Designation date: 04/06/12 **Ramsar Site no. 2040**

Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 14, 3rd edition). A 4th edition of the Handbook is in preparation and will be available in 2009.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

1. Name and address of the compiler of this form:

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DD MM YY

Designation date | Site Reference Number

Professor/ Mostafa Fouda
National Focal Point for Ramsar Convention
Nature Conservation Sector, Egyptian Environmental Affairs Agency, Ministry for State of Environment Affairs
30 Misr-Helwan El-Zyrae Road, Maadi, Cairo, Egypt
Fax.: +2 02 2527 1391
Mobile: +2 0122283890
E.mail: foudamos@link.net

Professor/Mohamed Reda Ali Fishar
Professor of Hydrobiology
National Institute of Oceanography and Fisheries
101 Kasr El-Aini St., Cairo, Egypt.
Fax.: +2 02 42184610
Mobile: +2 0106373619
E.mail: mfishar@hotmail.com

2. Date this sheet was completed/updated:
26/3/2012

3. Country: Egypt

4. Name of the Ramsar site:
The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.

Lake Qarun Protected Area (محمية بحيرة قارون)

5. Designation of new Ramsar site or update of existing site:

This RIS is for (tick one box only)**:**
a) Designation of a new Ramsar site ☒; or
b) Updated information on an existing Ramsar site ❑

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area

The Ramsar site boundary and site area are unchanged: ❑

or
If the site boundary has changed:
i) the boundary has been delineated more accurately ❑; or
ii) the boundary has been extended ❑; or
iii) the boundary has been restricted** ❑

and/or

If the site area has changed:
i) the area has been measured more accurately ❑; or
ii) the area has been extended ❑; or
iii) the area has been reduced** ❑

** **Important note**: If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site:
Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as: see Appendices1 &2
i**) a hard copy** (required for inclusion of site in the Ramsar List): ☒;

ii**) an electronic format** (e.g. a JPEG or ArcView image) ☒;

iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** ❑.

b) Describe briefly the type of boundary delineation applied:
e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The proposed Ramsar Site is the same as of Lake Qarun Protected Area which is located between longitudes 30˚38'00"E and 29˚ 28'00"N and geopolitical boundaries in the Fayoum Governorate in the Western Desert in the deepest part of Fayoum depression and lies 83 km south west of Cairo Egypt.

8. Geographical coordinates (latitude/longitude, in degrees and minutes):
Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

The site consisted from core zone (represented by lake Qarun) which is located between longitudes 30˚ 24'1.0" & 30˚49'45.9"E and latitude 29˚ 2'13.9" & 29˚32'11.4"N. Buffer zone is Lake Qarun protected area which is located between longitudes 30˚ 38'00"E and 29˚28'00"N.

Centre point 29°34'22"N 030°35'23"E
See Appendix (1 &2)

9. General location:
Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

Qarun Protected Area is located about 80-km southwest of Cairo in the Fayoum Governorate., the protected area includes inland water and terrestrial components. The inland water component is represented by Lake Qarun, the remainder of the ancient Lake Moeris, once fed by a channel branching from the Nile and now receiving agricultural drainage water from most of the land in the Governorate through a number of drainage canals. The lake is the third largest in Egypt. A small island, Gezert El Qarn El Zahbi (Qarn Island), is located in the middle of Lake Qarun covering an area of about 1.5 km^2, and it is considered as one of most attractive site for nesting birds.

See Appendices (2 &3)

10. Elevation: (in metres: average and/or maximum & minimum)
The site has a maximum elevation of approximately 45 meters below mean sea level.

11. Area: (in hectares)
The site has an irregular shape comprised of 1155 km^2 of land and 230 km^2 of water. The total surface area of Lake Qarun protected area is **134042 hectares**.

12. General overview of the site:
Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

Lake Qarun, is one of the oldest, lakes in Egypt. It was known to ancient Egyptians as Lake Moeris. Lake Qarun is a safe haven and warm cradle for thousands of migrant birds fleeing the severe cold of Europe. It is also the incubator and the happy nest that embraces infant birds on the lake islets during reproduction time. Various kinds of fish live in the lake waters, while many species of mammals and reptiles live in this wonderful area.

The southern shore of Lake Qarun which is included in the Protected Area boundary is heavily used for traditional agriculture and more recently fish farms. Fishermen are active in the lake using rowing boats and nets. An environmental plant (EMISAL) was constructed on the southern lake shore in 1984 in order to extracting lake salts thereby reducing salinty down to ecologically accepted levels and extract mineral salts from the lake water which has the side benefits of reducing the lake's salinity levels. A few villages and tourism resorts are also present along the southern shore of the Lake

Lake Qarun was declared a nature reserve with a view to protecting and conserving the biological, archaeological and geological diversity of the area. The Lake could also be considered as a wetland of international importance because of the presence of waterbirds. The internationally important species include Black-necked Grebe (*Podiceps nigricollis)*, Shoveler (*Anas clypeata)* and Slender-billed Gull (*Larus genei)*. The internationally important Little Tern *Sterna albiforns* breeds here. The lake produces an average of 900 tons of fish and shrimps once a year.

The main source of the Lake water is the agricultural drainage water which inflows through two main drains (El-Bats and El-Wadi) and some other small drains. El-Bats Drain receives nearly 193.3 x 106 m^3 per year of water and discharges into the eastern part of the Lake. El-Wadi Drain receives wastewater from the middle region of El-Fayoum depression and discharge 84.5 x 106 m^3 at the mid-southern shore of the Lake.
The lake has a rich biological diversity: around 88 species of birds have been spotted here, rare kinds of ducks, eagles, falcons, hornbills, macaws, swans and parakeets including many wild plants. The lake houses more than 12 kinds of fish, including mullets, tilapias, soles and shrimps.

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13. Ramsar Criteria:

Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1	2	3	4	5	6	7	8	9
☐	☒	☐	☐	☒	☒	☐	☒	☐

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14. Justification for the application of each Criterion listed in 13 above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Several land mammals are now very rare or extinct, including the slender horned gazelle, *Gazella leptoceros (EN)*. The Fayoum population of this sub-species may represent the only survivors in the world and is now probably locally extinct (IUCN, 2000). Other key wildlife species include *Gazella dorcas* (listed as vulnerable species), ubiquitous Sand fox, *Vulpes rueppelli (LC)*, and Fennec fox, *Vulpes zerda (LC)*. The main factors of declining mammal's populations are loss of habitat, hunting and the widespread use of rodent poison.

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

In a study conducted in 1989/90, Lake Qarun was found to hold large numbers of waterfowl in winter, estimated to be **32,665 individuals** wintering in Qarun Lake (Meininger & Atta 1994). The most abundant species were Grebes, and large numbers of Teal (*Anas crecca*), Tufted Duck (*Aythya fuligula*) and Coot (*Fulica atra*).

In 1999, Baha El Din (1999) conducted population estimate for some bird species in the lake. The study revealed that the breeding population of Slender-billed Gull (*Larus genei*) was about 1,000 pairs nested on El Qarn Island in summer 1998.

In summer 2007, a survey was conducted in beginning of August in Lake Qarun and surrounding areas (Ibrahim, 2007). Over 12,000 individuals out of 23 species were counted. More than 10,000 individuals of breeding adult Slender-billed Gull (*Larus genei*), and 500 individuals of Little Tern, (*Sterna albifrons*), were counted in addition to, chicks of Slender-billed Gull (*Larus genei*), have been observed.

In 2010, the water bird population was estimated to be over **26,000 individuals** (unpublished data from National Institute of Oceanography &Fisheries). The species present include *Podiceps cristatus, Ardeola ralloides, Bubulcus ibis, Egretta garzetta, Casmerodius albus, Ardea cinerea, Tadorna tadorna, Anas Penelope, Anas crecca, Anas acuta, Aythya fuligula, Anas clypeata, Platalea leucorodia, Phoenicopterus rubber, Gallinula chloropus, Gallinago gallinago, Charadrius dubius, Charadrius hiaticula, haradrius alexandrines, Pluvialis squatarola, Hoplopterus spinosus, Calidris minuta, Calidris ferruginea, Calidris alpin,Ph ilomachus pugnax, Tringa erythropus, Tringa stagnatilis, Tringa nebularia, Philomachus pugnax, Himantopus himantopus, Larus fuscus, Larus ichthyaetus, Larus ridibundus, Larus genei, Sterna nilotica, Chlidonias hybrid, Chlidonias niger* and *Chlidonias leucopterus*

Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of water bird.

According to BirdLife International (2011), the site is known to hold, more than 1% of the biogeographic population of the Slender-billed Gull (*Larus genei*): 1000 breeding pairs (that is 2000 individuals), the Egyptian Eared Grebe (*Podiceps nigricollis*) 3516 individuals which is slightly above 1% of the population estimate in Europe and North Africa (2800).

Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

Due to its habitats and the presence of permanent saline water, Lake Qarun can be considered a stronghold for the life cycle of many commercial fish species in Egypt: These include the Egyptian sole (*Solea aegyptiaca*) and Redbelly tilapia (*Tilapia zillii*).

According to General Authority of Fish Resources Development (GFRAD, 1995 to 2009) the catch of Lake Qarun developed from 703 tons (about 0.4% of the total catch of lakes in Egypt) in 1995 to be 3400 tons (about 2.0% of the total catch of lakes in Egypt) in 2009.

Because of this disappearance of its original fish fauna, the commercial catch dropped and affecting the livelihood of the fishing community around the lake. Accordingly, the necessity arose to stock the lake with species tolerant of high salinity. Fish of marine origin i.e. Mullet and Soles represented about one fifth of the total catch. During the 70's, sole production constituted about 50% of the total catch. By the early 90's.
Food and feeding studies indicated that almost all of the fish stocks in Lake Qarun are bottom feeders. They showed special preferences to crustacea. But, it worth mentioning that results represent the study of food and feeding habits for adult fish, while the fry have a different mode of feeding (plankton feeders). Thus, bottom fauna contributing a key factor and represent an important trophic level for maintaining Lake Ecosystem.

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):
Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

Lake Qarun Protected Area lies within the **Sahara ecoregion.** It is the world's largest hot desert, located in northern Africa. It stretches from the Red Sea to the Atlantic Ocean. The vast Sahara encompasses several ecologically distinct regions. The Sahara desert ecoregion covers an area of 4,619,260 km² (1,791,500 square miles) in the hot, hyper-arid center of the Sahara, surrounded on the north, south, east, and west by desert ecoregions with higher rainfall and more vegetation

b) biogeographic regionalisation scheme (include reference citation):

The area located in the sahara ecoregion which is part of the Palearctic. Physically, the Palearctic is the largest ecozone.

WWF Ecoregion (see bibliography)

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16. Physical features of the site:
Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

El Fayoum province consists of four main depressions (Nile Valley, El-Fayoum, Hawara and El-Raiyan) surrounded by the limestone plateau of Eocene Age Rock units exposed in El- Fayoum region range from Eocene to Quaternary Ages.

The subsurface stratigraphic column is capped by the Quaternary sediments that are widely distributed over the entire area of El- Fayoum province and composed of varied grain sizes of sand and gravel intercalated with silt and clay, these deposits are directly over the thick and extensive Eocene Age limestone deposits. The depositional environments and sequence succession of the underlying limestone resulted in the accumulation of thick Quaternary deposits in this region.

The climate of the Fayoum depression is fairly typical of hyper-arid desert climates: scanty winter rainfall, hot and dry with bright sunshine throughout the year, extremely high summer maximum temperatures and moderately low winter minimum temperatures.

According to climate from the meteorological stations in Fayoum, the average annual rainfall is 10.1 mm but this statistic masks great variability from year to year. In s ome years no rain falls, while as much as 44mm has been recorded in one day.

The minimum wind speed (2.11 m/s) is in December, while the maximum value (5.4 m/s) is in June. The Lake is characterized by a prevalence of N, NNE and NNW in most of the year except in December, when the wind has a variable direction.

The lowest values of air temperature are in winter (January; 13.14 ˚C), while the highest values are in summer (August; 28.90 ˚C). In spring season air temperature ranges between 17.40 ˚C and 25.96˚C, while in autumn air temperature varies from 20.20 ˚C ˚ to 28.10 ˚C. Surface water temperature increases from its minimum value (14.88 ˚C) in January to its maximum value of 28.35 ˚C ˚ in August.

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17. Physical features of the catchment area:
Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

The bottom deposits of Lake Qarun consist of sand fraction as main fraction with little amount of gravel and mud with different ratios. The mud fraction increases at westward and sand fraction increase eastward. The mean size of the sediment samples ranges between coarse silt and coarse sand. The

sorting of all of the samples occurre in the range of medium sorted to very poorly sorted. The skewness of the samples ranged between strongly fine-skewed and strongly coarse-skewed. The organic matter in the Lake showed increase westward with the increasing of mud fractions and eastward near the drain mouth, and showed decreasing at the middle zone due to the increasing of sand fractions.

Lake Qarun is characterised by shallow water with regular bottom topography with an average depth of about 4 meters. The Lake is, 45 meters below sea level, and has a surface area of 240 m^2. It has a maximum depth of just over 8 meters (west of Golden Horn Island) and a volume of 800 million cubic meters. About 370 million cubic meters of drainage water reach the lake annually, and as the lake level now stays fairly constant and there are no known outlets, this figure is also taken as the annual rate of evaporation. If follows that, if the water supply to the lake were cut off, it would dry up in two years.

The lowest relative humidity values are recorded in spring season (39.72%), while the highest relative humidity values are encountered in winter season (58.76%). The minimum air pressure (1011.8 mb) is in July, while the maximum air pressure (1022.2 mb) is in December. The lowest evaporation is in winter while the minimum value is 3.32cm in December. The highest calculated evaporation is in summer and the maximum is 24.77cm in August. A layer of thickness 174.17cm is being evaporated annually.

Lake Qarun is eutrophic in chemistry and phosphorus is considered as a limiting factor for water productivity. The basic nutrient salts (ammonia, nitrite, nitrate, orthophosphate, total phosphorus and reactive silicate) in Lake Qarun are allochthonous, where their concentration depends mainly on the quality and quantity of discharged wastes from the drain. Some Physicochemical characteristics of Lake Qarun and its feeding drains are shown in the following table:

	PO_4 µg/l	**NH_3 µg/l**	**NO_2 µg/l**	**NO_3 µg/l**	**TP µg/l**	**SiO_2 mg/l**	**EC mS/cm**	**DO mg/l**	**BOD mg/l**	**COD mg/l**
Lake Qarun	31.9	90.44	6.09	184.0	151.6	1.97	44.14	4.70	4.57	15.05
El Batts Drain	290.4	295.8	122.18	799.4	824.4	6.31	3.96	4.800	3.720	3.56
El Wadi Drain	178.2	119.0	56.0	1271.0	714.0	5.93	3.14	5.200	4.600	4.16

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

The change in water storage of the Lake had a plus and minus values. The lake storage ranged between +57.89 million m^3 in December and -40.93 million m^3 in June; withnet annual of 38.33 million m^3. The monthly water discharges, via El-Batts and El-Wadi drains, range between 13.10 million m^3 in January, and 48.89 million m^3 in September, with net annual water of 419.56 million m^3. Water loss due to evaporation has a minimum value of 7.93 million m^3 in December and a maximum value of 61.14 million m^3 in August, with net annual water of 438.45 million m^3. The water pumping to EMISAL ponds increases from 0.03 million m^3 in February to 2.21 million m^3 in July, with net annual water pumping of 11.75 million m^3.

Groundwater appears to be continuously seeping from a number of sub-surface springs at the lake bottom. A gently sloping sand-plain extends from the lakeshore northwards and upwards to reach sea level at 7 km north of the shoreline.

Lake Qarun showed in the last 100 years a sequence of changes in its salinity and a decline in its productivity. These phenomena attracted many investigators to explain and discuss them. Most of the results showed great fluctuations in the salt content of the Lake water or its salinity and accordingly many difficulties were found to interpolate the results. The water salinity was in order of 33.25‰. The annual salt gain via the main drains is 690.89 million kg, the net annual salts extract of 740.53 million kg and the net salt budget is negative and equal to 49.63 million kg/year (Abd Ellah ,1999). The change in water salinity is obvious. The progressive increase of salinity (from 10.6 at 1906 to 34.06 ‰ at 1993) is the main

problem in the lake due to its dangerous effects on biological productivity, fish production and all biota in the lake. Salinity in the last two decades is nearly constant and it shows slight variation depending on the amount of waste water discharged to the lake.

Concerning the salt budget, the input via the main drains (salinity of 1.0 ‰) is 419.56 million kg/ year and the ground water (salinity of 1.02‰) is 70.36 million kg/year. The output part of the salt budget comprises the volume of flow from the Lake to EMISAL plant (salinity of 34.5‰), which is 405.38 million kg/year.

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19. Wetland Types

a) Presence:

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • [G] H • I • J • K • Zk(a)

Inland: L • M • N • O • P • [Q] • R • [Sp] Ss • Tp Ts • U • Va•

Vt • W • Xf • Xp • Y • Zg• Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) Dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

Q -- **Permanent saline/brackish/alkaline lakes**
G -- Flats **(mud, sand or salt) Saline water**
Sp -- **Permanent saline/brackish/alkaline marshes/pools**.

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20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

Lake Qarun is located in Fayoum on the fringe of the Western Desert about 90km south of Cairo. Fayoum is far from the Nile Valley and it is one of Egypt's most treasured natural landmarks and a resource that has supported human culture for some 8,000 years. It is the only natural contemporary lake of any size in Middle Egypt. It is therefore rich in both natural and archaeological resources.

The biological diversity of the reserve is very important when considering that about 80 species of birds have been spotted the area. In addition, there are rare kinds of ducks, eagles, falcons, hornbills, macaws, swans and parakeets. Many wild plants are also to be found. The lake houses 15 kinds of fish. The reserve also offers shelter to five kinds of mammals including Egyptian hyena, red fox, beaver, kudu and gnu. Moreover, the reserve houses rare kinds of reptiles including the Egyptian Cobra, red-spotted and coral snake. All these make Lake Qarun one of the richest nature reserves nearby Cairo.

Although Lake Qarun was designated as protected area back in 1989 (Prime Ministerial Decree 943 for 1989), the lake has hardly been protected from various polluting elements. It suffers from a serious water pollution problem which is due to uncontrolled solid and liquid domestic and industrial waste disposal practices, in addition to agrochemical contamination and lack of sustainable wastewater management. This situation has caused negative water use impacts on public health, environment, and socio-economic development. Hence, there is a need for proper management of the quality of the lake water to address

these impacts and pave the way for environmentally sustainable and socio-economically viable use of these vital resources.

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21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS*.

i. Phytoplankton

Phytoplankton communities inhabiting Lake Qarun are represented by six classes, namely Bacillariophyceae, Dinophyceae, Cyanophyceae, Chlorophyceae, Euglenophyceae and Cryptophyceae.

A total of 108 species were identified. Marine taxa still dominated the phytoplankton communities, with no change of their percentage occurrence since the last studies of Anonymous (1997 and 2006).

The average of total phytoplankton, cyanoprokaryotes and diatoms densities was highest in the western area compared to middle area and eastern area. The average of dinophytes was highest in the middle area compared to western and eastern areas. Diatoms were most represented, 53 species with percentage occurrence of 50% of total recorded species **(Appendix, 4).**

ii. Vegetation

The vegetation of Lake Qarun and its suurounding area is described in three communities dominated by *Tamarix niloticus, Suaeda aegyptiaca, Alhagi graecorum, Calligonum commosum, Phragmites australis, Typha domingensis, Cyperus rigidus,* and *Desmostachya bipinata***.**

- **Desert shrub community:**

Occur on minor variations due to soil and moisture conditions, throughout the area. Its plants share a number of adaptations that enable them to survive in this hostile environment. This community distributed as sparse desert flora in small patches in the low lands of the interdune and desert plain areas. The desert shrub and sub-shrub plants include*:* halfa*, Nitraria retusa, Tamarix nilotica, Zygophyllum album, Phoenix dactylifera, Alhagi maurorum, and Desmostachya bipinnata.*

- **Salt marsh community:**

Along the adjacent lands to the shoreline of the lake Qarun and around the salt marshes. A characteristic element of this community is the *Tamarix sp.* The Salt marsh plants includes: *Phragmittes Australis, Typha domingesis, Juncus sp.* and *Imperata cylindrica.*

- **Agriculture plants**:

The agricultural plants in Fayoum include fruit trees (figs, olive, palm trees) as well as the other traditional crops such as vegetables, cotton, and wheat.

iii. Weeds

Weeds of very common occurrence found in the cultivated lands of winter crops in all regions of Egypt including Fayum are *Anagallis arvensis, Brassica nigra, Chenopodium album, C. murale, Convolvulus arvensis, Cynodon dactylon, Melilotus indica, Polypogon monspeliensis, Sonchus oleraceus* and *Trifolium resupinatum*. Most of these species are natives of the Mediterranean region, whereas *Cynodon, Sonchus* and *Chenopodium album* are often found in the warm temperate regions of the world. These three weeds tend to continue their growth during the summer. New seedlings of *Sonchus* and *Chenopodium* appear during early summer whereas *Cynodon* persists throughout the whole year.

The very common weeds in summer crops include *Amaranthus angustifolius, A. ascendens, Convolvulus arvensis, Corchorus olitorius, Cynodon dactylon, Portulaca oleracea, Solanum nigrum* and *Sonchus oleraceus. Cynodon, Convolvulus, Solanum* and *Sonchus* may also be present in the winter months, although less common. The others are obligate summer weeds.

Among the winter weeds, *Silene rubella* is rare, but there are more rare summer weeds, e.g. *Amaranthus chlorostachys, Ammi majus, Avena fatua, Beta vulgaris, Brassica nigra, Lolium perenne, Lotus corniculatus, Malva parvifl ora, Panicum repens, Plantago lagopus, Polypogon monspeliensis, Reichardia orientalis, Rumex dentatus* and *Xanthium spinosum*. Three of these weeds, *Amaranthus, Panicum* and *Xanthium*, are obligate summer weeds.

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS*.

i. Zooplankton:

A total of 24 species of zooplankton were identified from the lake (7 Protozoa, 6 Copepoda, 5 Rotifera, and 6 Meroplankton). Rorifera is the abundant group, particularly at the all western side stations, comprising 49.7% of total zooplankton density. Meroplankton came next with a percentage frequency of 3.1 % of the total zooplankton density **(Appendix, 5).** .

ii. Zoobenthos:

A total of 15 species of living bottom invertebrates are identified in the lake. These include, 4 arthropods, 4 annelids, 6 molluscs and one species of Coeletrata. Annelida occupies most of the population density of total macrobenthic fauna and representes 41.52% of the fauna present, follow by Arthropoda (34.94%), Mollusca (24.37%) and Coelentrata (1.7%) of the total number of macrofauna in the area **(Appendix, 6).**

iii. Fish and shrimps:

A total of 15 fish species were recorded in Lake Qarun. Tilapias represent with three major species namely; *Tilapia zillii*, *Oreochromis aureus* and *Oreochromis niloticus*. Six species of mullet could be identified in the catch (*Mugil cephalus*, *Liza ramada*, *Liza sliens*, *Liza aurata*, *Chelon labrousus* and *Liza craniata*). The soles species *Solea aegyptiaca* . Three species of shrimps could be identified in the catch. These include *Metapenaeus stebbingi*, *Palaemon elegans* and *Penaeus semisulcatus* **(Appendix, 7).**

iv. Birds

Species inhabiting agricultural landscapes on the southern shores of Lake Qarun , include avifauna typical of the Nile Valley, such as: Little Green Bee Eater *Merops orientalis*, Common Bulbul *Pycnonotus barbatus*, Crested Lark *Galerida cristata*, Senegal Thick-knee *Burhinus senegalensis* and Senegal Coucal *Centropus senegalensis*. Desert and semi desert habitats support a smaller species richness including most prominently Hoopoe Lark *Alaemon alaudipes*, Brown-necked Raven *Corvus ruficollis* and small numbers of Egyptian Nightjar *Caprimulgus aegyptius* in desert margins. A local endemic subspecies of Sardinian Warbler *Sylvia melanocephala norrisae* inhabited the dense vegetation, which existed along the shores of Lake Qarun in the past when it was mostly fresh. Now this subspecies has become extinct as a consequence of the rapid ecological changes which have taken place over the past century, which had lead to the loss of its habitat **(Appendix, 8).**

v. Herpetofauna

In desert areas *Acanthodactylus scutellatus* is the most common diurnal lizard, while *Stenodactylus sthenodactylus* is a common nocturnal gecko. The snake *Psammophis aegyptius* is common in rocky areas. In cultivated areas, *Bufo regularis* and *Ptychadena mascareniensis* are common amphibians.

vi. Mammals

Due to rapid ecological changes mammals species have disappeared and presumed extinct (*D. scabra* still documented only very rarely). Additionally most of the large mammals, which inhabited the region have now disappeared, with only the Jackal *Canis aureus* being the only remaining survivor **(Appendix, 9).**

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23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

The area occupies an important position in the ancient world which is reflected in a wealth of ancient monuments and archaeological sites dating from pre historic times, through the Phoraonic and Greco – Roman period, up to the Coptic eras. Such sites include Qasr El Sagha, Demiat Esbaa, and oldest paved road in the world.

1. Fisheries production

Fisheries production of Lake Qarun considerably varied between 3400 tons during 2009 and 1095 tons during 1998. The catch is dominated by tilapia which is contributed to about 45 % of the total catch. Tilapias are represented by three major species namely; *Tilapia zillii*, *Oreochromis aureus* and *Oreochromis niloticus*. *T. zillii* constitutes the major bulk of tilapia fisheries production, about 80% of the total yield. *O. aureus* represents about 15 % of the yield, while *O. niloticus* makes up about 5% of the yield.

Mullets came next to tilapias where they constituted about one quarter of the total catch. Six species of mullets could be identified in the catch (*Mugil cephalus*, *Liza ramada*, *Liza sliens*, *Liza aurata*, *Chelon labrousus* and *Liza craniata*). The percentage of the species in the catch depends mainly onf quantities of transplanted species and varied from year to year. By early 90's, the catch was dominated by *L. Saliens*, about 80%. *L. ramada* came next, where its production represented about 10% of the mullet production. Recently, *L. ramada* is dominating the mullet catch. In general, *M. cephalus* represented between 5 to 10 % of the mullet production.

Soles represented about one fifth of the total catch. During the 70's, sole production constituted about 50% of the total catch. By the early 90's, soles' catch significantly dropped till it reached its minimum of about 11.4 tons (1989/90), where it was contributed about 2% of the total fisheries production during this season. The depletion in soles catch was concomitant with the expansion of shrimp fisheries in the lake.

Shrimps constituted about one tenth of the total fisheries production of the lake. Three species could be identified in the catch. These included *Metapenaeus stebbingi*, *Palaemon elegans* and *Penaeus semisulcatus*. The latter was very rare. *M. stebbingi* contributes more than 99.5% of the shrimp catch in the lake.

2. Natural heritage resources

i. Paleontology

Fayoum contains some of Egypt's best fossil deposits laid down 30-40 million years ago, and marine sedimentary cretaceous period laid down 70 million years ago in the ancient Libyan River. This includes some of international importance, which modern scholars have called "the best known Paleocene site in Africa". The Eocene Birket Qarun formation yields a diversity of reptile and mammal fossils, and in the rocks of the Pliocene are fossils of land animals, crocodiles and tortoises and petrified wood.

Fifteen types of animal trail fossils (ichnofossils) have been identified and classified. These consist of communal nesting social insects like termites and ants, burrowing invertebrates, worms and excavators. Gebel Qatrani contains the "most important assemblage as yet described from fluvial rocks of the world". Also, further evidence that the area was a coastal plain at one time is found along the base of the Gebel Qatrani Formation at Madwar al-Bighal, consisting of Mangrove rhizoliths. The petrified wood is scattered in different areas in the north area of Lake Qarun and has very diverse and beautiful samples.

Thirteen different bird fossil families have been identified in Fayoum, of which only two are extinct. These birds include ospreys (Pandionidae) and the gigantic shoebilled stork (Balaenicipitidae). Other bird fossils discovered include the jacanas, herons, egrets, rails (Rallidae), cranes (Gruidae), flamingos (Phoenicopteridae), storks (Cinconiidae), cormorants (Phalacrocoracidae), and an ancient eagle named Accipitridae.

ii. Mammal fossils

There are at least twenty orders of mammal fossils in Fayoum. Some of these animals were natives of Africa, while others migrated from Eurasia. While a large Hyrax (megalohyrax oecaenus) was probably the most common mammal of the Fayoum, some of the most interesting animals included the Arsinoiherium, various Elephants and mastodons, as well as the Zeuglodon, Fayoum's famous whale. Turtle fossils are the most common reptiles found in Fayoum, including Testudo ammon. Other interesting reptiles are the gigantic snake fossils, including Gigantophis, measuring some 9 meters (29 feet), found in the Qasr al-Sagha Formation with the sea snake Pterosphernus. Also, the Tomistoma, a crocodile type animal. The remains of nine species of primate, including the Dawn Ape discovered in 1965, have been found in the Oligocene Gebel Qatrani formation and existed between 28 and 35 million years ago. These are the most investigated fossils in the region. Fayoum's primates include Aegyptopithecus zeuxis and four species of Propliopithecus, consisting of *P. chirobates*, *P. ankeli, P. haeckeli and P. markgrafi.*

iii. Archaeological sites

During the Old Kingdom (2686- 2181 B.C.) Fayoum was known as Ta-she, or She-resy (the Southern Lake) and was dedicated to the crocodile god Sobek. The first real pyramid of Egypt was built at the border of Fayoum in Meidum and several Middle Kingdom kings built their pyramids in the shadow of this great example. The Middle Kingdom saw an enormous bloom of life in Fayoum. Efforts to control the swampy area resulted in some magnificent buildings and statuary. Today there are only traces of the pedestals of two giant statues that once stood in Biahmu.

During the 12th Dynasty's King Amenemhet I's rule, the area's importance was elevated because of his ingenious scheme to regulate the Nile floods using Fayoum as a regulator reservoir. At that time there was a natural canal between the Nile and the lake of Qarun, Muslims believe that it was the biblical Joseph who widened the canal (Joseph's Canal or Bahr Youssef), and built the world's first dam at El Lahun to regulate the flow of water.

3. Agriculture

The agriculture land of the Fayoum Governorate covers an area of about 330000 acres. The agricultural production based on fruit trees represents 8.6% of the cultivated fruit land of Egypt. The fruit trees include figs, olive, palm trees as well as the other traditional crops such as vegetables, cotton, and wheat which are produced mostly for local consumption

4. Salt extraction

During the seventies, trials to estimate the economic beneficiation of salt extraction as a clue to re-balance and/or turn back the situation in the Qarun Lake into norm was the target heading to re-directing thoughts for a better sustainable development of the area as a whole. Implementation to extract salt was a convincing concept by Ministry of Industry; hence studies were devoted to El Nasr Saline Co. to carry out the project. The feasibility study indicates possible economic extraction of Na2SO4, NaCl and Mg salts from Lake Qarun water. The three products proved to be of ultimate need to replace imports and to satisfy local domestic and industrial market.

The Egyptian Salts and Minerals Company (EMISAL) started production by October 1992 with a designed capacity of 100,000 tons per year of high quality anhydrous sodium sulfate. Lake water are pumped to the evaporation ponds where concentration reaches 340 g/L in average as to suite the crystallization of glauber salt by cooling and then drying-up will led to anhydrous sodium sulfate product.

5. Tourism

Multiple forms of tourism exist in Lake Qarun Protected Area. These include environmental, natural and desert tourism, tourism safaris sports tourism and medical tourism, ecotourism and cultural tourism by visiting the excavation sites of old followingpre-human and pre-history and ancient Egyptian, Greek and Romanian region. In 1999, Bird Life international recognized the international importance of the Lake Qarun for bird conservation by including it on its list of Important Bird Areas IBA. The latter is defined as places of international significance for the conservation of birds at the global, regional or sub-regional level. Fayoum is a representative example of the Oases of the great North African Sahara desert in its form, origin, geologic formation, culture and ecosystem. The strategic location of Fayoum as a separate Oasis on the western boundaries of the Nile Valley gives it the opportunity to be the gateway to the region of the North Africa desert. The area benefits significantly from its nearby location to Cairo and its easy access along several well paved highways for local and international tourists and allowed the practice of water sports and fishing.

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

If Yes, tick the box ❑ and describe this importance under one or more of the following categories:

i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:

ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) Sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

iv) Sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

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24. Land tenure/ownership:

a) Within the Ramsar site:

Some land is owned by the government and the other lands and fish farms owned by private sectors. The existing land ownership and authority of the shorelines of Lake Qarun in the Fayoum governorate are shared among several government jurisdictions and governed by different laws, Ministerial and Prime Ministerial decrees including:

- Presidential decree no. 445 for the year 1992 for delimitation of the area 3 km wide of the coastal lands around the shoreline of Lake Qarun for Tourism Development Authority. This area is primarily dedicated to the development of tourism projects under the auspices of the Tourism Development Authority.
- Prime ministerial decree no.943 for the year 1989 according to law No. 102/1983 of the protected areas in Egypt for declaration of Lake Qarun as multiple use protected areas managed by Egyptian Environmental Affairs Agency EEAA
- Supreme Council of Antiquities.
- The Fayoum governorate - Authority of state ownership

b) In the surrounding area:
Some lands in the surrounding area are owned by the government and others by private sectors.

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25. Current land (including water) use:

a) within the Ramsar site:

The lake is used for fisheries, tourism (recreation) and salt extraction. Fisheries are operated in Lake Qarun with 583 wooden oaring boats and about 4000 fishermen. Fish production is landed in 11 landing sites and lies along the southern coast of the lake. The Egyptian Salts and Minerals Company (EMISAL) were constructed to extract the different dissolved slats from Lake Qarun. The lake water is withdrawn to a series of four ponds connected to each other the first one at the lake while the forth on is connected to the factory of salt extraction.

b) in the surroundings/catchment:

There are several villages occupied by the local community in Qarun Protected Area, which is situated at the southern, eastern and western shores of the lake and have a population of 20,000 inhabitants. The inhabitants around and within Qarun Protected Area are working on agriculture and fishery. Most of the villagers around Qarun Lake are working on agriculture of the economical crops (olive – maze – wheat – onion – tomato – etc).

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26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

a) within the Ramsar site:

1) Salinity

The salinity of the lake has strongly increased in the course of the twentieth century. In 1906, it was 10.5 g l−1, but already reached 18 g l−1 in 1919–1925 (Coastguards Administration). Naguib (1958) mentioned 17.8–25.5 g l−1 in 1953– 1955. Salinity increased further, to 30.9‰, 38.7‰ and 42.8‰ in the 1971, 1995 and 1999–2000, respectively (Mashal, 1973; Anonymous, 1997; Ali, 2003). This rapid evolution has important consequences for the biota of the lake which, for obvious reasons, cannot contain endemics. Soliman (1989) predicted a further increase in salinity in the twenty-first century.

This increase of salinity presented a series of threats to the biodiversity and species population of fishes and birds. It has also threatened socioeconomic systems in the governorate. Most of the studies reveal that salt extractions will enhance the lake biodiversity and at the same time enhance the economic value of the lake. In 1984, the Egyptian Salts and Minerals Company (EMISAL) was constructed to extract the different dissolved salts from Lake Qarun. The lake water is withdrawn through a series of four ponds connected to each other. The first pond is situated at the lake while the forth is connected to the factory of salt extraction.

2) Changing of fish catch

Since the lake was fresh water, its fisheries production contained most of the Nile fishes. The lake has been famous during the beginning of 20th century through the great quantities of *Lates niloticus* Linn., and *Tilapia nilotica* Linn. which were common on its shores (Faouzi, 1936).

The lake has undergone drastic changes as its salinity has increased progressively. The salinity increase was unfavorable to most of the fresh-water fish fauna originally inhabiting the lake. All fresh-water species with the exception of *Tilapia* and *Anguilla* gradually disappeared from the lake following their tolerance ability to salinity. Faouzi (1938) mentioned that remnant of the original fresh water species *Tilapia zillii* specie that had not suffered from the salinity increase. While, El-Zarka (1961) stated that *Tilapia nilotica* can still be found in small numbers.

With the disappearance of original fish fauna, the commercial catch dropped from 4000 tons during 1920 to an average of 1 to 2 thousand tons in subsequent years. This situation greatly affected the economy of the fishing community around the lake. Accordingly, to compensate the decline in fresh water fish production the necessity arose to stock the lake with fish species which could be tolerate and outstand withstand the increasing salinity. Egyptian Fisheries Research Department from 1928 to 1931 thought of the possibility to stock Lake Qarun with grey mullet (*Mugil cephalus*). Wimpenny and Faouzi (1935) and Faouzi (1936) found in a plankton sample eggs and larvae of *M. capito*. They gave this as a confirmatory

evidence of the fact that *M. capito* breeds in Lake Qarun. On the other side, El-Zarka (1965) attributed the small percentage of *M. capito* and *M. cephalus* in the catch to their inability to spawn in the lake.

The sole, *Solea vulgaris*, is another marine fish which was successfully transplanted and acclimatized in Lake Qarun. Soles were first introduced into the lake in 1938 and planting was made in 1943, 1945 and 1948.

3) Pollution

Lake Qarun suffers from a serious water pollution problem which is due to uncontrolled solid and liquid domestic and industrial waste disposal practices, in addition to agrochemical contamination and lack of sustainable wastewater management. This situation has caused negative water use impacts on public health, environment, and socio-economic development.

Potential environmental and health impacts of surface water pollution in the basin are multi-faceted and can be classified under direct and indirect impacts depending on the exposure pathway. Direct impacts are the result of direct exposure to low quality water such as the consumption of polluted water that could result in a variety of adverse implications to human, animal, and aquatic well-being. Indirect impacts are the result of indirect exposure to polluted water such as the consumption of damaged plants, affected animals, fish, or food products, and the development of eutrophication associated with algal blooms that in turn damage agricultural equipment, restrict water use in the lake, and produce foul odors and insects.

The lake is suffering from elevated concentrations of phosphorous and nitrogen that are conducive to algal bloom under appropriate environmental conditions (i.e. sunlight, temperature, water stagnation and depth). Total organic carbon (TOC) represents a measure of the amount of organic material present in sediments. The composition of lake sediments can affect the structure of benthic communities, the exchange rates of gases and nutrients between the water column and seafloor, and the bioavailability of nutrients and contaminants to resident fauna. High levels of TOC in sediment samples led to decreased benthic abundance and biomass in addition to enhanced sediment respiration rates which lead to oxygen depletion and accumulation of potentially toxic reduced chemicals that will affect the animal and plant life in the lake.

Furthermore, the presence of high trace metals levels in water and sediment has led to the accumulation of metal in different fish parts especially gills which will be very dangerous for man and animal life. Hussein *et al.* (2008) pointed out that the presence of trace metals in Lake Qarun is mainly due to either agricultural influx, wastes of fish farms or sewage via surrounding cultivated lands. Trace elements in water may undergo rapid changes affecting the rate of uptake or release by sediments, thus influencing living organisms throughout the water-sediment interaction chain. The distribution of pollutants in Lake Qarun showed increased values in the eastern sites when compared to western sites due to the impact of pollution sources in this area which come from Al- Batts drain and many anthropogenic activities in this part of the lake.

b) in the surrounding area:

Fish farms

The problem with fish farms originates from the fact that they derive their water from drains and their waste water flowing into the lake and affect ecosystems especially around discharge points and they cause water pollution due to increase in organic matter and nutrients contained in the wastewater.

Pollution

Water pollution issues are significant in the Qarun area, where communities adjacent to the lake have inadequate sewage disposal systems which, with untreated agricultural runoffs, is causing pollution in the protected area.

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27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

Lake Qarun was declared a Protected Area by Prime Ministerial Decree 348/1989. The site is Tentative World Heritage Site Submitted by the Egyptian National Commission for UNESCO in 10/02/2003 as category Mixed (Ref number 1797). It was also also designated in 1989 as Nature Reserve IUCN category Ia.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ☒; Ib ❑; II ❑; III ❑; IV ❑; V ❑; VI ❑

c) Does an officially approved management plan exist; and is it being implemented?:

A management plan for the Qarun Protected Area was designed in 1989 Its main aim is to represent a first basis for discussion and review, internal as well as with main institutional partners, of the plan structure, management issues, principles, and objectives, as a first step in the further development of a comprehensive management plan for the Protectorate. A required component of the planning process was consultation and participation of the main stakeholders, at the institutional and local levels

d) Describe any other current management practices:

At the present stage of the management the local Protected Area Management Unit (PAMU) was established, This Unit was strengthened through the enhancement of its administrative and technical capacities and increased financial sustainability.
The management centre aim to:

- Avoid damage to the Protected Area resources by unregulated visitor use.
- Retain the area as a prime scientific research site available to the scientific Community.
- Enhance the value of the Protected Area as a prime site for ecotourism and sustainable tourism initiatives.
- Avoid damage to the natural and cultural resources of the area by non-preventable long-term or large-scale natural or human induced phenomena such as climate change, earthquakes, etc..

28. Conservation measures proposed but not yet implemented:
e.g. management plan in preparation; official proposal as a legally protected area, etc.

1. Interpretation materials (e.g. panels, fossilized forest, major fossils … etc)
2. Fewer logistical constraints
3. Tracks and signage
4. Ancient paved road
5. Birdwatching sites and facilities
6. Parking areas
7. Designated campsites

9. Current scientific research and facilities:
e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

The Inland Water and Aquaculture Branch of the National Institute of Oceanography and Fisheries (NIOF) has a Shakshouk research station which is located on the south coast of Lake Qarun. The station holds a scientific laboratory for analysis of hydrobiological samples and two boats used for sampling and sampling equipments. The station also has a hatching laboratory for fishes and guest house.

NIOF carried out regular programs for monitoring the ecosystem of the lake such as physical, biological, chemical, toxic and life cycle data on the lake and their environs. NIOF also carried out a series of national and international projects concerning the development of fisheries and the ecosystem of Lake Qarun. Among these projects were the following::

- The local project "Effect of Fish Farms on the Ecology of Lake Qarun" which is funded by National Institute of Oceanography and Fisheries (NIOF).
- Project entitled "Data of lake Qarun" in a subcontract of Egypt infrastrucure Improvments. This project is carried out by CDM International Incorporation and funded by USAID.
- "Lake Qarun Ecosystem" project through the Marine Technology program for Middle East, funded by USAID.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

Nature Conservation Egypt (NCE) is a professional NGO in the field of nature conservation carrying out a project which is funded by BirdLife International and the Jensen Foundation. It aims to protect natural resources and enhance biodiversity conservation while promoting benefit sharing with local communities in the protected area. Local people contribute to conservation efforts by understanding how protecting biodiversity helps them economically, for example through nature tourism.

Their children, in meetings at school, are taught to know and appreciate their environment and its flora and fauna. An illustrated booklet has been produced on Lake Qarun and has been used in schools for raising awareness among school children. Several classes have been taken on field trips to observe local natural resources. The children were shown how to use binoculars and identify local breeding birds and migratory birds.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Ecotourism activities in the lake include such things as desert safaris, boat trips, bicycling and walking through the country side, horse and donkey rides, guided tours to the famous fossil areas and antiquities, camping in the desert and working with local craftsmen.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

Lake Qarun protected area is under the jurisdiction of Nature Conservation Sector, Egyptian Environmental Affairs Agency, Ministry of State of Environment.
30 Misr-Helwan El-Zyrae Road, Maadi, Cairo, Egypt

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Nature Conservation Sector, Egyptian Environmental Affairs Agency, Ministry of State of Environment
Dr/ Mostafa Fouda
National focal point for Ramsar Convention,
30 Misr-Helwan El-Zyrae Road, Maadi, Cairo, Egypt
Fax.: +2 02 2527 1391
Mobile: +2 0122283890
E.mail: foudamos@link.net

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

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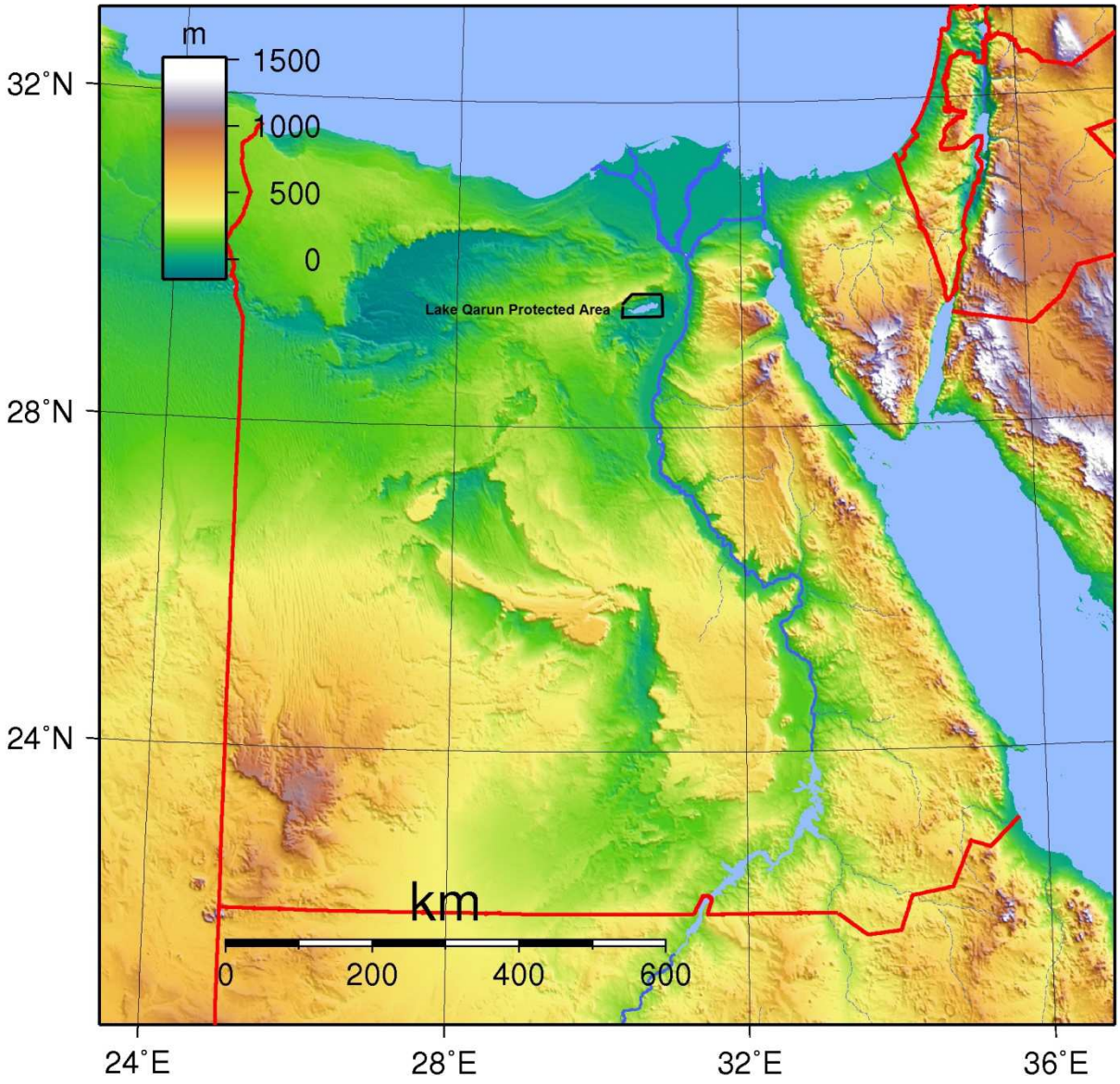
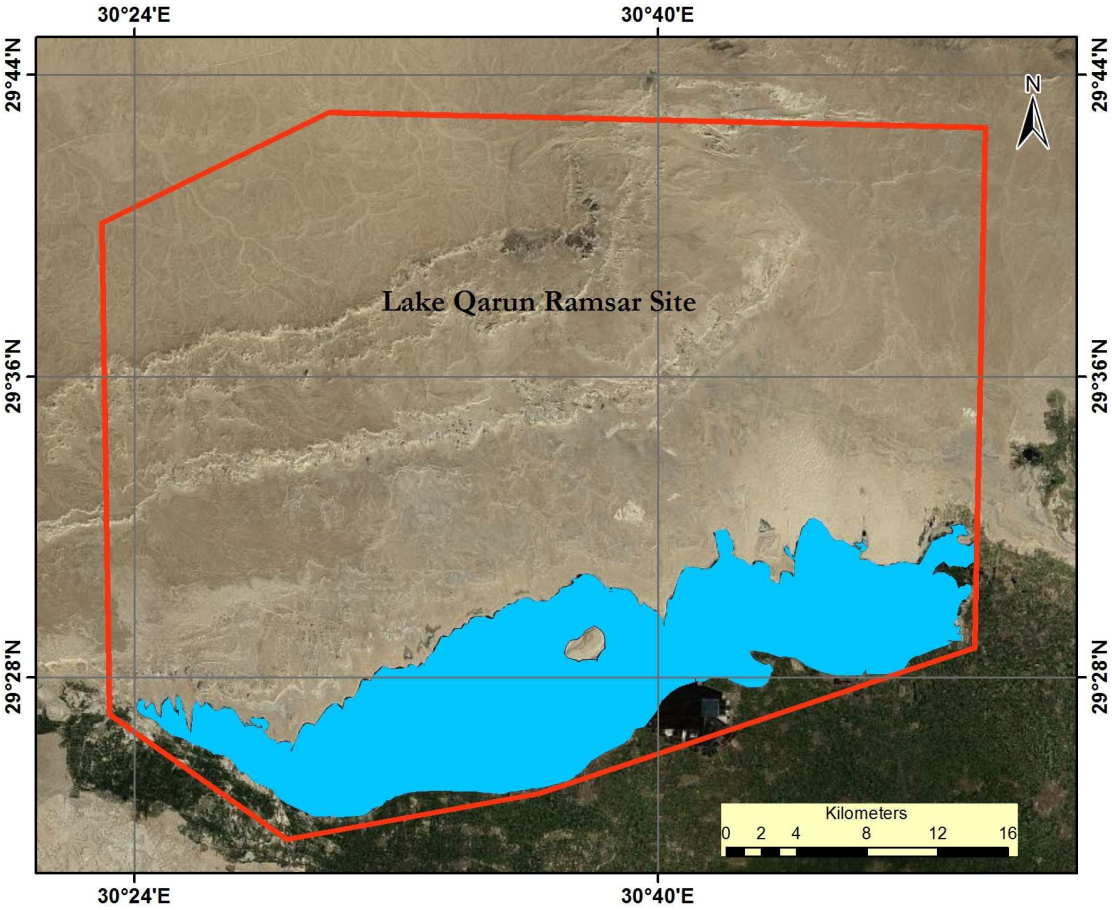
Telephone**: +41 22 999 0170** • Fax: **+41 22 999 0169** • e-mail: **ramsar@ramsar.org**

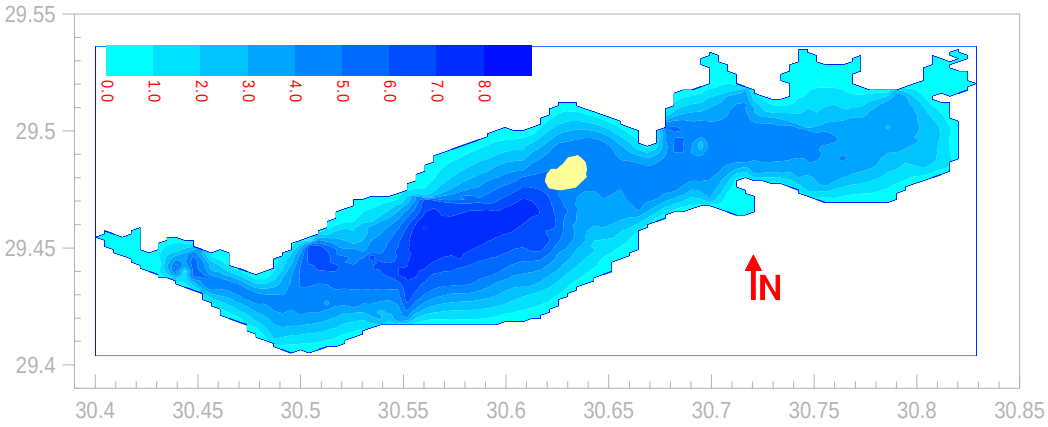
Appendix 1: Location Map



Appendix 2: Maps Showing Ramsar Site Boundary



Appendix 3: Map showing bathymetry of Lake Qarun (interval 1 meter)



Appendix 4: List of phytoplankton species recorded in Lake Qarun

Numbe	species
	Chlorophyceae
1	*Ankistrodesmus falcatus v. acicularis* (Braun.) West
2	*Chlamydomonas globosa* Snow
3	*Dictyosphaerium pulchellum* Wood
4	*Eutetramorus fottii* (Hindak) Komarek
5	*Kirchneriella irregularis* (Petyk.) Printz
6	*K. lunaris* (Kirch.) Moeb.
7	*Monoraphidium griffithii* (Berk.) Kom.-Leg.
8	*M. contortum* (thur.) Kom.
9	*M. dybowskii* Hindak
10	*Nephrocetium lunatum* West
11	*Oocystis borgei* Snow
12	*O. parva* West & West
13	*Pediastrum tetras* (Ehren.) Ralf.
14	*Scenedesmus acutus* Lemm.
15	*S. bicuadatus* (Gugl.) Chod.
16	*S. denticulatus* Lagerh.
17	*S. ecornis* (Ehren.) Chod.
18	*S. intermedius* Chod.
19	*S. protuberans* Fritch.
20	*S. quadricauda v. quadrispina* (Chod.) Smith
	Bacillariophyceae
21	*Amphora coffeaeformis* Kutz.
22	*A. veneta* Kutz.
23	*Aulocosera granulata* (Ehren.) Simon.
24	*Azpeitia africana* (Jan. ex Schm.) Fryx. & Watk.
25	*A. neocrenulata* VanLan.) Fryx. & Watk.
26	*Bacillaria paradoxa* Gemelin
27	*Chaetoceros curvesetus* Cleve
28	*Chaetoceros lorenzianus* Grun.
29	*Chaetoceros pseudocurvisetus* Mang.
30	*Cocconeis placentula* v. *euglypta* (Ehren.) Cleve
31	*Cosinodiscus divisis* Grun.
32	*Cyclotella bodanica* Eulent.
33	*Cyclotella kutzingiana* Thwait.
34	*Cyclotella menghiniana* var *tenera* Kolbe
35	*Cyclotella ocellata* Pant
36	*Cyclotella operculata* (Agard.) Kutz.
37	*Cyclotella stelligera* Cleve & Grun.
38	*Cymbella affinis* Kuetz.
39	*Entomoneis alata* (Ehren.) Ehren.
40	*Epithemia sorex* Kutz.
41	*Fragillaria capucina* Desm.
42	*Fragillaria construens* (Ehren.) Grun.
43	*Fragillaria construens* var *veneter* Grun.
44	*Gomphonema olivaceum* (Lyngb.) Kutz.
45	*Navicula atomus* Nag.
46	*Navicula cari* Ehren.
47	*Navicula cocconeiformis* Greg.
48	*Navicula graciloides* May

Numbe	species
49	*Nitzschia agnita* Hust.
50	*Nitzschia amphibia* Grun.
51	*Nitzschia capitata* Ostr.
52	*Nitzschia closterium* Ehren.
53	*Nitzschia clausii* Hantz.
54	*Nitzschia communis* Cleve
55	*Nitzschia granulata* Grun.
56	*Nitzschia ovalis* Arnott
57	*Nitzschia palea* (Kutz.) Smith
58	*Nitzschia paleaeformis* Hust.
59	*Nitzschia panduriformis* var *minor* Grun.
60	*Nitzschia reversa* Smith
61	*Nitzschia tryblionellae* Hant.
62	*Pleurosigma elongatum* Smith
63	*Stephanodiscus astraea* (Ewhren.) Grun.
64	*Synedra acus* Kutz.
65	*Synedra delicatissima* (Smith) Grun.
66	*Thalassionema bacillare* (Heid.) Kolbe
67	*Thalassionema nitzschioides* Grun
70	*Thalassiosira* sp
Cyanophyceae	
71	*Chroococcus disperses* (Keiss.) Lemm.
72	*Chroococcus limneticus Lemm* (Kutz.) Nag.
73	*Chroococcus minutus* (Kutz.) Nag.
74	*Cylindrospormopsis raciborskii* Wolosz
75	*Lyngbya limnetica* Lemm.
76	*Merismopedia tenussima* Lemm.
77	*Microcystis aeruginosa* Kutz.
78	*Oscillatoria brevis* (Kutz.) Gom.
79	*Oscillatoria janus* Skuja
80	*Oscillatoria kisselevii* Aniss.
81	*Phormedium frigidum* Fritsch
82	*Phormedium mucicola* Huper-Pest. Et Naum.
83	*Phormedium papillaterminatum* Kiss.
84	*Phormedium toficola* (Nag.) Gom.
85	*Spirulina major* Kutz.
86	*Tetrachloris merismopedioides* Skuja
Cryptophyceae	
87	*Hillea fusiformis* (Schil.) Schil.
88	*Chroomonas salina* (Wills.) Butch
89	subtotal Chryptophyceae
Euglenophyceae	
90	*Eugleba acus* Ehren.
91	*Eugleba proxima* Dang.
92	subtotal Eugelnophyceae
Dinophyceae	
93	*Gymnodinium biconica* Skuja
94	*Peridinium bipes* Stein
95	*Peridinium steinii* Jorg.
96	*Prorocentrum dentatum* Stein
97	*Prorocentrum gracile* Schutt
98	*Prorocentrum micans* Ehren.

Appendix 5: List of Zooplankton species recorded in Lake Qarun

Number	Species
Protist	
1	*Arcella* sp
2	*Helicostamella subulata*
3	*Globegrina inflate* d'Orbigny
4	*Textularia sp*
5	*Cyclidium glaucoma* Mueller
6	*Didinium nasutum*
7	*Euplots vannus*
Rorifera	
8	*Brachionus cf. rotundiformis*
9	*Synchaeta cf kitina*
10	*Keratella tropica*
11	*Synchaeta oblonga*
12	*Bedellioda sp*
Copepoda	
13	Nauplius larvae
14	Calaniod copepodide
15	Cyclopoid copepodide
16	*Paracartia latisetosa*
17	*Apocyclops panamensis*
18	*Canuella sp*
Meroplankton	
19	*Cirriped larvae*
20	*Free living Nematoda*
23	*Polychaete larvae*
24	*Ostracoda sp*
25	*Mollusc larvae*
26	*Fish embryo*

Appendix 6: List of Zoobenthos species recorded in Lake Qarun

Number	species
1	*Cerastoderma glacum*
2	*Pyrnella conica*
3	*Venerups aurea*
4	*Semisalsa sp.*
5	*Nassarius cuvereii*
6	*Bulla sp.*
7	*Cyprieds torosa*
8	*Balanus pallidus*
9	*Sphaeroma serratum*
10	*Corophium ascherusicum*
11	*Nereis diversicolor*
12	*Polydora ligni*
13	*Ficompomatus enigmaticus*
14	*Tubificdae sp.*
15	*Aiptasiogeton cf comatus*

Appendix 7: List of fish species recorded in Lake Qarun

Number	Species
1	*Solea aegyptiaca*
2	*Liza saliens*
3	*Liza ramada*
4	*Liza aurata*
5	*Liza craniata*
6	*Mugil cephalus*
7	*Chelon labrousus*
8	*Tilapia zillii*
9	*Oreochromis aureus*
10	*Metapenaeus stebbingi*
11	*Palaemon elegans*
12	*Penaeus semisulcatus*

Appendix 8: List of Bird species recorded in Lake Qarun Protected Area

No.	Common Name	Scientific Name
1	Great Crested Grebe	*Podiceps cristatus*
2	Squacco Heron	*Ardeola ralloides*
3	Cattle Egret	*Bubulcus ibis*
4	Little Egret	*Egretta garzetta*
5	Great Egret	*Casmerodius albus*
6	Grey Heron	*Ardea cinerea*
7	Common Shelduck	*Tadorna tadorna*
8	Eurasian Wigeon	*Anas penelope*
9	Common Teal	*Anas crecca*
10	Northern Pintail	*Anas acuta*
11	Tufted Duck	*Aythya fuligula*
12	Northern Shoveler	*Anas clypeata*
13	Eurasian Spoonbill	*Platalea leucorodia*
14	Greater Flamingo	*Phoenicopterus rubber*
15	Unidentified Ducks	
16	Common Moorhen	*Gallinula chloropus*
17	Common Snip	*Gallinago gallinago*
18	Little Ringed Plover	*Charadrius dubius*
19	Common Ringed Plover	*Charadrius hiaticula*
20	Kentish Plover	*Charadrius alexandrinus*
21	Grey Plover	*Pluvialis squatarola*
22	Spur-winged Lapwing	*Hoplopterus spinosus*
23	Little Stint	*Calidris minuta*
24	Curlew Sandpiper	*Calidris ferruginea*
25	Dunlin	*Calidris alpine*
26	Ruff	*Philomachus pugnax*
27	Spotted Redshank	*Tringa erythropus*
28	Marsh Sandpiper	*Tringa stagnatilis*
29	Common Greenshank	*Tringa nebularia*
30	Curlew	*Philomachus pugnax*
31	Black-winged Stilt	*Himantopus himantopus*
32	Lesser-Black-backed Gull	*Larus fuscus*
33	Pallas's Gull	*Larus ichthyaetus*
34	Black-headed Gull	*Larus ridibundus*
35	Slender-billed Gull	*Larus genei*
36	Gull-billed Tern	*Sterna nilotica*
37	Whiskered Tern	*Chlidonias hybrida*
38	Black Tern	*Chlidonias niger*
39	White-winged Tern	*Chlidonias leucopterus*
40	Unidentified Terns	

Appendix 9: List of Mammals species recorded in Lake Qarun Protected Area

Common name	Scientific name	Habitat
Giant Musk Shrew	*Crocidura flavescens*	Cultivated lands
Flower's shrew	*Crocidura floweri*	Cultivated lands
Fennec Fox	*Vulpes zerda*	Sand areas
Hyena	*Hyaena hyaena*	Desert margins
Jungle Cat	*Felis chaus*	Swampy and farmlands
Wild Cat	*Felis silvestris*	Wadis and rocky areas
Dorcas Gazelle	*Gazella dorcas*	Wadis and rocky areas
Slender-Horned Gazelle	*Gazella leptoceros*	Wadis and rocky areas