Ichkeul National Park

2020 Conservation Outlook Assessment

SITE INFORMATION
Country: Tunisia
Inscribed in: 1980
Criteria: (x)

The Ichkeul lake and wetland are a major stopover point for hundreds of thousands of migrating birds, such as ducks, geese, storks and pink flamingoes, who come to feed and nest there. Ichkeul is the last remaining lake in a chain that once extended across North Africa. © UNESCO

SUMMARY

2020 Conservation Outlook
Finalised on 02 Dec 2020

The Conservation Outlook for Ichkeul National Park is of significant concern considering that, although it was removed from the List of World Heritage in Danger in 2006 and the Montreux record in 2016, some threats remain of concern. Following the water supply crisis of the 1990s and early 2000s, and thanks in part to unusually rich rainfalls in 2003-08, and to adaptive measures as downstream flow regulation, Lake Ichkeul has recovered a significant part of its outstanding value as a waterbird wintering and breeding site and as one of the last intact examples of freshwater lakes along the southern Mediterranean. However, while the hydrological status of the site has improved over the last 15 years, the site remains vulnerable with regards to its hydrological management and the recovery of its values could be reversed by a series of low-precipitation seasons and due to the rising demand on drinking and irrigation water. Since the sustainable development of this ecosystem cannot rely on favourable weather conditions alone and given that drier seasons will be more likely in the future in this region due to climate change, there remains the need to fully mainstream conservation of the national park into sustainable water resource management (and more particularly in relation to the construction and management of dams in the catchment area) and strengthen the governance and institutional arrangement, local support and management (including effective monitoring) of Ichkeul National Park.
FULL ASSESSMENT

Description of values

Values

World Heritage values

► Last great freshwater lake of a chain that once stretched the length of North Africa with diverse vegetation

Lake Ichkeul is the last great freshwater lake of a chain that once stretched the length of North Africa. Characterised by a very specific hydrological functioning based on a double seasonal alternance of water levels and salinity, the lake and the surrounding marshes constitute an indispensable stop-over for the hundreds of thousands of migratory birds that winter at Ichkeul (World Heritage Committee, 2010). Its diverse vegetation includes complex assemblage of reeds, tamarisks, submerged macrophytes, cord grasses, bulrush, and halophytes, typical for coastal lakes along the southern Mediterranean (UNEP-WCMC, 2012).

► Waterbirds of global conservation concern

Species of worldwide interest for their protection (e.g. the white-headed duck (Oxyura leucocephala), the ferruginous duck (Aythya nyroca) and the marbled duck (Marmaronetta angustirostris) are present in the area (World Heritage Committee, 2010).

► Essential wintering area for palaearctic waterfowl

Ichkeul National Park contains important natural habitats as an essential wintering site for western Palaearctic birds. Each winter, the property provides shelter to an exceptional density of water fowl with, in certain years, numbers reaching more than 300,000 ducks, geese and coots at the same time (World Heritage Committee, 2010). It is one of the four top wintering sites in the western Mediterranean at that time (UNEP-WCMC, 2012).

Other important biodiversity values

► Rich fish fauna

The Lake supports a rich fish fauna including eels, mullet, sole, sea bass, barbel, and seahorses (Ramsar, 2012).

Assessment information

Threats

Current Threats

By far the greatest pressure on Ichkeul National Park has been insufficient water supply due to dam construction, leading to increased salinization, partial desiccation and shifts in the vegetation to halophytic forms of low food value to waterbirds. Since 2004, activities aimed at hydrological management have contributed to reducing this threat to a certain extent. However, the rise in local demand of drinking and irrigation water added to the recent construction of the two last dams in the Ickeul basin (Melah and Douimis) is affecting the water inputs into the lake, contributing to a dramatic imbalance in the lake’s ecosystem. Other current threats include poaching and a growing concern over
livestock grazing.

**Erosion and Siltation/ Deposition**  
*Low Threat*  
*Inside site, extent of threat not known*

Although anthropogenic disturbance in the catchment has occurred since at least Roman times, more recent river canalization, installations of dams on inflow rivers and agricultural intensification have had profound effects on the lake's hydrology, water quality and biodiversity (i.e. bird populations). Annual water inputs into Ichkeul Lake are partially controlled by the management of dams, but are still governed largely by precipitation and unregulated runoff from the catchment, with very large interannual variability. Internal redistribution of sediments plays an important role in the sedimentary dynamics of this shallow wind-stressed lake (Trabelsi et al., 2012). The accumulation of sediments on the lake bottom and in the marshes accentuates the level of risk of flooding, at the time of floods, of the infrastructures of the city of Mateur and agricultural land of the plain (Daly-Hassen, 2017). Nowadays, the lack of rainfall in winter and autumn increases the sedimentation danger at the site, which leads to the fluctuation of the lake's water level and salinity throughout the year (Ouni et al., 2019). There is visible but spatially limited siltation (over less than 2% of the surface of the lake) immediately upstream of the Tinja lock (the lock is a brake on the evacuation of sediment in Wadi Tinja especially during periods when the sluice gates are more or less closed to retain fresh water until spring). The degree of impact of sedimentation on the lake and management requirements requires further clarification (IUCN Consultation, 2020).

**Hunting and trapping, Fishing / Harvesting Aquatic Resources**  
*Low Threat*  
*Inside site, extent of threat not known*  
*Outside site*

Poaching was considered a threat in 2004 and (to a lesser degree) in 2008. In 2008, hunting was permitted in the periphery of the site and illegal fishing was considered a significant but manageable problem (GOPA, 2008; UNEP-WCMC, 2012). Since 2011, day and night poaching inside the park has steadily increased and a lack of capacity of park management and surveillance team, in particular the lack of specially trained personnel in anti-poaching, means that this is a growing problem for the birdlife that frequents the park. Poaching inside the park includes a Greylag Goose from Hungary tracked via GPS (IUCN Consultation, 2020). There are concerns that insufficient fishing management has disturbed the balance of the lake's ichthyofauna and diminished the food resources of piscivorous species, especially water birds (IUCN Consultation, 2020).

**Dams/ Water Management or Use**  
*High Threat*  
*Inside site, throughout(>50%)*  
*Outside site*

From 1996 to 2006, the site was included on the List of World Heritage in Danger because of damming, resulting in salinization and consequent degradation of vegetation (World Heritage Committee, 1996, 2006). Reduction of water inflow, from 350 to 230-270 million m3 following dam construction leading salinity to increase to 73 g/l, lead to a shift in vegetation to halophytes and a dramatic reduction in waterbird numbers (Baccar et al., 2000). Exceptionally abundant rainfall in 2002/03-2004/05 winters replenished the water resources of the lake and contributed to desalinization to acceptable levels (UNESCO, 2004, 2005). This replenished the water table and reduced salinity to 5-6 g/l, resulting in partial ecosystem recovery, but the threat from potentially insufficient water input remained. A positive trend was maintained through downstream flow regulations by Tinja sluice management since 2003/04 (UNESCO, 2007, 2008). In response to this positive trend, the site was removed from the List of World Heritage in Danger in 2006. Nevertheless, from 2002/03 to 2008/09, the site experienced highly fluctuating total water inflow between 59 and 535 million m3 (average 257 millions m3), the contribution of dam releases to these inflows having itself fluctuated between 6 and 345 million m3 (average 140 million m3) (IUCN Consultation, 2020; UNESCO, 2010). Declining water levels during dry years threatens aquatic fauna, including the European eel (UNESCO, 2017). Between the hydrological years 1999/2000 and 2016/17, the total storage capacity of the dams increased from 279 to 383 Mm3, representing a 37% increase. However, over the same period this growth in capacity was accompanied by a 149% rise in local water demand: drinking water for the Supply and Distribution of Water of Bizerte,
water for the irrigated area of the basin, and water destined for transfer outside the Ichkeul basin. The reduced inflows to the dams (particularly in the seasons 2015/16 and 2016/17, which was 89 Mm3 and 124 Mm3, respectively) combined with an apparently irrepressible demand for water in the south meant almost no releases were made into Lake Ichkeul (2.4 Mm3 in 2015/16 and 1.7 Mm3 in 2016/17, which were in fact leaks). This led to a dramatic imbalance in the lake’s ecosystem (Ben Fraj et al., 2019). Between 2017 and 2019, an increase in annual precipitation levels (respectively 797 and 682 mm/yr at Tinja station) led to limited water salinity (IUCN Consultation, 2020).

**Livestock Farming / Grazing**

*Low Threat*

| Inside site, scattered (5-15%) | Outside site |

Until 2004, 1,000 people were living inside the site (UNEP-WCMC, 2012), however this number decreased to 400 people by 2008. More recent figures are unavailable. In 2008, overgrazing was considered the most serious at Jebel Ichkeul, but in general the site is little used for this type of activity (GOPA, 2008). However concerns are being expressed that, since 2011, overgrazing is becoming a growing threat to the Ichkeul marshes, particularly illegal grazing and overgrazing in the Joumine marshes where cattle (cattle, sheep and goats) are transported from distant areas to be freed within the park and specifically in these swamps, resulting in degradation of vegetation cover and risk of erosion, as well as the potential mobilization of nutrients which risks increasing eutrophication of the lake and consequential increased sedimentation of organic matter and siltation (IUCN Consultation, 2020).

**Potential Threats**

*High Threat*

Priority given to the use of drinking and irrigation water needs combined with the likelihood of increased droughts and sea level rise due to climate change can potentially affect the hydrological variability and further strain the Ichkeul ecosystem. Nutrient load entering the system may become an issue if the use of fertilizer in agricultural fields in the site's surroundings continues to increase.

**Habitat Shifting/ Alteration, Droughts, Temperature extremes**

*High Threat*

| Inside site, throughout (>50%) | Outside site |

Drought episodes are likely to be more frequent in the future due to climate change (Ben Fraj et al., 2019). Furthermore, the predicted sea level rise may impact the balance level between the outflow and inflow of Oued Tinja, which will likely lead among other things to longer periods of seawater inflow into Lake Ichkeul (IUCN Consultation, 2020).

**Agricultural effluents**

*Low Threat*

| Inside site, localised (<5%) | Outside site |

An increased area outside the site devoted to cereal crops, accompanied by an increase in applied fertilizer, impact on the nitrate concentrations in the surface water. Nitrate load reached 14.5-17.5 kg/ha in some parts of the Joumine Basin of the Park (Aouissi et al., 2014).

**Overall assessment of threats**

*High Threat*

By far the greatest pressure on Ichkeul National Park has been insufficient water supply due to dam construction, leading to increased salinization, partial desiccation and shifts in the vegetation to halophytic forms of low food value to waterbirds. Since 2004, activities aimed at hydrological management have contributed to reducing this pressure. However, the rise in water demand for drinking and irrigation and its priority status on the ecosystem needs on water is opposing these efforts. This, combined with the effects of climate change, can further strain the Ichkeul ecosystem. Secondary pressures and potential threats to the park’s values are livestock overgrazing, poaching and increasing use of fertilizers; however, some of these have been decreasing.
Assessing Protection and Management

▶ Management system

The first management plan for the site was approved in 1977. A need to update the management plan has been reiterated since 2000 (Baccar et al., 2004). A GEF supported management planning project ($2.2 million, including hydrological management) was implemented in 2003-2008. A Scientific Management Council was established in 2007. A draft 5-year participatory management plan (GEF project output) was finalized in 2008 (GOPA, 2008). This draft management plan aimed at sustainable hydrological management, zoning, conservation management, institutional strengthening, staff development, monitoring, participation and local community development and ecotourism development. Complex responsibilities, inter-institutional conflict and lack of mainstreaming remained a challenge to the management of Ichkeul National Park (UNEP-WCMC, 2012). A new management plan is being developed (IUCN Consultation, 2020), that aims to strengthen the overall governance and management of the national park and in particular to strengthen efforts to improve hydrological management. However, there is no detailed information available on how the development of the management plan is progressing nor when it will be finalised.

▶ Effectiveness of management system

Although not expressed in terms of a formal management effectiveness assessment, a lack of effectiveness of the overall management framework of the park has been highlighted at various occasions in the past (e.g. GOPA, 2008; UNESCO, 2007, 2010; IUCN, 2017). Key issues have been lack of autonomy and authority and resources of the management authority. There has reportedly been progress in creating an autonomous management structure, contributing and thus increasing overall management effectiveness (Ministry of the Environment and Sustainable Development, 2010), but no more recent information is available. Management actions have improved the ecological status of Ichkeul, leading to its withdrawal from the List of World Heritage in Danger in 2006, and removal from the Montreux Record of the Ramsar Convention in 2016.

▶ Boundaries

Boundaries and zoning (including core, buffer, and peripheral zones) of Ichkeul National Park are mapped in the draft Management Plan 2008 (GOPA, 2008). Some fences were installed to protect the core zone by 2010. Boundaries and zoning are likely to be adequate if implemented and respected by all stakeholders, however various confusions remain (IUCN Consultation, 2020).

▶ Integration into regional and national planning systems

In 2016, the Directorate General of Forests (DGF) stated that special attention would be given to Ichkeul at the national level. This could lead to improvement in the level of integration. The integration of the site management at the regional level should be considered a priority especially in terms of governance and sustainable water management (especially in relation to dam construction and management) in the future management plan (IUCN Consultation, 2020) but no details are available to date.

▶ Relationships with local people

In 2008 there were around 400 persons living on southern Jebel Ichkeul (GOPA, 2008). Locals reportedly felt disenfranchised after the creation of Ichkeul National Park because of a loss of economic opportunities and livelihoods (grazing, timber, fish). Poor communication with farmers around the park and little involvement was noted in 2008. Community livelihood projects and public outreach and information campaigns were implemented until 2010 (UNESCO, 2010). Agenda 21 process for participative environmental management in the national park area was initiated in 2008. Areas for sustainable natural resource use were foreseen in the 2008 draft management plan, as compensation areas for local communities (GOPA, 2008). The Ichkeul National Park Management Committee includes
members from the local community and other stakeholders, enabling local people to capitalize on tourism and increase their incomes (Ramsar, 2012). Locals have been trained as guides and participated in credit schemes initiated by the Park. Increased participation of local communities in the management of the site should be addressed in the future Management Plan (IUCN Consultation, 2020).

### Legal framework

Ichkeul was recognized as a UNESCO Biosphere Reserve in 1977 and has National Park status since 1980. Its administration is not independent but falls under the Regional Commissariat for Agricultural Development/Department of Forestry Bizerte and other State institutions (UNEP-WCMC, 2012). A need for a clearer institutional set-up, mandate and strengthening of the park's administration has been noted several times since 2000 (Baccar et al., 2000), and corresponding steps were carried out in 2007 (Ministry of the Environment and Sustainable Development, 2010). A step-wise establishment of an autonomous, permanent management authority has been ongoing since 2010 (UNESCO, 2010). No recent information is provided.

### Law enforcement

A limited staff capacity was noted in 2004 and 2008, with only 38 staff in 2008, among them 25 guards. Additional enforcement infrastructure and equipment were planned for in 2008 (GOPA, 2008). No recent information is provided.

### Implementation of Committee decisions and recommendations

At its 27th Session (2003), the World Heritage Committee requested the State Party to make a commitment to ensure the provision of 80-100 million m³/yr of water to the lake. Water allocation in 2006/07 was unclear and a request to commit to minimum allocation was renewed at the 30th Session (UNESCO, 2006). The water supply management on a year-to-year basis was discussed by the Committee in 2006, at which time the site was removed from the List of World Heritage in Danger, but without a formal commitment (World Heritage Committee, 2006). Establishment of a participatory management plan and permanent/independent management authority for the site was requested between 27COM and 30COM, and a draft plan submitted at 32COM (UNESCO, 2008). Steps to strengthen and clarify the role of the Ichkeul National Park Administration were undertaken in 2007-09, and were still ongoing by 34COM (UNESCO, 2010). The Committee's request at 30COM (2006) to launch Agenda 21 Committee in the Ichkeul National Park area was met by 32COM (2008) (UNESCO, 2010). At 34COM (2010) the Committee requested the State Party to submit EIAs for three additional dams and to use these dams to ensure water supply to the lake (World Heritage Committee, 2010); progress made in the implementation of this request is thus far unclear. Due to the lack of a formal commitment to ensure minimum water inflows to the lake, some concern remains about the implementation of Committee decisions and recommendations. The site was last considered by the Committee in 2010.

### Sustainable use

In 2008, the lake was reported as being used legally for fishing by one concession holder (GOPA, 2008). Whilst fishing may have had an impact on the fish community in the lake, this appears to have been altered primarily because of hydrological changes (Sellami et al., 2010). At the same time, whilst hunting and grazing were reported as officially illegal in the park (UNEP-WCMC, 2012), some livestock entered the site from its periphery, and some poaching persisted (GOPA, 2008). The 2010-2014 management plan included a community development plan with measures to support sustainable alternative livelihoods (e.g. beekeeping, agricultural improvement outside the site, micro-credits) of the local population (Ministry of the Environment and Sustainable Development, 2010). However, since 2011 illegal activities have been increasing, in particular the overgrazing of marshes which is a growing source of concern (IUCN Consultation, 2020).

### Sustainable finance

In the past, sustainable financing has been considered to be insufficient: i.e. in 2004 the annual budget (excluding project funds) of ca. $11,600 was considered insufficient. In 2008 the required annual budget
IUCN World Heritage Outlook: https://worldheritageoutlook.iucn.org/

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was defined (GOPA, 2008) - at this time no independent budget was provided and the site depended instead on allocations from the budget of the Directory of Forestry Bizerte. The site has received support from a GEF project and various donors in the past, e.g. WWF for a monitoring workshop ($50,000, UNEP-WCMC, 2012). A total World Heritage Fund assistance of $140,000 was provided between 1981 and 2002 (World Heritage Committee, 2013). No recent information is provided, so it is unclear whether funding is currently sufficient.

▶ **Staff capacity, training, and development**

Some Concern

A limited staff capacity was noted in 2004 and 2008, with only 38 staff in 2008, among them 25 guards. Additional enforcement infrastructure and equipment were planned for in 2008 (GOPA, 2008). Room for improvement of staff number and qualification, as well as measures to address this were noted in the 2010-2014 management plan of the site (GOPA, 2008). While this is partly addressed in the most recent Management Plan, there is still a real need to improve staff capacity and its qualification (IUCN Consultation, 2020).

▶ **Education and interpretation programs**

Data Deficient

In 2010, the State Party reported a number of education and interpretation activities including school visits, television commercials, the production of guides to this and other parks, and workshops (Ministry of the Environment and Sustainable Development, 2010). The 2010-2014 management plan also included measures to raise awareness, particularly in relation to key threats like poaching (GOPA, 2008). No recent information is provided.

▶ **Tourism and visitation management**

Some Concern

Establishment of some visitor interpretation facilities (network of trails, museum/visitor centre) has been ongoing since 1989 (UNEP-WCMC, 2012). Extended use of the tourism potential of the site, aimed at improving living conditions of local populations, was included in the draft management plan of 2008, and some facilities were rehabilitated in 2009 and more recently (IUCN Consultation, 2020). Between 2005 and 2012, tourist numbers doubled to around 50,000 per year (Ramsar 2012). More recent figures are not available.

▶ **Monitoring**

Mostly Effective

There has been a waterfowl monitoring programme with international collaboration since 1963 (UNEP-WCMC, 2012). A 5-year hydrological monitoring programme was developed with the World Heritage Centre and IUCN in 1999. A need for a systematic monitoring programme was noted in 2000 (Baccar et al., 2000). Such a monitoring programme was developed jointly with IUCN in 2002 and implemented by ANPE (Ministry of Environment) and remains ongoing since (IUCN, 2017). Some reports were published afterwards (Ministry of the Environment and Sustainable Development, 2009) such as annual monitoring reports between 2002 and 2008 and a five-year report for the period 2009-2014 (IUCN Consultation, 2020). The need for centralized storage of scientific and monitoring data (including bird data) was noted in 2008 (UNESCO, 2008). Some steps in this direction started in 2009/10 (Ministry of the Environment and Sustainable Development, 2010).

▶ **Research**

Mostly Effective

Considerable ornithological and ecological research has been carried out at Ichkeul (UNEP-WCMC, 2012). Since 2002, dozens of research projects have been and are continuing to be carried out within the framework of masters and theses programs, through collaborations between ANPE and several universities on a wide range of topics related to Ichkeul (IUCN Consultation, 2020). Other work like hydrological impacts of agriculture (Aouissi et al., 2014) has been carried out within projects such as by Wetlands International.

**Overall assessment of protection and management**

Some Concern

Significant efforts aimed at hydrological management of Ichkeul National Park have contributed to its
recovery since 2004. At the same time, there is still no sufficiently broad consensus, adequate institutional setup and strong local participation for the sustainable long-term management of the site. A new Management Plan is currently being developed to take into account these issues (IUCN Consultation, 2020), however this remains to be finalised and implemented. The strong priority given to the drinking and irrigation needs at a large-scale level does not adequately address the needs of the local population and the ecosystem, thus jeopardizing the long-term conservation of the property (IUCN Consultation, 2020).

Assessment of the effectiveness of protection and management in addressing threats outside the site

Some Concern

Dams were erected in 1983 and 1995 for irrigation and drinking water provision in spite of objectives of the 1977 management plan. As a mitigation measure, Oued Tindja sluice was established in 1996 (Baccar et al., 2000) and rehabilitated between 2002-2003. Some additional hydrological mitigation measures had been established by 2002. A hydrological model was developed in 1996 to guide hydrological management in a sustainable way (see Ministry of the Environment and Sustainable Development, 2010). It was updated (data and software) in 2004 by ANPE (IUCN Consultation, 2020). Proactive hydrological management and planned water provision, based on the hydrological model results, were first tested in 2006/07 with satisfactory success (UNESCO, 2008). However, the model is in need of updating in order to take into account the new dams and recent rainfall data (IUCN Consultation, 2020). A project on integrated water resource management started in 2009 (Wetlands International, 2013b).

State and trend of values

Assessing the current state and trend of values

World Heritage values

Last great freshwater lake of a chain that once stretched the length of North Africa with diverse vegetation

Low Concern
Trend:Data Deficient

In past decades, the vegetation of the area was strongly altered/degraded following a shift in species composition in response to salinization (Baccar et al., 2000), including the reduction of ecologically crucial Potamogeton submerged macrophyte area from 3,000 to 500 ha in 1989. Since 2003 the area has been recovering and re-appearance of reed beds has been observed since 2007 (Ministry of the Environment and Sustainable Development, 2009). Increases in the release of water from upstream dams and successful regulation of seawater inflows led to a 66% reduction in lake salinity (UNEP-WCMC, 2012). Overall, there has been in positive trend in recent years thanks to increased precipitation. However, the recent decline of water inputs (due to drought periods, construction of the two last dams) could lead again to a rapid increase of water salinity (IUCN Consultation, 2020).

Waterbirds of global conservation concern

Low Concern
Trend:Stable

Limited recent information is available on the status of breeding (as opposed to migratory) waterbirds although a general recovery of their populations has also been reported (Ministry of the Environment and Sustainable Development, 2009). Over 2019, 70,000 migratory birds have been observed in the site (IUCN Consultation, 2020).

Essential wintering area for palearctic waterfowl

High Concern
Trend:Deteriorating

Abundances were reduced to 25-50% of original numbers by 2000 and shifts in community structure were noticed (Baccar et al., 2000, Hamdi et al., 2012). There has been a significant reduction of Greylag Geese (Anser anser) numbers (Hamdi et al., 2008). The avifauna remains sensitive to the hydrological
state of site. 70,000 migratory birds have been observed in the site over 2019 (IUCN Consultation, 2020). However, the annual long-term winter counts of waterbirds in Ichkeul National Park by AAO/BirdLife in Tunisia show a significant decline in the number of birds that remain in the Park over winter between 2008 (297,617 birds recorded) and 2020 (5,662 birds). Although initially considered to be a possible change in migratory patterns, it appears that the birds arrive in Ichkeul in an autumn migration, but then move on to overwinter in other sites (IUCN Consultation, 2020).

### Summary of the Values

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<thead>
<tr>
<th>Assessment of the current state and trend of World Heritage values</th>
<th>Low Concern</th>
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<tbody>
<tr>
<td>Trend: Improving</td>
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Starting in the early 1990's, critically reduced water supply threatened the integrity of Ichkeul National Park. Since 2004, the situation has improved, partly due to increased precipitation and partly thanks to the improved hydrological management, helping maintaining the values of the site. The effects of this recovery have been sustained through sluice downstream flow regulation, even during the low-precipitation season 2007/08. However, this could be reversed in future by a series of several consecutive low-precipitation seasons due to climate change, by the construction of the two last dams, and the rise in the demand for drinking and irrigation water, or as a consequence of a relaxation of the current hydrological management regime of the site. Concerns also exist with regards to the numbers of breeding and overwintering waterbirds, which have been reported to continue to decline.

<table>
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<tr>
<th>Assessment of the current state and trend of other important biodiversity values</th>
<th>Data Deficient</th>
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<td>Trend: Data Deficient</td>
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There is insufficient data available on the status and trend of Lake Ichkeul's fish fauna.

### Additional information

### Benefits

#### Understanding Benefits

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<th>Direct employment</th>
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<td>The site provides direct jobs in park management (e.g. rangers, guides), and more additional jobs (e.g. in fishery, tourism) depend on it.</td>
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<th>Fishing areas and conservation of fish stocks, Traditional agriculture, Livestock grazing areas</th>
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<tr>
<td>Ichkeul National Park sustains a small licensed fishery, and fishing and grazing are considered to be of some of the most important benefits for the Park (IUCN, 2017).</td>
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Cereal culture occupies more than 70% of the Joumine basin (the most important basin of the Ichkeul Lake watershed), winter wheat is grown throughout the park, and sunflowers and oats are also grown (Aouissi et al., 2014).

The increase of area devoted to cereal crops, accompanied by increase in applied fertilizer amounts, has an impact on the nitrate concentrations in surface water (Aouissi et al 2014).

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<th>Outdoor recreation and tourism</th>
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<td>The site has a considerable, as yet underused potential for nature based tourism, such as birding tours.</td>
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Importance for research

Ichkeul National Park comprises a wide range of phenomena, which in turn support global knowledge generation on shallow lagoon ecosystem dynamics, bird migration, and ichthyology.

Contribution to education

The site has a potential to support increased environmental education at the local, regional and national level.

Soil stabilisation,
Flood prevention,
Water provision (importance for water quantity and quality)

The most important ecosystem services provided by the Park are flood protection, groundwater recharge, and sediment retention (Daly-Hassen, 2017).

Tourism-related income,
Provision of jobs

Local people are trained as tour guides and residents sell produce to visitors (Ramsar, 2012). The value of regulatory services accounts for the majority of profit (73%), followed by supply services (18%), and cultural services (9%) (Daly-Hassen, 2017).

Summary of benefits

The conservation benefits of Ichkeul National Park reach beyond its boundaries, as illustrated by its role in bird migration. There are also significant potential benefits, which could be developed further, such as those related to tourism and education. The most important benefits are related to environmental services, grazing, recreation, and fishing (IUCN, 2017).

Projects

Compilation of active conservation projects

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<tr>
<th>№</th>
<th>Organization</th>
<th>Brief description of Active Projects</th>
<th>Website</th>
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<tbody>
<tr>
<td>1</td>
<td>Wetlands International</td>
<td>Integrated water management and biodiversity conservation</td>
<td><a href="http://www.wetlands.org">http://www.wetlands.org</a></td>
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