

INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND
NATURAL RESOURCES

LAKE ICHKEUL, TUNISIA

N° 9

Criteria (10) - Outstanding universal value

A National Park has been proposed for Lake Ichkeul but it has not yet been legally proclaimed. The area also has status as a Biosphere Reserve.

The area is recognized as the most important single wetland in North Africa. It is of international importance to huge numbers of wintering waterfowl (averaging a quarter of a million wintering geese, ducks and coots). Its declaration as a World Heritage Site is strongly supported by the International Waterfowl Research Bureau.

It appears that there is a prima facie case for the declaration of Lake Ichkeul as a World Heritage Site under Criteria C. 10(iii) and (iv). Its value lies in its continuity as a wetland sanctuary for migratory species.

IUCN's recommendation hinges upon the view the World Heritage Council proposes regarding "outstanding universal value". If this is understood to mean the most outstanding site say in North Africa our recommendation would be positive. If the term is to incorporate only the 4 or 5 most outstanding wetland areas in the world we would request that judgment be deferred pending further review.

Criteria (11) - Integrity

The value of the area as a World Heritage Site lies in its wetland character which is threatened by the proposed construction of three dams on its inflowing rivers.

It is recommended that assurances be sought from the Tunisian Government that the waterflow and existing salinity of the lake be maintained. If this is not done the area would have to be de-listed in the future.

Recommendation

Defer decision pending views of Tunisian Government on water quality and assurances of continuity in supply.

TUNISIA

NAME Ichkeul PN

MANAGEMENT CATEGORY II (National Park);
IX (Biosphere Reserve);
X (World Heritage Site (Criteria: iii and iv));

BIOGEOGRAPHICAL PROVINCE 2.17.06 (Mediterranean Sclerophyll)

GEOGRAPHICAL LOCATION Garaet el Ichkeul national park is situated on the Mateur plain, approximately 25km south-west of Bizerte (Bizerta) and 15km north of Mateur, Bizerta District in northern Tunisia. The park is approximately 30km south-west of the Mediterranean coast. A road leads directly to the park entrance. 37°10'N, 09°40'E

DATE AND HISTORY OF ESTABLISHMENT The Djebel Ichkeul was acquired by the state government in 1891. Prior to that date the lake surrounding the Djebel had been used as a hunting reserve. In 1240AD the dynasty of the Hafsids managed Djebel Ichkeul as a hunting reserve (Ministère de l'Agriculture, 1986; Anon, 1988). The area was first realised to be of international importance in the late 1960s and early 1970s, leading to a major part of the Ichkeul marshes being ceded to the Direction des Forêts in 1974.

The creation of the national park was ratified by Presidential Decree No. 80-1608 of 18 December 1980. It was classed as a Biosphere Reserve in January 1977 and included in the list of Wetlands of International Importance (Ramsar Convention) in June 1980 and subsequently in September 1980 was nominated as a World Heritage Site (Anon, 1988).

AREA 12,600ha. The lake area varies with season; minimum area of 10,775ha to a maximum of 12,600ha in the rainy season (Anon, 1988).

LAND TENURE The lake and djebel are state property whereas the marshes and the lake are the property of the Ministry of 'Public Hydraulique' and administered by the OTD and ONPA. Parts of the marshland are in private ownership.

ALTITUDE Ranging from 1.5m below sea-level at the lake bottom to 511m at the top of the Djebel.

PHYSICAL FEATURES The park consists of an isolated and wooded massif, Djebel Ichkeul and a brackish water permanent lake, Lac Ichkeul. The lake is indirectly connected to the sea by the river, Oued Tindja, which leads into the marine lagoon, Lac de Bizerte. There is approximately 1,360ha of mountain terrain, 8,500ha of lake habitat, the rest being represented by marshland. The lake is connected to the sea by Lac de Bizerte, and classed as a 'marine wetland' (Morgan, 1982). It exhibits a fresh water element being fed by several rivers in the west and south, such as the Oued Djoumine. These water sources dry out over the summer months. At this time of year a lack of incoming fresh-water, in combination with high

levels of evaporation, result in an overall drop in the level of the lake. There is also an increase in the concentration of salinity due to the influx of sea water. The waters in Ichkeul reach greatest salinity from July to October (38g per litre). There is a replenishment of fresh-water with the first autumnal rains; concentrations of 1.7g per litre (Andre, 1953; Hollis, 1977; Morgan, 1982; Hollis, 1986).

Djebel Ichkeul is composed of Triassic and Jurassic formations, largely as metamorphosed limestones with pseudo-dolomitic marbles. Triassic limestones and other sedimentary deposits are exposed in the quarries on the south-western slopes of the djebel. The endorheic basin of the lake and also the marshes are composed of Quaternary alluvia (ONM, 1976; Hollis, 1977; Bousquet, 1988).

CLIMATE The climate is typically Mediterranean with a mean monthly temperature in January of 11.3°C and a mean monthly temperature in July of 25.2°C. The minimum temperature is 0°C in winter and the maximum of 40°C in summer. Average annual rainfall is 625mm, only 4 per cent falling in the summer period. About 300 million cu.m of rainwater enter the lake each year (Hollis, 1977).

VEGETATION The park has a typically semi-arid bioclimatic element dominated by pan-Mediterranean plant species. Distinct habitat types within the park include the mountain and its foothills, dominated by a covering of lentisc Pistacia lentiscus with wild olive Olea europea, phillyrea Phillyrea angustifolia and Smilax aspera. It forms an ecosystem varying from fairly dense maquis of lentisc and wild olive to garigue and open associations of maquis with co-dominant Euphorbia dendroides on the south-east versant, and Juniperus phoenicea on the north versant. Other shrubs on the djebel include carob Ceratonia siliqua, Tetraclinis articulata and Cistus salvifolius (INRAT, 1967; Hollis, 1977; Morgan, 1982). There is a rich variety of northern Tunisian plant species including the endemic Teucrium schoenenbergeri and Nothotena vellea and Crypsis aculeata (see species listed by Hollis *et al.*, 1977; work also undertaken by Dr. Schoenenberger in 1965). The vegetation of the marshes is zoned. In the marsh pools and open water areas grow Potamogeton pectinatus, Zannichellia palustris, Enteromorpha intestinalis, Chara spp., Callitriche spp. and Ruppia maritima (Hollis *et al.*, 1977). Potamogeton pectinatus is abundant in the extreme west of the lake and represents one of the major food resources for the waterfowl flocks (Skinner, 1985). The lake is fringed by a narrow belt of Phragmites communis reeds whilst further inland the area is dominated by Scirpus maritimus, S. lacustris and Juncus subulatus. The threatened Ranunculus ophioglossum, recorded at only a few sites in Tunisia, also grows in the marshes (INRAT, 1967; Hollis, 1977; Morgan, 1982). In drier areas and on the well drained ridges are associations of Hordeum maritimum with Lolium multiflorum and Daucus carota or Nerium oleander and Ziziphus lotus. The unique lake and freshwater marsh vegetation of Djoumine and Melah consists of a range of associations from emergent plants such as Scirpus lacustris, Typha angustifolia and Phragmites communis to grass pastures and shrubs of Tamarix africana and the halophytes Salicornia arabica and Suaeda maritima (see also Hollis *et al.*, 1977; Morgan, 1982).

FAUNA The site has internationally important fossil deposits including late Tertiary and early Quaternary outcrops on the northern shore (Arambourg et Arnould, 1949). The Pleistocene (Villafranchian) deposits include numerous unique assemblages of fossil mammal remains most notable of which are the hominid and primate records. Other identified fossil bones include Elaphas planifrons, Stylohipparion libycum, Libytherium maurusium, Anacus osiris, Testudo gigans and T. emys (Arambourg et Arnould, 1949; ONM, 1976; Hollis et al, 1977).

The present fauna of the park is recognised as being extremely diverse largely due to the wide variety of habitats. For example, the main invertebrate fauna is typical of brackish water areas although on the edge of the salt marsh are freshwater species.

The dense Potamogeton beds contain the most abundant animal populations in the lake. Species include Nereis diversicolor, Gammarus locusta, Corophium volutator, Sphaeroma hookeri, Idotea spp., Hydrobia spp., Abra spp. and Cerastoderma glaucum (Morgan, 1982). Crab Carcinus mediterraneus and also Balanus amphitrite occur near the Tindja canal. The principal fish species are Anguilla anguilla, Mugil cephalus, M. ramada, Dicentrarchus labrax, Barbus barbus, and Alosa fallas. Aphanius fasciatus and Sygnathus are commonly found in shallow water. The herpetofauna Rana ribibunda and Clemys leprosa can be found in the marshes and lake (Morgan, 1982).

Ichkeul wetland is one of the most important sites in the entire Mediterranean region for wintering Palaearctic waterfowl, with records of up to 300,000-400,000 birds present at one time. More than 185 species of bird have been recorded (Hollis et al, 1977, Morgan, 1982, Skinner et al, 1986; Bousquet, 1988). The most numerous species recorded are wigeon Anas penelope (39,000), pochard Aythya ferina (120,000) and coot Fulica atra (36,000). The high records for Aythya ferina and greylag goose Anser anser (700-3,200) indicate that Ichkeul is the most important wintering station in the Maghreb for these species. Up to 600 of the threatened white-headed duck Oxyura leucocephala (K), 4 per cent of the known world population, were recorded in May 1977 (Morgan, 1982). Additional wetland birds found include mallard Anas platyrhynchos, high numbers of teal Anas crecca, pintail Anas acuta, shoveler Anas clypeata and black-winged stilt Himantopus himantopus. Other species include the booted eagle Hieraaetus pennatus, Bonelli's eagle H. fasciatus, peregrine falcon Falco peregrinus, marsh harrier Circus aeruginosus and collared pratincole Glareola pratincola. There are large numbers of migrant and resident marsh harrier Circus cyaneus and reed warbler Acrocephalus scirpaceus. There are migrant white stork Ciconia ciconia and records of the uncommon black stork Ciconia nigra and glossy ibis Plegadis flacinellus. The purple gallinule Porphyrio porphyrio breeds in the dense reeds (Smart, 1975; Hollis et al, 1977; Morgan, 1982).

One of the most notable of the mammals recorded at Ichkeul is otter Lutra lutra (V). Less than 10 animals are believed to occur (H. Miles, pers. comm., 1987). There are large populations of wild boar Sus scrofa, European genet Genetta genetta, as well as a limited number of crested

porcupine Hystrix cristata, mongoose Herpestes ichneumon and Asiatic water buffalo, Bubalis bubalis (E) which was introduced at an early period of Tunisian history (Müller, 1970). Lists of fauna are recorded in the University College London report (Hollis et al, 1977).

CULTURAL HERITAGE Garaet el Ichkeul has been protected as a reserve for state hunting for many centuries. The water buffalo are claimed to have been imported either: a) from Italy by Ahmed Bey between 1837 and 1855 or b) the buffalo descended from herds present in Carthaginian times and subsequently kept as game animals (Müller, 1970).

LOCAL HUMAN POPULATION The lake, marshes and mountain are situated in a part of Tunisia that has been settled and influenced by man over many millenia. The area immediately surrounding the park is very densely populated and includes a number of large towns such as Bizerte and Mateur (15km to the south). The small village on the park's boundary is still experiencing population increase and may absorb the 130 families currently living within the park (Anon, 1988; Nelson, 1988; Bousquet, 1988). Up to 2,000 cattle, sheep and goats and 800ha of cultivation occur within the park boundary (Nelson, in litt., 1988). On the park fringes there is intensive agriculture of ploughed land, orchards and pasture. The people living in the park are largely employed in the local quarry industry (Drucker, 1987).

VISITORS AND VISITOR FACILITIES Initially visitors occurred in low numbers but the Direction des Forêts and the Tourist Directorate undertook an extensive programme of promoting natural history tourism. There were 23,000 visitors to the park in 1987 and by spring 1988 more than 2,500 people visited the area in a six week period. Visitor composition included 41% in school groups and 6.6% as foreign tourists (Anon, 1988; Nelson, in litt., 1988). An eco-museum/information centre built with assistance from the British Museum (Natural History) and WWF Project No. 3403, opened in spring, 1989 (El Hili, pers. comm., 1989). The visitor facilities, including audio-visual displays, small museum and library are situated on the northern slopes of the djebel (Drucker, 1987; Bousquet, 1988; El Hili, pers. comm., 1989).

SCIENTIFIC RESEARCH AND FACILITIES Some of the earliest scientific studies resulted from the palaeontological excavations of 1947-49 (Arambourg et Arnould, 1949). Stratigraphical and palaeontological studies have been carried out by the Tunisian National Bureau of Mines (ONM, 1976). Research on the Lake Ichkeul environment has been undertaken by the University of Tunis, the Institut National Scientifique et Technique d'Océanographie et de Pêche, Tunis (INSTOP) and University College London. A programme of waterfowl observational research has been underway since 1963 with the collaboration of University College London, the International Wetlands and Waterfowl Research Bureau (IWRB/BIRO) and the Tour de Valat Biological Station, Camargue, France (Bousquet, 1988; Tamisier, in litt., 1989). The Ministère de l'Environnement Français (SRETIE), CNRS and SOGREAH over the last year have been involved in a series of management research projects, the budget involves several million French Francs (Tamisier, in litt., 1989). Research facilities in the park are due to open at the ecomuseum in

the 1989-1990 season. Professor Hedi El Anounid of l'Ecole Normale Supérieure has submitted a vegetation mapping programme for the Djebel (Drucker, pers. comm., 1987).

CONSERVATION MANAGEMENT The national park was created to safeguard Garaet Ichkeul, one of the most important wetlands to survive in the Mediterranean region (Morgan, 1977; Anon, 1988). The lake is of particular importance for the extremely high numbers of wintering Palaearctic waterfowl and the diversity of terrestrial and aquatic ecosystems. The park also protects internationally important mammal fossil deposits (Hollis, 1982). A management plan was developed in 1977 and subsequently incorporated into the national park statutes (Hollis *et al.*, 1977; Tamisier, in litt., 1989). Subsequent amendments and additional studies on water management have been undertaken with the assistance of EEC grants (Hollis, 1986). The master plan identifies zonation across the entire protected area. Zonation includes the core area of the main lake, mountain and marsh habitats along with peripheral buffer zones of 6,000ha. The most important objectives are to control the water level and salinity of the lake and to maintain and develop the important Potamogeton vegetation as food resources for migrating birds. Current management requirements include the construction of a sluice on Oued Tindja to control water salinity, by restricting sea-water entry and containing the loss of fresh water. This programme was due for completion by February 1989, although operational use was expected to be delayed until 1990 (Hollis, 1986; Bousquet, 1988; Tamisier, in litt., 1989).

Recommended improvements to the conservation of the park include a) increased input of management responsibilities from the Sous-Direction de la Chasse et des Parcs Nationaux, la Direction de l'Environnement and the Commissaire Régional du Développement Agricole; b) a need to re-structure the present inadequate wardening system and strengthen the park director's role; c) stop quarrying in within a 1-2 year period; d) define the current pastoral role on the djebel and in the marshes and perhaps tax the use of pasture; e) increase control on fishing by the Office National de Pêche; f) establish a scientific group formed from the different individuals engaged in Ichkeul research; and g) continue to monitor the hydrological problems caused by dam construction on the tributaries of the lake (Bousquet, 1988; Tamisier, in litt., 1989).

The water buffalo re-introduction programme has been undertaken by the Direction des Forêts. Much of the herd was slaughtered for food in 1954, with only three females remaining. Subsequently, a male buffalo was imported from Italy, a breeding programme established and animals re-released at Ichkeul (Riney, 1964; Müller, 1970; Drucker, 1987). Park regulations, which are not yet fully in force, ensure that hunting, fishing and grazing will be prohibited or strictly controlled. At present only Office National de Pêche personnel are authorised to fish in the lake, but the Directeur des Forêts can forbid access on certain days to minimise damage to flora and fauna. All industrial, touristic and commercial activities within the park are permitted only with authorisation of the Directeur des Forêts. In the latest code forestier (art. 208) management

projects in national parks must involve impact studies on the natural environment.

MANAGEMENT PROBLEMS The problems affecting the conservation and management of Ichkeul were highlighted in a MAB-UNESCO mission to study the current status of Ichkeul (Bousquet, 1988; Tamisier, in litt., 1989). Up to nine main problems were identified, the greatest threat to the continued existence of the lake being the construction of dams on the three rivers which supply it with fresh water, two being completed by 1988 and the most damaging third dam by 1991 (Anon, 1988). The River Sedjenane normally supplies 44% of the fresh water to Ichkeul and so is likely to have profound effects on the lake ecosystem when dammed in 1991 (Bousquet, 1988). Current studies are underway to ensure that the lake receives sufficient water to maintain the water table level. If there is no hydrological protection the marshes will be flooded, the lake will reduce in area, there will be an increase in salination through evaporation and a lack of incoming fresh water. In the winter season 1986/1987 there was no apparent reduction in water depth and the lake was in flood, lake levels in 1987/88 were also regarded as normal (Drucker, pers. obs., 1987; Nelson, 1988). It is reported that the overall change in salinity, due to the damming of the Djoumine and Rhezla rivers, has led to a great reduction in Potamogeton, a major food source for wintering waterfowl and a replacement of Scirpus maritimus by Ammi visnaga and Scolimus maculatus, a potential loss of up to 20 per cent of food plants (Bousquet, 1988). Other identified threats to the park include a) run-off of fertilisers and pesticides from agricultural land surrounding the lake; b) extremely large open-cast stone and marble quarries on the southern slopes of Djebel Ichkeul, with a production capacity of 1,250 sq.m per day. Unless their expansion is restricted they may threaten the ecosystems on and around the hill as well as polluting the lake water (Drucker, 1987; Bousquet, 1988). These quarries, mined by Italian and Tunisian companies, are reported to be expanding at an alarming rate, with a consequent increase in traffic on routes to the park and degradation of the surrounding vegetation (Nelson, 1988); c) grazing throughout the entire park is still causing serious degradation of the ecosystem, restricting vegetation growth and causing erosion on the Djebel slopes, as well as leading to malnutrition and death of the water buffalo (Drucker, 1987; Bousquet, 1988); d) currently there are about 1,000 people living in illegal douar or gourbis housing within the park boundaries (Bousquet, 1988; Tamisier, in litt., 1989). As yet, plans to re-settle the population have not been instituted (Drucker, 1987; El Hili, pers. comm. 1989; Tamisier, in litt., 1989); e) Hammam hot springs which at certain times of the year are besieged by people causing a high level of pollution; f) poachers hunt with impunity unaffected by the guards who seem ineffectual in preventing illicit hunting; g) the lake is used commercially and administered by the Tunisian National Fisheries Bureau. There is a lack of information concerning potential adverse effects from this fishing industry; h) one of the biggest gaps in the protection of the lake is the lack of personnel in the field (Bousquet, 1988; Tamisier, in litt., 1989; El Hili, pers. comm., 1989).

STAFF A national park director and wardens have been appointed and are

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based in Bizerte (Drucker, 1987; El Hili, pers. comm., 1989).

BUDGET The allocated gross annual budget for the park averaged at 16,000 DT of which in actuality only 2,000 DT was dispensed in the year 1987-1988 (Bousquet, 1988). The EEC funded a four-year management study by University of London, the IWRB and the Tour du Valet (1981-85). The eco-museum has been set up with assistance from the WWF, and the World Heritage Fund has assisted park management including by donating a vehicle for park surveillance (Bousquet, 1988; El Hili, pers. comm., 1989).

LOCAL ADMINISTRATION Directeur du Parc National de l'Ichkeul, Commissaire Régionale du Développement Agricole (CRDA), 7029, Bizerte. Direction des Forêts, 30 Rue Alain Savary, Tunis

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DATE February 1988, revised May 1989, updated December 1989
0404V