

# Lake Turkana National Parks

## 2020 Conservation Outlook Assessment

### SITE INFORMATION

**Country:** Kenya

**Inscribed in:** 1997

**Criteria:** (viii) (x)



The most saline of Africa's large lakes, Turkana is an outstanding laboratory for the study of plant and animal communities. The three National Parks serve as a stopover for migrant waterfowl and are major breeding grounds for the Nile crocodile, hippopotamus and a variety of venomous snakes. The Koobi Fora deposits, rich in mammalian, molluscan and other fossil remains, have contributed more to the understanding of paleo-environments than any other site on the continent. © UNESCO

### SUMMARY

#### 2020 Conservation Outlook

Finalised on 01 Dec 2020

**CRITICAL**

Lake Turkana's unique qualities as a large lake in a desert environment are under threat as the demands for water for development escalate and the financial capital to build major dams becomes available. Historically, the lake's level has been subject to natural fluctuations in response to the vicissitudes of climate, with the inflow of water broadly matching the amount lost through evaporation (as the lake basin has no outflow). The lake's major source of water, Ethiopia's Omo River is being developed with a series of major hydropower dams and irrigated agricultural schemes, in particular sugar and other crop plantations. These commercial sugar plantations, located upstream of the Omo Delta, are now partly under plantation and will have an impact on Lake Turkana. Apart from the hydrological impact of these major changes, there are numerous challenges at the site management level, with wildlife populations in decline as a result of increasing human population pressure, extreme poverty, lack of infrastructure investment, poaching pressure, over-grazing by domestic stock and habitat change associated with the receding shore-line. Increased levels of investment in site management and monitoring activities of environmental impacts on Lake Turkana are clearly required. The cumulative impacts from all of these factors pose considerable threat to the conservation outlook of this site.

## FULL ASSESSMENT

### Description of values

#### Values

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##### World Heritage values

###### ► Fossil deposits

Criterion:(viii)

Fossil deposits at Koobi Fora (in Sibiloi National Park) include pre-human, mammalian, molluscan and other fossils that have contributed more to the understanding of human ancestry and palaeo-environments than any other site in Africa (World Heritage Committee, 2012). The fossil remains include a petrified forest thought to have grown seven million years ago (when the area was much wetter than it is today), together with a great diversity of extinct fauna including giant tortoise, crocodile, behemoth mammoth, rhinos, otters and hippos (UNEP-WCMC, 2012). The complexity of the fossil record enables the reconstruction of palaeo-environments dating back four million years (World Heritage Committee, 2012). Five species of hominid fossil have been discovered including the earliest of the australopithecines, *Australopithecus anamensis*, estimated to be 3.8-4.2 million years old (World Heritage Committee, 2012; Hilton-Barber and Berger, 2002).

###### ► Complex of geological features

Criterion:(vii)

Lake Turkana is Africa's fourth largest lake and the most saline of these four (World Heritage Committee, 2012). It is situated in a semi-desert environment, characterized by recent volcanic, erosional and sedimentary land forms. The area's main geological features stem from the Pliocene and Holocene periods (from four million to 10,000 years ago). The World Heritage property (1,615 km<sup>2</sup>) covers three separate National Parks - Sibiloi (on the north-eastern shores of the lake), Central and South Islands, together with an aquatic zone stretching 1 km into the lake. These three areas encompass this diversity of geological features, including extensive sedimentary deposits, volcanic features and geological faulting (World Heritage Committee, 2012).

###### ► Diversity of aquatic and lakeshore habitats in a semi-desert environment

Criterion:(x)

The parks include a great diversity of aquatic, shoreline and semi-desert terrestrial habitats (UNEP-WCMC, 2012). The waters of the lake are 2.5 times saltier than the normal maximum limit of drinking water, but although the lake water is consumed by humans and livestock in the absence of alternative potable sources, the water contains levels of fluoride that are far in excess of acceptable drinking levels, and are hazardous, causing skeletal fluorosis, a crippling disease that is widely seen amongst people living along the lakeshore (AfDB, 2010; University of Oxford, 2012). The lake supports a diversity of freshwater fish species and, where suitable muddy substrate exists, beds of submerged aquatic macrophytes (*Potamogeton pectinatus*) and shoreline grasses (UNEP-WCMC, 2012). The lakeshore substrates vary from rock to pebble, sand and mud (Birdlife, 2012), while terrestrial habitats include Acacia savannas, Commiphora bushlands, grassy plains, rocky ridges and groves of desert date and doum palms (World Heritage Committee, 2012). A wildlife census with the latest data is foreseen after finalization of the park's Management Plan (States Parties of Kenya and Ethiopia, 2016).

###### ► Diversity and abundance of birds

Criterion:(x)

Lake Turkana is an internationally recognized Important Bird Area (Birdlife, 2012), with, according to the latest available data, 84 water bird species, including 34 Palearctic migrants (for which it serves as an important flyway and stop-over site for birds on passage). More than 10% of the entire East African/South East Asian population of Little Stints (more than 100,000 individuals) may winter here. At least ten regionally threatened species of birds breed, including African skimmer (UNEP-WCMC, 2012). Lesser flamingoes also pass through, feeding on the small saline lakes that characterise parts of the lak.

A wildlife census with the latest data is foreseen after finalization of the park's Management Plan (States Parties of Kenya and Ethiopia, 2016).

► **Rare and endangered fauna**

**Criterion:(x)**

According to historic data the lake supported the world's largest colony of Nile crocodile (World Heritage Committee, 2012), with an estimated population of 14,000 individuals breeding on Central Island (in 1968; BirdLife, 2012). Recent field observations suggest the crocodile population is a fraction of the size it once was due to increasing anthropogenic pressures (EAWLS, 2014). Rare, endangered and recent extinct mammals include hippopotamus, wild dog, lion, cheetah, reticulated giraffe, Grevy's zebra and Lelwel hartebeest (UNEP-WCMC, 2012). A wildlife census with the latest data is foreseen after finalisation of the park's Management Plan (States Parties of Kenya and Ethiopia, 2016).

► **Endemic species of fish**

**Criterion:(x)**

According to the latest available data, the lake supports over 60 species of freshwater fish, including eleven endemic species (FishBase, 2017). A wildlife census with the latest data is foreseen after finalization of the park's Management Plan (States Parties of Kenya and Ethiopia, 2016).

## Assessment information

### Threats

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#### Current Threats

**Very High Threat**

The inflowing rivers are being progressively dammed and an ever-increasing amount of the water that used to flow into the lake is being used upstream for hydropower, irrigation and other purposes. The interaction of climate change and periods of drought with other factors such as water regimes, governance, environmental degradation and land use makes Lake Turkana a very vulnerable trans-boundary ecosystem. Over-grazing, poaching, over-fishing and tree-cutting all enhance the potential of conflicts between local inhabitants of the region. The cumulative impact of all these threats, especially the impacts of the different uses of the water sources, are likely to significantly affect the the site.

► **Dams/ Water Management or Use**

**Very High Threat**

*(Damming of inflowing rivers and upstream use of waters)*

Inside site, throughout(>50%)  
Outside site

Ethiopia's Omo River accounts for over 80% of the inflow to Kenya's Lake Turkana where the World Heritage site is located. The river hydrology is being transformed through the progressive construction of a cascade of five hydropower dam projects, named Gibe I to V. Gibe III is the latest to be inaugurated (December 2016). Work on Gibe IV (Koysha) is in progress (JGLR, 2018), currently scheduled for completion in 2023. Water that used to flow naturally into the lake is being impounded with river discharges regulated according to hydropower generation requirements (AfDB, 2009; UNESCO/IUCN, 2015; KWS/NMK, 2019). River water is also increasingly abstracted for irrigation and other uses (AfDB, 2009 & 2010a; SOC, 2012; Univ. of Oxford, 2012 & 2013; JGLR, 2018; KWS/NMK, 2019; RRA, 2019). The Omo-Gibe Master Plan itself warned that the flow of Ethiopia's Omo River should not be altered without a bilateral agreement between Ethiopia and Kenya, (OGBMP, 1996; reviewed by AfDB, 2009 & Univ. of Oxford, 2012; EIB, 2010).

Two main aspects of concern of the effect on the 'Outstanding Universal Value' (OUV) of the site have previously been reported: 1) The impacts on the lake ecology of dampened flow variations including loss of the all-important annual flood season (AfDB 2009 & 2010a; EIB, 2010; Univ. of Oxford 2012 & 2013; SOC, 2015; JGLR, 2018); 2) The increased irrigation abstractions that are being developed downstream to exploit the regulated flows from Gibe III and IV that will reduce freshwater inflow to the lake (ibid.).

As had been predicted, the lake level dropped two metres during the two-year filling of the Gibe III reservoir (JGLR, 2018). Whilst this fall in lake level has been claimed to be within the lake's natural fluctuation range, it has been demonstrated that without the Gibe III filling, the lake's natural response

would otherwise have been to rise (ibid.). Models predict yields will decrease by up to two thirds, with fisheries potentially collapsing (EH, 2017).

The Gibe III and IV reservoirs will trap sediments and nutrients that would otherwise flow to the lake, changing the flooding regime of the river downstream, altering the nutrient scouring effects of the river, and impacting the replenishment of oxbows and other natural depressions that would otherwise be inundated by floodwaters that recharge the underlying aquifers. Furthermore, the reduction of freshwater inflows to the lake will lead to an increase in lake salinity and decrease in lake primary productivity, with potential catastrophic ecological consequences for the lake (Kenya JICA/NWMP, 1992; RRA 2019).

The major irrigated agricultural developments have notably included the Ethiopian government's Kuraz Sugar Development Project, originally planning 245,000 ha, but now 100,000 ha and privatised (JCAS, 2020) on land annexed along the Omo river from two national parks and a wildlife reserve. There are also areas being developed downstream for large-scale cotton production by private developers. The plantations along the river were however believed to have limited impact on the OUV of the site in 2015 (UNESCO/IUCN, 2015). According to Ethiopia, the Kuraz sugar scheme will use 4-6% of the river flow of the Omo River for irrigation purposes once the whole sugar scheme is in operation (SOC, 2015). Predictions of other sources however have been much less conservative, suggesting severe potential danger to the OUV, depending on the full extent of abstractions (JGLR, 2018). The draft EIA for the Kuraz project dated 2012 stated that 29% of the river water would be abstracted under full operation. In the later Kuraz feasibility report dated December 2014, it was stated that 18% of the river would be abstracted. On the other hand, increasing runoff is being forecast with climate and catchment change (JGLR, 2018). The impacts on the OUV on the mid- and long term therefore have to be closely monitored.

The cumulative impact of the different uses of the water sources, together with severe drought and other factors, can significantly affect the OUV, with sources that suggest the lake could drop between 16 and 22 m (AfDB, 2009; Univ. of Oxford, 2012 & 2013; JGLR, 2018).

► **Tourism/ visitors/ recreation**

**Low Threat**

*(Destruction and disappearance of fossils)*

Inside site, localised(<5%)

The Lake Turkana fossil sites are not threatened by the lower Omo plantations. The fossil beds are however poorly protected and are negatively impacted through trampling by livestock and looting of fossils by pastoralists and visitors (KWS/NMK, 2019). The petrified forest site is unprotected and encroached by livestock.

► **Other Activities**

**High Threat**

*(Destruction of crocodile nests)*

Inside site, throughout(>50%)  
Outside site

Information from 2012 suggests that crocodiles are heavily persecuted by fishermen who destroy nesting sites they come across, including those on South and Central Island NPs (Mission Report, 2012; EAWLS, 2012). The threats continue as fishermen are constantly encroaching into the waters of the World Heritage site (KWS/NMK, 2019). There is no permanent ranger presence on the islands and fishermen often camp on the shores where the crocodiles nest, sometimes doing so under the pretext that they are sheltering from the lake's dangerous winds and waves. Fishing is not permitted unless under license for sport tourism, and trespassing fishermen are often arrested (KWS/NMK, 2019).

► **Droughts, Desertification**

**High Threat**

*(Drought and climate change)*

Inside site, throughout(>50%)  
Outside site

The interaction of climate change and periods of drought with other factors such as water regimes, governance, environmental degradation and land use makes Lake Turkana a very vulnerable trans-boundary ecosystem (Anon., sd). Between the late 1800s and the mid-1900s, the lake level fell significantly. Since the 1940s, the lake level then rose before falling in the 1980s, and has since fluctuated, being on a general rising water level trend since 1992, and having risen over three metres between 1992 and 2015 when the Gibe III filling commenced (KENWEB, 2017; JGLR, 2018). After falling

two metres during the Gibe III filling, the region has experienced exceptional rains and flooding, and all east African Rift Valley lakes have risen. Periodic droughts and climate change exacerbate the problems associated with upstream use of water, denying the lake of the fresh water needed to compensate for evaporation losses. Furthermore, the salinity of the lake can be expected to increase further due to increased evaporation rates due to rising lake water temperature with global warming (Univ. of Oxford, 2012; International Rivers, 2016; JGLR, 2018). On the other hand, there is an increasing rainfall trend and catchment runoff proportions will increase with anthropogenic activity, increases that tend to offset the increased evaporation loss (Univ. of Oxford, 2012; JGLR, 2018; RVBP, 2020).

► **Livestock Farming / Grazing**

*(Over-grazing)*

**High Threat**

Inside site, throughout(>50%)  
Outside site

Pastoralism, agro-pastoralism, and fishing are the main sources of livelihood for the ever growing population around the lake. Increasing human population pressure and poverty among the pastoralist communities increases activities such as charcoal burning and opportunistic dryland cultivation that exacerbates degradation (UN Country teams of Ethiopia and Kenya and IGAD, sd). The deterioration of lakeshore habitats is impacting biodiversity (BirdLife, 2012).

The grazing pressures from domestic livestock within Sibiloi NP have become a permanent challenge (KWS/NMK, 2019). A grazing plan prepared in 2013 has yet to be implemented (KWS/NMK, 2019). This is leading to over-grazing, trampling of vegetation and an increase in woody vegetation, loss of grasslands, and shoreline nesting habitats for birds and crocodiles are adversely affected (KWS/NMK, 2019). Even the archaeological sites are being trampled (KWS/NMK, 2019). South Island NP is also threatened by sheep and goats, with both humans and livestock disturbing breeding birds and the crocodile breeding habitats (KWS/NMK, 2019).

The similar human threats to Central Island NP are not mentioned in the 2018-2028 Management Plan, presumably because this park currently falls under the jurisdiction of the KWS base in Kalokol on the opposite side of the lake from Sibiloi NP. Central Island is not impacted by livestock, but the breeding of birds and crocodiles are similarly affected by illegal fishermen that often camp on the beaches (EAWLS, 2012 & 2014), and flamingos are also disturbed and sometimes chased. The paths used by tourists around Crocodile Lake are in places very close to nesting bird colonies. When birds are disturbed by passing tourists, they temporarily leave their nests and opportunistic ravens dive in and steal the eggs (pers. obs.).

► **Hunting and trapping**

*(Poaching and fishing)*

**High Threat**

Inside site, throughout(>50%)  
Outside site

Although the wildlife resources in national parks are protected by law, the protection means are ineffective with little control over poaching and livestock and fishing encroachments into the parks.

In Sibiloi NP, the inadequate wildlife protection and widely accessible firearms are leading to a decline in wildlife populations, with the few remaining large mammals being concentrated in the most secure parts of the site, confirming that poaching is a significant threat (KWS/NMK, 2019). Within the lake, crocodiles and turtles are threatened as they become entangled in nets and drown, and will also take baited fishing hooks on long lines and then drown (EAWLS, 2012 & 2014). Reticulated giraffe have become extinct since the site was listed (SOC, 2012). Grevy's zebra are endangered nationally and may no longer be present in Sibiloi NP. The Northern topi (Tiang) population is approaching "vulnerable" or "near threatened" status (KWS/NMK, 2019). Large carnivores are listed amongst Sibiloi's wildlife (lion, leopard, cheetah, spotted hyaena, striped hyaena), but current numbers are not stated in the Management Plan 2018-2028. Lion are especially vulnerable nationally and numbers if any in Sibiloi NP are not known (KWS/NMK, 2019). National experience is that large carnivores will occasionally take livestock and pastoralists will often retaliate by poisoning carcasses with catastrophic widespread consequences for other scavenging wildlife and birds. Sibiloi NP is supposed to host Beisa oryx, gerenuk, Grant's gazelle, and Burchell's zebra, but previous assessments declared these virtually absent. Greater kudu were not previously mentioned although listed on the KWS Tourist map for Sibiloi NP. A

major factor displacing the wildlife population is the encroachment of livestock.

Central Island and South Island NPs are not permanently inhabited and lack fresh water sources and hence pastoralism is not practiced in these parks, but KWS have reported sheep and goats on South Island NP during the dry season (KWS/NMK, 2019).

Fishing is a significant threat to the wildlife diversity of the islands, notably crocodile, turtle and nesting bird populations, as fishermen camp on the beaches, sometimes under the pretext that they are sheltering from the lake's fierce winds and waves. And there have been reports of flamingos being chased on Central Island's Flamingo Lake.

► **Logging/ Wood Harvesting**

**Low Threat**

*(Tree cutting for fuelwood and livestock enclosures)*

Inside site, throughout(>50%)  
Outside site

Trees are reportedly taken for fuelwood and charcoal from within Sibiloi NP and elsewhere (UNEP-WCMC, 2012), exposing the thin soils to strong winds. Fishermen that camp illegally on the island national parks will also require fuelwood, which is a threat to the scarce woody species on those islands. With ever-increasing population in the Lake Turkana region, there is escalating fuelwood demand, and wooded areas are targeted as a consequence. In addition, pastoralists bring their livestock into Sibiloi NP for pasture and water, and in so doing they degrade the habitat through trampling, overgrazing, and they cut woody vegetation to construct livestock enclosures (KWS / NMK, 2019). On the one hand grasslands are increasingly becoming woody and bush and weed encroached due to degradation by livestock, and on the other hand the original wooded area habitats are impacted as they are exploited as sources of fuelwood and material for livestock stockades (KWS/NMK, 2019). The diversity of Sibiloi NP is affected as the wildlife includes both grazers and browsers.

► **Identity/social cohesion/ changes in local population and community that result in negative impact**

**High Threat**

*(Social unrest arising from tribal conflicts over diminishing resources)*

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

The lake supports livelihoods of about 500,000 people of different ethnic groups. Most of these people suffer extreme poverty, a large part of the increasing population is young, and the development indices of the region are much lower than the national average in both Kenya and Ethiopia. Literacy levels are very low (County Integrated Development Plans). As the population is quite mobile, cross-border conflicts over water and other natural resources are a persistent concern in the region. Causes and patterns of conflict are complex and intertwined with for example increasing human population, displacement of people from their traditional lands by developments in the Lower Omo, environmental degradation, competition over resources, livestock rustling, ethnicity, politics and lack of economic opportunities for the population (UN Country teams of Ethiopia and Kenya and IGAD, sd).

Remote-sensed water level monitoring by satellites shows that Lake Turkana fell two metres during the filling of Gibe III's reservoir (KENWEB, 2017; JGLR, 2018), and the fisheries is reported to have declined (as reported in the film "Water to Dust" screened on National TV in Kenya in 2017), thus enhancing the chances for conflict. While the Central Island and South Island NPs are uninhabited, they are nonetheless encroached by fishermen who regularly camp on the shores, and South Island NP is used by pastoralists as a dry-season grazing refuge for sheep and goats (KWS / NMK, 2019). Nests and eggs are either looted or trampled by humans and livestock (EAWLS, 2012; KWS/NMK, 2019). Local pastoralists are allowed grazing rights in Sibiloi NP in the dry season and pressure for resources from the park is escalating (UNEP-WCMC, 2012; KWS/NMK, 2019). The Management Plan 2018-2028 envisages formulation of a new grazing plan with the communities (KWS/NMK, 2019). With the increasing population pressure in the areas surrounding the site, this will be a challenge to enforce, and needs to be very closely monitored.

► **Other Ecosystem Modifications**

**High Threat**

*(Changing seasonality and nutrient status of inflowing waters to Lake Turkana)*

Inside site, throughout(>50%)  
Outside site

The loss of seasonality in water inflow resulting from flow regulation by dams on Lake Turkana's three main river basins will reduce the extent and quality of floodplain vegetation and will impact the ecology of aquatic habitats that are important fish-spawning sites (JGLR, 2018). The filling of the Gibe III reservoir caused a drop in lake level of 2 metres (JGLR, 2018), and a modelling study of the lake using satellite remote sensing estimated a 30% drop in chlorophyll in Lake Turkana during this period (RRA, 2019). A reduction in chlorophyll is indicative of a drop in primary production and hence the food chain upon which fisheries ecology depends. Future water management scenarios based on Gibe III operations predicted reduced seasonal chlorophyll-a variability, while irrigation scenarios showed marked declines in chlorophyll-a depending on the level of abstraction (RRA, 2019). Furthermore, river-borne silt that would have enriched the floodplains, deltas and lake will be deposited in the impoundments created by the dams instead, with major ecological implications for the Lake Turkana ecosystem and biodiversity. A recent study of Kenya's Turkwel dam's reservoir measured up to 40 metres of sediment deposited since 1990 (TKBV, 2020). Design studies for Gibe III dam determined that 98% of sediment would be trapped (EEPCo, 2007).

Poorly conceived development projects in the Omo River Basin are altering the freshwater inflow hydrology to the lake and associated nutrient passage along the rivers. Also, the plantations will potentially affect the nutrient status of the lake through the introduction of alien agricultural development chemicals that affect fish and cause eutrophication.

The WH Committee had requested the State Parties of Ethiopia and Kenya to provide an EIA for the Kuraz Sugar Development Project using best available hydrological data of the Lower Omo and accurate rainfall data, and submit it as part of the Strategic Environmental Assessment (SEA) by February 2018 (Decision 39 COM 7B.4). A proposed budget for undertaking the SEA was prepared and submitted by the State Party of Kenya to Ethiopia in May 2019, but there has been no response from Ethiopia to the proposal (NMK, 2020).

There are in any case, several studies already on the Lower Omo developments and the lake, and there are global parallels of environmental catastrophes that fully justify concerns for the lake ecology, notably the shrinking of the Aral Sea, Lake Chad, the Dead Sea (Univ. of Oxford, 2013; JGLR, 2018).

► **Fishing / Harvesting Aquatic Resources**

**High Threat**

*(Overfishing and diminishing fish stocks)*

Inside site, widespread(15-50%)  
Outside site

Since the 1960s, fishing has been an important livelihood, being practiced throughout the lake on an artisanal basis principally by Turkana fishermen. Illegal fishing activities are taking place inside the site and fisheries resources are not being adequately protected (KWS/NMK, 2019). There are, however, no fish stock assessment data to enable assessment of the broader impact of over-fishing on the fisheries resource. There have long been reports that the lake is over-fished (OGBMP, 1996), and hence the protected areas are vital for the lake.

Numerous fisheries expert studies have demonstrated that the lake fisheries ecology is highly dependent on the annual Omo seasonal flood and hence that development-induced hydrological changes in the Omo Basin would be detrimental (Lake Turkana Project 1972-75; Lake Turkana Limnological Study 1985-88; Omo-Gibe Basin Integrated Development Master Plan, OGBMP, 1996; Kolding; Ojwang et al (KMFRI team and others); Gownaris et al.; Muska et al.).

Due to the major Gibe III and Gibe IV hydro power plants, the annual flooding regime has been altered, and this will result in negative effects on the recruitment of young fish and the production of adults of all kinds of species with commercial value. The Gibe III dam has permanently dampened the seasonal oscillations in lake water level that were important for nutrient cycling and triggering fish breeding and migration. The loss of these oscillations was predicted to decrease fisheries yield by over two thirds (Gownaris et al., 2016). Declining lake levels due to irrigation abstractions also have the potential to lead to the loss of important fish habitat, including, for example, the productive Ferguson's Gulf fishery

(Hodbod et al., 2019, Ambio).

► **Renewable Energy**

**Data Deficient**

*(Wind turbines and transmission lines)*

Outside site

The Lake Turkana Wind Power project, located to the southeast of the lake, comprises 365 wind turbines, with its facilities occupying approx. 87.5 acres. Construction commenced in October 2014, and by July 2017, its 310 MW capacity was ready for commercial operations. The project's impact on biodiversity, particularly on birds, is unknown.

**Potential Threats**

**High Threat**

By far the greatest potential threat to the lake is the progressive development induced change to the inflowing hydrology in Ethiopia, in particular the threat of the depletion of inflowing waters for irrigation. The potential threat from oil exploration and extraction on Lake Turkana is currently unknown, but given its distance from the site, may be limited. However any accidental spills near a tributary of the Lake could lead to significant impacts.

► **Oil/ Gas exploration/development**

**High Threat**

*(Oil exploration and development)*

Outside site

Oil exploration has been taking place across the Lake Turkana basin (SOC, 2012), and significant finds have been made outside the site in the South Lokichar basin to the south-west of the lake. Development of these resources seemed set to transform the local economy, with construction of major new infrastructure planned, and significant associated risks. For instance, the government of Kenya has been undertaking social and environmental impact assessments for the development of a crude oil export pipeline between Lokichar and Lamu (the Government of the Republic of Kenya through the Ministry of Energy and Petroleum, 2016). Exploration licenses for the oil exploration blocks covering Lake Turkana - including some parts of the site - had been attributed to Tullow Oil plc. But in 2015, Tullow Oil declared a policy not to explore or exploit hydrocarbon resources within World Heritage properties (McDade, 2015). The oil extraction process in South Lokichar basin requires water and Tullow has explored a range of water sources, including distant sources like the Indian Ocean, local groundwater, Lake Turkana, and the existing Turkwel hydropower dam, which is now the preferred source. The Turkwel dam is on one of the three main basins that drain to Lake Turkana. Water will be taken by pipeline from the dam to feed the oilfield and communities that live along the pipeline.

The updated hydrological study for the existing Turkwel dam has been recently submitted to Tullow (TKBV, 2020), and an ESIA of the water pipeline is in progress. The amount of water abstraction proposed is 0.46 m<sup>3</sup>/s, which is 2.5% of the Turkwel river's mean annual flow, and this is a fraction of the total annual average freshwater inflow to the lake of 632 m<sup>3</sup>/s (JGLR, 2019). Evaporation alone from the Turkwel reservoir is 1.25 m<sup>3</sup>/s. Kenya's Rift Valley Basin Plan envisages irrigation abstractions from the Turkwel River increasing to 6.28 m<sup>3</sup>/s by 2040 (RVBP, 2020), Kenya's Kerio Valley Development Authority also commissioned a sugar plantation study that required 18 m<sup>3</sup>/s, the entire Turkwel river flow (KVDA, 2013). Thus, the oilfield and community domestic water needs planned to be served from Turkwel dam are in comparison very small to irrigation water demands. It has also been suggested the dam might supply water to the planned resort city on the lake at Eliye (RVBP, 2020; cited in TKBV, 2020).

The recent downturn in oil prices and the global Covid-19 pandemic has resulted in a near shutdown in Tullow's oil development activities. But, potential threats from oil exploration in the vicinity or within the watershed of Lake Turkana, or within the lake itself, still exist from prospecting by other oil and energy development companies. A geothermal project is being developed on the Barrier Complex that forms the southern boundary dividing the lake from the Suguta Valley, and details of water requirements and sourcing have not yet been provided.

Insofar as water resource depletion affecting the lake and the site, the biggest threats are the irrigation abstraction projects, both in Kenya and Ethiopia. In Kenya as a whole, irrigation accounts for about 80% of national water demand (NWMP, 2013). Kenya plans a 10,000 ha irrigation project at Todenyang based

on abstracting water from the Omo river too (Univ of Oxford, 2012; JGLR, 2019; RVBP, 2020).

► **Commercial/ Industrial Areas**

**High Threat**

*(Regional infrastructure)*

Outside site

The governments of Kenya, South Sudan and Ethiopia are collaborating on a major new infrastructure corridor named LAPSET (Lamu Port, Southern Sudan, Ethiopia Transport Corridor) through northern Kenya linking the Indian Ocean with other parts of the region. This ambitious infrastructure project comprises a deep sea port at Lamu, inter-regional railway lines and highways, crude oil pipeline, product oil pipeline, three international airports (including at Lake Turkana), three resort cities (one at Eliye on Lake Turkana) and a dam on Tana River (LAPSET, 2017).

► **Dams/ Water Management or Use**

**Very High Threat**

*(Upstream water use)*

Outside site

There is progressive development-induced change to the inflowing hydrology of Lake Turkana, and in particular the threat of the depletion of inflowing waters through abstraction by planned irrigation developments, and these pose a major threat to the ecology of the lake. These irrigation abstraction risks derive from a host of irrigation developments, not only from Kuraz Sugar Scheme in Ethiopia, but also cotton and other plantations, and from Kenya too in the form of KVDA's planned sugar plantation development, and Kenya's Todenyang irrigation project that is also planned to take water from the Omo river (RVBP, 2020). In future, there may also be an expansion of community run irrigation schemes in Ethiopia's lower Omo as an attempt to offset the loss of flood recession-agriculture due to the Gibe III dam (Tebbs et al, 2019, OTuRN).

► **Renewable Energy**

**Data Deficient**

*(Proposed geothermal power plant project)*

Outside site

A geothermal power station has been proposed at the Barrier Volcanic Complex, approximately 10km south of the site (WH Committee, 2019). Little information is available on this project such as the technology proposed. In 2019 the WH Committee requested the State Party to ensure an EIA for such a proposal is submitted to the World Heritage Centre before making a decision but the 2020 State Party provided no updates on this development (State Party of Kenya, 2020).

**Overall assessment of threats**

**Very High Threat**

The values of the site are seriously threatened by the accumulation of different factors, such as the progressive damming of the inflowing rivers and upstream use of water for irrigated agriculture and other uses. Both the hydropower plants and the sugar plantations are having far-reaching ecological consequences, lowering the lake levels, moving the shore-line, exposing saline soils, increasing lake water salinity and reducing the extent of seasonal flooding and nutrient cycling and replenishment. The effect of these large-scale changes is being exacerbated by human population increase and competition for diminishing resources by people living around the shores of the lake, including over-grazing, poaching of wildlife, over-fishing and tree-cutting, and creating ever-increasing demands for resources from within the site. The discovery of significant oil deposits in the lake basin, together with potential infrastructural and energy project create further risks to the integrity of the site.

## Protection and management

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### Assessing Protection and Management

► **Management system**

**Serious Concern**

The site (1,615 km<sup>2</sup>) comprises three separate components, namely Sibiloi NP (1,571 km<sup>2</sup>), South Island NP (SINP) (39 km<sup>2</sup>) and Central Island NP (CINP) (5 km<sup>2</sup>) managed by Kenya Wildlife Service

(KWS). The National Museums of Kenya (NMK) manage the fossil sites. Neither of the islands has a permanent KWS presence, and while South Island NP falls under the jurisdiction of Sibiloi NP within Marsabit County, Central Island NP is managed from Kalokol on the other side of the lake within Turkana County.

KWS / NMK have an agreed Lake Turkana National Parks Management Plan that was signed by NMK in December 2018 and by KWS in February 2019 (NMK, 2020). The three year action plan 2018-2021 has four objectives: (1) Effective management systems and human resource capacity deployment (2) Improve infrastructure to support tourism, ranger operations and administration (3) Provide and maintain vehicle, plant machinery and equipment (4) Wildlife, habitat and visitor security enhancement.

It is a concern however that whereas the Management Plan acknowledges representation from Marsabit County Government, neither the Turkana County Government nor Samburu County Government are acknowledged as having been represented (KWS/NMK, 2019 - see p.ii). It is vital for the successful implementation of the Plan that all county governments bordering the lake be fully represented and in agreement. Otherwise unhelpful disagreements will persist between national bodies like KWS / NMK and the devolved county administrations.

It is also a concern that the State Party of Kenya has reported delayed response from the State Party of Ethiopia in regard to the SEA action plan agreed by the two States Parties.

► **Effectiveness of management system**

**Serious Concern**

Management faces considerable challenges in such a remote and inhospitable location where poor infrastructure and social facilities make it extremely difficult to operate and maintain a competent and committed staff. The KWS / NMK management plan 2018-2028 is active but the management of the parks remains inadequate and ineffective. This is exacerbated by the divisions of responsibility within KWS itself, and between the devolved county governments bordering the lake and the national government, with KWS and NMK being national institutions. KWS has its own current management challenges with the Director having recently resigned. And with more budget cuts resulting from the Covid-19 pandemic, the Lake Turkana National Parks will remain a very low priority for a long time.

These parks urgently need revitalising. They are unique, and there is so much potential, but the parks will continue to languish in the doldrums unless other financial and support mechanisms are mobilised. PPP arrangements are welcomed by the government, with enabling legislation being formulated, and these PPP possibilities should be actively encouraged and supported.

► **Boundaries**

**Serious Concern**

The boundary beacons of SINP have been vandalised and the park's land boundary is not clearly visible (KWS/NMK, 2019, p.92). The Management Plan 2018-2028 recommends clear delineation with "unbreakable" beacons, and where geographically feasible, recommends a road to be cleared along the boundary. The offshore boundaries apparently extend 2 km offshore from the site shorelines. There is no map of these boundaries, and the boundaries are not delineated nor visible, and hence it is problematic in apprehending anyone encroaching into protected areas as it can be disputed and is hard to prove. Each island national park has small sister islands, and without any geo-referenced map being available, members of the public have no idea where the protected areas begin. The Management Plan 2018-2028 recommends visible buoys (KWS/NMK, 2019, p.92). This may not be easy as winds can be fierce and the lake can be very choppy, and the buoys are liable to drift, or more likely vandalised and sunk. It is also complicated by the fact that the shoreline is not fixed, varying with the water level fluctuations.

SNP protects about 13% of the Lake's shoreline, including some important shoreline habitats. Two out of the lake's three main island clusters are within the WH site, and these include valuable shoreline habitats and small sister island outcrops much favoured by birds. And there are three small crater lakes of remarkably contrasting salinity levels within Central Island NP itself, one of which attracts flamingos.

However, the bulk of the Lake's important biodiversity exists outside the site, where it has no special

protection status (UNESCO/IUCN, 2012). It is thus doubly vital that the protected areas be indeed protected. An acceptable mechanism needs to be agreed with the communities to police the boundaries. And in the case of the islands, permanent ranger presence on the islands are equipped with boats is essential.

Ideally all fishing boats would be equipped with GPS equipment, but that will be beyond the means of local fishermen. As constant abuse of the boundaries is likely, it would be preferable to extend the protected areas much further out into the lake. These days, the fishermen are far more mobile. Even the small canoes used by fishermen often have small petrol-driven outboard motors. Boda boda motorcycles are now widespread which in turn means that petrol is available throughout the area. Increased mobility has increased the poaching and encroachment risks that the site faces. Any extension of the site boundaries will not be popular and is liable to be rejected by the county governments. The present mechanism whereby offenders must be taken to court in Lodwar and Marsabit is also far too unwieldy for dealing with minor infringements. Powers to confiscate and dispose of fishing gear and weapons brought illegally into the national parks need to be reinforced.

► **Integration into regional and national planning systems** **Serious Concern**

Lake Turkana and its wider catchment area are shared roughly in equal areas between Kenya and Ethiopia, but with over 80% of the lake's inflow coming from the Ethiopian side, via the Omo River delta at the northern end of the lake.

In the last few years, the governments of Kenya and Ethiopia have worked together on the border region, including Lake Turkana and the utilization of the resources of the Omo River Basin (UNESCO World Heritage Centre - IUCN, 2015). They committed themselves to collaborating under the umbrella of the Joint Ministerial Commission to protect the OUV of the site (Kenya and Ethiopia, 2016).

In 2015, the Governments of Kenya and Ethiopia signed the Memorandum of Understanding Cross Border Integrated Programme for Sustainable Peace and Socioeconomic Transformation between Marsabit County of Kenya and Ethiopia's Borana Zone. The MoU covers, among other topics, environmental protection. One of the goals of the programme is to "improve environmental consideration of sustainable and inclusive use of resources consistent with the new Sustainable Development Goals". It is unclear if the MoU includes provisions to avoid, minimize and mitigate impacts of the Kuraz Sugar Scheme and Gibe III (World Heritage Committee, 2016).

In 2015 the two governments also signed the UNEP-coordinated project Support to Sustainable Development in Lake Turkana and its River Basins with the goal to enhance capacity of the governments and stakeholders to sustainably and equitably manage the ecosystem and its ecosystem services in the basin. The aim is, amongst others, to minimize the pressure on natural resources and monitor the health of the ecosystems and trans-boundary governance of the ecosystem. As part of that initiative, it was agreed that a Strategic Environmental Assessment (SEA) should be commissioned for the Omo Turkana basin to determine the impacts of river basin and other developments on the OUV of the basin. Several years later, consultants have not yet been commissioned, and the current delay attributed to the State Party of Ethiopia, is a major ongoing concern (KWS / NMK, 2019).

There seems little appetite to progress the SEA. The cascade of five hydropower projects is committed and well-advanced. The outcome in terms of hydrological impacts is already well-known. It is still possible to curtail the volume of water abstractions for irrigation projects (JGLR, 2018). A concession to release ecological floods as originally planned is also feasible, albeit complicated as these floods are liable to damage investment in irrigation infrastructure downstream that has been actively encouraged by the Ethiopian government. Also ecological flood releases equate to a loss of power generation revenue.

► **Relationships with local people** **Some Concern**

There is little information on community relations, but circumstantial evidence, such as livestock incursions, the decline of wildlife populations, and constant illegal fishing incursions into protected areas, suggest either that they are not as good as they need to be, or that the population pressure is

insurmountable.

Local people see little benefit from the parks and perceive only peripheral participation in research projects (SOC, 2020). They complain they never see the outcome of research projects (SOC, 2020).

The 2018-2028 Lake Turkana National Parks Management Plan by the Kenya Wildlife Services and National Museums of Kenya has recognised that the community livelihood activities around the parks increasingly impact negatively on the conservation aims of the parks (KWS/NMK, 2019). Communities are mobile and often illiterate and they lack organisational capacity to represent their interests. Accordingly, the Management Plan has included consultation with relevant stakeholders and local communities and several action plans are listed to improve communication and develop collaborative mechanisms (KWS/NMK, 2019). It is however uncertain whether KWS and NMK have the resources to sustain this exercise without significant and sustained external funding, as this funding is not likely to be forthcoming from government, especially in view of the economic consequences of the Covid-19 pandemic. The Management Plan itself was funded by USAID.

The local population in Kenya has not been consulted by Ethiopia about the potential impacts of hydropower and sugar and other plantation developments in the Lower Omo, nor how to mitigate them. An initial consultation was done by an African Development Bank team in 2010 (AfDB, 2010d). These distant top-down development projects are viewed with suspicion, and people will since have become aware of the displacement of local people and human rights abuse accusations in the Lower Omo (HRW, 2012). They are also aware of the impact on fisheries that resulted from the Gibe III filling (Nation TV "Water to Dust" documentary). And since Gibe III was commissioned, communities will be aware of the adverse impact on livelihoods and food security in the Lower Omo due to the loss of the annual Omo river flood (Hodbod et al., 2019).

#### ► **Legal framework**

**Serious Concern**

The site is protected under the Kenya Wildlife Conservation and Management Action 2013. The three National Parks are managed by the Kenya Wildlife Service (KWS) with the National Museums of Kenya (NMK) responsible for the fossil sites. The new Management Plan states that the management of Sibiloi NP is "carried out in an ambiguous way" (KWS/NMK, 2019). Both organisations are involved in tourism development and "this results not only in confusion in management, but conflict in revenue collection, implementing research priorities and entering into contractual agreements with partners" (KWS/NMK, 2019).

In general, national parks are protected against any settlement or resource use, but special provisions were invoked at the time of creation of Sibiloi NP (SNP) allowing local pastoralist communities access to grazing and water 'at times of difficulty' (Mission Report, 2012). However, these provisions have been interpreted very broadly and most of the northern part of the park is subject to unsustainable year-round grazing of domestic stock (Mission Report, 2012).

Fossil sites are being trampled and looted and wooded vegetation is being cut down by livestock herders in order to build livestock stockades (KWS/NMK, 2019). Southern areas of the park are also subject to unsustainable livestock trampling and foraging. The Alia Bay petrified forest is a maze of livestock trails, and wildlife is being disturbed and displaced. The island NPs are constantly encroached with South Island NP being used as a dry-season grazing area for sheep and goats.

The "protected" status of the site has to be restored and the process of apprehending and prosecuting offenders has to be thoroughly overhauled as the present legal process is logistically unworkable.

#### ► **Law enforcement**

**Serious Concern**

The national parks are not effectively policed. The biodiversity is not adequately protected, and the sites are subject to constant human encroachment. Authorities are hampered prosecuting violations of the law in the park, for several reasons. The courts are in Marsabit and Lodwar, which are far away, and KWS staff simply do not have the resources nor logistics to follow this through. They are required to apprehend, accommodate and transport suspects to Marsabit or Lodwar, and thereafter attend court as

witnesses. The land border of Sibiloi NP needs to be rehabilitated, and in the case of illegal fishing, KWS rangers are constantly faced with disputes as there is no visible demarcation of the protected area within the lake. And even if the boundary is demarcated, that zone keeps changing as the lake levels rise and fall, and markers in the form of buoys are liable to be either sunk or cut adrift by poachers. An effective gps-based mechanism to enforce the boundary needs to be agreed with the county administration and communities.

► **Implementation of Committee decisions and recommendations**

**Some Concern**

- (1) In the latest World Heritage Committee meeting in 2019, the Committee acknowledged the State Party of Kenya's implementation of the approved management plan. Little progress has since been reported on the Action Plan (KWS/NMK, 2019).
- (2) The Committee had reiterated the request for a consolidated response on progress to address the outstanding 2012 and 2015 mission recommendations as well as an update on the current status of the impounding of the Gibe III reservoir, and any mitigation measures being implemented. As the Gibe III reservoir was impounded from 2015-2016, that part of the request has been superseded by events. The State Party of Kenya has responded to say that it has been responding to issues that occur on Kenyan territory, but cannot report on the progress of development projects being undertaken in a neighbouring State Party especially as bilateral meetings on the issues affecting the site have been irregular (State Party of Kenya, 2020). The response from the State Party of Ethiopia is thus outstanding.
- (3) The EIA for the Kuraz sugar development project had been requested and was promised by 31st December 2019, but was not provided.
- (4) The Strategic Environmental Assessment (SEA) to assess the cumulative impacts of the multiple developments in the Lake Turkana Basin on the Outstanding Universal Value (OUV) of the affected sites has continued to face challenges and the response of the State Party of Ethiopia to the budget proposed by the State Party of Kenya is awaited (KWS/NMK, 2019). The Committee had requested the timeline, but this has not been provided.
- (5) The SEA for Lamu Port-South Sudan-Ethiopia Transport Corridor Project (LAPSSSET), the Environmental and Social Impact Assessment (ESIA) for the Lamu-Lokichar Crude Oil pipeline from Turkana county to Lamu and the proposed development of the geothermal power station at the Barrier Volcanic Complex south of the site were all noted by the Committee, and the State Party of Kenya was requested to submit all related impact assessments of projects, which may have potential impacts on the site, to the World Heritage Centre for review by IUCN, before taking any decision that may be difficult to reverse. The State Party of Kenya has confirmed participation in the oil pipeline ESIA which has been submitted to NEMA (KWS/NMK, 2019). No comment has been made on the status of the other projects.
- (6) The Committee had requested that a Reactive Monitoring Mission be invited to Kenya. The purpose was to assess the site's state of conservation, to review the impacts of the development projects in Ethiopia and Kenya on the site and the progress made to implement the past mission recommendations, and to develop, in consultation with the State Party of Ethiopia, a proposed set of corrective measures and a desired state of conservation for the removal of the site from the List of World Heritage in Danger (DSOCR), for examination by the Committee at its 44th session in 2020. That invitation was issued, and the Mission visited Kenya in early 2020, albeit only one team member due to the Covid-19 pandemic restrictions. That Mission Report has not been finalised, and the 44th session has been postponed to 2021.
- (7) The State Party of Kenya has submitted the State of Conservation Report that had been requested by 1 February 2020.

► **Sustainable use**

**Serious Concern**

Since the establishment of Sibiloi NP local pastoralists have been allowed grazing rights within the park during periods of drought. Regulation of this access has, however, not been effective and much of the park is used by pastoralists throughout the year (Mission Report, 2012; KWS/NMK, 2019). Likewise, sheep and goats are being taken onto South Island during the dry season. Fishermen are constantly illegally fishing within the national parks using nets and long lines. Available evidence suggests that wildlife populations are declining, and that local community-use of resources is not organized within the

framework of an agreed programme for sustainable use. Although there is a new management plan in place, it is very doubtful that KWS / NMK will have the resources to implement the plan. There have been government budget cuts, and this will be exacerbated by the challenges of the Covid-19 pandemic, and the Lake Turkana National Parks will be low on the priority list for allocation of available funds.

► **Sustainable finance**

**Serious Concern**

In 2019, it was reported that the site is significantly under-resourced, with financing for management being provided from KWS general resources (mostly generated from tourism at other parks). That financing situation has not improved since that time, and in 2020 the Covid-19 pandemic has resulted in a catastrophic collapse in tourism revenue globally. This situation will prevail for a long time to come, and available government funds will be directed to salaries and the flagship national parks. The Management Plan 2018-2028 (KWS/NMK, 2019) does not include any budget estimates for its ambitious implementation programme. Measures to attract external sources of funding support are likely to be needed to save and sustain the site, and PPP initiatives need to be urgently explored.

► **Staff capacity, training, and development**

**Serious Concern**

Information dating from 2012 indicated that the Lake Turkana World Heritage site had 40 staff members split between the three national parks (Sibiloi, Central and South Island NPs), the vast majority of which are security personnel. This number was however insufficient to ensure effective management of the entire area especially in more remote areas of the parks (KWS, Consultation, 2013). There is no information on staff training and development, but it has been noted that the staffing situation at the site is particularly difficult, with many staff positions remaining unfilled and very high levels of staff turnover (Mission Report, 2012). The new Management Plan gazetted in 2019 states there are 40 permanent staff split between two national parks (Sibiloi NP and South Island NP), and that the ideal staff number is 88 permanent personnel (SOC, 2020, p.90). Central Island NP is not mentioned. Thus the status quo is basically unchanged, with no ranger presence on either of the island national parks.

It was previously reported that besides being understaffed, the park management has insufficient vehicles and fuel, and rangers are under-armed compared to poachers and the local populace. That state of affairs remains the case today, with considerable investment needed in personnel development and training, vehicles, boats, plant, machinery, offices, telecommunication equipment, and buildings (State Party of Kenya, 2020, p.94).

► **Education and interpretation programs**

**Serious Concern**

The natural resources of the site are threatened, and in terms of alternative livelihoods for the surrounding communities, the lack of education is the biggest challenge to finding a solution. A survey by KMFRI published in 2017 encapsulates all these issues (KMFRI, 2017).

From 2015 to 2016 KMFRI interviewed 300 respondents around the lake, the first of two objectives being to explore the socio-economic impacts of development projects on Lake Turkana's fisheries and communities (KMFRI, 2017).

- 91% of respondents had experienced resource use conflicts, 83% stated that the frequency of conflicts was increasing.

- 81% experienced violent conflicts over competition over pasture, 76% over fishing areas.

- Only 15% reported violent conflicts over fishing in protected areas.

- 82% and 68% respectively of residents in Turkana and Marsabit Counties had no formal education.

With a human population growth that is double the national average, the competition for resources is an increasing challenge facing the lake and the site.

The new management plan 2018-2028 was approved in 2019, and this plan includes a comprehensive community partnership and conservation education programme. The purpose will be "To enhance community support for conservation at the property and promote conservation-sensitive land-uses to improve community livelihoods".

The plan overall is ambitious, especially in view of the general lack of funding for KWS and the site itself. The availability of resources needed to carry out this plan are a concern, all of which will be compounded by the critical collapse of tourism revenue resulting from the Covid-19 pandemic. This is adversely affecting all of Kenya's national parks.

And as mentioned earlier, the full engagement of the devolved county administrations is vital as they themselves have community wildlife conservation programmes and budgets (Marsabit, Turkana and Samburu Counties).

### ► **Tourism and visitation management**

**Mostly Effective**

There are very few visitors to any of the parks due to their remoteness, although remoteness is part of their appeal to the adventure tourist. Central Island can only be reached by boat or helicopter. South Island, likewise, although light aircraft with skilled pilots occasionally land there. Sibiloi is accessible by road, from the lake and by air. The lake can be rough and access by air to the islands can be very hazardous due to strong winds. The total visitors for Sibiloi NP and Central Island NP during the 1990s averaged about 500 visitors per year to each park (Njuguna, 2001). South Island was not mentioned. The 2018-2028 Management Plan provides no data on tourism statistics. There is a small museum near the shore at Koobi Fora within Sibiloi NP, and three notable fossils (a giant tortoise, crocodile and elephant) are protected in situ within specially-constructed buildings not far from museum. There are remnants of a petrified forest near Alia Bay, not far from the park HQ. There is a designated camping site with rudimentary facilities on Central Island NP, but no fresh water. No facilities exist on South Island NP. There are bandas at Alia Bay and Koobi Fora in Sibiloi NP, and there are several designated campsites with rudimentary facilities. In Sibiloi NP there is an adequate network of 4x4 tracks to provide for suitably-equipped visitors. Boats can land on the shores and beaches of all the national parks.

The scenic values of the site and its fossil sites clearly present significant opportunities for the development of tourism, but the wildlife experience needs to be improved as tourists do not appreciate paying to view sheep and goats instead.

### ► **Monitoring**

**Serious Concern**

The lack of data and impact assessments or official monitoring activities have long been a severe problem for the site. Furthermore, the impact assessments of significant development projects, such as Gibe III, Gibe IV and the Kuraz Sugar Scheme don't sufficiently take into account the cumulative or cross-border environmental impacts (UNESCO World Heritage Centre - IUCN, 2015; JGLR, 2018).

Lake ecological and water level monitoring data have been published by scientists with interests in the future of the lake, but the State Parties have done nothing yet to establish wildlife numbers, and Kenya's national fisheries research institute are unable to provide recent fish catch data with which to assess the impacts of the Gibe III filling. The 2018-2028 Management Plan includes neither wildlife nor fisheries statistics. And meanwhile wildlife numbers are being seriously impacted by increasing human population pressure, the associated livestock incursions are competing for the available grazing and forage, and poaching of fisheries is rampant.

Under the new KWS/NMK management plan 2018-2028, a plan for a wildlife census is included, and the baseline survey was scheduled to be done by December 2020 (KWS/NMK, 2019). The State Party of Kenya has mentioned national monitoring plans for Grevy's zebra, lion, hyaena and cheetah, and talks of a preliminary wildlife survey in Sibiloi for which results were stated to be attached to the State Party of Kenya report. But, only a bird survey was attached to that report, and it can be presumed that nothing has been done. The plan presumes that all such monitoring would be carried out in-house, but perhaps independent monitoring is the best way forward?

### ► **Research**

**Some Concern**

The rich fossil deposits at Koobi Fora have been the subject of extensive research by scientists since the 1960s and this area continues to yield important fossil finds. National and foreign universities provide expertise in research, monitoring and impact assessment (UNEP-WCMC, 2012) but there is no

systematic management-orientated research programme for the parks. Regrettably, the lack of ongoing research presence means that fossil beds have been trampled by livestock with fossils and the museum being on occasion looted too.

Archaeological research is also being carried out independently by the Turkana Basin Institute based out of their establishments outside the site at Ileret north of Sibiloi NP and west of the lake on the Turkwel river downstream from Lodwar. They fund activities through generating interest from offshore institutions.

### Overall assessment of protection and management

**Serious Concern**

Protection and management of the site is severely constrained by its remote location, lack of infrastructure and low levels of funding. Only a draft management plan exists and the parks' wildlife and other resources seem to be in decline. Data in the form of SEA and wildlife census is unavailable. In recent years, however, the governments of Ethiopia and Kenya signed a few agreements on mitigating impacts of development initiatives and enhancing cross-border collaboration with, among others, the aim to reduce environmental degradation, but there is no visible progress in implementation.

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

**Serious Concern**

The main threat to the site arises from the damming of inflowing rivers and the use of water for irrigated agriculture, which will progressively lower the level of the lake, altering its ecology and impacting on its biodiversity values. In recent years the Kenyan and Ethiopian governments signed agreements on several initiatives to enhance collaboration in the border-region, including the impact mitigation of the Kuraz Sugar Scheme, Gibe III and other factors that cause biodiversity and environmental degradation.

## State and trend of values

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### Assessing the current state and trend of values

#### World Heritage values

##### ► Fossil deposits

**High Concern**  
**Trend:Stable**

The fossil deposits at Koobi Fora and other locations are very vulnerable although most excavation sites are re-buried once investigations are completed (Mission Report, 2012). However, the fossil beds are being trampled by herders and livestock (KWS/NMK, 2019). The petrified forest near Alia Bay is a maze of livestock trails. No tourist is going to enjoy witnessing this lack of care.

##### ► Complex of geological features

**Low Concern**  
**Trend:Deteriorating**

The existing geological attributes and geomorphological formations of the site are unlikely to be altered significantly by development activities in the Lower Omo. The biggest threat is the increasing pressure on remaining pastures and woodland within the site that will lead to erosion. There is little care for the unique petrified forest with a proliferation of livestock trails forming conduits for stormwater runoff and erosion. Tourists will see petrified artefacts washed into the nearby water course by storm water. Those artefacts will in time be washed down the watercourse and reduced to sand and lost forever.

► **Diversity of aquatic and lakeshore habitats in a semi-desert environment**

**High Concern**  
**Trend:Deteriorating**

Receding water levels and reduced seasonal fluctuations resulting from the damming of the Omo River and sugar plantations are likely to alter the location and characteristics of the shoreline. Once completed, the development projects will continue to impact the lake, lowering its level and reducing its seasonal fluctuations, reducing the silt deposition into the lake and delta, dampening the beneficial flushing of high river discharges, and by introducing agricultural chemicals and depleting water volumes entering the lake through ongoing abstractions for agriculture. Furthermore, the salinity of lake waters is likely to increase significantly as the balance between rate of inflow and evaporation changes, with unpredictable consequences for the lakeshore and aquatic vegetation (and associated ecology).

► **Diversity and abundance of birds**

**Low Concern**  
**Trend:Deteriorating**

WHC previously reported that there are no recent data on trends in the diversity and abundance of birds (World Heritage Committee, 2015). That "no data" status was confirmed in the Bird Monitoring Report dated 2016 that was attached to the State Party of Kenya's 2020 report (NMK, 2020). The main concern in the Lake Turkana region will be ongoing loss of habitat and rangeland degradation. Vast areas of land in Lower Omo are being converted from national parks and reserves into mono-culture plantations and the Omo delta's ecology is threatened by damming of the river and deprivation of sediments and nutrients (Univ of Oxford, 2012). The Omo delta is a critical lake wetland and bird habitat. The Turkwel and Kerio deltas are likewise liable to be affected by upstream dam and irrigation developments. They are also already invaded by the invasive *Prosopis juliflora* (ibid.). If the lake level were to fall, the future of the crater lakes within Central Island NP would be threatened, notably the unique Flamingo Lake which is naturally shallow and highly saline (EAWLS, 2014). Concerns have also been expressed about the impact on flying birds of the huge wind farm between Loiyangalani and South Horr (on the edge of the Mt Kulal Biosphere Reserve, and not far from the lake).

► **Rare and endangered fauna**

**Critical**  
**Trend:Deteriorating**

There are no recent wildlife census data, although stakeholder reports suggest significant declines in the populations of key species of endangered fauna, including crocodile. Certain flagship species, such as reticulated giraffe and Grevy's zebra were reported to have disappeared altogether from the area since the site was listed (SOC, 2012). Grant's gazelle, lions, and plains zebra were reported virtually absent.

The national endangered status of Grevy's zebra is confirmed in the 2018-2028 Management Plan (KWS/NMK, 2019, p.12), and although mentioned prominently throughout the document, no numerical data were provided for Sibiloi NP. Oryx and gerenuk were reported "near threatened" (ibid., p.15), and "threatened" (ibid., p.10). There were no numerical data for northern topi in Sibiloi NP, and it had been stated to be "only a matter of time" before "near threatened" or "vulnerable" status is reached (ibid., p.15), but also listed as "threatened" (ibid., page v, Table 1). Northern topi, Burchell's zebra and Grant's gazelle are still to be seen near Park HQ. Lion are nationally classified by IUCN as vulnerable, and are referred to throughout the Management Plan, but with no supporting numeric data provided. With the levels of livestock incursions occurring accompanied by armed herders, any carnivore existing with Sibiloi NP will be increasingly vulnerable.

► **Endemic species of fish**

**High Concern**  
**Trend:Deteriorating**

Significantly, even Ethiopia's Omo-Gibe Integrated Development Master Plan in 1996 commented "... the lake is reportedly already over-fished and reductions in yield are likely no matter what developments take place in the Omo-Gibe Basin" (researched by Univ of Oxford, Section 2.2.6, 2012; OGBMP, 1996). That Master Plan further stated in 1996 that "...in the international context a bilateral agreement should be reached between the two countries before either country changes the natural flow of the river" (ibid). Years later when Gibe III was well under construction, that agreement was still not in

place (AfDB, 2009; EIB, 2010).

A Kenyan socio-economic survey carried out between 2015 and 2016 reported that the majority of fisher folk on Lake Turkana were expecting the damming of the Omo River and the irrigation plantations to significantly affect flows and affect water levels (KMFRI, 2017). The survey was conducted whilst the lake level was falling during the Gibe III filling period. 76% of respondents were already citing competition over fishing areas as a cause of violent conflict. Over 90% had experienced resource conflicts and over 80% stated these conflicts were increasing.

A progression of scientific studies have pointed out the threats to Lake Turkana's fisheries. The importance of the natural annual Omo flood to the lake ecology and fisheries was first established by the Lake Turkana Project 1972-75, followed shortly by the Lake Turkana Limnological Study 1985-88. And in 1992, Kenya's National Water Master Plan warned that increased water consumption in the Omo basin would lead to concentration of dissolved matter in the lake water, and that if this reached the point where fauna and flora cannot survive, the existing fishery and crocodile population would collapse (AfDB, 2009 & 2010; Univ of Oxford, Section 17, 2012; JICA/NWMP, 1992). Others have since either reiterated or confirmed those warnings (Kolding, AfDB, EIB, Ojwang et al., KMFRI, Muska et al., Gownaris et al., etc). A recent scientific study has confirmed the changes to the hydrological diversity of lake inflows due to the lower Omo developments, with a knock-on effect expected on ecological diversity (JGLR, 2018). Another recent study based on remote sensing has predicted a decline in primary production in the lake as a result of the Lower Omo dam and irrigation developments (RRA, 2019). These results simply confirm all the warnings over the decades.

## Summary of the Values

### ► Assessment of the current state and trend of World Heritage values

**High Concern**  
**Trend: Deteriorating**

Although the site retains its value as one of the world's most important fossil sites, its biodiversity is under escalating pressure from development activities outside the site as well as local population increase and associated over-grazing, illegal fishing and wildlife poaching. Upstream irrigation projects are in early days and the recent wet years have meant that the lake levels have not showed signs of lowering. The hydrological cycles have however, changed as predicted. Although there is little monitoring of the area's biodiversity and resources, local reports suggest that prominent wildlife species are in decline and several species have become locally extirpated as a result of poaching as well as encroachment of livestock and local populace since the site was inscribed.

## Additional information

## Benefits

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### Understanding Benefits

#### ► Fishing areas and conservation of fish stocks

Fishing is an important livelihood to lakeshore residents.

Factors negatively affecting provision of this benefit :

- Climate change : Impact level - Moderate, Trend - Continuing
- Overexploitation : Impact level - High, Trend - Continuing
- Invasive species : Impact level - Moderate, Trend - Continuing
- Habitat change : Impact level - Moderate, Trend - Increasing

*Prosopis juliflora* is overwhelming the river deltas (Univ. of Oxford, 2012). It is also clogging the shores of Ferguson's Gulf in the vicinity of Kalokol.

### ► History and tradition

There are important archaeological sites on both the western and eastern shores of the lake.

Factors negatively affecting provision of this benefit :

- Climate change : Impact level - Low, Trend - Continuing
- Invasive species : Impact level - Low, Trend - Continuing
- Habitat change : Impact level - Low, Trend - Continuing

Data deficient, but with the ever increasing pressure for pasture, these areas are being encroached upon and trampled by livestock and their herders.

### ► Natural beauty and scenery

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Factors negatively affecting provision of this benefit :

- Climate change : Impact level - Low, Trend - Continuing
- Overexploitation : Impact level - Moderate, Trend - Increasing
- Invasive species : Impact level - Low, Trend - Continuing
- Habitat change : Impact level - Low, Trend - Increasing

The main consideration is increasing human population, and constant encroachment into protected areas, which degrades the natural landscape. Whereas one used to see plentiful wildlife, nowadays one is more likely to see livestock instead.

### ► Importance for research

The western and eastern shores of the lake include important sites for archaeological research and especially within the Sibiloi National Park on the northeastern shore (SoOUV, 2012). This mainly benefits people from outside the community, and local people in the vicinity of Sibiloi claim they derive no direct benefit, they never see the outcome of the research, and none of their community is being educated in this research discipline (KWS/NMK, 2019). Similar complaints about job creation are routinely targeted by NGOs at the oil exploration industry. Expectations are generally unrealistic, as specialist skills take many years to acquire, and tend to be short-term inputs. The local skills base is predominantly pastoralism, the development of alternative livelihood skills being hampered by lack of education, this being a challenge facing government.

The Management Plan states the following: "In view of the fact that research carried out in the LTNPs potentially comprises anthropological, geological, paleontological, archaeological and ecological disciplines, it is imperative that the core team is led by, or composed of NMK and KWS staff. Under this management programme, NMK will seek research collaboration with other stakeholders to maintain a robust research presence in the LTNPs" (KWS/NMK, 2019).

Factors negatively affecting provision of this benefit :

- Climate change : Impact level - Low, Trend - Continuing
- Overexploitation : Impact level - Moderate, Trend - Continuing
- Invasive species : Impact level - Low, Trend - Continuing
- Habitat change : Impact level - Low, Trend - Continuing

### ► Collection of wild plants and mushrooms

Data deficient.

### ► Livestock grazing areas

Livestock forms an important livelihood for the local population around Lake Turkana (UN Country teams of Ethiopia and Kenya and IGAD, sd).

Factors negatively affecting provision of this benefit :

- Climate change : Impact level - Low, Trend - Continuing
- Overexploitation : Impact level - High, Trend - Continuing
- Invasive species : Impact level - Low, Trend - Continuing
- Habitat change : Impact level - High, Trend - Continuing

Livestock encroachment into protected areas is now near constant, whereas it had been intended to serve as a drought refuge only. Another recent competing factor is the emergence of locusts. Locusts tend to favour degraded landscapes for breeding .

#### ► **Cultural identity and sense of belonging**

The Management Plan objectives include establishing a cultural and natural heritage outreach programme as part of local education curriculum (KWS/NMK, 2019, p.84).

#### ► **Water provision (importance for water quantity and quality)**

The water of the main lake is 2.5 times more saline than the normal maximum limit of drinking water and contains excessively high fluoride concentration and is therefore unsuitable for drinking and irrigation (Avery, 2010 & 2012). The lake wetlands also include small lakes of varying salinity, notably three lakes on Central Island NP. The various lake waters support a diversity of freshwater fish species, hippo, birds, insects, reptiles including crocodile, turtles, snakes (Wetland Encyclopaedia, Ojwang et al., 2016). Where suitable muddy substrate exists, the lake also supports beds of submerged aquatic macrophytes (*Potamogeton pectinatus*) and shoreline grasses (UNEP-WCMC, 2012). The lake is part of the Turkana jet, a source of wind energy that induces lake currents and mixing, and the 20 km<sup>3</sup> of annual evaporation contributes to the micro-climate within this desert area (Ferguson & Harbott, 1982; JGLR, 2018). The lake wetlands include deltas where the Omo, Kerio and Turkwel basins discharge to the lake (EAWLS, 2012 & 2014).

Factors negatively affecting provision of this benefit :

- Climate change : Impact level - Low, Trend - Continuing
- Pollution : Impact level - Low, Trend - Continuing
- Overexploitation : Impact level - Very High, Trend - Continuing
- Invasive species : Impact level - Moderate, Trend - Continuing
- Habitat change : Impact level - High, Trend - Continuing

The main challenges are escalating human population pressure and development-induced changes to the freshwater inflow hydrological diversity (quantity, quality, variability), this being the lake's principal ecological driver (Kolding; AfDB, 2009; Univ of Oxford, 2012; Wetland Encyclopaedia, Ojwang et al., 2016; JGLR, 2018; RRA, 2019).

#### ► **Collection of timber, e.g. fuelwood**

Trees are reportedly taken from within the protected area for fuelwood and charcoal (UNEP-WCMC, 2012), and are cut to provide stockade material for livestock enclosures (KWS/NMK, 2019).

Factors negatively affecting provision of this benefit :

- Climate change : Impact level - Low, Trend - Continuing
- Pollution : Impact level - Low, Trend - Continuing
- Overexploitation : Impact level - Very High, Trend - Continuing
- Invasive species : Impact level - Low, Trend - Continuing
- Habitat change : Impact level - High, Trend - Continuing

#### ► **Collection of medicinal resources for local use**

Local people also rely on herbal medicine harvested at the site. There is reportedly also commercial harvesting of Aloe. There is no mention of these benefits in the 2018-2028 Management Plan other than reference to the Kalacha Food Festival organised by the Kivulini Trust that exhibits traditional foods and medicinal plants (KWS/NMK, 2019, p.18). This was last held in 2018, the Trust's website certificate is expired and the account suspended. Kalacha is located between North Horr and Marsabit, on the edge

of the Chalbi desert.

### ► Outdoor recreation and tourism

Potential as tourist sites but these are not developed to full potential. Livestock utilisation must be addressed (reduced) to preserve habitat and restore wildlife numbers, and poaching of fisheries must be addressed.

Factors negatively affecting provision of this benefit :

- Climate change : Impact level - Low, Trend - Continuing
- Overexploitation : Impact level - Very High, Trend - Continuing
- Invasive species : Impact level - Low, Trend - Continuing
- Habitat change : Impact level - Moderate, Trend - Continuing

### ► Contribution to education

The Management Plan objectives include establishing and equipping educational facilities in the parks, especially in Sibilo National Park, Kalokol, Loiyangalani and Illeret; establishing a cultural and natural heritage outreach programme as part of local education curriculum; promoting environmental education through awareness campaigns using schools, local barazas, women groups and work- shops (KWS/NMK, 2019).

Factors negatively affecting provision of this benefit :

- Overexploitation : Impact level - Low, Trend - Continuing
- Habitat change : Impact level - Low, Trend - Continuing

## Summary of benefits

The flora and fauna of Lake Turkana National Parks are accessible by the local population and comprise important and diverse natural habitats that include fish, bird, insect and wildlife stocks, wood, fodder for livestock, and wild plants for medicinal use. The site has historical, recreational and cultural value and provides natural beauty for tourism and educational and research benefits. Due to a lack of data, not all the benefits or their extent can be quantified, but the lake is a vast water body that contributes to the micro climate of a desert area. The lake's strong winds are a source of energy, and the water body forms a physical divide between different ethnic communities.

## Projects

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### Compilation of active conservation projects

№	Organi- zation	Pro- jec- t dur- ati- on	Brief description of Active Projects
1	Friends of Lake Turkana		Friends of Lake Turkana is a Kenyan organization whose objective is to strengthen natural resource management in the Lake Turkana Basin. The organisation has engaged stakeholders from Lake Turkana basin in dialogue about the current status of oil exploration and production, dam construction and other major infrastructural development in the region and the implication of these initiatives on the land rights, environment and culture of the people.
2	Save Lake Turkana Movem- ent		A Kenyan youth-driven organization that raises awareness about Lake Turkana <a href="https://www.youtube.com/watch?v=AVskqANY8FE&amp;feature=youtu.be">https://www.youtube.com/watch?v=AVskqANY8FE&amp;feature=youtu.be</a>

№	Organization	Project duration	Brief description of Active Projects
3	National Museums of Kenya (NMK)		Fossil and anthropological research
4	Kenya Wildlife Service (KWS)		Wildlife conservation and management
5	Kenya Marine and Fisheries Research Institute (KMFRI)		A national research institution with an office in Kalokol whose mandate encompasses the whole lake fisheries
6	Northern Rangelands Trust Kenya (NRT)		The Northern Rangelands Trust (NRT) is a Kenyan community conservancy membership organisation. NRT supports 39 community conservancies across northern and coastal Kenya. NRT member community conservancies work to conserve wildlife and sustainably manage the grassland, forest, river, lake and marine ecosystems upon which livelihoods depend. NRT works closely with KWS and the Kenya Police, and there are several NRT-supported conservancies within the Samburu and Marsabit Counties, and also in West Pokot to the west of the lake, and there has been dialogue with Turkana County too. If there are feasible buffer zones and corridors that would help protect, conserve and secure the OUVs of the Lake Turkana National Parks, NRT has the experience and community-conservation profile to advise.

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