Ministry of State for Environmental Affairs

Egyptian Environmental Affairs Agency

Nature Conservation Sector

WADI EL-RAYAN PROTECTED AREA Management Plan

June 2008

COOPERAZIONE ITALIANA
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محمية وادى الريان
WADI EL-RAYAN PROTECTED AREA

IUCN

Document Information

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This report was prepared by: Mohamed Talaat, with IUCN technical advice from Dan Paleczny.

June, 2008

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EEAA	Egyptian Environmental Affairs Agency
EIECP	Egyptian Italian Environmental Cooperation Program
EPF	Environmental Protection Fund
IBA	Important Bird Area
IUCN	World Conservation Union
LIFP	Legal and Institutional Framework Project
NCS	Nature Conservation Sector
NCSCBP	Nature Conservation Sector Capacity Building Project
PA	Protected Area
UNESCO	United Nations for Education, Science and Culture Organization
WHS	World Heritage Site, Wadi El-Hitan
WRPA	Wadi El-Rayan Protected Area

EXECUTIVE SUMMARY

The management plan of Wadi El-Rayan Protected Area was the first MP among the Egyptian network of protected area and was developed for the period from 2002 to 2006. It was developed after the first NCS workshop held in 2002 for preparing the management planning guidelines at WRPA by technical assistance from IUCN.

The first WRPA MP was purely developed and written by the WRPA staff; key staff Mohamed Talaat, with wide support and technical assistance from IUCN consultant; Dick Parris. It was taken about less than one year to develop after a series of meetings, field measures and extensive collaboration from the WR staff, IUCN team and the available local stakeholders.

The former WRPA MP has taken in consideration the coming parts:

Background, Conservation objectives, Site description, Management issues and constraints, Management goals and objectives, Management strategies and actions, Zone plan, Management tools, Management resources and Implementation/Evaluation/Revision.

Although, these parts were seen very essential, they need more amendments in most of them from conception as well as provision points of view

This second version of WRPA MP is updated from the former one taken in consideration the following amendments:

- Objectives: updated 1) to identify Wadi El-Hitan as a newly declared World Heritage Site with incurrence to the boundary change to identify a proposed world heritage destination of Fayoum, 2) to give consideration to the socio-economic context of the protected area and 3) to incurrence the business planning process aiming to strategic sustainable financing of WRPA.
- Zonation: The zone plan identified Wadi El-Hitan WHS boundary and consider specific uses and level of development
- Boundary: Proposals and recommendations have been made to enlarge Hitan WHS boundary to include Gebel Quatrani (per IUCN Hitan recommendations), to be the World Heritage destination of Fayoum.
- Collaborative management: The collaborative management is clearly justified and policies to be applied in near as well as far future are presented as much as possible.
- Water management: Specific management actions towards water management of Rayan Lakes and implementation of a well developed public awareness program are Provided.
- Supporting local communities in economic development initiatives: related actions in developing eco-products for local benefits are specified.
- Environmental awareness, monitoring, patrolling, sustainable financing, are well presented.
- Sustainable financing of WRPA

Using the 1994 IUCN protected area management categories, WRPA has 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.

The national objectives for protected areas in Egypt have been addressed prior to the main management objectives of WRPA which are: 1) Natural Resources Management, 2) Management of the World Heritage Destination of Fayoum (Currently Wadi El-Hitan) Hitan/Qatrani WHS, 3) Management of human and economic activities, 4) Public awareness and environmental education programs, 5) Local Community development especially the land reclamation villages inside WRPA and 6) Sustainable financing of WRPA

The main management issues of WRPA are: 1) World Heritage destination of Fayoum: Wadi El-Hitan, Qatrani with/without boundary change, 2) restoration of the water balance in Rayan lakes, 3) Conservation of sites with high biodiversity considerations 4) Local community development in and around WRPA and 5) raising of public awareness toward the most important management issues, 6) Eco-tourism development, visitor facilities and infrastructure, 7) Collaborative management, 8) Research and Monitoring and 9) Sustainable financing for strategic management of WRPA.

The plan has stated the strategies and actions dealing with each of the 9 specific management issues that currently facing the management process of WRPA to cover the working period of the plan (2008-2013).

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.

The management strategy is being achieved, in this plan, through 8 management tools which are zoning, environmental regulations & law enforcement, patrolling, communication, GIS, EIA, management effectiveness evaluation, and finally monitoring and research.

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.

This plan has incurrence to the latest management resources in terms of infrastructure & equipment, staffing and financing. The financing part is described through presenting the major findings obtained from the latest WRPA business plan in 2007.

The Implementation, evaluation and revision is the latest important part of this plan explained that the Annual Operating Plans (AOP) and the Management Effectiveness Evaluation and reporting are the main tools for implementation and evaluation of this management plan.

The specified team for updating WRPA MP is WR staff leaded by the coordinator of planning and management of the PA: Mohamed Talaat. Technical assistance was done by IUCN expert Dan Paleczny the Manager of the Italian Project Support to WRPA Phase II. The Italian Cooperation is funding this stage during the activities of the Italian Project support to WRPA phase II through Egyptian Italian Environmental Cooperation Program EIECP. The NCS is the umbrella that cover and control the end product of the WRPA MP for the period from 2008 to 2013.

Important processes and reports have been used efficiently to contribute to the new updated management plan which are: the management effectiveness evaluation process and report and the business planning process and report dated 2007.

Related appendices and maps are also attached after the necessary update

1. INTRODUCTION

1.1. Background

Wadi El-Rayan Protected Area (WRPA) is one of 27 today's protected areas of Egypt. Natural features and landscapes, biodiversity and the World Heritage site in Wadi El-Hitan have drawn national and international attention to its value. It is located in the Fayoum Governorate on the Western Desert of Egypt about 120 Km from Cairo. The WRPA is a popular recreation area due its close proximity to Cairo. It is visited by over 150,000 visitors per year.

WRPA has been declared by the prime-ministerial decree No. 943 in 1989 according to the law No. 102/1983 of the protected areas in Egypt. It is administered by the Nature Conservation Sector (NCS) of the Egyptian Environmental Affairs Agency (EEAA).

The WRPA project was funded by the Egyptian Italian Environmental Cooperation Program EIECP in its two phases (March 1998 - February 2001 for phase I and from May 2005 to May 2008 for Phase II) and implemented by NCS/EEAA with international technical assistance from the World Conservation Union (IUCN).

1.2. Legislation

WRPA was declared a protected area in 1989 according to Prime Ministerial Decree 943 and modified by Prime Minister's Decree 2954 in 1997. The overall management goal of the protected area is the protection of natural resources, in accordance with the declaration decree.

WRPA has strong legal protection under Egyptian Law No. 102 of 1983 for protected areas, which provides the legal framework for the establishment of protected areas throughout Egypt and forbids actions that would lead to destruction or deterioration of the natural environment.

Prime Minister's Decree N.264/1994, emerged from law 102/1983, establishes conditions to carry out activities in protected areas and assigns full responsibility to EEAA for releasing licenses concerning such activities.

Law No. 4 of 1994, is the first basic law containing a comprehensive set of rules on the environment. It is complemented by the Executive Regulations issued by Prime Minister's Decree N.338 of 1995, updated by decree No. 1741 of 2005. This Law provides for the restructuring of EEAA and the redefinition of the Environmental Protection Fund. The first part of the law addresses land pollution, specifying rules on hazardous materials and wastes including the issue of licenses and permits for activities requiring an environmental impact assessment (EIA). The second and third part of the law deal with the protection of air and water from pollution. The final part covers administrative and judicial procedures and penalties. The Executive Regulations provide more details on the subjects covered by the Law, including the licensing system, and sets specific standards, parameters, concentration limits etc.

Law 102/1983

The law 102 sets out the principles for the declaration of natural protectorates and stipulates development restrictions and activities within and adjacent to the protectorate. The Law obliges the EEAA as the concerned administrative body to:

- Forbid actions leading to the destruction or deterioration of the natural environment, biota or which would detract from the aesthetic standards of the protectorate.
- Regulate scientific research
- Develop management programs for declared Protected Areas
- Increase Public Awareness
- Regulate recreational activities in protectorates to protect natural resources
- Establish control systems to enforce regulatory measures.

In addition the Law established the Natural Protectorates Fund NPF specifically to finance the management of protected areas; this fund includes all revenue from donations, grants, sales, entrance fees, fines and subsidies. According to Article 6 the Fund can be used for;

1. supplementing the budget of the EEAA
2. enhancement of protectorates
3. undertaking surveys and field research
4. rewarding persons who provide information on offences or who apprehend offenders.

Ministerial Decree 1067/1983

It designates the Egyptian Environmental Affairs Agency as the authorized body to apply Law 102.

Prime Ministerial Decree 264/ 1994.

Sets out conditions, rules and procedures for definition and regulation of activities in natural reserve area and provides the Nature Protectorates Department of EEAA with executive administrative authority over natural protectorates. It has 6 articles and various conditions and rules and expressly forbids construction or development of any type without the permission of the EEAA.

Law 4/1994

It establishes principles and procedures to address all environmental issues in the ARE. This comprehensive law includes measures to address terrestrial, air and water pollution. Law 4 notes that the EEAA has the power to administer and supervise the natural protectorates.

1.3. Mission statement

"to manage and protect its important ecosystems and their integrity; conserve the valuable biodiversity, natural features and ancient fossils; enhance eco-tourism and recreation in the area, keep sustainable use of natural resources, improve environmental awareness and education, and support local communities".

1.4. Conservation objectives

Using the 1994 IUCN categories, WRPA has been classified in a two-category system as follows:

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

2. SITE DESCRIPTION AND EVALUATION

2.1. General Information

Fayoum is a city with a quiet reputation yet much to offer particularly at the winter time of year. From October till April, Fayoum enjoys a warm climate (22-28 degrees Celsius), also offering the opportunity to escape the noise and crowd for a weekend. The list of activities available in Fayoum is long

Location	Fayoum Governorate
Climatic Zone	Hyper-Arid Saharan
Area	175.900 ha (1,759 km^2)
Declaration	Prime-Ministerial Decree 943/1989
Category	Type II & VI of IUCN categories

Wadi El-Rayan has a special historical significance as a major crossroad that was used for many centuries by travelers 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).

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 Qaroun 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).

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.

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).

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 (Said, 1960).

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.

2.3. Ecological settings

Lakes

The two lakes of Wadi El-Rayan began forming in 1973 when the Wadi El-Rayan depression was inundated with excess agricultural drainage water. Extensive reed beds have formed along the shoreline creating breeding habitat for fish and water birds. The waterfalls is one of the park's best known attraction; the only permanent falls in Egypt

Main habitats (area in ha)	
Oasis	1,935
Desert	160.949
Wetland	1,583
Lakes	11,434

Taxa (Number)	
Plants	39
Mammals	24
Birds	174
Reptiles	14
Fish	29
Terrestrial Invertebrates	113
Aquatic Invertebrates	11 families

Desert

WRPA also conserves large desert areas containing a variety of landscapes and formations. Rare and fascinating wildlife are found in the deserts of Wadi El-Rayan along with fossils of creatures of past eras and cultural heritage sites from ancient civilizations.

Oases

The springs area contains four brackish springs supporting the highest diversity of desert plant and animal life in the protected area. Several rare and globally threatened animals

inhabit the springs area, including Dorcas Gazelle, Rüppell's Sand Fox and Fennec Fox. It is representing the last remains of Wadi El-Rayan depression's natural habitat as excellent and uncommon example of an uninhabited Saharan oasis.

This area in historic times was the main gateway for Western Desert trade routes into El Fayoum. Settlements and artifacts from ancient Egyptian, Greek and Roman eras are found in the area. The springs area is located off the main road west of the Lower Lake.

Most of the area is restricted to visitors in order to protect the fragile habitats and vulnerable wildlife populations. A viewpoint has been established offering panoramic views of the depression. There is a hiking trail down to the first spring. Surrounding the spring are palm trees and salt marsh vegetation. Birds, reptiles and insects are the most commonly encountered animals. Tracks are all one usually sees of mammals, most of which are active at night.

Sand Dunes

Extended sand dune fields are mainly found on the area south of the Lower Rayan Lake and Wadi Mwaileh.

For more information about the habitats and wildlife please refere to the Monitoring reports of Wadi El-Rayan which introducing the detailed information about the area, (IUCN, 2000b; IUCN, 2001& EEAA, 2002, EEAA, 2003)

2.4. Cultural and Social Settings

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

Local Communities

The local communities of WRPA are represented in outside and inside communities. The inside ones are those settled within the sites of economic activities which are: 4575 feddans of reclamation areas which include about 12240 individuals living and working mainly with agriculture and very low scale local markets selling vegetables, fruits and groceries. About 129 individuals work in an area of about 1300 feddans of intensive and extensive fish farms. The PA also includes some of 1724 local fishermen using 182 traditional fish boats in both of the upper and lower Rayan lakes, all in addition to 253 fishermen without boats. 11 individuals in the main beach area work in cafeterias, about 50 individuals work in salt extraction, and about 30 monks in a Coptic monastery located in the core zone of the PA. The outside communities are represented in the inhabitants of the villages sourrounding the protected area such as Youssef El-

Human activities (area in feddans)

Land Reclamation	4,575
Fisheries	16,236 (2 lakes and channel)
Aquacultures	1,300
Oil Extraction	71
Salt Mining	Negligible
Eco-Tourist Services	24
Coptic Monastery	11

Number of operators of human activities

Land Reclamation	12,240 approx.
Aquacultures	129
Oil Extraction	23
Salt Mining	50 approx.
Eco-Tourist Services	11 operators and approx. 150,000 tourists
Coptic Monastery	30

Seddik, El-Rayan, Tounis, El-Nasla, Hanna Habib. The inhabitants of these villages might be among the visitors to the PA, or doing some activities such as fishing, and some other services for the activities inside the PA.

The natural areas like the Rayan waterfalls and beaches attract about 150,000 visitors a year who enjoy swimming and relaxing in the quiet and beautiful outdoors. The visitors spend money on food, fuel, accommodation and souvenirs, and often hire guides, all of which provide jobs for local residents.

Now, with the opening of Wadi El- Hitan as a World Heritage Site, many more visitors are expected from all over the world. To increase the economic benefits, WRPA staff have created a new program called Eco-products for Local Benefit, which involves producing new products that local villagers can make and sell. These eco-products can be crafts and organic agricultural products like tea, olives, and fresh baking.

Human activities

Land reclamation is a major component of the government of Egypt's policy of food self-sufficiency and for this reason such schemes take precedence on virtually any other form of land use in the country. In the south-west of the WRPA about 4500 feddans of drip-irrigation scheme is located. The impact of the scheme in the WRPA is likely to be significant both on soil salinity and on the quantity and quality of water in the Rayan lakes. Perhaps, more critically, the scheme may also affect, in ways which are still to be determined, the adjacent and ecologically sensitive spring's area of the WRPA, through the influx of thousands of settlers into the area.

Oil extraction. There are currently 7 operational oil wells producing about 360,000 barrels/year, established in the northern region of the WRPA by the Qaroun Petroleum Company, a joint venture with the American company Apache. The visible impact of current drilling operations within the WRPA is limited to landscape mutilation due to the development of infrastructure, including a central pumping and storage station, several km of asphalt access roads and a helicopter landing pad.

Aquaculture. Authorizations for two fish farms of 1000 and 1300 feddans have been granted in the area along the waterway between the two Rayan lakes.

The first is already being developed by a private company as an intensive farm. To date, the main infrastructure includes 106 concrete ponds (400 m^2 each), 29 non-concrete ponds under construction/operation, a larger feeding pond and several feed and water distribution canals. The farm currently has an estimated daily requirement of more than 100.000 m^3 of freshwater. The planned expansion of the farm will bring the number of ponds to a total of 120 in addition to a fish feed production unit, a hatchery unit and a canal which will supply the farm with water by gravity directly from the waterway between the two lakes.

The most obvious and immediate impact of the actual and planned farm system will be due to the untreated wastewater being dumped into the main waterway feeding the lower lake without filtration or sedimentation of suspended organic matter. This is likely to lead to eutrophication of the near side of the second lake, propagation of infectious and parasitic diseases originating from the fish farm, and expected anaerobic conditions

leading to algal blooms in the waterfall area and surrounding beaches (main visitor area), situated about 2 km downstream from the farm. In turn, this would inevitably have an adverse effect on the thriving tourism activities currently concentrated in this area of the WRPA. The introduced EIA studies are not comprehensive, however, it stated that the farm should fix filters before discharge into the lake.

The annual fish production for each pond is about 3-4 tons which means about 370 tons of fish per year, which generating about LE 3,700,000 annually.

The second is developed by NGO: Fayoum fish farming society on extensive farming basis. The invested area is larger than the first farm and the impact is more or less the same as the intensive farm. To date, the main infrastructure includes 68 farms each of 4-6 ponds (about 8000 m^2 each). 58 farms are currently operating while the other 10 are under construction. The annual fish production is about 2.5-3 tons for each pond, which means about 870 tons of fish per year, which generating about LE 8,700,000 annually.

Fisheries. Fisheries activities in the Wadi El Rayan lakes are managed by the fisheries department of the Fayoum Governorate. The PA includes some of 1724 local fishermen using 182 traditional fish boats and was yielding an annual total of about 450 tons of fish in 1994, down from about 600 tons in 1988. Presently. At current levels of activity the overall impact of this economic sector is thought to be relatively mild although no data are available on its possible effects on the birdlife of the WRPA.

Tourism. Wadi El Rayan has the highest number of visitors of any Protected Area in Egypt outside South Sinai and the highest number of Egyptian visitors of any Protected Area in the country (Baha El Din & Baha El Din, 1999). About 150 000 visitors are annually visiting WRPA.

The vast majority of visitors is Egyptian (over 90%) and demand for the WRPA as a recreational destination is likely to continue to rise, given the over-crowded and highly polluted conditions prevailing in many urban areas of lower Egypt.

The fees collection is currently generating about LE 299,415 for the latest update in 2006/07.

The main visitor area in the WRPA, widely known as the Waterfall Area, covers a stretch of beach of about one km along the northern shore of the Lower Lake. Existing infrastructures include six cafeterias, a tourist camp, 2 public WC units, a small police station and a mosque. Overall, the environmental impact of current tourism infrastructure and activities is considered to be mild (IUCN, 1998b; 2000b).

The park is currently redesigning the area in an attempt to transform it into a recreational area with a strong eco-tourist and educational vocation. Expanding and improving the existing visitor centre , will offer eco-tourist and educational services to the visiting public as well as providing a hub for local tour-operators. New simple camping site and bird watching hide and other visitor facilities have been established in key locations.

Salt extraction. The impact of this activity is thought to be negligible under the present mode of operation and as long as it does not expand to ecologically fragile areas such as

the Springs and the Fossil areas. This activity is based on very poor local people whom permitted by the WRPA to work in a very limited barrel desert area (has no importance for biodiversity or other values) due to their very limited income levels.

2.5. Values of WRPA

The management effectiveness evaluation (????)for WRPA has identified the coming as the main values of the protected area under 3 categories:

Category 1. Biodiversity/Natural Resources/Cultural Resources:

- Fossils/World Heritage Site
- Springs oasis (Gazelle)
- Lakes (wetlands, shoreline, aquatic)
- Desert

Category 2. Ecotourism/Recreational Resources:

- Main visitor area (waterfalls, beach)
- Visitor centre
- Safary camp
- Campsites and bird hides
- Tracks

Category 3. Community Well-being (socio-economic)

- Land reclamation villages (Lower Lake)
- Other communities within WRPA, such as: fishermen, salt miners, cafeterias, boat
- owners, oil extraction, monastery.
- Local communities outside WRPA, such as: Yousef Sadeek & area, Rayan, Hana Habbib
- (solid waste site), Hamouli, Shaalan, Tunis.

3. MANAGEMENT OBJECTIVES

3.1. IUCN management Objectives

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 appendix 1). Each category has its own management objectives.

IUCN 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.

IUCN 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.

3.2. National Objectives for Protected Areas

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 NCS aims at maintaining the diversity and viability of the various components of natural heritage, and to ensure their sustainable utilization, through conserving adequate representative examples of the country's natural ecosystems and landscapes, for the benefit of present and future generations. The main national conservation objectives are:

- To conserve representative examples of all the nation's main natural habitats and physiographic regions;
- To help maintain the nation's biological diversity;
- To help maintain the nation's ecological viability;
- To protect the nation's most outstanding landscape features;
- To optimize socio-economic return from the nation's natural systems in a fashion that ensures their long term sustainable maintenance;
- To support national economic development strategies, particularly with regard to sustaining the tourism sector;
- To protect natural assets as future options available for economic diversification;
- To promote public understanding and appreciation of national natural heritage.

3.3. WRPA 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. <u>Natural Resources Management</u>
   - Conservation of Biodiversity
   - Management of Water resources
2. <u>Management of the World Heritage Destination of Fayoum (Currently Wadi El-Hitan) Hitan/Qatrani WHS</u>
3. <u>Management of human and economic activities</u>
4. <u>Public awareness and environmental education programs</u>
5. <u>Local Community development especially the land reclamation villages inside WRPA</u>
6. <u>Sustainable financing of WRPA</u>

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

3.3.1. Natural Resources Management

Conservation of biodiversity

- Preventing of illegal hunting and other actions against the elements of biodiversity inside WRPA (water birds, falcons and gazelles and cutting of plant species).
- Limiting of all sorts of habitat destruction that can come through economic activities, man made fires, unwise and uneducated visitors and different sorts of human settlements as land reclamation schemes and Coptic monastery.
- Applying of the new proposed monitoring program and follow up the specified control indicators
- Enhancing the patrolling and law enforcement system

Management of Water resources

- Stability of the water resources/demands of Rayan Lakes through implementation of a well defined collaboration strategy with the relevant stakeholders.
- Extensive collaboration with the relevant stakeholders to promote the control over the water use and applying the other scenarios ensuring the water availability to the Rayan lakes
- 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.
- Monitoring of water quantity/quality of the two Rayan lakes and their connecting canal.
- Monitoring of inlet to outlet of the operating fish farming activities

3.3.2. Management of the World Heritage Destination of Fayoum (Currently Wadi El-Hitan) Hitan/Qatrani WHS

- Developing a proposal for the management of Hitan/Qatrani as one destination. The proposal should address
    - area/boundary of each site and the boundary of the proposed destination
    - buffer zone between the 2 sites
    - rules to be applied in each of the sites and the buffer zone
    - management resources needed
    - training needed

- proposed research plan
- visitor carrying capacity of the destination

- Developing of a site plan that ensuring the control of the public use of the area for the scientific, educational and eco-tourism purposes.
- Developing and maintaining the infrastructure necessary for the visitor management inside the valley of the whales.
- Promoting of the research programs both nationally and globally
- Controlling the access of the vehicles to the Northern and eastern sides of the valley (coming from 6th of October and North of Qatrani routes) that can adversely affect the fossil remains.

3.3.3. Management of human and economic activities

- Public awareness program should address the issue of 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.
- Control of the licensed activities through close collaboration with EEAA legal department to renew the licensed activities acoording to the WRPA monitoring results
- Applying of EIA for any proposed change or extension at any activity inside the WRPA and ensuring approval of WRPA before starting any new activity of change in an existed one.
- Identifying and promoting the development of potential activities such as ecotourism in alignment of management goals.
- Applying and follow up of an effective program for monitoring of the existed economic/human activities and control indicators to measure the effectiveness of the program

3.3.4. Public awareness and environmental education programs

- Applying of a well defined awareness strategy addressing the newly identified issues from the MEE for WRPA
- 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).

3.3.5. Local community development

- Applying a program of producing eco-products for local benefits by WRPA staff
- Enhancing the communication and sharing with local community inside/outside WRPA

3.3.6. Sustainable financing of WRPA

- Maintaining a strategic perspective by keeping the long term goals.
- Ongoing evaluation and reporting by evaluating and reporting all opportunities to determine successes, failures and areas for improvement.
- Enabling environment: All levels of the government need to strive to create an enabling environment for entrepreneurial activities.
- Local community benefits: When benefits are realized by local communities and businesses, they are more likely to support protected area activities. This becomes a mutually reinforcing relationship.
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4. MANAGEMENT ISSUES, CONSTRAINTS, STRATEGIES AND ACTIONS

4.1. Management issues

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

1. World Heritage destination of Fayoum: Wadi El-Hitan, Qatrani boundary change,
2. Restoration of the water balance in Rayan lakes
3. Conservation of sites with high biodiversity considerations
4. Local community development in and around WRPA
5. Raising of public awareness toward the most important management issues.
6. Eco-tourism development, visitor facilities and infrastructure
7. Collaborative management
8. Research and monitoring
9. Sustainable financing for strategic management of WRPA

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.

4.2. Constraints

External

- Over use of water resources of the PA represented in the Lakes
- Lacking of a collaboration strategy dealing with the authorities especially those stakeholders involved with WRPA.
- The continuous expansion in both volume and variety of the human activities inside WRPA especially the fish farms and monks activities inside the springs area.
- The low conservation awareness of the local people, which currently constitute about 90 % of the visitors to WRPA.

Internal

- Inadequate annual funding of the protected area (running expenses, training, communication tools, etc….).
- Poor management awareness and follow up of the management activities.

4.3. Strategies and Actions

4.3.1. World Heritage destination of Fayoum: Wadi El-Hitan, Qatrani boundary change

In 2005, and after extensive studies and efforts done by WRPA/NCS/EEAA and the MSEA, the UNESCO has declared Wadi El-Hitan as the first World Heritage Site in Egypt of Natural category because its uniqueness in the number and quality of middle Eocene whale fossils (40-43 million years ago) that best show the development of the whales from land based to ocean based animals.

The UNESCO, in their statement, recommended that WRPA better to make boundary change to include the proposed WHS of the North of Qatrani in Qaroun Protected Area. WRPA has prepared a site management plan for Wadi El-Hitan in which the place is to be prepared to be the Fayoum eco-tourism destination. The issue of linkage of both sites is still under extensive study. A World Heritage Destination of Fayoum is to be proposed and managed by a team of both protected areas (Wadi El-Rayan and Qaroun protected areas) leaded by Wadi El-Rayan protected area staff for their experience in planning, management and research capabilities.

The conservation 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.

Strategies and Actions

- The fossil monitoring program should be strictly continued.
- A research strategy is needed to establish priorities related to the gaps and needs identified in the threat analysis of the management effectiveness evaluation process, such as finding fossil locations, determining suitable measures for fossil degradation and establishing a suitable visitor carrying capacity.
- Police powers for rangers should be increased to provide effective and firm management of this high value resource.
- Sustainable financing and a financing strategy (done in Wadi El-Rayan business plan 2007) is urgently needed to be implemented and verified and staff skills must be enhanced to undertake this kind of work.
- Information review and management practices should be examined to ensure that data is properly stored, backed-up, and accessible for multiple uses in PA management.
- The Hitan-Quatrani Joint Management Team should be put into practice to manage the destination from Wadi El-Rayan Protected Area.

4.3.2. Restoration of the water balance in Rayan lakes

The main source of water feeding WR Lakes is mainly agricultural drainage from Fayoum governorate. In turn, the quantity and quality of received water are mainly depending on several factors affecting the water source (Bahr El Banat, Bahr El-Nazla and El Wadi drain). These factors can be political such as water use for reclaiming new lands for agriculture, while others can be miss-management of the included water bodies (cleaning and hydrology), and weak collaboration among the relevant authorities such

as permitting agricultural activities while having water demands problems. A mixture of previous mentioned factors are affecting WR lakes water producing a severe water loss and water level decrease.

The decrease of water quantity which leading to decrease of water level and deterioration of water quality especially the increase of water salinity in the lower lake, all these factors are leading to environmental and socio-economic problems:

- The increasing salinity of the lower lake is leading to a major change in the vegetation succession
- The increasing salinity of the lower lake, will lead to ecological impacts in terms of changing of aquatic fauna and flora
- Decreasing the productivity and fish diversity which will have striking impacts on the social life of the local community

<u>Strategies and actions</u>

- Re-invigorate meetings with the Ministries of agriculture and irrigation concerning water levels. Undertake an information campaign with these ministries and with related groups to educate people about the related problems and impact on social, economic and ecological benefits.
- Develop an education and awareness campaign about clean water, and the situation of WRPA 'at the end of the line', as a recipient of the run-off. The Governorate should also be targeted given their roles in establishing water treatment plants and developing tourism opportunities. Safeguarding the recreational values of WRPA should be a priority.
- Undertake further work on the development of suitable indicators. Where necessary and suitable, develop partnerships with other agencies (e.g., Oceanography Lab) for research and monitoring.
- Follow-up on land reclamation waste disposal.

4.3.3. Conservation of sites with high biodiversity considerations

These sites are the springs area, Rowayan area and the wetlands around the Rayan Lakes especially the area south of Lower Lake.

The springs area is located south west of the protected area with total surface area of about 53.33 km2. 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 Rowayan area is located also in the southwest of the protected area just north to the first zone and of surface area is about 20.57 Km2. 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 wetlands around the lakes of Wadi El-Rayan has about 174 bird species. Birds are the most visible wildlife in the protected area and can be seen in the lakes, desert and farmlands. Bird watching is possible throughout the year, but the greatest numbers and diversity of birds occur in winter when the lakes are teeming with migrant water birds. Due to Wadi El-Rayan importance for wintering water birds, it has been designated by BirdLife International as an Important Bird Area (IBA).

Strategies and Actions

- Habitat supply studies to determine carrying capacity of the system for the gazelles is an important piece of missing information. University of Florence has expressed interest in gazelle research in the springs and may be able to assist with this.
- Strict and limit the extension of the Coptic Monastery in the springs area by applying the new protocol signed in 2007 between the EEAA/CEO and the monks.
- More work on establishing collaborative approaches with the monk community is needed.
- Continued patrolling and enforcement of the laws is warranted.

4.3.4. Local community development in and around WRPA

Local community inside WRPA is mainly represented in the land reclamation village located on the west side of the Lower Lake. Construction of the land reclamation project and villages (Siedna El-Khedr and Sienda Moussa) was initiated prior to establishment of the protected area.

Current size of the area inside PA is 8000 fedan . Estimated population size is about 4000. 40% are children and youth – 60% adults. 55% of the population are female – 45% are male. 55% of the population can not read or write. 200 LE per month / family. Most employment is through agriculture.

Other communities inside WRPA may be represented in the economic communities within WRPA such as fish farmers, commercial fishermen, salt miners, cafeterias, oil extraction, and the monastery.

Communities outside WRPA are represented by the villages nearby or bordering the protected area (e.g., Yousef Sadeek & area, Rayan, Hana Habbib (solid waste site), Hamouli, Shaalin, Tunis).

These communities inside and outside WRPA are expected to have direct or indirect benefits from the protected area

Strategies and actions

- Seek agreement with Ministry of Agriculture to stop any further land reclamation inside WRPA
- More control is needed on the fish farms in terms of water quality/quantity/area occupied and promoting the prevention of the introduction of invasive species.

- WRPA should enhance the information, education and communications program for local communities inside WRPA.
- Set a plan for signposts inside WRPA to direct the communities toward the proper behavior.
- Intensive meetings and follow up are urgently needed with Ministry of Agriculture and Irrigation to fix and control water demands for aquaculture and land reclamation activities.
- Licensing procedure should be updated to consider inputs from protected area management unit before issuing any license.
- Market alternative days (increase visitation at other times) and alternative opportunities (other locations) to reduce the impact on feast days and to enhance benefits in other periods.
- Develop "memorandums of understanding" for each individual economic community to outline key problems and agreements on solutions, including a code of conduct for all parties.
- Improve knowledge and management of fisheries, including the following (drawing from Fouda and Fouda, 2002):
    - Re-establish the committee to manage fisheries, including consideration of the effects of aquaculture on other activities (water quantity and quality).
    - Determine suitable indicators to measure effective management and benefits.
    - Prepare a fisheries management plan.
    - Develop a fisheries management model to correlate introductions, growth and yield, and harvest. This should become a useful tool in setting sustainable harvest limits.
    - Study benthic communities, as well as infectious or parasitic diseases originating in fish farms that may have an impact on fisheries and human health (including presence of Schistosoma).
    - Construct filtering or sedimentation ponds to reduce organic loading and eutrophication of the Lower Lake.
- An enhanced awareness campaign and water use committee should be established, aimed at raising awareness and finding solutions for declining water inputs into the Rayan Lakes
- Community socio-economic profiles should be researched and maintained to assist in planning and implementing programs (e.g., IEC, employment opportunities, etc.).
- In response to community surveys for this evaluation, more effort should be made in the areas of public awareness, providing local job opportunities and supporting community development.

- Staff from the protected area should be encouraged to participate in local committees to increase the visibility of WRPA and the potential for active cooperation.
- A 'local benefits' initiative should be designed and implemented to include measurable economic benefits as well as less tangible social and ecological service benefits. Such initiatives could include the following examples:
  - Providing venues and marking for the sale of fresh fish to visitors.
  - Offering promotions and opportunities for local residents to visit the PA.
  - Providing opportunities for hiring horses or camels in the Main Visitor Area.
  - Providing training for local guides and assisting with marketing local services.

4.3.5. Raising of public awareness toward the most important management issues.

Raising awareness at the local and national level on the importance of conservation of WRPA is essential for achieving its long-term management objectives. Public awareness in the protected area aims to elicit the support and goodwill of stakeholders as a means of meeting conservation management goals.

<u>Strategies and Actions</u>

- Enhance the current public awareness program targeting the local communities as well as authorities at the local level (councils, police, tourism offices, etc.), and aimed at promoting public understanding of the value of WHS and paleontological resources of the area and of the damage to by unauthorized activities (e.g. Hunting, fossil collection, etc.).
- Carry out an information and awareness initiative targeting desert tourism operators to inform them on the regulations of the protected area.
- Design and implement an information campaign, targeting primarily concerned government authorities (e.g. Ministry of Agriculture, Ministry of Water Resources and Irrigation, etc.) and their officials, aimed at increasing understanding of the water management issues concerning WR Lakes, of their environmental, health and economic implications, and of the need of a concerted effort to prevent excessive water use.
- The Visitor Center hours of operation and program of activities needs to be established and followed, including promoting the programs through staff, literature and sign boards.
- consideration the IEC plan. The long range (strategic) role of the protected area in environmental education (as a specific sub-component of IEC) is needed.
- Collaborative management requires a thoughtful process involving 'communications for behavioral change'. While this is recognized in the Information, Education and Communications Plan, a real effort to engage key stakeholders is necessary.

4.3.6. Eco-tourism development, visitor facilities and infrastructure

WRPA has a characteristic potential attracting local as well as foreigner visitors, such as the WHS in Wadi El-Hitan, desert landscape, the sensitive springs area, extensive dune fields, the lakes, etc. Camping and bird watching sites around the lakes are of the main infrastructures supporting these kinds of tourism. These activities have to be carefully evaluated and their operations closely monitored to ensure protection of habitats and in general to guarantee that they are consistent with the long-term vision and management objectives of the PA.

About 150 000 visitors are annually visiting WRPA. The vast majority of visitors is Egyptian (over 90%) and demand for the WRPA as a recreational destination is likely to continue to rise within the coming years.

Main visitor area has delivered a big attention towards the planning and re-design of its main items, while construction is still required. The USFS landscape architect was on-site for 10 days, during which time, several meetings and extensive planning was done and a final draft landscape plan was prepared.

A detailed implementation plan was prepared to properly sequence and schedule the work, as there are many components, and to estimate the costs (estimated to be about 400,000 LE). Completing the work in the landscape plan was beyond the scope of the Italian project budget and timetable as this is a multi-year project. It is recommended that the EPF provide a new project for the area's re-development.

The Ministry of Culture, environmental design unit has expertise in landscape planning. They have offered to provide their staff services, free of charge, to support the Main Visitor Area project.

<u>Strategies and actions</u>

- Regular patrolling of primary attractions and sensitive sites by the PA staff to reduce and prevent negative visitor impacts.
- Appropriate facilities and infrastructure needed to marketed and well maintained for the visitor use of the PA.
- Enhancing and developing the programs of eco-guide training for local residents as official guides for the PA, and in doing this appropriate consideration should be given to the need of establishing a system allowing only guided visits to the most sensitive areas, such as Springs area and Wadi El-Hitan WHS.
- Ecotourism opportunities, facilities, etc need a clear strategy and time table for maintenance and implementation in other parts of WRPA.
- The PAMU shall coordinate with Tourist Police to seek simplification of arrangements for non-Egyptians security, so that security concerns do not affect opportunities for the enhancement of visitor use of the area
- Enhance overall management of the main visitor area by increasing and focusing the staff activity on priority actions, including co-management with the economic stakeholders.

- Take action on the feral dog population, including educating fish farmers to discourage them from keeping domestic animals.
- Attempting to resolve the declining water issue. WRPA should take a lead role, with the Fayoum Governorate, to establish a water use/stakeholder committee to address the water quantity and quality issues. WRPA is an the 'end of the line' and is the recipient of the remaining flow. Investments in eco-tourism infrastructure local economic benefits are at risk.
- Establish a regular track maintenance program.
- Consider a partnership program with others who have the proper equipment (e.g., the oil company or Yosef Seddeek town) or others who are beneficiaries (e.g., fish farmers) to maintain the tracks.
- Clarify the responsibilities for fish farmers if/when the track is washed out.

4.3.7. Collaborative management

The involvement of stakeholders and local community is a must after the great challenges that WRPA has faced throughout the last 5 years. Challenges in water issues, extension of land reclamation activities, fish farming activities, etc has been faced and need a stronger collaborative efforts from WRPA.

<u>Strategies and actions</u>

- Prepare a priority and implementation strategy for the most facing issues and challenges.
- Support a well established and continued communication strategy with the main and effective decision making stakeholders on the governmental and non-governmental levels.
- Grasp the possible support from the available NGOs on the local and national levels.

4.3.8. Research and monitoring

The idea of external research programs has a large interest in WRPA. Different researchers from variant research institutes are interested in research subjects inside WR. The WRPA staff should have their strategy to follow, record and track these subjects, methodologies and their results to keep aware with such important information and to track the possible effects on the natural resources of the area.

<u>Strategies and actions</u>

- Produce a detailed guidelines and rules for external study and research. The following terms can be adopted:
    - Researchers should submit a detailed proposal to the NCS/WRPAMU for approval
    - The research should reflect the management needs
    - The researchers should provide copies of their final data/reports/papers to the NCS and WRPA

- No mass sampling/over collection of Flora or Fauna specimens
- Involving the WRPA staff in any proposed study/research for the purposes of follow up, training about research methodology and capacity building

4.3.9. sustainable financing for strategic management of WRPA

As the first business plan in Egypt for a protected area, WRPA has showed in its business plan, four strategies and associated opportunities to achieve sustainable financing which are: 1) Revenue generation (4 opportunities), 2) Governmental funding (1 opportunity), 3) Revenue retention (2 opportunities) and Partnerships (3 opportunities). (see the financial part of this plan).

<u>Strategies and actions</u>

- Set up an internal system by NCS of WRPA staff that enables the key BP person/team to directly implement/operate the self financing mechanism/budget.
- Preparing a simple portfolio for the WRPA priorities and alternatives which need co-financing to be addressed when dealing with certain sponsor/stakeholder.
- Seeking fund raising through initiating and strengthen the issue of social responsibility with the relevant local and national stakeholders to strongly cooperate and finance activities of WRPA.
- Considering the socio-economic context when implementing any of sustainable financing activities in near and far future
- Clearly implement the main 4 financial strategies obtained from the WRPA business plan 2007

5. MANAGEMENT TOOLS

EEAA is the responsible authority to manage WRPA and all its resources, as stated in the Laws 102 in 1983 and 4 in 1994 as one of the 27 Egypt's protected areas. The WR PAMU who operate the protected area is fully and directly working under the supervision of the Nature Conservation Sector of the EEAA.

Other stakeholders and authorities are partly responsible and managing specific resources such as Ministry of Agriculture and land reclamation (who is responsible for policies of land reclamation schemes and managing fish resources of internal water bodies).

The WRPA is directly affect, negotiate and collaborate the decision making of such authorities inside the protected area borders and its buffer zone.

The following is a list of the main stakeholders and authorities:

- Ministry of Agriculture and Land Reclamation
- Ministry of Irrigation and Water Resources
- Ministry of Tourism
- Ministry of Interior
- Ministry of Defence
- Ministry of Health
- Governorate of Fayoum
- Ministry of Petroleum

The implementation of the management strategies and actions is being achieved and ensured through the use of the following management tools; zoning, environmental regulations and law enforcement, patrolling, communication, documenting, monitoring and research, GIS and EIA.

5.1. Zoning

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.

The previous WRPA management plan (2002-2006) has divided WRPA into 5 zones of homogenous use and legislation: each zone with different characteristics (biologic, geologic, etc.) having different uses.

In this plan, and after recent changes and new amendments such as declaration of new world heritage site in Wadi El-Hitan, the new protocol extablished between the EEAA and the monks of the Coptic monastery in the springs area and the monitoring results and needs, each site of WRPA has been allocated one of the management zone categories listed below:

Table (1): Zoning system of WRPA

Protection Level	Name of Zone	Activities permitted
Low Impact A	• **Core World Heritage Zone** (Wadi El-Hitan) **A1**	• No vehicles access to the core heritage area; only foot visits or other means assigned by the WRPA staff. • The permitted area to visit is only 2km long while the rest of the valley is assigned for authorized research • Collecting, destroying, or replacing the fossil parts is strictly forbidden • Crossing of the demarcated tracks/footbaths or fencing around the fossil sites is extremely forbidden •
	• **Strict Natural Zone** (Springs/Rowayan areas) **A2**	• Studies and research under specific authorization and control. • Habitat exploitation is prohibited. • Tourism and Economic activities are not allowed. • Law impact ecotourism activities are permitted only under approval and guiding from WRPA staff
	• **Reserve Protection Zone** (area South of the Lower Rayan Lake) **A3**	• Law impact ecotourism activities are permitted only under approval and guiding from WRPA staff • Studies and research under specific authorization and control
Moderate impact B	• **Recreational/sustained ecotourism activities Zone** (Rayan Lakes and the main visitor area) **B**	• Tourism and tourism facilities and recreation • Bird watching • Camping • Pathway for the traditional fishing activities
High impact C	• **Development Zone** (Area of intensive economic activities) **C**	• 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

Zoning description

Five zone types with different degrees of protection levels will be described and explained (Appendix 1).

5.1.1. Zone A1: Core World Heritage Zone **----------**

Zone description

The core area of Wadi El-Hitan which includes the above and under soil surface part which is located in the fossil area situated northwest of the protected area. This part is limited with the GPS coordinates: N 29.29647, E 30.05411 & N 29.29228, E 30.03870 & N 29.26612, E 30.01765 & N 29.26968, E 30.04240. The total area of this part is 7.00 km2. This part is containing an enormous number of vertebrate fossil skeletons of the old middle Eocene whale (40-43 million years ago).

Zone Rules

- No vehicles access to the core heritage area; only foot visits or other means assigned by the WRPA staff.
- The permitted area to visit is only 2km long while the rest of the valley is assigned for authorized research
- Collecting, destroying, or replacing the fossil parts is strictly forbidden
- Crossing of the demarcated tracks/footbaths or fencing around the fossil sites is extremely forbidden

Public Use

The public uses of this zone are limited clearly to the well-controlled eco-tourism activities. Walking, viewing the landscape, visiting the demarcated fossil sites of the open-air museum and camping outside the core area are the main use of this site which containing the most integral vertebrate fossil skeletons in a natural protected show among one of the most amazing and attractive senses.

5.1.2. Zone A2: 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 km2, 4.2% of the total area of the protected area.

Zone description

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

Two zone A2 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 & N 29.06877, E 30.33292 & N 29.02038, E 30.26481 & 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 & N 29.12527, E 30.22013 & N 29.14209, E 30.18640 & N 29.162321, E 30.21640. The total surface area is 20.57 Km2. 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 A2 areas will be linked up in a way that 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
- Light guided ecotourism activities are permitted after authorization from WRPA

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 monks of the monastery, caves and infrastructure represented in some exposed guest rooms, church, WCs and kitchen facilities for the special visitations to the monastery 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, the signed protocol between the monastery and the EEAA should be strictly implemented. Regular monitoring and extensive interaction should be enhanced by WRPA staff and should be continued for the settlement inside the area.

***5.1.3. Zone A3: Reserve Protection Zone*----------**

The areas of a) an importance for resident and migratory birds, and b) characteristic landscapes have been classified as zone A3. This zone is under high control and protection for the natural resources. The total area of this zone is 24.92 km2, 1.4% of the total area of the protected area.

Zone description

(See also IUCN 2000a, The Environmental Profile of WRPA &EEAA 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 & N 29.09338, E 30.42061 & N 29.05785, E 30.42468 & N 29.09196, E 30.35669. The total area of this part is 24.92 km2. 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

- Visiting for viewing wildlife and landscapes is permitted
- 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
- Fishing activities are allowed
- No floating structures are allowed.
- No agriculture or livestock is permitted

- No constructions are permitted

Public Use

No sorts of public use has been identified in this area except low impact bird watching, the controlled car tours around the area through the designated tracks in the area around the lake and normal fishing activities.

5.1.4. Zone B: Recreational Zone----------

The area of this zone is designated for a) eco-tourism and environmental education activities (visitor center tracks & bird watching sites), b) recreational uses (safari camp, cafeterias & 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 &EEAA 2001, report on the third year of the monitoring program)

One zone B 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

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, WCs and the PA visitor center are existing eco-tourism facilities for the moment. Six cafeterias and one safari camp are existing as mild economic activities.

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.

Starting from 2001 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.

5.1.5. Zone C: 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 &EEAA 2001, report on the third year of the monitoring program)

There are three types of zone C 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 & N 29.34029, E 30.42559 & N 29.33722, E 30.41406 & N 29.33649, E 30.40014 & N 29.34966, E 30.40524. Part 2: N 29.35221, E 30.45013 & N 29.34618, E 30.45404 & N 29.33984, E 30.45375 & N 29.34440, E 30.43657 & 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 and Saiedna Mussa reclamation village) of an area of 48.134 km^2, and limited with GPS coordinates: N 29.20320, E 30.32731 & N 29.20295, E 30.27968 & N 29.13512, E 30.29092 & N 29.12995, E 30.39348 & N 29.12101, E 30.38212 & N 29.17719, E 30.34407.

c) 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 & N 29.20805, E 30.45855 & N 29.19965, E 30.43898 & N 29.21216, E 30.42371 & N 29.22276, E 30.42484, and with total area of 6.4 km2.

3. Fish farming activities in Wadi El-Rayan Protected Area comprise 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 almost 10 years while, extensive fish farming has only been operating for about 5 years.

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.

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. Any extension of aquaculture activities or others should be after authorization from EEAA.

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.

5.2. Environmental regulations and law enforcement

Regulations

Law 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

law enforcement is the most important task for the WRPA staff to apply at all times. The law 102/1983 has provided the protected area staff with the necessary police power enabling them to take the suitable actions against violators of the law. Law enforcement is an important component in particular of the patrolling activity, and patrolling teams should be prepared at all times to carry out their obligation in enforcing the law.

Most of WR staff have the basic training in enforcement procedures and professional behavior towards violators. Any violations of the regulations observed during patrols are recorded in a police report and submitted by WRPAMU to the relevant police station at Youssef ElSeddeek. The police report is transmitted to the prosecutor and finally to the court. The court decides the penalty.

The legal members (rangers) of WRPA are responsible for follow up of prosecution procedures and should keep tracking of record of details and relevant paper work. Close contact and coordination with police and other authorities is important to have effective law enforcement.

5.3. Patrolling

Patrolling of the PA and its resources is the major tool of the protected area staff aside with the law enforcement. Patrolling systems is acting as the enforcing hand of the PA regulations that observe the natural resources and stop any violations to regulations. It also keeps a recent picture about the condition of natural resources and management facilities (visitor facilities, management infrastructure, signposts, visitor use,…etc) and tracking any change in their states.

ALL PAMU staff with operational field tasks (senior staff, rangers, community guards, drivers) regardless of specialization are obliged to participate in patrolling activities. Training, full/clean uniform (if available), communication tools, and safety precautions must be followed by the patrolling team and inspected by the PA manager prior to any patrolling activity to ensure functional and safe patrols and staff.

5.4. Communication

WRPA has a remarkable and well defined communication system enhanced by the support from the Egyptian Italian Environmental Cooperation Program since 1998 through 2 project phases. Several communication tools have been adopted:

- WR visitor center with audio/video (WR documentary) devices and information panel system telling the history and main issues of WRPA
- WR poster and brochures
- multi-media tools such as talks, lectures, Radio, TV, Printed media, (Arabic and English.)
- publications e.g., WR atlas, visitors guides, maps etc.
- the newly developed Wadi El-Hitan DVD and open air museum guide
- Wadi El-Hitan newsletter
- WR website

These communication tools need strong support to continue both in volume and variety in future. The proposed self financing mechanisms and strategies, if implemented properly, will ensure sustaining of such tools. The existed tools should be invested and in a sustainable way to grasp the sponsors and extend a sound reputation of WRPA

5.5. Geographic Information System (GIS)

This tool plays an important role in supporting the other management 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.

Several layer for management infrastructure, visitor facilities, economic sites, roads and tracks and others were produced and kept for different uses.

The latest version of ArcGIS has been purchased and manipulated by the trained staff. It is expected that the GIS tool will play an essential role in the next planning period to cover and define the proposed World Heritage Destination of Fayoum in addition to monitoring the enlarged economic activities inside WRPA.

5.6. Environmental Impact Assessment (EIA)

This tool is used whenever a development activity involving infrastructure is planned/maintained/enlarged 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. The EIAs should follow the Environmental Impact Assessment Guidelines (EEAA 1996).

5.7. Management Effectiveness Evaluation (MEE) & Documentation

Monitoring of WRPA 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 Evaluation
- Budget and expenditure

- **Scientific and ecological monitoring**

The reporting system of this program should be strictly submitted annually. The report should include 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

New monitoring indicators have been adopted through the Italian project Phase II, to be aligned with the most recent resource evaluation (MEE 2007), See Annex

- **Management Effectiveness Evaluation**

Twice annual reporting of the management activities was the followed MEE procedure in the Italian project Phase I. While in Phase II, the procedure were changed to evaluate the outcomes rather than inputs or process in the previous system. The recent system for evaluation and monitoring is recommended to continue according to the guidelines done by the IUCN – MEE national team for NCS.

- **Budget and Expenditure**

In the presence of donor project, 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.

For the governmental system (no donor project), an annual statement of expenditure according to the governmental rules to be submitted at the end of each fiscal year by WR accountant.

5.8. Monitoring and Research

Monitoring is the tool that evaluate the natural resources and report their state periodically or statically, hence providing amendments for deferential management according to the natural resource status. monitoring should be designed to determine if the management objectives are met, as happened in the Italian project Phase II support

to WRPA. The project has revise the objectives and re-established monitoring indicators for correctly evaluating the state of resources, hence the management process.

A portfolio of indicator package has been prepared and under final revision, and recommended to start immediately. The indicator package included biodiversity elements, water quality/quantity, visitor management/capacity, world heritage evaluation, economic activities,…etc.

Targeted and management issues oriented research will be an important tool to achieve better management. The strategy of WRPA is to encourage the research programs on the local national and international levels.

5.8.1. Zone A1: Core World Heritage Zone

Two types of monitoring are developed for fossil sites survey and visitor monitoring.

5.8.2. Zone A2: Strict Natural Zone

Monitoring in this zone is mainly scientific in nature and deals with elements of biodiversity. Two monitoring programs have been applied in the area. The first is the Gazelle monitoring program, which deals mainly with the dorcas gazelle communities. The second is the vegetation-monitoring program, which deals with the general cover of vegetation (size). Another program for monitoring the activities of the existed coptic monastery should be established and strongly implemented.

5.8.3. Zone A3: Reserve Protection Zone

This zone should be monitored to keep its wilderness and protect the system from human impacts.

5.8.4. Zone B: Recreationa/sustained ecotourism activities Zone & Zone C: Development zone

Economic activities, visitor survey, water quality/quantity and visitor facilities should be monitored in these zones.

5.9. Organizational structure:

A new organizational chart and duty handbook (performance management system) was introduced in 2005. In 2007, these were updated, based on lessons learned, and presented to staff by the head of NCS.

6. 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:

6.1. Infrastructure and Equipment

The existing infrastructure was simply described below.

Infrastructure

Currently, the infrastructure of WRPA are diverse and numerous varying from complex management buildings to simple structures.

Headquarters

The WRPA headquarters existed since early 1995s. it has been renovated 2 times. The first was at the time of the Italian project Phase I to add about 115 m^2 (5 rooms, 2 bathrooms, 2 kitchens, 1 hall) new woody building for ranger accommodation. The Phase II of the project had a major renovation of the office, accommodation and guard's quarters; expanding the walled compound and parking areas; installing overhead shade in the parking area, and; constructing a storehouse for field equipment and publications.

Springs Outpost

This building was completely installed at the project Phase I. Improvements to the building were made by closing in the outdoor patio for protection from blowing wind (and to make the space more useful); covering the white block wall with sand-colored plaster; extending the wall to enclose and secure the generator, and; purchasing a new generator for this outpost. In addition, the unused garage was converted into a new environmental education nature center.

Visitor Area WCs

The old WC in the Main Visitor Area was completely renovated and expanded. The newer WC (constructed in phase I) suffers serious structural problems and should be permanently closed and demolished.

Hitan shadow structures

9 sites have developed for their shade structures of different sizes simulating the surrounding environment

Hitan Parking area infrastructure

Infrastructure for the Hitan visitor area was established, including the following:
Parking to hold about 80 cars.
Ticket station with two rooms.
A visitor reception/display shelter with displays.
A cafeteria and gift shop.
A police station.
Men's and women's WCs.

Camel shed.
Guard's quarters.
An asphalt helicopter pad beside the road.

Hitan Outpost

In 2006, a permanent tented camp was established at Hitan for the first time, housing a team of staff to oversee the site. Six tents were set up and outfitted with beds, generator, a kitchen (refrigerator, cooking equipment), laptop computer, camera, field tools, etc. In 2007, the tents were replaced with a 'temporary' mud brick building comprising a kitchen, living area and two bedrooms, with a detached WC.

Main gate structures

2 main gate structure had established at the time of HQ, each of one room and bathroom for ticket collection purposes.

Visitor Center

The existed VC had been established by project Phase I and currently under complete renovation for the infrastructure and educational exhibitions.

3 Cafeterias

The EEAA has established 3 cafeterias of natural materials and hired them to an external investor under the supervision of the EEAA.

Bird watching hide

Newly established bird hide was finished and operated in 2007 around the upper lake. It has been made of mud bricks

Camping site

Newly established camp site was finished and operated around the lower lake in zone A3. It has been made of natural reeds and mud bricks.

Tracks

About 150 km is the length of established tracks and roads by WRPA

Signposts

About 20 signposts made of local stones in different park areas

Equipment & Vehicles

Vehicles

5 Toyota Hilux pick up, 1 Land Cruiser pick up, 1 Nissan pick up, 1 Wagon Galloper all are 4WD. 6 motor bickes (3 Honda + 3 Jawa). 2 motor boats fiber glass. 7 generators of different capacities (from 3 to 40 kw).

Office equipment

PCs, Laptops, scanners, printers, digital cameras, video camera, office desks and chairs, software,

Field equipment

Binoculars, telescopes, camera trapping, camping equipment, winter and summer uniform. See monitoring and evaluation report (IUCN, 2001) for historical infrastructure and equipment.

A complete staff accommodation still critically needed to maintain the staff stability in the nearest site. 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 separate apartments for each of the staff could be satisfactory.

6.2. Staffing

The current number of staff is enough to carry out the management tasks (patrolling & law enforcement, monitoring, etc) after recruiting by EEAA the staff that hired by the project during its second phase. However, the staff job description should be more elaborated and carefully implemented.

New ticket collectors (4) should be recruited. The current acting ones are shifted from their main duties as community guards to work in ticket collection due to shortage resulted from transferring of the old ticket collectors to another branches of protected areas in Cairo.

Senior grade staff of WRPA have had mild training in their scientific and management fields, while about one fourth of the total staff continue their higher studies (diploma, master and PhD). So, WR staff needs more formal and well directed on the job national/over seas training. These kinds of training should continue throughout their careers in nature conservation.

The current status of WRPA staff is as the following:

JOB	NUMBER
Protected Area Manager……(PAM)	1
Environmental Affairs Researcher (ranger) ……(EAR)	13
Legal Affairs Officer ……(LAO)	2
Accountant……(Acc)	1
Financial Affairs Officer……(FAO)	1
Ticket Collector……(TC)	2
Guards……(Gd)	7
Administrative& Human Affairs……(Adm)	1
Driver……(Dvr)	4
Boat Driver……(BDvr)	1
Supporting Staff (House watching)……(SS)	1

The general and specific duties of the PAMU staff are given in the Duty Handbook for the Wadi El-Rayan Protected Area Staff.

The current resources were hired by the Italian project Phase II and hopefully to be contracted/recruited by EEAA in their current jobs as follows:

JOB	NUMBER
Guards……(Gd)	4
Driver……(Dvr)	3
Supporting Staff (House watching)……(SS)	1

Recruitment of following human resources

JOB	NUMBER	SPECIALIZATION
Guard	2	Diploma is preferred
Ticket Collectors	4	At least diploma degree
Boat Driver	1	Diploma is preferred

6.3. Financing, Sustainable financing & Business Planning

6.3.1. Historical

Financing is important for the protected area to manage the activities that depend on financing, and no goals can be achieved in case of having no money.

WRPA has developed a very strong and the first business plan in Egypt for a protected area. The purpose of that business plan is to examine the financial situation of the protected area and to establish a strategy for sustainable financing. The plan identifies the current sources of funding, revenues, and expenditures of the protected area, and relates these to future needs.

Funding

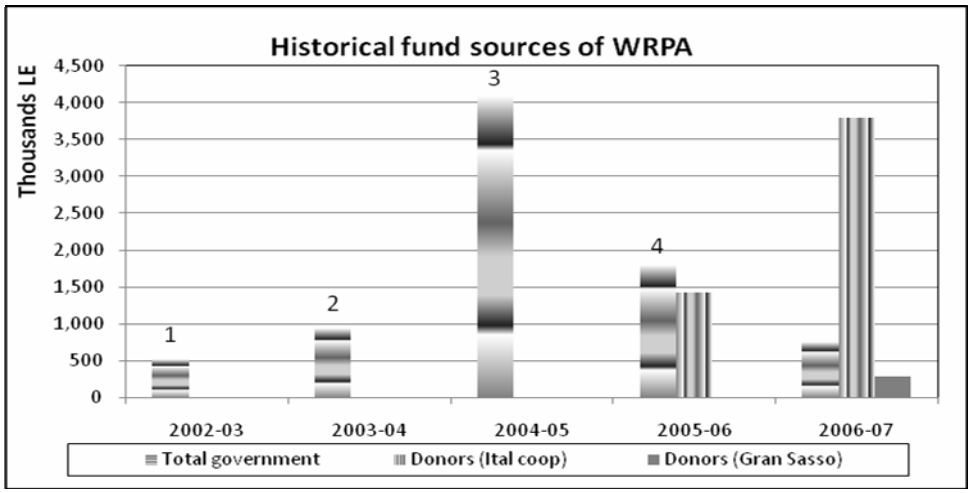
Currently, WRPA protected area has two main funding sources, which are the governmental budget and donor support. The only continuous source is the governmental budget (LE 750,000 for salaries and operations in 2006/07) which is absolutely insufficient. The other sources of funding are time limited, such as the three year Egyptian-Italian Environmental Cooperation Programme (EIECP) which includes LE 9,400,000 (2005-2008). In addition, Wadi El-Ryan's twin park in Italy, Gran Sasso National Park, has allocated LE 600,000 for improving education and communications facilities. (Table 2).

Table (2): Historical Fund sources (2002-2006)

Budget sources LE	2002-03	2003-04	2004-05	2005-06	2006-07
Government budget	522.319[1]	948.965[2]	4,095,739[3]	1,796,500[4]	750,000
Donors (Ital coop)	0	0	60,000	1,433,119	3,800,236
Donors (Gran Sasso)	0	0	0	0	288,000
Total	522.319	948.965	4,155,739	3,229,619	4,838,236

1. Included LE 38,500 for purchasing of 3 tractor trailers.
2. Included LE 360,000 for constructing of public WCs in the main visitor area in 2003/04
3. Included LE 3,375,000 for constructing of Wadi El-Hitan road and LE 108,889 for purchasing of a 5 meters boat.
4. Included LE 1,125,000 for constructing of Wadi El-Hitan road

Figure 1. Historical fund sources of WRPA



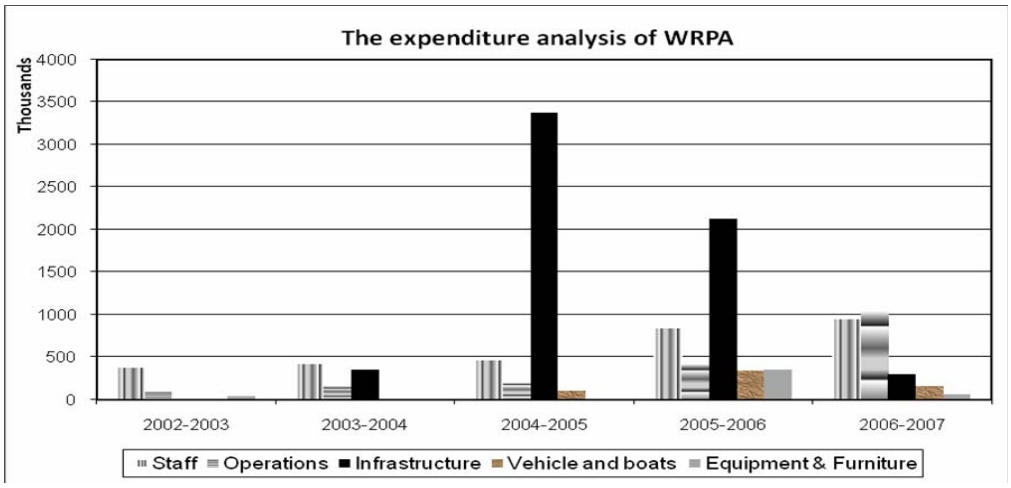
Expenditures

Expenditures of WRPA were analyzed for five key management programs to identify priority activities and needs to achieve a 'basic' and 'ideal' level of management. The key programs examined in the business plan are (1) planning and management (2) monitoring (3) Wadi El-Hitan development (4) eco-tourism, and (5) public awareness.

Table (3) the history of expenditure for WRPA 2002-2007

Category	2002-03		2003-04		2004-05		2005-06		2006-07	
	Government	Donor	Government	Donor	Government	Donor	Government	Donor	Government	**Donor**
Staff	383,819	0.000	426,465	0.000	473,850	0.000	526,500	318,333	585,000	370,000
Operations	100,000	0.000	162,500	0.000	138,000	60,000	145,000	277,633	165,000	876,133
Infrastructure	0.000	0.000	360,000	0.000	3,375,000	0.000	1,125,000	1,000,000	0,000	300,000
Vehicles and boats	0.000	0.000	0.000	0.000	108,889	0.000	0,000	342,000	0,000	160,000
Equipment & Furniture	38,500	0.000	0.000	0.000	0.000	0.000	0,000	351,491	0,000	66,302
Total (Gov - Don)	522,319	0.0	948,965	0.0	4,095,000	60,000	1,796,500	2,289,457	750,000	1,772,435
Grand Total	522,319		948,965		4,155,739		4,085,957		2,522,435	

Figure (1). Expenditure analysis of WRPA



Revenues

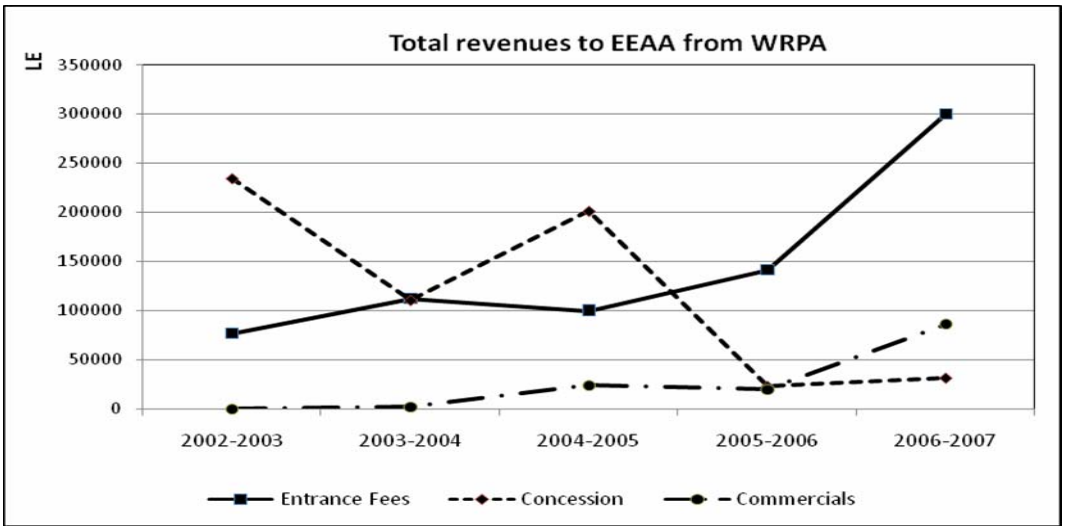
The total revenues from entrance fees, concessions and commercials in the year 2006/07 amounted to LE 417,000, however, theses revenues are transferred to the Environmental Protection Fund (EPF) of the Egyptian Environmental Affairs Agency (EEAA) and not returned back to the WRPA.

Table (4) The history of revenues from WRPA to EEAA EPF 2002-2007

Revenues	2002-03	2003-04	2004-05	2005-06	2006-07
Entrance Fees	76,950	112,000	100,250	141,450	299,415
Concession	234,478	110,777	201,335	23,461	*31,857
Commercials	0	2,000	24,000	19,572	86,000
Total	311,428	224,777	325,585	184,483	417,272

* Fish farms have not paid their concessions due to administrative & legal complexities.

Figure (2) Total revenues to EEAA from WRPA



6.3.2. Financial Gaps

The summary financial statement shows, for each program, the actual expenditure in 06/07, the required funding at the basic and ideal state levels and the funding gaps.

For ease of presentation of results, all figures are illustrated in LE and do not distinguish between the different sources of allocation.

Generally, the total amount of money required for WRPA in its current situation to cover the gap to reach the basic management status was estimated to be LE **5,842,027**. While, the required amount to cover the gap to reach the ideal management status was estimated to be LE **7,421,272**.

The highest gaps to the basic and ideal scenario were found to be in the Planning and management; Wadi El-Hitan development and monitoring followed by eco-tourism and public awareness programs. The gaps to basic were estimated as follows in LE: 2,811,750; 1,731,404; 721,288; 379,581; 198,004 respectively while the gaps to ideal were 3,505,657; 1,968,105; 848,691; 717,083; 381,737 respectively.

The figures from (6) to (12) show the trends of the different expenditure items against each of the management programs. See also appendix 4 for available resources, needs and their cost for each of the management programs in details.

Planning and Management

This unit represents the administrative entity of WRPA in addition to patrolling and law enforcement and daily operating activities. Implementation of management planning, management effectiveness evaluation and work plans are of the main duties in this program.

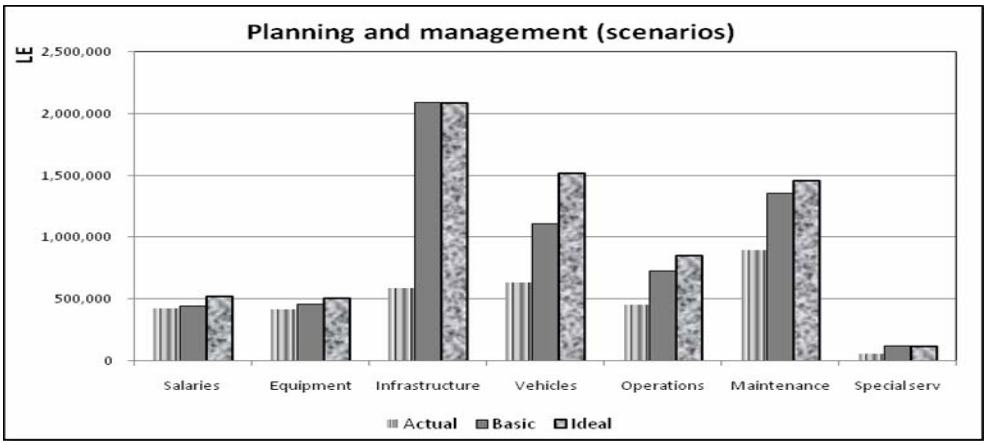
The expected amount of money to reach the basic management state for the planning and management unit was estimated as LE 2,825,280, while the expected amount to reach the ideal management state was LE 3,592,887.

Table (5) and figure (6) show the scenarios and gaps for this management program.

Table (5): Scenarios and gaps for planning and management program of WRPA

Categories	Actual	Basic	Ideal	Gap actual to basic	Gap actual to ideal
Salaries	425,040	439,800	520,200	14,760	95,160
Equipment	416,400	456,900	504,600	40,500	88,200
Infrastructure	586,272	2,086,272	2,086,272	1,500,000	1,500,000
Vehicles & Boats	635,000	1,110,000	1,515,000	475,000	880,000
Operations	452,001	729,008	854,777	277,008	402,777
Maintenance	894,170	1,352,183	1,460,920	458,013	566,750
Special services	60,000	120,000	120,000	60,000	60,000
Total	3,468,883	6,294,163	7,061,769	2,825,280	3,592,887

Figure (6): Scenarios for the planning and management program



Monitoring

All the sources of environmental and resource monitoring are run under this program. Biodiversity, water quality, paleontology as well as visitors and economic activities were monitored for their status. This program is currently using about 20 % of the vehicles and equipment and about 30% of the protected area human resources.

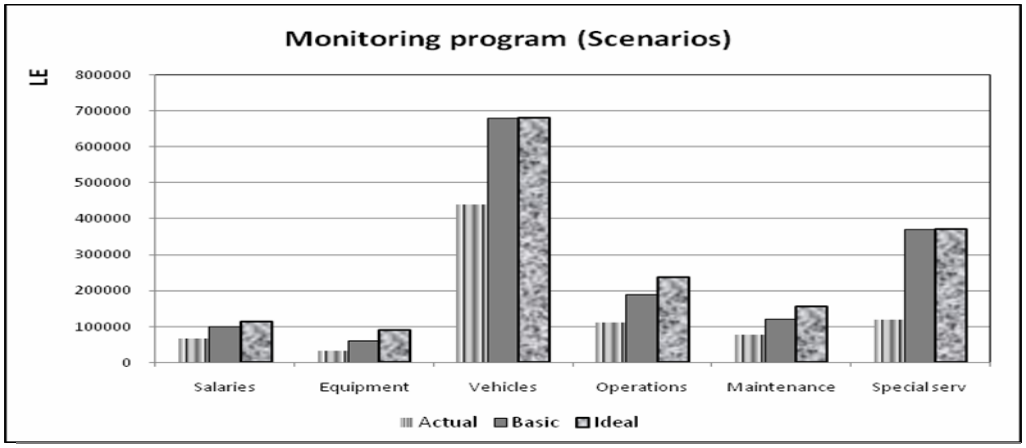
The expected amount of money to reach the basic state for the monitoring program was estimated as LE 671,288, while that expected to reach the ideal state was LE 798,691.

Table (6) and figure (7) show the scenarios and gaps for this management program.

Table (6): Scenarios and gaps for monitoring program of WRPA

Categories	Actual	Basic	Ideal	Gap actual to basic	Gap actual to ideal
Salaries	66,120	100,800	114,000	34,680	47,880
Equipment	33,500	59,300	90,500	25,800	57,000
Vehicles & Boats	440,000	680,000	680,000	240,000	240,000
Operations	111,157	187,960	236,108	76,803	124,951
Maintenance	76,195	120,200	155,055	44,005	78,860
Special services	120,000	370,000	370,000	250,000	250,000
Total	846,972	1,518,260	1,645,663	671,288	798,691

Figure (7): Scenarios for the Monitoring program



Wadi El-Hitan development

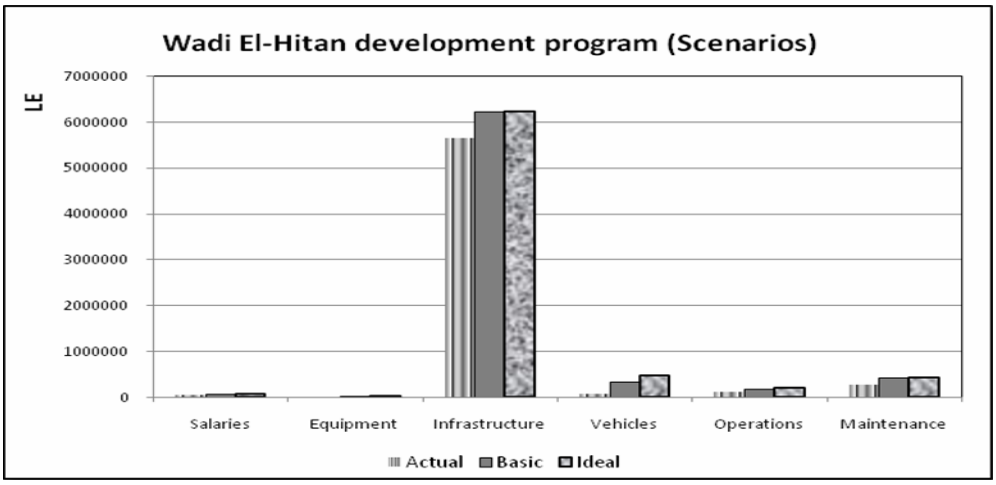
This program is aiming to promote the valley of the whales, the World Heritage Site as an eco-tourism destination of Fayoum on the national and international levels.

The expected amount of money to reach the basic state for Wadi El-Hitan developing program was estimated as LE 1,031,404, while that expected to reach the ideal state was LE 1,268,105. Table (7) and figure (8) show the scenarios and gaps for this program.

Table (7): Scenarios and gaps for Wadi El-Hitan development program of WRPA

Categories	Actual	Basic	Ideal	Gap actual to basic	Gap actual to ideal
Salaries	45,600	55,200	68,400	9,600	22,800
Equipment	11,000	17,800	30,800	6,800	19,800
Infrastructure	5,660,000	6,230,000	6,230,000	570,000	570,000
Vehicles	80,000	320,000	480,000	240,000	400,000
Operations	113,781	180,783	206,657	67,002	92,875
Maintenance	272,658	410,661	435,288	138,003	162,630
Total	6,183,040	7,214,444	7,451,145	1,031,404	1,268,105

Figures (8): Scenarios for the developing program of Wadi El-Hitan



Eco-tourism

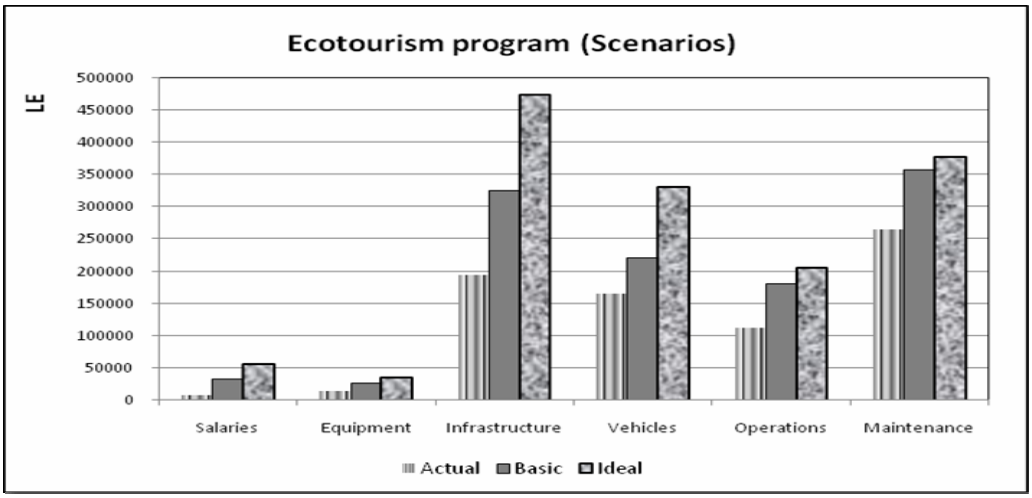
This program is dealing with promoting WRPA as an eco-tourism area on the national and international levels. About 10% of the vehicles and equipment and 20% of the park infrastructure (signs, tracks,…etc) were found in this sector.

The expected amount of money to reach the basic state for eco-tourism program was estimated as LE 379,581, while that expected to reach the ideal state was LE 717,083. Table (8) and figure (9) show the scenarios and gaps for this management program.

Table (8): Scenarios and gaps for eco-tourism program of WRPA

Categories	Actual	Basic	Ideal	Gab actual to basic	Gab actual to ideal
Salaries	7,920	32,400	55,200	24,480	47,280
Equipment	14,000	25,000	34,000	11,000	20,000
Infrastructure	194,000	324,000	474,000	130,000	280,000
Vehicles	165,000	220,000	330,000	55,000	165,000
Operations	112,281	179,283	205,157	67,002	92,875
Maintenance	265,158	357,258	377,086	92,100	111,927
Total	758,360	1,137,941	1,475,442	379,581	717,083

Figure (9): Scenarios for the Eco-tourism program



Public Awareness

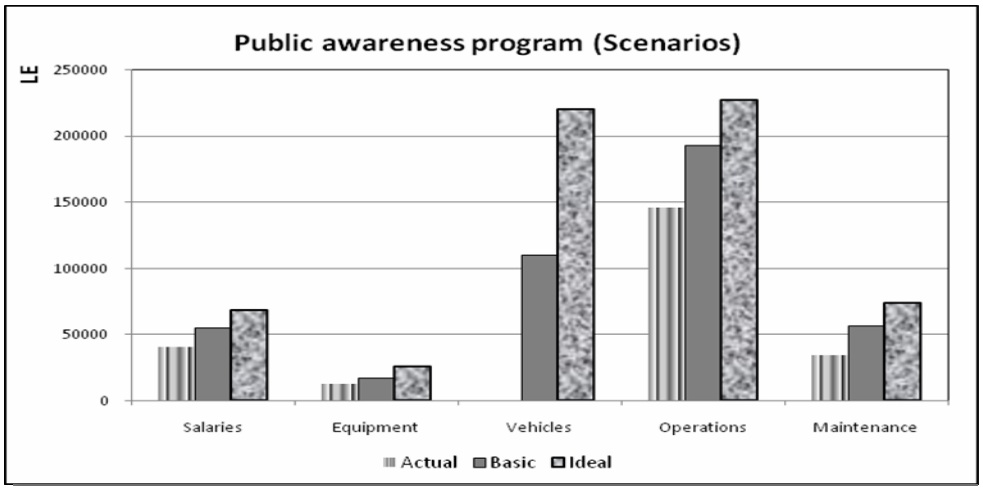
The aim of such program is to stimulate the public support to improve the protection of park's natural resources. Visitors to the PA, stakeholders and local communities are the main target of this program. The program is using about 10% of the park's vehicles and equipment.

The expected amount of money to reach the basic state for public awareness program was estimated as LE 198,004, while that expected to reach the ideal state was LE 381,737. Table (9) and figure (10) show the scenarios and gaps for this program.

Table (9): Scenarios and gaps for public awareness program of WRPA

Categories	Actual	Basic	Ideal	Gap actual to basic	Gap actual to ideal
Salaries	40,320	55,200	68,400	14,880	28,080
Equipment	13,000	17,000	26,000	4,000	13,000
Vehicles	0	110,000	220,000	110,000	220,000
Operations	145,779	192,900	227,006	47,122	81,227
Maintenance	34,348	56,350	73,778	22,003	39,430
Total	233,447	431,450	615,184	198,004	381,737

Figure (10): Scenarios for the Public Awareness Program



The Protected Area Management Programs:

The WRPA gap analysis shows LE 5,105,557 as a difference between the actual and basic levels of management, while the gap between actual and ideal management levels is about LE 6,758,503. The presence of donor funds to WRPA improves the status of infrastructure, vehicles and equipment, operation and maintenance and human resources. Visitor center, out posts, tracks, signs, vehicles and educational materials have been established and produced through the donor support and other sources, while other needs are still required such as staff accommodation, outpost in Wadi El-Hitan, eco-tourism facilities, more signposts, monitoring equipment, vehicles and more operation and maintenance costs. Some of these will be realized in the final year of the Italian project.

It is expected that after ceasing of donor support from the Italian cooperation, a drop will takes place in the different expenditure categories. In 2006/07, the expenditures for operation were LE 165,000 from the government and LE 876,133 from the donor support, which will stop its funding reducing the amount of money spend in operation to those received from the government (a maximum of LE 165,000 in 2006/07) for WRPA and Qaroun PA, unless other funding sources are available or unless finding a mechanism to refund the protected area with its generated revenues.

The major shortfalls are in planning and management and Wadi El-Hitan programs (LE 2,825,280 and 1,031,404 to basic and LE 3,592,887 and 1,268,105 to ideal management states respectively). The other programs of WRPA showed fewer shortfalls to the basic and ideal states as follows: monitoring, eco-tourism and public awareness respectively. The required amounts of money as gaps to the basic and ideal scenarios were estimated as follows: LE 671,288; 379,581 and 198,004 to the basic state and LE 798,691; 717,083 and 381,737 to the ideal management state respectively. (See table 10).

Table (10): Gaps from actual to basic and ideal scenarios for WRPA management programs

Management programs	Gaps actual to basic	Gaps actual to ideal
Planning and Management	2,825,280	3,592,887
Monitoring	671,288	798,691
Wadi El-Hitan Development	1,031,404	1,268,105
Eco-tourism	379,581	717,083
Public Awareness	198,004	381,737
Total	**5,105,557**	**6,758,503**

Figures 11 and 12 show the gaps to basic and ideal scenarios for each management program of the PA, and the total financial shortfall respectively.

Figure (11) WRPA management programs against gaps

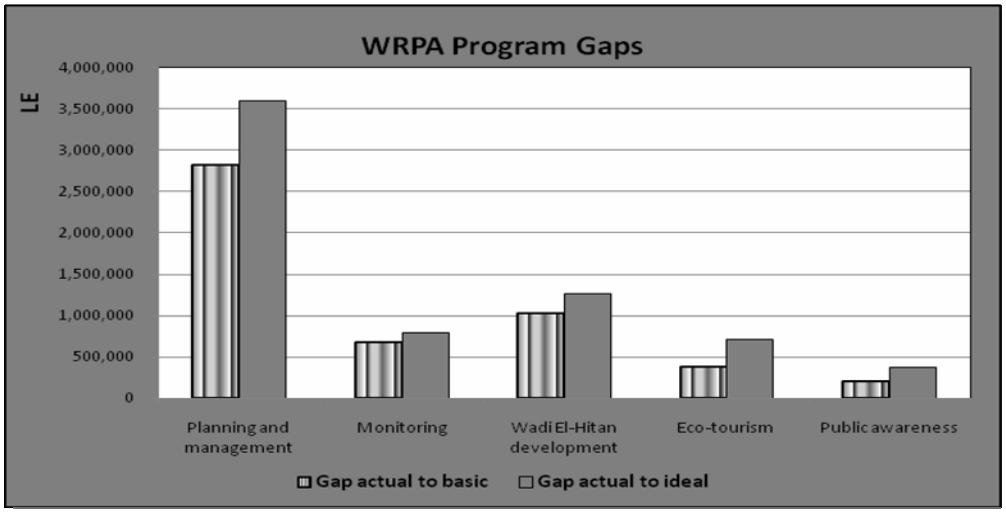
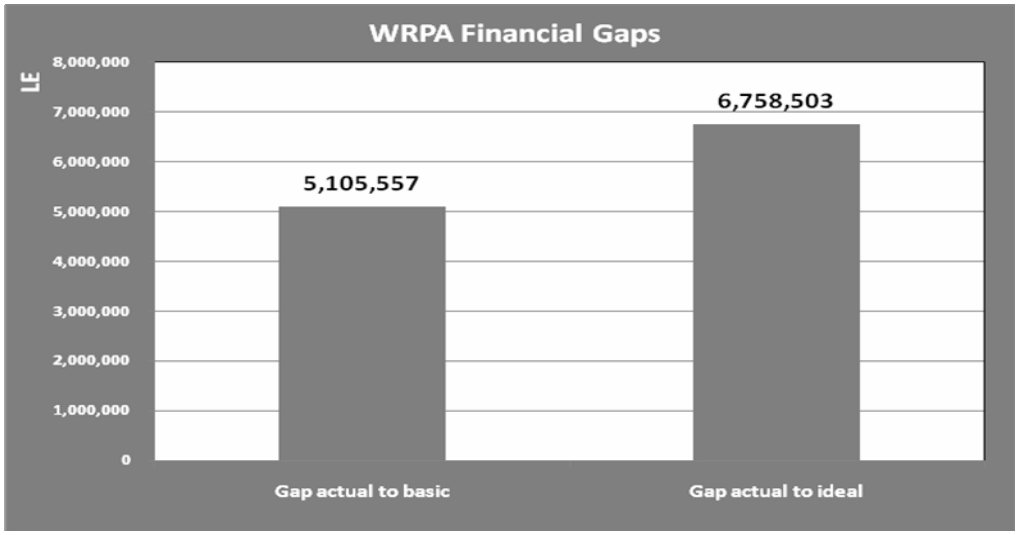


Figure (12) Wadi El-Rayan programs versus scenarios



Looking at the revenue generated by the WRPA and the expenditure categories tell us that WRPA can not be self financed even after retaining its revenues. The reason for that is the expenditure categories are much more than the generated park revenues, even if all revenues could be retained.

The PA will need to increase its sources of funds. This might include better fee collection, alternative fee structures, sale of goods, increases in concessions, and improvement in penalty fee collection, corporate, national and international assistance to support PA efforts.

The stakeholders who benefit from the natural resources and ecosystem services of WRPA should contribute by fund and in-kind support to enhance PA management and conservation and to support the role of PA in economic and social development.

6.3.3. Current Funding Opportunities

In recent years, support has come from a variety of partners, such as:

- Grand Sasso National Park, Italy through the twinning agreement with WRPA. Thus far, Gran Sasso has provided technical expertise and funds toward the development of the Open Air Museum.
- The University of Michigan (through the tri-partite agreement with EEAA and EMRA) and the US-Egypt Joint Technology Fund that has provided support and funding for research at Wadi El-Hitan and training for Wadi El-Rayan staff in the USA.
- The British Embassy for support towards the DVD.
- The US Forest Service for technical support in designing a landscape plan for the redevelopment of the Rayan Lakes main visitor area.
- EMECO travel for providing equipment.
- Apache Oil for sponsoring production of signs.
- Palm Press for providing translation of brochures and cooperation in the dissemination of products in Egypt.
- The Centre for Documentation of Culture and Nature in Egypt for sharing in the printing of brochures, including retaining revenues for future educational work at Rayan.

6.3.4. Strategies for Sustainable Financing

The value of economic activities in the PA is quite high. There is a huge gap between the revenues collected by investors in different economic activities (especially oil- Extraction Company and fish farming), and the concession paid to the EEAA.

Four strategies will be pursued to achieve sustainable financing.

A. *Revenue generation:* Higher levels of revenue will be generated, mainly for the national Environmental Protection Fund, from which protected area budgets are drawn.

B. *Governmental funding:* Increased financing is expected to enable higher levels of governmental budgets for annual operations and staffing, and for special development projects.

C. *Revenue retention:* Mechanisms will also be sought for retaining revenues arising from specific opportunities so that they can be focused on sustaining important protected area activities. i.e., environmental education activities could be sustained through the sale of education products and provision of education services by the Friends of Wadi El-Hitan non-governmental organization.

D. *Partnerships:* Another key strategy will focus on encouraging collaboration of stakeholders and in-kind support.

For each of these strategies, a series of *opportunities* are presented in the following sections, including an evaluation of the barriers.

Figure 13. Four-part financial strategy

A. Revenue Generation Strategy

This strategy aims to generate new revenues through 4 opportunities associated with tourism and ecosystem services provided by the protected area:

1. Entrance Fees to the Open Air Museum, Wadi El-Hitan World Heritage Site

Revenue Projections (LE)				
Year	2007	2008	2009	2010
Visitation	12,000	18,000	22,500	28,125
Revenue ($2/person)	139,200	208,800	261,000	326,250
Revenue ($5/person)	348,000	522,000	652,500	815,625
($1 = LE 5.8)				

The costs for introducing a ticket collection system are estimated to be about LE 60,000 /year. This includes hiring an additional two ticket collectors and printing tickets.

2. Redesign and Improve of the Current Concession System

Opportunity:

The current concessions inside Wadi El-Rayan include fish farms (Concession fees are L.E. 80 per feddan, of total LE 184,000, cafeterias (LE 12,700), 2 mobile stations (LE 14,055/year) and petroleum company (It was not possible to find out any concession paid by the company or the Ministry of Petroleum to the EEAA).

There is no direct relation between funds generated by the PA and those utilized or reinvested in the PA. In terms of the fish farm concessions, the lakes provide substantial economic return for the fish farm societies. The protected area incurs considerable financial costs related to implementing patrolling, enforcement and monitoring programmes, and collaborative management activities.

Revised concession fees are essential for all concessions. These are needed to be negotiated on a case by case basis.

The next table shows the estimated profits generated by the main economic activities in WRPA,

Activity	Production/year	ESTIMATE profits (L.E.)	Concession value to EEAA (LE/2006-07)
Oil- extraction	365,000 barrel	122,640,000 ($60/barrel)	??
Fish farming	1240 tons	12,400,000	184,000
Fishing	1500 tons	15,000,000	No conc. paid
Agriculture in Land Reclamation		2,579,167	No conc. paid
Cafeterias	150,000 visitors	**200,000**	12,700
Cell phone stations	about 3100 permanent users	**1,860,000**	14,055
Total revenues from activities		**154,679,167**	

3. New Cafeteria Concession at Wadi El-Hitan

Opportunity:

A new cafeteria has been constructed at Wadi El-Hitan, and a new concession agreement is required. Based on the global significance of the site, and the quality infrastructure and services set up in Wadi El-Hitan (WCs, tracks, shade structures, information and guiding panels and booklets), and based on the growing number of visitors, it is expected that the cafeteria will be a viable operation. Use of the facilities for events, occasions and camping can be also considered.

4. Special Events and Guided Trips

A variety of special events could be offered to attract people to the area. They can range from small events for a limited number of people to large events with thousands of visitors. These could include, for example:

- Annual bird migration festival that ties together nature, arts, music, crafts in an annual festival. This could be based in a local community or at the protected area. It could be hosted during the period when waterfowl numbers are at their peak.
- Camel expeditions to a remote area of the protected area under the guidance of a ranger and community guard. By example, Kruger National Park in South Africa operates a successful program of 3-day hikes and ½ day hikes, with user fees.
- Competitive sports (water sports, fishing, marathons, etc.).
- Daily, guided tours could be offered, ranging from 1 hour to full day excursions.

B. Governmental Funding Strategy

This strategy aims to secure sufficient levels of funding to protect natural resources and infrastructure, thereby continuing to sustain local community benefits from a protected area that is effectively managed.

The opportunity in this case is Wadi El-Rayan Protected Area, including the natural, social and economic values, infrastructure and vehicles. A minimum budget is required to protect investments. The alternative scenario is one of declining conditions, which results in reduced quality of services, reduced visitation, negative marketing and a loss of revenues.

C. Revenue Retention Strategy

This strategy aims to establish mechanisms to retain revenues for use in protected area programmes. It is particularly focused on retaining revenues that might otherwise not be available to the PA or to government. Revenues can be generated through a variety of means such as those listed in the previous and following sections concerning revenue generation and partnerships.

1. <u>The Friends of Valley of the Whales</u>

   Throughout the world, non-governmental organizations, often referred to "friends" organizations, have achieved significant success in raising funds to support protected area activities.

Friends' activities are carried out in close cooperation with the protected area and are intended primarily to enhance the educational, recreational, monitoring, research and resource protection programmes and facilities in the protected area. As a result, they help to improve overall effectiveness and financial sustainability. Activities may include, but are not limited to, such things as:

- Producing and selling educational materials (e.g., trail guides, checklists, maps, newsletters, DVDs, posters, etc.).
- Organizing special programs and events as a means to raise revenues.
- Raising funds, applying for grants, accepting donations and bequests, and re-investing the funds to further the NGO's objectives.
- Selling souvenir items (i.e., crafts, postcards, etc.) with a particular connection to the protected area and/or local community.
- Encouraging volunteer and community participation in its programs and those of the protected area.

The Friends organization is to be established under Egyptian law for NGOs. Their overall success is dependent upon how active the Friends are, the cooperation and support they receive from the protected area, and the degree to which government supports and enables the cooperation.

Potential revenues/benefits:

Potential revenues are unknown as this time, however, there is a reasonable expectation for success, due to the following factors:

- There is considerable qualified support in the local village of Tunis, which has an influential group of Cairo based residents with expertise in various fields.

- Through the Egyptian Italian Environmental Cooperation Programme, a good supply of quality brochures (Guide Book to the Open Air Museum, Birds of WRPA) and a new DVD (Whales of the Desert) have been produced. Through agreement, this inventory would be made available to the Friends for selling in order to retain revenues for sustaining production of education materials.

2. Special Services Unit

A special services unit could be established, similar to the Nature Conservation Training Center of the Nature Conservation Sector in Sharm El-Sheikh, operated by the South Sinai protectorate sector. The training center is designated as an administrative unit, which enables it to gain money through renting training facilities (class rooms, laboratory facilities), training courses, lodges and meals, etc, and to retain and use 50% of the revenues. This type of mechanism could operate in a complementary manner with the PA and the Friends.

At WRPA, this mechanism could include use of the visitor centre for special events (events, conferences, etc.), use of the Hitan fossil laboratory (under construction), use of the former small staff accommodation at Hitan for research or educational groups or for training courses.

D. PARTNERSHIP STRATEGY

This strategy aims to secure effective support through mechanisms that provide direct or indirect benefits. Often, they result in reducing impacts on the protected area budget or increasing capacity with no or low levels of additional inputs from the protected area. Overall, they increase effectiveness and sustainability.

1. In-kind Support and Sponsorships

Most stakeholders inside WRPA have demonstrated or indicated their willingness to support the PA activities. Often, these are characterized as one-time opportunities. To date, these have included:

- Apache Oil has funded new signs.
- EMECO Travel has provided equipment for fossil preparation. Many other opportunities are possible.
- British Embassy contributed to production of the Hitan DVD.

Potential revenues/benefits:

The needs for the protected area are many, as described in the *"Wadi El-Hitan Sponsorship Opportunities"* (enclosed with this plan). This brochure aims to identify and promote partnerships with a wider audience.

2. Agreements

WRPA has several partnerships in place, through agreements, that have demonstrated the importance of this opportunity. In general, agreements can be characterized as longer term arrangements, usually established through some kind of written agreement

or memorandum of understanding. They may have direct financial benefits through the provision of funds or indirect benefits through provision of services, in-kind.

To date, these have included:

- The tripartite agreement with the University of Michigan for research and training opportunities.
- Through the twin park agreement with Gran Sasso National Park, technical expertise and funding has been provided.
- The US-Egypt Joint Technology Fund supports fossil research.
- A memorandum of understanding with the Centre for Documentation of Culture and Nature in Egypt (CULTNAT) has supported printing and selling the WR bird brochure, without any financial provision from WRPA, and includes retaining the revenues for further education initiatives in the protected area.
- The US Forest Service has provided technical support in designing a landscape plan for the redevelopment of the Rayan Lakes main visitor area. Further support is being planned.

3. Volunteer Contributions

In many protected areas around the world, volunteers contribute in valuable and meaningful ways. Some programmes are self-funded by the participants. WRPA has had some volunteer contributions, such as the Wildlife Society visits to help at Wadi El-Hitan, and the Italian Dombosco technical school assistance with track work. Examples of opportunities might include:

- Clean-up programmes with Scouts and schools.
- Leading a special hike/tour by an expert, in different languages.
- Assisting with fossil excavations.
- Assisting with public relations, websites, translations, etc.
- Staffing the visitor center or monitoring visitors at the open air museum.

Potential revenues/benefits:

Direct financial benefits could be obtained for specific opportunities to assist with projects. Indirect (non-financial) benefits arise when volunteer support is focused on specific needed assistance.

6.3.5. Evaluation of Oopportunities

Analyzing the potential revenues and costs from the revenue generation/partnership strategies, and considering the feasibility of potential opportunities (Table 13), the needed amount of money/year to cover the PA needs can be estimated as follows:

Opportunity/ strategy	Priority	Potential cost LE/year	Revenues	Contribution to achieve basic level	
				50% retained	100% retained
Entrance fees at Wadi El-Hitan	1	60,000 (2 ticket collectors + printing)	**139,000**	69,500	139,000
Redesign of current concession system	2	100,000 (studies +consultants)	• Fish F. 184,000 to **368,000** • Cell phone 15,000 to **120,000** • Cafeterias 12,700 to **31,700**	259,850	519,700
Concession for new cafeteria at Wadi El-Hitan	4	0	**25,000**	12,500	25,000
Special events (win serve, sport fishing…) and guided trips	5	0	1000/person *100 * 2 kinds of events/year = **200,000**	100,00	200,000
In-kind support and sponsorships	3		50,000 for printing of brochures + track maintenance….	25,000	50,000
Agreements	6				
Total			**933,000**	**466,850**	**933,000**
PA current revenues			417,272	208,636	417,272
Grand Total			**1,350,272**	**675,486**	**1,350,272**

On implementation of successful revenue generation/retention strategies, the financial gap to the basic level can be overcame within 3-5 years if current and potential revenue sources have been retained totally. If the retention strategy is only able to retain only 50% of the revenues the gap to basic could be covered within 8 years. The ideal level of management can also be reached within 6 years if the expected revenue been totally kept. In case of WRPA can grasp more in-kind support and other opportunities, the financial gaps can take less time to overcome.

7. IMPLEMENTATION AND EVALUATION AND REVISION

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 2013. A next five year Management Plan for the period 2014 – 2019 will then be drawn up in accordance with experience gained in the coming five year period.

This management plan including a series of strategies and actions against the main management issues that currently facing WRPA. It is supposed that these strategies and actions been implemented for the next five years which is the period of plan implementation.

The responsibility of implementing this management plan is directly related to the EEAA/NCS as the policy/decision maker and to the WRPA management unit (particularly the WRPA manager) as the implementing and operational entity.

The WRPAMU should do their best to collaborate with the relevant stakeholders/authorities, initiate social responsibilities for the different partners, finding sponsorships for fund raising and carefully follow up the implementation steps for necessary adaptive management procedure.

Several tools are expected to be effective in terms of implementation of this management plan such as Annual Operating Plan AOP, Specifc Site Plans (scenario plans for development of Wadi El-Hitan and the World Heritage Destination of Fayoum) and Business Plan.

Annual Operating Plans will form the basis for the monitoring of plan implementation. Each year the status of implementation of the various actions shall be revised against the targets set in the AOPs. A major review of the overall implementation of the management plan is recommended after three 3 years.

This plan is intended to be a dynamic instrument. Continuous updates are expected and necessary to keep it accurate and up to date. It is envisaged that the plan should be completely reviewed and reassessed after five years, in light of achievements and shortcomings on the ground.

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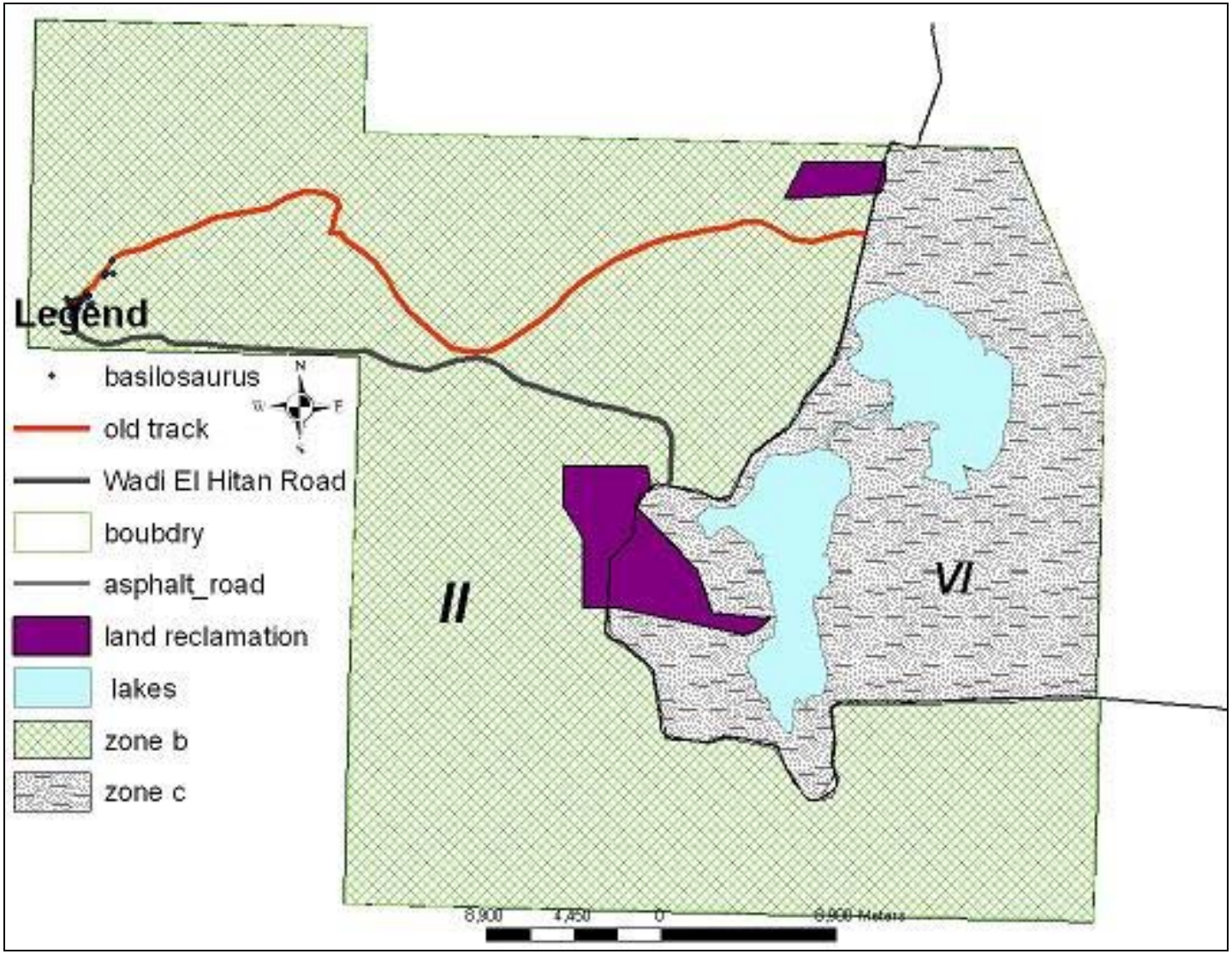
APPENDICES

Appendix 1

Maps


Legend
basilosaurus
old track
Wadi El Hitan Road
boubdry
asphalt_road
land reclamation
lakes
zone b
zone c
N
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E
S
II
VI
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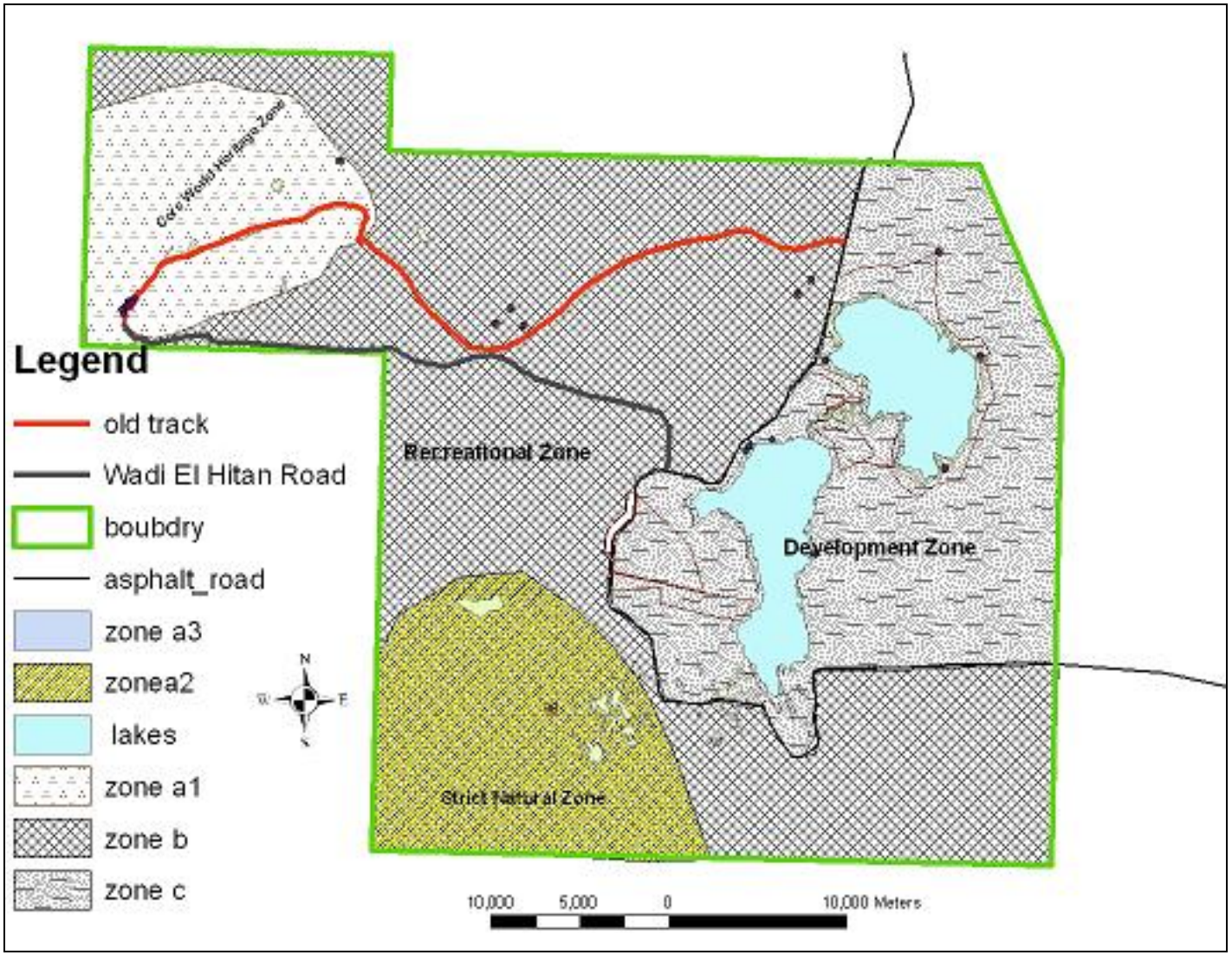
8,900 Meters


Legend
old track
Wadi El Hitan Road
boubdry
asphalt_road
zone a3
zonea2
lakes
zone a1
zone b
zone c
Recreational Zone
Development Zone
Strict Natural Zone
N
W
E
S
10,000
5,000
0
10,000 Meters

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	هبموكرومس مخطط
17	*Hemiramphus far*	Halfbeak	أبو منقار
18	*Labeo nilotica*	Nile carp	لبيس
19	*Lates niloticus*	Nile perch	قشر بياض (لفاش)
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

Benthic 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:	*Monorius pharaonsis* *Cataglifus bicolor*	Mantids	*Sphadrocantis sp.* *Mantis sp.*
Ant-lions	*Myraeleon sp.*	Dragonflies	*Crocotheaes sp.* *Heaianex echipoioer* *Orthetrus chrysostiosa*
Spiders	*Agelenidae*	Daeselflies	*Ischnura seseoalensis*
Tiger-Beetles	*Cicindela sp.*	Mayflies	*Baedtis sp.* *Centroptilua sp.*
Ear-wigs	*Labidura riparia* *Euborella annulipes*	Midges	*Chironoaus sp.* *Spaniotota sp.*
Crickets	*Gryllotalpa gryllotalpa* *Liogryllus bioaculatus* *Gryllus doaesticus*	Caddisflies	*Trichoptera*
Housefly	*Musca doaestica*	Crustacea	*Gannarus sp.*
Sand-beetles	*Tenebrianidae*	Rotifera	*Brachinous sp.*
Blood-sucking fly	*Tabanus sp.* *Siphona sp*	Foraminifera	*Rotatia beccarii*
		Gastropoda	*Melanoides tuberculatus* *Physa acuta* *Cleopatra buliaoides* *Theodorus niloticus* *Bulinus truncatus*
		Bivalvia	*Anodonta sp.* *Unio sp.*
		Diving-beetles	*Cybister sp.*
		Water-bugs	*Anisops sardea*
		Water-scorpions	*Raoatra vicina*
		Water-boataen	*Corixa nierogliphica*
		Nematodes	*Onocholainus sp.*
		Oligochaetes	*Chaetogaster 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	كزبرة البير
2	*Alhagi graecorum*	Aqool	عاقول
3	*Arthrocnemum macrostachyum*	Shinaan	شنان
4	*Calligonum polygonoides* sub. *comosum*	Arta/Risoo	أرطه/رصو
5	*Ceratophyllum demersum*	Nakshoosh el-hoot	نخشوش الحوت
6	*Cornulaca monocantha*	Shoak ed-deeb	شوك الديب
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	حلفا ديل القط
14	*Juncu rigidus*	Samaar morr	سمار مر
15	*Juncus acutus*	Samaar morr	سمار مر
16	*Launaea nudicaulis*	---	---
17	*Melilotus indicus*	Hendaqooq morr	حندقوق مر
18	*Myriophyllum spicatum*	Hamool el-maia	حامول الميه
19	*Najas armata*	Hamool	حامول
20	*Nitraria retusa*	Gharqad/Ghardaq	غرقد/غردق
21	*Phoenix dactylifera*	Hagna	حجنة
22	*Phragmites australis*	Nakheel el-balah	نخيل البلح
23	*Pluchea dioscoridis*	Barnoof	برنوف
24	*Polypogon monospliensis*	Deil el-qott	ديل القط
25	*Potamogeton pectinatus*	Hamool el-maia	حامول الميه
26	*Ranunculus sceleratus*	Zaghlanta	زغلنته
27	*Rumex dentatus*	Khilla	خله
28	*Salsola imbricata* subsp. *Gaetula*	Khareet/Kreesh	خريط/كريش
29	*Scirpus maritimus*	---	---
30	*Sonchus maritimus*	---	---
31	*Spergularia marina*	Samaar	سمار
32	*Sporopolus spicatus*	Nigeel shoaky	نجيل شوكى
33	*Stipagrostis ciliata*	Homareet	حمريط
34	*Tamarix nilotica*	Abal/Tarfa	عبل/طرفه
35	*Typha domingensis*	Halfa/Bardi	حلفا/بردى
36	*Zygophyllum album*	Rotreet	رطريط
37	*Zygophyllum coccineum*	Rotreet	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 cerastea,*	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	*Tarrentola 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	NAME AFTER
Ancalecetus simonsi	Mammalia	Basilosauridae	Dorudon osiris	Gingrich, 1996
Basilosaurus isis	Mammalia	Basilosauridae	Basilosaurus	Cope, 1868
Zeuglodon osieis	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 mokattamesis	Cephaloposda	Nautiloidea	Nautilus	Food, 1787
Nicaisoloph clot-beyi	Bivalvia	Ostreidae	Nicaisoloph	Bellardi, 1854
Ostrea elegans	Bivalvia	Ostreidae	Ostrea	Linne, 1758
Pycnodonte 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