MANAGEMENT PLAN

WADI EL-RAYAN PROTECTED AREA

Introduced by
Wadi El-Rayan Protected Area staff
EEAA

2002-2006

Prepared by

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List of abbreviations

DGCD	Directorate General Cooperation Development (Italian Foreign Ministry)
EEAA	Egyptian Environmental Affairs Agency
EIA	Environmental Impact Assessment
GOE	Government Of Egypt
IUCN	World Conservation Union
NCS	Nature Conservation Sector
PA	Protected Area
PAMU	Protected Area Management Unit
PCU	Programme coordination unit
WRPA	Wadi El-Rayan Protected Area
WRPAMU	Wadi El-Rayan Protected Area Management unit

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EXECUTIVE SUMMARY

Wadi El-Rayan Protected Area has been declared by prime-ministerial decree No. 943 in 1989 according to law No. 102/1983 of the protected areas in Egypt, and is directed by the Nature Conservation Sector (NCS) of the Egyptian Environmental Affairs Agency (EEAA). The overall management goal of the protected area is the protection of the natural resources in accordance with the declaration decree of the protected area.

Using the 1994 IUCN protected area management categories, WRPA has now been classified in a two-category system. A category II part managed mainly for ecosystem protection and integrity, environmental education and ecotourism, and a category VI part managed mainly for the sustainable use of natural ecosystems, environmental education and recreation.

WRPA is a desert area situated in the Fayoum Governorate of the Western Desert of Egypt. In the nineteen seventies two lakes were created in the lower portion of Wadi El-Rayan sub-depression to channel out excess agricultural drainage water. The creation of a large body of water in this hyper-arid area had a striking ecological impact and new species of plants, mammals, birds and invertebrates moved to Wadi El-Rayan area.

The main management issues of WRPA are the variety of agencies and authorities that operate inside WRPA, including the Ministry of Agriculture and Land Reclamation, Ministry of Petroleum, Ministry of Irrigation, Ministry of Tourism, Ministry of Defence and Ministry of Interior. It is also a major site of economic development and a popular site of attraction for local and foreign visitors. The current rate of water extraction and evaporation from the Wadi El-Rayan lake system, exceeds the inflow, and this places the future of the lake system in jeopardy.

The main external management constraints are the weak collaboration among the Egyptian authorities involved with WRPA, the continuous expansion in both volume and variety of the human activities inside WRPA, and the overuse of some resources of the protected area (e.g. the water of the lakes). Inadequate funding for running expenses, training, communication tools, etc., and the lack of permanent operating staff inside the protected area are the main internal constraints.

Zoning is the division of the protected area into zones of homogenous use and is an essential tool for the management of a protected area, which allows differential management considering the different zones characteristics. WRPA has zones permitting zero impact, low impact, moderate impact and high impact.

Development of clear strategies for the management of WRPA is one of the desired outputs of this management plan covering the period 2002-2006 and the strategies include collaborative management, improving control over water use in the lake system, adaptive management, and focusing at the management zone level.

The Governor of El-Fayoum expressed his appreciation to WRPA for initiating the management planning process at WRPA and described the Management Plan as an essential tool to achieve the required level of coordination between the various public agencies active in the Protected Area.

All key stakeholders are being informed and involved from the start of this management plan continuously. The management plan will be forwarded to the appropriate collaborating authorities for endorsement.

The natural resources of the protected area are under threat from the economic and human activities within WRPA but sound management practices, law enforcement (in collaboration with stakeholders) and monitoring can ensure the sustainable use of the natural resources.

The public use inside the area has been identified to include eco-tourism activities, human economic activities and human settlement.

The development of the public awareness program in WRPA is a main and important component of the management plan of the protected area.

The management strategy is being achieved through using the following management tools; environmental regulations and law enforcement, communication, documenting, monitoring and research, GIS and remote sensing, and EIA.

The critical resources needed for the management of WRPA are infrastructure and equipment, financing and staffing and are described in the plan.

The WRPA project was funded by the Italian-Egyptian Environmental Program in the first phase (March 1998 - February 2001) and implemented by EEAA with international technical assistance from the World Conservation Union (IUCN). The transition phase of the WRPA project started in June 2001 and ceased in December 2002. As one of the components of a broader support programme to the Egyptian Environmental Affairs Agency (EEAA), Nature Conservation Sector (NCS), funded by the Directorate General Co-operation Development (DGCD) of the Italian Foreign Ministry, the total proposed budget of the second phase of WRPA project is 6,024,000 L.E. until December 2005 shared with the NCS/EEAA.

PART 1

1. INTRODUCTION

1.1. Background

Wadi El-Rayan Protected Area (WRPA) was declared by the Prime-Ministerial Decree No. 943 in 1989 according to Law No. 102/1983 of the protected areas in Egypt.

Wadi El-Rayan Protected Area (WRPA) is one of the protected areas of Egypt administered by the Nature Conservation Sector (NCS) of the Egyptian Environmental Affairs Agency (EEAA). (Figures 1 and 2: Appendix 1)

The WRPA project was funded by the Italian-Egyptian Environmental Program in the first phase (March 1998 - February 2001) and implemented by EEAA with international technical assistance from the World Conservation Union (IUCN). The transition phase of the WRPA project started in June 2001 and will cease in June 2002 with the possibility to continue until the start of the second phase in January 2003.

1.2. Conservation objectives

Using the 1994 IUCN categories, WRPA has now been classified in a two-category system as follows: (Figure 3: Appendix 1)

CATEGORY II area:
A protected area managed mainly for ecosystem protection and integrity, environmental education and eco-tourism

CATEGORY VI area:
Protected area managed mainly for the sustainable use of natural ecosystems, environmental education and recreation

The management objectives and goals are discussed in part 4 of this plan.

PART 2

2. SITE DESCRIPTION AND EVALUATION

2.1. General Information

Wadi El-Rayan occupies a depression in the northern part of the western desert of Egypt. It is situated between longitude 29°00' 00" and 29°24' 11" E and latitude 30°00' 00" and 30° 34' 00" N. Wadi El-Rayan protected area located 210 km right angle south to the Mediterranean coast at co-ordinates of 30°00' N and 30°18' E. The main supply of water is underground water, and 4 natural sulphured water springs. The total area of the protected area is 1759 km^2. (Figure 2: Appendix 1)

Wadi El-Rayan is a desert area situated in the Fayoum Governorate of the Western Desert of Egypt. The area has a special historical significance as a major crossroad that was used for many centuries by travellers between the Nile Valley and the oases of the Western Desert. Remains of human settlements from Egyptian and Roman-Greek eras are found in the area (Fakhry, 1957). (Figure 1: Appendix 1)

In the seventies two lakes were created in the lower portion of Wadi El Rayan sub-depression to channel out excess agricultural drainage water in order to slow-down the increase of the water-table in the Fayoum main depression and in the Qarun lake. The creation of a large body of water in this hyper-arid area had a striking ecological impact: new species of plants, mammals, birds and invertebrates moved to Wadi El Rayan area (IUCN, 2000a).

2.2. Physical Settings

Climate

The climate is typically Saharan, hot and dry with scanty winter rain and bright sunshine throughout the year. According to the bio-climatic provinces of Egypt defined by Ayyad and Ghabbour (1986), the area is hyper-arid with mild winters and hot summers. The annual average of the precipitation rate is 10.1 mm. The highest rainfall occurs in December (40 % of annual rain) and the lowest (0%) in August. The average ambient relative humidity is 51%. The direction of the wind is, for most of the year, from the North, varying North-West or North-East, after Saleh, (1988).

Table (1) Summary of the monthly means of 50 years of temperature records (Saleh, 1988)

TEMPERATURE VALUES	WINTER	SUMMER
Mean	13.7°C	28.5°C
Absolute minimum/maximum	-1.2°C	48.8°C
Mean amplitude of diurnal fluctuations	14.2°C	17°C

Geology and Geomorphology

Wadi El Rayan is one of the three sub-basins that compose the large circular depression of Fayoum. The Fayoum depression is a marine sedimentary basin that has undergone alternating periods of erosion and deposition since the late Cretaceous period 70 million years ago (El Bedewy et al., 1998). The present depression was formed at least 1.8 million years ago, probably by wind erosion in the desert.

The geology and geomorphology of Wadi El Rayan have been extensively investigated starting from the end of the XIX century (Schweinfurth, 1886; Blankchenhorn, 1901; Beadnell, 1905; Bagnold, 1935; El Baz, 1984). Wadi El Rayan formation is essentially made of Middle Eocene, Pliocene, Early and Late Pleistocene and Halocene times. Badnell (1905), showed that the middle Eocene rocks, clays, marls and limestone with *Nummulites cezehensis*, a foraminifer species, formed the oldest beds found in the area. The land exposure from late Eocene to late Oligocene (40 to 30 million years ago) allowed the ancient "Lybian river" to begin eroding the thick Eocene sediments and laid down some of Egypt's most valuable fossil deposits of early mammals, primates, reptile and fish species. Schweinfurth (1886) discovered the first fossil vertebrate (whale remains of the most common species *Zeuglodon isis*) in Fayoum depression. The following studies and explorations showed that in WRPA, especially in the areas of Wadi Hytan and Garet Gehannam, four Eocene formation are present, all of them marine. A paleontological and paleoenvironmental report that summarize the existing data about the area of Wadi El Rayan has been finalized by the PAMU of WRPA with the consultancy of paleontologists and geologists (El Bedewy et al., 1998).

Regarding the different landform types of Wadi El Rayan depression, Abd El-Aal (1984) reports that they have different origin: alluvial, alluvial-colluvial and desert deposits. The Wadi El Rayan depression is an important site for the deposition of Eolian sand in the Western Desert. Extensive dune fields run the length of WRPA oriented NNW to SSE and, probably, they are formed within the Holocene period as a result of disintegration and transportation of friable stones. The dunes vary in length from a few hundred meters to thirty km and may reach the height of 30 m.

Table (2) is providing the vital statistics about the protected area as a whole.

Table (2): WRPA Summary Statistics Sheet

WADI EL-RAYAN PROTECTED AREA		
Location	Fayoum Governorate	
Climatic Zone	Hyper-Arid Saharan	
Area	175.900 ha (1759 km^2)	
Declaration	Prime-Ministerial Decree N. 943/1989	
Category	Type II and VI of IUCN categories	
Habitats	**Area (ha)**	**Proportion (%)**
Oasis	1935	1.1
Desert	160.949	91.5
Wetland	1583	0.9
Lakes	11.434	6.5
Taxa	**Number of Species**	**Last Update**
Plants	38	2002
Mammals	24	2002
Birds	164	2002
Reptiles	14	1999
Fish	29	2001
Terrestrial Invertebrates	113	1992
Aquatic Invertebrates	11 families	1999
Human Activities	**Area (Feddans)**	**No of operators**
Land Reclamation	4575	12 240 approx.
Fisheries	16236.28 (2 lakes and channel)	
Aquacultures	1300	35
Oil Extraction	71	23
Salt Mining	Negligible	50 approx.
Eco-Tourist Services	24.1	11 operators and approx. 150 000 tourists
Coptic Monastery	11.36	25

2.3. Ecological settings

Monitoring reports of Wadi El-Rayan have been introducing the detailed information about the area, (IUCN, 2000b; IUCN, 2001and EEAA, 2002)

2.4. Cultural and Social Settings

The environmental profile of WRPA has been presenting the available information in this matter, (IUCN, 2000a).

2.5. Values of the resources and contribution to PA network

The environmental profile of WRPA has been presenting the available information in this matter, (IUCN, 2000a).

PART 3

3. MANAGEMENT ISSUES AND CONSTRAINTS

3.1. Management issues

The general management issues of Wadi El-Rayan Protected Area have been identified as follows:

The variety of other agencies and authorities that operate inside WRPA which are represented in the Ministry of Agriculture and Land Reclamation, Ministry of Petroleum, Ministry of Irrigation, Ministry of Defence and Ministry of Interior.

Wadi El-Rayan Protected Area as a main popular site of attraction for local and foreign visitors and as an important ecotourism site.

Wadi El-Rayan Protected Area as a major site of continuous economic development.

The current rate of water inflow into the Wadi El-Rayan lake system is less than the total rate of water use and evaporation and this places the future of the lake system in jeopardy.

3.2. Constraints

External

The weak collaboration among the Egyptian authorities especially those stakeholders involved with WRPA.
The continuous expansion in both volume and variety of the human activities inside WRPA.
The low conservation awareness of the local people, which constitute 95% of the visitors to WRPA.
Lack of representatives of some economic activities inside the protected area (e.g. traditional boat fishermen).

Internal

Inadequate annual funding of the protected area (running expenses, training, communication tools, etc….).
Lack of permanent operating staff inside the protected area except the protected area manager.

PART 4

4. MANAGEMENT GOALS AND OBJECTIVES

4.1. Overall goal and objectives

The overall management goal of the protected area is the protection of the natural resources in accordance with the declaration decree of the protected area (943/1989) and follows the general protection rules of the law 102/1983.

The protected area as a whole has been identified to follow two broad conservation management objectives using the category classification system of IUCN and these are category II and VI (see Figure 3: Appendix 1). Each category has its own management objectives.

Category II

Management objectives

To protect natural and scenic areas of national and international significance for scientific, educational, recreational and tourist purposes;

To perpetuate, in as natural a state as possible, representative examples of physiographic regions, biotic communities, genetic resources, and species, to provide ecological stability and diversity;

To manage visitor use for educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state;

To prevent a future exploitation or occupation inimical to the purposes of designation;

To maintain respect for the ecological, geomorphologic, sacred or aesthetic attributes which warranted designation; and

To take into account the needs of indigenous people, including subsistence resource use, in so far as these will not adversely affect the other objectives of management.

Category VI

Management objectives

To protect and maintain the biological diversity and other natural values of the area in the long term;

To promote sound management practices for sustainable production purposes;

To protect the natural resource base from being alienated for other land-use purposes that would be detrimental the area's biological diversity; and

To contribute to regional and national development.

4.2. Specific objectives

The specific management objectives of WRPA are grouped under the following three headings and apply in both the category II and category VI areas.

1. Natural Resources Management
   - Biodiversity
   - Water resources
   - Geological formations and fossil sites
2. Human and economic activities
3. Public awareness and environmental education programs

Each of the previous issues has specific goals to be achieved, which can be summarized below:

1. Natural Resources Management

Biodiversity (Conservation of biodiversity)

Preventing of illegal hunting of biodiversity elements inside WRPA (water birds, falcons and gazelles).

Preventing all other illegal actions against the elements of biodiversity inside WRPA (e.g. removal of plant species)

Limiting of all sorts of habitat destruction that can come through economic activities, unwise and uneducated visitors and different sorts of human settlements as land reclamation schemes and Coptic monastery.

Limiting of man made fires that threat the biodiversity inside the natural wetland systems of Rayan Lakes.

Water resources

Monitoring of water quality of the two Rayan lakes and their connecting canal.

Monitoring of inlet to outlet of the operating fish farming activities

Preventing of any illegal discharging of different pollution sources to the water of the lakes e.g. illegal fishing activities that use decayed remains, vehicle cleaning beside the body of the lake system….etc.

Limiting of man made fires that increase the enrichement of the water of the lakes with inorganic elements.

Avoiding the wastewater discharging from the land reclamation scheme.

Geological formation and fossil sites

Keeping the naturally stored fossil remains (of about 400 vertebrate whale skeletons under the soil surfaceand more than 38 fossil skeletons above the soil surface) of Wadi El-Hitan site.

Developing of a site plan that ensuring the control of the public use of the area for the scientific, educational and eco-tourism purposes.

Controlling the illegal access of the vehicle tours to the valley that can adversely affect the fossil remains.

2. Human and economic activities

Promoting wise exploitation of the natural resources present such as the water of the lakes, which can be greatly affected by the fish farming and land reclamation activities.

Conserving the natural resources of the protected area through the high level control of the licensed activities (license format and restricted eligibility for the EIA studies of the different activities).

Identifying and promoting the development of potential activities such as ecotourism in alignment of management goals.

3. Public awareness and environmental education programs

Promoting WRPA as a valuable recreational and educational area.

Influencing policy makers and other key players by highlighting the economic significance of the protected area and how judicious management can create sustainable and growing real income.

Improving the accountability of license holders operating inside the protected area.

Increasing the targets of environmental education and awareness program by WRPA staff (school children, lower-middle income Egyptian nationals and upper-middle class Egyptian nationals and foreigners).

PART 5

5. ZONE PLAN

Zoning is the division of the protected area into zones of homogenous use and legislation: each zone with different characteristics (biologic, geologic, etc.) will have a different use. Zoning is an essential tool for the management of a protected area, which allows differential management considering the different zone's characteristics.

Wadi El-Rayan Protected Area includes areas with various environmental characteristics, which determine different ecological, tourism, educational and economic vocations.

Each site of Wadi El-Rayan Protected Area has been allocated one of the management zone categories listed below in accordance with the NCS management planning system:

Table (3): Zoning system of WRPA

Protection Level	Name of Zone	Activities permitted
Zero impact A	Special Protection Zone	Under investigation. Visitor use and educational plan is urgently needed
	Strict Natural Zone	Studies and research under specific authorization and control. Habitat exploitation is prohibited. Tourism and Economic activities are not allowed.
Low impact B	Reserve Protection Zone	Studies and research under specific authorization and control Eco-tourism only after authorization of WRPA.
Moderate impact C	Recreational Zone	Tourism and tourism facilities and recreation Bird watching Camping Pathway for the traditional fishing activities
High impact D	Development Zone	Controlled habitat exploitation Long-term high impact projects of the black and grey lists according to the Egyptian settings High-density tourism is allowed.

The following general rules apply to the whole protected area and all zones:

Prohibited activities:

- Hunting, capturing, damaging or disturbing wildlife
- Damaging or collecting vegetation (including firewood) and grazing
- Damaging or collecting fossils of geological formations
- Any activity modifying the natural landscape
- Liquid or solid waste discharging
- Driving out of the demarcated tracks or walking outside the demarcated area
- Introduction of pets, exotic animals or plants
- Camping outside the demarcated area
- Using sound systems or any other source of disturbance
- Lighting fires outside designated areas
- Mining or quarrying without EEAA authorisation
- Building permanent or semi-permanent structures or infrastructure including roads without EEAA authorization
- Using an engine powered boat on the lakes
- Building a structure closer than 200 m from the lake edge

Each zone has additional rules specific to the zone

5.1. Zoning system

Four zone types with different degrees of protection level will be described and explained (Figure 4: Appendix 1).

5.1.1. Zone A: Special Protection Zone

This zone is fully under investigation. A special team is recommended to study the area and prepare a visitor use and education plan for the area. This zone includes high paleontological values:

Zone description

The above and under soil surface part of Wadi El-Hitan which is located in the fossil area located northwest of the protected area. This part is limited with the GPS coordinates: N 29.29647, E 30.05411 and N 29.29228, E 30.03870 and N 29.26612, E 30.01765 and N 29.26968, E 30.04240. The total area of this part is 7.00 km^2. This part is containing an enormous number of vertebrate fossil skeletons of the old middle Eocene whale (40-43 million years ago).

Zone Rules

The rules for this zone will be drawn up by the special planning team

5.1.2. Zone A: Strict Natural Zone

The areas of unique ecosystem, which is used by the key wildlife species inside the protected area, have been classified as zone A. This zone is under strict control and total protection. The total area of this zone is 73.90 km^2, 4.2% of the total area of the protected area.

Zone description

(See also IUCN 2000a, The Environmental Profile of WRPA andEEAA 2001, report on the third year of the monitoring program)

Two zone A areas have been identified inside WRPA.

1. The first one is the **Spring Area** located south west of the protected area and limited with the GPS coordinates: N 29.10645, E 30.30554 and N 29.06877, E 30.33292 and N 29.02038, E 30.26481 and N 29.06744, E 30.22659. The total surface area is 53.33 km^2. The key-species *Gazella dorcas dorcas* and other wild life species such as fennec fox, sand fox and Egyptian golden jackal are also present. Those species are supported by the high plant diversity (with key-species *Nitraria* retusa and *Alhagi graecorum*) in the area and 3 natural springs. The fourth spring is zoned as Zone B where low impact ecotourism is permitted.
2. The second is the **Rowayan Area** located also in the southwest of the protected area just north to the first zone and is limited with the GPS coordinates: N 29.12808, E 30.24724 and N 29.12527, E 30.22013 and N 29.14209, E 30.18640 and N 29.162321, E 30.21640. The total surface area is 20.57 Km^2. The only small community of the key-species dorcas gazelle present in WRPA is found moving between this area and the first one. The habitat is quite similar to the first one with a mountain separating the two areas.

The two Zone A areas will be linked up in a way that excludes the Coptic Monastery but includes the gazelle movement routes.

Inside this zone, all the sorts of natural resources are completely protected and under strict control.

Zone Rules

- ❖ Public access is prohibited except for scientific activities with written authorization from NCS.
- ❖ No agriculture or livestock is permitted

5.1.3. Zone B: Reserve Protection Zone _____

The areas of a) special importance for resident and migratory birds, and b) characteristic landscapes have been classified as zone B. This zone is under high control and total protection for the natural resources. The total area of this zone is 24.92 km^2, 1.4% of the total area of the protected area.

Zone description

(See also IUCN 2000a, The Environmental Profile of WRPA andEEAA 2001, report on the third year of the monitoring program)

Two zone B areas have been identified inside WRPA.

The area south of the Lower Rayan Lake and limited with the GPS coordinates: N 29.12099, E 30.41873 and N 29.09338, E 30.42061 and N 29.05785, E 30.42468 and N 29.09196, E 30.35669. The total area of this part is 24.92 km^2. This area has a special importance as a resting-place for the migratory bird species passing WRPA. It also represents the most important site for nesting and

reproduction of birds inside WRPA. The area has characteristic landscape of sand dunes overlapping with the southern part of the Lower Rayan Lake.

Spring Area walking trails and view sites. This area extends from the visitor car park north of the spring area to the first spring. Visitors are encouraged to walk into a small section of the Spring Area to experience the natural beauty of the area. Low impact trails and view-sites have been made for visitors.

Inside zone B areas, all the sorts of natural resources are completely protected and under high-level control.

Zone Rules

- Public access is prohibited except for visitors viewing wildlife and landscapes.
- Scientific activities with written authorization from NCS
- Navigation with any kind of boats (with or without engine) is prohibited, except for scientific activities authorized by NCS
- All kinds of fishing activities are not allowed
- No floating structures are allowed.
- No agriculture or livestock is permitted

5.1.4. Zone C: Recreational Zone

The area of this zone is designated for a) eco-tourism and environmental education activities (visitor center tracks and bird watching sites), b) recreational uses (safari camp, cafeterias and camping site), c) high landscape values and d) less impact activities as traditional boat fishing. The total area of this zone is 49.5 km^2, 2.8 % of the total area of the protected area.

Zone description

(See also IUCN 2000a, The Environmental Profile of WRPA andEEAA 2001, report on the third year of the monitoring program)

One zone C area has been identified inside WRPA. The strip surrounds the Upper and Lower Rayan Lakes. The total area of this part is about 49.5 km^2. In the area of this zone only infrastructure for the protected area management or for educational and eco-tourism purposes are permitted. The only infrastructure related to the traditional fishing is the ice factory (solar panel system) and the small fish collection units, which are representing a negligible area as a whole.

Traditional fishery activities have been carried on in the Wadi El-Rayan lakes since 1980. First by a private company, and then since 1983 by the General Authority for Development of fish Resources. The General Authority for Development of fish Resources implemented a policy to develop the lakes which includes transplanting fish fry of different species into the lakes, controlling fishing gear, fishing seasons, the numbers of boats and fishermen. To more control and manage fisheries the lakes now have five fish-collecting units as following:

First Lake.

1- Main fish-collecting unit.
2- Abo Rokba fish-collecting unit.
3- Baccarat fish-collecting unit.

Second lake

1- Waterfall fish-collecting unit.
2- Horria fish-collecting unit.

The fish in Rayan Lakes are divided into two groups: resident species that arrived in the drainage water from Fayoum Governorate, and those that were introduced as a fry in order to increase fish production in the lakes. (See the species list)

Zone Rules

- ❖ Only infrastructure for educational and eco-tourism purposes after approval from EEAA
- ❖ Construction of new tracks, only or for educational and eco-tourism purposes, and after EEAA approval;
- ❖ No floating structures are allowed
- ❖ No commercial fishing closer than 150 m from the lake edge

5.1.5. Zone D: Development Zone

The areas of this zone are designated for different kinds of activities that are fully under official license: oil extraction, agriculture, fish farming, infrastructure for eco-tourism and recreation. All the activities must be licensed by EEAA after submission of an exhaustive Environmental Impact Assessment (EIA) following the "Guidelines for Egyptian EIA". EEAA has the right to monitor that existing establishments are conformed to the requirements of the law No. 4/1994 and law 102/1983.

Zone description

(See also IUCN 2000a, The Environmental Profile of WRPA andEEAA 2001, report on the third year of the monitoring program)

There are three types of zone D area in WRPA

1. The first area is the oil extraction field located on the north-eastern corner of WRPA. The area has low landscape, geological and paleontological and biodiversity values.

2. The second area is the land reclamation area, which is divided into two divisions:

a) The 1st division (2 parts) is located on the other side of the asphalt road from the petroleum field and near the main gate of the protected area. The total area of this division is 3.92 km^2 and limited with the GPS coordinates: part 1: N 29.34501 E 30.42448 and N 29.34029, E 30.42559 and N 29.33722, E 30.41406 and N 29.33649, E 30.40014 and N 29.34966, E 30.40524. Part 2: N 29.35221, E 30.45013 and N 29.34618, E 30.45404 and N 29.33984, E 30.45375 and N 29.34440, E 30.43657 and N 29.35312, E 30.44116. The area has low landscape, geological and paleontological and biodiversity values.

b) The 2nd division includes the reclamation area (Saiedna El-Khedr reclamation village) of an area of 48.134 km^2, and limited with GPS coordinates: N 29.20320, E 30.32731 and N 29.20295, E 30.27968 and N 29.13512, E 30.29092 and N 29.12995, E 30.39348 and N 29.12101, E 30.38212 and N 29.17719, E 30.34407.

3. The third area is that of fish farming activities along both sides of the junction canal between the two Rayan Lakes, limited with GPS coordinates: N 29.23184, E

30.45002 and N 29.20805, E 30.45855 and N 29.19965, E 30.43898 and N 29.21216, E 30.42371 and N 29.22276, E 30.42484, and with total area of 6.4 km^2.

Fish farming is a relatively new activity in Wadi El-Rayan Protected Area and comprises an intensive fish farming section situated immediately below the upper lake, and an extensive fish farming section above the lower lake.

Intensive fish farming has been in operation for four years and there are currently 90 ponds covering an area of 30 feddan in the section. Extensive fish farming has only been operating for a year. There are a total of 68 licensed fish farms in the extensive section of which only 12 are currently in operation.

Zone Rules

- The licensee must strictly follow the terms of the EEAA license;
- Infrastructure, including roads, should be compatible with the environmental needs.
- Solid wastes have to be regularly collected and conveyed to the nearest authorized waste disposal facility
- Sewage must be collected into septic tanks and the tanks must be cleaned regularly.

The Prime Minister's Decree No 264/1994 establishes that the total area for economic activities allowed must not exceed 10% of the total extension of the protected area. The total extension of the D zone is 119.744 km2, 7 % of the total area of the protected area. Adding the 2.8% surface occupied by the eco-tourism activities, the 10% limit has almost been reached. Consequently, no more protected area land should be allowed for human activities.

PART 6

6. MANAGEMENT STRATEGIES AND ACTIONS

Development of clear strategies for the management of WRPA is one of the desired outputs of this management plan covering the period 2002-2006. The strategies as well as the future well-studied actions will contribute to the process of effective environmental management in the protected area.

The following specific management strategies and actions have been adopted:

6.1. Collaborative Management will be given a high priority.

The successful management of the protected area requires the support of stakeholders in the public and private sectors. All main key stakeholders at Governorate level, including the Governor, will be informed and involved from the start of the management planning process, and on an ongoing basis. A copy of the management plan in Arabic and English will be discussed with the appropriate collaborating authorities for endorsement.

At a special meeting with the Governor of El-Fayoum, Professor Dr. Saad Nasaar, held on 14 October 2002, the Governor expressed his appreciation to the WRPA Manager for initiating the management planning process for WRPA. He described the Management Plan as an essential tool to achieve the required level of coordination between the various public agencies active in the Protected Area and undertook to advise all the relevant departments in the Governorate that they should give the Management Plan their full support.

The following departments have already given their formal support of the Management Plan.

The Irrigation and Water Resources Department
The Tourism Department
The General Authority for Development of Fish Resources.
The Water and Environmental Police

A meeting was held with the Security Department on 15 October 2002 to discuss the Management Plan.

Meetings with other key stakeholders will be held and meeting schedules will be given in the 2002 – 2003 Operating Plan.

6.2. Special attention will be given to improving control over water use in the lake system

Inflow into the tunnel that feeds the upper lake is the surplus runoff water from the El-Fayoum irrigation system and the amount varies depending on the amount of water recycled for irrigation before it reaches the tunnel. According to the Water Resources Department the extraction and evaporation of water from the lake system is currently greater than the inflow, and the allocation to each user will have to be reduced.

It is also their recommendation that the Nature Conservation Sector should request a technical meeting on water supply to the Wadi El- Rayan lakes, held under the chairmanship of the Governor of Fayoum. The meeting will discuss the water allocations

to the different water users in the system. WRPA staff supports the recommendation and NCS will arrange the meeting.

6.3. Adaptive management will be applied to ensure that the plan objectives are achieved.

Results obtained from the monitoring programs will be continuously evaluated and the management actions will be adapted where necessary to ensure that the management objectives set out in the management plan are being achieved.

6.4. Management actions will cover the three core protected area functions of natural resources management, public use and public awareness and community outreach.

Each function is described below.

Natural Resources management

The management of natural resources is the priority among the other objectives of the protected area. The natural resources can be simply classified into:

A. Biotic elements

1. Biodiversity elements

a. Flora

b. Fauna

Mammals
Birds
Invertebrates
Amphibians
Reptiles
Fish

B. Abiotic elements

1. Water resources and wetlands

- Lakes and natural springs

2. Geological formations
3. Paleontological sites
4. Cultural heritage elements.

Each of the above resource elements will be discussed under the identified zonation system of the protected area. The management strategy for the biotic elements can be principally represented in the spring and Rowayan areas of zone A (Strict Natural Zone). The strategy of the abiotic elements can be represented in a) the Fossil Area - Wadi El-Hitan - of zone A (Special Protection Zone) and b) the two Rayan Lakes which are in zones B, C and D.

Public Use

The public use inside the area has been identified to include one or all of the following a) eco-tourism activities b) human economic activities or c) human settlement.

Public Awareness and Community Outreach

The development of the public awareness program in WRPA is a main and important component of the management plan of the protected area. The role of public awareness program is clear on the light of the potential of WRPA as a main popular as well as economic development site. The different targets of the program have been identified for each zone inside the protected area. The components of the program for each of these targets inside each zone have been also identified. The overall targets as well as the different components of the program constitute the public awareness program for the protected area as a whole.

6.5. Management will be focused at the management zone level.

Each zone has its own unique management objective, and management actions will be focused mainly at the management zone level to ensure that the specific management objectives of each zone are achieved.

The management actions are described in each zone below.

6.5.1. Zone A: Special Protection Zone

Fossil Area (Wadi El-Hitan)

Natural Resources management

Geological formations as well as paleontological sites are the main resources in this special protection zone. Magnificent Saharan scenes as well as interesting vertebrate fossils constitute the main targets to apply the management strategy of the protected area in this zone. Those skeletons of whales are date back to about 40 million years ago, scattered in Wadi El-Hitan and embedded in a thin layer of sand and parts of them are exposed to the surface. The valley contains about 400 whale skeletons some of them are exposed and some others are not.

The strategy of this zone is the extreme protection of these natural and cultural resources. The protection strategy is coming parallel with the wise investment of the area from the eco-tourism point of view. The protection strategy has been identified to serve the following: a) safeguard structural landscape features and whale skeletons, b) ensure that future generations have the opportunity to experience understanding and enjoyment of the fossil area and its whales and c) maintain respect for the ecological and geomorphological values. A permanent staff outpost is planned to control visitors in this sensitive and remote area.

Application will be made for the site to be listed as a World Heritage Site.

Public Use

The public uses of this zone are limited clearly to the well-controlled eco-tourism forms. The following forms of eco-tourism are coming to be the acting ones in the area.

a) An ecotourism site plan will be developed in the operational plan with the assistance of experts, following the guidelines developed in the first phase of the Italian project, (El-kamash, 2001).

b) The open-air museum, which containing the most integral vertebrate fossil skeletons in a natural protected show among one of the most amazing and attractive senses.

Public Awareness and community outreach

The program is including targets mainly outside the protected area, which are represented in the local and foreigner visitors. (see zone C).

6.5.2 Zone A: Strict Natural Zone

Spring and Rowayan Areas

Natural Resources management

This zone encompasses spring and Rowayan areas. This zone has biological cultural and historical significance. This zone characterized by unique sand dune ecosystem in which small population of Dorcas Gazelle is living. The presence of a small group of monks in the Coptic monastery inside the spring area is the only exception of this zero impact zone. The use of natural resources is limited in the water of one spring mainly for the irrigation of the small half-feddan garden of the monks.

The strategy for the management in this zone is the conservation of wildlife, especially Gazelle population inhabiting this area to provide proper site and time for breeding to increase their number returning with this population back to their original natural status.

Public Use

The only sort of public use inside this zone is the human settlement of the Coptic monastery inside the spring area (the only exception inside the zone). The settlement of the Coptic monastery is limited to 9 monks (some times increased and some times decreased), 20 caves and some infrastructure represented in some exposed guest rooms and about half feddan garden for personal use of fresh vegetables. In order to avoid any further expansion of the existing infrastructure or agriculture activities, regular monitoring and extensive interaction has been carried out by WRPA staff and should be continued for the settlement inside the area. Their Father and protected area representatives have signed after these regulations.

Public Awareness and community outreach

The public awareness program in this zone has only one target and should be directed for the monks of Coptic monastery. The program must involve different communication channels between their side and that of the protected area, identifying what is new for both and what are the different means to support the collaboration of the different programs of the protected area as the monitoring program.

6.5.3. Zone B: Reserve Protection Zone

The Area South of the Lower Rayan Lake and the fourth spring

Natural Resources management

Conservation and total protection of natural resources constitute the management strategy for this zone. The areas are of special importance for wildlife, resident and migratory birds, and characteristic landscapes.

Public Use

No sorts of public use has been identified in this area except low impact wildlife viewing, the controlled car tours around the area through the designated tracks in the area around the lake with the roles mentioned in part 5. The existing bird watching sites and visitor footpaths will be maintained

Public Awareness and community outreach

The two primary targets of the program in this zone are the local communities of the main villages surrounding the protected area and the fishermen as a sub-target, and the visitors to the sites. The protected area roles have to be brought to the attention of the first target. The program must involve the concept of the protected area parallel with the collaborative management issues.

6.5.4. Zone C: Recreational Zone

The Area of Rayan Lakes and their Destinations

Natural Resources management

Conservation of the biotic elements as well as wise and controlled use of available natural resources represents the management strategy of this zone.

Both biotic and abiotic resources are moderately invested from the two side of economic as well as eco-tourist approaches. The vegetation has been identified as the acting biotic factor as well as the bird species inside for the eco-tourism purposes. The water of the lakes as well as the natural landscapes around the lakes is wisely invested.

Public Use

The area of this zone is designated for a) eco-tourism and environmental education activities b) recreational uses and d) moderate impact activities as traditional boat fishing.

One bird watching site, one campsite and the visitor center are existing eco-tourism facilities for the moment. Six cafeterias and one safari camp are existing as mild economic activities. Two proposed ecolodges are planned to construct in this zone according to the feasibility study for eco-tourism facilities inside WRPA depending on the mild availability of the natural resources inside this zone.

General Authority for Development of Fish Resources opened the Rayan lakes to fishing for nine months, during this time it collects fishes from fishermen every day according to this distributed fish-collect unit. The closed season supposed to allow the fry introduced into the lakes each year to grow, as will as the resident fish to spawn. Season is now closed about three months, from (1/7/2002) to (1/10/2002) in the upper lake and from (1/7/2002) to (20/10/2002) in the lower lake.

In 2001-2002 the lower lake was extended to one month more open, but with non-significant harvest. The problem of illegal fishing: Many fishermen [with or without license] are fishing by illegal ways without any control from collecting fish unit. This people can use illegal nets to capture any fish at any size, also they are fishing in closing season.

Public Awareness and community outreach

The primary targets of this program have been identified as local communities around the protected area and the local and international visitors (outside the PA). Fishermen and owners of economic activities (inside the PA) are representing sub-targets. Students. The main visitor area (waterfall area) is included in this zone.

The channels of communication must involve the media tools in addition to the normal pre-described ones.

The protected area program can introduce the following:

The communication through multi-media tools

- Radio is a powerful media-type reaching most parts of the country, through local language. "Radio is particularly instrumental in reaching the two largest pivotal audience groups". First, it can influence subsistence users of natural resources. Second, radio can reach to the majority of women -the repositories of values.

- Use of the TV has a strong influence in the urban areas and amongst the middle class especially the women who stay at home.

- Cinema is popular amongst certain groups in society.

- The use of newspapers in both English and local language is limited to the small percentage of the population who is literate. It is, however, a useful and powerful medium for communication with the senior decision-makers, which may not have time for other activities. The use of posters, pamphlets and the visitor center.

- Increasing the collaboration with the tourist companies.

- Publications e.g., visitors guides, maps etc.

- Website

6.5.5. Zone D: Development Zone

Spots of intensive economic activities around Rayan Lakes

6.5.5.1. Land Reclamation

Natural Resources management

Sustainable use of natural resources is the management strategy of this zone parallel with the conservation of biotic elements inside. Water of the lakes and soil are the main resources involved in this zone.

Public Use

Activities are fully under official license issued by EEAA after submission of an exhaustive Environmental Impact Assessment (EIA) following the "Guidelines for Egyptian EIA". EEAA has the right to monitor that existing establishments are conforming to the requirements of the law No. 4/1994 and law 102/1983.

No increase in the size of the land reclamation area should be permitted until the problem of the over use of the water resources in the lake system has been solved. This is discussed under paragraph 6.5.3.

Public Awareness and community outreach

The program is directed at the settlers inside the area. The program is dealing mainly with the creation of appropriate communication channel between WRPA management unit and the settlers. These channels are represented in a) establishment of a permanent office for the protected area inside the reclamation area to increase the collaboration as well as help WRPA staff in different management issues, b) introduction of important and vital studies for the area as the bio-agriculture program, increasing awareness in the administration as well as the settlers of the area with the advantages of this program for them and in the same time for the protected area and c) raising the level of public awareness for school children to create new generation able to assist and support the nature conservation concept.

6.5.5.2. Oil Company

Natural Resources management

Geological residues (crude oil) is the main resource involved in this zone.

Public Use

A high impact economic activity depending on the natural resources of this zone. Activities are fully under official license issued by EEAA after submission of an exhaustive Environmental Impact Assessment (EIA) following the "Guidelines for Egyptian EIA". EEAA has the right to monitor that existing establishments are conformed to the requirements of the law No. 4/1994 and law 102/1983.

Public Awareness and community outreach

The program should deal with introduction of the protected area objectives and giving the difference between working inside the protected area and outside

6.5.5.3. Fish Farms

Natural Resources management

Sustainable use of natural resources is the management strategy of this zone parallel with the conservation of biotic elements inside. Water of the lakes and soil are the main resources involved in this zone.

Water supply problems for the fish farms

In their report Joint Mission Report on Fresh water quality and ecosystem evaluations, and on feasibility assessment of constructed wetland technologies for fish farm wastewater treatments, Pucci and Masi (May, 1999) expressed concern about the water use and suggested that any future incrementation in water use for productive activities should be avoided.

During a field visit to the intensive fish farm section on 3 November 2002 the fish farm managers stated that the water supply to the farms used to be 1.00 cubic meters per second but had been reduced to 0.25 cubic meters per second after the “water crisis”.

According to the Water Resources Department the extraction and evaporation of water from the lake system exceeds inflow, and the allocation to each user including the fish farmers will have to be reduced. It is their recommendation that no further licences for fish farming should be issued until the critical problem of over use of the available water in the lake system has been resolved.

Public Use

High impact economic activity depending on the natural resources of this zone. Activities are fully under official license issued by EEAA after submission of an exhaustive Environmental Impact Assessment (EIA) following the "Guidelines for Egyptian EIA". EEAA has the right to monitor that existing establishments are conformed to the requirements of the law No. 4/1994 and law 102/1983.

Public Awareness and community outreach

The program should deal with introduction of the required base-information about environmental low-cost technologies (such as artificial wetland) to mitigate the pollution of the fish farm effluent and giving in the same time a satisfied investment result.

PART 7

7. MANAGEMENT TOOLS

The long-term application of the management strategy is being achieved through using the following management tools; environmental regulations and law enforcement, communication, documenting, monitoring and research, GIS and Remote Sensing, and EIA. The tools are the same for the protected area as a whole but each of the four allocated zones of WRPA is treated dealing with monitoring and research.

7.1 Environmental regulations and law enforcement

Regulations

Law No. 102/1983 provides the legal framework and Prime minister's decree No. 943 /1989 established the Protected Area of Wadi El-Rayan.

Law No. 4/1994 provides the rules governing the granting of licences and Prime minister's decree No. 264/1994 promulgates the regulations.

Law enforcement

Patrols are carried out by Rangers and Community Guards.

Any violations of the regulations observed during patrols are recorded in a police report and submitted by WRPAMU to the water police station. The police report is transmitted to the main police station in Abshaway, then to the prosecutor and finally to the court. The court decides the penalty.

Community Guards are stationed at outposts to improve patrolling of remote areas, but coverage of the PA is not yet adequate.

7.2 Communication

Communication uses multi-media tools such as

-talks, lectures, Radio, TV, Print media, (Arabic and English.)

-posters, pamphlets and the visitor center.

- publications e.g., visitors guides, maps etc.

- website

7.3 GIS and Remote Sensing

These two tools play an important part in supporting the other tools such as monitoring and are used throughout the protected area. Realization of topography, land-use, infrastructure, monitoring, categorization and zonation maps in the protected area.

Remote sensing facilities assess and record the accumulated changes of the natural habitats, land-use and infrastructure for the existing and developing economic activities.

7.4 Environmental Impact Assessment (EIA)

This tool is used whenever a development activity involving infrastructure is planned in the protected area. All the activities in the area are only licensed by EEAA after submission of accepted EIA study following the guidelines of Egyptian EIA.

7.5 Documentation

Monitoring of project activities has been carried out by WRPA staff as a continuous process to support an effective management of the area, modify the strategies and actions and ensure the wise-use of resources. Periodical internal reporting system for evaluation have been carried out and recommended to continue as biannual, annual and final reports including a statement of:

Scientific and ecological monitoring
Management effectiveness monitoring
Budget and expenditure

Scientific and ecological monitoring

The reporting system of this item had been done annually. The report included two main monitoring categories:

Biodiversity monitoring that includes Flora and Fauna. Biodiversity is the main target resource of the protected area.

Resource monitoring that includes the followings:

- Water quality monitoring
- Geology and palaeontology monitoring
- Monitoring of resource-based economic activities
- Visitor monitoring

The current monitoring system is strongly recommended to be followed for the next period.

Management effectiveness monitoring

Twice annual reporting of the management activities is recommended to continue according to the guidelines done by the IUCN joint mission (IUCN, 1998).

Budget and expenditure

Periodical internal evaluations have been done through the previous part of management and effectiveness monitoring. The reporting is presented in the form of an annual report including a statement of expenditure. These will be presented together with annual work plans and budgets at the end of each year in the Operating Plan. A project final report and statement of expenditure will be presented at the end of the period of the plan.

7.6 Monitoring and Research

7.6.1. Zone A: Special Protection Zone

Two types of scientific regular monitoring program in this zone are found to deal mainly with the paleontological sites of the area in addition to a satisfactory program for visitor monitoring.

7.6.2. Zone A: Strict Natural Zone

Scientific regular monitoring program in this zone is dealing mainly with the elements of biodiversity. Two monitoring programs have been applied in the area. The first is the mammal-monitoring program, which deals mainly with the large mammals especially dorcas gazelle communities. Fennec fox, Sand Fox, Egyptian Jackal and Wildcat are also involved. The second is the vegetation-monitoring program, which deals with the abundance of plant species in the different microhabitats of the area. Another program for monitoring of the activities of Coptic monastery had been adopted. The existing monitoring programs (EEAA, 2002) have been recommended to continue for years of application of this management plan.

7.6.3. Zone B: Reserve Protection Zone

Scientific regular monitoring program in this zone is dealing mainly with the elements of biodiversity. The same monitoring programs for the large mammals and vegetation of the zone A has been applied also in zone B except that of gazelle monitoring part at the lake. The existing monitoring programs (EEAA, 2002) have been recommended to continue for year of application of this management plan.

7.6.4. Zone C: Recreational Zone and Zone D: Development zone

Scientific regular monitoring program in these two zones is dealing mainly with the elements of biodiversity as well as monitoring program of economic activities (EEAA, 2002).

PART 8

8. MANAGEMENT RESOURCES

The critical resources for the management of WRPA can be identified under three main categories, which are infrastructure and equipment, financing and staffing which have been described below:

8.1. Infrastructure and Equipment

The existing and proposed infrastructure was simply described below (Table 4). A complete housing for the staff is strongly recommended in Fayoum City. The minimum living needs, health care, communications, etc must be provided in the place of housing, so Fayoum City is strongly recommended as a proposed housing place. One house with a separate apartment for each of the staff could be satisfactory.

The current status of the existing equipment was introduced in the monitoring and evaluation report (IUCN, 2001).

Table (4) Existing and proposed Infrastructure

Infrastructure	Existing		Proposed	
	Location	Purpose	Location	Purpose
WRPA Headquarters	Main visitor area	Main management structure	-	-
Personnel accommodation	Headquarter	Accommodate staff	At an appropriate site	Senior staff accommodation
Outpost	Spring area	Satellite management structure	Fossil Area (Wadi El-Hitan). Special Protection Zone A	Satellite management structure (zone A control)
Visitor center	Main visitor area	Public Awareness	-	-
Environmental school	-	-	Inside the protected area	Environmental education facility
Main Gate	Main Entrance	Ticket collection	-	-
2 Ticket Check Points	- Entrance of the main visitor area (Temporary structure) - Southern entrance way from Beni-Suif road (Temporary structure)	- Ticket check - Ticket collection	- 2 Permanent at the same places	Same purposes
Control Check Point	-	-	Fossil Area (Wadi El-Hitan). Zone A	Entrance control to the special protection zone A
Cafeterias	6 at Main Visitor Area	Visitor facilities	Remove three of the cafeterias-	In accordance with the plan-
2 WCs	Main Visitor Area	Visitor facilities	-	-

Bird Watching Site	2 at Lower Rayan Lake	Eco-tourism Facilities	-Additional sites	Ecotourism facilities-
Camping Site	Lower Rayan Lake	Eco-tourism Facilities	-Proximity of fossil area	Ecotourism facilities-
Ecolodge	-	-	- Lower Rayan Lake - Upper Rayan Lake - Fossil Area	Ecotourism facilities
Tracks and footpaths	The 4 zones of the area	110 km tracks Covering the most uses of the 4 zones Footpath in the Springs area	- Foot path (Wadi El-Hitan) - Track West of the protected area (to Baharia) - Track East of the PA (To Madi cultural monument)	- Educational - Eco-tourism - Eco-tourism
Natural Fences	- Main Visitor Area - El-Modawara area - Wadi El-Hitan	Management structure	- Fossil Area (Wadi El-Hitan) Special protection zone A	- Open Air Museum
Signposts	The 4 zones of the area (25)	Covering the most uses of the zones	Supporting Coverage of the 4 zones	Management, Information and education
Information Panels	Main areas of the 4 zones	Educational and Eco-tourism facilities	Supporting Coverage of the 4 zones	Information and education

8.2. Financing

Financing is important for management, regarding to profit seeking or non-profit seeking, to manage the activities that depend on financing, and no goals can be achieved in case of having no money.

Protected areas management (non-profit seeking) devotes the majority of attention to nature conservation, and needs funds for reaching the aims.

In WRPA different sources of financing have been provided as follows:

1-Local fund (Egyptian Government, EEAA, NCS)
2-Donor Contribution (Italian Co-operation, DGDC)

The salaries of the staff are given by GOE. The returns of the tickets (coming from commercials and custom license) are going directly and totally to the administrative body of EEAA without any deduction for WRPA.

Usually, the local fund is not sufficient for the activities of the protected area. Self-financing can solve this problem and cover these needs.

General Financial analysis and planning steps:

1- financial analysis and planning is concerned with transforming activities and financial data into a form that can be used to monitor the PA financial condition.
2- evaluating the need for increasing management capacity.
3- determining the requirements for additional sources of financing.
4- making wise uses to cover the cash requirements.

Proposed sources of financing for WRPA

1) The annual fees (for the concession use) paid by the owners of economic activities inside WRPA, must be direct (totally or partially) to manage the activities of the PA.
2)- Raising the entrance ticket fees of WRPA. The returns of the tickets could be reduced at once, however, in the future will gradually increase, especially after the new facilities introduced by WRPA management unit.
3)- Merchandising shop can sell the posters, stickers and handcraft, which can be done by the local community.
4) Increasing paid-trips for the most attractive and famous place inside WRPA.

8.3. Staffing

The current status of WRPA staff is as the following:

JOB	NUMBER
Protected Area Manager……..…(PAM)	1
Environmental Affairs Researcher (ranger) …..….(EAR)	9
Legal Affairs Officer ……..…(LAO)	1
Accountant……...……(Acc)	1
Financial Affairs Officer……(FAO)	1
Ticket Collector……(TC)	3
Guards……...…(Gd)	7
Secretary……...……(Sec)	1
Driver……...…(Dvr)	2
Supporting Staff (House watching)……...(SS)	2

The entire staff is lacking of the permanent recruitment by EEAA except the protected area manager and the two drivers. The general and specific duties of the PAMU staff are given in the Duty Handbook for the Wadi El-Rayan Protected Area Staff.

Recruitment of following human resources

Job Description	Number	Specialization
Environmental Affairs Researcher	4	At least Bachelor degree
Guard	8	Diploma is preferred
Ticket Collectors	3	At least diploma degree

PART 9

IMPLEMENTATION AND EVALUATION AND REVISION

Details on the implementation of the Management Plan are given in the annual Operating Plans for WRPA. The first Operating Plan is for the period July 2002 – June 2003.

Evaluation of the Management Plan will be carried out annually in June as part of the process of preparing the Operating Plan for the following year.

A full revision of the Management Plan will be done at the end of the five-year period of the Plan, which is in June 2006. A second five year Management Plan for the period 2007 –2011 will then be drawn up in accordance with experience gained in the first five year period.

APPENDICES

Appendix 1

Maps:

Figure 1. Map showing the protected areas of Egypt

Figure 2. Map showing Wadi El-Rayan Protected Area

Figure 3. Map showing the 2-category system of WRPA

Figure 4. Map showing the zonation of WRPA

Appendices (2 - 9): Check lists

Appendix 2

List of Bird species inside WRPA

No	LATIN NAME	ENGLISH NAME	ARABIC NAME	NOTES
1	*Accipiter brevipes*	Levant Sparrowhawk	باز/بيدق	Migrant
2	*Accipiter nisus*	Sparrowhawk	باشق	Migrant
3	*Acrocephalus arundinaceus*	Great Reed Warbler	هازجة القصب الكبيرة	Resident
4	*Acrocephalus dumetorum*	Blyth's Reed Warbler	-	Migrant/Winter visitor
5	*Acrocephalus schoenobaenus*	Sedge Warbler	هازجة السعد	Resident
6	*Acrocephalus scirpaceus*	Reed Warbler	هازجة الغاب	Resident
7	*Acrocephalus stentoreus*	Clamorous Reed Warbler	هازجة القصب الصياحة	Breeding Resident
8	*Actitis hypoleucos*	Common Sandpiper	طيطوى	Summer visitor
9	*Alaemon alaudipes*	Hoopoe lark	مكاء	Migrant
10	*Alcedo atthis*	Kingfisher	صياد السمك	Resident
11	*Anas acuta*	Pintail	بلبول	Winter visitor
12	*Anas clypeata*	Shoveler	كيش	Winter visitor
13	*Anas crecca*	Teal	شرشير شتوى	Winter visitor
14	*Anas penelope*	Wigeon	ظاى	Winter visitor
15	*Anas platyrhynchos*	Mallard	خضارى	Winter visitor
16	*Anas querquedula*	Garganey	شرشير صيفى	Winter visitor
17	*Anas strepera*	Gadwall	سمارى	Winter visitor
18	*Anthus campestris*	Tawny Pipit	أبو فصية الصحراء	Winter visitor
19	*Anthus cervinus*	Red-throated Pipit	أبو فصية أحمر الزور	Winter visitor
20	*Anthus pratensis*	Meadow pipit	أبو فصية الغيط	Winter visitor
21	*Anthus spinoletta*	Water Pipit	أبو فصية الماء	Winter visitor
22	*Anthus trivialis*	Tree Pipit	أبو فصية الشجر	Migrant
23	*Apus apus*	Commun Swift	سمامة	Summer visitor
24	*Apus pallidus*	Pallid Swift	سمامة باهتة	Migrant
25	*Ardea cinerea*	Grey Heron	بلشون رمادى	Resident
26	*Ardea purpurea*	Purple Heron	مالك الحزين	Winter visitor
27	*Ardeola ralloides*	Squacco Heron	واق أبيض	Resident/Migrant
28	*Arenaria interpres*	Turnstone	قنبرة الماء	Migrant
29	*Aythya ferina*	Pochard	حمراى	Winter visitor
30	*Aythya fuligula*	Tufted Duck	زراقى أبو شوشة	Winter visitor
31	*Aythya nyroca*	Ferruginous Duck	زرقاى احمر	Winter visitor
32	*Botaurus stellaris*	Bittern	واق او عجاج	Winter visitor
33	*Bubulcus ibis*	Cattle Egret	أبو قردان	Resident/Migrant
34	*Burhinus oedicneumus*	Stone-curlew	كروان جبلى	Migrant
35	*Buteo buteo*	Buzzard	صقر حوام	Migrant
36	*Buteo rufinus*	Long-legged Buzzard	صقر جراح	Migrant
37	*Calidris alba*	Sanderling	مدروان	Migrant
38	*Calidris alpina*	Dunlin	دريجة	Migrant
39	*Calidris canutus*	Knot	دريجة الشمال	Migrant

40	*Calidris ferruginea*	Curlew Sand Piper	دريجة كروانية	Migrant
41	*Calidris minuta*	Little Stint	كروان الماء	Winter visitor
42	*Calidris temminckii*	Temminck's Stint	فطيرة تمنك	Winter visitor
43	*Centropus senegalensis*	Senegal Coucal	مك أو كوكو	Resident
44	*Cercotrichas glactotes*	Rufous Bush - Robin	دخلة حمراء	Summer visitor
45	*Ceryle rudis*	Pied King Fisher	صياد السمك الأبلق	Breeding Resident
46	*Charadrius alexandrinus*	Kentish Plover	قطقاط أبو الرؤوس	Resident
47	*Charadrius dubius*	Little Ringed Plover	قطقاط متوج صغير	Migrant
48	*Charadrius hiaticula*	Ringed Plover	قطقاط متوج كبير	Migrant
49	*Charadrius leschenaultii*	Greater Sand Plover	قطقاط الرمل الكبير	Migrant
50	*Chlidonias hybridus*	Whiskered Tern	خطاف أبو بطن	Migrant
51	*Chlidonias leucopterus*	White-winged Black tern	خطاف أبيض الخد	Migrant
52	*Chlidonias niger*	Black Tern	خطاف أسود	Migrant
53	*Ciconia ciconia*	White Stork	لقلق أبيض	Migrant
54	*Ciconia nigra*	Black Stork	لقلق أسود	Migrant
55	*Circaetus gallicus*	Short-toed Eagle	عقاب أبيض	Migrant
56	*Circus aeruginosus*	Marsh Harrier	مرزة المستنقعات	Winter visitor/Resident
57	*Circus cyaneus*	Hen Harrier	مرزة الدجاج	Migrant
58	*Circus macrourus*	Pallid Harrier	مرزة بغشاء	Migrant
59	Circus pygargus	Montagu's Harrier	أبو شردة	winter visitor
60	Coracias garrulus	Roller	غراب زيتونى	Migrant
61	*Corvus bruniceps*	Brown-necked Raven	غراب نوحى	Resident
62	*Corvus corone cornix*	Hooded Crow	غراب بلدى	Resident
63	*Coturnix coturnix*	Quail	سمان	Winter visitor
64	*Cuculus canorus*	Cokoo	هوهو / وقواق	Migrant
65	*Cursorius cursor*	Cream Colored Corser	الجليل / جروان	Breeding Resident
66	*Delichron urbica*	House Matrin	سنونو أبيض البطن	Migrant
67	*Egretta alba*	Great White Egret	بلشون أبيض كبير	Winter visitor
68	*Egretta garzetta*	Little Egret	بلشون أبيض صغير	Resident
69	*Eremophila bilopha*	Temmink,s Lark	قنبرة الصحراء	Migrant
70	*Falco biarmicus*	Lanner	صقر حر	Migrant
71	*Falco columbarius*	Merlin	ابو رية	Migrant
72	*Falco concolor*	Sooty falcon	صقر الغروب	Breeding summer visitor
73	*Falco naumanni*	Lesser Kestrel	عوسق صغير	Migrant
74	*Falco pelegrinoides*	Barbary's Falcon	شاهين مغربى	Migrant
75	*Falco tinnunculus*	Kestrel	عوسق	Resident
76	*Ficedula albicollis*	Collared Flycatcher	خاطف الذباب المطوق	Migrant
77	*Ficedula hypoleuca*	Pied Flycatcher	خاطف الذباب الأبقع	Migrant
78	*Fringilla coelebs*	Chaffinch	عصفور ظالم	Migrant
79	*Fulica atra*	Coot	غر	Resident/Winter visitor
80	*Gallinago gallinago*	Common Snip	بكاشين	
81	*Gallinago media*	Great Snipe	شنقب كبير	Migrant
82	*Gallinula chloropus*	Moorhen	فرخة الماء	Resident/Winter visitor
83	*Gelochelidon nilotica*	Gull-billed Tern	خطاف نورسى المنقار	Migrant

84	*Glareola pratincola*	Collared Pratincole	ابو اليسر	Migrant
85	*Grus grus*	Crane	كركى / غرنوج	Migrant
86	*Himantopus himantopus*	Black-winged Stilt	أبو المغازل	Winter visitor
87	*Hirundo daurica*	Red-rumped Swallow	عصفور الجنة أحمر العجز	Resident
88	*Hirundo rustica*	Swallow	عصفور الجنة	Migrant
89	*Hoplopterus spinosus*	Spur-winged plover	زقزاق بلدى	Breeding Resident
90	*Ixobrychus minutus*	Little Bittern	واق صغير	Breeding Resident
91	*Jinx torquilla*	Wryneck	لواء / أم لواء	Migrant
92	*Lanius collurio*	Red backed Shrike	دقناش اكحل	Migrant
93	*Lanius minor*	Lesser Grey Shrike	دقناش صردى	Migrant
94	*Lanius mridunals*	Southern Grey Shrike	دقناش البادية	Breeding Resident
95	*Lanius senator*	Woodchat Shrike	دقناش أوروبى	Resident
96	*Larus fuscus*	Lesser Black-backed Gull	نورس دغبة	Migrant
97	*Larus genei*	Slender-billed Gull	نورس قرقطى	Resident
98	*Larus ichthyaetus*	Great Black-headed Gull	نورس السمك	Winter visitor
99	*Larus ridibundus*	Black-headed Gull	نورس أسود الرأس	Winter visitor
100	*Limosa limosa*	Black-tailed Godwit	بويقة سوداء الذنب	Migrant
101	*Luscinia megarhinchos*	Nightingale	المغناء الأسمر	Migrant
102	*Luscinia svecica*	Bluethroat	الحسينى	Winter visitor
103	*Merops apiaster*	Eurasian Bee-eater	وروار أوروبى	Migrant
104	*Merops superciliosus*	Blue-cheeked Bee-eater	وروار أزرق الخد	Summer visitor
105	*Milvus migrans*	Black Kite	حدأة سوداء	Migrant
106	*Monticola saxatilis*	Rock Thrush	سكالة / أبوشوك	Winter visitor
107	*Monticola solitarius*	Blue Rock Thrush	حمامة زرقاء	Winter visitor
108	*Motacilla alba*	White Wagtail	أبو فصادة أبيض	Winter visitor
109	*Motacilla cinerea*	Gery Wag Tail	أبو فصادة رمادى	Migrant
110	*Motacilla flava*	Yellow Wagtail	أبو فصادة أصفر	Migrant
111	*Muscicapa striata*	Spotted Flycatcher	خاطف الذباب المنقط	Winter visitor
112	*Netta rufina*	Red-crested Pochard	ونس	Winter visitor
113	*Numenius arquata*	Curlew	كروان الغيط	Winter visitor
114	*Nycticorax nycticorax*	Night Heron	بلشون الليل	Winter visitor
115	*Oenanthe deserti*	Desert Wheater	أبلق الصحراء	Migarnt
116	*Oenanthe hispanica*	Black-eared Wheatear	أبلق أسود الأذن	Migrant
117	*Oenanthe isabellina*	Isabelline Wheatear	أبلق أشهب	Migrant/Winter visitor
118	*Oenanthe leucopyga*	White-crowned Black Wheatear	أبو سليمان	Migrant
119	*Oenanthe monacha*	Hooded Wheatear	أبلق أبو طاقية	Migrant
120	*Oenanthe oenanthe*	Norhten Wheatear	أبلق أبو بليق	Migrant
121	*Oriolus oriolus*	Golden Oriole	عصفور التوت	Migrant
122	*Pandion haeliatus*	Osprey	نسورى	Migrant
123	*Passer domesticus*	House Sparrow	عصفور دورى	Breeding Resident
124	*Passer hispaniolensis*	*Spanish Sparrow*	عصفور اسبانى	Migrant
125	*Phalacrocorax carbo*	Cormorant	غراب البحر	Winter visitor
126	*Phoenicopterus ruber*	Greater Flamingo	البشاروش	Occasional visitor
127	*Phoenicurus ochruros*	Black Redstart	حميراء سوداء	Winter visitor
128	*Phoenicurus phoenicurus*	Redstart	حميراء	Winter visitor

130	*Phylloscopus bonelli*	Bonelli's Warbler	نقشارة صفراء العجز	Migrant
131	*Phylloscopus collybita*	Chiffchaff	سكسكة / شادية الخمايل	Winter visitor
132	*Phylloscopus sibilatrix*	Wood Warbler	نقشارة الشجرة	Migrant
133	*Phylloscopus trochillus*	Willow Warbler	نقشارة الصفصاف	Migrant
134	*Platalea leucorodia*	Spoonbill	أبو ملعقة	Winter visitor
135	*Plegadis falcinellus*	Glossy Ibis	أبو منجل أسود	Winter visitor
136	*Podiceps cristatus*	Great Crested Grebe	غطاس متوج	Winter visitor
137	*Podiceps nigricollis*	Black-Necked Grebe	غطاس أسود الرقبة	Winter visitor
138	*Porphyrio porphyrio*	Purple Gallinule	فرخة سلطانى	Breeding Resident
139	*Porzana porzana*	Spotted Crake	مرعة منقطة	
140	*Prinia gracilis*	Graceful Warbler	فصية / هازجة	Breeding Resident
141	*Pterocles orientalis*	Black-bellied Sandgrouse	قطا أسود البطن	Migrant
142	*Pterocles senegallus*	Spotted Sand Grouse	قطا ارقط	Migrant
143	*Riparia riparia*	Sand martin	سنونو الرمل	Resident
144	*Saxicola rubetra*	Whinchat	قليعى أحمر	Migrant
145	*Saxicola torquata*	Stonechat	قليعى مطوق	Winter visitor
146	*Scotocerca inquieta*	Scrub Warbler	هازجة الدغل	Breeding Resident
147	*Sterna albifrons*	Little Tern	خطاف صغير	Winter visitor
148	*Sterna caspia*	Caspian Tern	خطاف أبو بلحة	Migrant
149	*Sterna hirundo*	Common Tern	خطاف البحر	winter visitor
150	*Streptopelia decaocto*	Collared Dove	قمرى مطوق	Resident
151	*Streptopelia senegalensis*	Palm dove	قمرى بلدى	Resident
152	*Streptotelia turtur*	Turtle Dove	قمرى	Resident
153	*Sylvia atricapilla*	Blackcap	أبو قلنسوة	Migrant
154	*Sylvia borin*	Garden Warbler	دخلة كحلة	Migrant
155	*Sylvia cantillans*	Subalpine Warbler	دخلة الصرود	Migrant
156	*Sylvia communis*	Whitethroat	زريقة فيرانى	Migrant
157	*Sylvia curruca*	Lesser Whitethroat	دخلة فيرانى	Migrant
158	*Sylvia melanocphalla*	Sardinian Warbler	دخلة رأساء	Migrant
159	*Sylvia rueppelli*	Rueppell's Warbler	زريقة قصابى	Migrant
160	*Tachybaptus ruficollis*	Little Grebe	غطاس صغير	Winter visitor
161	*Tadorna tadorna*	Shelduck	شهرمان	Occasional winter visitor
162	*Tringa glareola*	Wood Sand Piper	طيطوى غياض	Migrant/Winter visitor
163	*Tringa nebularia*	Greenshank	طيطوى أخضر الساق	Resident
164	*Tringa ochropus*	Green Sandpiper	طيطوى أخضر	Migrant/Winter visitor

Appendix 3

List of Fish species inside WRPA

No	LATINE NAME	ENGLISH NAME	ARABIC NAME
1	*Alestes nurese*	Imberi	راي سردين نورس
2	*Aphanius disper*	Tooth carp	-
3	*Aphanius fasciatus*	Tominnow – Pastrica	بطريق
4	*Altherina boyeri*	Silverside	باساريا
5	*Altherina spp.,*	Silverside	باساريا
6	*Bagrus bayad*	Forsskal catfish	بياض
7	*Bagrus docmak*	Catfish	بقر دقماق
8	*Bagrus spp.,*	Catfish	بياض
9	*Barbus bynni*	Barbel	بيني
10	*Clarias lazera*	African catfish	قرموط
11	*Ctenopharyngodon idella*	Grass carp	مبروك الحشيش
12	*Cyprinus carpio*	Common carp	مبروك
13	*Dicentrarchus labrax*	Seabass	قاروص
14	*Dicentrarchus punctatus*	Spotted seabass	قاروص
15	*Haplochromis spp.,*	Cichlid	هابلوكرومس قزم
16	*Hemichromis bimaculatus*	Cichlid	هيموكرومس مخطط
17	*Hemiramphus far*	Halfbeak	أبو منقار
18	*Labeo nilotica*	Nile carp	لبيس
19	*Lates niloticus*	Nile perch	لفاش) قشر بياض(
20	*Liza aurata*	Golden grey mulet	هاليلى
21	*Liza ramada*	Thinlip grey mullet	طوبار
22	*Mugil cephalus*	Flathead grey mullet	بورى
23	*Oreochromis aureus*	Tilapia	بلطى سلطانى
24	*Oreochromis niloticus*	Tilapia	بلطى أبيض
25	*Sardinella spp.,*	Sardin	راي سردين
26	*Sarotherodon galilaeus*	Tilapia	بلطي جليلي
27	*Sparus auratus*	Gilthead seabream	دنيس
28	*Synodntis schall*	Barbel	شيلان
29	*Tilapia zilii*	Green tilapia	بلطي أخضر) حجارى(

Appendix 4

List of Insect species inside WRPA

SPECIES	FAMILY	ORDER
Agelena lepida	Agelenidae	Araneida
Argiope trifasciata, Argiope lobata, Cyrtophora citricola	Araneidae	
Cheiracanthium sp.	Clubionidae	
Dictyna sp.	Dictynidae	
Stegodyphus sp.	Eresidae	
Pterotricha schaefferi, Haplodrassus sp., Setaphis sp.	Gnaphosidae	
Trochosa sp., Pirata sp., Evippa ungulata	Lycosidae	
Peucetia sp., Oxyopes sp.	Oxyopidae	
Philodromus sp., Thanatus sp., Ebo sp.	Philodromidae	
Mogrus bonnetii	Salticidae	
Tetragnatha nitens	Tetragnathidae	
Theridion sp.	Theridiidae	
Thomisus onustus	Thomosidae	
Buthacus leptochelys, Androctonus amoreuxi		Scorpionida
Olpium kochi	Olpiidae	Pseudoscorpionida
Geleodes graecus		Solphugida
Suborder lxodides		Acarida

Appendix 5

Littoral and sub-littoral fauna collected from Wadi El-Rayan Lakes during the period from July 1984 to October 1986. (M. M. Foda and M. A. Saleh, 1988)

Littoral		Sub-Littoral	
Ants:	*Monomorium pharaonis* *Cataglyphis bicolor*	Oligochaetes	*Chaetogaster* sp.
Ant-lions	*Myrmeleon* sp.	Dragonflies	*Crocotheaes* sp. *Heaianex ephipigger* *Orthetrus chrysostiosa*
Spiders	Agelenidae	Damselflies	*Ischnura senegalensis*
Tiger-Beetles	*Cicindela* sp.	Mayflies	*Baedtis* sp. *Centroptilua* sp.
Ear-wigs	*Labidura riparia* *Euborella annulipes*	Midges	*Chironoaus* sp. *Spaniotota* sp.
Crickets	*Gryllotalpa gryllotalpa* *Liogryllus bimaculatus* *Gryllus domesticus*	Caddisflies	*Trichoptera*
Housefly	*Musca domestica*	Crustacea	*Gammarus* sp.
Sand-beetles	Tenebrianidae	Rotifera	*Brachinous* sp.
Blood-sucking fly	*Tabanus* sp. *Siphona* sp	Foraminifera	*Rotatia beccarii*
Mantids	*Sphodromantis* sp. *Mantis* sp.	Gastropoda	*Melanoides tuberculatus* *Physa acuta* *Cleopatra bulinoides* *Theodorus niloticus* *Bulinus truncatus*
		Bivalvia	*Anodonta* sp. *Unio* sp.
		Diving-beetles	*Cybister* sp.
		Water-bugs	*Anisops sardea*
		Water-scorpions	*Ramatra vicina*
		Water-boatmen	*Corixa hierglyphica*
		Nematodes	*Onocholainus* sp.

Appendix 6

List of Mammal species inside WRPA

No	LATIN NAME	ENGLISH NAME	ARABIC NAME
1	*Hemiechinus auritus auritus aegypticus*	Long-eared hedgehogs	قنفد طويل الأذن
2	*Crocidura flavescencs deitac*	Giant musk shrew	
3	*Crocidura floweri*	Flower's shrew	
4	*Gerbillus pyramidium pyramidium*	Greater gerbil	
5	*Gerbillus andersoni andersoni*	Anderson's gerbil	
6	*Gerbillus gerbillus gerbillus*	Lesser gerbil	
7	*Dipodillus amoenus amoenus*	Charming dipodil	
8	*Meriones lybicus lybicus*	Libyan jird	
9	*Arvicanthis niloticus niloticus*	Field rat	فأر الغيط
10	*Rattus rattus*	House rat	الفأر المنزلى
11	*Rattus norvegicus*	Brown rat	الفأر البنى
12	*Nesokia indica suilla*	Bandicoot rat	
13	*Jaculus jaculus*	Desert jerboas	يربوع حر
14	*Mus musculus*	House mouse	الفأر المنزلي
15	*Canis aureus lupaster*	Golden jackal	الذئب
16	*Fennecus zerada*	Fennec fox	ثعلب الفنك
17	*Vulpes vulpes Aegyptica*	Red fox	الثعلب الاحمر
18	*Vulpes ruepelli Ruepelli*	Ruppell’s sand fox	ثعلب الرمل
19	*Felis sylvestris libyca*	African wild cat	القط البري الافريقي
20	*Gazella dorcas Dorcas*	Dorcas gazelle	الغزال المصري
21	*Herpestes ichneumon*	Egyptian mongoose	النمس المصري
22	*Mustela nivalis*	Weasel	العرسه
23	*Lepus capensis Rothschildi*	Cape hare	أرنب الكاب
24	*Felis chaus nilotica*	Jungle cat	قط الأدغال
25	*Gazella leptocerus leptocerus*	Slender horned gazelle	الغزال الأبيض

Appendix 7

List of Plant species inside WRPA

No	Latin Name	Common Name	Arabic Name
1	*Adiantum capillus-veneris*	Kozbaarit el-beer	البير كزبرة
2	*Alhagi graecorum*	Aqool	عاقول
3	*Arthrocnemum macrostachyum*	Shinaan	شنان
4	*Calligonum polygonoides* sub. *comosum*	Arta/Risoo	رصو/أرطه
5	*Ceratophyllum demersum*	Nakshoosh el-hoot	الحوت نخشوش
6	*Cornulaca monocantha*	Shoak ed-deeb	الديب شوك
7	*Cressa cretica*	Nadwa	ندوه
8	*Cynanchum acutum*	Olleiq	عليق
9	*Cynodon dactylon*	Nigeel	نجيل
10	*Cyperus laevigatus*	Sead	سعد
11	*Desmostachya bipinnata*	Halfa	حلفا
12	*Haloxylon salicornicum*	---	---
13	*Imberata Cylindrica*	Halfa deil el-qott	القط ديل حلفا
14	*Juncu rigidus*	Samaar morr	مر سمار
15	*Juncus acutus*	Samaar morr	مر سمار
16	*Launaea nudicaulis*	---	---
17	*Melilotus indicus*	Hendaqooq morr	مر حندقوق
18	*Myriophyllum spicatum*	Hamool el-maia	الميه حامول
19	*Najas armata*	Hamool	حامول
20	*Nitraria retusa*	Gharqad/Ghardaq	غردق/غرقد
21	*Phoenix dactylifera*	Hagna	حجنة
22	*Phragmites australis*	Nakheel el-balah	البلح نخيل
23	*Pluchea dioscoridis*	Barnoof	برنوف
24	*Polypogon monospliensis*	Deil el-qott	القط ديل
25	*Potamogeton pectinatus*	Hamool el-maia	الميه حامول
26	*Ranunculus sceleratus*	Zaghlanta	زغلنته
27	*Rumex dentatus*	Khilla	خله
28	*Salsola imbricata* subsp. *Gaetula*	Khareet/Kreesh	كريش/خريط
29	*Scirpus maritimus*	---	---
30	*Sonchus maritimus*	---	---
31	*Spergularia marina*	Samaar	سمار
32	*Sporopolus spicatus*	Nigeel shoaky	شوكى نجيل
33	*Stipagrostis ciliata*	Homareet	حمريط
34	*Tamarix nilotica*	Abal/Tarfa	طرفه/عبل
35	*Typha domingensis*	Halfa/Bardi	بردى/حلفا
36	*Zygophyllum album*	Rotrait	رطريط
37	*Zygophyllum coccineum*	Rotrait	رطريط
38	*Hyocyamus muticus*	Sakaran	سكران

Appendix 8

List of Reptile species inside WRPA

No	SCIENTIFIC NAME	ENGLISH NAME	ARABIC NAME
1	*Ptyodactylus hasselquistii*	Fan-footed Gecko	برص أبو كف
2	*Cerastes cerastes,*	Lesser Ceraster Viper	حيه قرعاء
3	*Cerastes vipera*	Horned viper	حيه مقرنه
4	*Psammophis schokari*	Sshokari Sand Snake	هرسين
5	*Lytorhynchus diadema*	Diademed Sand Snake	بسباس
6	*Malpolon moilensis*	Moila Snake	أبو العيون
7	*Varanus griseus*	Desert Monitor	ورل صحراوي
8	*Mesalina rubropunctat*	Red Spotted Lizered	سقنقر منقط كبير
9	*Acanthodactylus scutellatus*	Nidua Lizered	سقنقر الرمل الكبير
10	*Tropiocolores steudneri*	Steudners Gecko	برص تحت الحجر
11	*Tarentola annularis*	Egyptian Gecko	برص رباعي النقط
12	*Stenodactylus*	Peteries Gecko	برص واسع العين
13	*Stenodactylus stenodactylus*	Elegant Gecko	برص واسع العين
14	*Sphenops sepsoides*	Audouins Sand skink	سحليه نعامه

Appendix 9

List of Invertebrate and Vertebrate fossils of WRPA

SPECIES	CLASS	FAMILY	GENUS	Author
Ancalecetus simonsi	Mammalia	Basilosauridae	Dorudon osiris	Gingrich, 1996
Basilosaurus isis	Mammalia	Basilosauridae	Basilosaurus	Cope, 1868
Zeuglodon osiris	Mammalia	Basilosauridae	Dorudon osiris	Dames, 1894
Shark teeth	Elasmobravchii	Mitsukurinidae	Scapanorhynchus	Woodard, 1889
Cardita viquesneli	Bivalvia	Carditidae	Cardita	Oppenheim, 1903
Carolia plcunoides	Bivalvia	Anomiidae	Carolia	Cantraine,1838
Drepanocheilus wagihi	Gastropoda	Aprrhaidae	Drepanocheilus	Abass, 1963
Lucina fajumensis	Bivalvia	Lucinidae	Lucina	Oppenheim, 1903
Mesalia fasciata	Gastropoda	Turritellidae	Mesalia	Lamarck, 1830
Nautilus mokattamensis	Cephaloposda	Nautiloidea	Nautilus	Food, 1787
Nicaisoloph clot-beyi	Bivalvia	Ostreidae	Nicaisoloph	Bellardi, 1854
Ostrea elegans	Bivalvia	Ostreidae	Ostrea	Linne, 1758
Pycnodonta gigantica	Bivalvia	Gryphaeidae	Pycnodonte	Solnder, 1766
Turritella carinifera	Gastropoda	Turritellidae	Turritella	Cossmann, 1901
Turritella pharaonica	Gastropoda	Turritellidae	Turritella	Deshayes, 1824
Vulsella crispata	Bivalvia	Carditidae	Vulsella	Fisher, 1870

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