Land-use Plan for Adapting Ecotourism in Zaranik Protected Area, North Sinai Egypt

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1. Abstract

The main concern of this paper is utilizing land-use zoning for adopting ecotourism and, in turn, sustaining spatial development in Zaranik protected area in North Sinai, Egypt. Zaranik protected area, as one of the key point for bird migration in the world and the first stop for bird migration from Europe and Asia heading Africa during the fall, is facing tourism demand and economic interests. The negative impact that could arise as a result of these interests is used to define the importance of enhancing suitable sustainable development policy for its natural and heritage resources. The investigation of the natural, historical and cultural characteristics, land-use pattern, potential and constraints of the protected area is used to define a system of land classifications that embraces areas markedly sensitive to spatial development. The results show that these resources are all valuable regionally, nationally and internationally. Combination of the land-uses with physiographic climate, cultural and historical patterns produces a series of landscape types with varying qualities need conservation. Ecotourism is also studied; in terms of its definitions, bases and limitations; to define its capabilities as industry which maintains sustainability of the local environmental systems. Previous development studies provided for Zaranik protected area are also reviewed to figure out their impact on the protected area. The criteria and proposed outlines for adapting ecotourism development in the protected area are defined. Finally, a land-use plan and management guidelines for ecotourism development in Zaranik protected area are proposed.

2. Introduction

Zaranik Protected Area is located in the eastern part of Lake Bardawil on the Mediterranean coast of North Sinai Governorate, Sinai Peninsula (connection between Asia and Africa Continents), Egypt. It is situated about 35 km to the west of Al-Arish city, capital of the North Sinai Governorate, Figure 1. The boundaries of the protected area encompasses the Mediterranean in the north, El-Qantara-El-Arish main road in the south with Bedouin communities scattered along the road, tourism development in the east and Lake Bardawil in the west. The area of the Zaranik site is about 250 sq. Km, including 68% water surface and 32% sand dunes, and 0-30 meters above sea level, Figure 2.

The location is reflected in the physiography, climate, and flora and fauna of the area. Zaranik area is a geological and scenic entity with distinctive characteristics which is the basis of its attraction for different activities. The resources are all valued regionally, nationally and, to a large extent, internationally. A description of various geographical, soil, administrative context and economic development, accordingly, is essential to understand the value of the area and it is a pre-requisite for

preservation. The main objectives of the conservation are to preserve and enhance the natural, historical and cultural resources of the area.

Zaranik, during the 1970s, recognized internationally as a wetland and important first resting area for birds migration from Asia and Europe to Africa, by which it has been known worldwide. Zaranik and its environs represent a unique example of Mediterranean coastal habitats. It encompasses a wide variety of ecosystems, 17 species of flora and 244 species of birds have been mainly recorded. Therefore, Egypt declared Zaranik as a Protected Area in 1985, which would be managed by the Egyptian Environmental Affairs Agency. Zaranik is also recognized as an Important Bird Area (IBA) because of its global significance for bird conservation. Thus, the maintenance of these sites contributes in a significant way towards fulfilling national and global obligations to conserve nature.

The internals and surroundings of Zaranik include various forms of land-use and activities such as small fishery community, fishing, ancient monuments (Roman, Christian and Moslems), wetlands, sand dunes, bird catching and hunting, agriculture, grazing, salt extraction, El-Salam canal and related land reclamation of about 400,000 feddans to the south, tourism village, establishing the International Highway Rafah-El-Salum and Bedouin communities. The study site, therefore, represents a relatively significant part of the natural resources of the country at the local, regional and national levels.

Land-use and economic activities inside and outside Zaranik protected area would have environmental impacts on its resources. Zaranik protected area, currently, is facing land-use conflict and economic interests. Within the study area there are several locations of potential land-use conflict. The list of potential land-use conflict encompasses areas of potential conflict between natural, cultural and heritage resources; tourism, agriculture, mining and industry, and physical development. The land-use conflict includes bird catching and hunting, over grazing, sand movements and its impact on wetlands and monuments, expansion of salt extraction and related activities, huts for fishermen, etc. The economic interests include increasing the value of land on the east boundaries as a result of tourism development, which has increased the potential of tourism development, population and physical growth of rural and Bedouin communities along the south boundary, expanding of agriculture activities, etc. Since it is practically impossible to isolate Zaranik protected area from the economic interests and activities in its surroundings, Zaranik protected area requires planning and management to avoid negative impact on its environment, ecology, and landscape.

In 1985, Zaranik protected area was the second oldest protected area in Egypt; currently Egypt has identified 34 protected area which are approved by the IBA, Figure 3. Since then, the only management activities provided to Zaranik in 17 years period was monitoring the fishing activity in the Lake Bardawil, in terms of keeping the productivity at an optimum level with allowed fishing techniques, fishing calendar and number of fishing days per year. In 1999, a five-year regional project was launched to conserve biodiversity in wetlands, and coastal ecosystems in the Mediterranean region through the Wetlands and Coastal project, which funded by the Global Environmental Facility

(GEF). In 2002, a general management plan for Zaranik protected area was formulated. The long term objectives of the conservation measures adopted in the management plan include: 1) maintaining and enhancing the ecological and landscape values of the site; 2) conserving available resources of the site through environmental management; 3) improving the socio-economic opportunities of the local population; 4) developing public awareness and participation in nature conservation; 5) resolving existing legal conflicts, especially those of land ownerships; and 6) expanding the propriety of Zaranik Protected area to include the rest of Lake Bardawil to decrease the environmental impacts of the economic development ongoing in the area, which, in turn, would make sound of environmental sustainable development and management of the natural resources of the protected area. To facilitate the implementation of this long term objectives, particularly of items 1 and 2, two major development aspects were defined pre-requisite: enhancing and implementing a scheme of land-use; and adapting ecotourism development for Zaranik protected area.

Therefore, the purpose of this paper is to propose a land-use plan and adapting ecotourism development policy to sustain the natural resources of the protected area. To achieve this purpose, the following methodology will be implemented. First, examine and address natural, historical and cultural resources, potential and constraints and the importance of conserving of Zaranik area and its surroundings. Second, define land-use pattern and issues experienced and would perceive by the implementation of economic development. Third, review previous development studies provided for Zaranik protected to figure out their impact on the protected area. Fourth, study the capabilities of ecotourism as industry which maintains sustainability of the local environmental systems. Fifth, outline criteria for adapting ecotourism in Zaranik, propose a land-use plan and management guidelines for ecotourism development that could sustain land resources of the protected area.

3. Key Words:

Land-use, Ecotourism, Protected Area, Sustainability, Spatial Development, North Sinai, Egypt

4. Potential and Constraints of Zaranik Protected Area

The potential and constraints of Zaranik protected area can be described through the conditions of its landscape pattern, soils, climate and vegetation. Generally, the landscape of Zaranik protected area is limited to sand dunes, sand sheets, mud flats, salt marshes and few small islets. The principal feature in the protected area is Zaranik lagoon, an eastern extension of Lake Bardawil. The lagoon is separated from the Mediterranean by a narrow sand barrier. Water is exchanged with the sea, through several branches in the sand barrier which form the only natural connection between Lake Bardawil and the sea. Numerous islets are scattered throughout the lagoon. Altitude ranges between sea level and about 30 m at the highest sand dunes which dominate the landscape in the southern part of the Protected Area.

The major types of landscape pattern recognized in the study areas cover three main zones A, B and C in addition to the area located between the main road and south border, the southern area, Figure 4. Zone A is located in the north along the Mediterranean coast, zone C is situated in the south part of Zaranik along the main road, and zone B is located along the protected area between zones A and B, with a narrow sand barrier to the west of zone A which forms the lagoon. Zone A represents the main wetland of Zaranik. It is characterized mostly by horizontal landscape, which includes scattered sand dunes. Zone B is marked mostly by dry land with about 6 to 15 m higher in elevation than the sea level. There is an unpaved road separates between Zones A and B. The narrow sand barrier of Zone B separates between the Mediterranean and Lake Bardawil forming a lagoon. Zone C could be described as a mix of dry sand with scattered wetlands and sand dunes. Its elevations are between 7 and 15 above the sea level. There is also unpaved road which defines the north border of zone C. The southern area is featured mainly with dry stable sand dunes with variation of elevation from 9 to 30 m above the sea level, including scattered different kind of vegetation.

The soils of the site consist mainly of loose sand, compact calcareous sand, black sand in the Lake Bardawil which contains high concentrations of dark minerals including iron salts, and sand with mud in the wetland of Zaranik. Each kind of soil provides support to certain type of vegetation of the area. Soil profiles in the study area seldom exhibit evidence of maturity. Soils erode easily by wind and marine actions with results of gradually reducing the areas of Lake Bardawil and the protected area.

The macroclimate could be described as Mediterranean, hot humid in summer and warm rainy in winter, with average percentage of humidity of 71.6, and average maximum temperature of 25.4°C and average minimum temperature of 17.6°C. The microclimate is highly influenced by the location of Zaranik, which boarded by the Mediterranean in the north, Lake Bardawil in the west and desert in the rest of directions. This location is reflected on the climate of Zaranik, which could be described as Mediterranean and warm humid zone, with average minimum temperature of 13°C in January and average maximum temperature of 25°C in August. The average relative humidity is 70% on the coast and 40% in the south border. The average minimum amount of evaporation is 49 mm/month in December and the average maximum amount of evaporation is 192 mm/month in July. The wind direction in winter is south, and in spring and summer is northwest. The average annual amount of rainfall is 80-100 mm, with peak in December and January. The main sources of fresh water are ground water.

The ecosystem of Zaranik could be described through the types of habitats, flora and fauna. The habitat types includes open water, water inlet (Bughas), wet salt marsh (Sabkhas), sabkhat El-Bardawil, calcareous stabilized sand dunes, non-calcareous stabilized sand dunes and mobile sand dunes. The flora types are lower plants and higher plants. The main types of fauna encompass invertebrates, fish, herpetofauna (amphibians and reptiles), birds and mammals.

*** Habitats: Open water:** shallow salt water (1-1.5m in depth), with an area of about 68 % , 170 sq km, of total area of Zaranik, includes three species of vegetation provide food for fish. **Water inlet (Bughas):** a unique habitat type in the area because it exchanges water between Lake Bardawil and the Mediterranean at a higher water speed than the rest of inlets of the lake, with a length of 1203 m, width of 82 to 162 m and depth of 1 to 2 m. **Wet salt marsh (Sabkhas):** permanently wet soil (hyper-saline) with sea water including vegetation of sparse and halophilic species. **Sabkhat El-Bardawil:** located in the east of Lake Bardawil. It is the largest size of sabkha in Egypt. It forms about 23 % of the total area of Zaranik, including 34 shrubs. **Calcareous stabilized sand dunes** mixed with loose sand located in the two islets of Felusyat and El-Matly including 78 vegetation species, which is threatened by over grazing. **Non-calcareous stabilized sand dunes** located in the narrow strip separating Lake Bardawil from the Mediterranean and in few locations in the small islands with 111 of vegetation species which are sources for Bedouins for firewood and some medical uses. **Mobile sand dunes** located along the south border of Lake Bardawil, with vegetation of 49 species.

*** Flora: Lower plants:** diatoms and dinoflagellates are found in density and richness species. **Higher plants:** 152 species representing 43 families are found in Lake Bardawil. In Zaranik 2 species of endemic and four of near endemic are recoded, in addition to cultivated species of palm trees and water melon.

*** Fauna: Invertebrates:** 28 species of zooplankton are recorded; most of them are rare or very rare. Zooplankton is an added ecological significant because it is a major component in the fish diet and it is an additional sensitive indicators of the wetland. 202 species and subspecies of insects are recorded. They belong to 170 genera representing 65 families and 16 orders. **Fish and Crustacean:** fish consists of shrimps and prawns, 5 species of Crustacean representing 3 genera, and one rare species of cartilaginous and 31 species belonging to 24 genera of bony fish. **Herpetofauna (amphibians and reptiles)** includes 21 species of reptiles (14 lizard species representing 11 genera and 6 families), one tortoise and two sea turtles. 4 species of the reptiles are recorded very rare in Zaranik as well as in Egypt. **Birds:** the number of species and subspecies recorded in this area is no less than 241, including resident and migratory birds. The majority bird species are passage migrants, which stop briefly only in Zaranik in transit during their migration in fall and spring. 3 endemic subspecies and 8 species and subspecies are recorded globally threatened animals. Additional 107 species and subspecies considered rare or scarce. **Mammals** consist of 20 species representing 16 genera belonging to 11 families and 5 orders. The list is dominated by the rodents by 50%.

*** Archaeology:** there are two archaeological sites within Zaranik protected area. The first site is an ancient Roman settlement located on Felusyat island (means money), on which numerous fragments of pottery belonging to various historical periods are scattered. The second one is called Khuwaynat. It is composed of stones constructions with a distinctive architectural style differs than what is common in Sinai peninsula. These constructions are the remains of military fortress, a large mosque,

Byzantine churches and dwellings. These two ancient sites are a result of the location of Zaranik protected area along an important historical trade route connecting Egypt with the East, through which journeys used to pass.

5. Importance of Conservation of Zaranik Protected Area

The importance of conservation of Zaranik protected could be defined through analyzing the land-use pattern of zones A, B and C of Zaranik, Figure 4, and the economic activities and development in and around the protected area. First, the land-use of zone A consists of water inlets (Abu-Salah and Zaranik, from the Mediterranean), turtle breeding area, pumping station for the salt plant (brings water to a higher level), ancient monuments in Felusyat and Khuwaynat islands, a fishery community including their fishing activities and huts, area for catching Simon bird in the east and natural vegetation area (restricted for any economic activity) and scattered sand dunes. Second, the land-use of zone B encompasses a water inlet for water exchange, landing area for birds during the seasonal journey and breeding area for local birds (restricted for any economic development), natural vegetation area (restricted for any economic activity), salt production, sand dunes; administration area with main entrance of Zaranik, and a research center including a laboratory, a discussion hall and a guest house for visiting researchers; and a vacant area located in the far east of zone B. Third, the land-uses of zone C are mainly Abu-Hassan Bedouin village with population size of 200, located in the southeast of the protected area; El-Medan village situated in the southeast border of the protected area and the main road; and a vacant area suitable for economic activities such as agriculture or/and grazing in the south area of Zone C. Fourth, the land-use of the southern area includes a vacant land in the southwest, and El-Mazar and El-Roda Bedouin communities located in the southeast border of Zaranik and main road with potential of expansion toward the protected area.

The total population size of the Bedouins communities is 1405 persons. All urban, semi urban and Bedouin communities in North Sinai suffer from the lack of sewage disposal system except El-Arish city. The expansion of all villages will have direct impact on the protected area. El-Mazar village would have significant direct impact on the protected area because it is largest one, in terms of population size with different economic activities. Its population size is about 500 persons in 1999. Their main economic activities are fishing, grazing, and agriculture within the protected area and its surroundings. They own about 1153 different kind of animals, including goats, sheep, camels and donkeys. They produced in 1999 about 43 ton of date palm, 25 ton of figs, 8 ton of grapes and 7.5 ton of pome granates. The most profitable crop in El-Mazar village is the date palm and the least one is pome granate. Therefore, the demand of palm trees is always considerable.

5.1. Culture and Social Conditions

*** Population:** The majority of Sinai Peninsula permanent population is Bedouins, who have traditional desert lifestyle. Zaranik area and its surroundings do not have any urban communities. The

nearest urban community is Al-Arish city, 30-35 km to the east, and El-Qantara town, 75 km to the west. Currently, there is a noticeable change from traditional Bedouins lifestyle to urban lifestyle. Although Bedouins still depend on camels as a source of wealth and income, the number of cars and pickups are replacing camels as means of transportation. The grazing and herding of goats and sheep are exclusively the role of women, only younger unmarried girls or elder women.

- Two main categories of fishermen are found working, first in Lake Bardawil and second in Zaranik protected area, with total population size of 4130 and 250-300 relatively. The first category lives close to the southern shore of the lake along the main road. The second category, about 50 fishermen and their families, lives during the fishing season in the protected area in their huts on the Mediterranean shore close to the pumping station with 13 poorly equipped boats, Figure 2, and then they return to their permanent living in El-Arish. These huts lack water supply and disposal, electricity, etc.
- The educational data of the area in 1989 show that 27.6 % of the population is illiterate, 33.4 % can only read and 39 % are literate. The education services in the local communities include mixed primary, intermediate and secondary schools. Higher education such as institutes and university colleges are available in El-Arish city and Bir El-Abd town. Currently, the size of university graduated is considerable. e.g., Negela village includes 80 university graduates out of population size of 4000.
- In the area of Zaranik and Lake Bardawil, there are two water resources: legal and illegal. The legal water source is wells in loose sand areas. The illegal water source is through siphoning off the water pipeline supplying El-Arish coming from El-Qantara and going parallel to the main road.

*** Education and Research:** Zaranik provides a significant educational opportunity for different educational levels and fields. It is an outdoor and indoor classes and laboratories. In 2002 about 607 students from different 14 schools visited Zaranik in addition to 1300 Egyptian and foreign visitors and visitors from most of Egyptian universities. It has also facilitated research programs, including joint researches, initiated by scientists from different countries in addition to Egypt such as USA, Denmark, Belgium, German, etc.

5. 2. Economic Activities

*** Agriculture**: The agricultural activity in Zaranik area could be divided into two main categories: first at local level of Zaranik area and second at regional level, Wadi Al-Arish and new cultivated lands. They depend on two irrigation methods: traditional and modern. Zaranik category depend only on traditional method, which is limited to rain-fed in the south area and zone C. Its crops include mainly watermelon, barley, tomatoes and date palms, mainly date palms because it is an important source of food and income. The regional category depends on the Nile water supplied to the area through El-Salam canal, within which different new irrigation systems have been used such as drip and flood systems. Wadi Al-Arish depends on small size drip irrigation system. In 1988, this irrigation system covered 10,209 feddans, about 50 % of which is nearby of Lake Bardawil. Other areas nearby Zaranik will depend on flood system. The seepage of El-Salam canal and the drainage of the newly

cultivated land will have direct impact on Zaranik through the lose sand. The crops of the newly cultivated land include vegetables and fruits such as tomatoes, cucumbers, melons, watermelon, figs, olives, etc.

*** Recreation:** There is no any tourism facility within the boundaries of Zaranik protected area. At the regional level, North Sinai Governorate has been facing economic interest since 1990s, particularly tourism development along the sea shore. Several resorts have been established to the east and west of the Lake Bardawil. A tourism resort is newly established on the east border of Zaranik. This development would have impact on Zaranik protected area by demanding its natural resources. The land value already has increased accordingly.

*** Grazing:** the vegetations of Zaranik and it surroundings are exploited through daily over grazing and collecting shrubs for firewood by Bedouins. In 2001, the total number of grazing animals is 6002 including camels, goats, sheep and donkeys, which is much larger than stocking rate required for natural growing vegetations. Over grazing, therefore, shifts the species composition of the vegetation communities. It leads to disappearance of preferred species and increasing of unpalatable species. In addition, overgrazing has also led to clearing sand dunes of vegetation and, in turn, to sand drift by wind, increase in faunal species favoring open habitats and decline in preferred closed habitats.

*** Hunting and Fishing**

- Bird Catching: Although hunting is prohibited in Zaranik protected area, quail netting and falcon trapping are common activities of North Sinai Bedouins, consuming most of quail and selling falcons to the local market. In 1989, 20500 quails was captured during the catching season of 45 days along the shore of North Sinai, 179 km in length, which dramatically decreased in recent years. Other kinds of birds are being caught such as peregrine falcons, kestrels and red-footed falcons, which sold to dealers from the Arab Gulf Countries, particularly peregrines.

- Fishing: Fishing in Zaranik is allowed only in the open water. Fishing could be considered the most economic activity in Lake Bardawil. The total amount of fishing in 1992 was about 1371 ton which has increased to 1832 in 1995, 2758 in 1999 and to 2801 in 2001. Most of this amount always sold regionally or nationally and the rest left for domestic consumption. The average fishing season period varies from 135 days in 1992 to 166 days in 2001. In May, the total amount of fishing production of important species is about 1019714 kg, which is about 36.4 % of the total amount caught in 2001. May is the most profitable month of the year round and June is the second. Both months contribute about half of the annual production of fishing and annual income.

- Mining (Salt Extraction): In 1982, a public company, called El-Nasr Salines Company, was established by the North Sinai Governorate for salt extraction in Zaranik. This activity occupies about 16.5 sq. km. in the protected area. It consumes annually about 250 million cubic m. The size of salt production declined from 426,000 ton in 1997/98 to 404,000 ton in 1999/2000 and to 336,000 ton in 2001/2002. The North Sinai Governorate is planning to lease this economic activity to the private

sector to increase the size of this economic activity from small to medium or large, which will require future expansion and additional land-use conflict in the protected area.

6. Development Plans Provided for Zaranik Protected Area

Since the general management plan of Zaranik protected area was formulated in 2002, as mentioned above, its implementation have been carried out by the protectorate including the following activities and services. 1) Setting up the management plan team, who has completed the first draft for Zaranik management plan; including selected projects which still need detailed development. 2) Held periodical meeting with local informal Zaranik communities, stakeholders and interested parties, by site personnel and community advisor to validate management plan orientation. 3) Improving database: the management plan team produced the final habitat map for Zaranik in December 2002 with the support of the GIS team. 4) Implementing field activities such as management and monitoring actions encompassing promoting ecotourism by setting up a bird land center on the eastern border of Zaranik; planting acacia trees along the sand dunes at the southern border of Zaranik to fix sand dunes and facilitate sources for grazing; and motivating local communities to form organizations for the development of local society. 5) Additional detailed activities have been also carried out such as bird-watching, environmental education, scientific research, camping, nature photography, beach recreation, natural walks and visits to archaeological sites. Moreover, the Zaranik management plan team has provided additional facilities for visitors such as a visitor center, which includes exhibits of examples of the local fauna and flora, an auditorium for environmental education and meetings, and a cafeteria. An environmental research center was also established including lodging facilities, laboratory and library for visiting researchers. Recreational areas are defined where recreational activities are allowed, such as swimming and picnicking.

7. Ecotourism as a Sustainable Development Policy

Before discussing advanced description of adapting ecotourism in Zaranik Protected area, it is useful to have a clear understanding of what ecotourism is and why ecotourism is suitable for sustainable development in protected areas.

Generally speaking, tourism statistics show that the tourism trend toward natural resources is growing up. In Australia and New Zeland, 32 % of tourists look for natural resources and wildlife as a part of their tours. In African countries, 80 % of tourists target wildlife as a primary attribute. In North America, 69-88 % of the European and Japanese travellers consider bird-watching and natural resources as the most important part of their visits. In Latin America, 50-79 % of tourists emphasized that protected areas must be a major part of their tours in these areas. In America, it was declared that over 100 million people participated in wildlife activities, of which 76.5 million visited wildlife areas and 24.7 million were interested in bird-watching. These tourism destinations have generated over $ 20 billion in related economic development and activities, with estimate of growth of about 30 % per

year. Summing it all up, the size of international tourists visited natural and wildlife areas accounted about 20-40 % of the total size of international tourists, with estimate of increase of about 20-50 % per year. In Egypt, the potentials of tourism is promising, in terms of size and growth of tourists, and tourism activities, facilities and services. The size of tourists has increased dramatically during the last decade. The size of tourists was about 2 million per year during 1999 to 2001. It was increased to 5.6 million in 2003 and 6.5 million in 2004, which is expected to reach 8 million/year in the coming few years. The size of tourists interested in wildlife and natural resources is expected to reach 1.5 to 2 million in the coming years. The size of tourist facilities has also increased by 35 %, particularly in Red Sea and South Sinai governorates.

Consequently, a severe problem for conserving biodiversity and protected areas was felt to their fragmentation of ecosystems. It is believed that mass tourism, associated with package deals to wildlife and protected areas, and interaction with local populations characterized by inexperience of local life and culture would result in adverse ecological and socio-cultural impacts. These critiques emerged at a time when a more global environmental movement was beginning to take place. Later on, the natural-based element of holiday activities together with the increased awareness to minimize the aggressive impacts of tourism on the environment contributed to the demand for ecotourism holidays that originated as a concept in the late 1980s, at a time when significant criticism was being levied against traditional tourism.

There is no universal definition for ecotourism. It is usually considered as tourism favourable to the environment, which is variously interpreted differently from country to another. The International Society for Eco-Tourism in 1991 defined ecotourism as: "*a responsible tourism in natural environment which preserves it and participates to the well-being of local populations*". The World Conservation Union in 1996 defined it as "*the visit of natural environments remained relatively intact, with a low negative impact including a socio-economical implication for the local populations which is at the same time active and beneficial*". Today many different types and definitions of ecotourism exist. The International Ecotourism Society (TIES) give the following definition which has been widely accepted: "*responsible travel to natural areas that conserves the environment and improves the well-being of local people*." Ecotourism, moreover, is a form of alternative tourism which aims to achieve economic gain through natural resource preservation. While they disagree on its exact definition, many tourism experts generally agree that ecotourism is characterized by ecological and socio-cultural integrity, responsibility and sustainability. For the most part, the success of this form of tourism in different locations depends on a variety of factors such as the commitment to ecotourism, including political stability, host governments and local communities; the extent of its promotion by local governments and tour operators; image of the area; ease of travel; and product demand. Ecotourism, in fact, is a complex activity, often seeking to meet a range of objectives, involving a variety of stakeholders and taking place in environmentally and economically fragile locations.

Therefore, it needs careful planning, which maximize sustainability and local benefit. Nowadays, we commonly admit that ecotourism includes the principles of lasting tourism regarding the impact of such an activity on economy, society, and environment. It includes specific principles: it actively contributes to the natural and cultural heritage protection; includes local and native populations in its planning, development, and exploitation, it contributes to their well-being; offers to visitors an interpretation of the natural and cultural heritage; and it lends itself better to travelling of individual or/and small groups. Finally and for the analysis of definitions, three main dimensions should be considered, which characterize the essence of ecotourism: tourism axed on nature; educational aspect; and need for durability.

On the other hand, the national park concept started in 1872 when the first national park Yellowstone was established in Wyoming, U.S.A. Since then many national parks have been discovered worldwide, with a purpose of ensuring that particular character of the area is preserved for the benefit of present and future generations. This purpose has been interpreted in various ways and translated into differing policies and proposals. Now, many countries have proclaimed one or more national parks or similar reserves. Other countries recognize several different types of protected areas. This process has led to the establishment of a system of protected area categories and definitions by the International Union for Conservation of Nature and Natural Resources (IUCN), which defined the protected area as: *"An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means"*. Although all protected areas meet the general purposes contained in this definition, in practice the precise purposes for which protected areas are managed differ greatly. The National Parks in North America were visited by almost 400 million visitors in 1991 trampling over the fragile habitat, ruining the flora with the pollution from their cars, scaring the animals, destroying the wilderness. In Kenya, the central circuit of Amboseli National Park has been reduced to semi-desert by visitors' vehicles, while in the Maasai Mara, which receives 200,000 visitors a year, the construction of a large number of lodges outside the controlled area threatens to overload the system. As a result, historical development of the parks demonstrates fundamental misunderstandings of the relationship between land and people, which has sadly been allowed to continue through. Tourism uses landscape, and flora and fauna as important natural attractions, whilst conservation of the built environment also provides tourists with sites of interest. Similarly, it is argued that one of the positive impacts that tourism can have is to act as a financial incentive for areas to be designated for conservation. In fact throughout the history of the national parks, there have been the twin pressure groups of recreationists and conservationists. Tourism is seen by conservationists as more of a threat. Where conservation interests have been successful in designating zones from which all human activity is excluded tourism interests are forced to compete with other excluded interests in the zones adjacent to protected areas.

Therefore, Ecotourism found as an important tool in the designation of protected areas. This is because ecotourism capabilities are suitable not only for the integrity of their natural systems, and species diversity, but also for economic benefits need to accrue to local communities, and to projects that benefit them. Ecotourism, in fact, looks for authentic nature experiences, which can often be found in protected areas. Ecotourism presents several characteristics: the destination is generally a natural environment which is not polluted; its attractions are its flora and its wildlife, and more generally it bio-diversity; it supports the local economy and the specificity of the place; it contributes to the preservation of the environment, and more generally, promotes the preservation of nature; and eco-tourist stays often include an educational aspect.

In addition, planning and policy development for sustainable tourism is the appropriate context for ecotourism planning, since ecotourism embraces the principles of sustainable tourism concerning the economic, social and environmental impacts of tourism. There are merits in highlighting the particular characteristics of ecotourism, bringing positive benefits for conservation and communities and not simply avoiding negative impacts. It is recognized that ecotourism products may vary considerably, but that all should adhere to basic ecotourism principles. The areas themselves need to address the problems, or others that may be applicable to the local situation. A rather unusual variation on this theme is where ecotourism acts as the forerunner to alternative developments. It is suggested that a useful educational and management tool is the creation of maps to illustrate locations, threats, or other spatial variables, so indicating where it is most necessary to conserve biodiversity. It is recommended that appropriate scale in ecotourism development be a part of planning considerations. For example, some destinations build in development controls ahead of time.

Finally and for many destinations within the Developing World, ecotourism is becoming the most important tourism market segment. The popularity of ecotourism among Developing World countries has increased since 1988, as evidenced by the proliferation of specialized ecotourism tour operators and by the increasing number of ecotourism conferences in those countries. Ecotourism is ideally suited to the Developing World because it is a form of tourism with smaller-scale infrastructural needs and less sophisticated consumer demands. It does not necessitate multi-billion dollar investments. Local, small businesses and entrepreneurs can successfully fulfil the demands of ecotourism, especially in the areas of lodging and food services. As a result, ecotourism has become incredibly popular within the Developing World, particularly as a means of stimulating economic development. Struggling with severe balance of payments difficulties, ecotourism provides these countries with the opportunity to earn foreign exchange without destroying their environmental resource base. For the most part, countries in the Developing World have something of a comparative advantage when it comes to ecotourism, in terms of the vast biodiversity and extent of pristine, natural environments in those countries. According to the World Wildlife Fund for nature, that comparative advantage translated into nearly $12 billion in ecotourism revenues for Developing Countries in 1988. Overall

tourism earnings in the Developing World for 1998 were $55 billion. This segment of tourism is reported to have been growing at a rate of 10-15% per year, whereas mass tourism is said to average only a 4% annual growth rate.

8. Proposed Land-use and Ecotourism Development Plans for Zaranik Protected Area

8. 1. Criteria for Land-use and Ecotourism Plans

The objectives of Zaranik protected area are to conserve its natural biological, physical and cultural features; promote sustainable and environmentally friend economic activities such as ecotourism; control and mitigate impacts of on going adverse activities such as hunting and fishing; encourage scientific research in areas related to life sciences, especially ecology, biological and conservation; and become a regional attraction and a focal point for ecologically sensitive tourism and environmental education for the benefit of the present and future generations. Therefore, land-use plan is important to maintain the natural and traditional regimes that govern the environment of Zaranik. In an almost pristine site as the Zaranik protected area, the land-use plan should be based on non-intervention in the habitat types and maintenance of species diversity of the site.

In addition, the first step of land-use plan is the formulation of zoning, which, in turn, establishes management zones to provide proper recognition and protection for resources of protected areas and greatly facilitates their proper management. Zones, as a tool for resource management, indicate where physical development can be located and, even more important, where it cannot be located. These zones are consistent with the objectives for which the area was established. Zones also defines the different general parts of protected areas such as: strict protection (some called a sanctuary zone, where people are excluded), wilderness (where visitors are permitted only on foot), tourism (where visitors are encouraged in various compatible ways), and development (where facilities are concentrated). Tourism zones should contain representative samples of the park's important resources available for visitor appreciations. Such zones are sometimes divided into two types: extensive use where infrastructure of the protected areas such as roads, trails, simple camp grounds and vista clearing are permitted for low density recreational use; and intensive use where relatively high concentrations of visitors are expected.

Land-use plan, moreover, defines specific and detailed, boundaries, activities, rules, size, etc., of zones of the protected area as of the following:

* Clarifying where or to what extent tourism and ecotourism can occur in protected and non-protected natural areas, by defining what use rules apply to the different categories of protected areas i.e.: nature reserves, marine/coastal zones etc.

* Promoting eco-tourism; controlling bird catching, and banning of quail netting; monitoring species diversity; controlling salt mining activities; protecting and fencing sites which contain considerable plant covers and representing different habitats against grazing and human activities.

* Allowing or/and partially opening access for public use, recreation, visitor facilities and education/demonstration; and closing and fencing, areas with endemic, near-endemic and/or globally threatened species for public use.
* Controlling the conflict between the protected area and adjacent communities, in terms of physical expansion of adjacent communities in response to population growth and tourist demand often target protected areas.
* Enhancing physical planning and design to integrate community services, transportation and tourism of the protected area. Economic development could be properly designed in compatible manners with values of the protected area to minimize impact.
* Explaining the guidelines for development of tourist facilities in the protected area such as man-made structures and infrastructure.
* Demarcating areas around the visitor centers, selected spots with bird watching hides and the location near the archaeological stone constructions for public enjoyment.
* Guiding spatial development through defining compatible architectural designs, and construction methods, materials and procedures to minimize environmental impact.

8. 2. Proposed Land-use Plan for Zaranik Protect Area

The designation of the land-use zoning is influenced by landscape characteristics, natural and historical resources; and objectives of Zaranik protected area. The definitions of zone boundaries are all based on past, existing and anticipated uses and the capabilities of lands to support identified uses. The provision of boundaries is highly recommended to protect significant resources of Zaranik. These boundaries could be identified by topographic or other natural features, or roads. Sub-zones, moreover, are proposed to be used in the future detailed management zoning plan. Sub-zones will be used to distinguish and focus management on the particular resource values and use potentials of various areas within the park. Five different land-use zones, as a result, are identified: Restricted Areas, Semi-Restricted Area (Special Natural Reserve Area), Buffer Zones (Natural Environment), Tourism Area (light activity using carrying capacity), and Economic Residential Area (Dense Economic Activities), Figure 5.

The Restricted Areas (natural sanctuaries): This zone has no access and no facilities. It is defined into two main parts within the protected area in the middle and west parts of the protected area. This zone includes lands that will be managed to preserve: 1) habitat and ecosystem of natural vegetation area, which would be closed for any economic activities and visitors; 2) wetlands for protecting bird life; 3) turtle breeding area; 4) carrying out forthcoming comparative ecological studies on migrate birds and vegetation types inside and outside the wetlands; and 5) migrating birds and selected scientific use.

Semi-Restricted Area (Special Natural Reserve area): This zone includes lands that will be managed to conserve wild nature. In fact, this zone is a wild place, not mostly reachable, and still rich of different kind of valuable species and ecology. It is proposed that this zone has no human activities except for educational and scientific purposes and bird watching using carrying capacity method for controlling visitor numbers. It is defined along the Mediterranean shore and in the middle part of the east area of Zaranik. It consists of bird-watching hides, water inlets, wetlands for protecting bird life and the fishermen community which would be developed in a compatible manner with the protected area activities and purposes because the fishermen are a main part of the ecosystem.

Buffer Zones (Natural Environment): This zone has cultural values, wild nature and controlled human activities such as light agriculture. It is distributed along the protected area in the middle part surrounding the Restricted and Semi-Restricted Areas formulating a protection buffer. This zone includes lands that will be managed to preserve, protect and interpret natural resources and their use and enjoyment by the public. Most of the areas included in this zone were categorized as unique ecosystems because they vegetation importance, which are in demand for tourism and agricultural activities. e.g., the analysis referred to wetlands and vegetation cover for sand dunes, which severely threatened by human activities particularly over grazing and vegetation collection for fire and medication usages. Therefore, the land-use plan proposed developing this zone with controlled human activities where there is potential land-use conflict.

Tourism Area (light activity using carrying capacity): This zone is developed within the middle area of the Buffer Zone to protect its unique cultural and historical resources of the archaeological sites (Felusyat and Khuwaynat) of ancient Roman, Christian and Moslems monuments. It is, therefore, proposed that this zone has no human activities except for educational and scientific purposes and light tourist visits using carrying capacity method for controlling visitor numbers.

Economic Residential Area (Dense Economic Activities): This zone has wild nature with economic and recreational activities and facilities. It consists of the south zone and extended area in the middle part of the protected area. This zone includes lands that will be managed to conserve valuable ecosystems, resources and use potentials of the site. Management in this zone focuses on specific types of protection, use or development. The site potential includes tourism compounds and camping areas in the east, salt extraction in the extended area, and Bedouins communities and agriculture activities along the south border of the protected area. To control the development in this zone, restricted regulations are required through the sub-zones planning management policies.

8. 3. Proposed Outlines for Ecotourism Development

As a result of the analysis of Zaranik protected area, the paper proposed outlines for ecotourism development plan. These outlines provide certain general project concepts for physical development within and outside the protected area as of the following, Figure 6:

* Improving the condition of existing road by supporting internal roads and paving the main road which leads from entrance gate to the visitor center.
* Limiting and controlling the size of salt extraction within the protected area by separating its daily activities, particularly truck activities, to the east part of the protected area. This could be achieved by establishing a new road to the east going parallel to main road of the protected area; and preventing the expansion of their working areas and premises.
* Establishing eight bird-watching hides along the Mediterranean to provide a comfortable place for sitting and observing birds at close range with limited number of researchers and visitors per season and day, using carrying capacity method for controlling these numbers.
* Preserving and developing the archaeological sites (Felusyat and Khuwaynat) to be able to receive researchers, visitors and tourists.
* Developing and establishing three small tourism compounds; and four small tourism camping areas in the east vacant area of Zaranik. Architectural designs, structural systems and construction materials must depend on sustainable methods suitable to the site characteristics of Zaranik protected area.
* Developing and establishing three small Bedouins tourism clusters in the southwest vacant area in the area of the protected area. The purpose is to provide these tourism compounds with Bedouin and desert atmosphere, including cultural and traditional activities and handicrafts.
* Developing and establishing research and handicraft centers. These centers would be highly efficient with reliable communication facilities and equipment to environmental and conservatories universities and institutions
* Monitoring and limiting bird catching and hunting through daily patrol system, particularly during the fishing and hunting seasons.
* Improving and supporting the life conditions and income of fisheries and Bedouins in and around Zaranik protected area. These communities must be supplied with infrastructure, especially potable water, and sewage disposal and treatment systems to avoid environmental impact on the natural resources of Zaranik. Special attention should be given to the fishery huts in the protected area because it is a part of the ecosystem, which could be developed, managed and controlled for the sake of ecotourism development of the protected area. At the same time, the physical development of these communities should be controlled and monitored to avoid any conflict with the natural and historical resources and activities of the protected area.
* Cultivating grazing areas outside the boundaries of Zaranik to minimize internal over grazing of in the protected area.
* Planting the south boundaries of the protected area with trees to limit the impact of the south sand storms and movements of light sand.
* Increasing the size and amount of the vegetation on the sand dunes for settling the sand dunes.

9. Management Guidelines for Ecotourism Development in Zaranik Protected Area

The management policy of ecotourism plan shall become the basis for all planning and utilization of resources of Zaranik protected area. It shall be the agreed vehicle for coordination of efforts of all authorities with an interest in the protected area. Once the land-use zoning proposal is established; the detailed and specific goals and objectives of establishing the Zaranik protected area be clearly formulated and accepted at the outset; and all participants understand these goals. These objectives should be formulated in relation to its particular set of resources and to the region, Sinai Peninsula. These objectives should be appropriate to Zaranik protected area. This action-oriented component is the heart of the plan and addresses the four major policies of protected area management: resource management and protection; human use, including tourism; and administration, research and monitoring. Within the management planning process a number of specific concerns should be outlined as of the following.

* Limitation to tourism usage defines concept and major factors in estimating carrying capacity, environmental, social and managerial.
* Identifying resource conflicts and options for solving such conflicts to harmonize the development of resources and, wherever possible, blend tourist development with the local culture and way of life.
* Determining objectives through discussion and negotiation with those most directly concerned, deciding objectives, beneficiaries, dependency, scale and source.
* Mount community awareness campaigns and encourage strategic alliances between private businesses and local communities. Develop a framework of cooperation between public, private and non-governmental organisations.
* Ensure coordination between government ministries in the planning and regulation of ecotourism.
* Zaranik protected area must be integrated as an essential element in the regional land-use pattern of Sinai Peninsula to review regional interrelationships. It should review the potential effects of the development outside the protected area borders as well as the effects of the protected area on the region.
* Attention should be given to disposal of drainage water, resulting from major irrigating agricultural projects along El-Salam canal, away from Zaranik protected area and Lake Bardawil.
* Conserve energy, water, and other resources, reduce waste and favor materials that are not imported and plan more sustainable transport options.
* Particular attention must focus on ecotourism development in small islands and respect the island's local, natural and cultural environments, keeping in consideration the fragility of island ecosystems.
* Appropriate liquid and solid waste treatment systems must be a major component of any ecotourism development and should be considered starting from design stages of any physical establishment.
* Local and national media should be utilized for promoting Zaranik protected area. This promotion should include all information of the protected area such as location, facilities, capabilities,

importance, purposes, functions and benefits of the site. All kind of methods, nationally and internationally, should be facilitated and applied such as printed colorful brochures, maps, multimedia, internet, etc.

10. Conclusion

This paper has discussed ecotourism as a sustainable policy for developing Zaranik protected area, North Sinai, Egypt. Land-use zoning is also illustrated as a tool for establishing management zones of Zaranik and, in turn, adapting ecotourism development. The outcomes of the investigation and analysis of the potential and constraints of Zaranik protected area show that its natural, historical and cultural resources, and landscape characteristics and land-use pattern are valuable regionally, nationally and to significant extent internationally because most of its natural resources are rare or/and endangered species. At the same time, Zaranik protected area is facing ongoing land-use conflict, tourism demand and economic interests. Therefore, the conservation of these resources became a pre-requisite. The objective is to integrate conservation with development of these resources to facilitate the effective and efficient use of land and its resources for current and future generations.

The results, in addition, focus on the nature of conservation policies for sustaining the environment of Zaranik protected area. Ecotourism, within this context, could play a major role in the development of Zaranik protected because ecotourism capabilities are suitable for the integrity of Zaranik natural system, and species diversity as well as for economic benefits needed for local communities. Ecotourism embraces the principles of sustainable tourism concerning the economic, social and environmental impacts of tourism**.** It also presents several characteristics such as supporting the local economy; contributing to preservation of the environment and promoting the preservation of the natural environment which is not polluted, including flora, wildlife and more generally bio-diversity.

To facilitate this objective, land-use plan is an important tool to maintain the natural and traditional regimes that govern the environment of Zaranik because it defines specific and detailed, boundaries, activities, rules, sizes, etc., of zones of the protected area; clarifies where or to what extent tourism and ecotourism can occur in protected natural areas, by defining what use rules apply to the different categories of protected areas, i.e., nature reserves, marine/coastal zones etc. Management zones, in addition, provide proper recognition and protection for resources of protected areas and greatly facilitate their proper management. Zones, as a tool for resource management, indicate where physical development can be located and where it cannot be located. These zones are consistent with the objectives for which the area was established.

The proposed land-use plan for adapting ecotourism development in Zaranik protected area is strongly influenced by landscape characteristics, land resources, and objectives of Zaranik protected area. The zone boundaries are recommended to protect significant resources, and endangered and rare species of Zaranik, by which sub-zones could be defined for future detailed management of

particular resource values and use potentials within the park. Five different land-use zones are formulated. The Natural Sanctuaries Zone preserves natural vegetation, wetlands, turtle breeding area and migrating birds. The Special Natural Reserve conserves wild nature, with no human activities except for educational and scientific purposes, and bird watching using carrying capacity for controlling visitor numbers. The Natural Environment Zone controls human activities such as light agriculture. The Buffer zone preserves and interprets natural and cultural resources and their use and enjoyment by the public, where there is potential land-use conflict. Tourism Area protects unique cultural and historical resources (Felusyat and Khuwaynat), with no human activities except for educational and scientific purposes, and light tourist visits using carrying capacity. Economic Residential Zone conserves valuable ecosystems, resources and use potentials of the site, which focuses on protection, use or/and development of site potential including tourism compounds and camping areas, salt extraction, and Bedouins communities and agriculture activities. The proposed outline of ecotourism development also reflects the suitable socio-economic development for Zaranik protected area.

This developed procedure would have a significant application to other protected areas in Egypt, particularly coastal ones with wetlands and marine life such as the ones in Aswan, Fayum, Port-Said, along the Nile River, etc., with similar landscape and land-use practice and pressure on their resources resulting from recreational and economic interests. Therefore, the findings of this study could contribute to the formulation of the planning policy and legislation of these protected areas.

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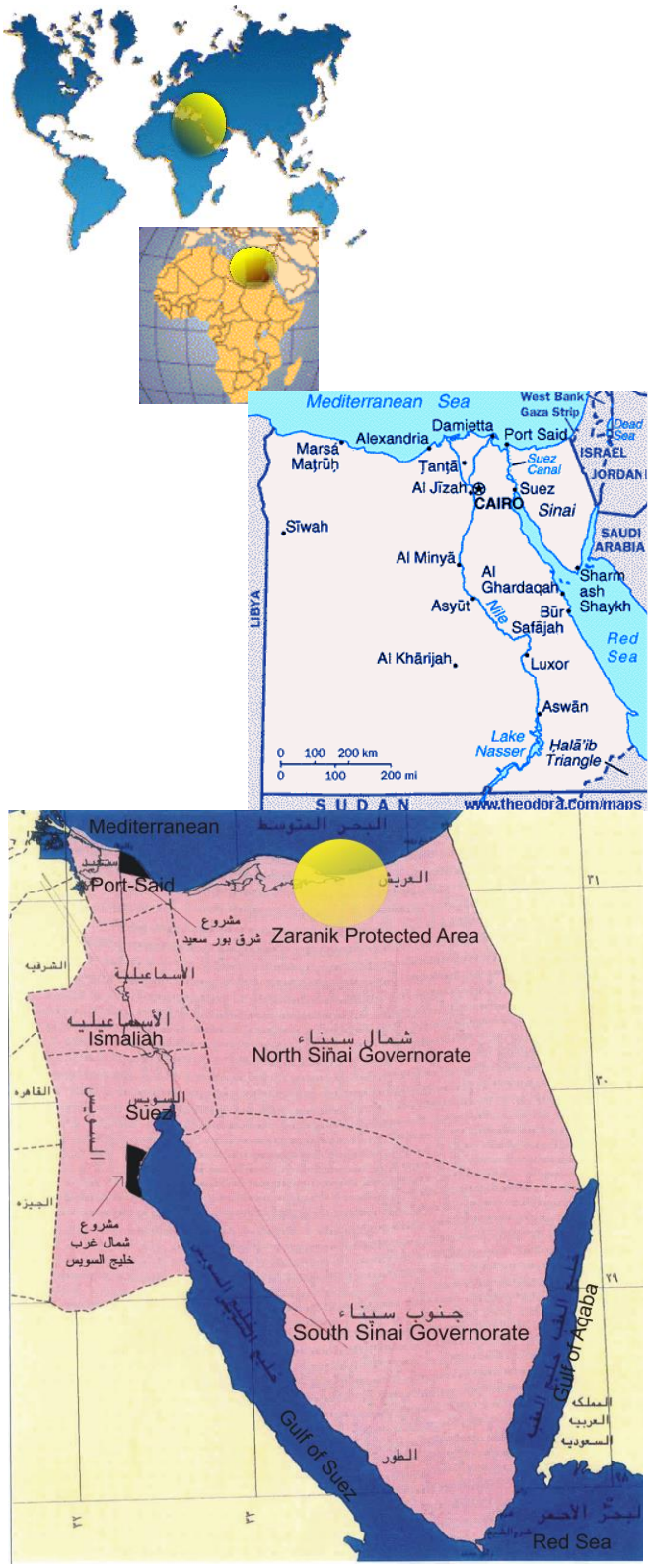

Figure 1: Location Map
Zaranik Protected Area

Figure 2: Zaranik Protected Area

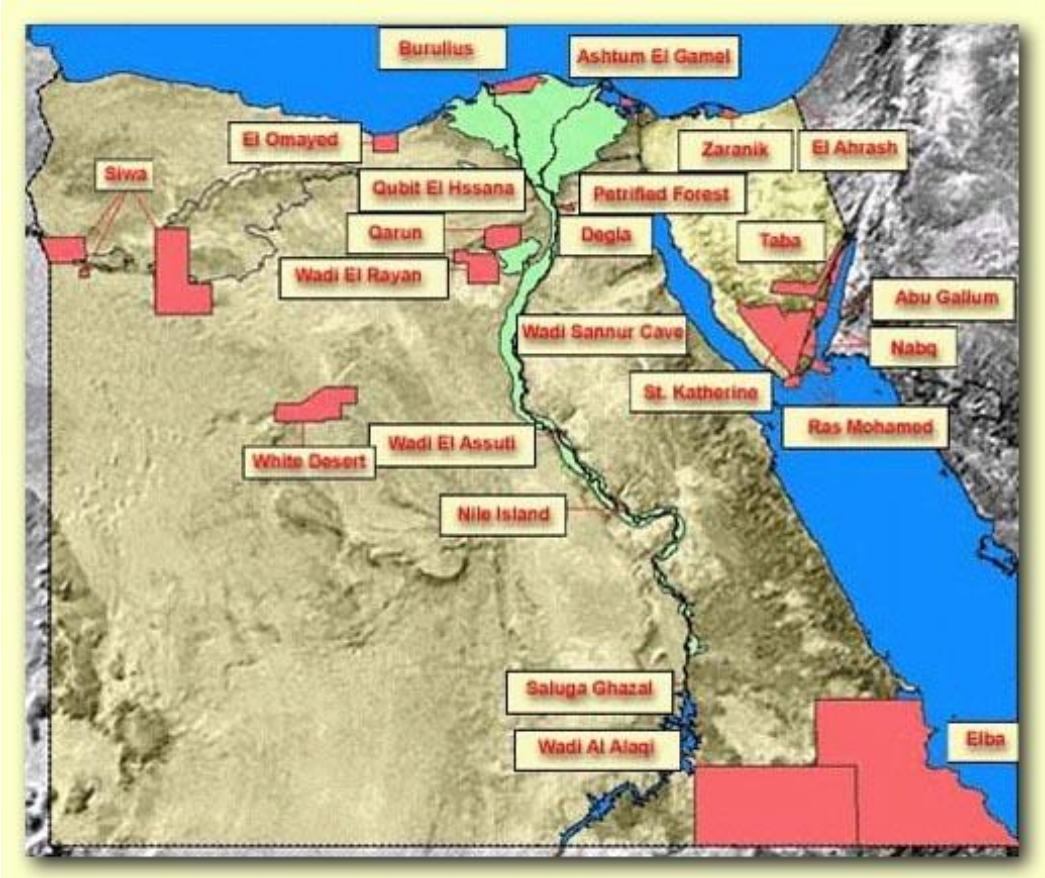

Figure 3: Protected Areas in Egypt

Source: Egyptian Environment Affairs Agency. Map of Zaranik Protected Area. http://www.eeaa.gov.eg/zaranik/english/main/protectedzar81/asp. Ministry of State for Environmental Affairs, Cairo, Egypt.

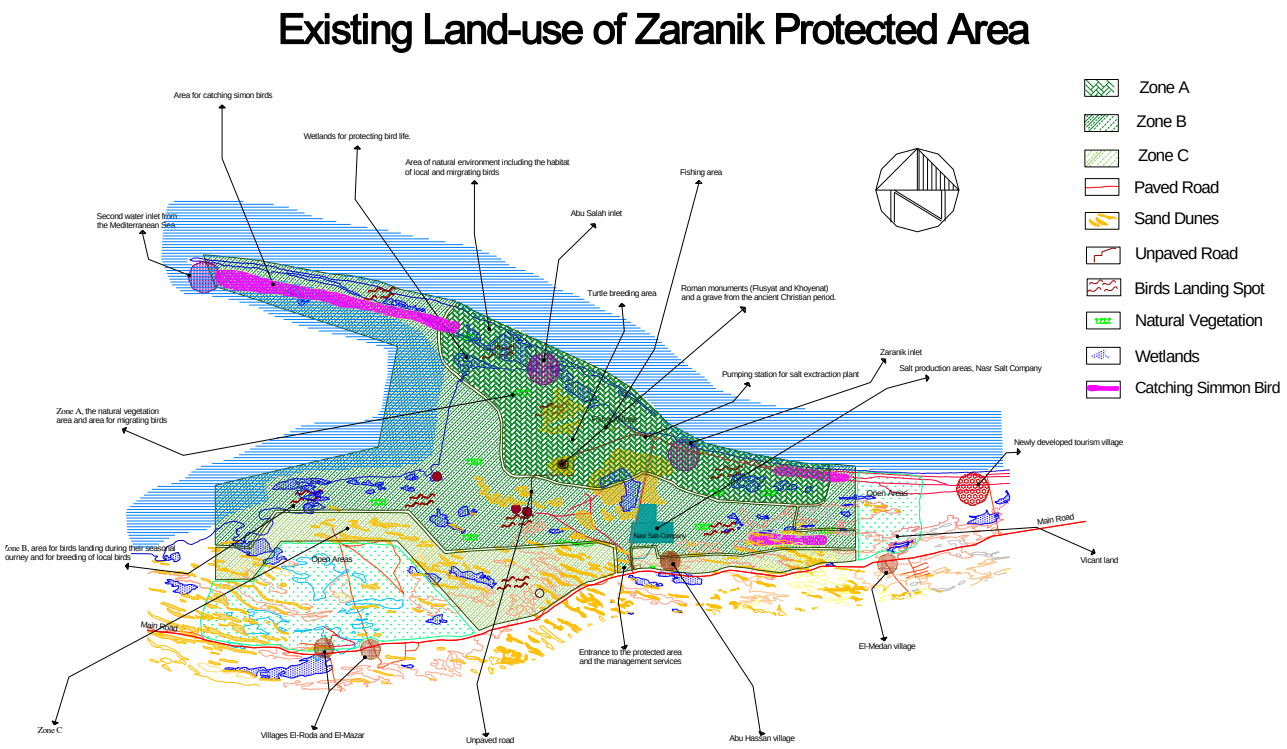

Figure 4: Existing Land-use of Zaranik Protected Area

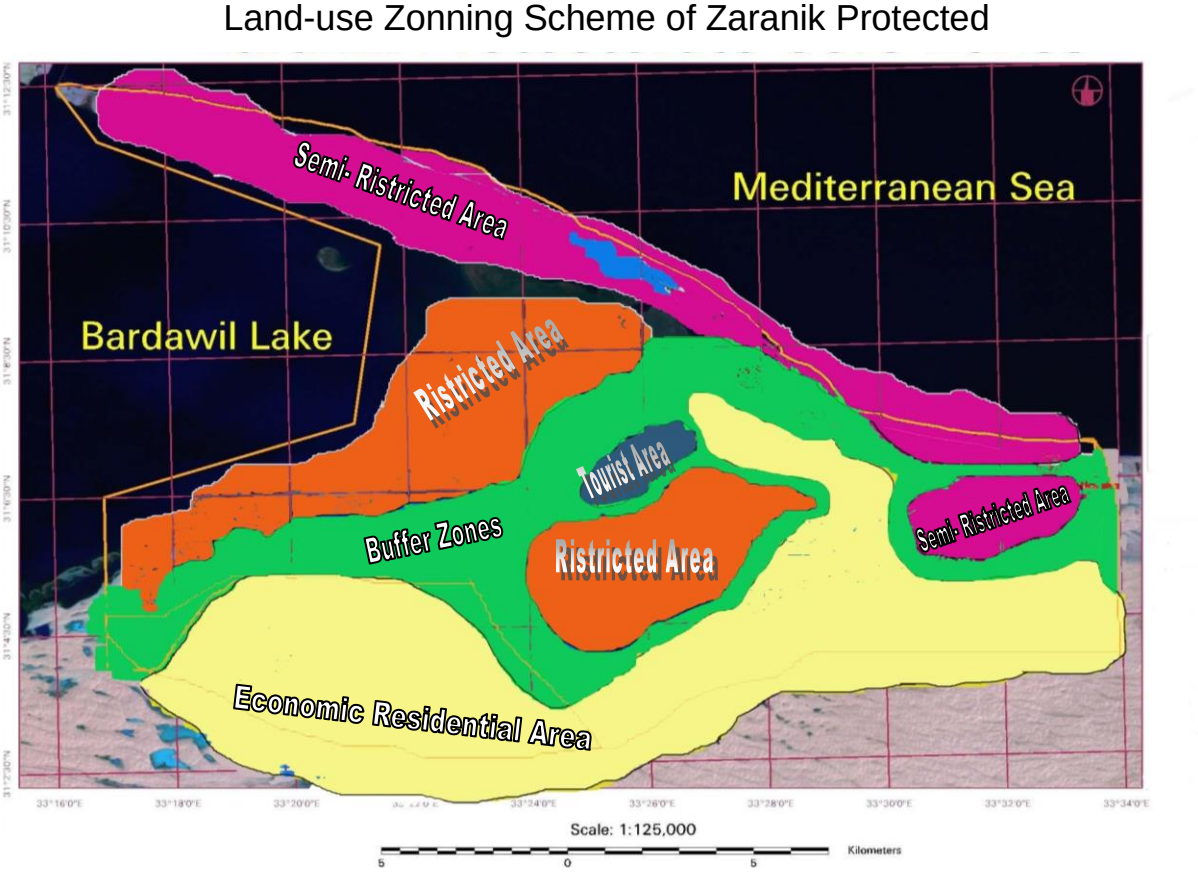

Figure 5: Proposed Land-use Zoning Scheme of Zaranik Protected Area

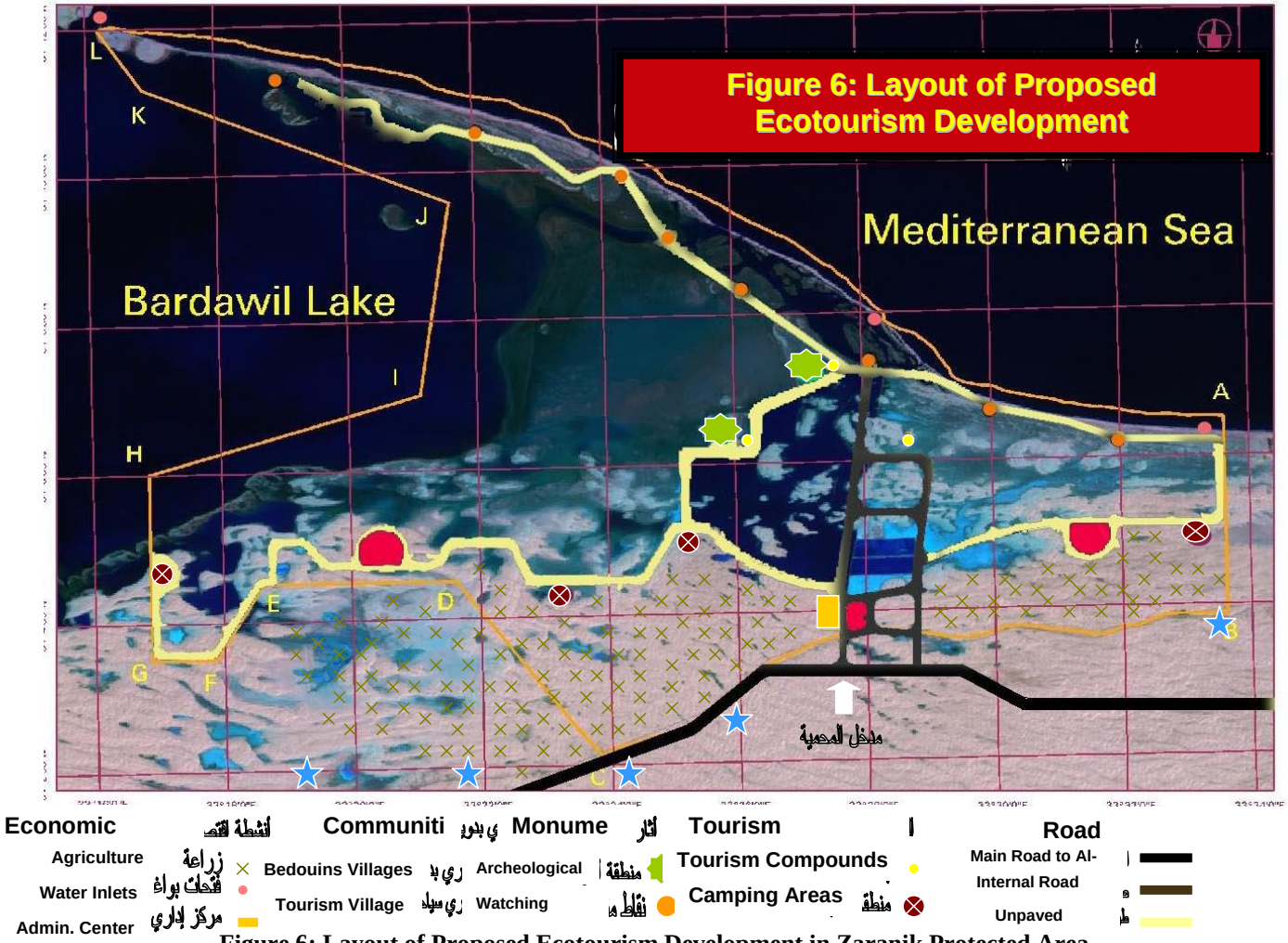

Figure 6: Layout of Proposed Ecotourism Development in Zaranik Protected Area