World Heritage Sites

Protected Areas and World Heritage

LAKES OF OUNIANGA

CHAD

The 18 lakes of Ounianga lie in a beautiful desert basin fringed by low hills halfway between the Tibesti mountains and the Ennedi plateau in northern Chad. Although the rainfall is less than 2mm a year, in all but one lake the freshwater is constantly replenished and supports two fertile oases in the middle of the hyperarid eastern Sahara.

COUNTRY
Chad

NAME
Lakes of Ounianga

NATURAL WORLD HERITAGE SITE
2012: Inscribed on the World Heritage List under natural criterion (vii).

STATEMENT OF OUTSTANDING UNIVERSAL VALUE
The UNESCO World Heritage Committee adopted the following Statement of Outstanding Universal Value at the time of inscription:

Brief Synthesis
Located in North-Eastern Chad, in a hot and hyperarid desert setting with less than 2mm rainfall per year, the Lakes of Ounianga comprises a total of 18 lakes, in two groups, displaying a variety of sizes, depths, colorations and chemical compositions. The property covers 62,808 ha and has a 4,869 ha buffer zone. The Lakes of Ounianga property is located in a basin which, less than 10,000 years ago, was occupied by a much larger lake and has a globally unique hydrological system, sustaining the largest permanent freshwater lakes system in the heart of a hyperarid environment.

The property also displays a range of striking aesthetic features, with varied coloration associated with the different lakes and their vegetation, and the presence of dramatic natural desert landforms that all contribute to the exceptional natural beauty of the landscape of the property. The shape and distribution of the lakes, combined with the effect of the wind moving the floating vegetation in the lakes, gives the impression of “waves of water flowing in the desert”.

Criterion (vii): The property represents an exceptional example of permanent lakes in a desert setting, a remarkable natural phenomenon which results from an aquifer and associated complex hydrological system which is still to be fully understood. The aesthetic beauty of the site results from a landscape mosaic which includes the varied coloured lakes with their blue, green and /or reddish waters, in reflection of their chemical composition, surrounded by palms, dunes and spectacular sandstone landforms, all of it in the heart of a desert that stretches over thousands of kilometres. In addition, about one third of the surface of the Ounianga Serir Lakes is covered with floating reed carpets whose intense green colour contrasts with the blue open waters. Rock exposures which dominate the site offer a breathtaking view on all the lakes, of which the colours contrast with the brown sand dunes separated by bare rock structures. The shape and distribution of the lakes, combined with the effect of the wind moving the floating vegetation in the lakes, gives the impression of “waves of water flowing in the desert”.

Integrity
The boundaries of the 62,808 ha property have been designed to ensure its integrity. The property includes the area situated below the 450m contour line within the immediate lake watershed. The 4,869 ha buffer zone includes the village of Ounianga Kebir beside Lake Yoan. Zoning for management of the site takes into account pressures which are now mainly concentrated on Lake Yoan. Ounianga Serir, the smallest village (population of c. 1,000 in 2012) is next to the lake Teli, inside the property. The hydrological system of the Lakes of Ounianga is functioning and the water level is stable apart from a slight seasonal variation, thanks to a groundwater supply which compensates for evaporation losses.

The beauty and aesthetic values of the property have been well conserved. Although a good number of people live around lakes Yoan and Teli, local initiatives are assuring the compatibility between human activities and conservation of the site's values. Activities planned in the management plan strengthen and complement these initiatives. In addition the recently adopted Decree No. 095 which aims to maintain traditional agricultural practices in the property instead of intensive agriculture will enhance the conservation of the property.

Protection and Management Requirements

Decree N° 1077/PR/PM/MCJS/2010 of 15.12.2010 designated the Lakes of Ounianga as a 'Natural site'; the protected area system of Chad, as established in Law N°14/PR/2008, focuses on fauna and flora conservation and, alone, is not fully suited to Ounianga; thus, responsibility for the property is vested in the Ministry of Culture. There is high level political support for the protection and management of the property at national and local levels.

Under the decree, all activities that could threaten the integrity of the property, including mining, are forbidden. The national designation is similar to IUCN Category III for protected areas. This decree is complemented by the Decree No. 630 which regulates the need to prepare Environmental Impact Assessments for development projects. The property has an effective management plan in place for the short and long term, and there are adequate resources and staffing provided its implementation and monitoring.

Wetlands such as the Lakes of Ounianga are also protected by Law 14/PR/98. An action plan is implemented through local associations to avoid negative impacts on the site. Conservation efforts focus on factors that could impact the site's integrity, which include effective measures to regulate urban development, address litter and waste management, support sustainable agriculture and ensure that traffic, tourism and other uses is maintained at levels that do not impact the Outstanding Universal Value of the property. Several local associations created at the initiative of the local governmental authorities and the local communities are also responsible for the conservation of the property. These activities are implemented with the support of a Local Management Committee, which provides input for improving the existing management plan.

IUCN MANAGEMENT CATEGORY

Unassigned

BIOGEOGRAPHICAL PROVINCE

Sahara (2.18.7)

GEOGRAPHICAL LOCATION

In far northeastern Chad in the province of Ennedi 300 km northeast of the town of Faya. The lakes lie in two groups with their central villages lying some 40 km apart beside the two largest lakes: Ounianga Kebir at 19°03' N x 20°35' E and Ounianga Serir east-southeast at 18°55' N x 20°55' E.

DATES AND HISTORY OF ESTABLISHMENT

2010: The Lakes of Ounianga designated a Natural Site by Decree No.1077/PR/PM/MCJS/2010.

LAND TENURE

State owned. The management is vested in the Ministry of Culture working through a Technical Management Committee of experts and a Local Management Committee of local associations.

AREAS

The property covers 62,808 ha. It is defined as land below the 450m contour line and includes both oases. The surface areas of the lakes of Ounianga Kebir and Ounianga Serir are 7,056 ha and 5,108 ha respectively, covering 19.4% of the total area of the property. There is a 4,869 ha buffer zone around the village of Ounianga Kebir.

ALTITUDE

The water level of Lake Yoan in Ounianga Kebir is around 402m above sea level, that of Lake Teli in Ounianga Serir 360m above sea level. The surrounding hills rise some 50-80 metres above 450m.

PHYSICAL FEATURES

These 18 lakes lie in two groups about 40 kilometres apart in a basin where the wind has scooped out a depression some 50-80m below the surrounding sandstone plateau. They draw on a flow of underground water that maintains their level, with small seasonal variations, despite the extremely high evaporation from Lake Teli of 6 to 7.8m per year. The four western lakes of Ounianga Kebir are the hypersaline Lake Yoan (370 ha, 27m deep), Lake Uma, and two smaller lakes six kilometres to the south. The 14 lakes of Ounianga Serir including the large brackish Lake Teli (436 ha, 10m deep) extend over 8.5 kilometres from west to east in a remarkably parallel array. Separated by low wind streamlined ridges of ancient rock and recent sand dunes in the erosion furrows between, and driven by constant winds from the northeast, the lakes all taper towards the source of the invading sand which

is estimated to advance by two metres a year. They are partially covered with a carpet of floating reeds which reduces the rate of evaporation.

The lakes lie in the lee of a low plateau of Palaeozoic sandstone over which the winds circling the Tibesti mountains accelerate. These sweep sands from the north into the hollow where the aquifer is exposed in a long deflation basin which less than 10,000 years ago held a lake about 60 km long by 10-15 km wide under the low escarpment. The waters of the parallel lakes are hydrologically connected since the dunes between them allow groundwater to percolate. The strong evaporation from Lake Teli acts as a pump on a subterranean aquifer, drawing water into the other lakes of Ounianga Serir. This has resulted in the largest freshwater hydrological system known to exist in a hyperarid desert. The aquifer is described as fossil water but the intermittent rainfall on the Tibesti mountains 200 kilometres northwest may contribute. There are hot springs near Lake Yoan which also occur in the volcanic Tibesti.

This is a landscape striated by winds. The narrow ridges of rock aligned in the direction of the wind confine the dunes that invade the basin where the aquifer surfaces, breaking it into thin fingers of water. Visually the oases are remarkable for their bright wind-ruffled lakes fringed by sedge and half covered by carpets of intensely green reeds or light green algae in a dramatic setting of distant sand-brown mesas, cliffs and wind-sculpted rock. The varied chemical content of the waters turns them green, dark or light blue or red in the changing light, and with the lakeside vegetation makes for exceptionally beautiful desert scenery to which the present land uses contribute, and which viewpoints on outcrops overlooking the lakes make easy to view.

CLIMATE

The region has been humid in the past but since about 5,300 years ago has grown increasingly dry. Ounianga now lies in a hot and hyperarid desert where rainfall averages 2mm a year. Average maximum temperatures are 26°C-46°C and minimum temperatures 13°C-26°C. The lakes lie across the broad path between the Tibesti mountains and the Ennedi massif of violent winds from the north-northeast over half the year. These hot dust-bearing winds, like the west Saharan *harmattan*, part of the global pattern of winds, prevail for seven months, and blow strongly between late November and mid March.

VEGETATION

Most of the lakes are fringed with narrow stands of the sedge *Cyperus laevigatus* with common reed *Phragmites australis* and bulrush *Typha capensis.* The surface of most lakes is carpeted by the floating reed *Eragrostis bipinnata*. The phytoplankton is abundant but not well studied; a pondweed *Potamogeton* sp., water lily *Nymphaea* sp. and *Lemma* sp. grow in most of the lakes, and in some the common waterweed *Ruppia maritima.* In hypersaline Lake Yoan the only plant form is the floating macroalga spirulina *Arthrospira platensis* which turns the water light green and which near Lake Chad is cultivated for its protein content. The native doum palm *Hyphaene thebaica* has been largely supplanted by date palms *Phoenix dactylifera* which grow freely around the lakes.

FAUNA

The fauna, amphibia and invertebrates of the lakes have not yet been adequately studied. The mammals identified are Cape hare *Lepus capensis,* red fox *Vulpes vulpes*, fennec fox *V. zerda*, jackal *Canis aureus*, spotted hyena *Crocuta crocuta* and dorcas gazelle *Gazella dorcas.* Waterfowl seen in passing through Ounianga are white pelican *Pelicanus onocrotolus,* greater flamingo *Phoenocopterus roseus,* marbled teal *Marmaronetta angustirostris* (VU) and Cape teal *Anas capensis.* There are also wintering or migrant grey wagtail *Motacilla cinerea,* little stint *Calidris minuta,* Temminck's stint *C. temminckii,* African black swift *Apus barbatus*, and wheatears *Oenanthe* spp. Breeding birds include an unspecified falcon, owls, turtledove *Streptopelia roseogrisea*, blackcap *Sylva atricapilla*, chichaff *Phylloscopus collybita* and pied crow *Corvus albus*. Among the fish collected in Lake Teli are Nile perch *Lates niloticus* and unspecified carp and catfish, red jewel cichlid *Haplochromis bimaculatus* and the tilapid *Oreochromis galileus.* Salt-tolerant microorganisms exist in Lake Yoan. The nomination claims that only sixty years ago lions, leopard, oryx and addax were found in the area but have fallen to drought and hunting.

CONSERVATION VALUE

The Ounianga lakes lie in a remote unusually beautiful desert fringed by low hills. Despite a low rainfall of less than 2mm a year, in all the lakes bar one the water is constantly replenished and supports two fertile oases in the middle of a hyperarid desert with very high rates of evaporation. The complex is the world's largest known such phenomenon.

CULTURAL HERITAGE

The local people are largely Toubou (or Teda) a now muslim Nilotic people known to the Carthaginians and one of whose main centres is the Tibesti mountains. The Toubou are semi-nomadic camel herders by origin who once controlled the trade routes of east-central Sahara. They are also warriors from whom the most recent Chadian leaders have come, and employ other peoples to work their farmland. The sculpted rocks of the Ennedi plateau 200 kilometres southeast bear petroglyphs of gazelles, aurochs, camels and groups of horses racing as though on a raid *(razzia);* those of the Tibesti 200 kilometres northwest even depict elephant, rhinoceros and giraffe.

LOCAL HUMAN POPULATIONS

Ounianga Kebir near Lake Yoan had a population of about 9,000 in 2010 and lies in the buffer zone. It has a health centre, primary and high schools for 300 students, customs office, shops, accommodation and traditional restaurants. Ounianga Serir near Lake Teli, housed about 1,000 people in 2009 and has a primary school for 150 students and a health centre. Its people practice subsistence fishing. In 2000 the inhabitants of the two oases cultivated some 500,000 date palms of many varieties in groves of varying sizes. Rearing camels or mixed herds of camels, goats, sheep and cattle is an important occupation. There are small irrigated fruit and vegetable market gardens and from September to December, villagers harvest *kreep,* a wild grass appreciated as food. Other traditional sources of income are the collection of salt and soda from Lake Yoan.

VISITORS AND VISITOR FACILITIES

Some 200-600 tourists visit in groups organised by two tour operators who visit the main scenic features of northern Chad, the Tibesti mountains, the highest in the Sahara, the Ounianga lakes and the remarkable sculpted outcrops of the Ennedi plateau. They visit in October and April bringing their own camps. A few basic facilities are provided for travellers and traders on the route to Libya. Light aircraft access via an airstrip at Wadi Doum, 60 km west, may become possible.

SCIENTIFIC RESEARCH AND FACILITIES

A six year study by scientists have been made by the universities of Quebec, Ghent and Cologne of the muds of Lake Yoan to discover from their sediments the nature of the recent paleoclimate of the Sahara. The nearby laminated layers of sandstone have also been examined for fossils. Much of the nature and biodiversity of the area remains to be studied, especially the flora and fauna, the subterranean hydrological system and the nature of the African Humid Period between c.11,000 and c.5,300 years ago (de Menocal & Tierney 2012).

MANAGEMENT

The north and east boundary of the site follows the 450m escarpment contour line. The south boundary parallels it at about 410m to include both oases but excludes the village of Ounianga Kebir and its recent structures in a buffer zone. There is strong political support at national and local levels for the protection of the property which was designated a Natural Area by Decree in December 2010. The responsibility for its protection is vested in the Ministry of Culture. The designation protects the hydrological and scenic qualities of the property under Law 14-60 of 1960. The flora and fauna are protected under Law 14/PR/2008, the wetlands are protected by national Law 14/PR/98, and its integrity is safeguarded by recent Decree 630 requiring the preparation of an Environmental Impact Assessment for development projects, and Decree 095 passed to maintain traditional agricultural practices in the property instead of intensive agriculture.

Administration is by a Local Management Committee with a Technical Committee of experts. An operational site plan for 2010-2012 has been agreed, and a longer term management plan incorporating local input is to be ready by 2013 providing for adequate funding and staffing. It forbids mining and industrial farming and will regulate urban development, traffic, pollution and waste management, sustain sustainable agriculture, promote tourism and local and public awareness of the sites and maintain their visual quality. Several local associations created by the local government will be responsible for the conservation of the property. Regular monitoring of the flora and fauna, water quality, sedimentation, visitors and traffic will be provided for in the management plan.

MANAGEMENT CONSTRAINTS

Zoning for management mainly concerns development near Lake Yoan where new infrastructure has been built and the road to southeast Libya runs beside the lake. There is litter around both settlements and both discharge wastes into their lakes which need to be controlled. New buildings will be expected to blend with the surroundings. The use of the water for intensive farming is not permitted in the management plan but palisade rows of reeds and, behind them root-irrigated palms, are planted to halt sands advancing on the main lakes.

COMPARISON WITH SIMILAR SITES

There are two desert Saharan natural World Heritage properties where there are small permanent freshwater pools *(gueltas):* Tassili n'Ajjer and the Aïr mountains of the Aïr and Ténéré Reserves which however, like the Tibesti and Ennedi, feed permanent small pools from precipitation. There are ten other desert water bodies in six Saharan countries but all are either rain-fed, intermittent, depleted by overuse or salt. No other hyperarid hot desert lake system, whether in the Peruvian or Australian arid deserts, has been found comparable in size and in the persistence and volume of fresh water with the Ounianga lakes.

STAFF

A site manager is to be appointed. He will be supported by local authorities and by the Swiss Development Corporation which has long connection with the area. Local people will be recruited.

BUDGET

The government has set aside 120 million CFA (US$ 238,000) for 2012-2113 and will allocate a five-year budget for 2011-2116 on the basis of an annual expenditure of US$111,900. It is expected that in the future expenditure will be met from revenues.

LOCAL ADDRESSES

Le Ministre, Ministere de la Culture de la Jeunesse et des Sports, BP 931, N'Djaména, Tchad.

Secrétaire Général, Commission Nationale Tchadienne pour l'UNESCO.
http://www.patrimoine-mondiale-tchad.org

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