



Ramsar Information Sheet

Published on 13 July 2017

Malawi Elephant Marsh



Designation date	1 July 2017
Site number	2308
Coordinates	16°21'29"S 35°00'58"E
Area	61 556,00 ha

Color codes

Fields back-shaded in light blue relate to data and information required only for RIS updates.

Note that some fields concerning aspects of Part 3, the Ecological Character Description of the RIS (tinted in purple), are not expected to be completed as part of a standard RIS, but are included for completeness so as to provide the requested consistency between the RIS and the format of a 'full' Ecological Character Description, as adopted in Resolution X.15 (2008). If a Contracting Party does have information available that is relevant to these fields (for example from a national format Ecological Character Description) it may, if it wishes to, include information in these additional fields.

1 - Summary

Summary

The Elephant Marsh is located in the Lower Shire valley, Southern Malawi spanning the administrative districts of Chikwawa and Nsanje. Its area varies across the flood cycle and is estimated to cover approximately 615.56 square kilometers in the wet season. The Elephant Marsh is a mosaic of rooted swamp vegetation, floating vegetation and open water with grassy margins and reed beds, interspersed with islands containing reeds, shrubs and palm trees. A large proportion of the floodplains and some of the marshy periphery are cultivated which means that the dominant undisturbed habitat is marsh. Although the vegetation of the Elephant Marsh is not considered to be globally or nationally threatened, its presence and protection is intimately linked with the hydromorphological functioning of the marsh, the habitats that it provides and biodiversity that it supports, and the provision of ecosystem services and goods that sustain the livelihoods of many rural households in these two districts. The combination of the different habitat types within the marsh, and the changes in these over the course of the flood cycle, gives rise to the overall productivity of the site and its importance for the conservation of resident and migrating species.

The site supports populations of birds, insects, reptiles, fish and large mammals. Around 110 waterbird species have been recorded at Elephant Marsh and 26 of these have been found breeding in the area. The Elephant Marsh supports over 20,000 waterbirds and 1% or more of a delineated population of three waterbird species therefore exceeding the thresholds set by The Ramsar Convention for a wetland to be considered of 'international importance'. In addition to this it also supports populations of hippopotamus, and several species of fish and aquatic invertebrates, including one new sub-species of butterfly.

In terms of ecosystem services and livelihoods, the area is characterized by subsistence farming on customary land, livestock production and small-scale fishing. The Elephant Marsh area plays an important role in terms of storage for maintenance of hydrological regime including flood control and storage and supplying nutrient-rich sediment. It is particularly important during the dry (winter) season when agriculture is largely reliant on the soil moisture. The Elephant Marsh also supports around 1,500 small-scale fishers.

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Compiler 1

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2.1.2 - Period of collection of data and information used to compile the RIS

From year	2014
To year	2016

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)	Elephant Marsh
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2.2 - Site location

2.2.1 - Defining the Site boundaries

b) Digital map/image

<2 file(s) uploaded>

Former maps	0
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Boundaries description

The Elephant Marsh lies within the floodplains of the Lower Shire River and covers an estimated area of 615.56 km² based on the extent of high water flooding in the Elephant Marsh. The area of the Marsh can vary between wet and dry season and between years depending on the flood cycle.

2.2.2 - General location

a) In which large administrative region does the site lie?	The Elephant Marsh straddles the administrative districts of Chikwawa and Nsanje.
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b) What is the nearest town or population centre?	Elephant Marsh lies between the administrative centres of Chikwawa in the north Nsanje in the south. Chikwawa lies at the northern end of the marsh and Bangula and Chiromo Bridge at the south. Around the edge of the marsh there are a number of towns
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2.2.3 - For wetlands on national boundaries only

a) Does the wetland extend onto the territory of one or more other countries? Yes No

b) Is the site adjacent to another designated Ramsar Site on the territory of another Contracting Party? Yes No

2.2.4 - Area of the Site

Official area, in hectares (ha):

Area, in hectares (ha) as calculated from GIS boundaries

2.2.5 - Biogeography

Biogeographic regions

Regionalisation scheme(s)	Biogeographic region
WWF Terrestrial Ecoregions	Central and Eastern Mombo Woodlands

3 - Why is the Site important?

3.1 - Ramsar Criteria and their justification

<no data available>

<no data available>

Criterion 3 : Biological diversity

Justification

A butterfly survey was undertaken in the Elephant Marsh on the 25th-29th June and during this time a new sub-species of butterfly was recorded. It has been estimated that the marsh may contain up to 25% of Malawi's butterfly species. A new race of *Colotis amata* was recently discovered that breeds exclusively on *Salvadora persica* (toothbush/salt bush) on the lake edge. This plant will not be threatened by habitation as it offers shade for small ruminants, some food and is used by the population.

It is estimated that fewer than 100 hippopotamus currently exist in Elephant Marsh. These are the only mammal species that are listed as Threatened (VU) that still remain in the area. At least 108 species of mammal are expected to still occur in the Elephant Marsh area, with 37 more species considered as 'uncertain/presence not impossible' of which 3 are listed as Threatened and by CITES.

During a bird survey between 7th-15th March 2016 a total of 199 bird species were recorded in the Elephant Marsh area, of which 68 species were regarded as water birds. The March survey confirmed that the Elephant Marsh supports 1% or more of a delineated population of three waterbird species and in general regularly supports over 20,000 waterbirds. Eight of the waterbird species that have been recorded at Elephant Marsh (either in the March survey or during the African Waterbird Census) are formally considered globally threatened including; Madagascar Squacco Heron, Lesser Flamingo, Wattled Crane, Southern Crowned Crane, Great Snipe, Bar-tailed Godwit, Curlew Sandpiper and African Skimmer. Of these species the Elephant Marsh is a significant locality for the African Skimmer.

The fish population is similar to the Zambezi and while the majority of fish are considered to be Least Concern as assessed by the IUCN Red List, the Sanjika (*Opsaridium microcephalum*) is considered Vulnerable and is endemic in the area. Two other fish species, the African mottled eel (*Anguilla bengalensis labiate*) and the Mozambique tilapia (*Oreochromis mossambicus*), are also considered to be Near Threatened. Whilst not considered threatened, the lungfish (*Protopterus annectens*) is restricted to seasonal pools, which are susceptible to land use change and drainage, and so might be at risk locally. Although the Elephant Marsh system has been significantly altered and has lost much of its original wetland and floodplain area to agricultural use and human settlement, it still contains large enough areas of functional marshes and floodplain habitats in the less accessible centre of the marsh to support significant biodiversity and ecosystem services.

Criterion 5 : >20,000 waterbirds

Overall waterbird numbers 20,238

Start year 2016














Source of data: The source of the data is presented in a technical report on the Biodiversity of the Elephant Marsh (uploaded). The fieldwork undertaken to collect the data as part of the Shire River Basin Management Program World Bank funded project.

Criterion 6 : >1% waterbird population

3.2 - Plant species whose presence relates to the international importance of the site

Field studies conducted in March 2016 recorded 70 species of reed, tree and shrub were recorded in the Elephant Marsh along with 82 species of graminoids, groundcovers and aquatic plant species. None of these species are considered threatened or of any particular conservation interest and therefore do not contribute to the Ramsar criteria.

3.3 - Animal species whose presence relates to the international importance of the site

Phylum	Scientific name	Common name	Species qualifies under criterion			Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence ¹⁾	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification	
			2	4	6	9	3	5	7									8
Birds																		
CHORDATA/AVES	<i>Anastomus lamelligerus</i> 	African Openbill	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3991	March 2016	1	LC 	<input type="checkbox"/>	<input type="checkbox"/>		Population counts conducted in March 2016 exceed 1 % thresholds specified by Ramsar
CHORDATA/AVES	<i>Chidonias hybrida</i> 	Whiskered Tern	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	246	March 2016	2.9	LC 	<input type="checkbox"/>	<input type="checkbox"/>		Population counts conducted in March 2016 exceed 1 % thresholds specified by Ramsar.
CHORDATA/AVES	<i>Glareola pratincola</i> 	Collared Pratincole	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2000	January 2016	2	LC 	<input type="checkbox"/>	<input type="checkbox"/>		African Waterbird Census in Jaunray 2016 exceeded 1 % thresholds specified by Ramsar Population counts conducted in March 2016 exceed 20,000 thresholds specified by Ramsar
CHORDATA/AVES	<i>Rynchops flavirostris</i> 	African Skimmer	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	113	March 2016	1.1	NT 	<input type="checkbox"/>	<input type="checkbox"/>		Population counts conducted in March 2016 exceed 1 % thresholds specified by Ramsar.
Fish, Mollusc and Crustacea																		
CHORDATA/ACTINOPTERYGII	<i>Opsaridium microcephalum</i> 	Lake trout	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		March 2016		VU 	<input type="checkbox"/>	<input type="checkbox"/>		Classified as threatened by the IUCN Red List
Others																		
ARTHROPODA/INSECTA	<i>Colotis amata</i> 	Topaz Arab; Small Salmon Arab	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		June 2016			<input type="checkbox"/>	<input type="checkbox"/>		New race of <i>Colotis amata</i> discovered
CHORDATA/MAMMALIA	<i>Hippopotamus amphibius</i> 	hippopotamus	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100	March 2016		VU 	<input type="checkbox"/>	<input type="checkbox"/>		Classified as threatened by the IUCN Red List

1) Percentage of the total biogeographic population at the site

The March 2016 counts revealed totals in excess of the 1% thresholds for the following species: Openbill Stork (counted - 3991, 1% threshold – 3900), Whiskered Tern (counted – 246, 1% threshold – 85), and African Skimmer (counted 113, 1% threshold – 100). The African Waterbird Census (AWC) counts have also reported numbers of Whiskered Terns, African Skimmers and Common Pratincoles in excess of the 1% threshold. Given that the March 2016 survey and the AWC counts are undercounts to at least some degree for all, or virtually all, species, it also seems likely that the actual numbers of the following species in Elephant Marsh also exceed the 1% Ramsar thresholds on the basis of the numbers that have been counted by one or both efforts counted: Common Squacco Heron, Black Egret and Long-toed Plover.

Hippopotamus is the only threatened mammal species that remains at Elephant Marsh, outside of the protected areas, with a population estimated to be less than 100. A butterfly survey undertaken in June 2015, discovered a new race of *Coloti amata* (Topaz Arab) that was feeding extensively around the lake edge on *Salvadora persica* (toothbush/ salt bush). This species is Pan African, found in Senegal and Ethiopia to South Africa however, it has not before been recognised to occur in Southern Malawi and could potentially be considered a Shire Valley Endemic Butterfly. In the past the Elephant Marsh would have supported a fairly diverse butterfly fauna however, following significant degradation of the area many of these species are thought to have disappeared. From a fish survey undertaken from 2-13 November 2015 a total of 52 species from 17 families were observed or strongly expected to be resident in the Elephant Marsh. Of those observed or expected to occur, most have been assessed by the IUCN Red List, however only the Sanjika (*Opsaridium microcephalum*) is assessed as Vulnerable and is endemic to Lake Malawi, its catchment and the Lower Shire.

From a fish survey undertaken from 2-13 November 2015 a total of 52 species from 17 families were observed or strongly expected to be resident in the Elephant Marsh. Of those observed or expected to occur, most have been assessed by the IUCN Red List, however only the Sanjika (*Opsaridium microcephalum*) is assessed as Vulnerable and is endemic to Lake Malawi, its catchment and the Lower Shire.

3.4 - Ecological communities whose presence relates to the international importance of the site

<no data available>

4 - What is the Site like? (Ecological character description)

4.1 - Ecological character

The Elephant Marsh is located in the southern region of Malawi and is characterised by a low-latitude dry climate. It comprises of a diversity of aquatic and floodplain habitats that vary with the flooding cycle and it utilised to different extents in different parts. In the north-west, it is typically a seasonal wetland; in the centre region, it is semi-permanent marshland, and; in the south, it is characterised by semi-permanent marsh and shallow lake. The Marsh supports floating mats of vegetation and its margins are relatively grassy and lined with palm and fever trees. However, the main area of its surface is a mosaic of rooted swamp vegetation, floating vegetation and open water. The Marsh responds to the water and sediment regimes of the Shire River, whose source originates from the outflow of Lake Malawi. The Shire River flows south through the Marsh before joining the Zambezi River in Mozambique.

The Elephant Marsh supports a wide diversity of species and is especially important for water birds as it regularly supports 1% or more of three waterbird species, including the African Skimmer, for which the Marsh is a significant locality. In addition to this the Marsh support around 100 hippopotamus, which are globally threatened, and other noteworthy species such as *Borassus aethiopum* which was listed as endangered in an FAO report on plant genetic resources.

In spite of the fact that the Elephant Marsh system has been significantly altered around the edges, it still contains large enough areas of functional marshes and floodplain habitats to support significant biodiversity and ecosystem services.

4.2 - What wetland type(s) are in the site?

Inland wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
Fresh water > Flowing water >> M: Permanent rivers/ streams/ creeks	Shire River and tributaries (e.g. Ruo Tributary)	4		
Fresh water > Flowing water >> N: Seasonal/ intermittent/ irregular rivers/ streams/ creeks	e.g. Maperera, Thangadzi East, Mwanza	4		
Fresh water > Lakes and pools >> O: Permanent freshwater lakes	e.g Lake Tomaninjobi	3	1782	
Fresh water > Lakes and pools >> Tp: Permanent freshwater marshes/ pools	Elephant Marsh	1	2103	
Fresh water > Marshes on inorganic soils >> Ts: Seasonal/ intermittent freshwater marshes/ pools on inorganic soils	Elephant Marsh	2		

Human-made wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
3: Irrigated land		2		
4: Seasonally flooded agricultural land	Dimba	1		

(ECD) Habitat connectivity

Lower Shire basin sits within the Lower Zambezi system, ecologically disconnected from the Middle, Upper Shire, and Lake Malawi to the north by a series of natural and man-made barriers. Connectivity with Lower Zambezi to south is relatively unimpeded

4.3 - Biological components

4.3.1 - Plant species

Other noteworthy plant species

Scientific name	Common name	Position in range / endemism / other
<i>Borassus aethiopum</i>	borassus palm or muvo	

Invasive alien plant species

Scientific name	Common name	Impacts
<i>Eichhornia crassipes</i>	water hyacinth	Actually (major impacts)
<i>Pistia stratiotes</i>	water cabbage	Actually (major impacts)

4.3.2 - Animal species

Other noteworthy animal species

Phylum	Scientific name	Common name	Pop. size	Period of pop. est.	%occurrence	Position in range / endemism/other
CHORDATA/REPTILIA	<i>Crocodylus niloticus niloticus</i>	Nile Crocodiles				

4.4 - Physical components

4.4.1 - Climate

Climatic region	Subregion
B: Dry climate	BSh: Subtropical steppe (Low-latitude dry)

It is suggested that climate change and development will result in an increase in both floods and droughts. The Shire Valley, which has been identified as one of Malawi's most susceptible regions to the negative impacts of global climate change is likely to experience shorter wet seasons and longer dry seasons.

4.4.2 - Geomorphic setting

a) Minimum elevation above sea level (in metres)

a) Maximum elevation above sea level (in metres)

- Entire river basin
- Upper part of river basin
- Middle part of river basin
- Lower part of river basin
- More than one river basin
- Not in river basin
- Coastal

Please name the river basin or basins. If the site lies in a sub-basin, please also name the larger river basin. For a coastal/marine site, please name the sea or ocean.

The Shire River is one of the 13 sub-basins of the Zambezi Basin.

4.4.3 - Soil

- Mineral
- Organic
- No available information

Are soil types subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification)? Yes No

4.4.4 - Water regime

Water permanence

Presence?
Usually permanent water present

Source of water that maintains character of the site

Presence?	Predominant water source
Water inputs from surface water	<input checked="" type="checkbox"/>

Water destination

Presence?
To downstream catchment

Stability of water regime

Presence?
Water levels fluctuating (including tidal)

Please add any comments on the water regime and its determinants (if relevant). Use this box to explain sites with complex hydrology.

The Elephant Marsh is fed by the Shire River whose source originates from Lake Malawi. The Lake Malawi-Shire River hydrological system represents Malawi's most important natural resource and the river flows for 520km through the southern region of Malawi and is joined by numerous tributaries along its length before discharging into the Zambezi River near the town of Caia in Mozambique. The Lower Shire emerges from the Kapichira Falls where it enters a floodplain system. The Ruo River is the largest tributary of the Shire River entering the marsh at the south and a dynamic network of narrow and shallow distributary channels flow through the eastern and central regions.

(ECD) Stratification and mixing regime

It is believed that there would be some vertical temperature differentials in the shallow lakes, especially in the dry season. This is expected because, with exception of downstream section of Lake Tomaninjobi, therefore there is expected little mixing

4.4.5 - Sediment regime

- Significant erosion of sediments occurs on the site
- Significant accretion or deposition of sediments occurs on the site
- Significant transportation of sediments occurs on or through the site
- Sediment regime is highly variable, either seasonally or inter-annually
- Sediment regime unknown

Please provide further information on sediment (optional):

The main river channel is sinuous, deep and relatively fast flowing, with eroded and vegetated banks, as well as backwaters. The water turbidity was extremely high, water clarity 2 cm, and the water colour red-brown. Water Clarity was extremely low in the wadaeble river sites and in the Elephant Marsh at the NEM sites, ranging between 2 and 3 cm. Water clarity improved slightly in the Elephant Marsh at site in the SEM, ranging from 5 to 130 cm. The highest water clarity was measured at the WEM sites, which were all >120 cm.

(ECD) Water turbidity and colour Field sampling was undertaken on several sites from the 17th to 21st January 2016

4.4.6 - Water pH

- Acid (pH<5.5)
- Circumneutral (pH: 5.5-7.4)
- Alkaline (pH>7.4)
- Unknown

Please provide further information on pH (optional):

pH varied between different sites that were sampled ranging from between 6.7 to 8.2.

4.4.7 - Water salinity

- Fresh (<0.5 g/l)
- Mixohaline (brackish)/Mixosaline (0.5-30 g/l)
- Euhaline/Eusaline (30-40 g/l)
- Hyperhaline/Hypersaline (>40 g/l)
- Unknown

Please provide further information on salinity (optional):

(ECD) Dissolved gases in water

Overall dissolved oxygen levels measured were very low and ranged from between 0.7-9.4mg/l between the different sites sampled.

4.4.8 - Dissolved or suspended nutrients in water

- Eutrophic
- Mesotrophic
- Oligotrophic
- Dystrophic
- Unknown

(ECD) Water conductivity Electrical conductivity varied between the different sites. Highest (320.0 S/cm) and lowest (145.8S/cm).

4.4.9 - Features of the surrounding area which may affect the Site

Please describe whether, and if so how, the landscape and ecological characteristics in the area surrounding the Ramsar Site differ from the site itself. i) broadly similar ii) significantly different

- Surrounding area has greater urbanisation or development
- Surrounding area has higher human population density
- Surrounding area has more intensive agricultural use
- Surrounding area has significantly different land cover or habitat types

Please describe other ways in which the surrounding area is different:

On the west the Marsh is bordered by land that rises gently towards the low lying hills that include the southern-most end of the Kirk Range, the Matandwe hills in the south west and the Namalombo hills extending south wards from the Bangula Road. To the east the Thyolo Escarpment rises steeply with a number of perennial streams flowing into the Elephant Marsh. On both the east and west sides of the Elephant Marsh there are a number of streams and rivers, some seasonal (particularly on the less steep western side), that feed into the marsh. The surrounding area is characterized by higher human density and greater urbanization including towns (e.g. Kasinthula and Nchalo) and district administrative centres (e.g. Chikwawa). The surrounding area is also characterized by more intensive agricultural use both for subsistence and also commercial cash crops e.g. sugar. There is also subsistence and commercial livestock raising.

4.5 - Ecosystem services

4.5.1 - Ecosystem services/benefits

Provisioning Services

Ecosystem service	Examples	Importance/Extent/Significance
Food for humans	Sustenance for humans (e.g., fish, molluscs, grains)	High
Fresh water	Drinking water for humans and/or livestock	High
Fresh water	Water for irrigated agriculture	High
Wetland non-food products	Livestock fodder	High
Wetland non-food products	Reeds and fibre	Medium

Regulating Services

Ecosystem service	Examples	Importance/Extent/Significance
Maintenance of hydrological regimes	Storage and delivery of water as part of water supply systems for agriculture and industry	High
Maintenance of hydrological regimes	Groundwater recharge and discharge	High

Cultural Services

Ecosystem service	Examples	Importance/Extent/Significance
Recreation and tourism	Recreational hunting and fishing	Low
Recreation and tourism	Nature observation and nature-based tourism	Low

Supporting Services

Ecosystem service	Examples	Importance/Extent/Significance
Biodiversity	Supports a variety of all life forms including plants, animals and microorganisms, the genes they contain, and the ecosystems of which they form a part	Medium
Nutrient cycling	Storage, recycling, processing and acquisition of nutrients	High

Other ecosystem service(s) not included above:

Grasses found within the 87km² of uncultivated floodplain found within Elephant Marsh are widely collected and used for thatching

Within the site:

Outside the site:

Have studies or assessments been made of the economic valuation of ecosystem services provided by this Ramsar Site? Yes No Unknown

Where economic studies or assessments of economic valuation have been undertaken at the site, it would be helpful to provide information on where the results of such studies may be located (e.g. website links, citation of published literature):

Economic assessment of fisheries and agricultural are undertaken by the National Fisheries and agricultural departments.

In addition to this the value of different provisioning and regulating services were estimated in a study on ecosystem services within Elephant Marsh (Forsythe & Turpie, 2016) Report is attached;

- Fishing was estimated to be worth between US\$1.5 – 8.8 Million per year.
- Bird populations are still relatively health, and the sustainable yield is estimated to be in the order of 400 waterfowl per year sustainably (at a rate of 10% harvest), which would be worth about US\$970/annum.
- The total value of harvested papyrus and reeds in the Marsh could be in the order of US\$131 000/yr.
- The value of grasses found in the 87 km² of uncultivated floodplains could be in the order of US\$2.6 million per year. Water lilies are abundant throughout the marsh and their value be about US\$565 000 per year.
- The value of the flood retention service offered by the Elephant Marsh was assessed. The increased damage cost that would be associated with the change from a 1 in 5 year return period flood if the Elephant Marsh was not present is estimated at approximately US\$7.1 million and the increased damage cost associated with a 1 in 10 year flood would be in the order of US\$19.4 million.
- The estimated standing stock of carbon in the major vegetation groups within the Elephant Marsh is approximately 0.6 million tonnes of carbon. Using the social cost of carbon which is equal to the damage avoided by not releasing the tonne of carbon into the atmosphere, we estimate that while the loss of the Elephant Marsh could generate global damages worth \$20 million, the damage costs accruing to Malawi might only be \$3596 per annum.
- The value of day-trips on mokoros by nature and bird-watchers equates approximately US\$5000-7000 per annum.
- There are only a few tourism establishments in the area which may attribute some of their annual turnover to the presence of the marsh. Using bed nights, rack rates and an estimate of the percentage of visitors visiting the marsh specifically, we estimate that approximately US\$12500 of their annual turnover is attributable to the Marsh itself.

The total annual provisioning value was estimated to be approximately US\$5 million per annum. Most of this value is from fish and thatching grass. The total tourism/recreation value is currently quite low at approximately US\$17 500 per annum.

4.5.2 - Social and cultural values

- i) the site provides a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland
- ii) the site has exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland
- iii) the ecological character of the wetland depends on its interaction with local communities or indigenous peoples

Description if applicable

The Elephant Marsh is important to local livelihoods, particularly in respect to the provisioning services that it provides. Raw materials such as fish, mammals, birds, papyrus, reeds, thatching grass and water lilies are harvested mostly by the poorer households for subsistence and as a source of income.

Within the Marsh, rain-fed agriculture provides the main livelihood activity, including the production of sugar cane, cotton, rice, maize and sorghum, with a majority of people also keeping livestock. Agricultural production makes an important contribution towards the provision of food for local households and products can be sold at local markets to generate income. Wild foods such as lotus roots are also collected from the Marsh again providing an important food source, especially to the poorest households and can be sold, along with reeds for income.

Agricultural production is supplemented by fishing which occurs all around the Marsh, representing the full time occupation and main source of income for many.

While tourism infrastructure is fairly underdeveloped in the Lower Shire Region, there is increasing interest in tourism development based on the local flora and fauna within the Marsh.

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

Description if applicable

Several graveyards exist in and around the Marsh which have spiritual significance to communities and as such are respected by the local people. This has allowed the vegetation to develop naturally, creating refuges for butterflies and other tree dwelling animals.

4.6 - Ecological processes

(EOD) Notable species interactions, including grazing, predation, competition, diseases and pathogens

Human-Wildlife Conflict: crocodile (and to some extent hippo) attacks on people are common as the fishers and farmers make use of the marsh for livelihood and basic life. People living within are vulnerable to water-borne diseases (malaria, bilharzia etc)

(EOD) Pressures and trends concerning any of the above, and/or concerning ecosystem integrity

There are a number of threats to the ecology of the marsh and to the livelihoods and well-being of people living there. Growing human population and commercial agriculture development main pressures

5 - How is the Site managed? (Conservation and management)

5.1 - Land tenure and responsibilities (Managers)

5.1.1 - Land tenure/ownership

Public ownership

Category	Within the Ramsar Site	In the surrounding area
Public land (unspecified)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Private ownership

Category	Within the Ramsar Site	In the surrounding area
Commercial (company)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other types of private/individual owner(s)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cooperative/collective (e.g., farmers cooperative)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Other

Category	Within the Ramsar Site	In the surrounding area
Commoners/customary rights	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Provide further information on the land tenure / ownership regime (optional):

Elephant Marsh falls under traditional authority (TA) Lundu, Ngowe and Ngabu on the west bank in Chikwawa District; TAs Makhuwira, Maseya and Katunga on the east bank in Chikwawa District; TA Mbenje on the west bank in Nsanje District; and TA Mlolo on the east bank in Nsanje District.

Although public, private and customary land exists in the Lower Shire and Elephant Marsh area, over 60% of the land in the basin is under customary tenure. Ownership and access to customary land is based on kinship inheritance and/or marriage. In the Marsh, in line with the National Land Policy 2002, land under customary tenure is mainly under communal tenure and cannot be sold outside the community. The communal land is governed by customary law (also as endorsed by the 2002 Land Policy), in which the traditional leaders are the custodians of the land on behalf of their communities.

Public (unspecified) – includes government facilities and national park (Lengwe)

5.1.2 - Management authority

Please list the local office / offices of any agency or organization responsible for managing the site:

At National level: Department of National Parks and Wildlife
 At Local level : Lowershire Division National Parks and Wildlife
 At Local level : Elephant Marsh Association (Represents local communities around the wetland, and has a Board of Trustees that include the District Commissioners for Chikwawa and Nsanje, Paramount Chief Lundu, Illovo Sugar Company)

Provide the name and title of the person or people with responsibility for the wetland:

Mr Brighton K. Kumchedwa -Director National Parks and Wildlife; Division Manager Lowershire; Elephant Marsh Association.

Postal address:

National Level : The Director, Department of National Parks and Wildlife, P.O Box 30131 Lilongwe 3, Malawi.

Local Level : The Division Manager, Lengwe National Park P.O Box 18 Nchalo

Local Level : The Chairperson, Elephant Marsh Association, C/O P.O Box 18 Nchalo.

E-mail address:

dpw@wildlifemw.net

5.2 - Ecological character threats and responses (Management)

5.2.1 - Factors (actual or likely) adversely affecting the Site's ecological character

Human settlements (non agricultural)

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Housing and urban areas	Low impact	Low impact	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Water regulation

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Water abstraction	Medium impact	High impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Agriculture and aquaculture

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Livestock farming and ranching	Low impact	Medium impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Annual and perennial non-timber crops	High impact	High impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Energy production and mining

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Unspecified	Low impact	Low impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Transportation and service corridors

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Roads and railroads	Low impact	Medium impact	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Biological resource use

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Hunting and collecting terrestrial animals	Medium impact	High impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Fishing and harvesting aquatic resources	High impact	High impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Gathering terrestrial plants	Medium impact	Low impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Logging and wood harvesting	Low impact	Low impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Human intrusions and disturbance

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Recreational and tourism activities	Low impact	Low impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Natural system modifications

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Dams and water management/use	High impact	High impact	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Vegetation clearance/ land conversion	High impact	High impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Fire and fire suppression	High impact	High impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Invasive and other problematic species and genes

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Invasive non-native/ alien species	Low impact	Medium impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Pollution

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Household sewage, urban waste water	Low impact	Low impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Climate change and severe weather

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Droughts	Medium impact	High impact	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Storms and flooding	Medium impact	High impact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Please describe any other threats (optional):

The main overall threat to the Elephant Marsh is the growing human population, not only directly surrounding the marsh but within the catchment and Malawi as a whole. This population pressure has resulted in increased water abstraction, conversion of natural vegetation, sediment input, movement and deposition, as well as biodiversity losses. The resultant high turbidity reduces the productivity of the littoral zone, smothers substrates, and reduces food source availability and fish visibility (which can affect hunting for many species). The unknown implications of the proposed abstractions from the Shire River and the possible upgrades to increase the capacity of the Kapichira Falls Hydroelectric Power Station is also a threat. Marsh vegetation will be impacted by reduced flow, as drying will reduce the ability of marsh plants to resprout and therefore to persist and will also make it easier to clear marsh areas for cultivation. Felling and removal of the remaining large trees bordering the Marsh will further impact groups of fauna that rely on these fringing habitats such as waterbirds that rely on such areas for roosting and breeding as well as mammal species that use these thicker habitats as refugia from the surrounding cultivated and disturbed matrix. The large sugar cane estates on the edge of the Marsh may impact the wetland through habitat modification. Fishing pressure and collection of crocodile eggs occurs within the marsh, however, given the size of the marsh the fish and crocodile populations seem to be in a reasonable state currently. Invasive alien floating weed species such as water hyacinth *Eichornia crassipes*, water cabbage *Pistia stratiotes* and water fern *Azolla filliculoides* are very abundant across the Elephant Marsh, sometimes forming large mats which almost completely cover smaller lakes. These weeds can clog waterways, change drainage patterns and lead to low oxygen levels in the water which can be detrimental for aquatic invertebrates and fish species. In addition these alien invasive plant species could have profound ecological impacts on the wetland avifauna by reducing habitat for certain species. One of the major threats is hunting by local inhabitants. Poaching and illegal harvesting of fish, reptiles, mammals and birds also takes place inside the Elephant Marsh. If local livelihoods are threatened or population pressure increases, these problems may continue to exacerbate.

5.2.2 - Legal conservation status

<no data available>

5.2.3 - IUCN protected areas categories (2008)

- Ia Strict Nature Reserve
- Ib Wilderness Area: protected area managed mainly for wilderness protection
- II National Park: protected area managed mainly for ecosystem protection and recreation
- III Natural Monument: protected area managed mainly for conservation of specific natural features
- IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
- V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation
- VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems

<no data available>

5.2.4 - Key conservation measures

Legal protection

Measures	Status
Legal protection	Proposed

Habitat

Measures	Status
Catchment management initiatives/controls	Partially implemented

Species

Measures	Status
Threatened/rare species management programmes	Implemented

Human Activities

Measures	Status
Management of water abstraction/takes	Implemented
Fisheries management/regulation	Implemented
Harvest controls/poaching enforcement	Implemented
Research	Implemented

5.2.5 - Management planning

Is there a site-specific management plan for the site? In preparation

Has a management effectiveness assessment been undertaken for the site? Yes No

If the site is a formal transboundary site as indicated in section Data and location > Site location, are there shared management planning processes with another Contracting Party? Yes No

5.2.6 - Planning for restoration

Is there a site-specific restoration plan? No, but restoration is needed

5.2.7 - Monitoring implemented or proposed

Monitoring	Status
Animal community	Implemented
Birds	Implemented

Agricultural and fisheries production, animal -human interactions and human diseases.

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

GOM. (2013). Shire River Basin Management Programme (Phase I) Project. Final Environmental And Social Assessment Report. Ministry Of Water Development And Irrigation. Lilongwe

Kaunda, C.S. and Mtalo, F., (2013) Impacts of environmental degradation and climate change on electricity generation in Malawi. *IJEE* 4, 481–496.

Kosamu, B.M., (2014) Conditions for Sustainability of the Elephant Marsh Fishery in Malawi, *Sustainability* 6, 4010-4027; doi:10.3390/su6074010

Kosamu, I.B., de Groot, W.T., Kambewa, P.S., & de Snoo, G.R. (2012) Institutions and Ecosystem-Based Development Potentials of the Elephant Marsh, Malawi. *Sustainability* 4(12): 3326-3345.

Matchaya, G. (2009) Land ownership security in Malawi. *Afr. J. Agr. Res.* 4, 1–13.

Takane, T. (2007). Customary Land Tenure, Inheritance Rules, and Smallholder Farmers in Malawi; Discussion Paper No. 104; Institute of Developing Economies: Chiba, Japan, 2007.

Timberlake, J. (1998) Biodiversity of the Zambezi Basin wetlands: Review and preliminary assessment of available information. Phase I. Consultancy report for IUCN ROSA. The Zambezi Society/Biodiversity Foundation for Africa, Harare.

Turpie, J.K., Forsythe, K., Reinecke, M.K., Diedericks, G., Dijkdra, K.D., Collins, S., Branch, W., Davies, T., Allan, D., Avenant, N. (2016) Climate resilient livelihoods and sustainable natural resources management in the Elephant Marshes, Malawi: Biodiversity of the Elephant marshes (Sub-study 4). Ministry of Irrigation and Water Development. Shire River Basin Management Program Project 117617. 221 pp.

Tweddle, D., (2015a) 561: Lower Zambezi. *Freshwater Ecoregions Of the World*. Available at: http://www.feow.org/ecoregions/details/lower_zambezi [Accessed April 6, 2016].

6.1.2 - Additional reports and documents

- i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)
<1 file(s) uploaded>
- ii. a detailed Ecological Character Description (ECD) (in a national format)
<no file available>
- iii. a description of the site in a national or regional wetland inventory
<no file available>
- iv. relevant Article 3.2 reports
<no file available>
- v. site management plan
<1 file(s) uploaded>
- vi. other published literature
<5 file(s) uploaded>

6.1.3 - Photograph(s) of the Site

Please provide at least one photograph of the site:



Skyview of Lake (Dr. Katherine Forsythe, 2015)



Skyview of River (Dr. Katherine Forsythe, 2015)



Fishers backwater in northern marsh (MRAG Ltd, 2015)



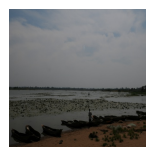
Main channel in northern marsh (MRAG Ltd, 2015)



Edge vegetation (MRAG Ltd, 2015)



Agriculture land western marsh (MRAG Ltd, 2015)



Open water area and fish landing site (MRAG Ltd, 2015)

6.1.4 - Designation letter and related data

Designation letter

<1 file(s) uploaded>

Date of Designation