



**Ministry of State for the Environment
Egyptian Environmental Affairs Agency
Department of Nature Conservation
National Biodiversity Unit**

Egypt: National Strategy and Action Plan for Biodiversity Conservation

January, 1998

**Egypt: National Strategy
and Action Plan for Biodiversity
Conservation***

Part 1 : Introduction

Part 2 : Goals and Guiding Principles

Part 3 : Components of the National Plan of Action

Part 4 : The National Programmes of Action

Annex: Programmes , fact sheets

* This document incorporates the outcome of sessions of extensive discussion held at Aswan, Qena, Sohag, Assyut, El-Minya, Beni Suef, Faiyum, Cairo, Ain Shams, Helwan, Tanta, Zagazig, Benha, Mansoura and Damietta between March and May, 1997, and a national conference held in Cairo: 26 -27 November 1997.

FOREWORD

Concern with, and interest in, the study of wild species of plants and animals and observing their life cycles and ecological behaviour as related to natural phenomena was part of the cultural traditions of Egypt throughout its long history. In Pharaonic Egypt certain species were sacramented (e.g. the sacred ibis, sacred scarab, etc.) or protected as public property because of their economic importance (e.g. papyrus: material for state monopolized paper industry).

In recent history laws protected certain species of animals, but protection of natural habitats with their ecological attributes and assemblages of plants and animals (nature reserves) remained beyond the interest of government. The United Nations, with the assistance of the International Union for Conservation of Nature and Natural Resources (IUCN) published lists of nature reserves worldwide, and Egypt was not mentioned in these lists till the late 1970s. As President M. Hosny Mubarak was elected in 1981, he enacted the presidential decree 631 in 1982 that established the Egyptian Environmental Affairs Agency (EEAA) and in 1983 the Parliament enacted Law 102 that empowered the Prime Minister to issue decrees assigning prescribed territories as protected areas and outlining their statutes. Management of these areas is within the responsibilities of EEAA in collaboration of local authorities in governorates.

During the first 10 years of President Mubarek's rule, 18 nature reserves were established with a total area of 7.5% of Egypt's territorial space. This puts Egypt among the countries that are concerned with protection of nature and conservation of biodiversity. Future plans outlined in this document envisage the increase of the total area of nature reserves to 15% of Egypt's territories by the year 2017.

In the United Nations Conference on Environment and Development (UNCED), commonly known as the Earth Summit (Rio de Janeiro, 1992), Egypt signed the Biodiversity Convention, which was subsequently ratified in 1994. This initiated work towards the completion of our national plans and development of our capabilities for addressing the requirements of conservation of national biodiversity. EEAA established, within the Department of Nature Protection, a National Biodiversity Unit (NBU) that would undertake surveys and inventories of biodiversity which form the bases for setting our National Strategy for Conservation of Biodiversity. This strategy would be part of our national commitments under the Convention and our responsibilities to our future generations. The NBU managed to mobilize the scientific community in government departments and in non-governmental institutions in Egypt to contribute to the background studies and the preparation of a draft of this document that I had the pleasure of submitting to public debate in this National Conference held (26-27 November) for this purpose. The present document was discussed and approved by this Conference.

I would like to extend words of thanks to the hundreds of Egyptian scientists, scholars and interested citizens who contributed to the drafting of this document, and to the international bodies who provided technical and financial assistance to this endeavour and in particular to the United Nations Environment Programme (UNEP) and the European Union.

It was particularly fortunate that the National Conference to discuss and endorse the National Strategy and Action Plan for Biodiversity Conservation was held under the chairmanship of Mrs. Suzanne Mubarak; the whole endeavour is part of Egypt's achievements under the leadership of President Mohamed Hosny Mubarak .

January, 1998

**Nadia M. Ebeid
Minister of State for the Environment**

EXECUTIVE SUMMARY

This document is set in four parts.

Part 1: INTRODUCTION comprises four chapters: (1) A survey of the broad geographical features of Egypt, its position, area, climatic pattern, population and demography, and natural resources. (2) Actions towards conservation of natural resources and biodiversity during the 20th century. (3) The present state-of-knowledge as regards ecological surveys and studies on various sectors of biota in Egypt since the signing of the Biodiversity Convention in 1992. (4) Brief notes on the 18 nature reserves established from 1983 till 1997, which include three groups:

wetland reserves (marine - lakes - islands)	9
desert reserves (highlands - wadis - plains)	6
geological formations	3

Part 2: GOALS AND GUIDING PRINCIPLES. The document defines six principal goals:

1. Management of natural resources and its various elements should be founded on scientific bases that ensure maintenance of natural balances, protection of ecosystems against degradation and conservation of living biota.
2. Development of Egyptian scientific and technological capabilities in the fields of biodiversity conservation and development of natural resources, and development of institutional and managerial capacities so as to be able to implement programmes of action in fields of research, monitoring and inventories, and management of projects
3. Mobilize national capacities and resources to conserve biodiversity with its ecological, taxonomical and genetical elements; to ensure the sustainability and rational use of these elements.
4. Set programmes of action that ensure the positive participation of people, as individuals and as organizations, in the implementation of biodiversity conservation programmes, and in enjoying their equitable shares of benefits of these endeavours.
5. Establishment of 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 the fields of biodiversity conservation, exchange equitably available scientific and technological knowledge related to conservation of biodiversity resources including genetic resources.

Part 3: ELEMENTS OF NATIONAL PLAN OF ACTION, comprise three principal sectors:

- 1. Programmes of research, inventories, monitoring and assessment.**
- 2. Programmes of implementable projects and their management.**
- 3. Programmes of supporting measures.**

Part 4: NATIONAL PROGRAMME OF ACTION, translates the elements of the National Plan into packets of projects that are implementable and projects related to development of instruments and mechanisms of action that ensure achievement of national goals. This part comprises three sections.

First, national programmes that are centrally managed, they include eight packets:

- 1. national network of protected areas (now and till the year 2017),**
- 2. Egyptian Natural History Museum (referral collections),**
- 3. National Gene Bank (conservation of genetic resources),**
- 4. Captive Breeding Centre (endangered species),**
- 5. national programmes for research, monitoring and assessment in fields of biodiversity,**
- 6. national network of depots of biodiversity data and information,**
- 7. national programme for manpower development,**
- 8. national programme for education and public awareness.**

Second, nation-wide provincial programmes, they include four packets:

- 1. units associated with the Egyptian Natural History Museum,**
- 2. units associated with the National Gene Bank,**
- 3. units associated with the Captive Breeding Centre,**
- 4. science parks, gardens and education field stations .**

Third, institutional arrangements, these are the set of tools and mechanisms that manage the national programmes of action within the framework of: central planning and decentralised implementation actions, collaboration among governmental bodies and non-governmental organizations and ensuring public participation.

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PROJECTS: fact sheets

PART I

INTRODUCTION

A. GEOGRAPHICAL FEATURES

Egypt is located at the northeastern corner of Africa and the western extension of Asia (the Sinai Peninsula). It is also part of the Mediterranean Basin (ca. 1200 km of coastal front), and embraces two biogeographical corridors which link the tropics in the south with the palearctics in the north: the Red Sea connects the tropical seas of the Indian Ocean with the temperate Mediterranean, and the River Nile links equatorial Africa with the Mediterranean Basin. The Red Sea and the Nile Basin are two principal highways along the migratory routes of the palearctic-tropics journey of birds, and the Mediterranean wetlands of Egypt (northern lakes: Bardaweel, Manzala, Burullus, Idku and Mariut) are vital resting stations. They are internationally important sites within the framework of the Wetland Convention (Ramsar, 1971) and the Convention on the Conservation of Migratory Animals (Bonn, 1979).

This geographical position of Egypt has had an indelible impression on the ethnology of inhabitants and on the geographical affinities of its biota. To this we add that the history of the climate in the Quaternary which included alternating periods of rain and drought (pluvials and interpluvials), and that the history of the River Nile (which acquired its present form and hydrological rhythm only recently - about 10000-20000 years ago) was complex.

Egypt is part of the Sahara of North Africa. It has an area of about one million square kilometers, divided into a western part comprising the Western Desert (681000 km²), an eastern part comprising the Eastern Desert (223000 km²) and the Sinai Peninsula (61000 km²). The Nile Basin comprises the valley in the south (Upper Egypt) and the Delta in the north (Lower Egypt), and forms a riparian oasis (40000 km²); this is the densely inhabited farmlands of Egypt.

The climate of Egypt is that of the Arid Mediterranean region, with notable differences between the coastal and inland parts of the country. According to the system applied in the UNESCO map of the world distribution of arid regions (which takes into consideration the degree of aridity, the mean temperature of the coldest and the hottest months of the year and the time of the rainy period relative to the temperature regime), four major bioclimatic provinces are recognized:

(i) the hyperarid province with mild winter and hot summer (mean temperature of the hottest months is 20° - 30° C) includes the Eastern Desert (the area between Lat. 22° N. and Lat. 30° N., except the coastal mountains along the

Gulf of Suez) and the southern parts of the Western Desert. Rain is extremely scarce and several years may pass without rain;

(ii) the hyperarid province with a cool winter (mean temperature of the coldest months is 0° - 10° C) and a hot summer. It includes the mountainous massif of Southern Sinai. Rainfall is less than 30 mm/yr, occasional and unpredictable;

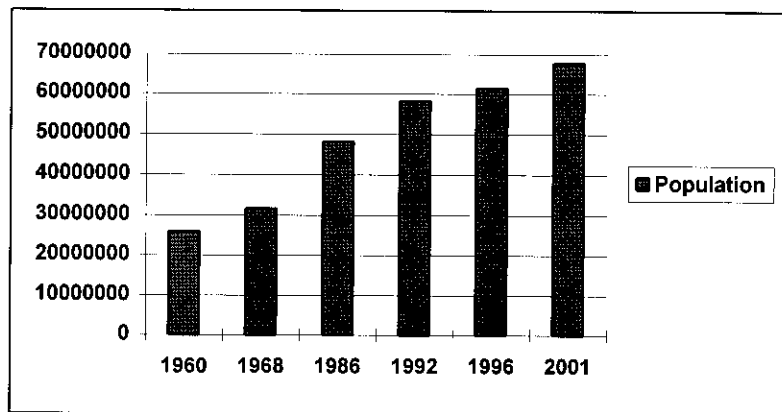
(iii) the coastal belt falling under the maritime influence of the Mediterranean Sea. It extends between Rafah and Sallum where the annual rainfall is more than 100 mm (250 mm at Rafah and 150 mm at Alexandria) and the dry period is relatively short (attenuated); and

(iv) the sub-coastal belt where annual rainfall ranges between 30-100 mm coupled with a mild winter and a hot summer; the dry period is relatively long (accentuated).

DEMOGRAPHY

Egypt comprises a principal riverine oasis associated with the Nile Valley and the Delta. The inhabited area, which includes irrigated farmlands, is about 4% of the total area of Egypt: almost 99% of the population dwell in an area of only 42000 km², where the population density is 1170/km². The rest of the country (deserts) is thinly populated. Furthermore, the population increases at remarkably high rates as can be seen in the following statistics:

Year	Population
1960	25,984,000
1968	31,693,000
(census) 1986	48,254,000
1992	58,194,000
(census) 1996	61,452,000
(expected) 2001	67,922,000



In the rainy eras (the last of which was between 5000 and 2500 BC) human settlements were spread across the area between the Red Sea and the Libyan borders. But when the climate became arid settlements moved towards the sources of water in the Nile Valley and oases and along the northern coast. Nowadays, the distribution of the population is also highly uneven. Egypt is divided into 26 Governorates, of which 21 are in the Nile Valley, the Delta and the adjoining territories, while the remaining 5 are in the desert (1 in the Eastern Desert and 2 in each of the Western Desert and Sinai). In the former group (only 4% of the area of Egypt) live 47690000 persons, while in 5 desert governorates (96% of Egypt) live only 564000 persons (1986 figures). Human impact on the environment and its limited natural resources extends over thousands of years, at present the problems of encroachment of urban settlements on farmland and desertification are looming very large. The main consequences of such problems are the continual loss of agricultural areas and the decrease of these areas per person of the population.

RENEWABLE NATURAL RESOURCES

The renewable resources of farmlands and water (agriculture) are limited. Agricultural land is c. 7 million feddans (acres) and freshwater resources are about 60 billion m³. With the increase of the population, farmland per person decreased from 0.22 feddans (924 m²) in 1960 to about 0.12 feddans (504 m²) in 1984, and the freshwater annual share dropped from 2000 m³ to 1200 m³ per person during the same period. This underlines the special significance of measures to conserve and sustainably use these limited natural resources. For irrigated agriculture the farming system tends to reclaim new land. The 1990-2000 development plans aspire to reclaim 100-150 thousand feddans of new land every year. These ambitious plans of land reclamation will depend on re-use of water and the change from traditional irrigation by flooding to sprinkle and drip irrigation, especially in the newly reclaimed lands. The two major projects of El-Salam Canal in Sinai and Toshki Canal in the Western Desert aim at adding 600000 and 500000 feddans respectively to agricultural lands.

Limited rain-fed agriculture prevails in the Mediterranean coastal belt where the annual rainfall is 150-200 mm. In years of relatively high rainfall barley and wheat are cultivated in flat areas, while olive and fig trees are grown in runoff-collecting sites. In the subcoastal arid belt (rainfall 100 mm/yr), natural vegetation provides grazing sites for livestock (mainly sheep and goats).

Fisheries prevail along the coasts of the Mediterranean and the Red Sea, the northern lakes, the inland lakes (Qaroun, Wadi Rayyan, Nasser), and the River Nile and its associated irrigation networks. Aquaculture and mariculture are on the increase and use both local and introduced species of fish.

Wild animals (gazelles and antelopes), and resident and migratory game birds are under pressures of excessive hunting. This is one of the major causes of deterioration and sometimes complete loss of wildlife.

Natural vegetation, though often thin and widely dispersed, provides the desert inhabitants with resources of considerable importance: fuel for their consumption and charcoal and medicinal herbs as cash crops. Excessive collection is a cause of deterioration of the vegetation and the loss of species.

During the last 2 centuries, Egypt has introduced a number of crop plants (including cotton) which now form the backbone of agriculture. These imports brought with them a number of exotic weeds which became naturalized as well as a number of other pests. Almost all the trees and shrubs grown in city streets, country roads and in public and private gardens are introduced. The last three decades have also witnessed the introduction of numerous cultivars of fruit and vegetable crops and animal races including fish and chicken. Production of these new introductions has been increasing steadily, with negative implications for the neglected local breeds, some of which have been badly degraded while others have disappeared.

NON-RENEWABLE NATURAL RESOURCES

The groundwater resources of the deserts of Egypt are mostly fossil water stored since the rainy periods and are used in irrigating arable lands of the oases of the Western Desert and to a limited extent in Sinai. Development of Nubia Sandstone aquifers in southern parts of the Western Desert includes: the East Oweinat programme and the Darb El-Arbaeen (extension of the Toshki irrigation scheme) programme.

Prospecting and exploitation of oil resources in Egypt date back to the beginnings of the 20th century. Extensive Egyptian and international efforts are being made to explore and develop additional oil resources in all parts of the country. Large reserves of natural gas have already been found (in the Delta and the Gulf of Suez) and are being developed. Coal deposits are recorded in a few sites in Sinai, of which the one at El-Maghara is being developed.

Mineral deposits including gold, copper, gemstones and others were known and exploited in ancient Egypt together with building stones of various kinds. Other mineral sources recorded in Egypt include tin, tungsten, lead, zinc, nickel, chrome, iron, titanium, talc, barite, asbestos, magnesium, graphite, phosphate, marble, alabaster and other building material.

B. CONSERVATION OF NATURAL RESOURCES

Egypt has been among the pioneer countries to take an active interest in the conservation of biodiversity and the preservation of natural resources and heritage. In 1936, Egypt became party to the "Convention Relative to the Preservation of Fauna and Flora in their Natural State", London 1933. This was later followed by signing and ratifying conventions and agreements pertaining to the various aspects of biodiversity conservation, such as "The Agreement for the Establishment of a General Fisheries Council for the Mediterranean Sea" in February 1952, "The Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Near East" in 1972, and "The African Convention on the Conservation of Nature and Natural Resources" in 1969, "The International Convention on the Protection of Cultural and Natural Heritage" (Paris, 1972), "The Convention on Trading in Endangered Species of Wild Animals" (Washington, 1975), "The Convention on Conservation of Migratory Animals" (Bonn, 1979), and "The Convention on Wetlands of International Importance Especially as Waterfowl Habitat" (also known as the Ramsar Convention, in 1986).

Furthermore, Egypt welcomed the World Conservation Strategy formulated jointly by IUCN, WWF and UNEP in 1980. The National Committee of IUCN in collaboration with the Academy of Scientific Research and Technology put forward a "Draft National Strategy for the Conservation of

Natural Heritage in Egypt". However, implementation of this draft strategy has not been possible for various political and socio-economic reasons.

In the field of environmental legislation, Egypt has introduced a number of laws concerning the conservation of plant and animal life. The Ministry of Agriculture was empowered to put these laws into effect and to follow up their implementation. To achieve this objective, the Ministry of Agriculture set up the Egyptian Wildlife Service (an authority for the protection of nature).

In 1983, Law 102 was enacted and it set up the legal framework for the declaration and management of protected areas. To secure a suitable source of funding for the protected areas, Law 101 for 1985 was enacted; it levies an additional tax on aeroplane tickets issued locally, income to finance programmes for developing tourism and environmental protection. This was later followed by Law 4 for 1994 in which article 28 regulates the hunting of wild animals and prohibits the destruction of their natural habitats; article 84 of this law sets forth the penal code for illegal hunting. In 1989 the NBU has completed a detailed and comprehensive study on the control of hunting practices.

In 1992, Egypt signed the Biodiversity Convention. Ratification of this Convention has been completed in 1994. In article 6, this Convention required the parties to formulate national strategies setting framework for the conservation of biodiversity. A national strategy for biodiversity conservation should define the goals, the guiding principles and the national plan of action. The policy-making body entrusted with the task of biodiversity conservation is the Egyptian Environmental Affairs Agency (EEAA). Formulation of the national strategy should be a democratic process. Therefore, the EEAA has invited a number of governmental scientific establishments as well as interested NGO's to participate in this process so that the outcome would be collaborative and agreed upon. In this way each sector of the society should adopt the national strategy and take part in its implementation.

In order to achieve this wide participation, scientists, representatives of local administration and NGO's have been invited to 15 one-day sessions of extensive discussion hosted by Egyptian universities in different parts of the country.

For the national strategy to be comprehensive and applicable, it should cover the following components:

- * Species diversity, covering all hierarchical taxonomic levels of plants, animals and micro-organisms,**
- * Habitat diversity, and**
- * Genetic diversity in species of plants, animals and micro-organisms.**

As regards the habitat diversity, conservation programmes concentrate on the selection of habitats with relatively high richness in biodiversity, those harbouring species of plants and animals with special interest (endemics, rare, endangered or extinct), or those with natural formations (geological or geomorphological) with special scientific, cultural or aesthetic value. Ecosystems subject to severe and irreversible modification as a result of development programmes and exploitation of resources also feature high on the list of habitat types eligible for conservation.

In programmes of conservation of species diversity, priority is given to endemics and near endemics as well as to:

- * rare and endangered species,
- * species with critical taxonomic or evolutionary significance,
- * the close relatives of domesticated plants and animals and those with high industrial value (e.g. medicinal plants),
- * sources of special products.

Conservation programmes also give priority to species with a wide range of morphological and/or physiological plasticity (i.e. a relatively large number of biotypes), and to species with a wide range of ecological plasticity (i.e. a relatively large number of ecotypes), as well as those with other features which might suggest the presence of special genes or genomes in them. This also includes the conservation of cultivars and races which had a significant role to play in agriculture and animal production and still store a useful genetic make-up but have been replaced by other varieties and races in the wake of the green revolution. Conservation of such cultivars and races is the work of the gene bank. In this connection, special mention should be made of the multitude of cultivars and races of some crops (e.g. cotton, wheat, rice, dates, etc.) and farm animals (cattle, chicken, goats and sheep).

C. THE PRESENT SITUATION

Article 8 of the Biodiversity Convention urges the contracting parties to establish and manage their own systems of protected areas mainly for: (i) the conservation and sustainable use of biodiversity and ecosystems, (ii) the promotion of environmentally sound and sustainable development in the areas adjacent to protected areas, (iii) the maintenance of viable populations of species in their natural surroundings, (iv) the rehabilitation and restoration of degraded ecosystems and the recovery of threatened species, and (v) the management of the risks associated with the use and release of living modified organisms resulting from biotechnology with possible adverse impact on the environment.

Law 102 of 1983 empowered the Prime Minister to designate certain areas to be declared as protectorates. A Prime Minister's decree defines the limits of each protected area and sets the basic principles for its management and for the preservation of its resources. Between 1983 and 1997, 18 areas have been set aside as protectorates (see Map 1). These will be dealt with in some detail in the following section, but suffice it here to mention that 7.5% of the total area of Egypt is now under protection and it is intended that this ratio will be doubled by 2017.

The NBU has been actively engaged in commissioning national experts to write up comprehensive treatises on habitat types as well as on Egyptian representatives of taxonomic groups. The result has so far been quite rewarding. It produced several important and much-needed publications on: (i) ecosystems as seen from a geographical perspective (entitled "Habitat Diversity"), (ii) a Guide to the Mammals of Natural Protectorates in Egypt, (iii) the Reptiles of Egypt, including a brief account of all studies carried out until 1995, (iv) The Natural Protectorates of Egypt, (v) The Marine Algae of Alexandria, and (vi) A Checklist of the Flora of Egypt, (vii) Fungal Biota in Egypt, (viii) Birds Known to Occur in Egypt, and (ix) Freshwater Fishes of Egypt. Similarly inventories with particular emphasis on detailed description, local and global distribution, ecology and economic value of nematodes and acari are being prepared for publication. More efforts are being made towards:

- * The publication of similar volumes on other groups for which no surveys have as yet been written (see Table 1).

- * The accumulation of information on a number of taxonomic groups, to be published during 1997.

- * The synthesis of a wealth of information on the ecosystems in the northern lakes (Bardaweel, Manzala, Burullus, Idku and Mariut), and Lake Nasser; these are currently being prepared for publication.

- * As part of a major programme of biodiversity data management, the NBU has established a biodiversity data base incorporating available information about representatives of the various taxonomic groups in the country. It can be easily expanded and updated. This data base is the nucleus of a national network connecting scientific establishments and referral collections (e.g. herbaria, botanic gardens, zoos) in universities, research centers and scientific societies (e.g. the Entomological Society of Egypt). It is also intended to render the data base available globally through the INTERNET.

- * The NBU prepared four preliminary feasibility studies concerning the establishment and management of: (i) the group of 18 protected areas, (ii) a center for the captive breeding of rare and endangered species of plants and animals, (iii) a gene bank for the preservation of genetic resources, and (iv) a natural history museum housing the major referral collections.

Table 1. Summary of species diversity in Egypt.

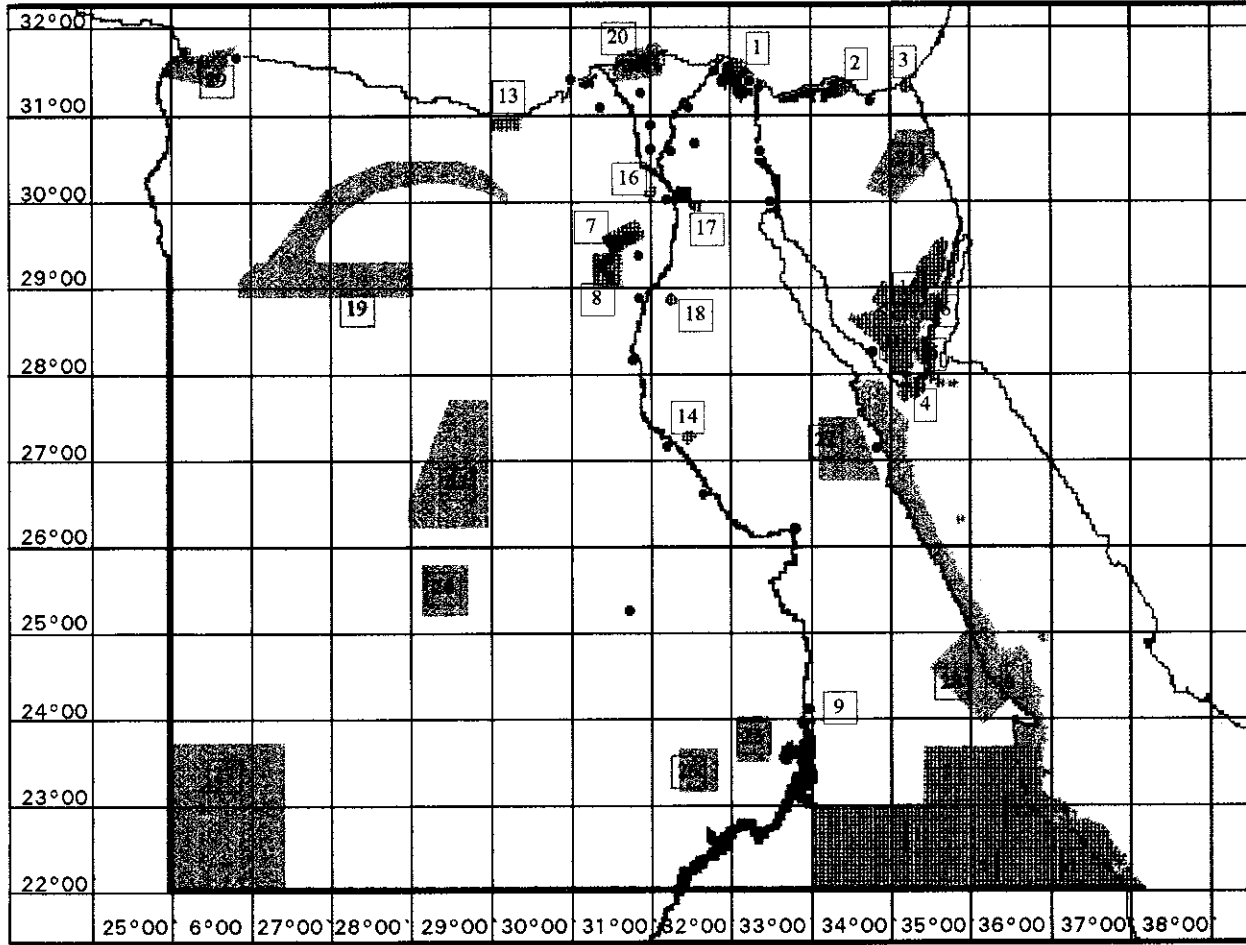
R= rare; End.=endemic; Ex.= extinct; ?= the group has not yet been studies.

Kingdom	group	English name	No. of Species		Status			
			in Egypt	Global	R	End	Ex	
VIRUS	--	viruses	44	1000	-	-	-	
MONERA:	Bacteria	bacteria	97	3000	-	-	-	
	Myxoplasma	bacteria	60	141	-	-	-	
	Cyanobacteria	blue-green algae	162	1700	-	-	32	
FUNGI:	Zygomycota	zygomycetes	68	665	-	-	-	
	Ascomycota	cup fungi	219	10650	-	-	-	
	Basidiomycota	basidiomycetes	189	16000	-	-	-	
	Oomycota	water molds	92	580	-	-	-	
	Chytridiomycota	chytrids	59	575	-	-	-	
	Acrasiomycota	cellular slime molds	?	13	-	-	-	
	Myxomycota	plasmodial slime molds	?	500	-	-	-	
	Lichen	Lichen forming fungi	?	18000	-	-	-	
	ALGAE:	Chlorophyta	green algae	415	7000	-	-	31
		Euglenophyta	euglenoids	39	800	-	-	4
Pyrrhophyta		dinoflagellates, etc.	295	1100	-	-	1	
Chrysophyta		diatoms, etc.	544	12500	-	-	3	
Phaeophyta		brown algae	48	1500	-	-	-	
Rhodophyta		red algae	142	4000	-	-	1	
PLANTS:	Bryophyta	mosses, liverworts, etc	337	16600	-	-	-	
	Psilophyta	psilopsids	0	9	-	-	-	
	Lycopodiophyta	lycopsids	0	1275	-	-	-	
	Equisetophyta	horse-tails	1	15	1	-	-	
	Filicophyta	ferns	16	10000	15	-	-	
	Gymnospermae	conifers, etc.	6	529	6	3	-	
	Dicotyledoneae	dicots	1636	170000	-	86	8	
	Monocotyledoneae	monocots	430	50000	-	11	-	
	ANIMALIA:	Protozoa	protozoa	371	30800	-	-	-
		Porifera	sponges	73	5000	1	-	-
Cnidaria		jellyfish, corals	389	9000	76	-	-	
Ctenophora		comb jellies	?	-	-	-	-	
Platyhelminthae		flat worms	?	12200	-	-	-	
Nematoda		round worms	?	12000	-	-	-	
Annelida		earthworms	167	12000	17	-	-	
Mollusca		molluscs	552	50000	-	-	-	
Echinodermata		echinoderms	255	6100	97	-	-	
Arthropoda:		arthropods	-	-	-	-	-	
		Insecta	insects	10000+	751000	-	-	-
		Arachnida	scorpions, spiders, etc.	1528	60000	-	-	-
		Crustacea	crustaceans	379	9300	-	-	-
		Chordata:	chordates	-	-	-	-	-
Tunicata		tunicates	115	1250	-	-	-	
		Cephalochordata	acorn worms	?	23	-	-	-
Vertebrata:		vertebrates	-	-	-	-	-	
		Agnatha	jawless fish	1	63	-	-	-
		Chondrichthyes	cartilaginous fish	95	843	35	-	15
		Osteichthyes	bony fish	659	18150	35	-	1
	Amphibia	amphibians	7	4184	-	-	-	
	Reptilia	reptiles	91	6300	-	-	-	
	Aves	birds	515	9040	113	17	12	
	Mammalia	mammals	132	4000	28	10	5	

جدول ١. موجز لأعداد أنواع الكائنات الحية في مصر والأعداد التقديرية لأنواع الكائنات الحية في العالم وكذلك

أعداد الأنواع المنقرضة (Ex) والمتوطنة (End) والنادرة (R) في مصر.

EXISTING AND PROPOSED NATURAL PROTECTORATES IN EGYPT



- | | |
|------------------------------------|----------------------------------|
| 1) ASHTOOM EL-GAMEEL PROTECTORATE | ١) أشطوم الجميل |
| 2) ZARANEEK PROTECTORATE | ٢) محمية الزرائق |
| 3) SABKHAT AL-AHRASH PROTECTORATE | ٣) محمية الأعراش |
| 4) RAS MOHAMED NATIONAL PARK | ٤) محمية رأس محمد |
| 5) NABQ PROTECTORATE | ٥) محمية نبق |
| 6) ABU GALUM PROTECTORATE | ٦) محمية ابوجانوم |
| 7) LAKE QARUN PROTECTORATE | ٧) محمية قارون |
| 8) WADI ELRAYAN PROTECTORATE | ٨) محمية وادي الريان |
| 9) SALUGA AND GHAZAL PROTECTORATE | ٩) محمية سانوجا وغزال |
| 10) ST. KATHERINE PROTECTORATE | ١٠) محمية سانت كاترين |
| 11) WADI ALLAQI BIOSPHERE RESERVE | ١١) محمية وادي العلقى |
| 12) ELBA PROTECTORATES | ١٢) محميات علبنة |
| a-Red Sea Islands (22 Island) | أ- جزائر البحر الأحمر (٢٢ جزيرة) |
| b-Al-Ahraq Protectorate | ب- محمية الأرق |
| c-Al-Danieb Protectorate | ج- محمية الدنيب |
| d-Elba Protectorate | د- محمية جبل علبنة |
| 13) OMAYED BIOSPHERE RESERVE | ١٣) محمية العميد |
| 14) WADI EL-ASSUTI PROTECTORATE | ١٤) محمية وادي الأسوطي |
| 15) TABA PROTECTORATE | ١٥) محمية طابا |
| 16) HASSANA DOME NATIONAL MONUMENT | ١٦) محمية قبة الحسنة |
| 17) EL MAADI PETRIFIED FOREST | ١٧) محمية الغابة المتحجرة |
| 18) WADI SANNOUR CAVE | ١٨) كهف وادي سنور |

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|---------------------------------|------------------------|---------------------------------|-----------------------|
| 26) DONKOL PROTECTORATE | ٢٦) محمية دنقل | 19) AL-MAGHARA PROTECTORATE | ١٩) محمية المغرة |
| 27) ALGALF ALKABIR PROTECTORATE | ٢٧) محمية الجلف الكبير | 20) BOROLLOS PROTECTORATE | ٢٠) محمية بورس |
| 28) HAMATA PROTECTORATE | ٢٨) محمية حماطة | 21) AL KOSAIEMA PROTECTORATE | ٢١) محمية القسيمة |
| 29) SALOUM PROTECTORATE | ٢٩) محمية السلوم | 22) SHAIEB ALBANAT PROTECTORATE | ٢٢) محمية شايب البنات |
| | | 23) AL-FARAFRA PROTECTORATE | ٢٣) محمية الفرافرة |
| | | 24) AL-DAKHILA PROTECTORATE | ٢٤) محمية الداخلة |
| | | 25) KARKAR PROTECTORATE | ٢٥) محمية كركر |

EXISTING PROTECTORATE		محميات معلنة
PROPOSED PROTECTORATE		محميات مقترحة

The surveys carried out by the NBU have shown that there are almost complete referral collections with numerous type specimens for some taxonomic groups of plants and animals (such as the spermatophyta, insects and birds). Other groups, for which referral collections are not complete, have been covered by detailed and critical literature search sufficient for the compilation of provisional checklists; these groups include the viruses, bacteria, fungi, marine algae and algae of the River Nile and inland lakes. A third group of major taxa (e.g. the lichens, nematoda, flat worms) are in urgent need of taxonomic surveys; see the summary of species diversity in Table 1.

Available referral collections (of plants, insects and other groups) are not connected through a network of data bases which should guarantee some degree of co-ordination between them. Referral collections are needed for other major taxa. This highlights the need to set up some form of institution whose task would be to build the required collections, to bridge the gaps in others, the co-ordination between respective collections, and the scientific documentation of biodiversity in Egypt.

Threats to biodiversity in Egypt are either directly or indirectly related to human impacts. The former include excessive hunting and cutting, whereas the latter involve habitat destruction for developmental purposes and all types of pollution with refuse from industry and human settlements. Excessive hunting is endangering the very existence of several species of resident and migratory birds and a number of hoofed animals (e.g. gazelles, antelopes). Pollutants in air, water and soil (especially in rural areas) are threatening a large number of plants and animals and have an effective impact on the environmental equilibrium. This is leading directly to the loss of some useful elements of biodiversity and a substantial increase in other harmful exotic ones, such as some species of rats, birds, the red spider and the American cotton worm.

It is noticeable that the occurrence of many plant and animal species in Egypt is on the very edge of their geographical or ecological range of distribution. Under these conditions, such species have limited tolerance for ecological pressures. Perhaps the best example of such precarious existence is the case of corals in the Red Sea, the Gulf of Suez and the Gulf of Aqaba, where these localities represent the northernmost latitudinal limit of their distribution in the world. Any environmental changes in such a fragile ecosystem are bound to initiate a series of negative and destructive impacts on these corals. On the other hand, global warmth would extend their distribution further northward. Distribution of mangroves is comparable.

Some animal and plant species represent relicts of a once flourishing growth in ancient periods when the environment was less severe. As conditions became decidedly arid, limited populations numbers of these species remained in the natural refugial sites. For example, small populations of gymnospermous trees of *Juniperus phoenicea* still exist in a few hilly sites in N. Sinai (e.g. Gebel El-Maghara, Yelleg, Labni and El-Halal). Similarly, a few individual

chitas can be found in the Qattara Depression of the Western Desert, but they are on the brink of extinction.

Another form of threat to biodiversity in Egypt is the intentional and non-intentional introduction of exotic species. A famous example is the detrimental effect of the introduction of the water hyacinth (*Eichhornia crassipes*) on life in the River Nile and the networks of irrigation and drainage canals throughout the country. A more recent example is the introduction of the water fern *Azolla filiculoides* to be used as a biological fertilizer in rice fields but it inadvertently has escaped into water courses where it seems to be wiping out a number of other native hydrophytes (e.g. *Lemna* spp. and *Spirodela* spp.). Similarly, an exotic species of freshwater crabs was introduced in aquaculture basins but it found its way into major water channels where it became a serious pest to commercial fish and to biodiversity in general.

Since the thirties, Egypt has adopted a major programme of industrialization which accelerated enormously in the second half of this century. Unfortunately, environmental considerations have not been among the criteria for the determination of the type of industries nor in the choice of locations of industrial centers. Some of these centers were established in the midst of human settlements and in the Nile Valley and the Delta where they became major sources of pollution for land and its associated network of irrigation and drainage canals. Egypt has also initiated the green revolution and adopted a policy of intensive agriculture. This entailed the widespread use of agricultural chemicals in the form of pesticides and fertilizers with residues that seeped into rural environment in general and into the irrigation and drainage canals in particular. The immense population explosion in the second half of the twentieth century necessitated the large expansion in housing sites both in rural and urban places. This inevitably led to a severe shortage in sewage systems which, in turn, became an additional source of pollution, especially in the agricultural irrigation and drainage systems.

All these sources of pollution have led to detrimental impacts on habitats and to major changes in the biodiversity of terrestrial, atmospheric and water environments.

On the other hand, major efforts have been made in the last two decades to improve the infrastructure throughout the country. New networks of irrigation and drainage as well as stations for refuse treatment have been built. These are beginning to show a positive effect in improving the environment. However, pollution remains a serious source of threat to the environment.

Development programmes in Egypt include the expansion of tourism, with special emphasis on ecological tourism (i.e. where the tourist is attracted to sites with special ecological features especially along the warm coasts of the Red Sea, the Gulf of Suez and the Gulf of Aqaba). In this context, nature conservation is a basis for development. However, this important consideration needs to be strongly impressed upon development planners and investors in

touristic projects. They should be made aware that conservation of corals and mangroves, with the associated multitude of organisms, coastal zone protection and the preservation of unique geological and geomorphological formations are essential to sustainable development of tourism.

There is a recent trend towards the development of desert tourism. A number of hotels are beginning to emerge in Egyptian oases, and a number of companies have been established to promote and organize this new type of desert safari. Here, the touristic attraction is ecological as it is directly related to the desert climate and landscape. Environmental conservation in these natural, and as yet undisturbed habitats, is a necessity for the successful development of these safaris. The same can be said about Lake Nasser.

D. THE NATURAL PROTECTORATES

The 18 natural protectorates declared so far in Egypt cover three main environmental categories: the wetlands, the deserts and the special geological formations (see Map 1). Each of these categories embrace a variety of habitat types. There follows a brief account of the individual protectorates of each category.

I. Wetland Protectorates (Marine, Lakes & Riverine)

1) Ashtoom El Gameel (Lake Manzala)

It was declared a protectorate by Prime Minister's decree no. 459 of 1988. It occupies the northeastern corner of Lake Manzala close to Port Said, and covers an area of about 35 km², extending southwards for 3 km into the Lake (thus including Tennees Island) and westwards for ca 7 km along the Mediterranean shore. A narrow sand bar separates this part of the Lake from the Sea. Lake Manzala is one of the important fisheries in Egypt as it contributes 50-60% of the total catch of the northern lakes. Human settlements are attracted to the area around Lake Manzala for fishing and hunting. This protectorate is regarded as an internationally important wetland owing to the fact that large numbers of birds winter in it.

2) Zaraneek and the Bardaweel Lake

The Bardaweel is a shallow water body in the northern coastal part of Sinai Peninsula. It extends between 31° 3' and 31° 14' N, 32° 40' and 33° 30' E and covers an area of 595 km². A narrow sand bar separates the shallow lake from the Mediterranean, with a number of openings joining them. One of these openings is found in the extreme eastern section of the lake at Zaraneek. This protectorate is an internationally important site for resident and migratory birds and has recently been recognized as a Ramsar site. It is also among the

important locations for fishing and quail hunting, which attract tourism and traditional bedouin settlements.

3) Sabkhat Al-Ahrash Protectorate

It has been declared a protected area by the Prime Minister's decree no. 1429 of 1985 and covers an area of about 4 km². It occupies part of the sand dune system between El-Arish and Rafah cities in Northern Sinai, close to the Mediterranean shore and falls under its climatic influence. It has a dense growth of planted *Acacia* trees as well as numerous shrubs and herbs, thus serving as an important source of firewood and as rangeland for herds of the local Bedouins. The vegetation of this area is also useful in sand dune fixation, thus helping to stop sand encroachment.

4) Ras Mohammed National Park

It was declared a protectorate by the Prime Minister's decree no. 1068 of 1983 and occupies the southern tip of the Sinai Peninsula together with the two small islands (Tiran and Senafir) of the Tiran Straits at the southern end of the Gulf of Aqaba. The total area of this national park is about 750 km². Technical and financial assistance towards the development of this national park is generously provided by the European Community in 3 stages of 3 years each: the first started in 1989, the second in 1992, and the third in 1997. The management plan for this protectorate includes the completion of the infra-structure and a training programme for rangers and scientific staff. The Ras Mohammed National Park is remarkably rich in biodiversity as has been shown by the numerous baseline studies of its fauna and flora. Apart from rich coral growth, plant life ranges from meadows of seaweed (numerous *Sargassum*, *Turbinaria*, *Ulva* spp.), sea grasses (*Halodule uninervis*, *Halophila ovalis*, *Halophila stipulacea*, etc.) and a wide variety of halophytes inhabiting the coastal hypersaline mudflats and mangroves (*Avicennia marina*) to vast acreages of rangelands, wadi beds with plenty of silted catchment areas supporting large *Acacia raddiana* trees and various herbaceous species, and mountain slopes covered with small characteristic herbs of magnificent colours and aroma.

Ras Mohammed National Park is the first reserve to have its infrastructures completed (visitors centre, tracks and passes, field laboratories, staff accommodation, etc.). Rangers and staff are trained and carry their functions effectively. Management scheme is implemented, it is already receiving revenue that can sustain its operation.

5) Nabq (Multiple Use Management Area)

It was declared a protected area by the Prime Minister's decree no. 1511 of 1992 and covers an area of about 600 km² of the southeastern part of the Sinai Peninsula. Like the preceding protectorate, this area incorporates a variety of ecosystems ranging from the marine to the mountainous and harbours rich populations of corals, other marine animals and sea grasses. It provides food and

shelter for numerous resident and migratory birds (e.g. the osprey). The shores at Nabq provide the northernmost limit of the mangrove trees in the Red Sea region. The wadis (valleys) of this protectorate are home for numerous mammals including rodents, gazelles, ibex and hyenas, together with some reptiles.

6) Abu Galum (Multiple Use Management Area)

This is undoubtedly one of the most picturesque parts of Egypt, where the high hills of southern Sinai steep at several points directly into the waters of the Gulf of Aqaba. It was declared a protected area by the Prime Minister's decree no. 1511 of 1992. The total area of this protectorate is about 500 km², including several mountains traversed by an intricate network of deep wadis, freshwater springs and coastal sand dunes. Diving, fishing and safari tours are the main attractions of this protectorate. Biologically, this protectorate has a rich and unique fauna and flora. The arak (*Salvadora persica*) community occupying most of the vast alluvial fan of wadi Kid is the largest of its kind in the country.

7) Lake Qaroun Protectorate

Declared a protected area by the Prime Minister's decree no. 943 of 1989. It covers an area of 250 km², the water level is 34-43m below sea level. The Lake is nearly 40 km long, with a maximum width of 5.7 km and an average depth of 4.2m. It receives the agricultural drainage of Faiyum Governorate, and some ground water from a few natural springs in its bottom. Excess water runs further south of the Lake to the Wadi El-Rayyan Depression. Lake Qaroun is regarded as an internationally important wetland because numerous birds winter in it.

8) Wadi El-Rayyan Protectorate

Declared a protected area by Prime Minister's decree no. 943 of 1989. The area is a natural depression in the Western Desert, ca 18 km to the southwest of Lake Qaroun. It covers an area of 710 km² and includes 2 artificial lakes formed by the drainage water flowing from Lake Qaroun as well as agricultural drainage from the nearby farmlands of Faiyum Governorate. The protectorate has several interesting geological formations and a number of relicts from the Graeco-Roman period. The wadi also includes a number of natural springs which support a rich vegetation, more than 100 species of birds, 16 species of reptiles, 16 species of mammals (including the red fox, the fennec fox, the slender-horned gazelle), as well as a number of fish species.

This area is also the proposed site for the Captive Breeding Centre of the present plan of action. A study is being carried out, with the financial and technical assistance of Italy, with the purpose of: (1) development of a management scheme for the reserve area, and (2) setting a design and an operation scheme for a Captive Breeding Centre.

9) The Saluga and Ghazal Protectorate

Prime Minister's decree no. 928 of 1986 declared these two islands, as well as all the small islands between them, in the River Nile, a protected area. These granitic islands are located 3 km north of Aswan Dam. They harbour a unique flora and are regarded as a great reservoir of rare genetic diversity, hence their special biological significance. It is proposed that the protectorate be expanded westwards into the Western Desert and to include some arid and semi-arid habitat types as well.

This protectorate is a research site for the Aswan Faculty of Science, and is extensively visited by the Aswan schools (some 3000 visitors / year) and thus provides field site for natural history studies.

II . Desert Protectorates (Highlands, Valleys & Plains)

10) St. Katherine Protectorate

It was declared a protectorate by the Prime Minister's decree no. 613 of 1988. It is one of the large reserves in the country, occupying an area of 5750 km² in the central parts of the mountainous massif of southern Sinai. The St. Katherine summit (2641m) is the highest in the country, and most other summits (including Moses mountain, with its well-known religious significance) are higher than 2000m. The protectorate includes St. Katherine City and the St. Katherine Monastery which attracts a great deal of religious tourism to the area. The climate is ageeably moderate and fresh water is adequate for irrigating the monastery garden and plantations. From the biological point of view, the area is characterized by a remarkably high concentration of endemic species of plants and animals, as well as a wealth of medicinal and poisonous plants. It represents in biogeographic terms the most western outpost of the Irano-Turanian biota.

A scheme is being implemented, with the technical and financial assistance of the European Union, that will provide a management scheme for this complex park, and will initiate implementation of the scheme.

11) Wadi Allaqi Biosphere Reserve

This is a dry river system traversing the southern part of the Eastern Desert of Egypt and joining the Nile valley at a point some 180 km to the south of Aswan. The protectorate covers an area of ca 30,000 km².

After the construction of the High Dam at Aswan in 1964, the water level was raised south of the Dam and formed Lake Nasser and water entered into the downstream part of Wadi Allaqi for a distance of about 80 km. When the water level in Lake Nasser subsided in subsequent years, the water retreated some 40

km downstream Wadi Allaqi, leaving behind an area covered with an appreciable layer of riverine silt suitable for the dense growth of *Tamarix*.

Wadi Allaqi has been the site of extensive research programmes in fields of ecology, sociology, economics of natural resources, etc. under the leadership of the Aswan Faculty of Science. Field stations, experimental farms, research facilities, etc. are available. Research scholars from UK, USA, Canada, The Netherlands, France, Germany, etc. participate in these research programmes.

Mineral deposits in the protectorate include gold and several types of gem stone. In 1993, this protectorate was declared by UNESCO a biosphere reserve.

12) The Elba Protectorate

This is by far the largest reserve in Egypt, covering an area of 35,600 km² and including 4 distinct types of ecosystem: the mangrove forests of the Red Sea coast and its numerous islands, the Doaib region, the Gebel Elba region and the Abraq region. The Gebel Elba region has large mangrove communities along the Red Sea coast which are the most important breeding sites for marine birds. The region is also home for many species of wild animals including the mountain goat, the wild ass, numerous gazelles, hares, sand foxes and the hyrax. The avifauna of this region is also well diversified. It includes many falcons, eagles, vultures, crows, sea gulls and herons. The mountains of Elba represent formation of 'mist oasis' in Egypt. Plant diversity in Elba is also remarkable; records include 396 species of flowering plants and ferns and the vegetation is particularly lush after incidents of rainfall.

This large and extensively diverse area awaits: a management scheme to be set and endorsed, and establishment of field facilities with qualified personnel. These are basic requirement for the operation of this protectorate.

13) The Omayed Biosphere Reserve

This protectorate was declared by Prime Minister's decree no. 3216 of 1996; it covers an area of about 700 km² and is located some 83 km to the west of Alexandria (or 200 km east of Matrouh) and nearly 15 km south of the Mediterranean shore. It incorporates a variety of habitat types, animal and plant communities, traditional bedouin settlements, and patterns of land use. It started as a field research site of the University of Alexandria in 1973; in 1981 it was declared a biosphere reserve by UNESCO. It has been the field site of one of the IBP desert biome (1973 - 1976), and site for ecosystem studies till now.

14) Wadi El-Assyuti Protectorate

This relatively small protectorate covers an area of only 24 km² on the western banks of the River Nile at Assyut in Upper Egypt. It was recently declared by Prime Minister's decree no 710 of 1997.

15) The Taba Protectorate

It was declared a protected area by a Prime Minister's decree in 1997. It occupies a stretch of desert to the southwest of the township of Taba on the eastern borders of Egypt.

The area embraces geological and geomorphological features of scientific interest and spectacular landscape: caves, an intricate network of wadies and rocky plateaus, mini-oases and archeological sites. But this desert area presents rich biodiversity : 25 mammal species; 50 species of birds, mostly rare; 24 species of reptiles together with a rich diversity of plants. All this rich biota is threatened by over-exploitation.

This protectorate completes the network of nature reserves in the Sinai Peninsula as they now represent the main habitat types and areas that need to be protected for their natural and cultural attributes.

III . Geological Protectorates

16) The Hassana Dome

This dome was declared a protected area by Prime Minister's decree no. 946 of 1989. It is a peculiar geological formation covering an area of 1 km² on the Cairo-Alexandria highway. It is part of a larger formation known as the Abu Rawash formation which dates back to the Cretaceous. The Abu Rawash formation in turn falls on the line joining similar domes of Al-Maghara mountain in Northern Sinai with those of Bahariya Oasis in the Western Desert. These formations are very useful in geological teaching and research.

17) The Petrified Forest at Maadi

This protectorate was declared by Prime Minister's decree no. 944 of 1989. It is situated at 18 km east of Maadi (a suburb to the south of Cairo). It is a flat expanse of gravel and sand covered with innumerable pieces of silicified tree trunks and stumps, some of which are almost intact with clearly visible annual rings. The whole formation belongs to the Oligocene (32-35 million years). These fossils are interesting records of ancient life in the area.

18) The Cave of Wadi Sannour

It was declared a protectorate by Prime Minister's decree no. 1204 of 1997. This cave is found in the Western Desert about 70 km southwest of Beni Suef city. It is 700m long and 15 m wide with numerous stalactites and stalagmites which formed in the Middle Eocene (ca. 60 million year) as a result of seepage of saturated solutions of calcium carbonate through the cave's roof. This protectorate derives its significance from the rarity of such formations in Egypt. It could be a major tourist attraction, and sheds light on the paleoclimate of the region.

All these three protectorates await for management scheme to be set, field facilities to be completed and qualified personnel to be available.

PART II

GOALS AND GUIDING PRINCIPLES

A. PRINCIPAL GOALS

The goal of a national strategy for conservation of biodiversity is to set the bases of the rational use and sustainable development of the national natural 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. This will require harmonization and maximum co-ordination between conservation measures and the national plans for development in the various sectors of the economy (agriculture, industry, tourism, housing, etc.).

Natural resources comprise: (1) Ecosystems that produce human needs (farmlands, pasturelands, fisheries and woodlands) and the biotic (plants, animals and micro-organisms) and the abiotic elements (soil, water and air) of these ecosystems. (2) Non-renewable (stored) resources (geological formations of minerals, coal, oil, natural gas, fossil groundwater). (3) Energy elements within the biosphere (solar, wind, waves and tides and geothermal). This strategy aims at conserving these natural resources and guarding against their destruction or over-exploitation so as their production be sustained at present and in the future.

The strategy also aims at setting in clear terms the limits of social responsibility of the present generation. Sustainable development requires justice in sharing the resources and maintenance of social peace and setting ethical responsibility towards future generation, our children and grandchildren, as sustainable development and conservation of natural resources envisage long term time horizons into the future. This may be achieved through the following six goals:

1. MANAGEMENT OF NATURAL RESOURCES AND ITS VARIOUS ELEMENTS SHOULD BE FOUNDED ON SCIENTIFIC BASES THAT ENSURE MAINTENANCE OF NATURAL BALANCES, PROTECTION OF ECOSYSTEMS AGAINST DEGRADATION AND CONSERVATION OF LIVING BIOTA.

The purpose is to ensure that the management and development of natural resources be based on scientific grounds that protect their elements and their ecological processes and that guard against their deterioration. We may reiterate here the three principal objectives defined in the World Conservation

Strategy (1980): (a) to maintain essential ecological processes and life support systems, (b) to preserve genetic diversity, and (c) to ensure the sustainable utilization of species and ecosystems.

Conservation of biodiversity is part of the sustained development of natural resources and protection of the environment against degradation and pollution that impairs human health and well-being of other organisms, and that harms the ecosystems and their resources. Programmes of development depend on these resources. Scientific management of the biosphere is the means for achieving these aims. Scientific management depends on outputs of environmental research and monitoring and ensures the sustainable use of the natural resources and guards against their degradation or loss. Environmental research and monitoring include inventories of biodiversity, prospecting for the genetic and chemical structures in each species together with its autecology. These need to be set within integrated programmes of research, inventories and monitoring.

2. DEVELOPMENT OF EGYPTIAN SCIENTIFIC AND TECHNOLOGICAL CAPABILITIES IN FIELDS OF CONSERVATION AND DEVELOPMENT OF NATURAL RESOURCES, AND DEVELOPMENT OF INSTITUTIONAL AND MANAGERIAL CAPACITIES SO AS TO BE ABLE TO IMPLEMENT PROGRAMMES OF ACTION IN THE FIELDS OF RESEARCH, MONITORING AND INVENTORIES AND MANAGEMENT OF PROJECTS.

Success in implementing programmes of research, scientific studies and inventories and environmental monitoring that provide the information for setting sustainable development on sound bases, depends on the national scientific capabilities embodied in the national science institutions (research centers and institutes, specialized science institutions, universities, consulting firms and expertise bodies).

Development of the scientific and technological capabilities of these national science institutions comprises development of: (a) infrastructures (laboratories, experimental fields, computer and data management facilities, means for field inventories and remote-sensing surveys, etc.), (b) manpower development (research scientists and their assistants), and (c) data banks, information bases and documentation centers. These elements need to be co-ordinated within a national network of science and technology.

The build-up of data bases that serve the objectives of conservation and the sustainable development of natural resources underlines the special importance of: (a) taxonomic studies on plant and animal species, (b) establishment and development of referral collections of these species, (c) completion of scientific and ecologic information related to every species. This may be set within the framework of a national geographic information system

that integrates available information on all natural resources. This is a national need that should be completed.

Development of administrative institutions and implementation facilities capable of satisfying the objectives and management of actions towards these objectives, and management of the programmes and projects encompassed in the national plan of action, include:(a) development of manpower, (b) providing means of effective management, and (c) development of institutional systems (means, rules, laws, etc.) that regulate and monitor actions. All this requires provision of financial resources needed to build and develop facilities and to implement the programmes.

3. MOBILIZE NATIONAL CAPACITIES AND RESOURCES TO CONSERVE BIODIVERSITY WITH ITS ECOLOGICAL, TAXONOMICAL AND GENETICAL ELEMENTS; TO ENSURE THE SUSTAINABILITY AND RATIONAL USE OF THESE ELEMENTS.

National capacities combine capacities of government and those of people as individuals and as organized groups. Mobilization of these combined capacities adds to the capabilities of action and enhances efficiency of performance of these agencies and institutions. The purpose here is to ensure that a share of these capacities will be devoted to needs of conservation of natural resources. The concerned government agencies are those operating in fields of research and scientific studies that address natural resources, and those that implement projects for development and conservation of these resources. These agencies are parts of the central government and units of local governments; they are also parts of the institutions of education, training and public information.

Mobilization of national capacities should be within the framework of wide participation in setting strategies of national actions, in outlining policies and setting plans for these actions and in contributing meaningfully in implementing these plans. This positive participation stems from conviction and awareness of the importance of the role played by each individual and every institution whether governmental or non-governmental. Actions of governmental institutions should be integrated, their complementarity is indispensable.

Conditions for the success of this nationwide mobilization include: national plans of action should aim at harmonization among different -and often contradictory- needs, at reaching broad consensus on bases of acceptable priorities. Public good and what is good for future generations should have the heaviest weight possible in setting policies of action, which need to be within the confines of general acceptance and approval.

4. SET PROGRAMMES OF ACTION THAT ENSURE THE POSITIVE PARTICIPATION OF PEOPLE,AS INDIVIDUALS AND AS ORGANIZATIONS, IN THE IMPLEMENTATION OF

BIODIVERSITY CONSERVATION PROGRAMMES, AND IN ENJOYING THEIR EQUITABLE SHARES OF THE BENEFITS OF THESE ENDEAVOURS.

Success in the effective implementation of plans for sustainable development and conservation of natural resources depends on positive participation of all people and their enthusiastic support to the execution of the programmes. Everyone should play his role: individuals, civil bodies, public organizations and institutions. This effective participation depends on two things. (1) People should participate in setting policies and in elaboration of plans, follow stages of setting strategies and priorities of national actions. (2) Benefits which accrue from sustainable development should go to all people within the principles of social equity that do not deprive certain groups of their share, especially women and children.

People's enthusiastic participation is much needed. It requires two conditions. (1) People must be fully cognizant of the objectives pursued, be aware of the elements of national actions and programmes, be convinced that aims are important and feasible. This underlines the roles of schools and other institutions of education, programmes of public awareness and information, the specially important role that can be played by mosques and churches in motivating people. (2) That people be organized in specialized civil bodies that mobilize public participation and guard against dissipation of people's energies. Public institutions (political parties, trade unions, professional associations, etc.) should provide room in their activities for concern with issues of environment and conservation of natural resources.

Included here is the promotion of societies of nature lovers who care for, or are interested in, elements of nature or conservation of biodiversity: certain species of wild terrestrial or marine animals of plants, or certain landscape or habitat types.

5. ESTABLISHMENT OF LEGAL INSTRUMENTS AND ECONOMIC AND SOCIAL INCENTIVES THAT SUPPORT CONSERVATION AND SUSTAINABLE USE OF NATURAL RESOURCES.

The integration of national endeavour requires a legal framework that guides the steps of action, defines the responsibilities and prerogatives of institutions working in areas related to meeting the requirements of this national strategy and implementation of its approved plans and programmes. Legal instruments will define means for deterrence and/or punishment of violations of set limits. It is true that we have a number of laws for protection of the environment at large and for conservation of natural resources and biodiversity in particular. But there is still the need for consolidating and enforcing these instruments and their statutes.

There is need for all projects of development of natural resources to fall within the frame of a national plan for land use that is based on a national geographical information system. This plan should receive national consensus, and be observed by all stakeholders (government agencies, non-governmental bodies and individuals). This will ensure that there will be no conflicts nor contradictions amongst development projects carried out by public and private sectors.

Legal instruments need -in addition to genuine public acceptance- to have means for enforcement, so that the law does not remain an important but not implemented document. The law must define who is responsible for its enforcement, and the tools for this enforcement.

Implementation of projects emanating from national plans needs to incorporate incentives for positive participation, so that every individual and institution will play its designated role effectively. Financial incentives make participation remunerative and encourage people to share effectively in the work programs. Social incentives (prizes for distinguished actors - societal recognition of those who excel - etc.) have an important weight.

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.

Responsibilities of Egypt in fields of environmental protection and conservation of natural resources transcend its political boundaries to regional extents because of its geographical location and its sharing in a number of major ecological systems: the River Nile Basin, the Red Sea Basin and the Mediterranean Basin. Here, national responsibility is part of the regional responsibility. Egypt has signed and ratified a number of regional conventions for protection of the environment in the Red Sea and the Mediterranean, and is party to regional programmes related to the Nile Basin.

Egypt's responsibility extends in these areas to the worldwide level as its geographical location puts it on the migratory highways of birds, and as a signatory of several regional and international conventions concerned with conservation of biodiversity. This means that Egypt is committed to sharing in the international endeavours that aim at conservation of biodiversity, and the observance of rules set in these conventions. Egypt has to include in its national plans the requirements of these international instruments.

The regional and international frames for collaborative action which are set by these conventions and agreements include: (a) exchange of information and experiences, and (b) regional and international programmes of training (manpower development in fields of conservation of biodiversity). Some of these

conventions provide for mechanisms of technical and financial assistance to support national programmes. Egypt is in a position to contribute to these mechanisms especially those related to regional actions and that aim at providing support to neighbouring countries. This adds a regional and international dimension to Egypt's responsibilities.

B. GUIDING PRINCIPLES

1. General Considerations

Egypt approaches her concern with the conservation of biodiversity and the sustainable development of resources for reasons which include:

(i) To ensure the best use of biodiversity elements, those with known economic utility and those that we do not yet know their use but future inquiries may discover their uses.

(ii) To maintain ecological balances in the productive ecosystems so as to avoid vicious circles of ecological imbalance: incidence of new pests, deterioration of productivity, etc. Maintenance of ecological balance in pristine ecosystems is particularly necessary in nature reserves.

(iii) To protect elements of biodiversity resources against dangers of deterioration or loss. These elements may provide future generations with valuable resources. These elements have their inherent right to survive and it is our human responsibility to observe this right.

(iv) To protect elements of biodiversity as parts of our cultural heritage. The Pharaonic heritage is rich with murals and depictions of plants and animals, and Arabic literature (poetry) is loaded with references to names and attributes of plants and animals. The loss of papyrus and sacred ibis is a cultural loss for Egypt.

These issues and concerns are, and should be, reflected in rules and mechanisms set for regulating use of biodiversity resources, that is, hunting and culling, grazing, cutting (wood) and collecting (medicinal plants), etc. Egypt is also concerned with a number of important issues related to biodiversity conservation, sustainable development and the rational use of natural resources. These include:

(i) The issue of bio-engineered organisms and its economic, ethical and legal aspects; this is the issue of bio-safety. The Deputy Prime Minister and Minister of Agriculture established by decree no. 85 of 1995 a National Committee for Biosafety under his chairmanship. The Committee negotiated and endorsed a: Biosafety Regulations and Guidelines for Egypt.

(ii) The problems related to parasites and pathogens borne by wild and domestic animals, particularly transient and migratory birds, which can infect humans; this may require the furtherance of the quarantine functions.

(iii) The complex issues related to protection of indigenous knowledge and intellectual property; the Biodiversity Convention provided for these rights among countries parties to the Convention (the right to share equitably the benefits of developing and utilizing indigenous biodiversity materials), but this principle does not commit countries that are not signatories and hence countries, like Egypt, should enact a national law which ensures the protection of national property rights as regards native biodiversity resources.

2. Principles

In the light of these considerations, we may set the following guiding principles relevant to the national strategy and actions towards its implementations.

(i) elements of biodiversity have ecological and economic values, and are among the foundations for sustainable development of renewable natural resources;

(ii) conservation of biodiversity is a dimension of development of natural resources at present and in the future and is a part of integrated national plans for sustainable development, programmes of conservation should therefore have their share of national actions and resources;

(iii) programmes for conservation of biodiversity and sustainable development of its resources should be set for the benefit of all Egyptians and be implemented through their participation and should ensure equity between people at present and future generations;

(iv) biodiversity is part of the national natural heritage, its conservation is a national and ethical responsibility, all organisms have the right to survive (God instructed Noah to carry with him in the Ark "load therein a pair of every kind, and thy household" *, thus stipulating the right of all species to survive);

* Souret Hood, The Quran.

(v) success of endeavours for conservation of biodiversity depends on: understanding the ecosystems and comprehension of their internal processes and their response to external factors, inventory of taxonomic groups and monitoring their positive or negative changes, that is, conservation is closely knit with research and monitoring;

(vi) success of conservation actions requires the developed national capacities, the capacity to formulate programmes and projects and to manage their implementation, here is the importance of training of manpower; success depends also on positive public participation of people in all sectors of national action, here is the importance of programmes of public awareness and the studies on indigenous knowledge and cultural attitudes towards living organisms and their habitats;

(vii) success of conservation of biodiversity actions depends also on availability of appropriate legal instruments and mechanisms for their enforcement;

(viii) national responsibilities include positive contribution to the implementation of regional and international conventions concerned with conservation of biodiversity and the compliance with commitments set by them.

PART III

ELEMENTS OF PLAN OF ACTION

Elements of a national plan of action for conservation of biodiversity and sustainable development of natural resources comprise part of the national plans for development and protection of the environment. This plan has three principal sectors that are inter-related and inter-active:

- A. Programmes of research, monitoring and assessment,**
- B. Programmes of applied projects, and**
- C. Programmes of supporting measures.**

A. PROGRAMMES OF RESEARCH, MONITORING AND ASSESSMENT

The principal functions of this sector include the build-up and completion of data and information bases that provide for planning and formulating programmes of applied projects (including choice of sites for nature reserves), and for setting processes for implementation that ensure their sustenance. Monitoring (collection of data on regular and time series bases) provides bases for follow-up of changes in environment in sequence of time. This will also provide means for assessing success or shortcoming, and will also provide a mechanism for early warning as regards damage that may harm the environment, natural resources or man. Scientific and environmental research may be part of the supporting measures, but it is also means for gaining insights and information that add to data obtained through monitoring. Both research and monitoring form the sound bases for applied projects. Within this sector room will be available for regional and international cooperation. Under this broad area the following elements may be included:

- * surveys of geographic regions, natural ecosystems and productive (managed) ecosystems,**
- * economics of conservation of nature, protection of the environment and development of its resources,**
- * detailed scientific research including modeling of principal ecosystem types,**
- * autecological studies of species with special reference to their eco-indicator significance,**
- * build-up/completion of referral collections, and**

taxonomic research related to it,

- * prospecting studies on species: search for gene resources and chemical contents,**
- * inventories of history of change in habitats and species, and assessment of degradation or loss,**
- * programmes for establishment of monitoring stations and schemes of their operation,**
- * inventories of indigenous knowledge related to living species,**
- * surveys of introduced species and races and their impacts on native ecosystems.**

B. PROGRAMMES OF APPLIED PROJECTS

Applied projects are the field manifestations of the objectives set by the strategy and the means of the practical actions for the conservation of biodiversity and its natural resources. These conservation projects may have additional useful functions relating to education and public awareness, and may become field extensions to schools, institutes of higher studies and research institutions. Nature reserves may also provide for recreation (eco-tourism). Applied projects include:

- * network of protected areas that represent the principal ecosystem types with scientific importance, biodiversity richness or that may be threatened,**
- * the institution of referral collections: national natural history museum, national network of referral collections in institutes of research and scientific studies and in non-governmental organizations,**
- * the national germplasm bank (or banks) as center for conservation of genetic stocks,**
- * captive breeding center (or centers) for breeding and propagation of rare, endemic, threatened and extinct species of plants and animals; these centers will be sites for research in ecology, physiology and reproduction of these species and for designing programmes for their re-introduction,**

* biodiversity data and information institution comprising a focal (central) unit and a nation-wide network of units, this institution will be a principal tributary of the national geographical information system.

C. PROGRAMMES OF SUPPORTING MEASURES

Programmes of supporting measures aim at providing for the capabilities and mechanisms for implementing efficiently the projects of research, monitoring and assessment and the applied projects; and for ensuring the proper functioning of national institutions and the promulgation of policies and legislation that support national actions and that provide it with conditions of success and resources necessary for its proper operation. The frame of these measures should provide scope for participation in regional and international collaborative programmes. Supporting programmes may include:

* programmes of training for human resource development required for undertaking programmes of research and monitoring and of applied projects, these programmes should make full use of capacities available in universities and institutes of higher education in planning and implementing training programmes, these institutes may consider establishing degrees in environmental science,

* programmes of public awareness that aim at persuading people of all age groups and at all levels of education to participate actively in support and in implementation of national plans of action to conserve biodiversity,

* programmes for supporting, and enhancement of effectiveness of government agencies concerned with conservation of biodiversity, feasibility studies on need for new institutions in central and in local governments and for mechanisms for coordination among various departments in line ministries and the Egyptian Environmental Affairs Agency,

* updating and completion of laws and statutes operative in fields of biodiversity, with special reference to regional and international conventions endorsed by Egypt,

* establishment, support and development of mechanisms for enforcement of national laws or

indigenously held rulings,

*** programmes for support of non-governmental organizations and for assisting them to play their roles in mobilizing public participation in community action,**

*** programmes for mobilizing financial resources from national and international sources to support projects of biodiversity conservation.**

PART IV

PROGRAMMES OF ACTION

The programmes of action comprise two complementary sectors, the first concerns those projects of a central nature, while the second deals with the local projects of individual governorates. Implementation of both sectors will be within a system of inter-related networks and under a unified system of management, which should co-ordinate and direct its activities and secure the financial resources needed for its smooth and successful operation.

The national programmes of action translates the national plan into a number of field and applied projects. All of these projects fall within the three main components of the plan: (i) research and monitoring, (ii) applied projects, and (iii) supporting projects. These three components are the extension of previous efforts made in the fields of conservation of biodiversity and natural resources, which started in an orderly fashion with the introduction of Law 102 of 1983 and the ratification of the Biodiversity Convention in 1994, see Part I.

A. NATIONAL PROGRAMMES: CENTRALLY MANAGED

1. Network of Protected Areas

In accordance with Law 102 of 1983, the Prime Minister of Egypt has issued a number of decrees between 1983 and 1997, by which 18 locations have been declared as natural protectorates. Mention of these protectorates has already been made (see Part I of this document). They can be classified into the following 3 main categories:

1. Marine and wetland protectorates (9),
2. Desert and mountain protectorates (6), and
3. Geological and geomorphological formations (3).

Natural protectorates are the *in situ* method for the conservation of biological diversity, as well as the preservation of certain ecotopes and formations with unique or rare characteristics. This means that they preserve all elements of the ecosystem and protect them from deterioration. The natural protectorates are the backbone of all national plans of conservation.

The natural protectorates perform a number of functions, supplementary to their role in the preservation of the ecosystem. These include:

- * they facilitate field studies and research,
- * they provide suitable sites for monitoring environmental changes,

- * they are suitable sites for ecological public awareness, as well as being focal points for eco-tourism,
- * they play an important role in the education of various disciplines of natural history.

Some natural protectorates serve the additional purpose of being suitable experimental grounds of studies and research on the sustainable development of natural resources. Such experiments may be carried out within these protectorates or in locations allotted especially for this purpose in their vicinity. These studies would deal primarily with the relationships between man and the environment, and the effects of human activities on the environment and its components.

The discussions which took place in the 15 regional meetings have highlighted the important role which natural protectorates could play in supporting the educational programmes in schools and universities in the study of natural history and ecological sciences within the regions of these educational institutions. It has been repeatedly proposed that each protectorate should cater for this educational service, whereby the student would come in direct contact with the elements and phenomena of the environment.

Legislation, in the form of Prime Ministerial decrees and the maps attached to them, has been completed for all 18 protectorates. For most protectorates a preliminary building has been established and an administrative unit including a director, a scientific advisor and a number of assistants, have been appointed. Ecological surveys and baseline studies of the biodiversity in the 3 protectorates of the Gulf of Aqaba (Ras Mohammed National Park and the two multiple use management areas at Nabq and Abu Galum) and St. Katherine (S. Sinai) have been carried out. Management plans have been drawn up and are being implemented for the 3 protectorates of the Gulf of Aqaba. Extensive studies are underway to formulate a management plan for the protectorate at St. Katherine. Financial support from the European Union contributed greatly to these achievements. Similar baseline studies on the biodiversity of the protectorates of Wadi Allaqi, El-Rayyan and Omayed have been carried out.

Some of these protectorates are being run as national parks. This implies that they have the additional function of enhancing eco-tourism. All 4 protectorates of southern Sinai belong to this category. Two other protectorates have been declared by UNESCO as biosphere reserves: Omayed (on the Mediterranean coast) and Wadi Allaqi (southeast of Aswan). These two protectorates are fields of extensive ecological studies and monitoring, as well as in programmes of field training. When ecological and biodiversity surveys are completed together with management plans for the remaining protectorates, it will be possible to assign them to the various categories of the international

classification of protected areas. This is part of the national programme of action for the forthcoming period.

The present group of 18 protected areas of Egypt represent about 7.5% of the total area of the country. It is intended to increase this ratio to 15% in the next two decades. It is noticeable that both the Mediterranean coastal region and the Western Desert (681000 km², or two thirds the area of Egypt), are modestly represented in the present network of natural protectorates: the former incorporates only the Omayed Biosphere Reserve, while the latter has only Wadi El-Rayyan and the Qaroun Lake.

The preparatory studies for a regional project (submitted to GEF in 1997): Conservation of Wetland and Coastal Ecosystems in the Mediterranean Region surveyed: Albania, Algeria, Egypt, Lebanon, Marocco, Palestinian Authority and Tunisia. These studies identified as selected sites for conservation in Egypt: Zaranik (Ramsar site), Burullus (Ramsar site) and Matrouh Sector (Mediterranean coastal land). Ecological surveys are being actively carried out to identify those sites worthy of detailed investigation with the view of declaring them new natural protectorates to be added to the present group. In this connection, several proposals of new protectorates have been forwarded during the 15 regional meetings. They include:

THE WESTERN DESERT

1. Maghara Oasis (at the eastern end of Qattara Depression),
2. East of the Qattara Depression and west of Siwa Oasis,
3. Donkol and Kurkur Oases and the Toshky Depression,
4. El-Gelf El-Kebir area and Mount Oweinat,
5. extending the present limits of the Omayed protectorate to reach the Mediterranean shoreline,

THE EASTERN DESERT

6. Wadi Qena,
7. extending the present limits of Maadi protectorate (petrified forest) to include the nearby Wadi Degla and its surrounding areas,
8. extending the present limits of Wadi Sannur to include parts of Wadi Araba,
9. Wadi Al-Gemal (the Camels Valley) and its alluvial fan on the Red Sea coast,
10. the area of Mount Hamata,

THE NILE VALLEY AND DELTA

11. parts of Lake Burullus and the grounds between its eastern limit and Gamasa city,
12. some of the Nile islands in Minya and Sohag section,
13. extending the protectorate at Saluga and Ghaza to include some of the islands of the First Cataract,
14. Lake Nasser to be declared an area of special protection.

The national plan of action is also concerned with further development of the present group of 18 protectorates and the completion of studies and surveys needed for the selection of new sites from the areas proposed for protection. This requires the co-operation and active participation of the universities and research centers with the Central Directorate of Nature Conservation.

Law 102 of 1983 demands that the management of all types of natural protectorates be the responsibility of the Central Directorate of Nature Conservation of EEAA. However, successful management of these protectorates requires the support of local administration in the individual Governorates.

All preparatory and implementation efforts made in the field of establishing the national network of natural protectorates fall within the scope of implementing the Biodiversity Convention (1992) as well as other agreements and conventions pertaining to the conservation of nature. They are therefore well qualified to receive scientific and financial support from bilateral and international funding organizations. The European Union has already provided generous technical and financial support for the development of the natural protectorates in southern Sinai and for a nation-wide survey for prospected sites.

It has been provisionally estimated in the country study on biodiversity that the completion of establishing the existing 18 protectorates will cost about \$ 50m. Further \$ 30m will also be needed for the completion of studies, surveys and constructions of the new protectorates. The total cost is, therefore, about \$80m for the next 10 years (1998-2007). The annual running expenditure for the national network of nature reserves is estimated at \$ 20m, in addition to the revenue.

Priorities

The national programme embraces the long-term objectives of : development of the present 18 reserves and surveys for identifying new sites and expanding some of the existing reserves. Prioritisation needs to select short-term targets. This is set on ground of : (1) representation of principal ecological setup, and (2) requirements to “save” areas of special interest and areas under threat.

Among the present 18 reserves there are 7 that are : managed as nature reserves and need to be sustained (the three reserves of the Gulf of Aqaba), with management plan at advanced stage of development (St. Katherine, South Sinai), or with management plan at initial stage of development (Wadi Rayyan, Faiyum Governorate), two biosphere (UNESCO) reserves (Omayed-Mediterranean and Wadi Allaqi - southeast Nubia) are managed as sites of ecological research and monitoring by teams of associated universities.

The remaining 11 sites, though have minimal infrastructure and staff, require development and subsequent implementation of management plans, recruitment and training of staff. Priority (target for the next five years) may be given to two areas:

1. The wetland sites of Ashtoom El-Gameel (Lake Manzala) and Zaraneek- Lake Bardaweel (north Sinai) . These wetland sites of international importance are under escalating stress: extensive development of natural gas facilities near Ashtoom El-Gameel site and extensive irrigation-drainage schemes of the Sallam Canal (400 000 acres of land to be reclaimed) in North Sinai.
2. The Elba Protectorate is an extensive and complex area that may eventually comprise a number of systems: the mangroves of the Red Sea littoral, the Red Sea 22 islands (within the EEZ of Egypt), and the Gebel Elba montane area. The first two are of scientific and biogeographical interest and are under the intense threat of tourism development. The Gebel Elba is one of the richest sites of natural biodiversity in Egypt, it represents the very special ecological set-up of coastal mist oases and is biogeographically the northest outpost of the Ethiopian highland biota.

Within the proposed sites to be surveyed and eventually managed as nature reserves, priority may be assigned to (1) the wetland sites of Lake Burullus, the Qattara-Siwa district of the northern Western Desert and the El-Gelf El-Kebir - Gebel Oweinat district of the southern Western Desert.

2. Egyptian Natural History Museum ^{*}

Students and researchers in agriculture, medicine, industry and the natural sciences need to identify precisely the organisms they deal with. This cannot be achieved without matching those organisms with authentic specimens kept in referral collections.

* The traditional term 'natural history' incorporates the group of biological sciences (botany and zoology) and geology.

Reference has already been made in Part 1 of this document to the tentative and incomplete estimates of the numbers of species representing the major taxonomic groups in the fauna and flora of Egypt (see Table 1). There are referral collections of a limited number of these groups: insects, birds and seed plants. Most other microbial groups (viruses, bacteria, fungi, etc.) and small organisms (nematoda, acari, etc.) are not represented in comprehensive referral collections, despite their medical and economic importance.

The main objective of building a natural history museum is to house complete referral collections of as many taxonomic groups of plants, animals and micro-organisms as possible. These collections should include representatives of extant and extinct biodiversity, as well as the groups of fossils embedded in the geological formations of the country. It also provides a center for taxonomic research.

The museum should be staffed with sufficient numbers of qualified experts in the taxonomy of various groups, as well as trained technicians to curate the specimens and increase their numbers. There should be room in the activities of the museum for the continuation of biodiversity surveys, updating information and the much-needed taxonomic revisions of all groups, especially those which have not hitherto been investigated.

Among the staff of the museum, there should be a number of experts in the fields of data analysis and the construction of data bases, which ought to cover those referral collections kept in and outside the museum; refer to the section on the national network of biodiversity data bases.

The Egyptian Museum of Natural History, with its main scientific functions in support of the referral collections, should also perform the following additional services:

- * training taxonomists and curators of referral collections,
- * training specialists in the collection and processing of taxonomic information and the management of data banks,
- * supporting educational programmes of natural history in schools and universities,
- * supporting popular science programmes.

The museum should be connected with the Egyptian network of referral collections in the different universities, research centers and other scientific institutions. It should also work in collaboration with the group of natural protectorates, and should have access to the on-going monitoring of biodiversity.

During 1985-1994, the Academy of Scientific Research and Technology carried out preliminary studies on the establishment of a natural history museum under the supervision of a committee of national experts with Japanese

co-operation. The Academy also provided some financial assistance to 15 of the referral collections housed in universities and scientific institutions for their maintenance and to encourage the collection of specimens which would form the nucleus of referral collections of the proposed museum.

In 1995, the National Biodiversity (NBU) completed the preliminary studies for the establishment of the Egyptian Natural History Museum, including the necessary constructions, equipment, furnishings, training of personnel and capacity building. The costs were estimated at about \$ 100m over 5 years.

The 15 regional sessions of discussion have shown that there are small referral collections scattered in different universities and other institutions of scientific research. There should be some form of liason between them and the Egyptian Natural History Museum. A recommendation has also resulted from these discussions that each of these small referral collections should be specialized in, and characterized by, members of a certain taxonomic group or groups, preferably those prevailing in its territorial region. It has also been suggested that each university or research center should specialize in the study of a certain group or a number of groups (depending on the interests of the academic staff), within a general framework to be elaborated and agreed upon. Such teams of researchers, when formed, should have a working relationship with the Museum, thus establishing a national network of referral collections in Egypt.

3. National Gene Bank

The beginning of agriculture depended mainly on the domestication of wild species of plants and animals. Through breeding and selection man has been able to develop new races and varieties of farm crops, fodder and range plants. Techniques of plant and animal husbandry became important agricultural sciences, especially with the advent of the green revolution in the 1960s.

The introduction of new and improved varieties has led to neglecting the older ones (such as the cotton cultivars Ashmouni and Skalaridis). This meant ignoring important genetic resources which should have been preserved and resorted to when the need for them in breeding programmes would arise. Close relatives of these neglected- species and varieties have remained in the wild state. They, too, harbour important genetic resources which should be preserved because of their potential as valuable components of breeding programmes.

The main objective of establishing a National Gene Bank is to preserve genetic resources of wild and domesticated varieties of plants and animals which would otherwise be lost beyond retrieval. The gene bank would be among the *ex situ* mechanisms of biodiversity conservation. Its major functions include:

- a. collection of genetic resources of wild and economic varieties, with special emphasis on the

wild relatives of crops and fodder plants, poultry and farm animals,

b. short-term preservation of genetic resources in the laboratory (*in vitro*), in the fields of the gene bank (*ex situ*) and in their natural habitats (*in situ*),

c. long-term preservation of genetic resources (i.e. storage) in seed banks, tissue cultures or the storage of embryos and gametes in special inert gases,

d. preservation of genetic resources of micro-organisms using appropriate media and techniques for the various groups concerned.

Scientific activities in the gene bank include also studies and research in the technologies of conserving genetic resources, molecular genetics and providing other centers of plant and animal husbandry with genetic materials required for the production of improved races and cultivars. Modern technologies of genetic engineering have added new dimensions to the tasks of a gene bank such as prospecting for genes with special interest in different plants, animals and micro-organisms as well as the documentation of their genetic codes.

The geographical range of the work of the gene bank might be extended to cover similar activities in the Middle East. Thus, this bank may have regional programmes of co-operation in the fields of surveying genetic resources, training, research and exchange of information.

The nation-wide regional sessions of discussion have revealed a number of interesting points:

* it is recommended that there should be separate gene banks for plants and animals, owing to the obvious differences between the two groups in requirements and methodologies,

* some regional specialized collections of genetic resources (e.g. the date palm collection in Sohag) should be regarded as important elements in the national wealth of genetic material and should be treated as complementary to the National Gene Bank.

In 1995, the National Biodiversity Unit (EEAA) completed a preliminary study on the establishment of the national gene bank. The study dealt with the architectural design of the gene bank, the laboratories, preservation and storage rooms, workshops, power generators and library. The costs have been estimated at \$ 11m. On 5th March, 1995 this study was the subject of detailed discussion in a workshop chaired by Prof. Yousef Wali, Deputy Prime Minister and Minister of Agriculture and Land Reclamation. The ministry has shown great interest in this project as they have the beginnings of a similar bank in the Agricultural Research Center (the National Unit for Plant Genetic Resources), the Desert Research Center (the station at Sheikh Zowaid, N. Sinai) and the Agricultural Research Station at Bahteem. The ministry has adopted the project of establishing the National Gene Bank.

4. Captive Breeding Center

The main objective of this center is to allocate a field (or a number of fields in suitable sites) for the propagation of rare and endangered species of plants and animals. It should also cater for the species recorded previously in Egypt but have since disappeared. The principal tasks of this center include:

- a. the *ex situ* conservation of these species,
- b. ecological and physiological research on these species and on their reproduction,
- c. studies on the propagation of these species, and
- d. programmes of re-introduction of these species to their natural habitats, especially in protected areas.

As a zoo and a botanical garden, the center would also perform an educational function to school children as well as a cultural center for the general public. Scientific research in the center will be supportive to research and post-graduate studies in universities. The center would also be complementary to the network of protected areas. It should have a close working relationship with the Zoo at Giza, where it would positively gain from the experience of its staff, especially in the initial stages of its construction. Co-operation with neighboring countries is also envisaged.

The NBU prepared a detailed study on the establishment of the captive breeding center. The study strongly recommends that the Wadi El-Rayyan Protected Area in Faiyum Governorate be selected as the suitable site for the center (or alternatively for the central unit of a network of smaller captive breeding centers). The study also dealt in detail with the phases of construction, the management plan and the personnel required. The costs have been estimated at \$ 16m.

Recent field surveys have shown that a number of sites are suitable as animal sanctuaries, where both propagation and conservation can take place. Examples of these sites include the western fringes of Qattara depression and the eastern parts of the Siwa depression (both in the western desert), where limited numbers of the chita (*Acinonyx jubatus*) and the slender-horned gazelle (*Gazella leptoceros*) can still be found. Such sites should be attached to the captive breeding center.

5. National Programme for Research and Monitoring

This programme consists of the following 5 main sectors:

- a. completion of surveys and monitoring of species richness,
- b. research on ecosystems and their dynamics,
- c. research on genetic variation within species,
- d. screening and monitoring the chemical composition of species, and
- e. socio-economic studies related to biodiversity.

Implementation of this national programme requires the mobilization of facilities found in university colleges, research institutes and other scientific organizations in the country. The central unit responsible for the implementation of all national programmes (i.e. the NBU) should have access to a fund for financing these studies and research programmes. It should also have the ability to follow up the surveys and monitoring schemes, and to keep, and make use of, their results in enriching national efforts of biodiversity conservation.

a. Completion of surveys of species richness

It aims at bridging the numerous gaps in our knowledge of the species representing various taxonomic groups as well as completing their referral collections. The surveys carried out in the country study of biodiversity (1995) have shown that while the referral collections of some taxonomic groups are scanty and in need of replenishment, other groups have no such collections in Egypt.

b. Ecosystem research

These aim at understanding the various ecosystems as natural habitats for animal and plant species. Such habitats are in many cases the ecosystems on which human societies depend for rangelands, fisheries and agriculture. The study of these ecosystems and their dynamics (e.g. the cycles of matter, energy

flow, etc.) and the role of each organism in these interactions should provide grounds for their rational management and sustainable development, as well as bases for their restoration and repair.

Within the framework of this sector may be included the study of autecology (ecological behaviour, physiological responses to environmental changes, and reproduction) of certain species. Such studies may be carried out partly in the Captive Breeding Center and its fields, and partly in universities and research centers.

Some studies of certain ecosystems have already been carried out: the western Mediterranean coast (at Alexandria University), Wadi Allaqi (at South Vally University), and in N. Sinai (at the Faculty of Environmental Agriculture at El-Arish, Suez Canal University). The national programme aims at expanding such studies to include examples of all available ecosystems in the different parts of the country (e.g. the coastal zones and their immediate vicinities, deserts, wadis, inhabited and uninhabited oases, the mountainous massifs of the Red Sea and southern Sinai, Gebel Oweinat, the coastal and internal lakes, agricultural areas and the networks of irrigation and drainage canals).

Researchers in universities and other academic institutions may choose to study such transitional ecosystems as the Suez Canal and the lakes attached to it (where movements of biota and transportation traffic are continuous), the sea bed, and the boundaries between Lake Nasser and the surrounding deserts.

c. Prospecting for genetic variation

These studies aim at the discovery of genetic variation within populations of the same species. In the initial stages, priority may be given to such plant species grown as crops and fodder, poultry and farm animals and their wild relatives. Studies in this field that are carried out in universities and research institutes will liaise with studies carried out in the Captive Breeding Center and the Gene Bank.

d. Chemical screening of species

Surveys of the chemical composition of plants and animals in Egypt should give a clear indication of their value as:

- * sources of food for man and fodder for animals,
- * sources of medicinal compounds,
- * sources of industrial raw materials.

The nutritive value of many desert species of plants has been studied in some detail (especially at the Desert Research Center) with particular emphasis on grasses and legumes. Other desert plants have been investigated as sources of medicinal drugs at the Faculties of Pharmacy, the National Research Center and the pharmaceutical companies. Current research carried out jointly with foreign

institutions aims at the discovery of anti-cancer drugs in some species of marine animals of the Red Sea.

The national programme aims at finding the suitable framework of co-ordinating such studies and research on a systematic basis, as well as the documentation of their results.

e. Socio-economic studies

These aim at the collection and documentation of traditional knowledge of local inhabitants related to the use of wild species of animals and plants (e.g. folk medicine), and all beliefs and practices associated with it.

Related to this topic is the evaluation of the role played by wild species of biota in the economies of local societies in Egyptian deserts. These species represent sources of fuel (firewood and charcoal) and medicines for personal use or for income generation through the sales of these species to other markets. Preliminary studies along these lines have already been made in some parts of the Eastern Desert and the Eastern Nubian Desert (Wadi Allaqi); they deserve to be developed and expanded.

The economic aspects of natural protectorates in general and the national parks in particular should be studied carefully as they play an important role in enhancing eco-tourism. The Ras Mohammed National Park brings in an annual revenue of ca. LE 2m.

Criteria for the evaluation of damage (intentional and non-intentional) done to biodiversity are worthy of detailed studies. Examples of such damage include the effect of oil spillage on marine biodiversity and the loss of corals hit by ships running aground. These and many similar issues are subject to legal judgement for the estimation of compensation.

Studies of the economic evaluation of natural resources in general and the components of biodiversity in particular deserve special attention as an important sector of ecological economics. They are among the newly emerging sciences of the modern world.

6. National Network of Biodiversity Data

The preliminary survey of biodiversity referral collections has revealed the need for the following:

- a. completion of the holdings of these collections,**
- b. establishment of the natural history museum,**
- c. establishment of a mechanism of co-ordination between these referral collections for the exchange of data, and**

d. connecting the national network with global centers of biodiversity data.

The National Biodiversity Unit (EEAA) has taken some preliminary steps towards the establishment of a nucleus of the proposed network. Studies have been carried out on a number of referral collections of insects, birds and seed plants in various scientific institutions in order to find out their needs (training, equipment, computers, etc.). The NBU is currently developing the basis for the establishment of a biodiversity data base, which would serve as a central unit for the national network. Work is also being done to estimate the cost of such network.

When the basic essentials of this network become operational, it will be a part of the national system of geographical information, as well as a part of the global information mechanisms. The network will be at the disposal of the Egyptian research community, decision-makers in governmental institutions concerned with sustainable development.

When all components of the national programme are completed, the Egyptian Museum for Natural History will play a central role in this network. The network will be capable of preparing, updating and publishing series of data documentation, atlases of geographical and ecological distribution of species, and lists of surveys and other scientific literature.

7. National Programme for Manpower Development

Management of the national plan of action depends on the trained work force, just as much as it depends on construction facilities, funds and the administrative and organizational tools which co-ordinate the work and its applications. The programme of developing this work force is therefore a crucial part of the national plan of action. The work force consists of the following two groups:

- a. trained labourers for the network of natural protectorates, and technical assistants for the natural history museum, the referral collections, the gene bank and the captive breeding center,
- b. technicians and specialists for the network of natural protectorates, the natural history museum, the gene bank and the captive breeding center; they will carry out the biodiversity surveys, monitoring and research.

Labourers will receive on-the-job training and will be able to gain experience through practice in their respective sites and locations, provided that sufficient time is set aside for this purpose. Candidates for this type of work may

be chosen from among graduates of agricultural and technical high schools. In selecting labourers for the natural protectorates priority should be given to local inhabitants.

The training programmes intended for the technicians require the active participation of universities and other educational institutions, especially in the multi-disciplinary fields. They are all post-graduate studies.

Tanzania has established a training institute for rangers of protected areas in the Siregetti National Park, and Egypt benefited from this institute by sending a number of young university graduates to receive their training. It is planned to include a similar training center in the housing programme of the Gulf of Aqaba protectorates at Sharm El-Sheikh. It is estimated that Egypt will need 250-300 of these trained rangers. The center should also cater for the needs of other neighbouring countries.

Training technicians and specialists to work in the referral collections of the natural history museum and other scientific institutions falls within the scope of taxonomic studies. Some universities have the facilities required for such specialized post-graduate training. When the museum of natural history has been established, it should have the facilities and capabilities for such training as well.

The post-graduate training of specialists for work in the gene bank (or banks) requires certain facilities, some of which may be available in some biotechnology units (e.g. The Agricultural Research Center, university colleges, Mubarak's City for Sciences). Some of the trainees may have to travel abroad for advanced technical training.

The facilities needed for training specialists of the captive breeding center in physiology, ecology and reproduction are mostly available in university faculties of science, agriculture and veterinary medicine.

Special programmes are needed for the training of specialists in data processing (storage and retrieval) to work in the referral collections of the universities and other scientific institutions and in the central data base of the NBU. Such programmes are already established at the Botany Department, Faculty of Science, Ain Shams University.

The national programme of capacity building aims at training 500 specialists (post-graduate) during the period 1998-2007. These are distributed as follows:

- 300 rangers for the natural protectorates
- 150 taxonomists of various groups
- 60 specialists for the gene bank
- 40 specialists for the captive breeding center.

The training period ranges between 6 months and 2 years. The average cost per trainee is LE 10000, and the total cost of training in Egypt would be LE 5m. Training 50 specialists in data processing is estimated to cost LE 75000, and the training of 10 specialists for the gene bank abroad is expected to cost an additional sum of ca \$ 500000.

8. National Programme of Education and Awareness

Public participation and contribution together with the voluntary actions of civil societies are great assets in support of the national plan of action for biodiversity conservation. People need to be convinced of its importance and usefulness of the plan in order to take active interest in it. They also should be made to realize that there are economic, social and environmental benefits to be gained from it, both at present and in the future. Religion, ethics and good citizenship call upon people to share actively in the projects of sustainable development and conservation of natural resources. All these aspects require special programmes to inform people at all age groups and enlist their support. Such programmes should also be directed at the legislative, executive and political sectors of society until they appreciate the value of the natural environment and its components. Those working in local governments and municipal councils ought to be included among the prime targets of public awareness schemes. Law enforcement personnel should be made aware of the importance of abiding by the rules and regulations controlling hunting, fishing and the conservation of natural resources.

The following establishments have crucial roles to play in the success of public awareness programmes:

- a. institutions of formal education,
- b. the media, and
- c. non-governmental organizations and public societies.

a. Education Institutions

Curricula in schools and universities should include some knowledge of environmental sciences, which should be chosen to suite the type of study and be in harmony with it. Extra-curricular activities should be modelled so as to arouse the interest of students in the various topics of natural history, especially those which the student can come in direct contact with such as the study of plants, birds, butterflies and fish. Science museums (e.g. Suzanne Mubarak Natural History Museum in Heliopolis) and children libraries have an important role to play in the spread of knowledge and the control of public behaviour.

It became abundantly clear during the 15 sessions of discussion that the role of the school in environmental education and public awareness must be extended to the field outside the school. The way to achieve this is to have a specialized scientific garden in each governorate, or that each protectorate

should have a section set aside for educational purposes, where the students can absorb information with all their senses.

Another idea came to the fore during these sessions: university students should be subjected to 10-12 lectures of general environmental knowledge followed by 10-12 lectures of more specific environmental topics as part of their undergraduate curricula. The aim of these lectures is to widen the scope of understanding and appreciation by the students of the close relationship between the various issues of environmental sciences and their studies in medicine, agriculture, law, engineering, economics, commerce, etc.

b. Media

Egypt is witnessing the beginnings of interest in the issues of the environment and natural history by the media in the form of special pages in some daily papers and journalistic investigations, which usually follow major environmental events both at home and abroad. Some radio and television programmes deal with various topics of natural history (especially biodiversity). The mosque and the church can contribute positively in the spread of public awareness and in encouraging the general public to preserve available natural resources. Pioneer experiments in Ain Shams and Mansoura universities deserve a special mention: preachers of mosques (imams) have been trained to include topics of the environment and the conservation of natural resources in their sermons and to emphasize their present and future significance.

The success of such programmes depends primarily on training those charged with their implementation and continuously supplying them with the necessary information. In other words, 'data files' should be a part of the national programme of nature conservation, and should be easily accessible to those responsible for the information programmes.

c. Non-Governmental Organizations

NGO's and civil societies of voluntary public work (e.g. sporting clubs, youth centers, political parties, trade and professional unions, etc.) have a significant role to play in public awareness through practice. There is plenty of room in the social and cultural activities and programmes of such public institutions for the conservation of nature and biodiversity: the schemes of special hobbies, tree planting, caring for wild animals, visiting protected areas, etc.

Providing technical and financial assistance to such public institutions is among the objectives of the national plan of action. It also aims to encourage the establishment of more NGO's concerned with the issues of biodiversity and its conservation.

B: NATION-WIDE PROVINCIAL PROGRAMMES

The workshops hosted by 15 universities in individual governorates and attended by stakeholders* dealt with the first draft of this document (the version of January, 1997). The present version incorporates the additions and corrections resulting from these discussions, and discussions at the National Conference held in Cairo (November, 1997).

These discussions have shown that:

(1) The Egyptian universities are keen on active participation in the national programmes of a central nature (covered in the previous section of this document), especially in the fields of ecological studies, research and monitoring, training and assistance in the management of natural protectorates. Examples of this assistance include the efforts made by members of Alexandria University in Omayed Biosphere Reserve, South Valley University (Aswan branch) in the protectorates of Wadi Allaqi and Saluga and Ghazal Islands, Assyut University in the protectorate of Wadi Assyuti, and Suez Canal University in the protectorate of St. Katherine in S. Sinai,

(2) The local administration in individual governorates are keen on offering assistance in these programmes, especially those concerning the natural protectorates and the educational units in them, and the scientific gardens. The recommendations of these sessions have also added considerably to the local components of the national programme.

The general framework of arrangement of regional components is that each university should have scientific responsibility in its territorial geographical range so that Egypt is divided into a number of sectors each of which is taken care of by one of the universities. This arrangement will eliminate repetition of efforts, and each university will have a characteristic role. The regional components of the national programme of action include:

- * the units attached to the natural history museum,
- * the units attached to the gene bank,
- * the units attached to the captive breeding center,
- * scientific gardens and the educational units in the natural protectorates.

* participants in these workshops included university scholars, staff of the governorate including agriculture, veterinary and education departments, representatives of NGOs and civil groups, etc.

1. Units Associated with the Natural History Museum

The local referral units are part of the tools for school and university education. Therefore, each university has made sure to acquire some referral collections related to the teaching of natural history, especially in the faculties of science, agriculture and education. Similarly, the faculties of medicine and veterinary medicine have acquired scientific museums to keep referral specimens of disease causals and vectors. These are all supplementary to the referral collections of the Egyptian Museum for Natural History. The relation between these units and the Museum are within the general framework of the national plan of action; they are inter-connected through the network of data bases.

The discussions and recommendations of workshops have stressed the importance that local referral collections should contain: (1) components of biodiversity found and monitored in the territorial zone taken care of by each university, and (2) that each university should concentrate on certain taxonomic groups according to the specializations and research interests of its own faculty members. This will ensure a degree of complementarity between their work and the work of scientific institutions of the Ministry of Agriculture and research centers.

For example: Tanta University should have a herbarium (i.e. a referral collection of weeds and wild plants) of the Central Delta sector, Mansoura University should have a herbarium for the plant of the Eastern Delta sector, Suez Canal University should have a herbarium housing the plants of Sinai Peninsula, etc. Faculties of science in a number of universities have small referral collections of fungi, freshwater mollusca, worms parasitizing on fish, as well as other groups of the biota. These small units need some form of organizing framework to support them, co-ordinate their efforts and maximize their benefits.

2. Units Associated with the National Gene Bank

Part of the objectives of the gene bank is to conserve the genetic make-up of agricultural races and wild species, especially the close relatives of crops, forage and grazing plants. Each of these has its pattern of distribution in the various regions of Egypt. Some races have a localized geographical range near the local educational units in universities and agricultural research stations.

The discussions in the provincial workshops revealed a great interest in the wealth of genetic resources in the date palm (*Phoenix dactylifera*), and the presence of significant collections of cultivars in Senaniya (near Damietta) and in Sohag. The date palms deserve special care and interest. In some regions, the date palms are not only economically important, but they are also a significant

element of the landscape and tourist attraction, for example, the groves of date palm trees along the northern coast of Sinai, especially at El-Arish. Conservation of these groves combines the conservation of nature, economy and the date palms.

The workshop held at Zagazig recommended the preservation of the genetic resources and make-up of the Arabian horse, in view of the special place of the Sharkia Governorate in the history of the horse. A unit for the preservation of the genetic resources of the horse can be one of the components attached to the National Gene Bank. Several sites were proposed as sanctuaries for migratory birds and for Falcons and Eagles .

It has also been recommended in the two workshops held at Mansoura University and Tanta that a special unit should be established for the conservation of the genetic resources of rice. Such unit should be part of the network of similar units attached to the National Gene Bank. A nucleus of this unit is already found in the International Center for Rice Research at Kafr El-Sheikh.

The same could be said about the conservation and re-introduction of genetic resources of several other local fruit and vegetable crops, which are on the brink of disappearance. For example, some experts at Mansoura Universities have expressed the wish to conserve the genetic resources of some superior olive cultivars along the shores of the Nile Delta; other cultivars from the western Mediterranean coasts and N. Sinai may be added to this unit. Similarly, experts from Zagazig University (Banha Branch) have recommended the conservation of genetic resources of local cultivars of citrus.

A number of workshops recommended the establishment of special units for micro-organisms: algae, fungi, races of yeasts, bacteria, etc. Such special units would belong to the group of referral collections (The Egyptian Natural History Museum) and to the National Gene Bank. The main objectives of the natural history museum are classification and identification, whereas that of the gene bank is the preservation of various strains, their characteristics and their ecological and physiological behaviour.

Some universities and research institutes are concerned with the establishment of biotechnology units, including tissue culture. The studies and research carried out at these units are related to the scientific activities of the National Gene Bank. Co-operation between these units and the gene bank will increase the effectiveness and benefits of national efforts.

3. Units Associated with the Captive Breeding Center

The establishment of a National Captive Breeding Center for the propagation of important and endangered species of plants and animals has been debated thoroughly in the provincial workshops, and it has been strongly recommended that provincial units should specialize in the rearing of limited numbers of species according to the suitability of environmental conditions in each province for the species concerned. It has also been pointed out that propagation of these species can be regarded as a form of investment. For example, the raising of ostriches in Wadi Allaqi, and the endangered animals such as the mountain goat and the Barbary sheep in Wadi Assyuti.

4. Science Gardens and Education Field Stations in Nature Reserves

The provincial discussions attached special significance to the availability of field facilities to supplement the teaching of ecology and natural history in schools and universities. These may take the form of: (1) part of the nature reserve, or (2) a science garden where Egyptian wild plants and animals live as well as some exotic species of special scientific interest. The objective is that school boys and girls can have the opportunity to study these plants and animals in the wild state and to feel and touch them, so that education is gained through all senses.

The aim is that schools and universities in all governorates should have access to one or more field sites representing examples of the wild habitats in nature reserves, or representing fields of natural growth of organisms. Directorates of education in governorates should design time-tables for visits to such sites during semesters or vacations.

This idea has been cordially received by Governors who attended the provincial workshops, and the following sites have been recommended as science gardens:

1. The protectorate of Saluga and Ghazal (Aswan Governorate) is actually performing an educational function, and is visited annually by 4500 students.
2. There is ample opportunity for school children to visit and stay at the Allaqi Biosphere Reserve.
3. An area of about 40 hectares in Kafr Shalabi (Qutur, Gharbia) was used by the army for defensive purposes but was later left disused for some years and turned ruderal. Ecological studies have been carried out on this area (Tanta University) to monitor the changes in environmental conditions and in animal

and plant life. This is a likely site for a science education garden serving the schools of Gharbia Governorate.

4. A coastal area to the west of Damietta city is sufficiently large for a science garden serving the schools of Damietta Governorate.

5. In Shousha (Minya Governorate) there is enough land for establishing a science garden serving the schools of this Governorate. The international garden planned on the eastern side of the Nile can contribute to this educational purpose.

6. An area of 60 hectares is close to the site allotted for the new campus of South of the Wadi University (Qena Governorate) is proposed by the Governorate to be used as a science garden serving the schools of this Governorate.

7. The Governorate of Giza has allotted a site of 155 acres (at the junction between the Alexandria and the Faiyum roads) to become a science-and-education garden.

8. The oldest botanic garden in Egypt is found in the grounds of the Faculty of Agriculture at Mushtuhur, Zagazig University and has numerous exotic plant species. It has an important role to play in support of educational programmes.

These are only examples illustrating that a network of science gardens can be established in all governorates of Egypt to perform an important educational function.

C. INSTITUTIONAL ARRANGEMENTS

1. Preface

Throughout its long history, the Egyptian government showed interest in certain species of plants and animals and protected them either as sacred (e.g. the sacred ibis, the sacred scarab, etc.) or in the pretext of governmental monopoly (e.g. the papyrus plant used in the paper industry). This interest continued until the recent times when the Agricultural Law (Law 53 of 1966) was passed, in which Section 3 dealt with the protection of useful birds, wild animals, etc. This Law empowered the Minister of Agriculture to compile lists of protected animals and plants, and to issue decrees prohibiting harm to all species in certain areas (ecosystem conservation). In 1979, the Minister of Agriculture issued decree 349 to establish the Egyptian Wildlife Service to act as the national instrument in this respect.

Within the authority of Governors, some decrees were issued prohibiting the hunting of birds and wild animals in certain regions, especially the rare and endangered species. Thus, in 1980 the Governors of N. Sinai and the Red Sea

issued decrees for wildlife protection and control of hunting in both Governorates. Furthermore, the Governor of N. Sinai declared the eastern part of Bardaweel Lake a natural protectorate, while the Governor of Matrouh prohibited hunting wild species in his Governorate.

In 1982, the Presidential decree 631 established the Egyptian Environmental Affairs Agency (EEAA) to be affiliated to the Cabinet of Ministers. This was followed in 1983 by the introduction of Law 103 concerning the natural protectorates. It aimed at the conservation of units ecosystems with their plant and animal communities, or to the conservation of units of natural formations with special scientific or cultural significance. This Law empowered the Prime Minister to define the limits of each protectorate as well as the scientific bases of its management. EEAA became the organization which prepares the preliminary studies underlying the Prime Minister's decisions and follows up their implementation. Between 1983 and 1997, the Prime Minister issued decrees establishing 18 protectorates, which represent most of the major ecological zones of Egypt, as has already been outlined in Part 1 of this document.

It is worth noting that the task of most sectors of EEAA is policy-making, planning and supervising implementation of plans carried out by governmental and non-governmental organizations. The EEAA also defines the rules and regulations for the conservation of nature and natural resources. Through the Nature Conservation Sector, the EEAA and the Ministry of Environmental Affairs assumes executive functions for the management, administration and supervision of protected areas within the context of policies and plans formulated by the Nature Conservation Sector on behalf of the EEAA. The EEAA can also assume executive functions to resolve issues detrimental to protected areas but originating in areas adjacent to declared natural protectorates. In order to fully meet the demands of its mandate, the Nature Conservation Sector of the EEAA must have sufficient institutional capacity to enable it to plan, administer, manage and implement all aspects of its mandate defined by Law 102 of 1983, its associated Decrees and relevant International Conventions specific to biodiversity and the conservation of nature and natural resources. The EEAA seeks the assistance of local administrations (governorate in whose territory there is a protected area) and scientific institutions (the university in the same governorate).

When Egypt signed the Biodiversity Convention in 1992, EEAA established the National Biodiversity Unit (NBU) as part of the Central Directorate of Nature Conservation. The NBU is a unit with special character: it is capable of inviting the scientific expertise of governmental and non-governmental organizations to carry out the studies related to biodiversity and its conservation.

2. Management of National Institutions

When the national strategy and the programmes of action set out in it for biodiversity conservation are adopted, an institutional arrangement will be required for the management of these numerous and varied programmes, whose scope extends into the work of many sectors of the central government, universities, research centers, local administrations in governorates and provinces.

When the national strategy is adopted, it becomes a part of the national plan for comprehensive and sustainable development. It would receive the appropriate share of resources as can be decided by the authorities of national planning. Adoption of the action programmes is part of the adoption of the national strategy.

Management of the natural protectorates (18 at present, but will be increased by the end of development plan in 2017) is the executive function of the sector of natural protectorates in EEAA. It performs this function in collaboration with the governorates and scientific institutions. On the other hand, management of the educational units and science gardens in the natural protectorates will be the responsibility of individual governorates (universities and education authorities).

The project of the Egyptian Museum of Natural History is close to the sphere of interests of the Academy of Scientific Research and Technology (Ministry of Scientific Research). For 10 years, the Academy has taken numerous initiatives in this regard, including some feasibility studies in co-operation with the Japanese Aid Organization.

The project of the National Gene Bank falls within the scope of the Agricultural Research Center (Ministry of Agriculture). The Ministry has continuously made great efforts in this field for more than 2 decades.

The project of the Captive Breeding Center is close to the type of work carried out by the Zoo at Giza (Ministry of Agriculture). Members of staff at the Zoo have accumulated a wealth of experience in caring for wild animals. Similarly, the staff of botanic gardens (Ministry of Agriculture) are well-versed in growing wild plants.

The performance and implementation of other components of the national programme concerning research and monitoring, the network of biodiversity data, manpower development and training, and education and awareness verge on the domains of scientific institutions in universities, research centers, educational establishments, the media, non-governmental organizations and various sectors of the central and provincial governments.

3. National Institutional Arrangement

In its executive capacity as the national body responsible for the conservation of nature, natural resources and biodiversity, the Nature Conservation Department of the Ministry of State for Environmental Affairs and the EEAA will develop capacity to coordinate actions and policies with other concerned Line Ministry's, Government Authorities and Agencies.

A co-ordinating instrument is required to:

- * formulate the plans of action and the division of labour between appropriate organizations,**
- * co-ordinate the efforts made by these organizations in order to maximize the benefits,**

This organization arrangement may consist of 3 components:

The first: a leading body combining high political standing with spiritual leadership to inspire successful performance. It is proposed that the national programme should have a Supreme Council under the chairmanship of the First Lady of Egypt and with the membership of:

- * Their Excellencies the Ministers of:
Environment, Agriculture, Scientific Research,
Education, Planning, Information, Rural Development
and Tourism,**
- * Two representatives of non-governmental organizations,**
- * Two representatives of the private sector,**
- * Two experts in ecology and biodiversity.**

The Chairman of the Egyptian Environmental Affairs Agency will be the Secretary General of the Supreme Council. This Council shall guide and oversee actions of the Nature Conservation Sector and the implementation of national plans of action.

The second: A fund for financing the national programme, and managed by EEAA, under the guidance of the Supreme Council,

The third: A technical and executive secretariat of the Supreme Council to assist the Secretary General; this is the National Biodiversity Unit of the Department for Natural Protectorates (EEAA).

Establishment of this organization arrangement shall be effected by a Presidential decree. The statute comprising in detail the mechanisms of performance shall be issued by a Prime Ministerial decree.

Annex

**Programme Priority Activities
(1998 - 2003)**

Programme 1 :

Conservation of the Delta-Mediterranean Wetlands.

This programme aims at establishing and managing three nature reserves in wetlands of international importance (Ramsar-type sites) in: Lake Bardaweel (Zaranik), North Sinai, Lake Manzala (Ashtoom El Gameel), East Delta, Lake Burullus, Middle Delta.

All are brackish-water lakes with access to the Mediterranean.

Lead Responsible Agency:

Department of Nature Conservation (Ministry of State for the Environment).

Others Directly Involved:

The three governorates of North Sinai, Dakahlia and Kafr el-Sheikh.

Planned to start in 1998

Estimated costs (from external sources), US \$:

stage 1	(1998 - 99)	3,000,000
stage 2	(2000 - 2002	9,000,000
stage 3	(per year as from 2002)	1,500,000
Total	(six years)	13,500,000

Objectives

1. to manage the three lakes on bases of sustainable development of natural resources,
 2. to conserve habitat and biota in ample areas of the three lakes, including rehabilitation of damaged habitat types and re-introduction of lost biota,
 3. to insure haven-habitat for migratory birds en-route during their seasonal voyages,
 4. to provide field sites for research (wetland ecosystems) and monitoring (migratory birds) and education and training.
-

Stages of Activities
1. In the first stage (two years: 1998 - 99):

- ecological and socio-economic inventories,
- design of management schemes for conservation including designation of reserves,
- design a plan of action and a system for sustainable management of natural resources, including a land-use plan,
- training of personnel,
- initiate building up of data base (GIS).

2. In the second stage (three years: 2000 - 02):

- application of the conservation scheme (define reserve areas, build reserve infrastructures including research and monitoring facilities, etc.),
- establish a system (with its structures) for sustainable management of fisheries, implement the approved land-use plan,
- recruit necessary staff,
- establish mechanisms for participation of stockholders,

3. As from 2003 onward the system of wetland reserves will run as a national network of northern (coastal) wetlands with affiliation and collaboration with regional (Mediterranean) and world (Ramsar) programmes.

Cost estimates (for each of the three sites), in 1000 US \$.

<u>Stage 1</u> (total \$ 1,000,000 / year)	1998	1999
field equipment	100	150
habitat-biota surveys	50	50
consultancies	100	100
training	30	170
initial data bases	50	100
operation and contingencies	50	50
Total	380	620

Stage 2 (total \$ 3,000,000 / year)	2000	2001	2002
buildings	500	750	
infrastructures	300	500	
fisheries (management)		100	150
bird hunting (management)		100	150
data bank (GIS)		50	50
operation and contingencies	50	50	50
Total	850	1550	400

Salaries, etc. in Egyptian Pounds (1000)	200	200	200
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**Stage 3 (per year / site as from 2003
in US \$ (1000)**

running expenses (fuel, etc.)	100
repair, maintenance	200
consultancies	100
contingencies	100
Total	500

Salaries in Egyptian Pounds,	500,000
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Likely external sources of funding:

- 1. share of GEF project: Conservation of Wetland and Coastal Ecosystems in the Mediterranean Region,**
 - 2. European Union: showed interest in the north Sinai site of Zaranik as part of their support to the Sinai natural reserves,**
 - 3. METAP**
 - 4. funds in Egyptian Pounds to be provided by the Government of Egypt: EEAA, Ministry of State for the Environment.**
-

Programme 2:

Conservation of Southern Red Sea Coastal Lands of Egypt Including the Elba Highlands.

This programme aims at establishing and managing systems of biodiversity conservation (and sustainable development of natural reserves) in three principal systems:

1. Red Sea littoral including the mangrove formations, coral reefs, islands and littoral salt marshes,
2. Red Sea coastal plain including wadi systems debouching into the sea,
3. Red Sea coastal mountains including the mist oases formations represented by the Elba highlands with its rich biodiversity and associated indigenous societies.

Lead Responsible Agency:

Department of Nature Conservation (Ministry of State for the Environment).

Others Directly Involved:

The Governorates of the Red Sea.

Planned to start in 1998.

Estimated costs (from external sources), US \$

stage 1	(1998 - 99)	2,000,000
stage 2	(2000 - 2002)	15,000,000
stage 3	(per year as from 2003)	3,000,000
Total	(six years)	20,000,000

Objectives:

- 1. to manage the Red Sea coastal territories of Egypt in ways that resolve conflicts among users, and that set bases of sustainable development of natural resources,**
 - 2. to conserve habitat and biota in ample areas (reserves), to rehabilitate damaged habitat types and to re-introduce lost biota,**
 - 3. to ensure secure (or least hazardous) passage of migratory birds along the highway of the Red Sea, and to sustain the ecological health of this major biogeographic corridor,**
 - 4. to provide field sites for research (various ecosystem types), monitoring biodiversity, and education and training.**
-

Stages of Activities**1. In the first stage (two years: 1998 - 99)**

- **integration of the results of two projects (the GEF-Red Sea 1994-1998; and the US-AID Mobarak-Gore initiative-coral reefs 1994-1998),and build-up a consolidation base of information on biodiversity of the Egyptian Red Sea coastal territories,**
 - **design management schemes for conservation of various habitat types (and their biota), identification and designation of nature reserves,**
 - **design plan of action and a system for sustainable management of natural resources, including a land-use plan that would be acceptable to stockholders, especially those concerned with:**
 - a- tourism and recreation,**
 - b- fisheries,**
 - c- mineral resources, industry, energy,**
 - d- conservation (nature reserves),**
 - e- infrastructure (roads, airports, ports, settlements, etc.**
),
 - f- life-support systems of indigenous communities (rangelands, farmlands, etc.).**
 - **training of personnel,**
 - **initiate building of data base (GIS),**
 - **establish mechanisms for participation of stockholders.**
-

2. In the second stage (three years: 2000 - 02)

- establish the institutions (management mechanisms and people organizations, legislation, etc.) capable of management of the scheme and its territories,
- establish a series of nature reserves with the necessary infrastructures in each and systems of management as appropriate,
- recruit necessary staff,

3. As from 2003 onward the system of research will run as a national network of sites with affiliation with other national networks of nature reserves and with collaborative relations (programmes) with nature reserves in the Red Sea basin.

This system of reserves will include sites representing:

- islands,
- coral reefs,
- mangrove formations and associated littoral,
- coastal plain including wadi systems,
- mist oases of the Elba highlands.

Cost estimates for the whole programme in 1000 US \$.

Stage 1 because of the information made available through the two on going projects (GEF - USAID) costs of this stage are less than otherwise.

	1988	1989
field equipment	600	500
consultancies	200	200
training	100	150
initial data bases	50	50
operation and contingencies	50	100
Total	1000	1000

Stage 2	2000	2001	2002
buildings, infrastructures, etc. of nature reserves			
islands	750	750	500
coral reef	1000	1000	1000
mangrove and littoral	750	750	600
coastal plain	500	200	200

Elba highlands	2000	1500	1500
consultancies	200	200	200
data bank (GIS)	300	300	200
operation and contingencies	200	200	200
Total	5,700	4,900	4,400
Salaries, etc. in Egyptian Pounds (1000)	750	750	750
Stage 3 (per year / site as from 2003 in US \$ (1000)			
running expenses (fuel, etc.)	1000		
repair, maintenance	1000		
consultancies	600		
contingencies	400		
Total	3000		
Salaries In Egyptian Pounds (1000):	750		

Likely external sources of funding:

- 1. GEF: follow up of the GEF-Red Sea project**
 - 2. USAID: follow up of ongoing coral reef project**
 - 3. World Bank: Red Sea Programme (MENA)**
 - 4. funds in Egyptian Pounds (and contributions in kind) to be provided by the Government of Egypt : EEAA, Ministry of State for the Environment.**
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Programme 3:

Conservation and Sustainable Management of Lake Nasser
(Aswan High Dam).

This programme aims at establishing a system of management of the large man-made lake of the Aswan High Dam. Lake Nasser is the part of this water body within the Egyptian border (north of Lat. 22°N). Lake Nasser (Egyptian part) and Lake Nubia (Sudanese part) represent the principal water reservoir of Egypt. Conservation will aim at keeping this water body healthy (no pollution), and maintaining its biota (including migratory birds) in natural balance, and monitoring biotic invasions (water weeds, tropical disease vectors, etc.):

Management programme will enforce regulations that ensure the sustainable use of the resources of the Lake. System of management will include mechanisms (institutions) that will implement the necessary operations.

Lead Responsible Agency:

Ministry of State for the Environment.

Others Directly Involved:

Ministry of Public Works and Water Resources, High Dam Authority,
The Governorate of Aswan.

Planned to start in 1998.
Estimated costs (from external sources), US \$

stage 1	(1998 - 99)	1,000,000
stage 2	(2000 - 2002)	10,000,000
stage 3	(per year as from 2003)	2,000,000
Total		13,000,000

Objectives:

1. to establish an environment monitoring network that would monitor (a) water quality, (b) biota in water, (c) biota associated with the water body and its fringes, (d) people associated with the lake (users),
2. to establish a research facility for carrying out ecological and limnological studies on the water body and its ecotone fringes (with adjoining deserts),
3. to establish and operate a geographical information system (GIS) for the Lake and adjoining territories,
4. to establish a mechanism and institutional arrangement of the lake in its totality (the lake and its environment), the purpose is to sustain the environmental health of the Lake.

Stages of Activities**Stage 1. (preparatory)**

- review the information available and collected during various programmes of studies (since 1964),
- design management schemes for conservation of various habitat types (and their biota), identification and designation of nature reserves,
- design the units of the monitoring network:
 - a-location,
 - b-equipment,
 - c-programmes,
- consultations with stockholders on management and institutional arrangements;
- initiate building of data base (GIS),
- establish mechanisms for participation of stockholders.

Stage 2. (action)

- establishment of monitoring network and research facility, (rehabilitation of the existing research centre)
- data bank (GIS),
- training of manpower,
- establishment of the necessary institutions.

Stage 3. first year in operation

Cost estimates (x 1000 US \$)

<u>Stage 1</u>	1998	1999
consultancies - contracts	400	100
workshops		200
field work	100	100
operation and contingencies	50	50
Total	550	450

<u>Stage 2</u>	2000	2001	2002
buildings,	1000	2000	2000
equipment	500	1500	1000
GIS		500	
training	750	500	250
Total	2250	4500	3250

<u>Stage 3</u>	2003
monitoring	750
research	1000
data processing	100
running expenses	150
Total	2000 (yearly)

Salaries In Egyptian Pounds not included.

Likely external sources of funding:

1. UNESCO - FAO - UNEP : technical assistance
 2. GEF - World Bank:
 3. Bilateral aid
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Programme 4:
Egyptian Genetic Resources

This programme aims at establishing and managing three national institutions:

- Natural History Museum,
- Gene Bank,
- Captive Breeding Centre.

Lead Responsible Agency:

Ministry of State for Scientific Research (Natural History Museum),
Ministry of Agriculture (Gene Bank, Captive Breeding Centre).

Others Directly Involved:

Ministry of State for the Environment.

Planned to start in 1998.

Estimated costs (from external sources), US \$

The Natural History Museum	100,000,000
The Gene Bank	11,000,000
The Captive Breeding Centre	16,000,000

Total	127,000,000
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stage 1	(1998 - 99)	5,000,000
stage 2	(2000 - 2002)	110,000,000
stage 3	(per year as from 2003)	12,000,000
Total	six years	127,000,000

Objectives:

- 1. The Egyptian Natural History Museum will have the main function of housing complete referral collections of the taxonomic groups of the biota of Egypt. In support of this function, it will perform the following functions:**

surveys and inventories of biodiversity,
 build up and manage the national network of biodiversity data,
 training of taxonomists and curators,
 training of specialists in management of data banks,
 supporting programmes of education and dissemination of biodiversity information.

- 2. Function of the National Gene Bank will include:**

collection and maintenance of genetic resources with special emphasis on races, wild relatives of crop and fodder plants, poultry and farm animals,
 preservation of genetic materials in laboratory (*in vitro*), in fields of the Gene Bank (*ex situ*) and in their natural habitats (*in situ*),
 preservation of genetic materials of micro-organisms,
 research programmes in relevant aspects of bio-technology.

- 3. The Captive Breeding Centre will have the following principal functions:**

ex situ conservation, breeding and husbandry of rare and endangered species of plants and animals,
 ecological and physiological studies on these species, including reproductive processes,
 programmes of re-introduction of these species into their natural habitats, especially in nature reserves,
 support education in schools and out-of schools,
 support research and university postgraduate studies.

Stages of Activities

Stage 1. (1998) Architectural and management designs of the three institutes.

Stage 2. (1999 - 2002)

- i. Building the institutes,**
 - ii. Programmes of training and manpower building,**
 - iii. Initial phases of collection of materials, etc.**
-

Stage 3. (2003 onwards) Functioning of the three institutes, their networks of affiliated units.

Cost estimates US \$ 1000

1. Natural History Museum

Land	40,000
Buildings	38,000
Furniture - equipment	17,000
Training - manpower	5,000
Operation and contingencies	1,000
Total	101,000

2. Gene Bank

Land (provided by Ministry of Agriculture)	
Buildings	2,000
Equipment, etc.	5,000
Library	2,000
Training	1,500
Operation and contingencies	500
Total	11,000

3. Captive Breeding Centre

Land (provided in Wadi Rayyan Reserve)	
Buildings and infrastructures	10,000
Equipment, etc.	3,000
Training (manpower)	1,000
Library	1,000
operation and contingencies	500
Total	15,500

Salaries In Egyptian Pounds not included.

Likely external sources of funding:

- 1. UNESCO - FAO -: technical assistance**
 - 2. Japan aid programme showed interest to support the Natural History Museum.**
 - 3. GEF**
 - 4. Other bilateral aid**
-

Programme 5:**Capacity Building for Conservation and Sustainable Use of Biodiversity in Egypt**

The Department of Nature Conservation of the Ministry of State for the Environment is the principal instrument for coordination of the implementation of the NSAPBC. Implementation of the various components of the Strategy and Action Plan will be the responsibility of various sectors. To do this effectively it needs to be restructured and developed and be provided with trained manpower and technical and operational facilities that would enable it to carry the following functions:

- i. be the focal point for managing the national network of nature reserves (of all categories),
- ii. be the parent body of the national biodiversity unit (NBU) that carries out inventories of Egyptian biodiversity including surveys of habitat types (nomination of nature reserves) and species diversity (feeding referral collection and biodiversity data),
- iii. be the institution for providing technical assistance and support to provincial affiliates of the Egyptian Natural History Museum, Egyptian Gene Bank, National Captive Breeding Centre,
- iv. be the institution for providing technical assistance and support to the biodiversity education network of Science Gardens and Education Field Stations,
- v. be the focal point for overseeing the enforcement of national laws concerned with protection of biodiversity, and the national focal point for ensuring compliance with requirements of international conventions concerned with conservation of biodiversity.

Lead Coordinating Agency:

Ministry of State for the Environment - Egyptian Environmental Affairs Agency (EEAA)

Others Directly Involved:

Governorates, Ministry of Education, Universities, Research Centres, Ministry of Agriculture, etc.

Planned to start in 1998.

Single Stage : 1998 - 1999 (two years).

Objectives:
1. To implement:

**National Programme for Manpower Development,
National Programme for Research and Monitoring,
National Network of biodiversity Data,
National Programme for Education and .
supporting programmes of education and dissemination of
biodiversity information.**

2. To build-up the technical capabilities (equipment, electronic networks, trained personnel) of the Department of Nature Conservation and its associate units and institutions.**3. To establish a functional mechanism for the relationships of mutual support between the Department and the non-governmental organizations (NGOs) and civil society bodies, and between the Departments and government bodies concerned with conservation of biodiversity.**

Activities and cost estimates (x 1000 US \$)

1. Manpower Development Programme	1000
2. Research and monitoring programme	2000
3. Data network	1000
4. Education and awareness programme	1000
5. Technical capability of Department	1500
6. National mechanisms	500

Total**7000**

Salaries to be paid in Egyptian pounds not included. Yearly operational cost, as from 2000 onward, is US \$ 2,000,000 (equipment)

Likely external sources of funding:

- 1. UNESCO - UNEP - CBD Secretariat, technical assistance**
 - 2. GEF - UNDP**
 - 3. Other bilateral aid**
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Programme 6:**Preparation and implementation of National
Biotechnology/Biosafety Frameworks**

Biotechnology will contribute substantively to the improvement of agriculture, fisheries, health and environment in Egypt. However, to date there is no national biotechnology policy or biosafety framework irrespective of the fact that living modified organisms (LMOs) and other biotechnology products are being developed and commercialized in Egypt. LMOs are also traded internationally and their movement into and out of Egypt is inevitable.

Objectives:

To promote safe development and application of biotechnology for conservation and sustainable use of genetic diversity.

Stages of Activities:

1. Stock taking and assessment of existing biotechnologies and state of safety in their application.
2. Identification and analysis of options for biotechnology applications and implementation of biosafety frameworks.
3. Preparation of national biotechnology policy and biosafety frameworks.
4. Implementation of priority activities and information exchange requirements.

Lead agencies:

- Ministry of Agriculture and Ministry of Environment. Planned to start in 1998.

Estimated cost:

US \$4,000,000.

Likely sources of funding:

1. GEF
 2. USAID
 3. Other bilateral aid
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