beneficiaries of Sherouq are about 60 percent of the population. The program provided assistance to 13,829 projects that requested investments of about £E 243.78 million. These projects generated about 80,775 job opportunities, most of which are for women and youth.
> The immediate results of the Sherouq Project were:
> -Adopting a system for collecting and treating liquid waste in ten Egyptian villages.
> -Generalizing the modality among other villages that were not included in the program.
> -Providing training to personnel.
> The experience gained from the Sherouq program provides a model for serving the environment using health and sustaining livelihoods as the entry point.

MALR has also developed a plantation project in the Sarabium area, 15 kilometers south of Ismailia. The project aims at planting timber trees using treated wastewater. See Picture (6). The planted area reaches 500 feddans (almost 500 acres) using drip irrigation system. Tree species planted include cupressus, pinus, khaya, casuarinas, eucalyptus and mulberries. The project proved to have positive economic, social and environmental impacts. The efforts of MALR in the area of plantation of timber trees using treated wastewater is totally in line with the programmes included in the NEAP. Furthermore, engaging the private sector in this activity is among the targets of Egypt to give it the responsibility of allocating investments of the sectoral plans to the year 2017. The experience proved to be feasible from the economic and financial aspects; accordingly, the GOE through the efforts of MALR is planning to develop several projects similar to the Ismailia project as it contribution top plantation and environment is significant.

In line with the National Energy Efficiency Strategy (NEES), presented earlier in Part 2.4, GOE is encouraging farmers and residents of rural settlements to use energy more efficiently and suggests that farmers use a mix of fossil and renewable energy sources, including fuels from biogas and agricultural residues.

Picture 6: Pine trees grown on treated wastewater

Chemical control of pests has dominated agricultural management practices over the past few decades but has proved to be costly with adverse impacts on the environment. MALR now encourages farmers to employ integrated pest management that combines biological control, host-plant resistance and appropriate farm practices, thus increasing food production, reducing costs and conserving the environment.

The successful execution of the above-mentioned efforts will improve living standards in rural settlements. These improvements will encourage more people to stay in their villages, where their labor is needed. By slowing the exodus to the cities, informal urban settlements and loss of agricultural land on metropolitan peripheries will be reduced.

3. Supportive Measures

Research: Egypt has been experiencing a steady loss of both animal and plant species. GOE, through MALR and research institutions, supports research and development in the area of plant and animal genetic resources to increase animal production and improve the quality of draught animals. Funds have been allocated for promoting genetic diversity.

Village Cleanliness: The residents of two villages, Kafr-Abdo and Kafr-Wahba in Menofia, decided to improve their local environmental conditions. They had no system for collecting solid waste so they started a self-financing project for waste collection. They also introduced street lighting and filled a polluted, rat-infested, waterway with soil and turned it into a garden.

Picture 7: Clean Village of Kafr Abdo

The success of Kafr-Abdo village was the inspiration for the Environmentally Friendly Egyptian Village project. It can be considered a new form of environmental management that can be replicated throughout Egypt, where the locals establish a community-based organization to provide them with services such as garbage collection and street sweeping.

3.3.2 Environmentally Sound Management of Urban Settlements

Egypt, a developing economy rooted in agricultural activities, nonetheless has a considerable portion of the population living in cities and the bulk of population migration is borne by existing cities. Very few people who leave rural areas go to the new cities. This fact is an environmental and development dilemma because the major cities are already suffering from overcrowding and the environmental problems that result: inferior air quality accumulated solid wastes, expanding informal economy etc.

Picture 8: Newly developed urban gardens should be planned using principles of xeroscaping. It is the concept of planning parks using plants that are structurally adapted to growing under very dry or desert conditions.These plants often have reduced leaf surfaces to minimize water loss, thick, fleshy parts for water storage and hairs, spines, or thorns.

Vacant unused land could be developd for urban agricultural purposes. It could provide residents of the community with fresh produce. EEAA and MALR are encourging CBOs to execute such initiativs.

1. Information, Monitoring, and Assessment

Adopting a program for "Urban Watch" in major cities of Egypt is a necessity to keep record of the major environmental parameters. The purpose of the urban watch project is to use trained cadres to monitor selected environmental information and to identify common pollutants and contaminants within the study area. Compiling these data and transforming them into information and knowledge will facilitate the policy dialogue and the processes of decision-making and implementation.

2. Corrective Actions

To make Egyptian urban areas sustainable, GOE has embarked on implementing several programs including the development of 44 new settlements to be added to the urban system of Egypt. These settlements are either on the fringe of the Nile Valley neighboring existing ones, such as New Aswan, developing an existing settlement, such as Farafra oasis that currently accommodates about 12 thousand persons to accommodate an estimated 30 thousand, or developing new settlements to serve the newly developed areas, such as Toushki. Providing these cities with the essential infrastructure and social services will decrease its dependence on the primary cities. Increasing the green areas in these cities should be considered. The location of these new cities took into consideration potential natural environmental hazards such as flash floods and earthquakes. The development of new settlements outside the Nile Valley and Delta aims to redistribute the population and increase the inhabited area of Egypt from 4 percent to 25 percent in the current century. Property trade-off program is for managing the growth of human settlements by trading valuable cultivated small plots of land for developed desert land at market prices. If resources are earmarked, local administrators will able to implement this program. The result would be saving much agricultural land from the sprawl of Human settlements.

To control the growth of Egypt's primate cities, i.e., Cairo and Alexandria, the Government, in addition to developing new towns, is encouraging the development of secondary cities, particularly those with desert frontiers, such as Belbais, Sharqia. Allocating investments to develop new industrial estates and direct the development of these medium-size cities will create employment and housing. Furthermore, sound management of medium-size cities will prevent urban sprawl onto agricultural land and environmentally fragile areas.

Another means of making Egyptian urban settlements sustainable is to upgrade informal settlements in and outside the urban areas. The Government is providing the dwellers with access to land, credit and low-cost building materials. Securing tenure and legal protection against unfair eviction are also part of this effort. The Government is upgrading these slums and squatter settlements to close the deficit in urban shelter. Upgrading these settlements includes providing them with clean water, sanitation, and waste collection. Adding the solid waste collection fees to the electricity bill is a means to raise funds necessary for providing the services to poor settlers. These efforts will have a positive impact on alleviating poverty. Putting credit at the disposal of the poor will improve their financial and economic status, lower inflation and improve macroeconomic measures as well.

Emphasizing the use of local building materials, particularly those that do not harm human health and the environment, and energy efficient designs are another way of making human settlements in Egypt sustainable. The architectural legacy of Hassan Fathy, Ramsis Wessa Wassef and others has inspired the development of architectural prototype designs for the settlements in the desert.

Picture 9: A school at Fares that Hassan Fathy built using local construction materials serves as an

Resolving land uses conflicts will have a positive impact on the amount of time that people spend traveling if the various land uses are logically related and the network of routes and modes of transportation are well planned. Better management of land uses will minimize congestion that will decrease the use of energy, improve air quality and minimize the impact on systemic global environmental issues, such as climate change. For example a series of tunnels under the Nile Boulevard in Cairo and Giza will ease the flow of motor traffic leaving the top surfaces as areas for recreation. Vacant unused land could be developed for small-scale urban agricultural purposes to provide residents with fresh produce. EEAA and MALR encouraged CBOs to execute such initiatives.

Picture 10: The North-South traffic route for Cairo is often congested. The Local Administration in collaboration with MWRI, is encourging the private sector to develop a series of tunnels parallel to the Nile where the roof is gardens and open spaces for recreational activities.This will create employment, add to the green areas of GCR, and generate income. The above picture is a perspective of the proposed development of the Corniche at Maadi.

3. Supportive Measures

There is a need to build the capacities of local administrations to be able to formulate and implement Local Agenda 21 for their settlements. This will require training administrators, developing new cadres capable of planning and updating plans for the sustainable development of their communities. Capacity development will also

encompass institutionalizing participatory structures for decision-making, building partnerships between stakeholders and enabling the locals to control their destiny[1].

Supportive measures also include enforcing, laws and regulations to avoid noise pollution and visual blight. Another supportive measure could be location taxes. If someone applied to locate a business in a primate city (Cairo or Alexandria) a fee could be added to the cost of the permit. These additional amounts could be a means for raising funds for financing NEAP projects. Alternatively, if people did not wish to pay the location tax, they could relocate their businesses in new land developments.

3.4 Combating Desertification and Managing Drought

The formulation of the United Nations Convention to Combat Desertification (UNCCD), adopted in Paris in 1994 and ratified in 1996, with the active participation of Egypt, gave emphasis to combating the major threats to sustainability in countries of dry land. The Convention defined desertification as "land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities." 'Land' in this context means the terrestrial bio-productive system with all its components. The Convention also defined combating desertification as "activities, which are part of the integrated development of land in arid, semi-arid and dry sub-humid areas for sustainable development", which aimed at:

1. Prevention and/ or reduction of land degradation.
2. Rehabilitation of partly degraded land.
3. Reclamation of desertified land.

Commitments by parties to the UNCCD include the preparation of a National Action Plan (NAP) to combat desertification. According to the convention, NAP should identify the factors contributing to desertification and prescribes practical measures to combat it. This implies the adoption of an integrated approach that affords the proper identification, assessment and monitoring of factors and processes of desertification and their adverse impacts on the nation's resource base and socio-economic aspects, as well as describing present feasible and environmentally sound measures to combat factors and processes of desertification.

Egypt, with land extending over one million square kilometers under arid and hyperarid climatic conditions, is endowed with varied agro-ecological zones with varied and specific attributes of resource base, climatic features, terrain and geomorphic characteristics, land use patterns and socio-economic implications. A meaningful NAP for Egypt would be comprised of sub-components, each of which is geared to address the specific attributes of each agro-ecological zone distinguished in Egypt. The zones could be identified as follows:

1. North Coastal Belts: Including North West coastal areas and Northern areas of Sinai.
2. The Nile Valley: Encompassing the fertile alluvial land of Upper Egypt, the Delta and the reclaimed desert areas in the fringes of the old Nile valley.
3. The Oases and Southern Remote Desert Areas: Including Uwienate, Toshki and Darb El-Arbien Areas and Oases of the Western Desert.
4. The Desert Inland: Including the plateau and dry valleys of Sinai and elevated areas in the Southern Eastern Desert.

Active factors of desertification and their impacts are necessarily varied. It would not be appropriate to formulate a single unified plan to combat desertification for these varied

[1] Refer to Part Five "Institutional Building".

agroecological zones. It would be more appropriate to formulate a NAP with 3-4 sub-components to address and focus on the varied natural attributes, specific desertification processes and, priorities of action. Variations in attributes of these agro-ecological zones are easily identified will be stated in the appropriate sections of the Plan).

Such a four-part approach would facilitate the investigation and identification of appropriate techniques, required activities, capacity building needs, participating, stakeholders, required legislation, economic tools, incentives, finance, as well as, social implications. This approach would also help to define institutional setups and responsible parties. It would also facilitate the identification of suitable indicators of development, as well as appropriate techniques for monitoring ongoing and future desertification processes in each of these agro-ecological zones. This approach will also improve the identification of projects, research needs and public awareness campaigns geared and tailored for the needs of each agro-ecological zone.

3.4.1. Basic Considerations

To ensure the achievement of NAP's objectives, MALR is the high decision making level to coordinate and follow up on implementation activities of NAP, as well as to integrate activities to combat desertification with the National Development Plans in Egypt. Such an authority would be entrusted with setting priorities for implementing activities, monitoring progress of implementation and evaluation of results and impacts.

Ample considerations and attention should be given to the documentation and compilation of indigenous knowledge and experiences, which are a wealth in itself in addition to its great value for appropriate planning of NAP's activities. Egypt is endowed with a multitude of academic and research institutions, as well as centralized and local governmental institutions and authorities. It would be very wasteful not to benefit from the previous studies, plans, data, research outcomes and reports of these institutions. Each of the agro-ecological zones referred to above has had its fair share of previous studies and investigations, Whilst such studies might not be of harmonized and standard specifications, nevertheless, an appropriately tasks force formulated of pertinent experts and specialists could compile and process a very useful database relevant to each zone. This ensures that such that previous efforts are not wasted, real gaps are identified, and appropriate follow-ups are planned.

Basic tools for proper planning could be acquired or jointly used from the various sources and institutions if proper collaboration plans and suitable incentives are applied. Basic and thematic maps, a real photographs, satellite images, GIS facilities and interpretation expertise are available in various institutions, ministries and research centers. Credible and verified data could be used to establish suitable databases where needed.

3.4.2. NAP Sub-Components and Areas

i. North Coastal Belts

Specific features

North Coastal Belts are characterized by arid Mediterranean climate with limited rainfall that varies between 100-300 mm/year. Rainfall is practically the main natural water resource; terrain attributes are based on rapid slopes from elevated plateaus and areas to level coastal plains within a coastal belt that averages about 20 km width. The main land use categories are rangeland with grazing animals and seasonal relatively limited areas of rainfed crops and permanent fruit trees based on traditional water harvesting and storage techniques, (Mawasi, dikes, ridges, Roman wells.. etc). Soils are mainly coarse textured, calcareous with weak physio-chemical and nutritional characteristics.

The population is mainly of tribal origin and traditions. Socio-economic characteristics are based on tribal systems of nomads and agropartoralists. The local economy depends on trade of agricultural products, livestock sales animal byproducts and local handcrafts. Present developmental activities are based on the rapid extension of tourist villages and extension of El-Hamam canal westwards in the North Western Coastal area and the establishment of Al-Salam Canal in Northern Sinai to irrigate 400,000 new feddans.

Desertification stems from climatic and rainfall variability and drought. Terrain attributes are conducive to water erosion during flash flooding. Overgrazing has led to degradation of plant cover to varied extents especially for palatable species that are adapted to the harsh environment. This is a loss of valuable genetic resources. Loss of plant cover leads to wind erosion, sand encroachment and mobile sand dunes. Lately, especially in the North Western Coastal Belt, active urban encroachment of tourist villages without proper building zone authorization have adversely impacted the natural resource base. See Box (8).

The north coastal belts has been the subject of several R&D activities sponsored by varied donor agents including World Bank, FAO, ICARDA, IDRC, GTZ, JICA and others These areas have also been the subject of numerous research investigations conducted by the Desert Research Center, University of Alexandria, University of Suez Canal and others. These studies have tested and evaluated various techniques of water spreading, water harvesting, supplemental irrigation, traditional Roman Storage Wells, range management practices to improve plant cover, innovative techniques to use natural halophytes as fodder plants and agro-industrial by-products, cultivation of cereal crops on an expanded level... etc. although mainly on limited scales. Potentials and constraints should be well defined by now.

Objectives

The objectives of the Master Plan for Combating Desertification are as follows:

1. To halt or minimize the degradation factors active in the marginal land of the coastal areas such as, rangeland and cultivated rainfed areas outlined in the previous section.
2. To assess the environmental impacts (EIA) of the two major irrigation canals in this zone (El-Salam and El-Hamam Canals) to combat any anticipated adverse environmental impacts.
3. To formulate meaningful options that ensures that the introduction of irrigation into the area does not threaten the sustainable use of the marginal land or the livelihoods of the present local population.
4. To formulate integrated measures for the conservation and sustainable use of land and water resources of Wadi Al-Arish. Such measures would halt erosional processes for this resource base and prevent siltation of the reservoir of the proposed new dam.

The proposed Master Plan to combat the main desertification processes in this agro-ecological zone needs to be integrated and implemented concurrently with the pertinent in ongoing development activities.

Activities

- ✓ Use GIS technology to display all previous and present R&D activities in this zone with proper layering of information including design, measures and technologies applied, potentials constraints, outcomes, actual impacts on resource base and socio-economic concepts.
- ✓ Use thematic mapping, GIS technology and pertinent satellite imagery to display the major areas prone to the different degradation process to be the base for desertification monitoring on the medium and long-term measures.

- ✓ Identify hotspots with active degradation processes in this zone for priority assignment of combating desertification measures.
- ✓ Secure the participation of all pertinent stakeholders in all stages of formulation and implementation of major projects to combat the main degradation factors as projected by the objectives and priorities developed for this agro-ecological zone. The formulation of projects would be prioritized according to short-medium-long terms with relevance to the availability of funds from varied sources.

It is also necessary to ensure that the overall strategy and individual projects are technically and economically feasible. Not all desertification can be prevented.

Box 8: A proposed project of high priority

***Project title**:*
"Land Use Planning for Combating Desertification in the North Coastal Areas of Egypt.
***Justification**:*
Land allocation and utilization in the Northern Coastal Areas are the subject of varied land use demands and pressures. Among these demands are; rehabilitation of range areas with its associated animal carrying capacity, sedentarization activities, expansion of Touristic and summer resort villages, areas to be irrigated by El-Hamam and El-Salam Canals, expansions of rainfed cultivated cereals and infrastructure for urban, travel and emerging industrial activities including, oil and gas industries. Such varied land use demands have varied impacts on the environment and desertification processes in these coastal areas.
It would be of great significance to establish a GIS based data system that would compile, process and display in a geo-referenced way all such varied categories of land use. The establishment of such a GIS data system would be a decision support tool and a very important mechanism for assessment of positive and negative impacts of varied land use categories on desertification processes active in that agroecological zone. This is in addition to enabling formulation and testing of different scenarios and options for future land use plans with the use of modeling and EIA techniques. Finally, such a data system will help in monitoring the changes in magnitude and direction of desertification processes and impacts on the resource base.
Activities

- ✓ Compile, document and process data and outcomes of previous R&D activities in the Northern Coastal Areas including those of world Bank, EAO, ICARDA, IDRC, GTZ, CEDARE, JIECA, Desert Research Center, NWC Development Authority and North Sinai Development Authority, University of Suez Canal and others.
- ✓ Establish the GIS data system utilizing the available basic equipment, facilities and expertise of CEDARE, (Appropriate capacities available in Egypt).
- ✓ Organize and standardize the available data and its entry in the established GIS data system.
- ✓ Assess the integrated impacts of present land use activities on desertification processes using indicators and modeling appropriate for the environmental conditions of the North Coastal Areas.
- ✓ Use the established data system to identify hotspots and assign priorities for actions to combat ongoing desertification processes.
- ✓ Use the established data system to formulate options and scenarios for future land use activities with the participation of the relevant stakeholders.
- ✓ Periodical reporting every 6 months on the implemented activities.
- ✓ Convene a national workshop for all-collaborating institutions, and relevant stakeholders to review the outcomes.
- ✓ Offer training and capacity building relevant to the project activities.

***Project Duration**: 2 years. **Estimated Budget** L.E: 2,750,000.*
Anticipated Outcome:

- Establishment of a GIS data system with compiled geo-reference data for developmental activities, land use and interrelated desertification processes, which would be valuable for assessment and monitoring purposes.
- Identification of hotspots and priorities for combating desertification.
- Formulation of a Master Plan for combating desertification in the Northern Coastal Areas of Egypt.

Means of Implementation

1. Collaborating Parties include Governorate, and local authorities, EEAA, MALR, MWRI, Ministry of State for Scientific Research, Desert Research Center, Alexandria and Suez Canal Universities, regional organizations concerned such as CEDARE, UNEP, FAO, representatives of stakeholders, and interested NGOs.
2. Human Resources: Experts with previous experience in the varied activities implemented in this zone in addition to leading scientists and needed consultants.
3. Capacity Building will be undertaken as required by the formulated projects.

ii. The Nile Valley and the Reclaimed Desert Areas that have Joined Infrastructure with the old valley.

The basic features of this agro-ecological zone are the common water resource base formed mainly from the Nile water with its old conveyance system, in addition to reuse of agricultural drainage water from the old valley in the reclaimed new desert areas. Relatively shallow ground water resources are recharged mainly from Nile water seepage. Conveyance systems and canals were extended from the Nile Valley to the western and eastern desert strings of the Nile Valley in Upper Egypt, where groundwater resources of different low range salinities are being used. The soil resource base varies and includes the fertile alluvial soils of the old Valley, desert calcareous soils of varied textures and non-calcareous coarse textured soils (sandy and loamy soils) in the western and Eastern fringes of the Nile Delta. The desert soils are characterized by low fertility and resilience.

The main degradation factors in this zone are water-logging of soils due to excessive seepage from conveyance canals and a high local water table, initial salinity of virgin desert soils in addition to inappropriate irrigation techniques leading to salinity of around 35 percent of the soil resource base. Other major desertification factors are urban encroachment, although this has been curtailed recently, pollution of land and water resources through industrial wastes, excessive use of agricultural chemicals and commercial fertilizers in addition to urban and sewage wastes. Finally mis-management practices and the application of inappropriate cropping patterns and farming systems, especially in the reclaimed desert areas, lead to degradation of land productivity and huge income forgone compared to the optimum potential of proper use practices.

Previous and ongoing activities to combat desertification, in this sub-region, were initiated by concerned ministries and governmental institutions. Such activities include; (i) improvement of degraded land in the old valley through land lazer leveling, application of soil amendments and improving soil management practices (Ministry of Agriculture and land Reclamation). (ii) Introduction of tile Drainage System to the drainage efficiency and lower the water-table level to combat soil salinization. In addition, measures are being applied to minimize water conveyance losses, which save sizable percentage of the irrigation water and improve irrigation losses[1]. (iii) Legislations were formulated to ban the urban encroachment on cultivated land, which caused the serious loss and irreversible desertification of highly fertile areas (GOE). (iv) Reform policies privatization of ownership of newly reclaimed land, liberalization of pricing and marketing of major crops and agricultural products led to improvement of production policies, agricultural management practices and production level in the old Valley and newly reclaimed desert areas[2]. (v) Minimization of pollutants to land and water resources through the adoption of integrated pest management and limiting the use of pesticides and herbicides[3], as well as, efforts to limit the discharge of industrial wastes and pollutants through proper management within the industrial firms. A proposed integrated project of high priority to

[1] Abou Zeid, Minister of Water Resources and Irrigation, 1994, Ministry of Water Resource and Irrigation.

[2] Annual Reports from the Ministry of Agriculture and land Reclamation.

[3] Ibid.

combat pollution of water and land resources in the old and newly reclaimed areas through the implementation of a master plan with establishment of a comprehensive information system is presented in Box (9).

Box 9: Water, air and land pollution information system for industrial wastes in the ecological zone of the Nile valley and associated reclaimed areas

Justification*:*
A Master Plan to combat desertification processes in this highly important agro-ecological zone would have several components already being implemented by Ministries of Water Resources and Irrigation (rational use of water resources and minimization of conveyance and field losses), Ministry of agriculture and land Reclamation (Minimizing urban encroachment on productive land, improving agronomic management practices and curtailing the excessive use of agricultural chemicals through integrated pest management, research activities expert systems and integrated information systems for varied crops).
However, other major efforts could be carried out through the presently proposed National Action Plan. These would complement the ongoing efforts to survey and monitor the locations and impact of industrial pollutants discharged to the water resources or through air , which wind up, in most cases, polluting the high- value productive land as well as lakes and marine environments. These objectives could be achieved through the establishment of a geo-referenced data base of pollution sources, types of pollutants discharged to water and air, extension ad migration of pollutants, impacts on affected soils, methods and technologies to treat, minimize and curtail the discharge of industrial pollutants and efficient techniques to rehabilitate polluted soils.

Activities:

- ✓ Compile and process information, knowledge and data from the varied sources pertinent to location of industrial factories, nature of their activities, produced pollutants, location of discharge points to water and air, amounts of pollutants, migration of pollutants and impacts on resource base.
- ✓ Establish a GIS based information system to project analyses and apply modality to the compiled data to act as a support system for decision making, monitoring and planning of actions to combat and mitigate pollution processes emanating from industrial activities.
- ✓ Offer personnel training at varied levels and institutional capacity building in disciplines related to the activities of the project.
- ✓ Offer access to the compiled data, knowledge and experiences to interested stakeholders from industry, investors, private sector and NGO's.
- ✓ Identify hotspots and priorities of mitigation actions.
- ✓ Exchange knowledge and experiences with comparable national and regional organizations in the Arab Region and foreign institutions.

Project Duration: *3 years.* ***Estimated Budget****: (For 3 years) L.E. 4,500,000* ***Anticipated outcomes:***

- Establishment of a GIS based information system to act as support system for decision making, monitoring and planning of actions to combat and mitigate industrial pollution processes of surrounding land air and water resources.
- Offer appropriate training and capacity building, activities of varied levels.
- Identification of hotspots and priorities of actions to combat the pollution processes referred to.

Means of Implementation

1. Collaborating Parties include EEAA, MWRI, Ministry of Industry, MALR, Governorates of the Nile Valley, Academy of Scientific Research and Technology, concerned universities and research centers, private industries, interested NGOs; and other stakeholders.
2. Finance: the required funds over the following five years plan is 10 million dollars to be acquired from various sources and funding agents.
3. Human Resources: available from the various governmental and scientific institutions.
4. Capacity Building: training activities as deemed fit in the areas of advanced technologies for treatment and recycling of industrial wastes data base, and GIS techniques and information.

iii. The Oases and Southern Remote Desert Areas

This agro-ecological zone is characterized by hyper-arid climatic conditions with rare rainfall and extreme temperatures. The most significant environmental feature is the enclosed fragile ecosystems of developed and populated areas.

The water resource base is mainly groundwater of variable quality although water of the Nubian Sandstone Aquifer is mainly of good quality. Although these aquifers are huge, they are non-rechargeable or slowly-rechargeable at best. This is a significant factor that has to be taken into consideration for the rational use, allocation and management of water resources.

The soils resource base is desert soils belonging to the Aridisols and entisols orders with varied limiting factors including the calcarous nature, gypsum content, salinity, possible hard pans and varied soil profile depths. However under appropriate practices of irrigation, suitable farming systems and proper considerations of the economics of remote areas, such resources could be very productive.

Human resources are sparced with valuable indigenous traditions and knowledge. Educational background is generally low, but valuable indigenous traditions knowledge and handicrafts skills are wide-spread, which could be enhanced through judicious social development and marketing of tourist marketing. The sustainable long-term impacts of any proposed new production systems should be assessed prior to implementation, through rigorous stakeholder participation.

The main desertification processes are based on weak land characteristics and resilience with specific limitations, wide spread, mismanagement of land and water resources can easily cause degradation of the enclosed fragile ecosystem. Rational use and reuse of water resources is imperative due to the enclosure of the ecosystem and the need to deal with excess drainage water in ways other than the traditional ways of the old valley.

Other significant environmental concerns include the conservation of species indigenous flora and fona and preservation of the genetic resources and species adapted to the harsh environment, as this is another important means of combating desertification. Finally most of the oases and remote areas are endangered as ecosystems by creeping sands and mobile sand dunes which usually threaten the cultivated land, urban areas, strategic installations and infrastructures within the ecosystem, may also obliterate connections to the old valley and the outside world, thus hampering transportation and marketing of produced agricultural commodities.

Previous studies and activities to combat the desertification factors in this ecological zone include; (i) Investigation of varied techniques of mechanical, chemical and biological fixation of mobile sand dunes (Desert Research Center, Ministry of Agriculture and land Reclamation, General Authority for Remote Sensing, Academy of Scientific Research and Technology). (ii) Assessment of ground water potentials and limitations with respect to sustainable use and water quality (Ministry of Water Resources and Irrigation). (iii) Appropriate sustainable developments, land use strategies and cropping patterns for remote desert areas and oasis (Ministries of Agriculture and land Reclamation, Water Resources and Irrigation, Academy of Scientific Research and Technology and CEDARE). (iv) Formulation and implementation of mega projects for the sustainable development of remote desert areas including Tushki, Oienate, Darb El-Arbien and rational expansion of the Oasis cultivated areas. These projects are to be implemented through Ministry of Agriculture and land Reclamation, MWRI; and other research centers. Box (10) represents a proposal for an integrated Master Plan for combating desertification in this agro-ecological zone.

Box 10: A master plan to combat sand encroachment and active sand dunes in the southern desert region of Egypt

Justification:
The main desertification processes are based on the combined effects of climatic conditions, terrain attributes, sparce plant cover of the desert areas and the threats of the active sand dunes of the Great Sand Sea. The Location of the Great Sand Sea in the pathway of the prevailing North Westerly Winds pose threats to newly developed areas of Toshki, western shores of lake Nasser, Darb El-Arbain and adjacent areas and Oasis of Dakhla and Farfra. The active aeolian processes in these areas cause serious sediments and sand encroachment problems to cultivated areas, urban centers, infrastructure of roads and means of communication, as well as, health and socio-economic problems for the local population.
A Master Plan for combating active aeolian processes in this ecological zone would have highly significant beneficial environmental, as well as, soci-economic returns through the conservation of resource base and protection of the various developmental activities.

Activities:

- ✓ Compilation of basic data, satellite imagery, aerial photography, previous investigations and relevant experiences.
- ✓ Formulation of the Master Plan for combating active aeoline process in the area through integrated activities and techniques appropriate to the prevailing characteristics of this ecological zone. The plan should adopt most efficient mechanical and afforestation techniques with suitable economic feasibility.
- ✓ To set priorities and hotspots for phasing activities of the project.
- ✓ To provide for the institutional setup, needed training of personnel and capacity building of institutions.
- ✓ To provide a plan of needed infrastructures including nurseries, appropriate tree and shrub transplants, vehicles ... etc.
- ✓ Assessment and monitoring of field activities and continued evaluation of its impacts.
- ✓ Securing the participatory role of all relevant stakeholders in the various processes of planning and implementation of project activities.

Project Duration: *Five years and* ***Estimated Budget::*** *A total of 18 million Egyptian pounds for the five years duration of the project.* ***Anticipated outcome:***

- Formulation of a Master Plan for the protection of Areas of priorities and major developmental activities.
- Establishment of appropriate institutional facilities.
- Training of personnel and capacity building.
- Income generating and job creating activities.

Objectives

A Master Plan for Combating Desertification in this agro-ecological zone should be geared to achieve the following objectives:

1. To conserve the ecosystem from creeping and airborne sands, and mobile sand dunes curtailing processes of wind erosion, and enhancing crop productivity.
2. To conserve the ecosystem from invading pests and pollutants.
3. To provide and enhance green areas for better and healthier microclimatic conditions.
4. To formulate rational and innovative policies for waste management treatment and reuse of solids and effluents.
5. To Promote public awareness campaigns dealing with environmental issues using all available media means.
6. To develop environmental institutional aspects with appropriate capacity building and training in issues specific to characteristics of the surrounding ecosystems.

Activities

- ✓ Compilation and processing of relevant investigations and data.
- ✓ Proper design and implementation of shelter-belts and afforestation using treated effluents and water of inferior quality to protect the ecosystem, the main infrastructures, the strategic installations and urban dwellings from sand

encroachment and mobile dunes. Designs should be based on climatic parameters and satellite imagery and terrain attributes.

- ✓ Use of legislation, economic incentives and dis-incentives to encourage the use of environmentally friendly inputs for agricultural production systems, and environmentally sound industrial technologies.
- ✓ Formulation of plans for treatment of solid and sewage wastes and the environmentally sound reuse and conveyance of such effluents. Hazardous waste treatment and disposal should be controlled under strict rules and regulations with proper monitoring to curtail pollution of the ecosystem.
- ✓ Ample consideration should be given to the establishment of adequate environmental institutional aspects and their links with local government and developmental activities.
- ✓ Design of efficient and properly targeted environmental campaigns to the varied population categories and ages to enhance the awareness and implementation of environmentally sound rules, regulation and behavioral attitudes among all stakeholders.
- ✓ Use afforestation activities for disposal of suitable wastewater, provision of added income sources, creation of jobs and interrelated agro-industrial activities, as well as the improvement of the microclimatological conditions with added aesthetics.
- ✓ Creation of genebanks, collection of indigenous plant species, establishment of national parks, and protected areas in appropriate locations to enhance public awareness, educational, tourist and research activities.
- ✓ Develop activities and institutional set-ups for continued assessment and monitoring of desertification processes.

Means of Implementation

1. Collaborating Parties include EEAA, local governmental institutions, authority for Remote Sensing, the General Authority for Urban Planning, The MWRI, The General Authority for Rehabilitation and Agricultural Development, Academy for Scientific Research and Technology, the Desert Research Center, universities in Upper Egypt, representatives of stakeholders; and interested NGOs.
2. Human Resources: To be obtained from the various collaborating parties especially those having previous experience under similar environmental conditions.
3. Capacity Building: Training in the relevant environmental aspects will be needed on a large scale with varied training courses to suit the varied levels and stakeholders. Training needs to enhance women's role should be stressed.

iv. The Eastern Desert Land

Specific features

This agro-ecological zone includes the plateau and dry valleys of Sinai, the Eastern desert inland and the elevated Southern Eastern Coastal areas. The climatic features are characterized by very limited rainfall (~ 50 mm/year) in most areas with increased rainfall in the elevated Southern coastal areas. Hyper-aridity dominates areas with the scarce rainfall. Meanwhile, this ecological zone has characteristic terrain attributes where elevations above sea level; are highly variable with variable terrain physiography with alternating high locations and dry valleys.

Despite the very limited rainfall, however, heavy thunder-showers combined with the physiographic features cause the formation of damaging flash floods during the rainy season. Such flash floods are well recognized in the Sinai plateau and the Southern elevated areas with the gushing water of these floods take its coarse to the coastal areas causing soil erosion, damaging cultivated and inhabited area, as well as, tourist roads and infrastructure that happen to be in the floods pathways.

Bedwin population aside from the touristic installations in the coastal areas and the Sinai plateau sparsely populates this ecological zone. The cultivated areas are very limited due to the scarcity of water resources and very limited rainfall. Groundwater resources data resulting fro, relatively few investigations show limited groundwater resources with varied legless of water salinity, some of which are prohibitive for cultivation of traditional crops. Cultivation of salt tolerant and appropriate non-traditional would be more appropriate and conducive to sustainable development.

Nevertheless, this ecological zone is endowed with a wealth of diversified natural plants adapted to the variable ecosystems and terrain attributes which are varied throughout this zone. Distinguished among these is the characteristic flora of the elevated southern areas, such as Gabal-Elba and others. Many of those natural species are of highly valuable economic values aside from its value as valuable genetic resources. Unfortunately, many of these species are facing serious ecological threats.

Despite the relative scarcity of appropriate developmental activities and appropriate investigations yet major efforts, to combat desertification and introduce appropriate sustainable development of the available resources, should be introduced to this ecological zone. A plan to combat desertification should be geared towards two main objectives:

1. To combat damaging flash floods through appropriate water spreading and water conservation techniques; and to prevent and alleviate damages of flash floods to the infrastructures and available resources including adverse socio-economic impacts.
2. To conserve, manage and utilize the highly valued and diversified natural flora and fona resources.

Activities

- ✓ Enhance needed surveys and research investigations should be encouraged through appropriate plans and allocation of funds.
- ✓ Formulate appropriate plans for the conservation, management and utilization of the valued biological resources available.
- ✓ Establish appropriate institutional structures to help in the proper implementation of activities to enhance combating the desertification factors and encourage activities for sustainable development of the available resources.

3.5 Protecting Egypt's Marine Environment

1. Information, Monitoring and Assessment

Coastal and marine environments located on the Mediterranean and Red Seas are among the major habitats in Egypt. This environment is very rich in terms of biodiversity and includes some of the nation's most important natural resources. However, Egypt is engaging in uncoordinated development along most of the country's coastlines without sufficient consideration to environmental consequences.

The coastal zone is of great economic and environmental significance as it provides food and is a major support of recreational and tourist activity. Currently, this zone is under severe and increasing pressure. Factors contributing to this situation include rapid infrastructure, recreational and residential development, increasing tourism activities, pollution from residential, commercial and industrial activities, resource allocation conflicts between and among resource users, and continuous development of hazard-prone

areas[1]. The development of an integrated coastal zone management plan is, therefore, of prime importance.

Available information on the sources of pollution of marine life is limited, as is information on the quantity and quality of sewage, industrial pollutants and methods and location of discharges. The main sources of pollution of marine life are known to be the discharge of poorly treated or untreated sewage effluents, agricultural and industrial activities, excessive recreational development and tourist activities (the Egyptian Red Sea coastal resorts include 23 hotels and 20 tourist villages with a total capacity of 11,307 beds), coastal construction, and mining and quarrying activities. Another major cause of pollution is tourism development associated with an increase in the unsustainable tourist activities. Tourism development may threaten the marine environment and the tourism industry dramatically if not planned and developed on an appropriate environmental basis with complete enforcement of environmental legislation and regulations.

2. Corrective Actions

Lack of sufficient regulation of tourism and lack of adequate infrastructure to protect the natural resources degrades the country's marine and coastal resources and threatens the future sustainable return from these resources. The problems that result from over exploitation of the coasts are well known. Agencies responsible for protecting the marine life suggest that addressing the issue of the physical alteration and destruction of marine habitats should be considered a top priority. The already degraded condition of much of the Red and Mediterranean coasts shows that they are being exploited beyond their ecological and social carrying capacities.

The responsibility of conserving marine life lies mainly with the EEAA, which is responsible for setting the general environmental policy and formulating legislation, standards and guidelines to protect the environment. The Ministry of Tourism is another player, responsible for planning and developing the country′s tourist industry. Other responsible parties include the Red Sea coastal Governorates with coordinating and assessing responsibilities, the Port and Lighthouse Authority and the General Organization for Coastal Protection.

Efforts of EEAA in protecting the coastal zones

With the passing of Law 4/1994 for managing and protecting the environment, the EEAA has the authority to coordinate national coastal zone management activities. It also established a national committee under its auspices. One of the major tasks of the committee is to develop an Integrated Coastal Zone Management Program. A major component of this program is protecting coastal water from pollution.

In addressing the issue of protecting the marine environment, NEAP included a program for managing national marine coastal zones. The main objectives of this program include establishing a dynamic process for national comprehensive coastal zone management and development to achieve sustainable use of marine and coastal resources through a combination of scientific research, appropriate quotas and regulations, active monitoring and enforcement, and adoption of pilot projects that allow the exploitation of certain resources by local citizens and promote the concept of Eco-Tourism.

[1] According to the *UNEP Regional Seas Reports and Studies No. 166 for 1997*, the Red Sea coast and the Gulf of Aqaba will attract over one million tourists during the next few years.

i. The Red Sea

According to the UNEP Regional Seas Reports and Studies No. 166, for year 1997, the followings programs and projects are crucial for conserving the Red Sea coast. NEAP strongly recommends adopting and implementing these programs.

- ✓ Integrating all policies related to coastal and marine management into national development plans.
- ✓ Establishing a comprehensive zoning system to designate intended uses of coastal areas and to identify protected areas and public parks.
- ✓ Establishing a comprehensive monitoring program to provide baseline information with respect to marine environment resources and biodiversity.
- ✓ Identifying and managing marine protected areas in order to maintain the integrity and biodiversity of their habitats.
- ✓ Identifying and managing marine protected areas in order to maintain the integrity and biodiversity of their habitats.
- ✓ Establishing programs to restore coastal habitats that have suffered a decline or loss as a result of tourist and other development activities.
- ✓ Establishing programs to restore coastal habitats that have suffered a decline or loss as a result of tourist and other development activities.
- ✓ Enforcing and implementing the existing laws, regulations and other legislation related to the management of coastal and marine areas.
- ✓ Enforcing the use of EIAs for all tourist and development coastal projects, including large scale private and Government development projects.
- ✓ Hiring and training staff to implement regulations and ensure the compliance of both the private and the governmental projects with the stated regulations both for coastal zone management and EIA.
- ✓ Encouraging private sector actors to adjust their activities so that their harmful impact is reduced or avoided.
- ✓ Establishing a water quality-monitoring program to assess current marine water quality and establishing measures for improving water quality.
- ✓ Establishing and implementing waste water treatment and disposal quality criteria and implementing an effluent quality monitoring program to ensure compliance with the stated discharge criteria and standards.
- ✓ Monitoring all industrial discharge on a regular basis to ensure their compliance with the local standards and criteria set for effluent discharge into the marine environment.
- ✓ Adopting tested economical and effective pollution control strategies that are capable of reducing the impact of sewage disposal on the coastal and marine environments.
- ✓ Upgrading and constructing new treatment plants to accommodate excess waste water flows.
- ✓ Making sure that the location and design of marine outfall systems to discharge treated effluents into the sea meet the appropriate environmental quality criteria.
- ✓ Developing and implementing effective control of the dredging and filling of coastal and marine areas for urban and industrial development, port construction, as well as maintenance and dredging of navigational channels.

Another major program that was initiated in October 1995 was the Strategic Action Programme (SAP) for conserving the Red and Gulf of Aden. Its process provides a framework and a mechanism to enhance regional environmental management through a series of complementary policy, institutional strengthening and investment actions. It is supported by projects designed to address specific issues, and are being implemented on a short-, medium- and long-term basis according to the nature of the issues being addressed.

ii. The Mediterranean Sea

The Mediterranean Action Plan (MAP) was formed to protect the environment and to foster development in the Mediterranean basin. Since its adoption by all Mediterranean states and the EC, the action plan has served as the basis for the development of a comprehensive environmental development program in the region. It includes the Mediterranean coastal States, specialized organizations of the United Nations system, and intergovernmental and non-governmental organizations. In 1995, this plan was revised to become action-oriented and an instrument for achieving sustainable development in the region.

The major activities of the Mediterranean Action Program are:

Pollution assessment and control

Within MAP, the activities related to the assessment and control of marine pollution are organized and coordinated by the Mediterranean Pollution Program. Its main objective is to assist the contracting parties to formulate programs and measures to control and eliminate marine pollution. Through this program, the contracting parties formulate and implement pollution trend and compliance monitoring as well as research activities to be used as an essential element for appropriate coastal management.

Coastal areas management program

MAP Coastal Areas Management Program (CAMP) is a form of advanced collaboration between MAP, national and local authorities and institutions, as well as international financial institutions. It is based on the principles of sustainable development, integrated planning, and the management of Mediterranean coastal areas. Thirteen CAMP projects have been, or are being, implemented since 1989 in various countries of the Mediterranean region. In Egypt, Fuka-Matrouh Project increased the capacity for GIS and image processing; developing GIS for the Fuka area, using GIS in determining the carrying capacity of the area; and enabling environmental impact assessment on the plans for the area.

Currently, a Strategic Action Plan is being prepared on the Mediterranean marine and coastal biological diversity (SAP BIO). This project is integrated into the strategic action plan aimed at combating pollution due to land-based activities (SAP MED). The main objective of SAP BIO is to establish a database for implementing the new protocol conserving specially Protected Areas and Biological Diversity in the Mediterranean. The project envisage that each contracting party will appoint a national correspondent who will be responsible for running the project on the national level.

The Government Tourism Development Authority (TDA) is now using all available outputs and information in guiding tourism development in the Mediterranean area. Although the Government of Egypt has received technical assistance and excellent communications from the Priority Action Program (PAP), funds are required to adopt and implement similar projects.

<u>Supportive Measures</u>

- Strengthening the technical financial and institutional capabilities of EEAA and related agencies to facilitate the implementation of the proposed control programs and projects.
- Reviewing, enforcing and implementing all legislation and regulations related to coastal activities and their control.
- Providing financial and technical support to all relevant governmental agencies such as the Ministry of Tourism to facilitate compliance with the laws and regulations set by EEAA.

- Establishing coordination among the various governmental agencies whose mandates and activities overlap.
- Revising the institutional arrangements of all responsible parties to increase their authority and enhance their effectiveness in environmental management.
- Conducting an independent economic evaluation by the EEAA on the economic repercussions of nature based tourism on the resources base in Egypt. This study should evaluate the cost of environmental degradation and its mitigation. There should be also selection of the best methods for optimizing income from legitimate tariffs imposed on the use of coastal resources.

3.6 Environmentally Sound Management of Solid Wastes

Solid wastes include all domestic refuse and non-hazardous wastes such as commercial and institutional wastes, street sweepings, and construction debris. The rapidly growing quantity of garbage is a threat to human health and the environment. In Egypt, current collection rates range from 30 to 77 percent in urban areas. Unsustainable consumption is increasing the amount and variety of produced wastes. Consequently, waste disposal costs will increase as stricter environmental controls are imposed. Waste management charges should ensure that those who generate wastes pay the full cost of environmentally safe disposal. This will make waste recycling and resource recovery cost effective. Large part of waste accumulated in rural and urban areas is due to the lack of clear policies, shortage of human and financial resources (the public budget is the main source of finance) and the shortage of landfill sites for final waste disposal.

The Government of Egypt is exerting a great effort in removing the piles of solid waste that have accumulated over past years, and increasing efficiency of waste collection, treatment and disposal. The MSEA and the EEAA have formulated a national program for the proper management of waste in Egypt and this program is currently under implementation. The main goal of this program is to achieve improvements in the present solid waste management system in order to reach adequate acceptable levels of public health, environment protection, and resource conservation. The system should be cost effective and in accordance with the appropriate engineering, heath and environmental regulatory requirements. The program framework includes the following main principles:

- Consideration of the social dimension through the cooperation of citizens in the cost to reduce the dependence on public budget.
- Attract private investment, using the economic incentive system as it was stated in both laws of environment and investment incentives.
- Coordination with concerned ministries to afford suitable land for landfill sites.
- Appropriate financial management at all levels of the solid waste management system, with the cooperation of the private sector.
- Modification of the existing packaging system to reduce the density of waste and encourage the usage of recyclable materials.
- Increase public awareness through education, training, and media.
- Support for the recycling industries and assistance with developing their markets, and enhancing production of equipment needed for solid waste management.
- Decisive application of all laws related to solid waste transactions.
- Deepening decentralization in dealing with this issue and determining a clear role for all participants.

The environmental action plan, through the national program of solid waste management, is to apply 13 project concerned with solid waste treatment divided into first priority, which includes municipal solid waste, agricultural solid waste, health care waste and construction and demolition waste, and second priority, namely hazardous industrial wastes.

3.6.1 First priority

i. Managing Municipal Solid Waste (MSW)

Unsustainable patterns of production and consumption in Egypt especially in urban areas are increasing the quantities and variety of persistent waste at unprecedented rates. A preventive approach focused on changes in life styles and in production and consumption patterns, offers the best chance for reversing current trends in Egypt.

1. Information, Monitoring and Assessment
   - The waste quantities, generation rates, and characteristics are site specific and tend to vary with factors such as the standard of living and season. Per capita generation rates in cities and towns vary from low socio-economic classes, to rural areas, to high levels of living standards in urban centers. Solid waste streams should be characterized by their source, by the type of waste produced, and by generation rates.
   - Municipal solid waste is generally taken to exclude hazardous and special wastes (medical, industrial agricultural, sewage, and construction and demolition sources but definitions vary, thus making comparison of data unreliable. This leads to inaccuracy in information disseminated, which consequently leads to planning deficiencies.
   - Land disposal is the most common management strategy for municipal solid waste. Refuse can be safely deposited in a site that is carefully selected, designed, constructed and operated to protect the environment and the public health. Information about the feasibility of available areas for landfill siting in each Governorate is very important for the Solid Waste Management Strategy.
   - Facts concerning the development of the problem and the present baseline situation are necessary for a sound waste management strategy. A national data base on MSW generation patterns and available landfill sites should be entered into GIS to help with planning the national MSWM system.
2. Corrective Measures

The solid waste management program

The Government of Egypt has taken solid waste as one of its priority issues in its plan for modernizing Egypt in the 21 century. The Ministry of State for Environmental Affairs is engaged in an extensive effort to address the long-standing solid waste problem through a National Plan for the proper management of solid waste. The National Municipal Solid Waste Strategy aims to design an effective and integrated management system to be implemented on the national level. This system will be based on environmental legislation regulations, standards, and international guidelines. The strategy is based on a vision to develop Governorates' capabilities and to ensure that integrated systems are effectively implemented, relying on international experience and sustainable technological alternatives. The following table (1) shows five projects to be implemented in this branch, with £E 145 million-investment cost and £E 856 million annual expenses.

Table 1: Budget planned for Municipal Solid Waste

Project	Investment Cost (million LE)	Annual Cost (million LE)	Duration
Accumulation Removal	55	----------	28 months
The integrated System in urban communities	----------	----------	----------
1st stage (11 Governorate)	----------	543	36 months

2nd Stage (8 Governorate)	----------	145	20 months
3rd Stage (8 Governorate)	----------	96	24 months
Landfills construction	70	----------	24 months
Improvement of open dumping areas	20	----------	24 months
Integrated systems in rural areas	----------	72	24 months
Total	145	856	

Source: The National Program for Managing the Solid Wastes, EEAA, 2000.

Informal dumpsites are found in every town and village in Egypt. Whilst a few landfills in some large cities and the capital of each Governorate are properly managed sites, the majority are on the banks of the canals or some waste land on the outskirts of the village or small town and harbor rats and insects and act as breeding grounds for houseflies and serious diseases.

The MSEA's National Plan aims to minimize waste generation by recycling and to introduce safe handling, and final disposal of solid waste. Waste control programs will be developed in cooperation with Governorates, businesses, non-Governmental organizations, and consumer groups.

The MSEA and EEAA, in coordination with the European Union (EU) Life Program, in 1999 initiated the preparation of a landfill program. The program focuses on landfill sitting, the identification of alternative disposal techniques, elimination of illegal burning of wastes, phasing out of uncontrolled dumping practices, as well as development of long term plans for rehabilitation of contaminated areas.

3. Supportive Measures

User charges for solid waste collection and disposal

Private contractors collect, sort and dispose of solid wastes from households, service sectors and industry, particularly in areas where wastes include valuable recyclable materials. Their services are paid for by the waste generators (households, etc…) on a monthly basis. There is a price differential for the charge existing among households and between households and other types of economic activities. The user charge for solid waste management is paid directly to the private contractors and is charged per unit of housing whether residential or business. The fee is a monthly flat rate that is neither related to the volume or weight of the waste generated. Unfortunately, there is no exact record or data pertaining to the number of subscribers to such a service or the proceeds resulting from such a charge. This is attributed to a number of factors, primarily:

- This fee /charge is paid on a voluntary basis. If waste generators not wish to receive this service, there is no obligation to pay the monthly charge/fee.
- If residential units (or offices etc…) are unoccupied for any reason, the tenants or the owners are not obliged to pay the fee to the contractors.
- Payments made are not recorded in any official way i.e. the private contractor does not issue any receipts or official document of any sort to prove any kind of contractual agreement or financial transaction taking place between the two parties.

However, these private waste collectors do not cover all solid waste generated, even in the Greater Cairo area, due to shortage equipment and personnel. In some cases, only 60 percent of the daily quantity of solid waste is lifted while the rest stays overnight.

Lack of supervision and monitoring by the local authorities is the primary reason for the system's inability to deliver and function efficiently. In many instances, the usual waste pick-ups are missed quite frequently and so the waste is left abandoned on streets in front of houses and offices, etc… until a pick-up is made. The abandoned waste is a suitable environment for stray cats to carry out scavenging which is also done frequently by the traditional *zabbal* who sometimes collects only parts of the waste that has economic value like paper and carton boxes.

Construction waste is disposed of somewhat differently. That is, for one to obtain a construction permit, a charge (variable) is levied as a kind of performance bond for construction/demolition waste. In theory, this charge is reimbursable once construction activities are over and the site is clear of any waste. In practice, no reimbursements are made regardless of the state of rehabilitation of the construction sites. There is therefore no interest or incentive for building contractors to remove the waste coupled with no effective enforcement on the part of the municipality/local administration. Removal of construction waste is a complicated matter. It is a relatively expensive operation as there are some restrictions on the movement of trucks on the streets of Cairo. Moreover, there is a charge levied on the disposal of waste at dump-sites. Such factors result in scattering construction waste in unused land plots in the midst of residential areas or being dumped on other nearby construction sites, or very commonly in canals.

There is, however, another charge levied on all housing units by the municipality and is also related to general street cleansing and waste management services in general. This cleansing charge is set at 2.5 percent of the value of property tax determined for each housing unit. This charge is mandatory. Owners have to pay the cleansing charge to the municipality regardless of whether they pay for rubbish collection by a private contractor.

The Governorate of Alexandria has embarked on a pioneering approach in the imposition of a mandatory user charge for SW management. For many years, Alexandria –like Cairo- has experienced problems in managing municipal solid waste, from collection to disposal. The current governor is determined to adopt a state-of-the-art approach in SW management, and has issued a request for proposals (RFP) to international firms with the necessary expertise and hardware needed to implement the project. The reasoning behind the choice of an international firm lies in the belief that Alexandria needs to gain from the experience and lessons learned in other similar cities around the world in the ways of handling their solid waste. The design and construction of a sanitary landfill will also require the experience of a competent international firm. As regards to hardware and technology, the Governorate of Alexandria is of the opinion that large international firms have the financial means and capacity to purchase and operate such systems efficiently. In contrast, local firms dealing with SWM are believed to be inefficient in operating hardware and machinery, let alone acquiring them in the first place.

In an unprecedented step, Alexandria has levied a monthly surcharge on electricity bills regardless of actual occupancy. The latter point has been particularly controversial as Alexandria is a summer resort where many housing units are only occupied only during the summer season but tenants or owners have to pay the surcharge irrespective of occupancy or services rendered. The monthly charge ranges from £E 1 per month for low-income housing to LE 5 per month for luxury type housing. It is still early days to draw any conclusions from the Alexandrian experience.

Deposit refund schemes on certain containers

Deposit-refund schemes can be applied on certain containers that are reused on recovery. This is the case on certain beverage bottles and on Liquefied Petroleum Gas (LPG) containers. Such schemes are quite efficient and can achieve their targets with a high degree of success. Moreover, a post-audit can be conducted on this economic instrument with a fair amount of ease.

ii. Managing Agricultural Waste

With the expected increase in cultivated areas and in the productivity of these areas, increased generation of agricultural wastes is expected. Proper management of these wastes would focus on minimizing losses and maximizing appropriate use of residual materials.

Agricultural residues are estimated at around 25 million tons per year, of which about 12 million tons are utilized for energy purposes i.e. approximately 3 million tons of bagasse and rice straw are used as fuel for industrial purposes. The remainder is disposed of by burning in low-efficiency open-fire stoves and ovens. A small percentage of the waste is used as organic fertilizer, animal fodder, and industrial raw materials.

1. Information, Monitoring and Assessment

In order to optimize the environmentally safe use of agricultural waste and to protect public health and the environment, we need to enhance the information available about this sector by:

- Establishing a database system for providing updated information about cultivated areas and estimates of amount of wastes based on production of cultivated areas.
- Developing a procedure for estimation of annual production of waste based on actual data on cultivated areas.
- Reviewing and updating data about expected loss percentage from agricultural products and residual quantities, and recommended methods for minimizing waste generation.
- Coordinating with the industrial sector and developing research and application programs.

2. Corrective Actions

The Ministry of State for Environmental Affairs has prepared a plan to benefit from agricultural waste, especially rice straw. This plan aims to protect the environment and transform these wastes into economic products. This plan includes educating the farmers on different ways of recycling agriculture waste to produce organic fertilizers and introduce new types of rice farming to reduce the amount of generated straw and develop campaigns to give farmers new skills to benefit from this waste. There are two projects in the framework of the national program with an investment cost of £E 25 million and an annual cost of £E 25 million as shown in Table (2).

Table 2: Agricultural waste projects

Project	Investment Cost (million)	Annual Cost (million)	Duration
Compact and transfer 2.5 million tons of Rice straw	£E 25	£E 25	12 months
Private sector implementation			12 months
Total	£E 25	£E 25	

Source: The National Program for Managing the Solid Wastes, EEAA, 2000.

3. Supportive Measures

Economic incentives can be used to encourage investment by small and micro businesses in the field of agricultural waste. The Government of Egypt should finance grants and loans to help farmers engage in “on farm recycling” projects which will help decreasing the environmental and health hazards.

iii. Managing Health Care Waste

Medical waste contains hazardous wastes that need to be handled in a special way. Not only does medical waste entail health risks to waste handlers, hospital staff, and visitors within the medical establishment, there exist a number of impacts on human health and the environment outside the domain of health care facilities. Medical waste is capable of producing adverse health effects directly through contact ingestion; or inhalation of the toxicant or indirectly from fire, explosion; or other secondary effects.

Hazardous hospital waste may result in widespread infections, outbreaks, or even epidemics through water contamination, food handling; and vectors. Furthermore, the unsound management of medical waste has some serious effects on the environment. The following represent few examples of such impacts: uncontrolled dumping of medical waste, dumping directly in watercourse canals or drains or on land leads to pollution of both surface and ground water, open burning accentuates the problem of air pollution; and waste chemicals can be released or can explode or catch fire releasing combustion by-product.

1. Information, Monitoring and Assessment

The MSEA is supporting development of an integrated management system within all hospitals and health care facilities, which includes e proper collection, treatment, transport, and disposal of these wastes. Accurate information is essential for a better understanding of the problem and hence provides the appropriate solution. More information and monitoring is needed in the following areas:

- Monitor diseases that may be caused by exposure to health care waste.
- Improve and review the existing environmental and environmental health information surveillance and data systems.
- Monitor the total amount of HCW generated at hospitals and private clinics including the numbers of outpatient′s services.
- Monitor impact on neighbors and hospital employees′ health and well being due to smoke and smell emitted from waste incineration plants and landfills
- Information about risk of infection to nurses and doctors in connection with segregation of infectious waste.

2. Corrective Actions

The Ministry of State for Environmental Affairs, in cooperation with the Ministry of Health, is preparing a National Strategy to deal with health care waste. There are two main programs of health care waste management; their estimated investment cost is about £E330 million as shown in Table (3).

Table 3: Health Care Projects

Project	Investment Cost (million £E)	Annual Cost	Duration
Integrated systems in hospitals with 40 percent treatment facilities in health care firms	30		24 months
Private sector implementation	300		36 months
Total	330		

Source: The National Program for Managing the Solid Wastes, EEAA, 2000.

3. Supportive Measures

The suggested strategy has the following objectives:

- Encouraging the establishment of Environmental Management Systems for Hazardous Medical Wastes in hospitals, clinics and health care facilities.
- Introducing better practices for dealing with hazardous wastes within medical establishments.
- Reducing the adverse negative impacts of hazardous medical waste on human health as well as on the environment.
- Ensuring better disposal of hazardous medical waste rather than having them discarded with general-type waste or being burnt in an uncontrolled manner.
- Improving the quality of their work environment for medical staff in hospitals, clinics and health care facilities.

The implementation of this strategy requires the use of the following economic instruments for handling hazardous health care waste:

1. Specific charges for hazardous waste (infectious and pathological) set either according to the amount of waste generated, according to the number of patients (or number of occupied beds) or according to a flat monthly rate.
2. An incentive-based instrument to be introduced to encourage the segregation of hazardous waste (infectious and pathological) from general waste. Two cases are to be noted in this respect:
    - In case of state hospitals: grants are offered, their size related to the amount of hazardous waste segregated in colored bags.
    - In case of private hospitals: tax concessions are granted which are also set according to the amount of hazardous waste segregated at point of generation, also collected in colored bags.
3. Deposit-refund system on sharps (that is, needles scalpels, saws, and blades).
4. Deposit-recycling system on plastic infusion bottles.
5. Deposit-refund system on radiological films and liquid resulting from their developing processes.
6. With regard to hazardous chemicals there are two possible cases in this respect:
    - Deposit-refund system on hazardous chemicals in the case of no recycling taking place.
    - In cases where there is potential for hazardous chemicals to be recycled, a deposit-recycling system is installed.
7. Research grants are offered to universities and research institutes to initiate research on the most appropriately adapted technologies used for the disposal and recycling of hazardous medical waste as well as for the treatment of hazardous chemicals.
8. Subsidies on protective clothing and gloves for waste handlers.

The expected outcomes of this strategy include proper management of hazardous waste in medical establishments, reduction in environmentally borne diseases and ailments due to contact with hazardous medical waste; and establishing database of hazardous medical waste in Egypt comprising quantities and composition.

iv. Managing Construction and Demolition Waste

As a result of the economic growth experienced in Egypt, the construction industry is booming, with the concomitant increase in the waste that it generates. In addition, renovation works result in the production of demolition waste that also requires proper management.

1. Information, Monitoring, and Assessment

Information on construction and demolition waste is required in the following areas: (i) to identify priority areas where construction waste has been previously illegally dumped; and (ii) to identify areas suitable as landfill sites.

2. Corrective Actions

Proper management of construction and demolition waste would result in cleaner sites around constructed areas, and reduced airborne pollution. Material recycling would reduce the demand on landfill sites. Most construction and demolition waste is non-toxic and is suitable for recycling. However, the recycling industry in Egypt is highly selective and very small compared to the total volume of generated waste. If expanded, recycling could create numerous labor-intensive job opportunities. There are four programs for construction waste management with £E350 thousand-investment cost and £E35 million annual costs. See Table (4).

Table 4: Construction waste projects

Project	Investment Cost (thousand)	Annual Cost (million)	Duration
The integrated system of construction waste	£E 50		6 months
Design and produce containers and trucks	£E 250		18 months
Prepare maps for suitable places of final disposal	£E 50		6 months
Waste transportation by the private sector		£E35	12 months
Total	£E 350	£E 35	

Source: The National Program for Managing the Solid Wastes, EEAA, 2000.

3. Supportive Measures

The Government of Egypt is introducing economic instruments in order to create incentives for construction companies to adopt recycling technologies and minimize the amount of waste to be finally disposed off. The Government also develops guidelines controlling waste reuse based on local and international practices. It would appear that proper enforcement of the current regulations and the proper pricing of the construction bond to provide sufficient incentive for legal clean-up and disposal would be sufficient.

3.6.2 Second Priority

Managing Hazardous Industrial Solid Wastes

Egyptian industries are estimated to produce solid wastes in the range of 4-4.5 million tons per year of which 100-150 thousand tons per year is estimated to be hazardous waste. Hazardous wastes are usually disposed along with general industrial solid wastes. Increasing amount of hazardous waste is affecting human health and the environment. Egypt does not have enough expertise in managing the problem nationwide.

Effective control of the generation, storage, treatment, recycle and reuse, transport, recovery, and disposal will require the active cooperation of governmental authorities and industry.

1. Information, Monitoring and Assessment

Information about how much and what types of pollution is released, and what risk they pose on people and the environment is not yet comprehensive. In order to treat hazardous wastes correctly, we need to prepare:

- A database for hazardous solid wastes.
- An inventory for hazardous substances used in Egypt.
- An inventory for hazardous wastes produced in Egypt.

- Conduct environmental audits of existing industries to improve hazardous waste management.

2. Corrective Actions

One of the important plans of the MSEA for national environmental protection is to target hazardous waste generation and secure its proper management. The MSEA is exerting pressure on industries to play their part by promoting cleaner production methods on a wide scale and ensuring the compatibility of their hazardous waste standards with those set internationally. This is in addition to the handling and the safe final waste disposal. Part of the international movement of hazardous wastes involves illegal shipments. The MSEA has managed to establish an alerting system to detect illegal cross boundary trafficking of hazardous wastes.

The MSEA is planning to increase people's level of awareness about the proper use and handling of different types of chemicals, especially toxic ones. Also to increase the number of experts who know how to manage toxicity problems, how much and what types of pollution are released, and what risk they pose to people and the environment. In addition, the MSEA will seek the implementation of programs needed to identify wastes and their potential effects, to minimize emissions, and to treat the waste safely.

Radioactive materials as used in scientific research, radiotherapy, and industry present a separate issue. Nuclear wastes are also generated in the nuclear fuel cycle as well as in nuclear applications. Given their characteristics, the safe and environmentally sound management of radioactive wastes, including their minimization, transportation, and disposal is imperative.

3. Supportive Measures

The MSEA is considering the safety and protection from environmental health risks of radioactive wastes, which varies from very low in short lived isotopes up to a very high level in certain radioactive wastes. The MSEA is supporting a national program to deal efficiently with hazardous waste, with the cooperation of the concerned ministries, industrial corporations, and other organizations.

3.7 Biological Diversity

3.7.1 Principles and Goals of Biodiversity Conservation in Egypt

The mandate of the nature conservation sector in Egypt is to protect and manage the nation's wild resources, by conserving the nation's biological diversity, preserving a spectacular sample of the country's geomorphology in an undistributed state, and ensuring that the management and use of wild resources is sustainable.

The aim of biodiversity conservation in Egypt is to set the bases of rational use and sustainable development of the national natural biological resources so that they remain fit for use and capable of production in ways that provide for the legitimate requirements of the present and for the basic needs of future generations. The goals of biodiversity conservation in Egypt are:

1. Managing the natural biological resources and the systems that support and sustain them on a scientific basis, which ensures maintenance of natural balances, protection of ecosystems against degradation and conservation of living biota.
2. Developing Egyptian scientific and technological capabilities in fields of conservation and development of natural resources, and development of institutional and managerial capacities to enable implementation of action programs in the fields of research, monitoring, and inventories and management of projects.

3. Mobilizing national capacities and resources to conserve biodiversity with its ecological taxonomical and general elements; to ensure the sustainability and rational use of these elements.
4. Setting programs of action that ensure the positive participation of people, as individuals and as organizations, in the implementation of biodiversity conservation programs, and in enjoying their equitable shares of the benefits of these endeavors.
5. Establishing legal instruments and economic and social incentives that support conservation and sustainable use of natural resources.
6. National actions should complement regional and international actions in fields of biodiversity conservation, exchange equitably available scientific information related to conservation of biodiversity resources including genetic resources.

i. Principles guiding biodiversity conservation

- Sustaining the use of natural resources through protecting and managing a representation system of national protectorates, created by the prime minister to conserve and rehabilitate the nation's biological diversity and to protect a sample of the nation's most outstanding natural landscapes.
- Protecting the biodiversity resources against dangers of deterioration or loss through establishing and improving natural protectorates' networks, conducting research, and adopting essential monitoring and evaluation measures.
- Ensuring the sustainable management and use of natural protectorates and promoting conservation of biological diversity.
- Preserving the natural values and reducing the negative environmental impacts on natural protectorates.
- Ensuring that each protectorate is managed properly to optimize income generation without prejudicing the natural values for which it has been protected. This income is to be used in improving and developing other parks.
- Promoting the conservation and sustainable use of wild resources outside national protectorates in consultation and, where practicable, in cooperation with rural communities and user groups.

ii. Specific actions of the biodiversity sector

- ✓ Improving the biodiversity sector through hiring qualified staff that is well prepared for decision-making processes.
- ✓ Adopting a program for comprehensive management of national protectorates. Through this program there would be a specific management plan for each protectorate.
- ✓ Implementing the national strategy for biodiversity to be achieved through improving the performance of existing international projects and searching for local and international funds for new projects.
- ✓ Committing the national, regional and international efforts towards biodiversity conservation.
- ✓ Adopting environmental awareness programs to be integrated in EEAA programs.
- ✓ Expanding the natural protectorates network. Declaring new protectorates will not occur without preparing a previous study and setting required human and other resources needed for managing these protectorates properly.
- ✓ Adopting programs for improving the economic sustainability of natural protectorates. This to be done through increasing the income of the successful protectorates and investing in other protectorates.

The mandate of the nature conservation sector in Egypt is to protect and manage the nation's wild resources. This is achieved though conserving the nation's biological diversity, preserving a spectacular sample of the country's geomorphology in an

undistributed state, and ensuring that the management and use of wild resources is sustainable. In order to limit the use of wild resources, a three-pronged strategy needs to be adopted, based on (i) an appropriate legislative framework, (ii) ensuring mutual beneficial partnerships between the private and public sector to efficiently manage and market the wild resources, and (iii) allowing the community participation in the management of the natural resources.

To fulfill the mandate of conserving biodiversity in Egypt, the national biodiversity sector should set priorities for action and decide the appropriate steps required for biodiversity conservation. A determination to conserve the nation's biological diversity may be acceptable at the broad policy level, yet have little impact on practical management where success is determined by maintaining measurable levels of diversity in predetermined areas over a given time span. In addition, regular financial auditing is required in most organizations in both public and private sectors. Accordingly, the nature conservation sector has to set up a process that includes independent evaluators to review aspects of its management portfolio. Reporting and communication is another important step for effective performance in the nature conservation sector. Reporting and communication allows individual members of staff to evaluate their own performance and efficiently utilize the organization's resources. It also allows individuals to report to higher authorities on the progress and the obstacles facing the work environment.

3.7.2 Conserving Biodiversity Resources

One of the major functions of EEAA is to maintain Egypt's biological diversity and create a system for sustainable use of these resources. For achieving this aim, EEAA has adopted and implemented various measures and programs to meet the challenges of biodiversity in Egypt. Some of these programs are in progress and others are still in initial stages. The Nature Conservation Sector of the EEAA has already implemented the following tasks related to biological conservation:

1. The biodiversity sector has conducted much of the scientific research required for biodiversity conservation. The country study of Biological Diversity was completed in 1995. The output of this research was documented in 64 volumes that are currently organized and arranged in groups to be used as reference data.
2. Transformation of data generated from the country study into information was completed through the implementation of Biodiversity Data Management study in 1997. The resulting collections of flora, fauna and microorganisms were identified and a network of their collections was established with the National Biodiversity Unit.
3. A National Strategy for Biodiversity in Egypt was formulated in 1998. More than 1500 experts and decision-makers participated in the preparation of this strategy. Furthermore, various scientific institutions, governmental bodies and NGO's have reviewed the strategy that was endorsed by ministries, governors and the People's Assembly to be integrated in the Ministry of Planning for future funding.
4. Feasibility studies have been prepared for establishing centers for nature conservation, protecting rare species and developing the science of genetic engineering.
5. A comprehensive environmental survey was conducted for all Egypt during 1997/98 to explore the significant areas that need immediate interventions and to assist in building the national network of protected areas. The output of this survey was discussed among concerned parties. Accordingly, 19 areas were identified as future natural protectorates by the year 2017. As a result, 15 percent of Egypt's terrain would be zoned as protected.
6. Egypt's investment map, prepared in 1997 and updated in 2000 in collaboration with the MSEA and other ministries such as Ministry of Agriculture, Industry, Tourism, Housing, and Culture, has integrated the natural protectorates in the

nation's development. The result was the issuance of the Presidential Decree (154/2001) for the land-use map of Egypt.

The ongoing efforts of EEAA in the area of biodiversity conservation

EEAA is currently developing programs and measures to support Egypt's protectorates. At present there are 21 such protectorates covering about 8.5 percent of Egypt's area. Some of the best known of these protectorates are Ras Mohamed, Nabq, Taba, Saint Catherine and Zaraneeq. Supportive measures include preparing qualified cadres, offering essential equipment, monitoring the resources and the impact of human activities and other activities on natural protectorates and formulating plans for managing and improving these protectorates. EEAA has collaborated with various international donors to implement projects that aim at conserving biodiversity. Some of these projects are:

- Project for conserving the wetland and the environmental systems along the Mediterranean shores (GEF) 1999-2004.
- Program for conserving Gulf of Aqaba protectorates (EU) 1995-2002
- Project in Saint Catherine protectorate (EU) 1995-2002.
- Project for developing Wadi El-Rayan protectorate (Italian Government 1998-2001).
- Program for developing Egyptian Environmental Policies in regard to the Red Sea (American Agency for International Development 1999-2001 first stage), continuing till 2005.

1. Information, Monitoring and Assessment

There is still an insufficiency of scientific information in the field of biodiversity conservation, despite the extensive research work noted above. This hinders the processes of monitoring and follow-up required for managing natural resources. More research is needed to enable accurate monitoring to support biodiversity conservation. In addition, management skills and procedures need to be upgraded and more efforts are needed to raise general awareness of biodiversity issues.

The following elements are required in the Nature Conservation Sector:

- Establishment of a biodiversity data and information system compromising a focal unit and a nation-wide network of units.
- Surveys and assessment of geographic regions, natural ecosystems and productive (managed) ecosystems.
- Surveys and assessment of species (particularly those which have a restricted range and are globally threatened).
- Developing a sub-field in economics dealing with conservation of nature, protection of the environment and development of its resources.
- Prospecting studies on species: search for gene resources and associated pharmacological and chemical potential resources.
- Enhance/complete reference collections, and taxonomic research related to it.
- Programs for establishment of monitoring stations and schemes of their operation.
- Inventories of indigenous knowledge related to living species.

2. Corrective Actions

To meet the challenges and needs of biodiversity conservation in Egypt, the Ministry of State for Environmental Affairs has formulated a five-year plan (2000-2005) to be implemented through the Nature Conservation Sector. The plan's main objectives are (i) managing the natural protectorates properly and (ii) conserving biodiversity in Egypt. The plan adopts a policy of self-funding whereby the protectorates must generate their own revenue. The main projects included under this program are:

- Improving the natural protectorates networks for urgent ecological systems (2000-2005).
- Using up to date technologies in improving, administrating, managing and conserving the natural protectorates (2000-2005).
- Upgrading the economic activities inside the protectorates as a way to achieve self- funding (2000-2005).
- Establishing the Egyptian natural history museum in collaboration with international donors (2000-2010).
- Establishing a national genetic center for inherited resources in collaboration with the American Agency for Administrative Development (2000-2005).
- Establishing a center for increasing the number of rare plants and animals, specifically those threatened by extinction (2000-2005).
- The national program for research and monitoring in the field of biodiversity (2000-2005).
- Encouraging pilot projects for sustainable use of natural resources that have economic and social returns (2000-2005).
- Encouraging eco-tourist projects according to the recent tourist criteria (2000-2005).
- Participating in the regional development for South Sinai in collaboration with the EU and the SFD (2000-2005).
- Supporting the institutional organization to enable the national strategy for biodiversity (2000-2005).
- Improving and enabling the environmental legislation and including the international and regional agreements in the sector of biodiversity conservation (2000-2005).
- Developing medical plants adapted to arid ecological systems in collaboration with the UNDP, funded by the GEF (2000-2005).

Other programs are:

- National biodiversity and natural heritage inventory and monitoring program. The main project under this program is strengthening the institutional framework and building the capacity of organizations involved in biodiversity research and monitoring.
- National hunting management program.
- Natural heritage resources management program.
- International conventions compliance program.
- Public awareness, education and involvement program for natural heritage. The main projects under this program are building capabilities within the nature conservation sector of EEAA for undertaking programs to raise public awareness; and improving the quality and quantity of information about heritage and capacities of information distributors to disseminate this information.
- National wetland management program.
- National marine and coastal management program. Under this program there are two projects, establishing a dynamic process for national comprehensive coastal zoning (land and sea) and using the marine and coastal resources in a sustainable manner.
- National arid land management program.
- Nature-based tourism management and development. Under this program there are three projects; (i) addressing the specific needs of marine-based tourism, (ii) addressing the specific need of desert (safari) tourism; and (iii) promoting the concept of eco-tourism.

3. Supportive Measures

In order to insure the protection and lasting use of Egypt's of natural resources, the Nature Conservation sector has adopted the following set of supportive measures:

1. Egypt has issued two main legislation for nature conservation:
    - Law 102/1983 for the natural protectorates. This law establishes the basis for a national network of protected areas.
    - Law 4/1994 for environment has provisions for environmental protection of the air, water, and soil; makes environmental impact assessment mandatory for all development projects, specifies responsibilities for following up on international environmental conventions and contains provisions for the management of hunting.

   The EEAA is the responsible body for overseeing implementation of both laws.
2. Furthermore, Egypt has signed and ratified 24 regional and international conventions having provisions for the conservation of biological resources. The main conventions are:
    - Convention on Biological Diversity (CBD).
    - Convention for International Trade in Endangered Species (CITES).
    - Convention for the Conservation of Wetland of International Importance (RAMSAR).
    - Convention on Migratory Species (CMS).
3. Adopting institutional strengthening measures and introducing capacity building for all personnel working in the nature conservation sector.
4. Allowing the participation of all sectors of society in nature conservation. Nature conservation needs the supportive efforts of NGOs, local communities and businesses. They all have a role to play in protecting Egypt's natural heritage. Currently, there are very few NGOs dealing with biodiversity conservation in Egypt and the few NGOs active in this field need training and resources.

3.8 Emerging Issues

3.8.1 Introduction

i. Range of Biosafety Issues

Biosafety is concerned with measures aimed at protection of the human environment from potential injury or damage resulting from biological entities. The classic concept of biosafety related to control of the spread of infectious diseases and pests of humans, animals and plants in the environment and comes under the purview of specialized executive bodies of Government. More recently biosafety has become also concerned with introduced exotic species of plants and animals that may disturb economic bio-productive systems or the general environment and, as such, become an environmental concern. Since the early 1970s biosafety includes genetic engineering techniques (modern biotechnology) and hence the development, testing of "transgenic" organisms that are foreign to the natural environment. There was a concern about unintentional escape of transgenic organisms from laboratories during research and testing. The possible harm that they may cause to the environment includes harm to human health. Over regulating these aspects could be achieved through appropriate reporting, containment, and management procedures. In the mid-1990s, the concern became more acute when modern biotechnology products became commercially available for consumer use in large quantities and in international trade. International concern dictated the need for an International Protocol as part of the Convention on Biological Diversity (CBD) to regulate trans-boundary movement of such products. The Cartagena Protocol on Biosafety was drafted in January 2000 and has been so far signed by over 80 countries that are members of the CBD. Egypt signed the CBD in 2000 and ratified it on June 2nd 1994. Egypt also signed the Protocol in 2000 but is has not yet been ratified.

ii. Biotechnology

Biotechnology is defined as techniques that use living organisms or sub-units from these organisms. The aim of this technology is to improve quality and products needed for different aspects of life for the welfare of humanity. Biotechnologies are both multi-sectoral and multi-disciplinary in nature. The successful development and application of biotechnologies thus requires careful co-ordination among many disciplines. Modern biotechnology is a technology developed during the past 30 years, which promises to revolutionize the patterns of economic development in the 21st Century. The central material for modern biotechnology is the so-called "Genetically Modified Organisms" (GMOs) also referred to as "Living Modified Organisms "(LMOs). These are organisms developed in the laboratory, using molecular biology techniques, which break natural barriers between species, genera, families and even biological kingdoms, and hence can not develop in nature. Many non-living processed products of GMOs retain the unique laboratory-developed genetic material and hence may be regarded as equivalent to living GMOs.

Potential applications for biotechnologies are broad: in pharmaceuticals and health care, in food and agriculture, in environmental protection and management, and in industry. Modern biotechnology has great potential for human well-being if developed and used with adequate safety measures for the environment and for human health. It is widely thought that countries that fail to exploit the technology may suffer severely in terms of lost income and export potential.

iii. Possible Risks of the Release of Biotechnology Products

Like any new technology, biotechnology is not without risks. Fortunately, however, consideration of risk took place side by side with the development of the technology. Many such risks could be eliminated, or be made acceptable in terms of cost benefit analysis, with proper regulation of the use of biotechnology products and their release into the environment. The possible risks of the use and release of GMOs and their processed products are focused on:

1. Risks to biological diversity in the environment, which are often irreversible. This becomes even more relevant in centers of origin and centers of genetic diversity, such as Egypt.
2. Risks to human health.
3. Risks to the socio-economic integrity of a community, (exaggeration of discrepancies between small and large producers and between the poor and the rich), and
4. Risks to the political sovereignty of a country (loss of cash or export market to a new GMO product or dependence on imported packages).

Safety is achieved through the provision of transparent information on the product and the process and conducting adequate risk assessment and risk management by the regulatory authority in the receiving environment.

iv. Exploitation of Biotechnology in Egypt

In Egypt's quest for increasing food production and to overcome significant constrains of agricultural productivity, the country embarked on the development and application of relevant biotechnologies. In addition, the country is in the process of acquiring biotechnologies and biotechnology products developed elsewhere. This has led to plans for the release and commercialization of GMOs. However, a major issue that will affect and impede national efforts towards the transfer and application of biotechnology is the lack of a comprehensive regulatory climate governing:

- The safe development and application thereof;

- The safe transfer (including during importation) and use of its products and, in particular,
- The intentional release of GMOs into the Egyptian environment.

Lack of national regulations could seriously impede international trade in these commodities and the Cartagena Protocol States "environment and trade should be mutually supportive for achieving sustainable development".

v. Regulating the Exploitation of Biotechnology

Three cardinal principles govern the regulation system. The first is the application of the Precautionary Principle adopted at the Rio Earth Summit in 1992 (Principle 15 of the Rio Declaration on Environment and Development), which requires caution in application of actions that could have serious long-term impacts on the environment, unless there is solid proof of the absence of possible harm. The second is recognition that GMOs are distinct and intrinsically different from natural organisms because they did not develop in harmony with the environment and because their behavior cannot be predicted with certainty; hence they require specific regulation. The third is the right of the community to know the source of the material being made available through appropriate segregation and labeling of GMOs.

Accordingly, the regulation system must be based on specific legislation, to be introduced by the executive structure entrusted with environmental protection. It should apply only to GMOs and products thereof, and requires environmental approval before application of other regulatory requirements, which apply to both GMOs and non-GMOs. The legislation would call for prohibiting intentional release of GMOs before they are approved by a special committee established by the Ministry of the Environment in which the Ministries of Health, Agriculture, Industry, Trade, Higher Education, Justice and Scientific Research and of Foreign Affairs designate members with appropriate expertise. The committee should also establish an executing body with the responsibility of following up the implementation of permits issued under the proposed law and ascertaining adherence to its conditions.

3.8.2 Program Areas

i. Regulation of the Handling and Unintentional Release of Biological Material with Potential Environmental Risks

Current regulations on the handling of biological material that may constitute an environmental hazard were aimed at personal or public human health protection or at the protection of economic plants and animals. The scope of environmental hazards has expanded to cover broader environmental impact on genetic diversity and ecological balance. The scope of biological material too has expanded beyond disease-causing organisms into bio-entities such as vectors, introduced exotic species, strains and varieties. Moreover, research into such biological material and especially into "transgenic" organisms through molecular biology and genetic engineering techniques may have decades, becoming far removed from current scientific knowledge and practice, has become obsolete, or has become less rigorously enforced. With the increased size and means of mobility of people and material within the country, and across international borders, national environmental impacts acquire global dimensions and this trend promises to continue expanding.

A program was initiated by the MSEA in accordance with its responsibilities to protect health and environment and in accordance with its undertakings under the biodiversity convention, which aims to:

1. Protect workers handling potentially hazardous microbial and other biological material and pests (and their vectors) for humans, plants, animals and the surrounding environment from unintentional spread of such material.
2. Protect biological diversity and ecological balance from possible disturbance due to introduced exotic species, strains or varieties of plants, animals and microorganisms.
3. Protect biological diversity and ecological balance from possible disturbance due to unintentional release of genetically engineered elements derived from plants, animals or microorganisms during research, testing and contained field trials.

The activities of this program are:

- ✓ To collect current legislation and regulations governing the handling and unintentional release of the three categories of material listed above. The experience of other countries in regulation should be sought.
- ✓ To analyze the suitability of the legislation and regulations collected in fulfilling the objectives taking the current state of scientific knowledge into account and to identify gaps and needs for adjustments.
- ✓ To draft suggested adjustments of and additions to current legislation and regulations, along with enforcement mechanisms, and to sponsor its approval.

The MSEA is responsible to coordinate with the Ministries of Health, Agriculture, Higher Education, Scientific Research, Finance, Trade and Industry as responsible executing bodies. The program can be financed through donor assistance programs to Egypt in the field of biological diversity, health and agriculture. Beneficiaries can also incur portion of costs to finance this program.

The human resources needed for the execution of this program are physicians, plant and animal protection experts, biologists, microbiologists, geneticists, legal, public health, customs, quarantine and trade experts, and technical support staff who will receive training to fulfill their respective duties for the successful implementation of the proposed regulations. There is a need for establishing reference laboratories that are capable of testing and certifying material and of certification of facilities in conformity with the regulations.

ii. Regulation of Intentional Release of GMOs into the Environment

The need for such regulation is crucial to (i) protect Egypt's biological diversity and (ii) safeguard human health against potential hazards from GMOs. While Egypt ratified the CBD and signed the Cartagena Protocol on Biosafety, current national legislation does not recognize that being a GMO makes an article different, requiring specific declaration, labeling, handling or treatment. Although the international market abounds with GMO products in health care, food, agriculture, raw materials and industry, Environmental Law 4/1994 makes no mention of GMOs. Accordingly a domestically produced or an imported GMO could be legally released into the environment and consumed by people and animals with neither notification nor labeling. In addition to the risks this may present to the environment and to the health of people, lack of national legislation could negatively impinge on obligations under international law, hinder international trade, and leave Egypt as a dumping ground for risk-loaded biotechnology products.

In 2000, the EEAA, with financial support from UNEP, produced a framework for a national biosafety instrument, including draft legislation, which has been reviewed by the Ministries of Foreign Affairs and Justice but still needs further review and refinement before the Ministry of Environment for legislative consideration could sponsor it.

This program aims to:

1. Conform to obligations under international law and to avoid conflicts with Egypt's trade partners.
2. Protect biological diversity from possible risks due to intentional release of GMOs and their products into the environment, and hence promote the participation of Egypt in safely harvesting the fruits of modern biotechnology.
3. Protect the health of people without unnecessarily hindering the application of modern biotechnology products safely in the environment, and to promote the safe use of modern biotechnology in environmental management

The activities of this program are:

- ✓ Outlining and implementing a series of actions which would lead to a decision on the ratification of the Cartagena Protocol on Biosafety, so that Egypt can make use of funding and facilities made available to Members of the Protocol – especially in the areas of capacity building and interaction with the Biosafety Clearing House mechanism.
- ✓ Review and analysis of legislation and regulations on which the intentional environmental release of GMOs would have an impact, and of the report of the EEAA on the Biosafety Framework and the Cartagena Protocol on Biosafety. Identification of elements of the Framework, which need to be further polished in light of current state of the art on the subject, the provisions of the Cartagena Protocol on Biosafety, and the OAU suggested legislation.
- ✓ Outlining and implementing a series of actions which would lead to a consensus on the draft national legislation currently available at the EEAA, especially through circulation to stakeholders, soliciting opinions and views, through involvement of the Media, through public hearings and possibly through specialized workshops.
- ✓ Establishing the necessary instruments for implementation of the proposed legislation, including training of necessary human resources and provision of reference laboratories capable of backing proper implementation of the legislation.

The output of these activities will be a legislative instrument capable of maintaining biosafety of biotechnology products along with mechanisms for its enforcement. The outcome will be enabling the Egyptian participation in safely harvesting the fruits of biotechnology and be a partner in safe international trade in GMO products without jeopardizing its biodiversity, ecological equilibrium and the health of its people.

The responsible parties are the Ministry of Environment as a coordinator and the EEAA as the executing body. The program can be financed through donor assistance programs to Egypt in the field of biological diversity and biosafety

The human resources skills needed for the execution of this program include physicians, pharmacologists, toxicologists, geneticists, biotechnologists, molecular biologists, microbiologists, biochemists, ecologists, botanists, zoologists and computer scientists. Also required are entomologists, legal, public health, customs, quarantine and trade experts, and technical support staff who will receive training to fulfill their respective duties for the successful implementation of the proposed legislation. There is a need for establishing reference laboratories that are capable of testing and certifying material and of certification of facilities in conformity with the regulations. There is also a need to establish an electronic communication node to be linked to the Biosafety clearinghouse of the Cartagena Protocol on Biosafety's secretariat.

Part Four: Social and Economic Programs

4.1 Special Programs for Sub-Population Groups

Environment is a major issue and a vital component in the structure of Egyptian society. Environmental degradation impacts some social classes more directly than others, either because of their nature, race, ages, social and cultural aspects, or their intimate relation with the environmental problems. NEAP focuses on some of the most affected groups[1], such as children, youth, women, elderly, physically disabled and marginalized people. Improving the environment of the most vulnerable groups includes: eliminating sources of pollution, obtaining compliance with the laws of the environment, and protecting the social and cultural dimensions related to pollution. Any interventions will need to encompass the relationship between stakeholders and the Government, especially agencies responsible for environmental affairs.

Picture 11:The children of Omar Makram primary school gathering to plant the trees around the school corners.

C21 unit has also supported the "Green Schools Project" in collaboration with the Institute of Cultural Affairs (ICA). This project selected 28 schools in Beni Suef, Upper Egypt to implement an environmental awareness program that targets the children of these schools. NEAP formulated a proposal for upgrading the Gannabeya area, a poor district of Tanta in the Governorate of Gharbia that is home to many marginalized people. The proposal aims at eliminating the causes of environmental degradation in the area, such as accumulating of solid wastes. It also aims at relocating outside the city the polluting activities, which significantly affect the poor and marginalized dwellers.

4.1.1 Children

Residents of environmentally deteriorated areas, especially informal ones, suffer from harsh and complicated problems and hence require more development activities to upgrade this environment. Most commonly, they lack access to fundamental physical services and safe infrastructures. Developing an understanding and positive attitudes in children towards their environment is a crucial issue. This can be enhanced through the educational system along with family practices. A simple community awareness program to be easily implemented and duplicated in different areas, which would influence family practice and be reinforced by the educational programs for children.

1. Information, Monitoring and Assessment

There is a need for introducing the child, through simple means, to the essence of the environment. This would help establishing a mutually friendly relationship between the child and his/her surrounding environment. Although there are an increasing number of

[1] C21 Unit has supported some of these social groups through various initiatives. The first support was to the children of Omar Makram primary school where C21 Unit contributed to the greening of the court inside the school.

research studies on children in schools, data on their relation with the environment and ways of enhancing this relation is very limited. A program for collecting data and continuous monitoring of results after specific interventions is a step towards understanding the shape and strength of relationship between the child and their environment.

2. Corrective Actions

It is important to utilize sound means of raising children not only within the family and the associations they belong to, but starting from the environment they live in, teaching them how to act within its limits. The EEAA in collaboration with the Childhood Council has initiated a project to protect children from being exploited in the labor market. NEAP includes programs and projects for enhancing the relationship between the child and his environment through developing a friendly environment for the child. The main objectives of this program are to reinforce a positive relationship between the child and his/her environment by providing incentives so that she/he can feel there is something to gain from such a relationship. This entails incorporating children in simple activities involving their environment, which they can gain benefits from and thereby increase their sense of being intimately linked to the environment. Conserving various natural resources is an avenue for these kinds of activities. The main project under this program is to establish sports clubs and entertainment places for children in environmentally improved areas.

3. Supportive Measures

1. Designing and implementing campaigns to raise the awareness of children about their environment and highlightening the positive impact of the environment on their lives.
2. Encouraging research studies that the center for social and criminal studies conduct to examine the relation between children and their environment.

4.1.2 Youth

1. Information, Monitoring and Assessment

Surveys focusing on the relation between youth and the environment show that most young people lack the minimum level of environmental awareness. They lack essential information on their surrounding environment, sources of pollution and environmental laws. Accordingly, there is a need for more stakeholder facilitation that focuses on youth and their environmental concerns and needs. For these reasons, NEAP aims at stimulating environmental awareness among youth using organized and scientific means through exchange of information and dialogue.

2. Corrective Actions

The focus on youth is important as they are most willing group to learn and will become the agents of social change. Environmental training programs aim at getting them acquainted with essential information that will help reduce environmental problems and the risks facing society.

The Ministry of Education in collaboration with the Ministry of Youth and MSEA/EEAA has launched various training programs for youth especially in the summer vacations. These programs were implemented through sport clubs and youth centers providing access to the large numbers of youth who want to get involved in social and environmental work. The Ministry of Youth in collaboration with the EEAA has implemented a twenty activities programme for enhancing the youth participation in environmental activities. These activities include:

- Camp for youth and environment in Bardawit, North Syria.
- Clean-up campaigns in some urban areas.
- Greening projects in different locations.

The NEAP has a program for integrating the environmental aspect in the school curricula, which aims to provide secondary schools and university students with essential environmental information. The associated activities have a large practical component for stimulating environmental awareness, providing information exchange through dialogue and field visits and using practical examples.

There are a number of projects under this program:

1. Training the schoolteachers on environmental awareness, the scientific basis of environmental systems and associated practical applications. Such "training of trainers" will enable information and perceptions to be passed onto the students.
2. Field visits for secondary school students to various environments. The project aims at identifying the environmental problems in reality and building local students' information regarding the issue of environment in a practical and realistic way.

3. Supportive Measures

    1. Surveys with respect to the current levels of environmental awareness in youth, their needs, and future expectations.
    2. Training programs for specialists behavioral scientists, sociologists, political scientists, psychologists, environmentalists concerned with youth studies.
    3. Institutional development and capacity building including:
        - The establishment of a central administration for environmental activities among the hierarchy of the Ministries of Youth, Education and Higher Education.
        - Annual Plan for Youth and Environment activities for the Ministries of Youth, education and High Education.
        - Allocation of funds for both formal activities implemented through Ministries and informal activities implemented through Unions, NGOs, Clubs and Youth Committees of the various agencies and companies.
    4. Establishment of special environmental programs, such as Youth Hostels, the Scouts and the Science Club for Simple Research.
    5. Incorporation of environmental concerns into regional and international youth activities through exchange programs, common regional and international camps and participation in regional and international remarkable youth and environment activities.

Employment of youth in the environmental sector

Unemployment is one of the major problems facing the youth in Egypt. NEAP suggests that the youth be engaged in activities in the fields of:

1. Investment in cleaner production technologies and environmental friendly industries.
2. Investment in the environment service sector in solid waste management and the cultivation of trees and nurseries.

4.1.3 Women

The number of female-headed poor households in Egypt is rising. Increasing their opportunity to find employment linked to their local environments would help them feel socially secure. Women, particularly in informal areas, are vulnerable to exploitation and have to live with a great deal of uncertainty. Their planning horizons are therefore very short-term. This means that they do not consider activities that may eventually affect their lives in the long-term. Such "short-termism" means that poverty can lead to resource depleting behavior.

Combating poverty is a major issue for the environment and the nature of economic activity affects the environment. To achieve higher rates of environmental protection, The GOE has to direct more attention towards deprived social groups and adopt integrated comprehensive policies and measures that guarantee real equality in the world of work especially in environmentally deteriorate areas. Accordingly, it is essential to encourage and train women on economic activities that are environmentally friendly.

1. Information, Monitoring and Assessment

Promotion of women's participation is one of the major premises for social and economic development. There is a need to create an enabling environment so that women can play an effective role in establishing projects and executing activities, which support their families and positively change their environmental practices.

Current data and research do not provide a clear image on this social category so concerned parties need to direct efforts towards identifying the needs of this group to take appropriate corrective measures. Supporting projects proposed by grassroots organizations that are linked to the National Women Council (NWC) could possibly be the starting point for stakeholder analysis and gathering information about gender issues related to the environment.

2. Corrective Actions

To ensure the best way of utilizing environmental resources, there should be a program to train women on environmentally friendly handcrafts. This type of program would help integrating women in environmentally friendly productive activities as a means of income-generation and natural resources conservation.

The SFD is a major funding and supporting agency for women engaged in the labor market. According to the SFD Annual Report for the year 2000, almost 30 percent of SFD loans are directed to female entrepreneurs, mainly in rural areas and characterized by low literacy rates. Women were encouraged to use Small Enterprise Development Organization SEDO facilities in order to develop business opportunities.

The Organization for Reconstruction and Development of Egyptian Villages (ORDEV) under the MLD is currently responsible for the Integrated Rural Development Program (Sherouq) that aims at promoting the development of participatory structures responsible for the prioritization of community needs. According to the Evaluation Report on the Employment and Sanitation in Healthy Villages 1998, the *Sherouq* program provided assistance to 13,829 projects that requested investments that amounted to L.E. 243.78 million. The Local Development Fund (LDF) of MLD, provided financial assistance to these projects of the sum of £E. 135.9 million. These projects generated about 80,775 job opportunities the average cost for a job opportunity is about £.E. 3018. The majority of these jobs were for women and youth. .

The NEAP recommends establishing a program for enhancing the role of women in the field of environment through informal urban and rural community development projects. This program aims at increasing women's effective role in undertaking environmental activities, offering them the opportunity to participate in a beneficial societal activity.

The program includes:

1. Revolving funds for providing loans for women to develop environmentally friendly projects in local urban communities.
2. Raising awareness of women to public and household health issues, such as the avoidance of pollution of drinking water in rural areas.
3. Delivering training to poor women on how to establish and run their businesses.
4. Training sessions for women on ways of getting loans from funding agencies to establish a project, ways of marketing their products, and how to appropriately use the natural resources.

3. Supportive Measures

    1. Local stakeholder analysis and participation in the development of any programs or projects.
    2. Information dissemination and establishment of communication networks.

4.1.4 Elderly

The elderly are at risk of being marginalized by society. There is a danger that they are perceived as socially and economically less important. Other circumstances may aggravate their problems, such as chronic illness. The category of elderly people suffers from general deteriorating health conditions and decrease in levels of income followed by deterioration in the living standards especially in low-income groups. However, the elderly form an essential pool of knowledge and experience for the local community and as such can become a useful resource to any community-based environmental activities.

Information, Monitoring and Assessment

Available data on this sub-population is very limited and does not reflect their needs. There is an urgent need for research studies identifying the demographic characteristics of this group, their needs and effective means for producing an environment that is responsive to their needs. Community-based participatory situational and needs analysis is also required.

1. Corrective Actions

There is a need to create an environment characterized by low rates of pollution and scenes of green areas, in order to successfully integrate the elderly in society. Coping in a clean environment would increase their productivity and limit their dependency. NEAP includes programs and projects for integrating the elderly both at the physical and psychological levels. The program entitled “creating an appropriate environment for elderly people” aims at creating a healthy environment with low rates of pollution, and integrating the elderly into society through considering them productive factors not dependent ones.

2. Supportive Measures

The supportive measures include community-based stakeholder analysis and participation. Recommendations include codes of urban design and city-scaping.

4.1.5 Physically Disabled

Estimates of the number of Egyptians who are physically disabled are from 4-5 percent of the population. An estimated 1.2 million of those physically disabled are under 18 years of age. The main reasons behind the increasing number of this group in Egypt are the wars, traffic and road accidents and pollution of the environment that greatly affects the mental ability of the people. There is a need to develop strategies that allow the physically and mentally challenged to contribute to society where possible and ensure that they are not stigmatized and marginalized.

1. Information, Monitoring and Assessment

There is a need to asses the magnitude of the problem and to develop stakeholder participation and community activities that will enable an increase in quality of life and welfare of the disabled. Stakeholder participation would include the assessment of available services and required ones. Success stories and the experience of other countries in dealing with the problems of this group would also enhance the local efforts for supporting the physically disabled. The information gained from these activities and experiences would inform programs and projects development.

2. Corrective Actions

There should be interventions on behalf of the disabled to ensure that their environment is enabling and healthy. For instance, there should be escalators in the underground metro to help them move easily. Also, there should be special toilets in the metro stations and other public places and specially designated parking areas for exclusive use by the disabled.

EEAA in collaboration with the Ministry of Housing, Ministry of Social Affairs and Ministry of Health and Population are in the process of formulating plans on how to produce an environment conducive to their needs. NEAP programs and projects aim to make the environment more friendly and not regressive to their disability. Ways of approaching this group is another important issue included in the NEAP.

3. Supportive Measures

- Building the capacity of the trainers, technical specialists responsible for supporting the physically disabled.
- Agree upon and adopt a unified training program to be known to all governmental and non-governmental associations concerned with the issue of supporting the physically disabled.

4.1.6 Marginalized Population

1. Information, Monitoring and Assessment

Unemployment and underemployment are obvious characteristics of marginalized groups in low–income areas. Available data do not identify clearly the demographic characteristics of these groups. Limited research studies have pointed to their needs and suitable means for fulfilling them. The C21 Unit has formulated projects that aim to link increasing local job opportunities with protection of the environment. This would improve the living conditions of marginalized groups in low-income, environmentally deteriorated areas.

2. Corrective Actions

The Ministry of Local Development in collaboration with the Ministry of Insurance and Social Affairs, NGOs and funding institutions, mainly the Social Fund for Development, have been relatively successful in supporting marginalized groups in low-income areas. The support came in various ways such as providing loans, delivering training on marketing skills, establishing exhibitions to market their products…etc.

The SFD's main objective is to create employment for unemployed people especially youth, women and marginalized people in low-income areas. Greater efforts are required in this area. Many of the bilateral donor agencies currently have poverty alleviation as their primary policy objective. These support funds need to be accessed through proposing programs and projects that explicitly have the improvement of the welfare and living conditions of low-income groups as their major objective. This could be achieved through the provision of environmental services and neighborhood rehabilitation. Such activities if linked to community-based stakeholder participation will also, in the short-term, provide employment opportunities and if linked to small business income generating activities may also provide long-term sustainability. The NEAP recommends adopting the sustainable live hood approach that UNDP applied in Egypt and several developing countries as it serves as a model to be replicated. The Gannabeya project is described in section 3.2 "Environmentally Sound Management of Urban Settlements".

3. Supportive Measures

1. Training sessions on job creation to stimulate enthusiasm in the target community.

2. Securing funds for the establishment of loan programmes.
3. Minimize bureaucratic procedures to make accessing resources easy.

4.2 Economic Issues Related to Environment

4.2.1 Globalization

i. Conceptual Discussion

Globalization is a process that is having a profound impact on the world economy, politics, and environment in the new century and hence imposing a challenge on all societies to try to have plans that both maximize benefits and minimize losses. The challenge Egypt will be facing this century is to continue growing and developing at the national level, integrating her economy in the global economy, while protecting her identity and, natural resources and minimizing environmental damage. This requires more regional economic cooperation and well-formulated environmental policies to increase efforts for environmental protection[1].

The major attribute of globalization is the flow of information, capital and labor beyond nationally defined boundaries. Globalization has changed patterns of consumption and the geography of production due, in part, to the rise of multi-national corporations (MNCs). They organize themselves according to market networks locating each production and supply phase on the basis of economic efficiency, i.e., according to comparative advantage, regulatory constraints, labor markets, input cost, transport costs and market accessibility. The merger of well-known telephone companies and acquisition of major vehicle manufacturers are examples of intensified global economic linkages that support the process of globalization. The rise of global companies, many of which have turnovers far exceeding the national budgets of most developing nations, means that governments have less control over means of production and the labor markets that support them. MNCs make rational financial decisions that maximize returns to shareholders. This may mean that national government priorities and aspirations are ignored.

In the age of globalization, regions no longer need a major city as their nucleus. Regional cooperation does not have to mean regional governance. In this century, regionalism is partnership not a command-and-control relationship. A new global urban system is born. Cities, which are members of this system must meet certain requirements and perform specific functions to facilitate integrating local economies into the global economy. The outer environment of each global city, hence, has been transformed.

The development of electronic communication and information systems increasingly enables the de-linking of spatial proximity and the performance of individuals′ every day functions, such as work, shopping, entertainment, health care, education or public services. This is not the end of the city. These technological developments are transforming the city from "place of space" into a "space of flows". Dramatic increase of tele-commuting is the most common trend in the next century that will transform life in the city, i.e. urban civilization, as we have lived it in the past. The city will grow as a center of communication not as a center of innovation and culture. Each resident will be encapsulated in the cyber space communicating with members of his/her cyber community. This technological development is expected to transform the internal environment of the community. This in turn could explain changes in the behavior of individuals who are the subject of social inquiries, and the beneficiaries of development planning.

[1] Section six of this document sheds light on opportunities for collaboration in addressing environmental issues internationally.

ii. Impact of Globalization on Egypt

Globalization has an impact on all the sectors of economy in any country and this impact affects the environment either negatively or positively. This in return will influence the human resources of the country. The relationship between economic sectors, the environment and human resources is interdependent.

Globalization is regarded as an inevitable process. The challenge Egypt will be facing this century is to continue growing and developing at the national level; maximizing benefits through a fully integrated economy, while protecting her cultural identity and natural resources, and minimizing environmental damage. This requires more regional economic cooperation and well-formulated environmental policies to increase efforts for environmental protection.

Globalization and market liberalization are redefining the role of the state and its ability to control and mange plans for macroeconomic growth. They are promoting civil society organizations, particularly businesspersons associations, to play a larger role in the processes of development. This in turn will affect the conventional institutional setup for decision-making, thus affecting the context within which policies, programs and project as are formulated and executed.

The predictable major positive impacts of globalization on Egypt include:

1. Free capital movement allowing more foreign investment;
2. Greater labor mobility for appropriately qualified and skilled workers;
3. Increased competition, which spurs innovation at both the national and the global levels given that the share of research and development (R&D) in GDP increases;
4. Increased consumer welfare as prices decrease due to increased production efficiency brought about globalization;
5. Greater variety of better quality products; and
6. More rapid technological advances and developments beneficial to all sectors of economy.

The negative effects of globalization on Egypt are of two folds. First, the global environmental crisis manifested in the climate change and global warming, with all harmful outcomes, will affect Egypt as other countries of the world. The current environmental crisis is a globalization imperative. Second, globalization and neo- liberal policies are redefining the role of the state and its ability to control and manage plans for macroeconomic growth. There is a danger that as MNCs and globalization considerations begin to dominate national policies that more of the population will become disenfranchised and marginalized with fewer advocates to defend their interests. These impacts are interrelated and have a negative multiplier effect on the human resources of Egypt.

Other potential negative impacts include: increased market volatility due to the liberalization of capital transactions; possible collapse of some national industries due to their inability to compete with other more efficient centers of production; and possible loss of cultural identity.

The environment is also threatened by globalization, as MNCs are more likely to prefer to establish their production centers in countries with lax environmental and social regulations and enforcement, thereby transferring the environmental social costs of production away from the geographical area of consumption. In addition, industrial waste generated in developed countries has been dumped in developing countries, again transferring some of the social and environmental costs of production away from the centers of consumption. Only by effectively enforcing its environmental decrees can Egypt avoid such exploitation and resulting social costs and environmental degradation.

However, the public and their representative national governments, and the international community of nations and NGOs have already begun to appreciate the dangers of completely unfettered free-market globalization and are beginning to develop and establish regulatory authority over the MNCs. Thereby in the long-term addressing the potential social inequities and environmental externalities brought about by globalization.

The great challenge facing the process of globalization is to find the rules and institutions for stronger governance at the local, national, regional and global levels, to preserve the advantages of global markets and competition Countries all over the world have to afford enough space for communities and natural resources to guarantee that globalization works for people not just for economic profits. Globalization is to call for comprehension, ethics, human welfare, and sustainable development.

If Egypt is to effectively face the challenges of globalization, it has to acknowledge that the process is inevitable and hence, the Egyptian society needs to be prepared. Globalization offers us opportunities for development and growth. Yet, it poses threat to our national identity, development and environment. Traditional sectoral planning has to be substituted with participatory, cross-sectorial planning process that is anti-foundationalist and pluralistic in its nature by creating an enabling context where the interests of various stakeholders are not only represented but participate in the processes of decision-making and implementation. Egypt needs to implement a major institutional restructuring and development, which will require reduction of bureaucratic barriers to development and improve institutional efficiency and effectiveness, if it is to successfully overcome the negative impacts of globalization, and capitalizes on opportunities that evolve from it.

To boost the integration of Egypt in the global market, NEAP recommends the following policy:

1. Encourage institutions to open training centers to improve the skills of labor force;
2. Reduce customs duties and other trade barriers on factors of production including technology, imported raw materials and intermediate goods. This will help the flow of international trade and reduce production costs of Egyptian industries to help them compete globally;
3. Form more economic integration with Arab countries to minimize barriers among them and form a strong economic and cultural block;
4. Contract an agreement with the Nile River countries to minimize water losses thus increasing Egypt's share of water;
5. Invest more in modernizing agricultural production inputs and methods (e.g., improved seeds, use of environmentally friendly chemicals...etc and improving farmers' income level;
6. Direct farmers to produce a cropping pattern, which will help regenerate the soil and give more profit on the long term;
7. Invest in major programs to reduce pollution of the natural resources base of the country.

Under globalization, policies tend to adopt or at least be influenced by international systems and standards, which are more applicable to "environmentally developed" economies. This results in only formal rather than practical implementation. Hence, there is a need to establish environmental local actions where the Government attempts to:

1. Avoid short-term remedies and costly "end-of-pipe" solutions when planning environmental policies;
2. Develop policies to protect the environment for present and future generations, set the framework for development and optimize the use of environmental resources;
3. Base the environmental policies on sound social, economic and financial policies;

4. Introduce new environmental standards that are realistic, appropriate, affordable and enforceable;
5. Enhance community participation to tackle environmental problems;
6. Develop institutional changes that enhance the role of stakeholders, such as the private and the non-governmental sectors;
7. Introduce environment-friendly industries that would positively impact the local and global market; and
8. Clear environmental policies and fundamental reform for existing policies would solve different urban and rural problems, accelerate Egypt's integration in the global economy and sustain the economic and environmental gains.

To execute these recommendations, planning in the 21st century will have to abandon sectoral approach and replace it with cross-sectoral planning since environment is a crosscutting issue. This will require forming participatory structures for decision-making and enable interested parties implementing it and/or have the resources and information needed to formulate it. Greening national accounts and developing production and consumption indicators based on resources input and pollution output should replace conventional economic measures. The "if-then" logic will have to be replaced with 'both-and" logic that recognizes and acknowledges diversity and pluralism. The planning process should build partnerships and enable them to implement proposed actions. This new planning modality requires institutional transformation and the development of capacities that do not exist now.

A major policy tool now adopted “in principle” by many governments, is polluter pays principle, i.e., each polluter should pay for the costs of the pollution resulting from his operation. This is not necessarily the case in the normal circumstances. Most pollution costs are born by individuals or society, as a whole, in terms of bad health, degradation of environmental services, etc., or by governments through the cost of clean-ups and the extra burden on their social services. Such costs are termed externalities.

Government policy attempts to transfer these costs back to the producer through legislation, and adoption of various regulatory and economic instruments. By doing so the producer has two choices: to pass the increased costs of polluting on to the consumer if the product and thereby reducing demand, or by modifying the means of production so that it is less polluting. Either way the polluting levels are reduced.

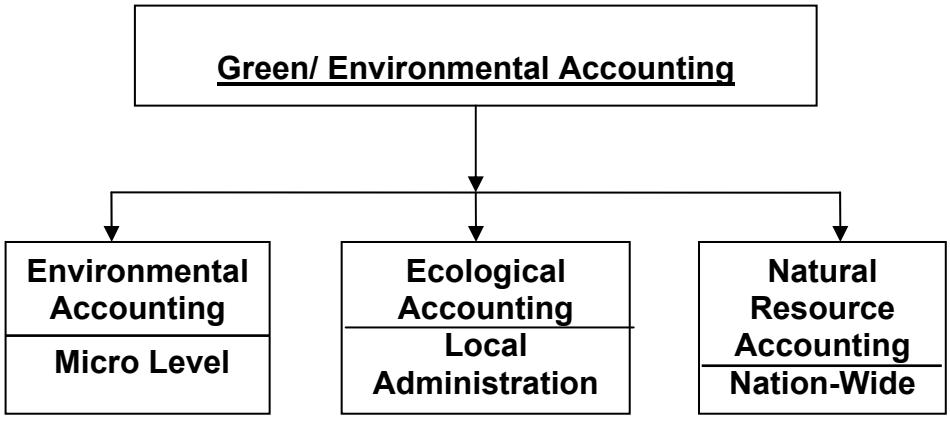
4.2.2 Environmental and Natural Resource Accounting

i. Environmental (Green) Accounting

The term "Greening" has been used a lot in the past thirty years in relation to different environmental issues. See Figure (3). In many cases, the term is also used to name organizations or activities such as Green Procurement, Green Belt Movement, etc. Green Accounting is a general term approximately synonyms with Environmental Accounting and both terms refer to the integration of the environmental dimension into the macro or micro level of accounting.

Environmental accounting supports sustainable development through national income accounting, environmental resource accounting at local administration level and at micro level relating to internal business and managerial accounting.

Figure 3: Environmental accounting



Micro level environmental accounting and reporting: In order to cope with the recent developments in the environmental field, the accounting profession needs to be prepared to extend its activities, especially with regard to environmental issues at the micro level. Environmental accounting and reporting activities of the firm have assumed an instrumental role as the public increasingly investigates the environmental and social policies of companies in their investment and buying decisions.

Environmental Accounting means the entire domain of accounting for the environment including financial accounting, reporting, auditing, and environmental management accounting (IFAC-1998).

Environmental Financial Accounting aims at true disclosure in financial statements. This means to include the environmental dimension in published financial data.

Environmental Management Accounting means the management of environmental and economic performance through the development and implementation of appropriate environment-related accounting systems and practices. While this may include reporting and auditing in some companies, environmental management accounting typically involves life cycle costing, benefits assessment, and strategic planning for environmental management (IFAC-1998).

Environmental cost accounting

The term environmental cost has at least two major dimensions: (i) it can refer solely to costs that directly impact "private costs"; and (ii) It can include the costs to individuals, society, and the environment for which a company is not accountable, known as "social costs". Environmental cost accounting deals with environmental costs in order to reach the full cost accounting. It requires the identification, evaluation, and allocation of conventional costs, environmental costs, and social environmental costs to be revealed. When theses costs are evident they can be significantly reduced or eliminated as a result of business decisions, ranging from operational and housekeeping changes, to investment in "greener" process technology, to redesign of processes/products. This type of accounting will reveal that many environmental costs (e.g., wasted raw materials) provide no added value to a process, system, or product.

According to the polluter pays principle (PPP) each polluter should pay for the costs of dealing with the pollution resulting from his operation. When this principle is not applied some other party has to shoulder them. External environmental costs have typically been borne by governments (cost of clean-ups) or by the society in general when the deteriorations in the environment are not or cannot be fixed.

- Environmental costs (and, thus, potential cost savings) may be obscured in overhead accounts or otherwise overlooked.

- Many companies have discovered that environmental costs can be offset by generating revenues through sale of waste by-products or transferable pollution allowances, or licensing of clean technologies, for example.
- Better management of environmental costs can result in improved environmental performance and significant benefits to human health as well as business success.
- Accounting for environmental costs and performance can support a company's development and show the benefits of operating under an overall environmental management system (e.g. ISO 14000).

ii. Required Procedures for Egyptian Entities to Adopt Environmental Accounting

Since accounting is an information and communication tool, it is the role of the accounting profession to provide different parties with financial data pertaining to the environment. At present, there is an increasing demand from different parties, both inside and outside the organization, for financial data about environmental activities, assets, and liabilities. This need escalated after the issuance of Law 4/1994 pertaining to the environment. Since the law was issued, the majority of Egyptian firms have embarked on the process of compliance with the law though varying pace and degree within different firms.

Environmental financial data is of great importance because, on the one hand, it indicates whether the organization is bearing its environmental responsibility or not as well as stating current and potential liabilities that may affect its financial position. This enables investors and lenders to choose to invest in environmentally friendly organizations. On the other hand, financial data helps management to take sound decisions based on true (full) costs.

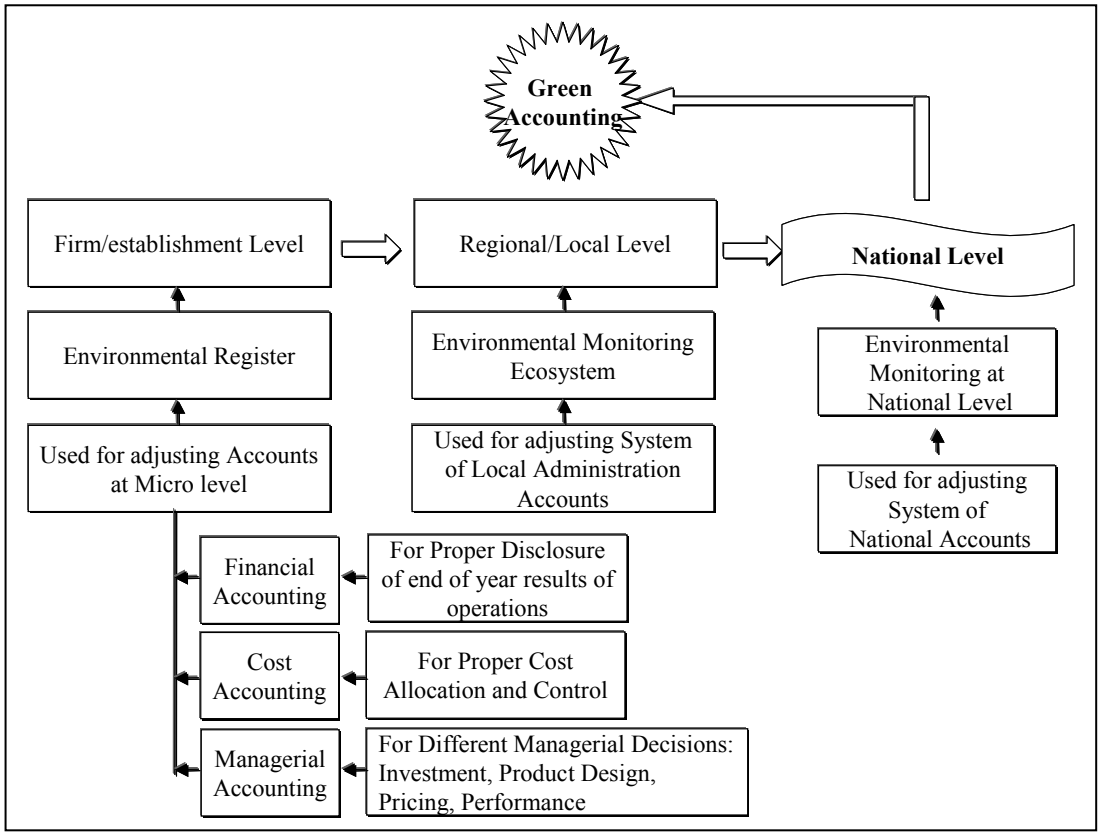
In order to assist firms on conforming to recent global trends (such as ISO 14000) and consequently acquiring a competitive advantage in the international market, the following supportive actions are needed.

- Production of guidelines on the proper classification, charging, allocation, and reporting of environmental expenditures.
- Production of a technical manual on environmental accounting for each sector.
- The accounting profession should cooperate with experts and advisers from other disciplines in the environmental field, using multidisciplinary teams with a clear distribution of tasks and functions.
- Facilitation of the collaboration and information exchange among sectors through workshops and seminars on environmental accounting. Cooperation and exchange of environmental data and expertise between sectors needs to be strengthened.
- Undertaking pilot projects on environmental accounting in one or more sector should be established as a means of encouraging other sectors.
- Capacity building of human resources and technical cadres in areas such as treatment of environmental costing, budgeting, and reporting.
- Establishing environmental accounting units or sections in large firms.
- Taking environmental management accounting in decision-making at the micro level on areas, such as new investment and product design.

iii. Environmental Resource Accounting

A commitment to sustainable development requires a broad definition of 'asset' management, one that includes environmental resource assets such as bush land, wetland, or places of natural amenity or inherent value. Natural resource accounting can be used to prepare asset management plans at local administration level. See Figure (4). Such plans provide a tool to evaluate the condition

Figure 4: Differences between natural resource accounting, resource accounting and environmental accounting



and life cycle of any particular physical asset. As a result, local administrations are able to identify their capital and operational expenditure requirements, and make sound decisions about asset usage, value, maintenance, retirement, and replacement.

Required procedures for Egyptian local administration to adopt environmental resource accounting

Applying environmental resource at the local administration level is a crucial and necessary procedure in order to be able to establish and maintain a fully developed and functional system for natural resource accounting. Besides, at the local administration level, there are many decisions made which are related to the exploitation and utilization of natural resources. Therefore, it is the appropriate level to produce financial data for the overall management and planning of the resources within the local administration area.

The concept of ecological accounting for local authorities in Egypt needs to be introduced gradually in a sequence of steps and according to the available resources and priorities. Such steps include:

- Opening and maintaining a register of environmental assets kept as a basis for strategic environmental planning and environmental asset management;
- Recording of market prices for environmental assets, whenever possible, as well as accumulating historical environmental cost information to help reconcile differences between market values and conventional accounting values attributed to assets;
- Recognizing environmental assets in an environmental balance sheet where potential economic benefits may materialize, and the cost or value of the environmental asset can be reliably measured. In this sense, an environmental asset is not different from any other asset;

- Maintaining a separate register of environmental liabilities to assist with environmental risk management;
- Separating disclosure of environmental liabilities and provisions for environmental liabilities in addition to a separate disclosure of contingent environmental liabilities;
- Establishing eco-sheets, which show the physical natural resources that the local Government is responsible for, with an indication of their economic value;
- Establishing targets for eco-assets in eco-asset 'budget' accounts to be agreed with stakeholders;
- Comparing targets with actual outcomes at the end of each accounting period; beside, record actions taken to address any significant variances between targets and actual outcomes;
- Providing trend information about eco-asset values;
- Identifying and recognizing any cross-boundary issues, which may affect critical natural capital in a local Government area, and identify other parties who can affect the value of this critical natural capital.

iv. Environmental Statistics

The availability and quality of environmental statistics should be strengthened as it is of great importance for the success of environmental accounting. The use of available international statistical concepts and definitions is highly recommended. Databases on environmental statistics should be established for each sector.

v. Benefits of Environmental Accounting for Egypt

Environmental and ecological accounting is an essential component for measuring and supporting sustainable development. It is within this context that it is instrumental to recommend the introduction and adoption of environmental and ecological accounting in Egypt especially as it pertains to the following issues:

- The main aim of the accounting profession is to support decision-making at all levels (Micro and Macro). The traditional accounting system fails to report on many indicators that reflect broad-based economic and financial performance. Therefore, by introducing the environmental dimension into accounting an improved decision making process is realized.
- In recent years, many Egyptian firms, in their quest to improve their overall environmental performance and comply with new environmental legislation, have increased expenditure in this area. Environmental accounting can assist in this regard by rationalizing such expenditure whether capital or operating.
- Moreover, adoption of environmental accounting has the advantage of prioritizing environmental expenditures. This is of specific relevance for Egypt due to the current economic and financial constraints imposed on the government and the private sector alike. By prioritizing environmental expenditure, an optimal allocation of resources is achieved thus supporting the national sustainable development policy targets of Egypt.
- For those Egyptian firms who are in compliance –or undergoing activities leading to it- with environmental legislation, environmental accounting has the ability of translating environmental activities into a financial format. This is eventually communicated to different relevant parties e.g., the public, banks, investors, etc, thus improving their image as well as accruing other benefits, such as reduced insurance premium, etc.
- Within the context of local administration, ideally incorporating resource accounting into the process of planning will result in better management of environmental resources. This is of specific relevance to environmentally sensitive areas in Egypt that require environmentally sound management practices.

Means of implementation

In order to ensure the successful and efficient implementation of environmental resource accounting in Egypt, the following issues have to be addressed:

- At the macro-level: an amendment to the System of National Accounts (SNA) is needed so as to integrate environmental aspects into the national accounts reporting.
- At the micro-level: accounting firms and practitioners have to become aware of environmental and ecological accounting and need to acquire additional skills and knowledge in this field. Technical capacity building of current accounting practitioners and firms is an important activity to ensure the gradual and successful introduction of environmental accounting in Egypt.

4.2.3 The Use of Economic Instruments

Environmental laws and regulations alone cannot resolve the challenges posed by environmental and developmental issues. What is required is an innovative mix of policies, economic instruments and market-based measures, which will induce changes in production and consumption behavior and thereby support sustainable development.

Economic instruments are used increasingly in many countries as part of the policy mix to achieve their environmental and sustainable development objectives. Most developing countries are inclined to adopt the same regulations that apply in industrialized countries, regardless of their particular circumstances. In addition, there is sometimes a lag of several years between the creation of a standard in a developed country and its implementation in a developing one, where it then often does not correspond with local realities and culture. This makes regulations too hard to comply with.

Command-and-control instruments that are sometimes successful in the developed countries are less so in developing countries due to inadequate resources allocated to monitoring and regulatory enforcement. Even if monitoring may be technically feasible, this is impeded by economic and cultural factors, such as limited budget, manpower and administrative constraints, centralization, etc. In many cases, especially in developing countries, both fines and penalties are inadequate and/or are easily circumvented.

Despite the disadvantages of CAC regulatory instruments when compared to economic instruments their utilization can be strongly justified especially in developing countries (Flores-Montalvo 1995). However, CAC regulatory instruments are still the most widely implemented policy instruments. A shift from the regulatory approach towards one based on economic incentives is unlikely to occur, whereby the utilization of both types of tools will move towards a more balanced condition.

In reality, the distinctions between direct regulations and economic instruments are often blurred, as any system of economic instruments usually requires appropriate legislative or regulatory backing. Wherever economic instruments have been used, supporting regulations have been applied.

Specific environmental problems are usually addressed by employing a Policy mix consisting of various command and control instruments, economic instruments and persuasive instruments. The effectiveness and efficiency of economic instruments always depends also on the overall policy mix. The optimal instrument must achieve its purpose at the lowest cost possible and simultaneously help improve the efficiency of resource use, increase productivity and economize on scarce resources (e.g., capital, skills and management). It is also desirable that the instrument promotes change towards the development and adoption of more efficient, less wasteful production technologies. In this sense, transition country priorities clearly favor the cost-efficiency and flexibility of economic instruments over the rigidity and cost-intensity of command-and-control instruments.

The Potential Use of Economic/Market-Based Instruments in Egypt

Egypt is and has been for almost a decade now- undergoing an economic restructuring and privatization program. At present, Egyptian industry is facing problems of production efficiency, quality control, competitiveness and profitability. These problems stem from the changes in the price structure, which industry has experienced as the economy moves towards a free-market environment. These present difficulties make industry in general unwilling to take on additional cost imposed by environmental regulations. However, much could be gained through improvements of input management efficiency cutting waste and therefore pollution.

In the long-term, the impact upon industry from the imposition of environmental costs will not have substantial impacts upon the level of national economic activity as long as the overall economic benefits outweigh the costs. Economies in transition have to consider implementation of environmental policy solutions that do not restrict broad-based economic growth or massively affect the competitiveness of the country's exports as a whole. Market-based instruments combined with an enabling regulatory environment present the most efficient way of avoiding serious socio-economic costs.

As Egypt is currently suffering from tight fiscal constraints, there is a need for additional revenues for environmental protection outside of the State budget. This, therefore, calls for earmarking additional revenues for environmental purposes in the form of gradually introduced environmental instruments while taken due consideration of the ability of industry and households to pay the additional costs. This would increase the priority attached to environmental issues without violating the budget constraint. It would also enhance the acceptability of the regulation by returning the revenue to the sector from which it was taken.

Given the scale of environmental problems in Egypt, immediate improvements in environmental protection and the conservation of natural resources are highly desirable. The utilization of economic instruments in Egypt must be considered as an option to facilitate the implementation of the environmental regulation by providing both economic incentives and disincentives to complement (and supplement) existing direct regulatory instruments. Market liberalization and market reforms will mean that it would be possible to introduce the notion of the polluter pays principle (PPP) which has been, so far, ignored in Egypt.

Part Five: Institutional Building and Legislation

5.1 Existing Institutional Framework for the Environment

The challenge of Egyptian environmental policy is to achieve a balance between the needs of a developing nation while protecting her natural resources. Environmental policy is set formally by the Ministry of State for Environmental Affairs (MSEA) and is the product of consultation with legislative, political and public representatives. It also includes representations from the private sector and from environmental NGOs. EEAA is the executive arm of the MSEA. The authoritative role of the Government and the support of the President for environmental concerns is the base for the successful execution and implementation of the NEAP. The strategic objective of environmental policy in Egypt is to introduce and integrate environmental concerns relevant to protecting human health and managing natural resources into all national policies, plans, programs and projects. The medium-term objective is to preserve natural resources, biological diversity, and national heritage within a context of sustainable development. The short-term objective is to reduce current pollution levels and minimize health hazards to improve the quality of life in Egypt.

Although Egypt has a long history of environmental legislation, compliance is weak because enforcement is not efficient enough. Egypt needs to strengthen the institutional mechanisms necessary for effective environmental management. This section describes the current institutional framework within which environmental policy is made and implemented. Then suggestions are made for the institutional and capacity building that is needed to obtain optimal benefits from the National Environmental Action Plan. In order for this to be realized institutions need to have:

- Clear mission statements.
- Adequate management systems.
- Budget systems.
- Personnel training programmes.
- Access to the environmental and information systems.

The implementation of environmental policy is dependent on the country's ability to set up appropriate institutional structures with clear mandates and the necessary infrastructure to carry out these mandates. Institutions need to have clear mission statements, an adequate personnel management system, sound budgeting systems, a continuous training program for internal capacity building, as well as access to the environmental and other public information systems.

5.1.1 Line Ministries and Governorates

The 1990s marked a turning point towards more effective environmental management as Egypt started its Economic Reform and Structural Adjustment Program (ERSAP) in 1992. The program expressed Egypt's commitment to pursing the goal of sustainable development. The shift towards sustainable development was due to the growing awareness of the pressure that both population and economic growth are exerting on the country's limited natural resources. This shift requires collective action based on appreciation and redefinition of the roles of various actors in society in relation to

environmental matters, including governmental authorities, and on a commitment to include the environmental dimension in all aspects of development. There is a need to incorporate the environmental and social aspects into planning; in addition to economic considerations.

Central Departments of Line Ministries and their Agencies

There are 17 Ministries involved in the administration of 81 laws and numerous decrees with environmental components[1]. Broadly speaking, we can say that all infrastructure projects and a good many other major activities by the line ministries have environmental implications. In addition there are over 40 governmental organizations involved in environment; however, this listing is not comprehensive as there are other aspects of official activity that also impact environment.

Many of the major funding ministries undertake works that have very strong environmental implications. To back this argument, when the MALR is looking at the introduction of new crop species there are environmental implications in terms of the fauna that may be encouraged or harmed by it, in terms of the chemicals that may be needed for its production or conservation, in terms of the effluents of any processing activities that may associate with the new crop etc. The MHUUC has a huge environmental impact through the land zonings that it recommends in that each human activity for which the land may be allocated has to be carefully balanced against the potential degradation of soil, pollution of air or water, or loss of irreplaceable cultural or natural resources that may result. The Ministry of Tourism' decisions with respect to new tourist developments have highly significant environmental effects on the land. There are other Ministries whose mandates affect land/environment issue. If we turn to look at water issues, again there is a complicated array of actions which a variety of ministries undertake as part of their mandate and which have enormous environmental impact.

5.1.2 Ministry of State for Environmental Affairs (MSEA)

The mandate of the MSEA is to achieve a balance between the needs of a developing nation while protecting her natural resources. The MSEA is required to address the cumulative impact of environmental problems that have accumulated over the past 40 years, mobilize investments; and build human capacities[2]. The National Environmental Action Plan includes plans to deal with these requirements, which has to be implemented through line ministries in collaboration with major stakeholders, such as NGOs and the private sector.

5.1.3 Egyptian Environmental Affairs Agency (EEAA)

In 1982 the Egyptian Environmental Affairs Agency (EEAA) was created by Presidential Decree No. 631, becoming the highest authority in Egypt responsible for promoting and protecting the environment and coordinating adequate responses to these issues. Previously the Environmental Research Council of the Academy of Scientific Research and Technology had been working on a national environmental research strategy and had initiated some projects on air and water pollution.

Since the creation of the Ministry of State for Environmental Affairs in 1997, EEAA serves as the central coordinating body that develops policies for the MSEA, overseas their implementation, monitors progress of environmental action plans.

Targets set for environmental action include:

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[1] Refer to the Environmental Profile, "Section D", NEAP, 2000.

[2] Ibid

- Complete phasing out of leaded gasoline, establishing of vehicle emission testing facilities, and promoting compressed natural gas vehicles
- Relocating lead smelters away from urban settlements,
- Developing low cost technology for potable water supplies in Egyptian villages,
- Reducing the use of chemical pesticides and fertilizers,
- Reducing of dust emissions by concrete factories, and
- Establishing and administrating 21 natural protectorates.

EEAA carries out its responsibilities through a central office that now has about 750 full time staff (among which 220 are experts) and utilizes the services of numerous consultants. In the current structure there are three technical sectors: (i) Environmental Quality, responsible for setting policies and plans, monitoring and information, and for developing programs for dissemination of environmental information, the coordination of available data, reports and research studies; (ii) Environmental Management, which sets the national program for environmental impact assessment and the implementation of pilot projects. It also supports technology development in the Agency and its directorates for Coastal and Marine Management, Hazardous Substances and Waste Management, and Environmental Development; (iii) Nature Protection, with a division for biodiversity and the Natural Protectorates' Management division.

An Enforcement Unit responsible for monitoring compliance, performing inspections and generally enforcing Law 4/1994 and Law 102/1983 has been created and about 40 inspectors have been trained and began work in 2001. The creation of an autonomous unit for biodiversity and Protectorates' management, reporting to EEAA, is being debated on the basis that these are field work-based activities and require a different management style to the think-tank aspects of EEAA. EEAA also has 8 regional branch offices (RBOs), although the RBOs are still in the process of finding suitable staff to meet the broad regional responsibilities that are envisaged for them.

5.1.4 The Private Sector and Civil Society Organizations

Egypt is encouraging the participation of the private sector and business community in the social and economic development since the open door policy in 1979. This encouragement would allow the private sector to support Egypt's economic growth, encouraged by law eight of investment. For achieving this goal, laws and regulations governing investment have been simplified over the past two years so as to reduce transactions costs and the time consumed in dealing with bureaucracy.

Civil society and the private sector have a vital role to play in conserving the environment as well as degrading the environmental resources. The NEAP involved several stakeholders in shaping and implementing environmental policy and in monitoring[1]. NGOs are among the civil society organizations that play a major role in the Egyptian society. One of the main targets of the NEAP is to establish a channel for mutual dialogue between NGOs and the GOE. Political parties are other form of civil society organisations[2]. Each political party has a committee for environmental protection, especially the National Democratic and *Khodr* (Green) Parties. Coordination between these committees and EEAA is required for more progress on the environmental level.

As for the labor unions and syndicates, it is crucial to strengthen the role of workers and labor unions through training, enhanced information flow and exchange, and increased participation to realize improved environmental management and sustainability in Egypt. Research institutes have a vital role to play in addressing environmental and

[1] Refer to the Environmental Profile, "Section D", NEAP, 2000.

[2] Ibid

development issues. Their role effectively depends upon a suitable set of technical and legal standards[3].

5.2 Upgrading Egyptian Environmental Institutions

Protection and conservation of the environment and pollution abatement are crosscutting issues and therefore implementation of environmental policies is difficult. Egypt is in need for a central administration responsible for the environment, line of budget for the environment as well as technical capabilities such as equipment and management procedures. Established sectoral interests have their entrenched ways of doing things and the barriers to rapid absorption of environmental concerns as part of their planning processes is more to do with lack of knowledge and human resource capacity than ideological – everyone can understand the need for environmental protection and conservation if it is clearly explained. The capacity of key institutions to respond appropriately is the major concern. A realistic assessment of the amount of support needed by the various institutions involved in implementation of environmental policy is fundamental to achieve the results desired by the NEAP.

Given that environment is a relatively new field in Egypt, the availability of qualified and experienced staff is a serious limitation, not only for MSEA and EEAA but also for all levels of government, civil society organizations, and the private sector wishing to develop and offer environmental services. Before looking at the specific upgrading needs of the various institutions involved in Egypt's environmental policy implementation, the general problem of lack of human resources is discussed.

Human capacity building

At the policy level the shortages in human resources are a serious constraint because the required personnel cannot simply be trained by providing a course of study and expecting suitable people to emerge after one year or more. Policy level work requires experience, and experience is necessarily time-consuming to acquire. MSEA and EEAA need more experienced environmental specialists to strengthen their position as the central focal point responsible for environmental management. Financial and human resources currently available fall short of what is needed to meet their institutional obligations.

5.2.1 EEAA's Institutional and Capacity Building Requirements and Action Plan

There are three interdependent clusters of functions that EEAA needs to perform with respect to NEAP:

1. Policy/Planning functions, including identifying problems, making strategic choices and so forth;
2. Executing functions, such as approving licenses, protecting nature, monitoring…etc.; and
3. Capacity development, such as training, establishing synergies between interested parties, encouraging research, and information dissemination.

EEAA has its own powers for enforcement and a budget for proactive interventions in the environmental field. Nevertheless, its primary influence derives from the persuasive impact of information that it disseminates in various ways. Therefore, it is very important that a good range and quality of factual information and analyses are provided by EEAA to all other participants in NEAP implementation.

[3] Refer the Environmental Profile, "Section D", NEAP 2000.

From the point of view of planning for EEAA's institutional development and capacity building it is useful to divide EEAA work into two types (i) functions that can be handled by short-term consultancy input, for which only a small supervisory staff of very broad background and experience are needed to prepare Terms of Reference for consultants and then to guide and review their work, and (ii) information gathering, analyzing and monitoring work for which a much larger permanent staff with a variety of specialized skills is required, and for which additional office and laboratory space is needed.

i. Development of EEAA Core Policy

Concerning the professional development of the core policy team of EEAA and the supervisory staff (for monitoring work by external consultants), the two main issues are to develop a 5-yr strategic sectoral plan and to attract and keep people with the requisite qualifications and background. Given the great shortage of experienced environmental professionals in Egypt, salary, working conditions and career prospects must be competitive.

Action plan

- Draft a strategic action plan that sets out three streams of action over a five-year period i.e. (i) plans for conforming with mandated participation in national and international forums, (ii) how the advisory role of EEAA will be met with respect to all key players in the environment, and (iii) plans for project style activities.
- Prepare staffing plans commensurate with the needs of the strategic action plan, including an integrated set of job descriptions, staffing policies, and statement of career development opportunities.

Policy development

In advance of, or concurrently with, development of the strategic plan, certain environmental policy issues need urgent refinement, authorization and dissemination.

- Finalize policy statements on (i) polluter pays principle, (ii) government to government pricing when related to environmental issues, (iii) EIAs for policies and regulations, not just projects, (iv) incentives for small investors, (v) licensing of inspection bodies, etc.
- Investigate methods for compelling various existing monitoring institutions to work with EEAA i.e. makes their data and results available to EEAA as a central authority.

ii. Information and Dissemination Functions

Information gathering, analysis and dissemination functions of EEAA need to be strengthened and expanded, building on what has already been achieved. As a first step some fundamental structural issues need to be resolved, such as whether to establish affiliated organizations with clearly defined scope. For example, the protection of nature could be the subject of such an affiliated organization, with its own staff, own budget, and own agenda. The rationale for this approach is that the protected areas are growing and need to be managed as income generating entities. This requires highly specialized capacities.

Regional strengthening

EEAA's eight regional offices need to have their physical requirements completed (currently 5 are operational). The major stumbling block is lack of qualified personnel to staff the offices. (The critical shortage of suitable personnel also affects the Governorate-level environmental units).

Action plan

- Develop, in consultation with private sector training providers, environmental management courses at a variety of levels of details e.g. 2 week overview courses, diploma level tuition;
- Develop alternative means of training delivery;
- Develop a range of funding options;
- Assist regional administrators and RBO and EMU personnel to select the appropriate courses and delivery method and to apply for training funding if required.

Financing: To date the NEAP process has received the bulk of its funding from Capacity 21. As that project is phased out, updating and implementation of NEAP will transfer to the EEAA's "Department for Planning, Follow-up and Technical Cooperation" (PFTC), which will need additional financial resources, and physical and skills upgrading, to meet this additional responsibility.

Policy development: The current environmental law focuses on end-of-pipe controls via command and control regulations. Its executive regulations have taken some of the standards from international standards and in some cases these are not relevant to the Egyptian situation. EEAA is in the process of reviewing these standards in the light of application for the past six years.

Appropriate methodologies need to be developed for pricing of environmental resources to reflect their real value to society. Crisis management should be only one component of environmental management. The long-term direction is to institutionalize the participatory process to form partnerships and enable stakeholders to own the process.

Financial stability: EEAA has depended on development assistance organizations-supported projects, which is not a sustainable source of funding, to meets its mandate. In most of these projects, there is an Egyptian component that may be accounted for in kind or in cash. It is worth mentioning in that regard that the community contributions to the implementation of these projects influenced the stability and sustainability of these projects, such as SEAM and EEIF. However, There must be more commitment of a specific percentage of the annual budget of the GOE to allow the Ministry and the Agency to carry out their assigned roles.

5.2.2 Support for Ministries with Environmental Responsibilities

i. Central level

In President Mubarak's speech inaugurating the Toushki Canal in January 1999, the following pledge was made:

> "In the New Valley, we should not again commit the same old mistakes which have spoiled the environment of the Old Valley. We must not indulgently adopt commonplace solutions, which disregard new environmental conditions nor the requirements of the new reality."

It is generally accepted nowadays that environmental dimensions must be incorporated into all aspects of development planning if a country is serious about wanting to attain sustainable development – this applies to developing and developed countries alike. Given Egypt's legacy of centralized state decision-making along sectoral lines, the current challenges are to find effective ways to (i) coordinate cross-sectoral environmental issues and (ii) increase public participation in defining, implementing solutions, and monitoring environmental problems.

The coordination aspect, at the highest level, takes place at the Cabinet of Ministers and there is full support for incorporating environmental concerns and participatory planning modalities into sustainable development for Egypt. Many ministries and multiple

subsidiary organizations and agencies have environmental responsibilities. In general, coordination occurs by means of issue specific ad hoc committees chaired by the Minister of the funding ministry. At the working level, 'including the environment' is largely a matter of persuasion by the EEAA, working through cross-sectoral forums on specific issues.

Box 11: Building the capacity of EMUs

Egypt's Capacity 21 project developed pilot proposals for capacity building for EMUs. The main objectives of this proposal are: developing an appropriate communication network in the EMUs offices, delivering training to the EMUs working staff in the field of planning/follow-up and environmental coordination for the purpose of building their capacity, providing the EMUs with technical experts to develop their technical and managerial skills and developing an organized institutional structure to improve the quality of the EMUs work.

In recent years, numerous regional and municipal units have been created to decentralize, democratize and coordinate. They lack the necessary capacities to fulfill their duties. Many organizations at as many levels need to be coordinated on various issues. Without this coordination, negative environmental impacts will result. Aside from which, it has proved impossible to train enough cadres of environmental professionals to staff relevant bodies at any level (central, regional or national).

ii. Central government

Many Egyptian ministries have recognized the value of establishing environmental units within their ministries. This is a valuable step towards mainstreaming environmental issues into national policy making. These units would ensure that all projects supported by the concerned ministry and associated line agency should comply to EIA regulations.

Some ministries are collecting data that will augment data that EEAA is developing. For example, MWRI are collecting data and information on water quality, whilst the MOHP is monitoring certain environmental parameters such as domestic wastewater quality. One output of joint efforts in this field could be the National Environmental Monitoring System.

<u>At the level of local administration:</u>

Environmental Management Units (27 EMUs) within the Governorate offices (reporting directly to the Governor) are still defining a role for themselves in most instances.

Action plan

- Case studies drawn from the experience of the (few) effective EMUs to be used in "Identity" workshops for EMUs, grouped on a regional basis.
- Project for building capacities of EMUs, as illustrated in Box (11).
- Staff and officials of the local administrations, primarily middle management staff at the Governorate and the *markaz* levels need to acquire a working knowledge of the changed economic environment that Egypt is now operating in, and to become sensitized to the problems they will face if environmental concerns continue to be ignored in their work. Furthermore, these officials are key personnel in creating and supervising the updating and maintenance of a database on local resources and environmental conditions.

The main needs are:

- To enhance the capability of local administration in improving the management of infrastructures and services for which municipal authorities are responsible.
- To encourage greater private sector participation in service production and/or delivery whenever it can improve environmental accountability and save expenses.

- To improve information infrastructures. Meaningful information is generated only after data has been collected, categorized and analyzed, for which equipment and relevant skills must be available in the right quantities in the right place.
- To establish a culture of information sharing. Government officials at levels other than those responsible for its collection need to have access to information to improve policymaking processes that enhance environmental management.

The financial and technical capacity of municipal institutions also need to be upgraded as raising and allocating funds requires negotiation skills to be employed at several different levels of administration. In the process of delegating authority to the lower levels of management, it becomes essential to grant local administration the right to access credit and capital markets to finance their investment projects. It is also essential to provide them with the necessary management tools to make proper use of this access. This should especially include, familiarizing local administrators with the banking system in Egypt and providing them with skills in finance as well as cost-benefit analysis of projects. Finally, with a growing stock market in Egypt (over 1000 listed companies in first quarter of 2000), local administrators should understand the mechanisms of the stock market. Given Egypt's efforts to spread high-tech industries, local administrators should be trained on how to evaluate high tech projects and the means to create an enabling environment for the growth of such projects in their community.

Improve planning processes

Current planning procedures entail multiple amendments to plans and budgets, each requiring another round of negotiations. A better planning process, rooted in realistic economic and social analyses, could save resources. These analyses require an improved information system and a mechanism for regular updates. Criteria for evaluation and prioritization are also needed, as are new cadres who are capable of utilizing modern technologies, such as GIS, in the planning process. Ideally the local level administrators would also be trained in strategic thinking and be able to develop a constructive discourse with the private sector and non-government entities.

iii. Support for Courts

The courts are expected to play a more effective role once proposed legislation and the stricter rules and penalties established in Law 4 are adopted and enforced. There is a need to develop the capacity of the judicial system to enforce and uphold respect for environmental laws. Otherwise, laws become meaningless and government loses credibility.

5.2.3 Support for Other Environmental Institutions

i. NGOs

Community based organizations and other forms of non-government entities can contribute to NEAP implementation at many points, thereby improving the quality of life in low-income communities. Law 4/1994 expanded the role of NGOs in environmental protection as article 103 entitles them and any individual to report any violations of the law. According to this law, the EEAA's Board of Directors includes three members representing NGOs as well as other members of civil society. Moreover, the Egyptian Environmental NGO Steering Committee was established comprising 15 representatives of NGOs. This would promote NGOs chance to participate in stating appropriate remedies for the Egyptian environmental concerns.

Egyptian environmental NGOs are of three types. The first is the NGOs with broad interest in the environment and large membership. Examples here include the National Association for Protection of Environment (NAPOE) and Friends of the Environment

Association in Alexandria (FEA). The second group of NGOs includes single-issue organizations with open but small member ships. Examples here include the Association for the Protection of the Environment (APE) and the Association for Health and Environmental Development (AHED). The third group of environmental NGOs is represented mostly by scientific societies and some research institutions that deal with environmental problems. Examples are the National Society for Environmental Protection and the Egyptian Society for Marine Sciences and Technology.

The EEAA board of directors includes three members representing:

- ✓ Union for Environmental NGOs including 250 NGOs was established under MOSA.
- ✓ Friedrish Ibert and the EEAA issued a directory of environmental NGOs.
- ✓ UNESCO of Egypt through its national committee MAB issues presented many NGOs working in environment in Egypt.
- ✓ NGO networking.

The effectiveness of NGOs in the field of environment has been recognized by the EEAA. They are providing NGOs with technical assistance and supporting them in mobilizing resources essential for funding their projects. At present, the MSEA/ EEAA is devoting serious efforts for informing the NGOs with environmental problems and corrective actions needed to limit the negative consequences of these problems. Though the responsible authorities mainly EEAA adopted various institutional developments as has been shown earlier, the capacity of the NGOs to carry out their environmental functions is constrained by both internal originations and the external political and legal problems. Thus, NGOs should be enabled and strengthened to help design and implement the EEAA programs and projects.

Action points

- The first institutional development that should be encouraged is to get greater geographic spread of environmental NGOs.
- Establishing a channel for mutual dialogue between the NGOs and the Government is another target of the NEAP.
- Participation of NGOs in the evaluation of the official mechanisms and formal procedures designed to review the implementation of the NEAP.

ii. Political Parties

Each political party has a committee for environmental protection, especially the National Democratic and *Khodr* (Green) Parties. The aim of these committees is to undertake various environmental activities that contribute to achieving environmental, economic and social progress. Coordination between these committees and EEAA is required for more progress on the environmental level. Furthermore, each party has to allocate more funds for the environmental committee to undertake it activities.

iii. Labor Unions and Syndicates

It is crucial to strengthening the role of workers and labor unions through training, enhanced information flow and exchange, and increased participation. The objectives required here include strengthening the role of labor unions by promoting increased dialogue, consensus, and information flow and exchange with workers and the Government; and the role of workers by increasing workers′ education, training and retraining, particularly in the area of occupational health and safety and environmental awareness. The main activities for achieving these objectives include:

- ✓ Strengthen the ability of labor unions to involve workers in environmental audits and keep registry at the workplace;

- ✓ Participate in environment and development activities within the local community and promote joint action on potential problems of common concern;
- ✓ Participate in environmental management activities of national, regional and international organizations; and
- ✓ Provide adequate training and retraining opportunities to workers in promotion of sustainable livelihoods.

iv. Research Institutes

There are numerous research institutions, universities, and the like in Egypt, and an ever-growing scientific and technical community. Because the role of science and technology is vital to addressing environment and development issues, decision makers must work to provide a framework, which will enhance communication of findings and collaboration for solutions. As well, a more participatory climate is needed by the research community to assist decision-makers and the general public in understanding how science and technology might be better managed or transferred to affect their lives in a beneficial way. Essentially, better conditions must be created so that researchers and research can make more effective contributions to decision-making processes.

Strengthening and enabling research institutions is vital for improved environmental management and sustainability. The role that research institutes and technical and information support centers can play effectively depends upon a suitable set of standards. Those standards are compatible with the environmental requirements of production and exports as well as serving the policy objectives of the Economic Reform Program especially with regard to export-oriented activities. Main objectives include:

1. To promote a more open climate for research institutions.
2. To promote increased dialogue and cooperation between research institutions and the Government.
3. To improve knowledge and information exchange among the research community, as well as to the general public in order to enhance understanding and support, and enable better policy and program development.
4. To create markets where information demand and supply meet.

ACTIVITIES

- ✓ Developing sophisticated information networks for exporting industries to strengthen the environmental performance of production especially those related to lack of information on the environmental standards and specifications of the EU and NAFTA.
- ✓ Reviewing national scientific and technological activities and prioritize/assess what contributions can better respond to interests and concerns of environmental management and sustainability.
- ✓ Developing a code of ethics and practices to act as guidelines for the special responsibilities that face researchers, scientists, and technologists.
- ✓ Promote:
  - i. Regard for the maintenance and enhancement of life-support systems for their own sake;
  - ii. Spatial and temporal concerns; and
  - iii. The accountability of R&D and science and technology.
- ✓ Promoting regional cooperative mechanisms to address issues that face various parts of Egypt. These mechanisms should be facilitated by public and private partnerships and funding.
- ✓ Developing and improving mechanisms for disseminating information to decision makers and the general public; and
- ✓ Promoting the role of women as full partners in science and technology discipline.

v. Private Sector and Business Community

Encouraging private sector participation in the development process can improve productivity and entrench sustainable economic growth. A consultative procedure that will enable the planning bureaucracy to gather information on markets and technology trends that would be otherwise inaccessible is needed. The private sector should participate in discussing contextual issues, such as labor wages and benefits, restrictive labor practices, worker productivity, bureaucratic constraints and the like. This participation is crucial for private sector companies to minimize their risks.

Private sector involvement should extend to implementation. There is evidence that private sector companies can deliver urban services efficiently. Reaching an agreement on the process of implementation, whether Build, Own, Operate and Transfer (BOOT) or Build, Own and Transfer (BOT) requires representatives of both urban administration and private sector companies to sit and discuss the issues to build partnership and reach agreement.

Since 1991, GOE has introduced a number of important laws and decrees that have significantly facilitated business operations, especially for foreign investors, increasing the scope of incentives and simplifying laws and regulations so as to reduce transactions costs and the time consumed in dealing with bureaucracy. In particular economic incentives are being used to promote cleaner production processes.

The institutional capacity building that can best integrate the private sector into support of the NEAP is in the field of information dissemination. Currently there are gaps in, on the one hand, entrepreneurs' understanding of the opportunities that are available in a wide range of environment-related production and services (including training), and on the other hand, what are their obligations with regard to resource use and pollution under current legislation and how this can affect their trading status under local law and international agreements.

There is insufficient capacity for effective monitoring and enforcement. This shortfall can be overcome if funds are available to provide training courses and fund the promotion of careers in environmental monitoring and management. The private sector can be expected to develop environmental services if trained labor is available, thus giving a good boost to employment of graduates.

Because regulatory agencies lack the authority and resources to enforce current laws and regulations, low levels of environmental compliance are common in Egypt. Reasons for non-compliance from the enterprise's view include: i) lack of financial resources to install pollution abatement equipment; (ii) inadequate economic incentives due to distortions in the prices of natural resources and environmental services; iii) absence of viable alternatives for what to do with the pollutants; and iv) and limited public awareness on part of industrialists and the public.

Shifting towards more flexible and integrated environmental legislation is key to achieving higher rates of environmental compliance. Moreover, business will need financial resources and technical assistance for installing pollution control equipment and development of environmental management systems. The private sector will also need access to environmental information.

5.3 Environmental Legislation and Law Enforcement

The Government of Egypt is a democratic state that recognizes three types of ownership: public, cooperative, and private. It guarantees the equality of all Egyptians before the law

and their protection against arbitrary intervention in the processes of law[1]. It is imperative that Egyptian environmental and regulatory institutions learn current regulatory know-how to develop more integrated and flexible environmental legislation to be applied on all citizens. The Egyptian legislation has been concerned with the environmental resources since long time; and has organized the human activities that affect the environment. However, for political and economic reasons it became difficult for the Egyptian legislator to apply these laws and for the citizens to abide with these regulations.

i. Gaps and Overlaps in the Legislative Framework

Various aspects of environmental protection were addressed before Law 4/94. These were traditional regulatory measures that focused on end-of-pipe controls implemented through command-and-control regulations. Not surprisingly the result is piecemeal, leaving gaps and causing overlaps. Law 4/94 was a step towards introducing more flexible and more effective tools for dealing with environmental problems. The source of institutional overlap between ministries and agencies involved with environmental issues lies with the originating legislation[1].

ii. Obtaining Compliance with Environmental Laws and Regulations

The environmental laws that are regulating the environment in Egypt include penalties to those who do not abide with the law. These penalties may tackle the form of restricting the freedom of the citizens who break the law or charge financial fines. Enforcing environmental law is done through specified responsible agencies. Enforcing the law is achieved through various means such as regular administrative inspection, sudden inspection and complaints from individuals or NGOs.

Egyptian environmental laws have not been enforced adequately for a variety of reasons, including lack of adequate authorities with necessary resources to carry out inspection and enforcement and lack of public awareness regarding the magnitude of the environmental problems and their negative effects. Moreover, the regulatory approach is not effective because standards generally do not allow the flexibility necessary for the polluter and the regulatory agency to negotiate quick agreement on a compliance schedule. Instead, Egyptian regulators concentrate on informing the polluter of a violation – but there are no provisions for phasing in compliance measures after the violation has been announced. Also, there is no sufficient coordination and cooperation among the ministries and governmental institutions regarding the issue of environmental protection.

The introduction of economic instruments has provided more flexibility into how compliance is to be obtained and greater use of economic instruments is expected in the future.

General objectives and action points

- To promote the integration of environment and development policy through appropriate legislation, regulatory instruments, and enforcement, at all levels;
- To strengthen the capacity, at all levels of society, in relation to the comprehension of and adherence to environmental regulation; and
- To ensure transparency of, and accountability for, the environmental implications of cross-sectoral policies.

Action points to enhance effectiveness of regulation, laws, and standards:

- Review laws relating to sustainable development to ascertain gaps;
- Develop laws, standards, and regulations which address gaps in legislation;

[1] Refer to the Environmental Profile," Section D", NEAP, 2000.

- Establish judicial and administrative procedures for remedial action against infringements;
- Encourage compliance through regulation simplification and policy incentives;
- Support those individuals, organizations, and institutions that comply with environmental and development regulatory policy, and those that respond appropriately to non-compliance.
- Promote public awareness and education of environmental law and regulation;
- Develop guidance materials, workshops, and the like for the capacity building of the public, the policy makers, and enforcers;
- Provide legal references and support services developed and administered by Government, academia, NGOs, and the international community;
- Establish a cooperative training network for sustainable development law in concert with academia, NGOs, intergovernmental organizations, and the international community;
- Undertake periodic review for assessing the effectiveness of regulatory framework;
- Revisit and redevelop judicial and legislative policy related to environment is required to ensure that development progresses along sustainable lines;
- Expanding the financial and economic penalties on citizens who break the rules; and
- Ensure regular evaluation of the environmental laws.

Parties responsible for implementation: the legislative and judicial levels of government will be required to review and revise current policy and regulation, and gaps therein. Also, the Ministries of Planning and Environment, as well as academia, will be needed to advise and inform the creation of a new regulatory framework.

Finance: the Government as part of ongoing policy updating processes shall fund this programme.

Scientific and technical means:

- Engage legal data collection, translation, and assessment.
- Establish enforcement/inspection training programmes for policing authorities.
- Strengthen legal and institutional capacities through information exchange, increased awareness, and the provision of support services.

Human resources: Government and the private sector will find essential the members of academia in the various fields of law and policy, NGOs, citizen's groups, trade unions, and professional organizations. Furthermore, people with training in inspection and environmental standards enforcement will be required.

Capacity building: Education and ongoing training, as well as information flow and exchange, are important. Enhancing university level environmental/sustainable development law programs is recommended. Furthermore, the creation and implementation of enforcement/inspection training programs is required.

5.4 Environmental Statistics and Information

The most significant constraint to effective environmental policy making and implementation in Egypt is the lack of reliable and timely information indicating how the various sectors of society impact on the environment and whether development is becoming more sustainable or not. Another constraint is that the existing data and information is not adequately managed due, in part, to a host of factors, including the lack of financial resources, trained workforce, awareness and availability of information and/or institutional setup. Other constraints related to the processes of environmental

information collection, production, and dissemination are evident in Egypt. Furthermore, the monitoring organizations do not feed their results into a common information system; and there is an absence of a comprehensive methodological.

Environmental Information Management Systems

Policy makers need environmental information to prioritize problems and take necessary actions. Most environmental problems are complex and decisions are often made with great uncertainty. No effective planning and decision-making can be achieved and implemented without a solid and dynamic information base that is based on monitoring.

Accordingly establishing effective monitoring systems is a major condition for environmental quality assessment and pollution control. The design of environmental monitoring systems should be systematic and compatible with the planning and decision making process. It should be based on a unified methodological framework that facilitates the development of environmental quality objectives and targets for the various media and sectors of the economy, and the development of both regulatory and non-regulatory policy instruments.

There are substantial inventories of statistics in Egypt but they are not shared and they are not comparable. However, it is also the case that additional data of different types is required for collection at the local, regional, national, and international level to elucidate a more detailed, accurate story of Egypt's environment and development issues. Furthermore, there is a need for standardizing data collection and storage, and making it accessible to technical and managerial levels. Reports and related information tend to be located in different bodies between which there is little or no coordination, cooperation or exchange, resulting in gaps, duplication, incompatibility, and limited utilization of data. This hinders policy development, planning, implementation and follow-up. It is imperative for improved decision-making that enhancements are made in data collection and analysis. The Ministries of Finance, Planning, Scientific Research, Environment, and Central Agency for Public Mobilization and Statistics (CAPMAS), information and Decision Support Center (IDSC), academia and the private sector are responsible for promoting environmental statistics and information. The program of establishing Environmental Information Management Systems has two main objectives: (i) strengthening local, regional, and national capacity to collect, analyze, and use multi-sectoral information for decision making by better identification of users, both public and private, and of their information needs at the local, regional, and national levels; and (ii) improving overall quality (i.e., validity and reliability), coverage, and timeliness of and access to environmental information. The required activities include:

- ✓ Carry out inventories of environmental, resource and development data for determining gaps and organizing activities to fill those gaps.
- ✓ Develop a coordinated, standardized data collection and assessment framework:
    i. Establish systems to verify quality of data gathered (i.e. a source check);
    ii. Establish procedures for measurement and evaluation;
    iii. Organize continuous and accurate data-collection systems, making use of Geographic Information System (GIS), databases, expert systems, models, and the like; and
    iv. Cooperate with the private sector and international bodies to facilitate transfer of technology and technical know-how.

Improving the quality of environmental data and statistics requires strengthening institutional capacity, promoting ongoing education, awareness, and training and ensuring financial commitment as well. There are many sources for statistical information, including Government archives, academic institutions, UN documents, and the World Bank as well as other international bodies. Efforts should be made to gather together

information from various sources to form a more complete profile of Egypt and be the base for better decision-making process.

5.5 Environmental Education, Training and Awareness

5.5.1 Integrating Environment into Education

Education is at the crux of reform. Without basic education, social, economic and ecological betterment cannot be achieved[1]. The Government of Egypt through the MSEA, Ministries of Education, Higher Education, Industry, Business and International Trade together with the private sector and NGOs has established a program that aims to integrate an environmental component into all levels of school/university curricula, and promote environment and development concepts in all educational programs, confirm and deepen the concepts of and establish mechanisms for environmental protection among young children; and increase overall quality and access to education, formally and informally, for all society including marginalized sectors , such as women, youth, children, the elderly, and the physically disabled.

Activities

- ✓ Prepare national strategies and actions for meeting basic learning needs, enhancing access, promoting equity, broadening means and scope of education, and mobilizing resources. Also, recognize the contributions that NGOs can make in developing and implementing educational programs;
- ✓ Prepare strategies for integrating environment and development as a cross-cutting issue into educational curricula at all levels;
- ✓ Review curricula to ensure a multidisciplinary approach to environment and development issues and their socio-cultural and socio-economic linkages, with attention to community-defined needs and knowledge systems;
- ✓ Prepare and document an educational supplement addressing the specific nature of each region;
- ✓ Establish a national advisory environmental education coordinating board or round table, representative of various environmental, developmental, educational, gender, and other non-governmental interests, to mobilize funding and encourage partnerships and information exchange;
- ✓ Through the coordinated efforts of educational authorities, together with assistance from local administrations, communities, and NGOs, develop training programs for teachers, administrators, educational planners, as well as non-formal educators, to address the nature and preferred methods of incorporating environment and development in education;
- ✓ Involve school children in local and regional studies on environmental health, including safe drinking water, sanitation, food and ecosystems. Also, establish "Friends of the Environment" clubs which organize learning games and competitions, as well as sponsor field trips to key environmental sites;
- ✓ Establish scientific environmental clubs among various Governorates in collaboration with the Academy of Scientific Research and Technology, outfitted with scientific and monitoring equipment, stationary, and halls for viewing and listening;
- ✓ Develop environmental programs in places such as Sharm El-Sheikh which will host university and schools' groups and educate them about Eco-tourism;

[1] Refer to the Environmental Profile," Section D", NEAP, 2000.

- ✓ Enhance and support environmental science, biodiversity conservation, sustainable environmental management, and similar cross-disciplinary programs in universities and other tertiary institutions. These university programs should be designed to deal with and be reflective of local and regional phenomena (e.g., the increase of jellyfish on the coast, indiscriminate hunting, over-grazing, and incompatible agricultural practices);
- ✓ Promote non-formal environmental education, especially for marginalized sectors (women, youth, children, the elderly, and the disabled), which uses an innovate range of teaching methods and settings, and is developed and implemented by educational authorities as well as NGOs (such as women's groups, youth groups, and other community-based organizations);
- ✓ Enhance the capacities of the media personnel working on the implementation of the program. This is included in the training activities; and
- ✓ Create radio and television programs with new environmental concepts that depend on the specialties in certain subjects.

The contribution of increased education to well-being cannot be overstated. Funding, training, technology, and technical know-how must be provided to all sectors, continuously, if overall literacy rates are to be enhanced. An informed, educated society is imperative for the realization of sustainable development.

5.5.2 Environmental Training

Training is a fundamental tool for human resource development. It is a two-way learning process that fills gaps in knowledge and skill, enables individuals to find meaningful employment, and facilitates the transition to greater overall sustainability. In order to prepare a training program, there should be enough information available for those who are going to implement the program, on one hand, and for satisfying their need to build their capacities on the other hand.

The quality of training received by those who are responsible for raising the environmental awareness is a major concern. Environmental awareness paves the road for the implementation of other activities through raising the public awareness. Training the trainers of environmental awareness should be a quality-targeted training that will enable them to convey the message in an easily, understood and acceptable manner to the potential recipients. High communicational and participatory skills are essential to mobilize the recipients so that they view the environment differently. Starting this process as soon as possible is imperative for fulfilling Egypt's environmental and development objectives. The Government of Egypt, especially the MSEA, Ministries of Education, Higher Education, Industry, Business and International Trade together with the private sector, NGOs has established a program that aims to:

1. Establish technical training programs, which meet the needs of environment and development, and make them available to all, regardless of social status, age, gender, race, or religion;
2. Promote a flexible, informed workforce equipped with the tools that meet the challenges arising from the transition to a sustainable society;
3. Strengthen the capacities of Governments, employers, and workers to meet environment and development challenges and to facilitate the transfer of new environmentally sound and appropriate technology;
4. Assert on the integrated relationship between environmental issues and the concerns of the local environments. This to be done on the administrative levels that encompass various jobs such as production, marketing and financing.

Activities

- ✓ Identifying workforce training needs and assess measures required to meet those needs, including a periodic review of progress in this area;
- ✓ Identifying the needs for training required by people in isolated situations, whether geographically, culturally, or socially, to enable them to participate in more sustainable work practices and lifestyles;
- ✓ Establishing "community-based" local training centers reflective of the specific problem issues and characteristics of the region or locality; for example, urban environments, industrial problems, coastal environments, and biodiversity issues. Such centers would not only deliver practical training of relevant issues, but would encourage the development of a stakeholder participatory approach to issue definition and problem solving, thereby increasing the communication and participatory skills of the trained individuals responsible for raising public awareness;
- ✓ Encouraging business and industry, along with other professional organizations, to develop and review their environmental codes of conduct to strengthen environmental commitments;
- ✓ Integrating environmental and development issues, as promoted by educational institutions, into existing training curricula and promote the exchange of methodologies and evaluations (e.g. "training the trainers" notion);
- ✓ Encouraging all sectors of society (Government, private sector, academia, and NGOs) to include an environmental management in all relevant training activities;
- ✓ Supporting training programs for business, especially SMEs, to build capacity/skills pertaining to environmental auditing, technology, Best Practices, and environmental services markets;
- ✓ Establishing practical training programs for graduates from vocational schools, high schools, and universities, enabling them to achieve sustainable livelihoods;
- ✓ Contract cooperation protocols between the MSEA and other institutions with the capacity of understanding the training responsibilities, such as universities, research centers, Radio and Television Union, Al-Ahram Regional Institute for Journalism, Institute for Environmental Studies and Research, Institute for African Studies …etc). Other specialized NGOs could share in this activity;
- ✓ Organizing programs for overseas training. These programs are based on the specialization and completion of the local programs successfully. This includes using training centers located outside Egypt, such as biodiversity training centers in Kenya, and International Academy for Environment in Geneva…etc;
- ✓ Developing advanced environmental technical training courses, such as GIS applications and remote sensing technologies; and
- ✓ Developing updateable national and regional environmental labor-market information systems and resource guides that would supply, on a continuous basis, data on environmental job and training opportunities.

5.5.3 Raising Public Awareness

General awareness of global and national environmental issues in Egypt remains low, despite the explicit link between nature and the predominance of rural/agrarian livelihoods. This lack of awareness is compounded with problems of inaccurate and insufficient information. For positive change to occur awareness needs to increase, and information generated regarding Egypt's environmental conditions must be disseminated by means, which will reach most people. This requires increasing the use of the media (i.e., newspapers, magazines, radio, and television). Further, there is a need to foster a sense of personal environmental responsibility and greater motivation and commitment towards involvement in sustainable development problems and solutions; a feeling of "owning" the problem and the means to improve it contributes to mobilization. Such

commitment comes from stakeholder participation in defining the issues, identifying solutions to the problems and being actively involved in implementing those solutions.

A program to include an environmental dimension in the school curricula is currently being undertaken through the cooperation of the National Council for Childhood and Motherhood, and the ministries of Culture, Information and Health and Population. The program aims to:

- ✓ Stress the role of the media and the press.
- ✓ Publish a magazine "Development and the Environment" to inform the Egyptian public of current environmental issues in Egypt.
- ✓ Publish booklets and brochures, which focus on environmental issues.

Supporting measures include programs for promoting broad awareness of and understanding among all sectors and levels of society of environmental issues and environment-society relationships; and stressing accountability and the principle of devolving authority to the most appropriate level, with preference given to local responsibility and control over awareness-building activities.

The activities needed for these strategies include:

- ✓ Utilize the mass media[1], to broaden the reach of sustainability messages and shape popular opinion;
- ✓ Produce press releases and information kits on current environmental conditions and actions;
- ✓ Utilize innovative, indigenous, multimedia approaches[2] to document and communicate sustainable development principles, strategies, and approaches;
- ✓ Develop and employ modern communication technologies for effective public outreach, such as:
    i. Mobile audio-visual methods, especially in rural areas;
    ii. Local, regional, and national television and radio programs; and
    iii. Web sites with appropriate links and coverage of major issues, including also e-mail connectivity;
- ✓ Enhance the capacities of the media personnel working on the implementation of this program through organizing training courses, workshops and lectures. Establishing an environmental information bank would support this activity;
- ✓ Organize fora for disseminating information and discussing policy development and implementation:
    i. Organize large-scale symposia for national level awareness raising;
    ii. Organize information workshops in major cities for regional level awareness raising;
    iii. Organize public hearings and open houses for community level awareness raising, as well as consultations and council meetings for local administrations;
    iv. Organize fora for women, youth, children, the elderly, and the disabled to enhance participation of traditionally marginalized sectors; and
    v. Organize roundtables for business, NGOs, religious authorities, academic institutions, trade unions, professional associations, local press, and other interested stakeholders;
- ✓ Ensure follow-up and evaluation of workshops and other awareness campaigns to assess effectiveness by disseminating publications and newsletters addressing challenges, issues, and outcomes to workshop participants, collaborating

[1] Such as newspapers, magazines, posters and other print media, as well as local media, and entertainment and advertising industries.

[2] Examples include theater and popular education.

agencies, donor agencies, environmental institutions, national and local Government, and individual consultants;

- ✓ Replicate the green corner project in all the Governorates provided that the location of the project should be in the environmental street at the entrance of the capital city of each Governorate. In addition, the efforts should be maximized to highlight the environmental activities undertaken in the street such as plantation, cleanliness, posters…etc;
- ✓ Create an enabling climate for environmental advocacy:
    i. Provide trade unions, professional memberships, women's groups, youth groups, volunteer organizations, and other non-governmental entities venues to meet and gather, as well as funding for equipment, training, and technical know-how to encourage broader citizen mobilization; and
    ii. Encourage NGOs to increase their involvement in environment and development issues through joint awareness initiatives (e.g. the fora mentioned above); and
- ✓ Create a system for environmental information to enhance the capacity of the media personnel concerned with the environment so that they could make best use of information technology in environmental management. This aims to:
    i. Complete the information structure of the EEAA and its divisions in the Governorates.
    ii. Complete the environmental Geographic Information System at the EEAA.
    iii. Use pictures of satellites and remote sensors systems in environmental monitoring;

The importance of energetic, high profile, awareness-raising campaigns cannot be understated. These events are crucial in "spreading the word," garnering support, attracting aid, and creating a common vision around which people with divergent backgrounds can rally. There is an opportunity here to be innovative, and also to explore new avenues for employment.

Part Six: International Cooperation

6.1 Responding to Systemic Problems

Egypt has signed and ratified most of the international and regional environmental agreements since 1933, the year of signing the London agreement for the protection of the flora and fauna of Africa. Egyptian scientists and scholars have made a substantial contribution as leaders of international organizations and as architects of international agreements for the protection of the global environment. Egypt was present in the formal meetings of the sixth session of the Conference of Parties of the Climate Change Convention in the Hague, November 2000. As one of the developing countries and one of the Group of 77, Egypt is stressing that all parties should have a real voice in negotiations, that priorities of developing countries must take a front seat and that parties have to reach an agreement at the next meeting on a comprehensive package of decisions on all issues covered by the Buenos Aires Plan of Action.

Egypt has an obligation to sign and ratify international and regional environmental agreements, which are seen to be of potential benefit to the country. The NEAP needs to take into consideration all these international agreements and incorporate into its proposed actions their inherent obligations. By doing so, Egypt will potentially improve its own ability to develop in a sustainable fashion and also contribute to the well being of the global community.

6.1.1 Climate Change

Egypt signed the United Nations Framework Convention on Climate Change (UNFCCC) at the UN Conference on Environment and Development (Earth Summit) in Rio de Janeiro in 1992. According to Articles 4 and 12 of the convention, parties are requested to prepare National Communication (NCs) on their implementation of the Convention.

Guidelines for the preparation of NCs and the process for their review were agreed upon by Parties to the Convention. All NCs should include the following elements:

- A national inventory of anthropogenic emissions by source and removal by sink of GHG.
- Expected impacts of climate change.
- National policies and measures responding to climate change.
- National assessment needs including financial assistance, technical and technology transfer, monitoring systems, education, and public awareness.

Egypt implemented two major projects in the field of climate change during the period 1995 to 1999. These projects were "Support for National Action Plan" and "Building Capacity for Egypt to Respond to UNFCCC". These projects ended in December 1999 by submitting Egypt's National Communication and establishing a Climate Change Unit at EEAA as the institutional focal point for climate change. As a result of the successful implementation of these projects many projects and activities commenced during and after executing the two projects. The following are examples of these activities:

- ✓ Fuel Cell Bus Demonstration Project.
- ✓ Natural Gas Motorcycles.
- ✓ Methane Recovery from landfills.
- ✓ National Strategy Study on Clean Development Mechanism (CDM).
- ✓ Technology Cooperation Agreement Pilot Project, TCAPP.
- ✓ Climate Change Capacity Building Phase II.
- ✓ The Integrated Solar Thermal / Natural Gas Power Plant at Kuraymat.

- ✓ The Energy Efficiency Improvement and Greenhouse (GHG) Reduction Project.
- ✓ Promotion of wind energy for electricity generation.
- ✓ National Energy Efficiency Strategy under the Egyptian Environmental Policy Program, EEPP.

A support program to build the capacity to institutionalize CDM is ready[1] for implementation as a step towards implementing Egypt's strategy on the CDM. The strategy itself includes, but is not limited to projects for improving energy efficiency, promoting use of renewable energy, and expanding current activities for afforestation.

Egypt is taking the issue of climate change seriously. The Nile Delta and coastal zones are prone flooding due, in part, to rising sea levels. Agricultural productivity is another subject that climate change will potentially negatively affect as a result of increased average temperature. Human health is also at risk due to climate change. The increased temperatures might lead to the outspread of vector-borne diseases. Coral reefs are one of Egypt's natural resources that climate change adversely affects. Egypt seeks the help and support of the international community to mitigate the impact of climate change.

6.1.2 Ozone

Ozone in the stratosphere (upper atmosphere) plays a crucial role in regulating the amount of solar ultraviolet radiation received at the earth's surface. Ozone occurs naturally throughout the stratosphere, although it is most concentrated in a layer at the base of the stratosphere some 20-25 km above the Earth's surface. It is formed when oxygen gas reacts with ultraviolet light to give a molecule of three oxygen atoms. Ozone is also continually being broken down naturally in the stratosphere, so that its concentration remains roughly constant under natural conditions. The ozone layer provides a natural barrier to a large proportion of the ultraviolet radiation from the sun that is received by the earth's atmosphere.

Recently, the rate of break down of ozone in the stratosphere has been accelerated by a number of pollutants. The major ones being of halocarbon group, which when carried up into the stratosphere have been implicated in the creation of ozone "holes" in the stratosphere. This depletion has accelerated since the 1960s and the frequency, duration and scale of ozone holes appear to be increasing.

Governments are currently cooperating to reduce the user of Halocarbons. Moves are now in motion to limit the manufacture of Chlorofluorocarbons (CFCs) and Halons and to recycle them better. The Vienna Convention for the protection of the Ozone Layer was adopted in 1985 and again in 1987 twenty-five countries adopted the Montreal Protocol, which aimed to reduce the use of chlorofluorocarbons CFCs from 1986 levels by 50 percent, by 1998. The 1990 London Meeting of the Protocol countries accelerated this process, with the 50 percent reduction target brought forward to 1996, to be followed by a total phasing out of CFC, Halons and Carbon Tetrachloride consumption by the year 2000, and methyl Chloroform by 2005. Egypt is a signatory to the Vienna Convention 1988 and the Montreal Protocol 1988.

For the protection of the Ozone layer, Egypt has embarked on a gradual program to reduce the use of these ozone-depleting agents, with the ultimate objective of the complete ban on their use. The EEAA coordinated and implemented this program.

Status of the Egyptian Country Program for Compliance with the Montreal Protocol

The National Ozone Unit (NOU) is in the process of achieving the following targets:

[1] November 2001 is the deadline for the successful completion of this activity.

- Formulating an information system to track imports and consumption of ODS substances for the monitoring and licensing system in compliance with Montreal Protocol control measures starting with freezing.
- Continuing the role of the Ozone Panel which was established through a Ministerial decree on July 24, 1993 (no. 93) constituting of all related ministries and authorities, to fulfill the Egyptian obligations under the Montreal Protocol with the complete phase-out of all ODSs by the year 2030 or any other deadlines adapted and approved by the MP parties.
- Monitoring and control of imports and use of ODS in co-operation with Customs Authorities. A ministerial Decree No. 77 issued in 2000 by the Minister of State for Environmental Affairs including the list of ozone depleting substances which is under control according to the regulations of the Montreal Protocol and its amendments. This decree prohibits import of these controlled substances without notifying EEAA/NOU.
- A proposal for new legislation, which regulates and systematizes the import and use of Ozone Depleting Substances (ODSs) and equipment based on ODSs, will enable compliance with the Montreal Protocol.
- Update of the existing database for all projects.
- In cooperation with UNIDO, completing the transformation of the domestic refrigeration and solvents sectors.
- In cooperation with UNIDO, following up the implementation of the two investment projects of Methyl bromide in Soil Fumigation and Grain Storage Sectors.
- In cooperation with UNIDO as an implementing agency and GTZ as bilateral stockholder of Multilateral Fund Secretariat (MLF), implementing a Refrigeration Management Plan (RMP) including a recovery and recycling project.
- In cooperation with UNDP, completing sectoral implementation of projects in the foam sector and formulate the Halon Management Plan to manage using Halons on the local and regional basis to provide the essential uses basically for the military demands as well as the Civil Defense and Civil Aviation needs.
- Establishing a web page for ozone unit activities and the Egyptian achievements for protecting the ozone layer.
- Preparing awareness campaigns especially directed to decision-makers, customs officials, students and the public.
- Preparing materials for the awareness campaigns (films, spots, booklets, and brochures),
- Prepare the annual celebration of the International Ozone Day.
- Publishing UNEP's Ozone Action newsletter in Arabic.
- Supporting activities in other Arab and African states.
- Participate in technical assessment panels and the open-ended meetings for the Parties to the Montreal Protocol.

Effective and timely data reporting (all data, i.e., Art. 7, MFS data IS data): It has always been the policy of NOU to report the data needed to the Ozone secretariat in Nairobi and the MLF Secretariat before its deadline.

Implementation of innovative strategies to phase out ODS

Different industrial sectors

- Aerosol Sector: a reduction of more than 60 percent in demand for ODSs has been achieved primarily through Ministerial Decree No. 977 issued in 1989 banning the use of CFCs in the new aerosols industries starting 1991. In addition the enterprises switched to the new ODS phase-out technology on their own initiative.
- Foam Sector: ODS phase out in the Egyptian foam industry is progressing in accordance with the Foam Strategy for flexible, rigid, and integral skin foam

projects established in 1993. This sector was implemented by UNDP, total consumption is nearly 1328.2 Tons, 90 percent is already completed and the remaining 10 percent is under implementation this sector is expected to be finalized by the end of the first Article 5 countries – perhaps the first one to achieve total phase out of the use of CFCs in the Foam Sector.

- Refrigeration Sector: In January 1994, a strategy was set for this sector. Total consumption of Ozone Depleting Substance (ODS) is nearly 1094.6 tons, 90 percent of this strategy is already completed and the remaining 10 percent is under implementation. This sector is expected to be finalized by the end of year 2001.
- Refrigeration and Air-conditioning Maintenance Sector: In November 1999, the Egyptian Refrigerant Management Plan was approved by MLF to be implemented by GTZ. This plan is scheduled to be in process in the coming two years.
- Solvents Sector: total consumption of ODS is nearly 439.9 tons, 70 percent of the strategy set for this sector is already completed and the remaining 30 percent is under implementation.
- Methyl Bromide: two demonstration projects were approved and implemented and finalized by GTZ through the bilateral co-operation for substitution of Methyl Bromide as a fumigant agent. One of the projects is in horticultural production and the other is in grain storage, which was completed in July 2000.
- Halon Sector: the Halon bank management was already approved and will be implemented by UNDP. This will be accomplished by collecting and recovery centers according to necessity and needs to enable Egypt to ban importing of Halon within the next two years.

Destruction programme

Egypt has the priority to start a destruction programme for old replaced machines in the completed projects, which shows a sustained commitment in phasing out ODS. The machines were completely dismantled into their components, and rendered unsuitable for the function originally intended. The outcome of the destruction process (electric motors, pumps, gauges and steel elements and cabinets…etc) will be sold by the company under the supervision of EEAA and UNDP Representative, as scrap material to cover the costs of the dismantling and destruction activities. The enterprise contributed to the Ozone Protection Awareness Campaign.

Regional activities

On the regional level, Egypt has formed a committee for coordination between Arab countries to facilitate exchange of information concerning their activities dealing with controlled substances within Montreal Protocol regulations. This committee was established in collaboration with the Arab League to coordinate the implementation of the Montreal protocol. Furthermore, Egypt efforts include translating into Arabic, publishing and distributing to all Arab-speaking countries, the Ozone Action Newsletter and a guidebook for implementation of good practices in refrigeration. Also, Egypt is in the process of implementation of outstanding outreach/awareness activities and developing effective policy and regulations.

6.2 Regional Cooperation

6.2.1 Mediterranean Action Plan

Deterioration in the quality of the environment in the Mediterranean Sea area has been increasing over the past fifty years. The need for action to protect the environment and

to foster development in the Mediterranean Basin became prevalent. In 1975, the Mediterranean countries and the European Economic Community (EEC) adopted the Mediterranean Action Plan (MAP), and in 1976, the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention), under the auspices of the United Nations Environment Program (UNEP). The main objectives of MAP are to assist the Mediterranean Governments to assess and control marine pollution, to formulate their environmental policies, to improve the ability of Governments to identify better options for alternative patterns of development, and to make rational choices for allocation of resources.

MAP is coordinated by the Barcelona Convention Secretariat, the Coordinating Unit (MEDU) that has been based in Athens since 1982. Six Regional Activity Centers (RACs) and the MED POL Program are responsible for the implementation of respective components of MAP. The Contracting Parties to the Barcelona Convention (the Mediterranean States and the European Union) meet every two years on a Ministerial level to deliberate on general policy, strategy and political issues relevant to their cooperation as well as to decide on MAP′s program and budget.

i. Marine Conservation

The impact of human activities on the state of the marine environment and the ecosystems of the Mediterranean region has necessitated closer cooperation among the Contracting Parties to the Barcelona Convention.

In order to establish specially protected areas and to help safeguard biological diversity in the region, a new Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean was adopted by the Contracting Parties in June 1995. The Protocol notably calls for the establishment of a list of Specially Protected Areas of Mediterranean Importance (SPAMI) in order to conserve biodiversity and to contain specific Mediterranean ecosystems. Related measures include protection and conservation of species, regulation of the introduction of non-indigenous or genetically modified species, and the improvement of the scientific, technical, and management research relevant to Specially Protected Areas.

ii. Coastal Areas Management Program (CAMP)

MAP (CAMP) is collaboration among MAP, national and local authorities and institutions as well as international financial institutions. It is based on the principles of sustainable development, integrated planning, and the management of Mediterranean coastal areas. Thirteen CAMP projects have been or are being implemented since 1989 in various parts of the Mediterranean region. Fuka-Matrouh project was the one implemented in Egypt.

With regard to the assistance provided by the Regional Activity Centers (RACs) the Egyptian Government was pleased with the high level of experts, the good technical assistance and excellent communications; the RACs were very quick to respond. The level and quality of technical assistance decreased because of budgetary constraints.

The Egyptian Government believes that RACs have experience and technical expertise in coastal zone management that is not found in any of the other institutions. It urges RACs to continue doing practical work as this is its strength.

In order to ensure sound technical backup and the successful implementation of projects, RACs need a minimum amount of money for each project. The Contracting Parties RACs must work with other partners in order to access resources from other sources such as the European Union, UNDP, the World Bank and NG0s.

With regard to the future role and activities of RACs, the following suggestions were made:

- The skills of local consultants in Member States should be upgraded to be able to handle coastal zone management issues;
- Selection of cooperating personnel is crucial and should therefore be done carefully;
- Activities should be followed up to make sure that the materials developed are utilized;
- Financial and technical support must remain the major part of the program.

6.2.2 Red Sea and Gulf of Aden Action Plan

The geographic coverage of this plan is seven States (Egypt, Jordan, Palestine, Saudi Arabia, Somalia, Sudan and Yemen). The action plan was adopted in 1982 and the convention was signed in the same year. It started to be effective in 1986. The secretariat is the Arab League Educational, Cultural and Scientific Organization (ALECSO). The plan did not achieve real progress due to lack of funds.

Two programming sessions were held between the Secretariats of UNEP and of the Program for the Environment of the Red Sea and Gulf of Aden (PERSGA), which technically co-ordinates the action plan (Jeddah, 25-26 June 1987; Nairobi, 25-26 April 1989), during which the following major potential areas of co-operation were identified:

- Ecological surveys aiming at development of conservation strategies;
- Assessment of the levels and effects of oil pollution; and
- Strengthening the pollution research and monitoring capabilities of the region

The areas identified for co-operation fall within the overall program adopted by the meeting of the Interim Council of PERSGA (Aqaba, September 1988).

Under an agreement between UNEP and IOC, and in cooperation with PERSGA, the IOC will organize the finalization and follow-up of the project proposals on strengthening marine pollution monitoring capabilities in four countries (Egypt, Jordan, Sudan and Yemen) within the framework of the Red Sea and Gulf of Aden Action Plan, and will provide preparatory assistance to national institutions selected as participants in these projects. These projects will aim at establishing a marine pollution-monitoring network in that part of the region and at strengthening the associated national institutions.

6.3 Bilateral and International Cooperation

During the past decade, Egypt received a total amount of about £E 950 million for environmentally related projects from the donor community. GOE allocated about £E 63 millions for these initiatives. The donor funds allocated for technical and institutional support of MSEA and EEAA were £E 114 million, about 12 percent of the total funds the donors provided to Egypt in the sphere of protecting the environment. MSEA and EEAA received another £E 68 million, about seven percent of the total funds, to meet their mandate in protecting nature. The remaining £E 768 million were allocated for projects that MSEA and EEAA jointly implement with other agencies. The following pages provide a detailed description of these projects.

6.3.1 Projects for Direct Technical and Institutional Support

Several donors-assisted projects provide EEAA with technical and institutional support. (i) The Japanese International Cooperation Agency (JICA) is supporting the network for monitoring the environment by establishing the Central Laboratory and those of the eight Regional Branch Offices (RBOs). GOE has provided an estimated three million Egyptian pounds in the first phase of the project and another £E15 million in the second phase.

JICA provided ¥ 215 million, which is about £E 7.1 million, in the first phase and ¥ 709 million, which is about £E 23.4 million, in the second phase. (ii) The Danish Development Agency (DANIDA) provided support to EEAA on monitoring air quality and coastal waters of the Mediterranean and Red Sea, including Gulf of Aqaba and Gulf of Suez for the amount of DKK 79.6 million, which is about £E39.8 million between 1995 and 2000 through the Environmental Information Monitoring Project (EIMP). (iii) The Canadian International Development Agency (CIDA) provided the EEAA with technical and institutional support through the Egyptian Environmental Information System (EEIS) that started in 1994 to last for three years for the total amount of CAN$ 11.7 million, which is about £26.2 million. This project has been extended to the year 2004. (iv) The Embassy of Switzerland in Cairo provided EEAA with support on establishing the Egyptian Hazardous Substances Management Information System (EHSMIS) in 1998 to last for three year at the cost of Swiss ₣ 565 thousand, about £E2.32 million. (v) The European Union provided support of € 422 thousand, about £E 1.33 million, for three years starting November 1998 to locate the sites of sanitary landfills for solid wastes.

(vi) The Capacity 21 Program of the United Nations Development Program (UNDP) provided Egypt with $1.13 million, about £E 4.7 million, to support Policy Support Unit at the Office of HE the Minister, to establish the Capacity 21 Unit at EEAA to update the NEAP and build the capacities of the Sustainable Development Unit at the Ministry of Foreign Affairs (MOFA). This project started on January 1996 to last five years. (vii) In the sphere of institutional building, DANIDA provided EEAA with another DKK 23.7, which is about £E 11.8 million, through the second phase of Organization Support Project (OSP) that started January 1998 to last for three years. The total amount of funds allocated for supporting the MSEA and EEAA technically and institutionally is about £E 114.26 million.

6.3.2 Programs and Projects for Protecting Nature

The European Union has provided MSEA and EEAA with finance for three activities. A program to develop and manage the protectorate at the Gulf of Aqaba, a project to develop the protectorate of St. Catherine and an emergency center at Sharm El-Sheikh to combat marine pollution especially oil spills, in the Gulf of Aqaba. The funds allocated for these activities are £10 million, 6 million euros, £4.3 thousand, respectively. These monies are about £E 31.6 million, £E 19 million and £E 13.5 million, respectively. Since March 1998 the Italian Government has provided the equivalent of £E 3.9 million to support Wadi El-Ryan protectorate, Fayoum.

6.3.3 Projects Jointly Implemented with Other Agencies

MSEA and EEAA implement donors-supported projects jointly with other agencies. The Government of Italy provides assistance for three projects: support for protecting the natural heritage in Saqara, developing decision-support system for managing water resources based on the ecological balance, and last but not least, land reclamation and fixing sand dunes at the Siwa Oasis. The funds allocated for these projects are £E 579 thousands, £E 5.52 million, and £E 7.52 million respectively.

The German Bank for Construction and Development, known as KfW, supports a fund for public sector industries to protect the environment. KfW provides DM 6 million for technical components and another DM 50 million for institutional building. The total amount of the fund is about £E 89.6 million.

Britain's Department for International Development (DFID) provided the amount of £4.6 million for the Support for Environmental Assessment and Management (SEAM) project in its first phase that started on December 1999 to last for three years, where the GOE provided £E 1.2 million as a cash contribution. The second stage that started in January 2000 to last for four years is receiving £5.7 million. The total finance for the two phases is

about £E 25.5 million. CIDA has established the Egyptian Environmental Initiatives Fund (EEIF) with CAN$ 20 million, which is about £E 45 million. GOE provided in-kind contributions to the fund.

The United States Agency for International Development (USAID) has supported Egyptian efforts to protect the environment through allocating $56 million, about £E 193.2 million, to improve the air quality of Cairo through Cairo Air Improvement Project (CAIP) that started in 1996 with a duration of seven years. USAID is also providing assistance to Egypt through the Egyptian Environmental Policies Project (EEPP) that started on September 1999. The budget of the first stage, which is one and half years, is $90 million, about £E 346.5 million, and £E 119 thousand of GOE contribution.

The Finnish Agency for International Development (FINNIDA) has provided $2.23 million, about £E 7.6 million, for a project that manages hazardous wastes in Alexandria. GOE contributed the amount of £E 1.8 million for this project.

The Global Environment Facility (GEF) is financing a project for engineered wetland to biologically treat Lake Manzala at the Bahr el-Baqar drain. The project started in September 1997 to last for five years with a total budget of £E 4.5 million and an additional £E 1.5 million as cost sharing from GOE. The World Bank and the Government of Finland provided FinM 26 million, about £E 41.6 million, and the GOE provided £E 13 million for the Environment Pollution Abatement Project (EPAP) to control industrial pollution starting January 1997 for seven years. Another project to protect wetland started in October 1999 to last for five years where the GOE provided £E 5.6 million in cash contributions and another £E 6.3 in-kind contribution, and another $ 23 million, about £E 80 million.

Part Seven: Financing the NEAP

Sustainable financing will be needed to finance the projects that constitute the NEAP. Following the Five-year Plan financing guidelines, the NEAP will seek additional funds to those allocated through the state as part of a stakeholder partnership. More effective enforcement of current regulations, improved legislation based on the polluter pays principle, and the growth economic instruments will encourage private investment in the environment.

Programs and projects developed at the local and community level may be funded with loans from the Environmental Fund or the Social Development Fund. Such activities should wherever possible be self sustaining through the development of cost recovery mechanisms for the provision of whatever environmental service.

7.1 The State Budget

Chapter III of the Egyptian State Budget comprises all budgetary allocations for new governmental investment projects. NEAP projects implemented by line ministries will have to be allocated funds through this chapter.

The government also finances projects through international assistance funds presented to the Egyptian government from development agencies of donor countries and international financial institutions and organizations. The Ministry of International Cooperation administers such funds.

It has been recommended that the revenue from some of the environmental charges proposed be earmarked for environmental purposes. The institutional mechanism for doing this would depend very much on the type of charge and method of collection. In some cases the revenue would pass through the state budget; in others, some of the revenue could go directly to linked enabling funds[1]; while yet others, particularly in the case of NGOs facilitated or community-based projects funds and or revenue could be received directly by the relevant organization.

7.2 Conventional Financial Tools

7.2.1 Banks and Other Financial Institutions

Commercial banks' focus is on short term financing, not commensurate with the majority of the requirements of the environmental projects where the tenor is concerned. On the other hand, there are banks with extensive term loan portfolios, like the public sector commercial banks and the specialized sectoral/development banks. Although there is no data on the volume of the outstanding environmental related loans in the banking sector, basic project financing principles are applied to environmental projects that apply for bank loans. Local specialized financial institutions are like: The Egyptian Industrial Development Bank, the Agricultural Development and Credit Bank, the Export Development Bank of Egypt; while regional specialized financial institutions are like: The Islamic Development Bank (IDB) and the Arab Regional Financial Institution (ARFI). The specialized financial institutions cater to projects related to economic and social development. This does not preclude the projects with an environmental dimension from benefiting from the services of these institutions.

[1] With the usual Government auditing and reporting requirements

7.2.2 Capital Market Tools

As the Egyptian capital market matures, equity and debt instruments for project and corporate financing should be readily available for investors to use. A currently evolving market is not able to actively remove the impediments to fund-raising and facilitate project financing; a difficulty anticipated to diminish as the market gradually reaches maturity.

7.3 Non-Conventional Institutions

This section refers to institutions involved in providing financial support to environmental projects either as a direct or indirect mandate.

7.3.1 The Environmental Protection Fund (EPF)

The Environmental Protection Fund was established in accordance with Law 4/1994. One of its objectives is to stimulate investment in the environmental sector. The EPF offers financial support in the form of soft loans, grants, subsidies, etc. according to pre-announced annual programs.

7.3.2 The Social Fund for Development (SFD)

The SFD was established in 1991 to mitigate the impacts of the ERSAP on the poor. With the publication of the Government of Egypt's "Vision 2017" in 1997, the definition of development took on a new dimension and the role of the SFD was also redefined. The SFD established the Environment and Development Unit in 1997. The Unit's mandate includes funding of environmentally oriented projects by soft loans, grants, or a combination of the two.

By strengthening partnerships to manage the impact of globalization and minimize social exclusion, the SFD set the pace for the new patterns of development and better understanding of the impact of globalization. Poverty and unemployment are alleviated by creating job opportunities through financing small enterprises and providing them with technological know-how and expertise. These enterprises may be environmental service providers, equipment manufacturers etc.

The SFD's Public Works Program provides basic infrastructure services and many such projects can be environment-related, e.g. wastewater treatment, solid waste management, health care, etc.

The Community Development Program of the SFD supports funding of small-scale environmental projects. It aims to include poverty alleviation and upgrade the living standards and quality of life of the poorest segments of the population. This program is designed to strengthen the institutional capabilities of regional NGOs and mobilize local grassroots community initiatives, either through social development activities or productive activities.

7.3.3 Non-Profit Organizations

Non-profits, such as foundations and trusts, are defined as non-governmental organizations (NGOs) that accrue no profit to individual members, but spend resources pursuing specific goals. NGOs in the field of the environment can be formed for many purposes, including awareness, tree planting, solid waste management, environmental monitoring compliance, research, education, and other activities.

7.3.4 NGOs

Some donor financing is reserved for Non Governmental Organizations. A prime example of this is the Global Environment Facility/ Small Grants Programme GEF/SGP, which has been one of the main sources of funding for environmental NGOs. This programme has been providing NGOs in Egypt with the financial resources to undertake projects that are in line with GEF main themes for a decade now. Some of the projects that were successfully implemented are related to energy efficiency and tree planting. However, the issue of sustainability of GEF/SGP funded-projects has been one of the criteria (and concern) of the national steering committee in the selection process. One way of guaranteeing sustainability is by involving a third party like the municipality as is the case of tree planting to hand over the project once it was successfully implemented and executed.

7.4 Non-Conventional Sources/Tools

For enhancing environmental investments in these early stages of environmental awareness, compliance and development, stimulants and enticements need to be available as also confirmed by Law 4/1994. In addition to the traditional incentives related to custom duties, taxes, etc., the following are recommendations for the utilization of a number of new financial tools that should be used to raise revenues needed to finance environmental projects.

7.4.1 Affinity Merchandising

Affinity merchandising refers to the sale of items such as license plates, stamps, maps and publications. Governorates and municipalities in Egypt can sell various items and dedicate the revenues to environmental programs. In many cases, revenues are earmarked to site-specific environmental projects. Items sold range from car license plates and special postage stamps, to items such as governmental publications, and maps. Such sales are a local source of funds that can be used locally for environmental purposes.

7.4.2 Contributions of Land

This comprises direct contributions of environmentally sensitive land from individuals and businesses. When the sensitive land must be returned to government control, the gifts of land reduce the need for outright governmental expense. In some cases the government can re-sell the land that has been donated, taking care to ensure environmental suitability of the proposed new use of the land. The Egyptian government can raise revenue for other environmental projects by this means.

7.4.3 Ecotourism

Ecotourism can be defined as purposeful travel to natural areas to understand the culture and natural history of the environment, taking care not to alter the integrity of the ecosystem, while producing economic opportunities that make the conservation of natural resources beneficial to local people.

In Egypt, there are 21 natural protectorates. The protectorates can earn some of the money needed for monitoring and maintenance “Travel and Learn” packages to suit the needs of various segments of the population such as schoolchildren, college students, etc… Proper selection of natural protectorates -or even other natural sites- and careful design of “Travel and Learn” packages is a necessary prerequisite to ensure maximum economic benefit. Programmes focusing on nature and conservation can be designed for tourists.

7.4.4 Emissions Trading

Emissions trading programmes allow owners of sources of air pollutants to trade their pollution rights geographically, over time, or among sources. How to allocate the initial rights and for what types of pollutants, and how much to charge for the permits are difficult matters. However, due, in part, to the present state of monitoring, enforcement and institutional capacity in Egypt, it is impractical to recommend these economic instruments at the present time, although emissions trading is being used to practical benefit in some developed economies.

Many emissions trading programmes incorporate a "bubble" structure. A bubble programme treats multiple emission sources as if they were included within an imaginary bubble, allowing existing sources to adjust emissions levels within the bubble as long as an aggregate limit on emissions is not exceeded. "Offset" programmes allow new sources to obtain emissions credits from existing sources to offset new emissions. "Banking" programmes allow sources to store emission reduction credits for future use or sale, while "netting" programs allow sources undergoing modification to avoid new source review if plant-wide emissions are reduced.

7.4.5 CDM projects

Notwithstanding the unsuitability of direct emissions trading at the present time, there are opportunities for Egypt in terms of Clean Development Mechanism (CDM) projects, which incorporate an element of emissions trading.

7.4.6 Environmental Revolving Funds

Environmental Revolving Funds (ERFs) are government run lending institutions. In Egypt revolving funds have been established in fields other than the environment e.g. NGO community development revolving funds. To establish Environmental Revolving Funds, the Egyptian government may choose to use the Environmental Protection Fund (EPF) at the Egyptian Environmental Affairs Agency (EEAA) as the vehicle for its implementation.

Add other financing procedures, which have some characteristics of revolving funds, essential characteristic that the environmental service provider receives the income, which is reused for environmental purposes.

Differs from government in that the money does not go into one general pool which is then redistributed on population basis to different purposes (because they are higher up the priority listing than the improvements sought by the agency that collected the funds, fees etc for service)

Differs from private sector in that the money does not leave the environmental field – private sector waste management firm can make a profit and repatriate to Holland or wherever the parent company wants; locally established environmental fund for waste management would have to keep the money in the system for upgrades, expansion, etc.

7.4.7 Green Credit Card

A percentage of the profit made from credit card use can be designated for a specific environmental cause or organization. This association between environmental groups and financial institutions can be profitable for both partners, if there is a sufficient level of support from potential card users for the associated environmental cause.

The cards may be issued on a local, regional, or national basis. The card is structured to benefit an existing or new fund in an organization dedicated to, for example, watershed protection, habitat management, species protection, or other environmental goals. For each “green card” issued by the sponsors, a fixed amount per card and a small

percentage of the spending would be donated to the fund in the card user's name. The fund would then be drawn upon by the host environmental organization to finance individual environmental projects and activities.

In Egypt, the use of credit cards has been gaining momentum in recent years. Nonetheless, a massive, well designed, and widely implemented awareness campaign needs to be initiated to ensure that potential cardholders are aware of, and convinced with, the environmental goals sought. Therefore, with an enhanced level of environmental awareness, this toll can be considered quite effective in raising revenues to finance individual environmental projects.

7.4.8 Individual and Corporate Donations

Most donations are made to non-profit foundations or trusts, or company-sponsored organizations or trusts, or company-sponsored foundations. The environment has not traditionally been one of the fields of sponsorship, but this is changing. Many banks and private sector firms in Egypt make annual donations especially towards the end of their fiscal years. Quite recently, some banks have started the process of making donations for specific environmental projects. However, awareness campaigns are still needed to entice more institutions to foster environmental projects or donate for specific environmental purposes.

Part Eight: Implementation Arrangements

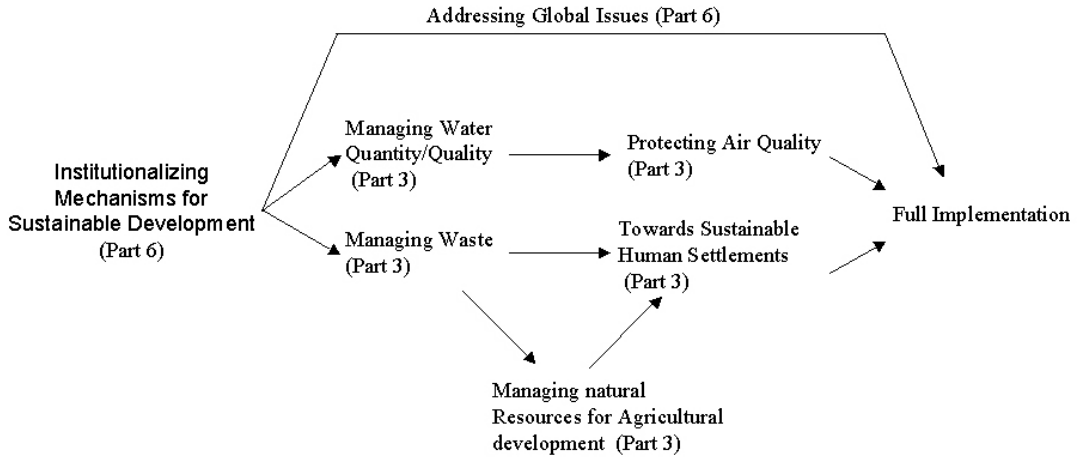
Presented here are guidelines for the planning, budgeting, monitoring, and implementation of projects prescribed in the NEAP. This "how-to" guide is to be used as a measure against which to check what has already been done and what needs to be accomplished. The Critical Path Method (CPM) is used for developing project timelines and schedules, and is applied to NEAP programs to provide a general timeframe and plan for implementation. It also includes an analysis of planning implications and considerations with reference to the model offered for implementation. This part of the document provides a discussion of Monitoring and Evaluation (M&E).

Part Eight strives to empower project teams with proven, systematized methods and tools to ensure project follow-through and success. However, because it is not uncommon that programs and projects fall subject to changing priorities and relevance, new technological developments, resources and budgeting limitation, and the like, the executing bodies are implored to recognize and be prepared to make the appropriate and necessary adjustments in the wake of such change.

8.1 Applying CPM to NEAP Programs

Figure (5) is a simple example of CPM logic broadly applied to the NEAP. Each arrow on the diagram represents a program area corresponding to those laid out earlier in the document. The schematic shows that before any of the environmental program areas (e.g., water, air, land, waste, etc.) can be addressed, the economic, social, and institutional mechanisms for institutional mechanisms for sustainable development (as illustrated in Parts Four and Five) must be developed. This task includes integrating environment into policy development, setting up appropriate legal frameworks, mobilizing resources, capacity building, training and education, raising public awareness, and so on. Once these mechanisms are in place, programs concerning water (3.1) and waste (3.6), which requires earlier implementation periods than other programs due to their high priority and large amounts of readily available information, can follow. As shown, other national and systemic issues (3.4, 3.5, 3.7, 3.8, 6.1), which include programs pertaining to global warming, ozone depletion, total energy management, biodiversity, biosafety, desertification and managing drought …etc, can be addressed simultaneously. Programs and projects falling under systemic environmental issues, which must be addressed through integration into Governmental five-year plans, is an area requiring ongoing implementation. Natural resources management devoted to agricultural production (3.5), if implemented after programs for water, waste, and global issues, can benefit from the conditions the aforementioned programs will create. It is also part of the prescription to address problems of land resources and management (3.3.1), and so can be implemented in close conjunction with its counterpart, sustainable human settlements (3.3.2). Air quality management (3.2) and sustainable human settlements planning and management (2.7) are also program areas that can be implemented in parallel due to their mutually reinforcing nature. For example, reducing air pollution improves quality of life, just as planning for more pedestrian areas and decreasing automobile use through establishing efficient urban mass transport positively impacts air quality. As indicated in the figure, full implementation of all NEAP programs) is the ultimate aim of this planning process. The length and scheduling of each program area, and the related planning implications and considerations, are discussed in the following section.

Figure 5: CPM of NEAP programmes



8.2 Scheduling the NEAP

Using CPM logic, general schedules and timelines for the NEAP implementation can be ascertained. It should be noted that (Annex V) reflects a focus on mechanisms for activation and implementation as opposed to specific programs and projects, which may change, assume different priority, become modified by technological advancement, or fall out of relevance.

Implementation of NEAP programs will be most effective once integrated as part of existing governmental five-year plans. Setting appropriate budgets at the beginning of the fiscal year, forming the necessary partnerships to ease implementation, preparing work plans that incorporate the NEAP programs (as well as the supplemental policy and regulations if needed), and executing strategies are necessary to assure the achievement of this aim[1]. Monitoring, evaluation, and revision of plans and strategies, as required, follow:

8.2.1 The First Five-Year Plan (2002-2007):

i. Regulation and Policy Development

A policy review process is required to identify gaps and ascertain needed policies, regulations, and related mechanisms prior to implementation. This is discussed in Part Five of this document, Institutional Building and Legislation.

ii. Task Delegation

Once the NEAP approval has been granted, delegating tasks among the appropriate central and local public bodies, developing work plans, and setting budgets may require from one to two years.

iii. Training and Related Capacity Building

The first two years should see the co-requisite development of work plans and human resources. Capacities must be built to be ready and able to handle the new conditions imposed by implementation. Part five of this document addresses the issue of environmental education and training.

[1] Refer to (Annex V) for NEAP strategy and implementation management scheme.

iv. Program Initiation

Water resources

Implementation of programs addressing this issue (3.1) can be relatively quick because of existing information on water quantity. Water reuse strategies and technologies can also be implemented within a short time span.

The starting points for water quality planning include problem identification and impact assessment. Although Egypt has considerable information, there is a need for further research and development to generate accurate information and data on Egypt′s water resources situation, including assessments of consumption patterns, sources of pollution, appropriate technologies, water quality mapping, among the other activities of the NEAP. Further, policy and legislation require reviewing, updating and filling in of the gaps that have been overlooked in prior policy development. Following this, teams of experts and consultants, as well as other stakeholders, can be assembled to work on planning and implementing programs. The above would characterize the first 1 or 2 years of water resources management.

Air quality

Beginning with the development of an inventory emissions sources, the principal problems of controlling episodes and reducing industrial pollution in urban areas (3.2) should be addressed.

Land use and management

Action should begin as soon as possible because of the long-term nature of the programs in this area (3.3). Programs to be commenced include:

- Environmentally sound agricultural development with pilot projects in target areas.
- Population redistribution (pilot projects for development of new towns, medium-sized cities and rural settlements).
- Informal settlement upgrades.
- Social services improvements.

Solid waste management

The managing of waste (3.6) requires policy and regulation development, as well as training and capacity building. Also, this initial period should be used to contract private companies for waste management activities.

Protecting nature

Programs pertaining to this category such as biodiversity, desertification, systemic global environmental issues, etc. would be implemented as part of the upcoming governmental five-year plan.

v. Public awareness campaigns

While programs and projects are being planned for, the stage needs to be set for public acceptance of pending policies and regulations. Launching public awareness campaigns early minimizes risk of widespread non-compliance. Part 5.5 addresses issues of raising public environmental awareness.

vi. Resource Mobilization

During the initial years, finance and donor support for implementation will need to be procured. Part Seven "Financing the NEAP," suggests programs for attaining funds and mobilizing resources.

vii. R&D and Developing Central Facilities

This initial period is the time to conduct studies, collect data, and generate information that will inform subsequent programs. This research can be undertaken by building on the capacities of central facilities already in existence. For example, bodies such as the National Organization for Potable Water and Sanitation Drainage (NOPWASD) and the Drainage Research Institute (DRI) can augment their designs and research mandates to include those reflected in sections on Water Resources and Waste Management of the NEAP. Likewise, the Organization for Energy Planning (OEP) can be assisted to undertake research related to the issues related to global warming and energy efficiency. For fields that lack representation by existing institutions, such as hazardous waste or biosafety consideration, the development of a central facility is required.

8.2.2 The Following Five-Year Plan (2007-2012):

i. Ongoing Capacity Building

Continuous training, education and overall capacity building should be accessible to all sectors of society. This is stressed again in the second five-year plan because it has a direct bearing on the ability to address and cope with emerging environmental issues.

ii. Program Implementation (Operation Phase)

All programs should be in some phase of implementation at the end of this term, with some reaching out of their target areas and pilot-based nature to wider regional application.

Water resources

Programs pertaining to water quality (3.1) should be the focus of this term. These include:

i. Managing Water Quality.
ii. Managing Lakes Water Quality including establishing an institution responsible for managing lakes.
iii. Managing Coastal Water Quality.
iv. Improving Drinking Water Coverage and Service Levels.

Air quality

Following the identification of issues of outdoor air quality and the partial management of these problems, efforts should concentrate on the widespread causes of air pollution, before moving to address indoor air quality issues. Programs to initiate during this time include:

i. Auto Exhaust Management in Urban and Rural Area.
ii. Air Pollution Mitigation from Existing Industry.
iii. Noise Pollution Abatement.
iv. Indoor Air Quality Improvement and Control.

Land use and management

The remaining programs for this area, having been to a small extent dealt with in the first term, should be implemented by the end of this term. These programs include:

i. Horizontal Expansion of Cultivated Land with pilot projects in target areas.
ii. Formulating Traffic Congestion Solutions.
iii. Establishing Efficient Urban Mass Transport.
iv. Establishing Pedestrian Zones in Major Egyptian Cities.

Solid waste management

By the end of this period, contractors should have been obtained and waste management programs (Municipal, Hazardous, Health Care, Radioactive, Agricultural, and Construction and Demolition) in major cities should be in implementation.

Protecting nature

By 2013, all proposed programs for protecting nature should have been initiated. New issues should be identified and necessary steps towards finding solutions should begin.

iii. Monitoring and Evaluation

This includes related feedback activities, undertaken regularly and continuously, that should be contributing to program performance, as well as legislative and regulatory review and modification.

iv. International Conventions' Compliance

Egypt is a signatory of numerous international conventions and an active participant in many global strategies and programs. By the end of this term, Egypt should be fulfilling targets and obligations of all international conventions and treaties to which it is party.

8.2.3 The Last Five-Year Plan (2012-2017 and beyond):

i. Targets and Benchmarks

Monitoring and evaluation should be yielding signs of achievement of short-term targets. Also, progress is being made towards benchmarks and longer-term goals.

ii. Implementation

By this time, all programs should be in some phase of implementation.

iii. Institutionalizing Sustainable Development

Modifications and provisions for environment and sustainability should now be routinely incorporated into governmental five-year plans and budgets.

8.3 Planning Implications and Considerations

8.3.1 Institutional Mechanisms for Sustainable Development

The main thrust for action comes from having institutional structures in place to support program implementation and goal actualization. It is imperative that these mechanisms be flexible, inclusive, transparent, and participatory. Developing and enhancing institutional structures for sustainable development is key to fostering much-needed collaboration and coordination between and among various government ministries,

agencies, local communities, NGOs, the private sectors, civil society in general, and the international community.

Other requirements for institutional transformation include capacity building, training, and education. Particularly with regard to programs devised to address desertification and managing drought, biosafety and climate change-related issues such as disease spread and agricultural pest infestations, scientific and technical capacities need to be enhanced. Programs such as the aforementioned require central research bodies, or "think tanks," to investigate and develop solutions, as well as enhance predictive capabilities. A National Laboratory for Natural Gas Technology and an Institute for National Hazardous Waste Research are examples of such Government-run research facilities, as detailed in Part Three of the NEAP.

8.3.2 Prioritization

Prioritization is vital in the wake of limited resources (financial, technical, personnel and the like). The responsibility for prioritization and scheduling rests with policy makers, coordinating bodies and the appropriate executing agencies.

Depending upon scheduling and prioritization, the implementation of one program or project in a stream of programs can have a positive trickle-down effect on the rest, relaxing the related problems underpinning the remaining programs. For example, the inception programs for Part Three, Sustainable Human Settlements, including redistributing population and upgrading informal settlements also start to tackle the problems of the subsequent programs, such as traffic congestion and quality of life improvements. Results are more expeditious when programs, given the availability of resources, can be run in parallel. Together, prioritization and strategic implementation can maximize outcomes.

8.3.3 Attendant Conditions

Almost all programs have attendant conditions. For example, the natural resources programs for sustainable agricultural development (Part Three), and the success thereof, entail co-requisite pollution regulations and related institutional mechanisms, as well as ongoing training and capacity building including information dissemination, conferences and workshops, and yearly evaluations of outputs, exports, cropping patterns and the like. It has been shown in Part Three that the aforementioned co-requisites can only strengthen a program and, in fact, must be in place to achieve long-term results and maximize outcomes. Addressing attendant conditions also works to minimize risk and increase the probability for success. For instance, developing laws and regulations for agricultural activity-related pollution must be accompanied by information and awareness campaigns so farmers understand why the new policies exist, how they can comply with them and explain the benefits thereof, thus making the farmers more willing to comply.

8.3.4 Public Awareness

Public awareness and media campaigns are becoming increasingly important for citizen participation and resource mobilization. Given the inherently political nature of sustainable development, enhancing exposure to sustainability issues is imperative for informing people, changing behavior and perceptions, and creating the demand to bring these issues onto political agendas. Intense media campaigns are required, particularly at the onset of implementation.

8.3.5 Monitoring and Evaluation

Refer to (Annex V) for M&E procedures.

8.3.6 International Cooperation and Support

International cooperation and information exchange are requisites for the planning and implementation of NEAP programs. Better policy is formulated when informed by lessons learned from studying the experiences of other countries. Furthermore, where possible, donor funds should be used for enhancing national capacities, such as establishing a National Laboratory for Natural Gas Technology or a Hazardous Waste Management Center, and not simply injected into a project with a finite timeframe.

8.3.7 Long-term Planning

The nature and reality of many of the NEAP programs are that they are long-term and ongoing. The planning and transforming of human settlements, for instance, is a process that can take several decades. However, policy makers are implored not to discourage or pass over programs requiring long-range planning. Immediate results-oriented approaches rarely address the important and pervasive issues demanding real change.

8.3.8 Uncertainty

For programs addressing biosafety and other emerging environmental issues and, in some cases, biodiversity protection, slow, deliberate, and cautious implementation is key as this type of planning entails planning for the unknown. In particular, issues of biosafety straddle concerns for human and ecological health and the variables involved are too uncertain to ascribe any detailed, precise implementation strategy; indeed attempting to define timelines and schedules for action pertaining to biosafety is arduous. In the wake of uncertainty and unpredictability, employing the precautionary principle, which is different from the "Do-Nothing" approach, is advised.

Annex I: Participating Organizations

Dr. Mamdouh Riad	H.E. The Minister of State for Environmental Affairs

Senior Advisors

Dr. Mostafa K. Tolba	President of ICED and Former Executive Director of UNEP
Dr. Mohamed A. Kassas	Professor, Faculty of Science, Cairo University

Capacity 21 Unit at Egyptian Environmental Affairs Agency

El-Kholei, Ahmed O.	Capacity21 Unit Coordinator

Financial Personnel

Mokhtar, Abdel-Meguid	Financial and Administration Officer

Administration Personnel (Alphabetic Order)

Abbas, Abeer	Executive Secretary and Administration Assist
Fahmy, Marwa M.	Executive Secretary and Technical Assistant

Technical Personnel

Behery, Heba S.	Economist
Bermawy, Abdou M.	Policy Analyst
El-Sawi, Iman	Economist
Gohar, Hisham S.	Geographic Information System Operator and Land Use Planner
Hamdy, Ismail	Programmer
Kinakin, Rebecca	Canadian Intern
Samra, Manal M.	Social Analyst

National Experts

Abdel-Aziz, Khaled	Assistant Professor, Institute for National Planning
Abdel-Raouf, Mohamed	Economic Researcher, Institute for Environmental Research Studies, Ain Shams University
Abdel-Razek, Salah	Capacity Building Consultant
Abd-Rabo, Ahmed	Coordinator, Climate Change Unit, EEAA
Abou-Saad, Mostafa	Professor, Faculty of Agriculture, Menofia University
Abu-Zekry, Tarek	Professor, Faculty of Engineer, Zagazig University
Amin, Ahmed	Director, Tebeen Meteorological Institute
Anwar, Wagida	Professor, Faculty of Medicine, Ain Shams University
Attia, Bayomi	Head of the Planning Sector, MWRI Component Manager
Bakr, Sawsan	Associate Professor, Faculty of Engineering, Cairo University
El-Bagoury, Ismail	Advisor, Land and Water Resources Management Program, CEDARE
El-Gohary, Ahmed A.	Advisor to HE Minister of State for Environmental Affairs
El-Gohary, Fatma	Professor, National Research Institute
El-Gohary, Hanaa	Associate Professor, Faculty of Literature, Cairo University
El-Haggar, Salah	Professor, American University in Cairo
El-Hakeem, Said	Attorney at Law and Advisor to EEAA
El-Kourdy, Mahmoud	Professor, Faculty of Literature, Cairo University
El-Mofty, Samer	National Coordinator, Med-Eco-Media

El-Tayeb, Osama	Professor, Faculty of Pharmacy, Cairo University
Fouad, Randa	Media Consultant, EQI
Gabbour, Samir	Professor, Institute for African Studies, Cairo University
Galal, Samia	Professor, High Institute for Public Health, Alexandria University
Nasralla, Mahmoud	Professor, National Research Institute
Nasr, Mohamed	Assistant Professor, Institute for Environmental Research and Studies
Ramzi, Youssef	Training consultant
Saleh, Hazem	Associate Professor, Faculty of Engineering, Menofia University
Sarhan, Alaa	Assistant Professor, Institute for Environmental Research and Studies, Ain Shams University
Games, Darcy V.	Technical Writer

Media Consultations to the Unit (Alphabetic Order)

Mahmoud, Mohamed	Media Consultant, Advisor to HE the MSEA
Saad El-Din, Somia	Media Consultant, Reporter Al-Akhbar Newspaper

Experts Associated With NEAP (Alphabetic Order)

Tahoon, Salah	Professor, Faculty of Agriculture, Zagazig University
Aid, El-Mohamdy	Consultant, Ministry of Planning and International Cooperation
Beltagi, Ali I.	Professor, Shore Process Laboratory National Institute of Oceanography and Fisheries
El-Amawy, Mohamed I.	Director, Air Pollution Monitoring Network, Ministry of Health and Population
El-Auoty, Mostafa K.	Consultant, Ministry of Industry and Environmental Technology
El-Gendy, Adel H.	Manager, Emergency and Environmental Health Project
El-Khafef, Soud M.	Water Consultant
El-Zarka, Mohamed	Senior Advisor, Egyptian Environmental Affairs Agency
Fahmy, Khaled M.	Deputy Chief of Party, PSU
Galal, Salma	Professor, Community Medicine, Azhar University
Gomaa, Salwa S.	Head of Center of Public Administration Studies, Cairo University
Kamel, Omima	Head of Culture Network, Radio and Television Union
Loza, Yousria N.	Association for Environmental Protection
Morad, Aml M.	Director, Environment and Sustainable Development Unit, Ministry of Foreign Affairs
Sabry, Amal I.	Head, Association for Health and Environmental Development
Youssef, Ragaa G.	Director, Wastewater Control Department, Ministry of Health and Population

EEAA Departments (Alphabetic Order)

Abdel-Reheem, Ahmed G.	Environmental Management
Abou El-Azm, Ahmed	Head of Environment Management Sector
Abou El-Azm, Mawaheb	Director Central Laboratory
Abou El-Seoud, Ahmed	Director, Environmental Monitoring
Abou El-Seoud, Nefisa	G. Director, Solid Waste, Hazardous Wastes and Chemicals

Abu-Sedera, Ali	Secretary - General, EEAA
Allam, Magdy	Head of RBO of GCR and Fayoum, EEAA
El-Khial, Amin E.	Manager, Department of Solid Waste
El-Naggar, Dina	Policy Coordinator officer of H.E. the Minister
El-Sharkawy, El-Sayed I.	Head of Branches Affairs Central Department
Fouda, Mostafa M.	Head, Sector for Nature Conservation
Hamza, Ahmed	Senior Advisor to HE The Minister of State for Environmental Affairs
Ibrahim, Mousa	Director, Information and Computer Center
Ismail, Ahmed	Chief Executive Office, Advisor for Environmental Inspection
Kamal, Mohamed	Director, Environmental Information and Public Awareness
Lotiyef, Dahlia	Director, Planning, Follow-Up and Technical Follow-up
Rashed, Mohamed	Technical Support and Environmental Disasters Management
Sabry, Hoda	Director, Environmental Protection Fund

Local Administrations That Participated in NEAP

Urban Governorates
Governorate of Cairo
Governorate of Alexandria
Governorate of Port Said
Governorate of Suez

Lower Egypt
Governorate of Ismailia
Governorate of Dammitta
Governorate of Daqahlia
Governorate of Sharkia
Governorate of Qalyibia
Governorate of Kafr El-Shiek
Governorate of Gharbia
Governorate of Menofia
Governorate of Behira

Upper Egypt
Governorate of Giza
Governorate of Beni Suef
Governorate of Fayoum
Governorate of Menya
Governorate of Assuit
Governorate of Suhag
Governorate of Qena
Governorate of Aswan
The Higher Council for City of Luxor

Frontier Governorates
Governorate of Red Sea
Governorate of New Valley
Governorate of Matrouh
Governorate of South Sinai
Governorate of North Sinai

Ministries
Ministry of Agriculture and Land Reclamation
Ministry of Communication and Information
Ministry of Foreign Affairs
Ministry of Culture
Ministry of Higher Education and State for Scientific Research
Ministry of Economy and Foreign Trade
Ministry of Tourism
Ministry of Housing, Utilities and Urban Communities
Ministry of Labor Force
Ministry of Health and Population
Ministry of Irrigation and Water Resources
Ministry of Local Development
Ministry of Industry
Ministry of Military Production
Ministry of Transportation
Ministry of Youth and Sports
Ministry of Planning and International Cooperation
Ministry of Finance

Universities

Professor, Amir Nasef	Cairo University
Professor, Mohamed A. Abdellah	Alexandria University
Professor, Abdel-Kader M.Abdel-Mohsen	Ain-Shams University
Professor, Mahmoud Gaber	Assuit University
Professor, Ahmed A. Habeeb	Tanta University
Professor, Ali M. El-Adl	Mansoura University
Professor, Gamal Nwar	Zagazig University
Professor, Hazem Attit-Allah	Helwan University
Professor, Abdel-Hady A. El-Gohary	Minya University
Professor, Ibrahim S. Ali	Menofia University
Professor, Ibrahim Ashour	Suez Canal University
Professor, Mohamed E. Rashad	South Valley University, (Qena)

Media Organizations
Al-Ahram Journal
Akhbar El-Yoom Journal
El-Akhbar Journal
El-Gomhorya Journal
El-Masaa Journal
Anbaa El-Sharq El-Awsat
Al-Esboa Journal
El-Omal Journal

Non-Profit Organizations (Alphabetic Order)
Al-Amal Village Associations
American Chamber for Commerce
Association for Better Life and Sustainable Development
Association for Health and Environmental Development
Association of Egyptian Youth Hostels
Association of Health and Environmental Culture
Association of Women Development

Assuit Environmental Protection Association
Business Association for Environmental Protection
Business Women's Association for Development
CARE International Organization
Coptic Evangelist Organization for Social Services (CEOSS)
Development Association for Supporting Street Food Vendors and Protecting the Environment
Egyptian Association for Developing Packing and Wrapping Industries
Egyptian Association for Health and Environmental Legislation
Egyptian Association for Saving the Children, Alexandria
Egyptian Association for the Development of Environmental and Productive Projects
Egyptian Forum for Environment and Sustainable Development
Egyptian Youth Association for Development and Environment
Eshraka Association
Federation of Egyptian Industries
Friends of the Environment and Development Association
Hawaa Al-Mostakbal Association, Institute for Social Service
Horrya Association for the Society Development, Alexandria
Institute of Cultural Affairs (ICA)
Mallawi Women's Association for Improving Health and Development
National Women Council
National Youth Association for Environment and Development
Protecting Water Resources Association
Red Crescent Association
Road El-Farg Association
Sharqia Association for Social Development
Upper Egypt Association for Education and Development
Women's Association for Social Development

Egyptian Political Parties
National Democratic Party
Egyptian Green Party

Private Sector Institutions (Alphabetic Order)
ADAPT Egypt
Crystal Asfour
Egyptian House for Printing and Binding
El-Maadi for Environmental System Company
El-Obour Company for Import
Environmental Quality International (EQI)
Industry and Finance Company
Modern Company for Packing and Wrapping Products, TECNOPAK
Multi M Group Industry
Olympic Company – Ideal
Sobeh Trading Company

Public Sector Institutions (Alphabetic Order)
Egyptian Agency for Protecting Coasts
Glucose and Starch Company
Nile Matches Company

Embassies (Alphabetic Order)
Austrian Embassy
French Embassy

German Embassy
Italian Embassy
Japanese Embassy
Netherlands Embassy
Norway Embassy
Switzerland Embassy

Donors (Alphabetic Order)
Canadian International Development Agency (CIDA)
Danish International Development Agency (DANIDA)
Social Fund for Development (SFD)
United Nations Development Program (UNDP)
United States Agency for International Development (USAID)
World Bank (WB)

Annex II: Produced Papers and Reports

Abou Saad, Mostafa. Programs Covering the Area of Management of Agricultural and Rural Development, Prepared for the National Environmental Action Plan, 2001.

_____. Egyptian Agriculture: Land and Water Resources and Their Rotation to the Environment, Background paper prepared for the National Environmental Action Plan, July 1999.

Abu Zekry, Tarek. Programs and Projects Covering the Area of Management of Urban Settlements, Prepared for the National Environmental Action Plan, 2001.

_____. The General Characteristics for the Human Settlements in Egypt and their Environmental Consequences, Background paper prepared for the National Environmental Action Plan, 2000.

Amin, Ahmed. The Status of the Environment and Energy Sectors in Egypt, Background paper prepared for the National Environmental Action Plan, August 1999.

Anwar, Wagida. Environmental Assessment and Human Health in Egypt, Background paper prepared for the National Environmental Action Plan, 1999.

_____. Health Impacts of Environmental Degradation, Background paper prepared for the National Environmental Action Plan, 1999.

Attia, Bayoumi, Assessment of Water Resources in Egypt, Background paper prepared for The National Environmental Action Plan, 1999.

Bakr, Sawsan. Environmental Management in Egypt: Towards a Unified Capacity Development Approach, Background paper prepared for the National Environmental Action Plan, 1999.

Capacity 21 Unit. Atlas of Sustainable Development Information, May 2001.

_____. Egypt Country Profile, Information Provided by the GOE to The United Nations Commission on Sustainable Development, April 2001.

_____. The Environmental Profile of Egypt (text in both Arabic and English) June 2000.

_____. Volume 2: Agenda for Action in the 21st Century, NEAP, February, 2001.

_____. Blue Print Budget for Financing The NEAP, NEAP, 2001.

El- Kholei, Ahmed. "The National Environmental Action Plan: From Preparation to Outcomes", June 1999.

_____. Building the Capacities of Local Administrators on Formulating Local Agenda 21 in Egypt, proposal presented to METAP CBU, July 2000.

_____. The Upgrading and Development of Al-Gannabeya, Tanta, proposal presented to The German Agency for Technical Cooperation (GTZ), July 2000.

_____. Globalization and its Impact on the Environment of Egypt, background paper prepared for the National Planning Institute in preparation for Egypt Human Development Report, January 2001.

_____. Planting Timber Trees Using Treated Wastewater: A profound Impact on the Environment, report on the workshop held in Ismailia, November 2000.

_____. The Rehabilitation of El-Attfi Water Canal and Branches, proposal submitted to The Ministry of Water Resources and Irrigation, March 2001.

_____. National Environmental Action Plan. "Volume 3: Project Ideas" February, 2001.

_____. National Environmental Action Plan. "Volume 4: Guidelines for Implementation, Planning, Monitoring, Evaluation and Follow-up for NEAP Projects" February, 2001.

El-Bagory, Ismail. Programs and Projects Covering the Area of Management of Agricultural and Rural Development, Prepared for the National Environmental Action Plan, 2001.

_____. Environmentally Sound Management of Land Resources, Background paper prepared for the National Environmental Action Plan, 2001.

El-Gohary, Fatma. Programs and Projects Covering the Area of Water Quantity and Quality's, Prepared for the National Environmental Action Plan, 2001

El-Gohary, Hanaa. The Social Aspects for The Environmental Management, Background paper prepared for the National Environmental Action Plan, July 1999.

El-Hakeem, Said. A study for Existing Laws and Measures Organizing the Issue of Environment in Egypt, Background paper prepared for the National Environmental Action Plan, 2000.

_____. Programs Covering the Area of Environmental Legislation and Law Enforcement, Prepared for the National Environmental Action Plan, 2001.

El-Kordy, Mahmoud. Programs and Projects Covering the Area of Social Programs for Sub-Population Group, Prepared for the National Environmental Action Plan, 2001.

El-Mofty, Samr. Programs and Projects Covering the Area of Environmental Education, Training and Awareness, Prepared for the National Environmental Action Plan, 2001.

El-Tayeb, Osama. Programs and Projects Covering the Area of Biosafety, Prepared for the National Environmental Action Plan, 2001.

Fouda, Mostafa. Programs and Projects Covering the Area of Biological Diversity, Prepared for the National Environmental Action Plan, 2001.

Galal, Samia. A Green Prescription to Modernize Egypt in the 21st Century, Background paper prepared for the National Environmental Action Plan, September 2000.

Ghabbour, Samir. Programs and Projects Covering the Area of Biological Diversity, Prepared for the National Environmental Action Plan, 2001.

Makary, Samir. Financial and Economic Analysis for Solid Waste Collection and Treatment Project, Background paper prepared for the National Environmental Action Plan, August 2000.

_____. Financial and Economic Analysis for Supermarkets Disposable, Background paper prepared for the National Environmental Action Plan, November 2000.

Nasrallah, Mahmoud. Programs and Projects Covering the Area of Air Quality, Prepared for the nation Environmental Action Plan, 2001

_____. Air Pollution in Egypt, Background paper prepared for the National Environmental Action Plan, 1999.

Saleh, Hazem. Potable Water, Wastewater and Solid Waste Current Status Egypt, Background paper prepared for the National Environmental Action Plan, June 1999.

_____. Programs and Projects Covering the Area of Wastes Management, Prepared for the National Environmental Action Plan, 2001.

Sarhan, Alaa and Mohamed, Abdel-Raouf. Ecological and Environmental Accounting, Background paper prepared for the National Environmental Action Plan.

_____. The use of Economic Instruments, Background paper prepared for the National Environmental Action Plan.

Sarhan, Alaa. Financing the NEAP, prepared for the National Environmental Action Plan, 2001.

_____. Programs and Projects Covering the Area of Economic Issues Related to Environment, Prepared for the National Environmental Action Plan, 2001.

Annex III: Biblography

Abou-Ali, Sultan. “Challenges Facing Human Development in Egypt Under Globalization”. A Background paper for Egypt Human Development Report 2000, Cairo, 1999.

Abou-Stait, Fouad. “Consequences of Globalization in the Third World”. Cairo Demographic Center, Working Paper No. 40, Cairo 1999.

Abu Zekry, Tarek and El- Kholei, Ahmed. "The Plans of Egypt for Population Redistribution: Are they Sustainable?", paper presented at The Cairo Demographic Center 29th Annual Meeting: Population and Sustainable Development, Cairo, 1999.

Abu-Lughod, Janet and Richard Hay Jr. Third World Urbanization, Methuen and Co. Ltd., London 1977.

Brunn, Stanley D. and Jack F. Williams, Cities of the World: World Regional Urban Development, (Editors), New York, NY: Harper and Row, 1983.

Central Agency for Public Mobilization and Statistics. “The Statistical Year Book”, 1993-1999.

Earth Summit. “Agenda 21”. The United Nations Programme of Action From Rio, Rio De Janeiro, Barazil, June 1992.

El- Kholei, Ahmed and, Abu Zekry, Tarek. "The Impact of Global Transformation on Traditional Societies: Avoiding Ecological Fallacies in Operational Planning Models", paper presented at The Conference on Planning Education in the 21st Century, Oxford Brooks University, Portland State University, Texas A&M University and Cairo University, Cairo, April 26-28, 1999.

El- Kholei, Ahmed. “Sustainable Development Strategies in Egypt: Experiences and Lessons Learnt, Submitted to: The Regional Consultative Meeting on Sustainable Development, Abidjan, Côte D’Ivoire, September 1999.

El-Batran, Manal and El-Kholei, Ahmed. “Gender and Rehousing in Egypt”, a study sponsored by The Royal Netherlands Embassy in Cairo The Gender and Development Unit, Cairo, July, 1996.

El-Diwany, Sherif and El-Kholei, Ahmed. "Strategies for Replication and Building on Lessons of Experience. Presented to The National Consultation Urban Environmental Management Strategies for Cities in Egypt, Ismailia, Egypt, 17-19 May 1998.

Environment 2000 and Beyond. Preface by Klaus Topfer, Executive Director and Edited by Ahmed K. Hegazy, UNEP and Cairo, Egypt 1999.

General Organization for Physical Planning. "Development and Construction Map for Egypt 2017". June 1998

Haughton, Graham and Hunter, Colin. Sustainable Cities, Jessica Kingsley Publishers, London, 1996.

Institute of National Planning. "Egypt, Human Development Report 1997/1998".

Jago, Philip; Linda Timothy and Abeer Shahin, "Water and Energy Conservation-Saving Money for Industry", Environment 99, Cairo, 1999.

Marlone, Thomas; Mohamed El-Masri, and Hazem Hassan, "Egypt's Green Mission – the Benefits of an International Consulting Operation", Environment 99, Cairo, 1999.

Pearce, David and Edward B. Barbier, Blueprint for a Sustainable Economy, Earth Scan Publications Limited, 2000.

Sarhan, Alaa. "The Effect of the Environmental and Technical Drawbacks on the Export of Agricultural Products as Applied to Egyptian Cotton Exports," Journal of Environment, Cairo University, 1999.

Smith, Michael A.; Ahmed G. Abdel-Rehiem; and Dahlia Lotayef. "Economic Analysis and Incentives in Environmental Policy and Decision-Making with Respect to Chronic Ambient Air Pollution in Cairo", Environment 99, Cairo: 1999.

UNDP, Human Development Report, New York, Oxford University Press, 1999.

Annex IV: EEAA Focal Points

No	Name	Field	Phone No.	Fax No.	Email
1	Dr. Moustafa Fouda	Biodiversity	7369261 7369265	7369261	
2	Dr. Salah Tahoun	Desertification	5254652 5256442 Ext.7514	5256454 5256490	stahoun@mailer.scu.eun.eg
3	Dr. Ahmed Abou El Azm	Mediterranean Action Plan	5256452 5256442 Ext.7514	5256454 5256490	
4	Dr. Salwa El-Tayeb	Ozone	5256452 5256442 Ext.7604	5256454 5256490	
5	Dr. Ibrahim Abd El Gelil	Climate Change	5256452 5256442 Ext.7508	5256454	iagelil@idsc.gov.eg
6	Dr. Neffissa Abou El Seoud	Basel	5256452 5256442 Ext.7211	5256454 5256490	
7	Dr. Essam El Badry & Dr. Moustafa Fouda	Protected Zones	7356777 7355963	7355962	
8	Dr. Ibrahim Abd El Gelil & Dr. Dina El Naggar	Rio + 10	5256452 5256442 Ext.7508/ 7412	5256454 5256457	iagelil@idsc.gov.eg dnaggar@hotmail.com
9	Dr. Yehia Abd El-Hady	Hazard Mitigation	5719687		
10	Dr. Osama El-Tayeb	Biosafety	3620122		
11	Eng. Dahlia Lotayef	Trade & Environment/ METAP	5256452 5256442 Ext. 7309	5256454 5256490	
12	Dr. Mohamed Borhan	Contingency Planning	5256452 5256442 Ext. 7309	5256454 5256490	
13	Dr. Mahmoud Khamis	Red Sea	03/ 3922316	03/5447080	

Annex V: Monitoring and Evaluation

Basic Elements of an M&E Framework

Monitoring, evaluation, and other feedback generating activities play important roles in assessing program performance, achievements, and shortcomings[1]. See Box (12). Information gathered under the auspices of monitoring and evaluation is key to regulatory and legislative modification.

Monitoring begins during the implementation phase, not after as regular documentation of both implementation activities and effects allows for comparison and evaluation of action strategies, approaches and impacts on local conditions for use in future performance evaluation. Certain programs, such as biodiversity protection, depend heavily upon diligent monitoring activities to gauge and maintain system health.

Generally, monitoring is required for internal management purposes, whereas evaluation and feedback activities have both external and internal applications and are important for guiding planning and resource allocation, maintaining accountability to stakeholders, informing the public, and signaling when plans must be altered.

Box 12: Monitoring, evaluation and reporting

Monitoring is a continuous process of collecting and analyzing information to measure the progress of a project toward expected results. Monitoring provides project managers and participants with regular feedback that can help determine whether a project is progressing as planned.

Evaluations are periodic assessments of project performance and impact. Evaluations also document what lessons are being learnt from experience. Generally, individuals involved in managing a project are charged with monitoring. By contrast, individuals independent of project operations conduct evaluations.

Reporting is the systematic and timely provision of essential information. It is an integral part of the monitoring and evaluation function. Monitoring, reporting and evaluation are management functions, which could also be described as observing project progress (monitoring), documenting the observed information (reporting) and assessing on the basis of the above (evaluating).

Evaluation is strongly recommended, particularly for smaller projects that are innovative or strategic i.e. experimental, pilot or demonstration projects; or projects that could have major repercussions on development policies. Moreover, an evaluation is a combination of learning and accountability, and in this sense, can be differentiated from an audit (just accountability) or research (just learning). Though they vary in the scope of their application, it is important to keep in mind that monitoring and evaluation work together to achieve the same purpose. M&E supports accountability, informed decision-making, and learning from experience.

i. Project Document

A project document is a legally binding contract and it is an important record of what the project sets out to accomplish and should be used as a constant point of reference. The project document frequently referred to as prodoc, forms the basis of M&E. Project managers and independent evaluators verify results against what is written in the project document. The project document is the master document that contains most of the pieces necessary for an M&E framework (logframe, timetables, TORs, etc.).

However, the project document should not be regarded as a rigid framework. An integral part of the M&E exercise is to appraise the validity of the project document in the context of new or changing environments. If necessary, a substantive revision can be proposed to recuperate its relevance.

ii. Logical Framework Approach

The logical framework (log frame) approach is now being widely adopted. Developed in the 1970s, the log frame has been used by a variety of development agencies. Its purpose is to provide a clear, rational framework for planning the envisioned activities and determining how to measure a

[1] This section is drawn from GEF/UNDP manuals on M&E that are applicable to NEAP projects.

project's success, while taking external factors into account. It encompasses the systematic analysis of stakeholders, problems, objectives, and helps to identify indicators and assumptions.

The strength of the log frame is in the analysis. Analysis of problems and objectives can be done through drawing problem and objectives trees. The tree, which is an analytical tool, determines cause and effect relationships and sheds light on the root causes of the deeper threat to environment. A log frame workshop should be carried out during a project's development stage. The Project Planning Matrix (PPM) is a one-page summary of a project's log frame and should be attached to the project brief.

iii. The 9-Step Logframe Process

1. Analysis of Stakeholders clarifies the views and interests of the major actors.
2. Problem Analysis compares the different viewpoints to identify and build consensus on the central problems and their underlying causes and effects.
3. Objective Analysis examines the possible objectives of the project in view of the resources available, and the expectations, interests and motivations of the stakeholders.
4. Analysis of Alternatives systematically identifies and selects the most realistic measures that will lead to achievement of the objectives.
5. Project Planning Matrix provides an overview of the project's goals, purpose, outputs, assumptions, indicators and means of verification.
6. Intervention Strategy is a descriptive summary of the Project Planning Matrix.
7. Verifiable Indicators are performance parameters that translate objectives into measurable indicators for monitoring and evaluation.
8. Means of Verification detail the methods for acquiring evidence that objectives are being met.
9. Assumptions/Risks identify important conditions that are outside the direct control of the project but which must hold true for the project to achieve its objectives.

Below Table (5) is the five-by-four Project Planning Matrix (PPM).

Table 5: Log frame Matrix

Project Planning Matrix

		Project Strategy	Indicators	Means of Verification	Assumptions/ Risks
1	Global Environmental Objective				
2	Immediate Objectives				
3	Outputs				
4	Activities				
5	Outcomes				

As can be seen in the diagram above, the log frame lays out the project's strategy (first column) and the causal relationships between the components (vertical logic), indicates how to check whether these components have been achieved (second and third columns) and establishes what assumptions outside the scope of the project may influence its success (fourth column). The logical framework is used for preparing, implementing, and evaluating a project.

This matrix should result from a participatory process by all stakeholder representatives. Before a project starts, the log frame builds a sense of communication and cooperation among stakeholders. Another distinctive feature of the logical framework is the emphasis

given to underlying risks and assumptions. On the other hand, it is neither a cure-all nor does it ensure project success. The importance of the log frame should not be exaggerated. After all, it is simply a planning tool that can help those who prepare and implement projects to structure their ideas in a clear, standardized form.

iv. Objectively Verifiable Indicators

Clearly, under the log frame approach to project management, objectively verifiable indicators are an important element of project design, implementation, and evaluation. Therefore, one of the most important aspects of M&E is the choice of suitable and meaningful indicators. An indicator is a qualified/quantified parameter that details the extent to which a project objective has been achieved within a given timeframe and in a specified location. For instance, an indicator measuring conservation of biodiversity might look at the change in the area (km^2) of habitat protected.

Above all, indicators must be practical and realistic and should, whenever possible, be meaningful and consistent with the main objectives of the project. In discussing indicators, a useful acronym to remember is: SMART (specific, measurable, attainable, relevant and trackable).

An indicator can also be considered a signal that shows the change in a parameter compared to a baseline or a future target. Due to the empirical nature of indicators, a project proponent and an external observer will both reach the same conclusion about the project′s progress. By specifying project objectives in more concrete and verifiable terms, indicators allow an impartial and indisputable assessment of whether a particular objective has been achieved. The project team should go one step further and interpret what the indicator means in the context of the project.

M&E methodologies are dependent on well-developed sets of indicators. Indicators provide the basis for before and after analysis and describe the effects of project interventions, positive and negative, anticipated and unanticipated, intended and unintended. They can be grouped into two categories:

a. Indicators of implementation progress, that is the delivery of technical services, capital inputs with related disbursements and the resulting outputs generated (facilities created, activities and participatory processes organized, people trained, etc.);

b. Indicators of environmental impact in local and global terms that demonstrate the environmental accomplishments.

The choice of indicators and their source of verification are governed, among other things, by considerations of the costs involved in collecting the relevant data. Excessively complex or numerous indicators lead to high costs, which could be a reason to seek other, more indirect indicators, for which the data are easier to obtain, so requiring less research and entailing less expense. For example, instead of conducting a survey on income, the number of bicycles sold in the village might be counted.

When in doubt, a "common sense" approach should be used. Never should the choice of indicators take up so much time that project managers lose sight of why they are establishing the indicators in the first place. It is far more important to direct resources toward project implementation than to come up with scientifically precise, detailed indicators. In other words, the project should not be driven by the indicators but rather by its objectives.

That said, indicators direct attention to whether the objectives and intended impacts of the project have been achieved, whereas previously the emphasis was mostly on the provision of inputs, and simply ensuring those inputs yielded the planned outputs. Until

the advent of indicators little attempt was made to assess impact, yet it is the eventual impact that is the true criterion of project success.

While it is not possible to establish a particular set of indicators for all projects, it is possible to provide general guidelines on how to formulate indicators during the planning stage of a project. In particular, the following questions should be answered as part of the process of establishing indicators:

- ✓ Are the objectives and outputs clearly stated?
- ✓ What changes are anticipated as a result of achieving the project objectives and outputs?
- ✓ What are the criteria for judging the success of the project?
- ✓ Anticipating the end of the project, how would one know if the objectives have been achieved?
- ✓ Are the key stakeholders participating in the establishment of indicators?
- ✓ Are the data, which are necessary to measure change against a baseline or target, available at reasonable costs?

An ideal set of indicators would include indicators of implementation progress and impact. One must make sure that changes in an indicator are attributable to project activities and not an external factor.

v. Assumptions

Assumptions are conditions that are outside the direct control of the project, but which are so important that they will have to be met or have to hold true if the project is to achieve its objectives. In formulating assumptions, one should ask the following three questions, as detailed in Figure (6).

vi. Standard Section on M&E for Project Brief and Documents

The Monitoring and Evaluation section of the Project Brief and Project document should include the following:

(a) Brief description of standard M&E procedures such as APR, PIR, mid-term and final evaluation, inception report, financial reports, updating and revising work plan and budget, terminal report and terminal reviews.

(b) Brief description of specific M&E procedures such as substantive review or steering committee meetings, submission of progress reports and technical reports, and so on.

(c) An M&E plan should be developed outlining in detail the following:

- ✓ Timetable: When are the crucial M&E activities supposed to take place during the lifetime of the project (APR, PIR, audit, evaluations)?
- ✓ Reporting requirements: What are the formats and frequency of reporting?
- ✓ Data collection: What kind of data will be collected, when, by whom and where?
- ✓ Responsibilities: Who will be responsible for the M&E tasks?
- ✓ Budget: What are the costs for each of the M&E tasks?

Compliance with the tasks specified in the M&E plan should be monitored and adjustments should be made as appropriate.

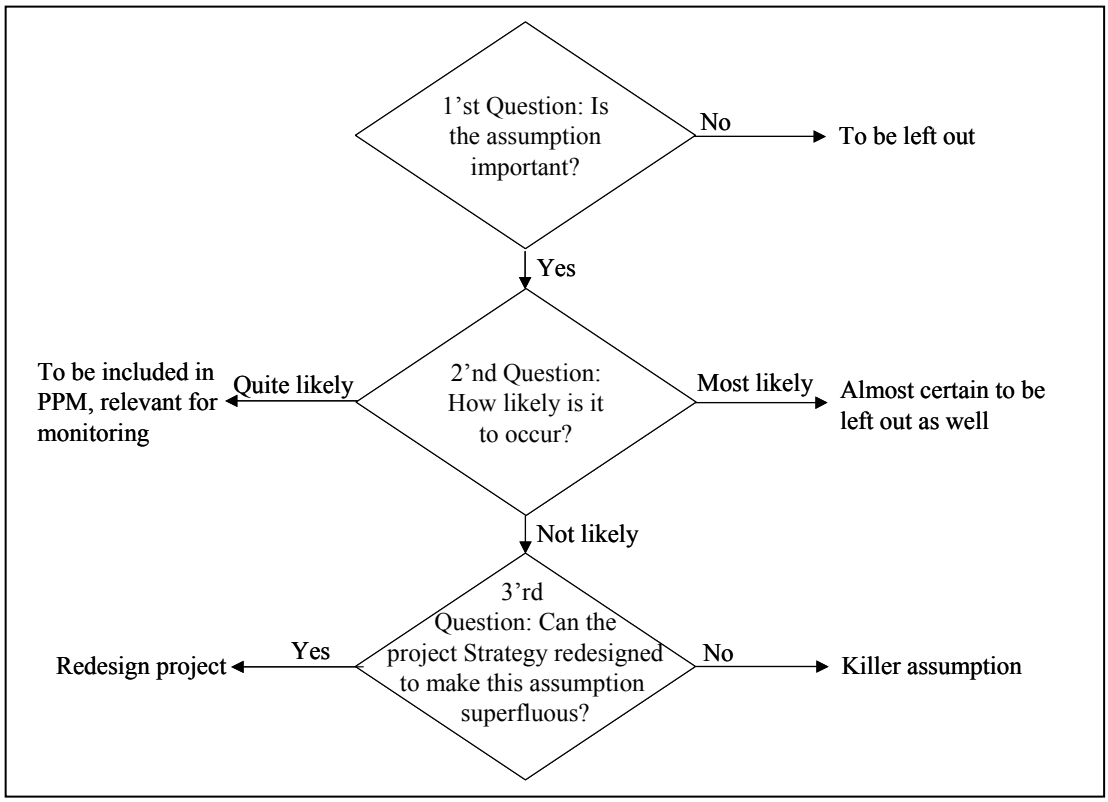
For each of the standard and specific procedures the following issues should be addressed:

- ✓ Mechanisms and tools that will be used;
- ✓ Schedule and responsibility (who is preparing reports and convening meetings, composition of the steering committee, identification of target groups); and
- ✓ Resources allocated for each M&E task.

Furthermore, the M&E section should refer to the indicators and benchmarks documented in the log frame matrix and specifically address the question of provisions, costs and methodologies for baseline data collection, data collection at regular intervals during implementation, and ex-post data collection and monitoring.

Last but not least, some insights should be given on how lessons that have been learnt elsewhere are incorporated into the project design and how the project is going to extract, document and disseminate its own lessons learnt. Learning and feeding back lessons are crucial to "close the loop" of the project cycle. In turn, these lessons will be applied to the next project.

Figure 6: Formulating assumptions



vii. Costs

It is necessary to allow adequate provision at the outset of the project for baseline data collection, independent evaluations, and all other M&E activities. Costs should be broken down by component and by type of input. They should be expressed in local currency and foreign exchange, specifying the source of financing and, where applicable, to financing arrangements.

Typically, M&E costs comprise 10-15 percent of a project's total budget. These costs should be included in the project budget on the respective budget line. Standard costs (APR, PIR, mid-term evaluation, final evaluation and terminal report) and project-specific costs (surveys to collect baseline data, workshops, M&E specialists, etc.) should be taken into account.

viii. Inception Report and Work Plans

The inception report constitutes the finalization of project design and presents the overarching work plan as well as the first detailed annual work plan. Project managers are required to prepare work plans at the beginning of project implementation and then

annually thereafter. Work plans put the project document into operational terms by describing in detail the provision of inputs, activities, and expected results for the project in a given year or for the life of the project. Moreover, they clearly indicate schedules and the persons or institutions responsible for providing the inputs and producing results. In conjunction with the PIR, APR, and other evaluations, these work plans constitute an important basis for monitoring the progress of a project.

Annex VI: Implementation Schedule