Ramsar Information Sheet

Published on 19 September 2024
Update version, previously published on : 22 May 2007

South Africa

Makuleke Wetlands

Designation date	22 May 2007
Site number	1687
Coordinates	22°23'17"S 31°12'16"E
Area	10 799,00 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 Makuleke Wetlands are located within the Makuleke Contractual National Park, part of the northern region of the Kruger National Park, 62 km from the town of Thohoyandou. This 10799ha Ramsar site follows the Limpopo River floodplain for 43km from just above the Banyini Pan (which includes the Mahanga and Nyavadi sub-pans) to below the confluence of the Luvuvhu and Limpopo Rivers on the borders between South Africa, Zimbabwe and Mozambique. From there it extends upstream along the Luvuvhu River Floodplain up until Lanner Gorge. In addition to the riparian woodlands comprising of Ana and Fever trees and floodplain grasslands of the Luvuvhu and Limpopo Rivers, thirty-one seasonal pans are present within the site which are intermittently filled during flood events. Examples of these pans include Makwadzi and Vhembe Bendzi, which are characterised by prominent floodplain vegetation, particularly emergent aquatic macrophytes. Other examples include the Hapi, Makwadzi, Mapimbi and Mambvumbvanyi Pans which have substantial catchment areas and drainage lines of their own. The wetlands of Makuleke are an excellent example of a floodplain wetland type characteristic of the northern part of South Africa. A large variety of species are dependent on the floodplain in this dry landscape, including the globally red listed African Mouthbrooder (Oreochromis mossambicus) and the near threatened African Longfin Eel (Anguilla mossambica). Several rare bird species, including the White-Backed Vulture (Gyps africanus) and African Pygmy Goose (Nettapus auritus) can be observed at the site as well as various avifauna on the east Africa/ east Asia fly-way which use the site for refuge. The Luvuvhu River valley is also home to South Africa's highest densities of Pel's Fishing owls (Scotopelia peli). African Wild Dog, Leopard, Brown Hyena and Aardwolf (an insectivorous species of hyena), Hippopotamus and the Nile Crocodile have also been observed at the site. The site is also a central resource-rich node for the transboundary Great Limpopo Transfrontier Park, which supports shared populations of elephant and buffalo, amongst other species with Zimbabwe and Mozambique. The wetlands are a key eco-tourism asset with trails and birding associated with the pans and the Luvuvhu River floodplain. The area is also used for wildlife management and field guide training at the EcoTraining facility on the banks of the Limpopo River close to N'wa-Xinavani pan.

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Responsible compiler

Institution/agency	Kruger National Park
Postal address	Dr Riddell - Private Bag X402, Skukuza, 1350, Kruger National Park Mr Maluleke - Makuleke JMB, C/o Punda Maria gate, Kruger National Park

National Ramsar Administrative Authority

Institution/agency	Department of Forestry, Fisheries and the Environment (DFFE)
Postal address	Department of Forestry, Fisheries and the Environment Branch: Biodiversity and Conservation 473 Steve Biko Road, Cnr. Steve Biko & Soutpansberg Rd Arcadia, Pretoria, 0001

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

From year	2015
To year	2022

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)	Makuleke Wetlands

2.1.4 - Changes to the boundaries and area of the Site since its designation or earlier update

(Update) A. Changes to Site boundary	Yes ◉ No ○
(Update) The boundary has been delineated more accurately	☑
(Update) The boundary has been extended	☐
(Update) The boundary has been restricted	☐
(Update) B. Changes to Site area	the area has increased
(Update) The Site area has been calculated more accurately	☑
(Update) The Site has been delineated more accurately	☐
(Update) The Site area has increased because of a boundary extension	☐
(Update) The Site area has decreased because of a boundary restriction	☐
(Update) For secretariat only: This update is an extension	☐

2.1.5 - Changes to the ecological character of the Site

(Update) 6b i. Has the ecological character of the Ramsar Site (including applicable Criteria) changed since the previous RIS?	No

(Update) Optional text box to provide further information

A number of targeted research activities have been undertaken to determine the ecological character of the wetlands in the Makuleke since the previous update and these will be reported in subsequent sections.

2.2 - Site location

2.2.1 - Defining the Site boundaries

b) Digital map/image
<2 file(s) uploaded>

Former maps	0

Boundaries description

The boundary of the Ramsar site incorporates the area inside the flood level of those sections of the Limpopo and Luvuvhu Rivers which occur within the Makuleke Contractual National Park and Kruger National Park.

The northern boundary is the middle of the Limpopo River, which is the border between South Africa and Zimbabwe. To the east it ends at the border with Mozambique (although the floodplain and some pans do exist in both Mozambique and Zimbabwe, they occur outside of the Ramsar site). To the west it ends with the inclusion of the Banyini Pan (which includes the Mahanga and Nyavadi sub-pans). In the Makuleke Contractual National Park (within the Kruger National Park) it includes the floodplains and all the pans along the Limpopo River, as well as floodplains and all the pans on both sides of the Luvuvhu River downstream of Lanner Gorge up until the confluence with the Limpopo River. South of the Luvuvhu River it includes the Hapi drainage line towards the Mozambique border and the southern boundary is effectively at the edge of the floodplain in proximity to the main tourist tar road that routes towards the Pafuri border post.

2.2.2 - General location

a) In which large administrative region does the site lie? Limpopo Province

b) What is the nearest town or population centre? Thohoyandou, Tshipise

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): 10799

Area, in hectares (ha) as calculated from GIS boundaries: 10798.706

2.2.5 - Biogeography

Biogeographic regions

Regionalisation scheme(s)	Biogeographic region
Freshwater Ecoregions of the World (FEOW)	Southern Temperate High Veld fresh water ecoregion

Other biogeographic regionalisation scheme

Limpopo plain.
Preliminary Level I River Ecoregion Classification System for South Africa. The Makuleke Wetlands are situated in the Limpopo Plain, an Ecoregion 1.01 classification (In: Kleynhans, CJ, Thirion, C and Moolman, J (2005). A Level I River Ecoregion classification System for South Africa, Lesotho and Swaziland. Report No. N/0000/00/REQ0104.Resource Quality Services, Department of Water Affairs and Forestry, Pretoria, South Africa.)

3 - Why is the Site important?

3.1 - Ramsar Criteria and their justification

☑ Criterion 1: Representative, rare or unique natural or near-natural wetland types

Hydrological services provided	The wetland is an excellent example of a floodplain wetland type characteristic of the northern part of South Africa and the south-western part of Mozambique. This comprises a riverine area, in this case dominated by tall perennial tree species and a grassy floodplain of varying width on either side. The riverine area is seasonally inundated but the grassy floodplain is only inundated by occasional floods. The floodplain plays an important role in attenuating floods, thereby reducing flood damage in the downstream areas of Mozambique. The floodplain and its associated pans also play an important role in recharging the groundwater levels and maintaining the riparian and floodplain vegetation (Rogers, 1995). Importantly the wetlands and Limpopo River overly a large transboundary aquifer whose primary porosity is characterised by the broad alluvial channel of the Limpopo River. This aquifer is recharged during the summer floods waters of the seasonal flows of the usually dry Limpopo River. The mean annual runoff (MAR) from the catchment of the Luvuvhu River (including the Mutale River tributary) for the undeveloped (virgin) condition is estimated to be 584 million m3/a, although under present catchment conditions this is 446 million m3/a (Bailey & Pitman, 2015). Runoff is unevenly distributed varying from 3% of Mean Annual Precipitation (MAP) in the drier area of the catchment to 38% of MAP in the wetter areas along the Soutpansberg mountain range to the west. Some 38% of the total runoff is produced from 9% of the catchment. Both the Limpopo and Luvuvhu Rivers show high seasonal flow variation and upstream water abstraction occurs to various degrees. The trend is is for abstraction demands to increase within the catchment but also through inter-basin transfers to larger municipal areas outside of the catchment. Two flood characteristics take place in the Ramsar site. High floods inundate the floodplains on either side of the Luvuvhu River, including the pans on the northern bank. On the southern bank of the Luvuvhu River, this type of flood follows the Hapi/Fever tree floodplain system, a very important factor in the reduction of accumulated Anthrax spores in this system (De Vos, et al. 1996). This type of flood is associated with high rainfall cycles and therefore occurs roughly every 8-10 years. It also scours the main channel, especially when it does not coincide with a Limpopo flood. The second type, back-flooding of the Limpopo River of the pans between the Limpopo and Luvuvhu Rivers, occurs more frequently, on average every two to three years. For inundation of these pans from water flowing over the embankments of the river, the Luvuvhu needs to have high flows (but not necessary in flood), but a pre-requisite is a simultaneous high flow of the Limpopo. Silt is deposited and pans such as Gwalala, Mambvumbvanyi, Xagova, Nwambi, Hulukulu, Makwadzi, Xipokonyole, Banyini (Mahanga & Nyavadi) and Dakamila pans, are filled.

Other ecosystem services provided	The floodplain pans in the Makuleke provide important sites for breeding and feeding for numerous and large quantities of fish. In an event of no follow-up floods, these floodplain pans become an important food source for piscivorous animals, as large numbers of birds, mammals and reptiles are attracted to the pans. Whilst not a significant breeding area for waterfowl, the Makuleke does provide an important refugia for avifauna on the east Africa/ east Asia fly-way. The area also provides important biodiversity services through water provision and grazing for the savanna dwelling fauna of northern KNP and is a central resource-rich node for the transboundary Great Limpopo Transfrontier Park, which supports shared populations of elephant and buffalo, amongst other species with Zimbabwe and Mozambique. Moreover, the wetlands are a key eco-tourism asset with trails and birding associated with the pans and the Luvuvhu River floodplain. The area is also used for wildlife management and field guide training at the EcoTraining facility on the banks of the Limpopo River close to N'wa-Xinavani pan. During drier times grazing cattle are also know to take place and access the floodplains from neighboring Zimbabwe.
Other reasons	The wetlands of Makuleke are an excellent example of a floodplain wetland type characteristic of the northern part of South Africa . The Luvuvhu and Limpopo River Floodplain supports permanent Rivers with forested riparian woodlands and includes thirty-one seasonally flooded pans. The pans of the Limpopo River floodplain hold water well into the dry season having a relatively high inter-annual variation in their hydroperiod and create important refuge areas for wildlife during the drier winter months. They also provide an important waterbird habitat during both summer and winter months in wet years and serve as a stopover for many migratory waterbirds. The Limpopo River is typically characterised by having a prominent levee on both banks. The floodplain forms depressions in places (pans), which are intermittently filled during flooding of the Limpopo and Luvuvhu Rivers. Examples of these pans include Makwadzi and Vhembe Bendzi (adjacent to the old Manxeba windmill), which are characterised by prominent floodplain vegetation, particularly emergent aquatic macrophytes. Mapimbi pan appears to receive seepage water from Limpopo River and it is speculated that its hydrology may be related to fluctuations in the alluvial water table. The subsurface connection appears to be most evident when the river is full. It appears to receive surface water earlier during floods than the other floodplain pans, which fill predominantly from overtopping of the levee. The northern bank of the Luvuvhu River, on the other hand, shows no evidence of a prominent levee. As a result, Mambvumbvanyi pan, which occurs in this area, is shallower, has a more accessible connection to the river, and is flooded more regularly than those on the Limpopo floodplain. Another pan is Hapi, which occurs south of the Luvuvhu River in a depression running parallel to the river, which fills during high flows as the river overflows its banks. All the above-mentioned pans, but especially Hapi, Makwadzi, Mapimbi and Mambvumbvanyi have substantial catchment areas and drainage lines of their own.

☑ Criterion 2 : Rare species and threatened ecological communities

Optional text box to provide further information	The Makuleke Wetlands Ramsar Site supports a number of Vulnerable, Endangered and Critically Endangered species, including the IUCN red listed Venda Cycad (Encephalartos hirsutus), the Mozambique Tilapia (Oreochromis mossambicus), White-Backed Vulture (Gyps africanus), Leopards and Hippopotamus.

☑ Criterion 3 : Biological diversity

Justification

Malherbe et. al (2017) for the first time described the diatom, zooplankton and macroinvertebrates communities in the pans of the Makuleke Wetlands. The results indicated that each depression (pan) within the wetland is unique and contributes to the overall diversity of the entire system. If one depression (pan) is degraded, it could impact on the overall diversity within the entire Ramsar site. Overall the Makuleke wetlands supports a high diversity of species, some of which have their centres of distribution in the area. Others have only been recorded from this area and it is therefore possible that they are confined to this area. Relevant to the Ramsar site or parts of the site only: The rare samango monkey (Cercopithecus mitis erythrarchus), four toed elephant-shrew (Petrodromus tetradactylus) and African civet (Civettictis civetta) occur in the riparian areas along the Luvuvhu and Limpopo Rivers. Rare bird species such as pygmy goose (Nettapus auritus), white crowned lapwing (Vanellus albiceps), and nesting white backed vultures (Gyps africanus) occur here, while the highest densities of Pel's Fishing owl (Scotopelia peli) in South Africa are found in the Luvuvhu River valley. The Böhm's (Neafrapus boehmi) and mottled spinetails (Telacanthura ussheri), which are rare in South Africa, occur along the lower reaches of the Ramsar site. This area also represent the south-western limits of the range of distribution for the dune squeaker frog (Arthroleptis stenodactylus). The wetland has exceptional ecological features that are unique for South Africa as a country. A number of species occur here and nowhere else in the country. Bats like Rüppels horseshoe bat (Rhinolophus fumigatus), Swinny's horseshoe bat (Rhinolophus swinnyi), the Madagascan large free-tailed bat (Tadarida fulminans) and Commerson's leaf-nosed bat (Hipposideros commersoni) are only known in the country from specimens collected in the areas adjacent to, and constituting, the Ramsar site. The Ramsar site continues to provide new biodiversity discoveries such as the most northerly phylogenetic record in South Africa of the enigmatic floodplain water snake (Lycodonomorphus obscuriventris, Keates et. al, 2022). The site also utilised by a broad-range of mega-herbivores, such as the African elephant (Loxodonta Africana), African buffalo (Syncerus Caffer), Common eland (Taurotragus oryx) and hippopotamus (Hippopotamus amphibius).

☑ Criterion 4 : Support during critical life cycle stage or in adverse conditions

Optional text box to provide further information

A large variety of species are dependent on the floodplain in this dry landscape. During flooding large numbers of fish species migrate into the flooded pans to feed and breed. The Luvhuvhu and Limpopo rivers have a total of 38 fish species that have been recorded in the area. Fish species found within the wetlands include Hamilton's Barb (Barbus afrohamiltoni), East Coast Barb (Barbus toppini), Spot-tail Robber (Brycinus imberi), Tigerfish (Hydrocynus vittatus), Purple labeo (Labeo congoro), Rednose labeo (Labeo rosae), Silver labeo (Labeo ruddi), Redbreast Tilapia (Coptodon rendali), Mozambique tilapia (Oreochromis mossambicus), straightfin barb (Enteromius paludinosus) and Silver Robber (Micralestes acutidens) (Russel, 2011; Malherbe et al., 2017, Munyai et al., 2023). In an event of no follow-up floods, these floodplain pans become an important food source for piscivorous animals as large numbers of birds, mammals and reptiles are attracted to the pans. The site is also used for nesting by a number of vulnerable and rare bird species such as the black stork (Ciconia nigra), yellowbilled stork (Mycteria ibis), marabou (Leptoptilos crumeniferus), open-billed storks (Anastomus lamelligerus), and threebanded courser (Rhinoptilus cinctus) and serves as a refuge area for migratory waterbird species such as the lesser gallinule (Porphyrula alleni) and the green sandpiper (Tringa ochropus). In terms of terrestrial mammals, the Makuleke area is also a migration corridor for elephant and antelope, as it links the KNP with the transfrontier parks in Zimbabwe and Mozambique. The wetlands of the Makuleke Ramsar Site furthermore provide breeding and feeding habitats for many of the 30 species of frogs which occur at the site (Keats et al, 2023) these include Afrixalus crotalus (snoring spiny reed frog), Hemisus marmoratus (Marlbled shovel-nosed frog) and Tomopterna krugerensis (knocking sand frog)

☑ Criterion 8 : Fish spawning grounds, etc.

Justification	The wetland acts as an important refuge for breeding stocks of fish which recolonise the floodplain by migrating upstream during flooding events, and is classified as a National Freshwater Ecosystem Priority Area (NFEPA, Nel et al, 2011) as a fish support and fish sanctuary area. Fish stocks for the river are therefore protected within the Makuleke Wetlands Ramsar site. During the flooding of the floodplains, huge numbers of fish will migrate into these flooded areas to feed and to breed. Since the Southern African fish are well-adapted to erratic seasonal flows and no-flow situations, the cue to spawn during the short flood event is very strong. Huge spawning runs into these floodplain pans take place and large amounts of eggs are deposited in the pans. Adult fish return to the main stem of the river as water recedes and the eggs get a chance to hatch while fry can grow without too much predation from adults. Follow-up floods see the repeat of spawning runs as well as the movement of juveniles from the pans into the main system. Fish that use these floodplains extensively are the following groups: Small minnow species that utilize the inundated grass and overhang to shelter and breed in: Hamilton's barb (Barbus afrohamiltoni), Straightfin barb (Barbus paludinosus) and East coast barb (Barbus toppini).Tigerfish (Hydrocynus vittatus) and robbers (Micralestes acutidens and Brycinus imberi) that breed in the shallow backwaters and feed on the other fish and invertebrates present. Fish that prefer to breed in shallower floodplains includes the labeos (Labeo rosae, Labeo congoro and Labeo ruddi), whilst other pool fish such as Silver catfish (Schilbe intermedius) and Plain squeeker (Synodontis zambezensis) also utilize these quiet waters to feed and breed.

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

Phylum	Scientific name	Criterion 2	Criterion 3	Criterion 4	IUCN Red List	CITES Appendix I	Other status	Justification
Plantae								
TRACHEOPHYTA / CYCADOPSIDA	*Encephalartos hirsutus*	☑	☑	☐	CR	☑	South African National Biodiversity Institute Red Data List - Critically Endangered	Endemic to Limpopo Province of South Africa

An outstanding variety of plant species are present at the site, with the critically endangered Venda Cycad (Encephalartos hirsutus) being of particular significance.
Donaldson, J.S. 2009. Encephalartos hirsutus P.J.H.Hurter. National Assessment: Red List of South African Plants version 2020.1. Accessed at http://redlist.sanbi.org

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

Phylum	Scientific 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								
Others																	
CHORDATA / REPTILIA	*Acontias aurantiacus fitzsimonsi*	☐	☐	☐	☐	☑	☐	☐	☐					☐	☐		Endemic to Southern Africa (Zimbabwe, Mozambique, Botswana, and South Africa). Centre of distribution occurs at the site.
CHORDATA / AMPHIBIA	*Afrixalus crotalus*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to southern Africa, rare in South Africa.
CHORDATA / REPTILIA	*Afroedura pienaari*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to South Africa
CHORDATA / REPTILIA	*Afroedura transvaalica*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to Southern Africa (Zimbabwe, Mozambique and South Africa). In South Africa distribution is restricted to the northern Limpopo Province.

Phylum	Scientific 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								
CHORDATA / AMPHIBIA	*Breviceps adspersus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to southern Africa
CHORDATA / AMPHIBIA	*Breviceps mossambicus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to southern Africa
CHORDATA / REPTILIA	*Chirindia langi langi*	☐	☐	☐	☐	☑	☐	☐	☐					☐	☐		Endemic to Southern Africa (South Africa, Mozambique and Zimbabwe). Centre of distribution occurs at the site.
CHORDATA / AMPHIBIA	*Chiromantis xerampelina*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to southern Africa, with populations extending to the Democratic Republic of Congo. In South Africa distribution is restricted to the Northern and Eastern parts of the Country.
CHORDATA / REPTILIA	*Crocodylus niloticus*	☑	☐	☐	☐	☑	☐	☐	☐				LC	☑	☐	Red list of South African species- Vulnerable	Endemic to Southern Africa
CHORDATA / AMPHIBIA	*Hemisus marmoratus*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		This species is widespread in the savannah zone of sub-Saharan Africa. In South Africa distribution is restricted to the Northern and Eastern parts of the Country and the species is relatively rare in South Africa.
CHORDATA / MAMMALIA	*Hippopotamus amphibius*	☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		This species is widespread in the savannah zone of sub-Saharan Africa
CHORDATA / MAMMALIA	*Hipposideros commersonii*	☐	☐	☐	☐	☑	☐	☐	☐				NE	☐	☐		Although distributed distributed throughout equatorial Africa and on the island of Madagascar. the species is rare in South Africa
CHORDATA / MAMMALIA	*Hyaena brunnea*	☐	☐	☐	☐	☑	☐	☐	☐				NT	☐	☐		Endemic to Southern Africa
CHORDATA / AMPHIBIA	*Hyperolius marmoratus*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to Southern and Eastern Africa
CHORDATA / AMPHIBIA	*Hyperolius pusillus*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to Southern Africa
CHORDATA / MAMMALIA	*Leptailurus serval*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		This species is widespread in the savannah zone of sub-Saharan Africa and rare in the lowland wetlands of South Africa
CHORDATA / AMPHIBIA	*Leptopelis mossambicus*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to southern Africa. Distribution is restricted to the Northern and Eastern parts of the Country and is relatively rare in South Africa.
CHORDATA / MAMMALIA	*Lycaon pictus*	☑	☐	☐	☐	☑	☐	☐	☐				EN	☐	☐	Red list of South African species - Endangered	
CHORDATA / REPTILIA	*Lycodonomorphus obscuriventris*	☐	☐	☐	☐	☑	☐	☐	☐				DD	☐	☐		Endemic to Southern Africa, rare in South Africa, with distribution mainly in eastern Mpumalanga and Northern Kwa-Zulu Natal.
CHORDATA / REPTILIA	*Lygodactylus stevensoni*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to South Africa and Zimbabwe. In South Africa, it is found in the Limpopo River valley
CHORDATA / REPTILIA	*Monopeltis leonhardi*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to southern Africa. Distributed in the Kalahari of Namibia and Botswana, western and southern Zimbabwe, and along the Limpopo River into extreme northeastern South Africa
CHORDATA / REPTILIA	*Monopeltis sphenorhynchus sphenorhynchus*	☐	☐	☐	☐	☑	☐	☐	☐					☐	☐		Endemic to Southern Africa (South Africa, Mozambique and Botswana)
CHORDATA / MAMMALIA	*Panthera pardus*	☑	☐	☐	☐	☑	☐	☐	☐				VU	☑	☐	Red list of South African species - Vulnerable	

Phylum	Scientific 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								
CHORDATA / MAMMALIA	*Petrodromus tetradactylus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		This species is one of the most widespread sengis, occurring in forest, woodland, and thicket habitats in central and eastern Africa from DR Congo to northeastern South Africa where it is restricted to the riparian forests of the Limpopo and Luvuvhu rivers and extreme northeast parts of KwaZulu-Natal
CHORDATA / AMPHIBIA	*Phlyctimantis maculatus*	☐	☑	☐	☐	☑	☐	☐	☐					☐	☐		Endemic to southern Africa, rare in South Africa
CHORDATA / AMPHIBIA	*Poyntonophrynus fenoulheti*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to southern Africa, distribution is limited to northern and eastern parts of South Africa.
CHORDATA / MAMMALIA	*Proteles cristata*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Rare
CHORDATA / AMPHIBIA	*Ptychadena mossambica*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to Southern Africa, rare in South Africa
CHORDATA / REPTILIA	*Python sebae*	☐	☐	☐	☐	☑	☐	☐	☐				NT	☐	☐		Rare
CHORDATA / AMPHIBIA	*Pyxicephalus edulis*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to central, western and southern southern Africa. Distribution is restricted to the Northern and Eastern parts of the Country and is relatively rare in South Africa.
CHORDATA / MAMMALIA	*Rhinolophus fumigatus*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		The species is widely distributed across Africa, however are only known in South Africa from specimens collected at Pafuri. Species uses the riparian areas to forage
CHORDATA / MAMMALIA	*Rhinolophus swinnyi*	☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	Red list of South African species - Vulnerable	Endemic to southern Africa, with populations extending to the Tanzania, are rare in South Africa. Species uses the riparian areas to forage
CHORDATA / REPTILIA	*Scelotes limpopoensis limpopoensis*	☐	☐	☐	☐	☑	☐	☐	☐					☐	☐		Endemic to Southern Africa (South Africa, Zimbabwe and Botswana). In South Africa, this species is distributed in Limpopo Province from the Soutpansberg area southwards to the Waterberg
CHORDATA / AMPHIBIA	*Sclerophrys garmani*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to eastern and southern Africa, with distribution in South Africa restricted to northern and eastern areas
CHORDATA / MAMMALIA	*Tadarida fulminans*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		The species occurs across Africa however only known in South Africa from specimens collected adjacent to and within the Ramsar site. This species probably also use the riparian areas to forage.
CHORDATA / AMPHIBIA	*Tomopterna krugerensis*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to southern Africa, rare species in South Africa with the site being one of few locations where the species has been observed.
CHORDATA / AMPHIBIA	*Tomopterna marmorata*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to eastern and southern Africa, rare in South Africa with a distribution limited to the upper Limpopo and eastern Mpumalanga provinces.
CHORDATA / AMPHIBIA	*Tomopterna natalensis*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to southern Africa
CHORDATA / REPTILIA	*Trachylepis depressa*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to Southern Africa . In Mpumalanga these skinks have a limited distribution. In the Park, the species has been recorded at the confluence of the Luvuvhu and Limpopo Rivers, the eastern boundary between the Mathlakuza pan and Saselandonga gorge and the eastern boundary north of Nwanetsi.

Phylum	Scientific 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								
CHORDATA / MAMMALIA	*Tragelaphus angasii*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to southern Africa
CHORDATA / AMPHIBIA	*Xenopus muelleri*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		The species is distributed across Africa, however are only known in South Africa from specimens collected at Pafuri. This species probably also use the riparian areas to forage.
Fish, Mollusc and Crustacea																	
CHORDATA / ACTINOPTERYGII	*Anguilla mossambica*	☐	☐	☐	☐	☑	☐	☐	☐				NT	☐	☐		Migratory species, and it is threatened by the construction of barriers in the rivers.
CHORDATA / ACTINOPTERYGII	*Brycinus imberi*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Clarias gariepinus*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Coptodon rendalli*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Engraulicypris brevianalis*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Enteromius afrohamiltoni*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Enteromius paludinosus*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Enteromius toppini*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Enteromius unitaeniatus*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Glossogobius giuris*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Hydrocynus vittatus*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Labeo congoro*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Labeo cylindricus*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Labeo rosae*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Labeo ruddi*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Micralestes acutidens*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding

Phylum	Scientific 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								
CHORDATA / ACTINOPTERYGII	*Oreochromis mossambicus*	☑	☑	☐	☐	☐	☐	☐	☑				VU	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Schilbe intermedius*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Synodontis zambezensis*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
CHORDATA / ACTINOPTERYGII	*Tilapia sparrmanii*	☐	☑	☐	☐	☐	☐	☐	☑				LC	☐	☐		The wetlands act as an important refuge for shelter, breeding and feeding
Birds																	
CHORDATA / AVES	*Acrocephalus griseldis*	☑	☐	☐	☐	☑	☐	☐	☐				EN	☐	☑	Red Data Book of Birds of South Africa, Lesotho and Swaziland-Endangered	It is one of the rarest migrants to Southern Africa. Very rare non-breeding Palaearctic vagrant that feeds along the tall weedy growth in riparian forests along the Luvuvhu River.
CHORDATA / AVES	*Acrocephalus schoenobaenus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Palaearctic migrant, occurs here alongside the Basara Reed Warbler but, in more riverine habitats. Uncommon in the K.N.P. where it has only been recorded from the north.
CHORDATA / AVES	*Botaurus stellaris*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Globally widespread, however in Southern Africa, it is rare in northern Botswana and the Caprivi Strip (Namibia), with a few isolated populations in South Africa and eastern Zimbabwe.
CHORDATA / AVES	*Chlorophoneus nigrifrons*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to Southern Africa. In South Africa, this is a rare species with occurrences limited to the northern region.
CHORDATA / AVES	*Chlorophoneus olivaceus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Rare in K.N.P. where it has only been recorded from the north
CHORDATA / AVES	*Ciconia microscelis*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Large wading bird that breeds across much of western, eastern, and south-central Africa. In South Africa it is a relatively rare species, with occurrences restricted to the northern and eastern regions. Occupies almost any wetland habitat, generally preferring flood plains, rivers, pans, ponds, dams, lagoons, swamp forests, mangrove swamps, tidal mudflats, estuaries and also man-made habitats
CHORDATA / AVES	*Ciconia nigra*	☑	☑	☐	☐	☐	☐	☐	☐				LC	☐	☐	Red Data Book of Birds of South Africa, Lesotho and Swaziland-Vulnerable	Breeds widely across the Palearctic region and is a partial migrant into Sub-Saharan Africa. Breeds on cliffs of Pafuri region, with very few nests in SA.
CHORDATA / AVES	*Cinnyris venustus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Uncommon in S.A.
CHORDATA / AVES	*Columba larvata*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Rare in K.N.P., but localized at Pafuri.
CHORDATA / AVES	*Coracias spatulatus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to Africa, occupying an area from Tanzania to Angola, south to Zimbabwe Botswana and Mozambique. Rare in South Africa.
CHORDATA / AVES	*Coracina caesia*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Rare in Sub-Saharan Africa as it occurs in isolated numbers across this region. Uncommon resident in S.A. Resident in small numbers on the Luvuvhu River

Phylum	Scientific 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								
CHORDATA / AVES	*Ephippiorhynchus senegalensis*	☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	Red Data Book of Birds of South Africa, Lesotho and Swaziland-Endangered	It is a widespread species which is a resident breeder in sub-Saharan Africa from Sudan, Ethiopia and Kenya south to South Africa, and in The Gambia, Senegal, Côte d'Ivoire and Chad in west Africa. Rare in South Africa, heavily dependent on water bodies at the site for their main food source of fish. quality of water especially those of the Luvuvhu/Limpopo River systems are of critical importance in maintaining this threatened species' population in South Africa.
CHORDATA / AVES	*Erythropygia quadrivirgata*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Rare in Southern Africa, particularly Namibia. In Namibia, it is only recorded from the Zambezi region, including from the Kwando, Chobe, and Zambezi rivers and intervening woodland.
CHORDATA / AVES	*Falco peregrinus*	☑	☐	☐	☐	☑	☐	☐	☐				LC	☑	☐		Rare in Southern Africa and localized in Namibia, northern and eastern Botswana, Zimbabwe, western Mozambique and South Africa. Scarce or rare visitor that breeds in the Luvuvhu gorge just upstream of the Ramsar site. Rare breeding resident
CHORDATA / AVES	*Gyps africanus*	☑	☑	☐	☐	☐	☐	☐	☐				CR	☐	☐	Red Data Book of Birds of South Africa, Lesotho and Swaziland-Critically Endangered	Nesting site. Breeds in the Riparian Zones of the Limpopo and Luvuvhu Rivers.
CHORDATA / AVES	*Lamprotornis mevesii*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Rare in S.A. Only resident in the Limpopo/Luvuvhu River valley.
CHORDATA / AVES	*Laniarius aethiopicus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Rare in S.A. Occurs in the Northern Limpopo Province, only in the north of the K.N.P.
CHORDATA / AVES	*Leptoptilos crumeniferus*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Occurs throughout Sub-Saharan Africa, however within the region, it is primarily a non-breeding visitor from farther north in Africa, with only scattered and sporadic breeding records known from the Kruger National Park and Pongolo Game Reserve (northern Kwazulu-Natal), one of two breeding sites in South Africa.
CHORDATA / AVES	*Merops hirundineus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Rare in the K.N.P. and only recorded along the Limpopo River
CHORDATA / AVES	*Motacilla clara*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Rare in Sub-Saharan Africa, occurring in isolated patches. In S.A., it is associated with the most limited and patchy distribution. Only common along Mutale and Luvuvhu Rivers in the K.N.P.
CHORDATA / AVES	*Mycteria ibis*	☑	☑	☐	☐	☐	☐	☐	☐				LC	☐	☐	Red Data Book of Birds of South Africa, Lesotho and Swaziland-Endangered	Nesting site. Opportunistic breeding resident with nomadic movements within the Park. Breeding has been observed at two of the pans in the Park (both Spokonyole Pan in the Limpopo floodplain and Reedbuck Vlei in the Luvuvhu floodplain).
CHORDATA / AVES	*Neafrapus boehmi*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Rare in South Africa. Resident at Pafuri. Nests inside hollow baobabs. Rare and local.
CHORDATA / AVES	*Nettapus auritus*	☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	Red Data Book of Birds of South Africa, Lesotho and Swaziland-Vulnerable	Has a wide, albeit fragmented, distribution across sub-Saharan Africa and Madagascar. Within southern Africa, it occurs in Mozambique, Zimbabwe, Namibia and Botswana where the Okavango Delta forms the regional stronghold. Uncommon in north-eastern South Africa with the only permanent populations (given sufficient rainfall) occurring on the Nyl River Floodplain and in the Kruger National Park (Mostly in the pans of floodplains of the Limpopo and Luvuvhu Rivers). It is more numerous in Kwazulu-Natal, and can be locally common in the extensive wetland, floodplain and pan systems of Maputaland.

Phylum	Scientific 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								
CHORDATA / AVES	*Oriolus auratus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Occurs in large areas of sub-Saharan Africa, however scarce in the Limpopo Province. Rare in SA. Restricted to the north of the K.N.P.
CHORDATA / AVES	*Pelecanus onocrotalus*	☑	☐	☐	☐	☑	☐	☐	☐				LC	☐	☑	Red Data Book of Birds of South Africa, Lesotho and Swaziland-Vulnerable	The breeding range of the great white pelican extends to Ethiopia, Tanzania, Chad, northern Cameroons, and Nigeria in Africa, and has been observed or reported breeding in Zambia, Botswana, and South Africa. Rare and threatened in South Africa
CHORDATA / AVES	*Pelecanus rufescens*	☑	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐	Red Data Book of Birds of South Africa, Lesotho and Swaziland-Vulnerable	It is a resident breeder in the swamps and shallow lakes of Africa and southern Arabia; it has also apparently been extirpated from Madagascar. Rare and threatened in South Africa
CHORDATA / AVES	*Platysteira peltata*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Uncommon, with populations scattered across Zimbabwe, Mozambique, KwaZulu-Natal and the northern region of the Limpopo Province in South Africa (in the Pafuri region). It usually occupies Afromontane and coastal forest, often near a river or stream with vegetation protruding into the water.
CHORDATA / AVES	*Polihierax semitorquatus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to eastern and southern Africa.
CHORDATA / AVES	*Porphyrio alleni*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Occurs in Africa south of the Sahara, Madagascar and Comoro Islands. Site serves as an important stopover for this migrating waterbird.
CHORDATA / AVES	*Rhinoptilus cinctus*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic to South Eastern Africa. Rare in South Africa. (RIS 2007: Only sightings in SA and the only breeding site in SA).
CHORDATA / AVES	*Scotopelia peli*	☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	Red Data Book of Birds of South Africa, Lesotho and Swaziland-Endangered	Nesting site. Rare in South Africa. High densities of breeding populations can be found in the Park, particularly along the Luvuvhu River.
CHORDATA / AVES	*Stephanoaetus coronatus*	☑	☐	☐	☐	☑	☐	☐	☐				NT	☐	☐	Red Data Book of Birds of South Africa, Lesotho and Swaziland - Vulnerable	Rare in eastern and southern South Africa. Uncommon in K.N.P. but localised at Pafuri.
CHORDATA / AVES	*Telacanthura ussheri*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Uncommon, only resident at Pafuri. Endemic to Sub-Saharan Africa, rare in South Africa, with distribution limited to the northern Limpopo province.
CHORDATA / AVES	*Tringa ochropus*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		Generally scarce in Southern Africa, occurring in patches of Zimbabwe, Limpopo Province, northern and southern Botswana and central Mozambique. Site serves as an important stopover for this migrating waterbird
CHORDATA / AVES	*Zosterops senegalensis*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Uncommon in S.A. where it has only been recorded from the Limpopo/Luvuvhu region

1) Percentage of the total biogeographic population at the site

The Ramsar site area contains a considerable portion of the biodiversity of the lowveld in South Africa. A large number of species occur here and nowhere else in South Africa. The diversity of landscape is matched by a great variety of soils which support an exceptional vegetation diversity and an unusually high number of habitats and wildlife.. The wetlands provide a critical link in a major food chain. Over 450 bird species have been identified in the Pafuri area and 34 are restricted to this northern area. 27 mammal species have been recorded directly utilising the pan systems within the Makuleke Ramsar wetlands (Antrobus, 2014). 38 Fish species and 33 amphibian species can also be found at the site.

Fish data obtained from: Russell, I. 2011. Conservation status and distribution of freshwater fishes in South African National Parks. African Zoology, 46, 117-132, Malherbe, W., 2018. Ramsar wetlands in South Africa: historic and current aquatic research. S. Afr. J. Sci. Technol. 38 (1), 1–13 and Munyai, L.F., Mugwedi, L., Wasserman, R.J., Dondofema, F., Dalu, T. 2023. Assessing Fish and Macroinvertebrates Assemblages in Relation to Environmental Variables in Makuleke Floodplain Pans: Implications for Biodiversity Conservation. Wetlands 43. doi:10.1007/s13157-023-01738-8. Fish threat status in South Africa obtained from Red List of South African Species, South African Biodiversity Institute accessed at http://speciesstatus.sanbi.org/
Frog data obtained from: Keates C, Wasserman RJ, Conradie W, Dondofema F, Munyai LF, Riddell ES & Dalu T. 2023. Frogs of the Makuleke Contractual Park, northern Kruger National Park (Poster). Distribution data obtained from: Minter L.R., Burger M., Harrison J.A., Braack H.H., Bishop P.J. & Kloepfer D. (eds). 2004. Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C. Published by the Smithsonian Institution and the Avian Demography Unit (now Animal Demography Unit) accessed at http://frogmap.adu.org.za/ and supplemented with information from the Biodiversity and Development Institute accessed at https://thebdi.org/
Mammal threat status and distribution in South Africa obtained from: Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa accessible at http://speciesstatus.sanbi.org/
Reptile threat status and distribution in South Africa obtained from Red List of the Reptiles of South Africa, Lesotho and Swaziland. South African National Biodiversity Institute, South Africa accessible at http://speciesstatus.sanbi.org/
Bird threat status and distribution in South Africa obtained from The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Taylor, MR, Peacock F, Wanless RW (eds). BirdLife South Africa, Johannesburg, South Africa accessed at http://speciesstatus.sanbi.org/

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

Name of ecological community	Community qualifies under Criterion 2?	Description	Justification
Acacia tortilis-Acacia albida Flood Plains Savanna and Riparian Forest Communities	☐	Hyphaene coriacea-Acacia tortilis floodplain Savanna, Peuchel-loeschia leubnitziae-Acacia tortilis pans and brackish plains savanna, Acacia xanthophloea-Azima tetracantha floodplain forest, Faidherbia albida-Ficus sycomorus riparian forest.	
Phragmites mauritianus-Breonadia salicina Reed Communities and Riparian Forest Communities	☐	Schotia brachypetala-Acacia robusta Dry Riparian Forest, Afzelia quanzensis-Combretum, icrophyllum Riparian Forest, Garcinia livingstonei-Phragmites, mauritianus Riparian Forest, Pluchea dioscorides-Breonadia salicina River bed	
Acacia nigrescens-Sclerocarya birrea Savanna communities of dry sandy floodplains	☐	Combretum hereroense-Acacia nigrescens dense tree savanna, Markhamia acuminata-Kirkia acuminata open tree savanna, Terminalia prunioides-Adansonia digitata open tree savanna	

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

4.1 - Ecological character

The east-west valley trough of the Limpopo links the east coast with the continental interior (Kalahari-Mozambique). The location of the wetland system together with the diverse landscape features in the vicinity, form the foundation for the high biodiversity which is characteristic of the Limpopo/Luvuvhu floodplain and pan system. The diversity of landscape is depicted by the area the wetland system occurs in (Tinley, 1978): the continental old land and the young coastal plain meet; the mountains of the Soutpansberg where the Great Escarpment ends; the north-south Lebombo Mountain range, which separates the South African Lowveld from the Mozambique coastal plain; and, this in turn is coupled with a high landscape and substrate diversity. In addition, the diverse topography provides a multiplicity of aspects open to or sheltered from aridity or moisture bearing winds. The presence of these landscapes and the contrasting moisture properties exhibited by the variety of substrates because of highly seasonal and erratic rainfall has resulted in a heterogeneous mosaic of plant communities in the vicinity of the Ramsar site. The major plant communities in the vicinity of the wetland and which are not found elsewhere in South Africa include (Tinley, 1978): Lebombo ironwood forests; mopane woodlands; baobab "forests"; and extensive areas of riverine woodland. In addition, there are several other more common wetland communities which constitute the Ramsar site. These include: riverine forest or thickets; Scrub-thicket on calcareous and brackish clays; clayveld; floodplain woodland; dambo grassland; floodplain grassland; and herbaceous aquatic communities. The diversity of landscape features is matched by a great variety of soils and relief aspects which support exceptional vegetation diversity. The Punda Maria-Pafuri-Wambiya area not only contains the most spectacular scenery in the Kruger National Park, but also has the richest variety of fauna and flora (Tinley, 1978). Many plant and animal species that occur here, occur nowhere else in South Africa. By far the most important of the unique features of this northern sector of the country, is the high biotic diversity formed by the overlapping elements of many biogeographic centres. This template provides for a diversity of ephemeral to seasonal pans within the floodplain hydro-geomorphic unit at the interface of the Limpopo-Luvuvhu Rivers. The characteristics of which are largely exogenous through a variable flood regime with high inter-annual variability and interface with the semi-arid regions of the coastal plain and sub-humid regions of the escarpment.

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	Permanent River	1		Representative
Fresh water > Flowing water >> N: Seasonal/ intermittent/ irregular rivers/ streams/ creeks	Seasonal Rivers	2		Representative
Fresh water > Lakes and pools >> P: Seasonal/ intermittent freshwater lakes	Depression, floodplain lakes and pans	1	587	Representative
Fresh water > Marshes on inorganic soils >> Xf: Freshwater, tree-dominated wetlands	Floodplain Riparian Area	2		Representative

(ECD) Habitat connectivity	the wetland habitat is contiguous with adjacent conservation areas in South Africa, Mozambique and Zimbabwe along the Limpopo floodplain

4.3 - Biological components

4.3.1 - Plant species

Other noteworthy plant species

Phylum	Scientific name	Position in range / endemism / other
TRACHEOPHYTA/MAGNOLIOPSIDA	*Adansonia digitata*	Is a protected tree species, rare, only occurring in the Limpopo Province. Positioned at the southern edge of range in South Africa
TRACHEOPHYTA/MAGNOLIOPSIDA	*Colophospermum mopane*	close to southern end of range
TRACHEOPHYTA/MAGNOLIOPSIDA	*Commiphora pyracanthoides*	close to southern end of range
TRACHEOPHYTA/MAGNOLIOPSIDA	*Euphorbia confinalis*	close to southern end of range
TRACHEOPHYTA/MAGNOLIOPSIDA	*Faidherbia albida*	close to southern end of range
TRACHEOPHYTA/MAGNOLIOPSIDA	*Ficus sycomorus*	close to southern end of range
TRACHEOPHYTA/MAGNOLIOPSIDA	*Terminalia prunioides*	close to southern end of range
TRACHEOPHYTA/MAGNOLIOPSIDA	*Vachellia robusta*	close to southern end of range
TRACHEOPHYTA/MAGNOLIOPSIDA	*Vachellia tortilis*	close to southern end of range
TRACHEOPHYTA/MAGNOLIOPSIDA	*Vachellia xanthophloea*	close to southern end of range. A large Fever Tree forest occurs at the site.
TRACHEOPHYTA/MAGNOLIOPSIDA	*Xanthocercis zambesiaca*	close to southern end of range

Invasive alien plant species

Phylum	Scientific name	Impacts	Changes at RIS update
TRACHEOPHYTA/MAGNOLIOPSIDA	*Argemone mexicana*	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Aristolochia elegans*	Actual (major impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Calotropis procera*	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Cardiospermum halicacabum*	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Chromolaena odorata*	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Clitoria ternatea*	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Datura ferox*	Actual (major impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Lantana camara*	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Parkinsonia aculeata*	Actual (minor impacts)	No change
TRACHEOPHYTA/LILIOPSIDA	*Pistia stratiotes*	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Ricinus communis*	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Senna occidentalis*	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Xanthium strumarium*	Actual (minor impacts)	No change

4.3.2 - Animal species

Other noteworthy animal species

Phylum	Scientific name	Pop. size	Period of pop. est.	% occurrence	Position in range /endemism/other
CHORDATA/AMPHIBIA	*Arthroleptis stenodactylus*				Endemic to southern Africa, with a population extending to Uganda
CHORDATA/AMPHIBIA	*Cacosternum boettgeri*				Endemic to southern Afric
CHORDATA/MAMMALIA	*Cercopithecus mitis*				Endemic to southern Africa, with populations extending to the Democratic Republic of Congo
CHORDATA/MAMMALIA	*Civettictis civetta*				
CHORDATA/MAMMALIA	*Equus quagga burchellii*				
CHORDATA/MAMMALIA	*Kobus ellipsiprymnus*				
CHORDATA/MAMMALIA	*Loxodonta africana*				
CHORDATA/AMPHIBIA	*Phrynobatrachus mababiensis*				Endemic to eastern and southern Africa
CHORDATA/MAMMALIA	*Raphicerus sharpei*				
CHORDATA/MAMMALIA	*Rousettus aegyptiacus*				
CHORDATA/AMPHIBIA	*Sclerophrys pusilla*				The species is distributed across East and Southern Africa however in South Africa distribution is restricted to the North Eastern parts of the Country.
CHORDATA/MAMMALIA	*Syncerus caffer*				
CHORDATA/MAMMALIA	*Taurotragus oryx*				
CHORDATA/MAMMALIA	*Tragelaphus strepsiceros*				
CHORDATA/AVES	*Charadrius marginatus*				Wader species endemic to sub-Saharan Africa It commonly occurs on the coastline, with fewer recorded observations in inland wetlands. At the site it mainly occurs on the Limpopo River.
CHORDATA/AVES	*Crithagra citrinipectus*				One of few species with global ranges of less than 50 000 km2 defining the South-east African Coast Endemic Bird Area
CHORDATA/AVES	*Laniarius atrococcineus*				Rare in the area with sightings only in the north
CHORDATA/AVES	*Laniarius major*				endemic to sub-Saharan Africa, occurs only to the north of Kruger National Park
CHORDATA/AVES	*Vanellus albiceps*				High densities occur along the Luvuvhu River

Invasive alien animal species

Phylum	Scientific name	Impacts	Changes at RIS update
CHORDATA/ACTINOPTERYGII	*Cyprinus carpio*	Actual (minor impacts)	No change
CHORDATA/ACTINOPTERYGII	*Gambusia affinis*	Actual (minor impacts)	unknown
CHORDATA/ACTINOPTERYGII	*Hypophthalmichthys molitrix*	Actual (minor impacts)	No change
CHORDATA/ACTINOPTERYGII	*Oreochromis niloticus*	Actual (major impacts)	No change

4.4 - Physical components

4.4.1 - Climate

Climatic region	Subregion
C: Moist Mid-Latitude climate with mild winters	Cwa: Humid subtropical (Mild with dry winter, hot summer)

The average daily maximum temperature (Tinley, 1978) in January (hottest month) is 33.5o C and in June and July (the coldest months) it is 24.9oC. The highest temperatures that have been recorded for summer and winter respectively are 43.5oC and 32.4oC. The mean daily minimum in January is 21.3oC, and 15.9oC in June and July but extremes of 13oC and -3.8oC have been recorded.

4.4.2 - Geomorphic setting

a) Minimum elevation above sea level (in metres): 190

a) Maximum elevation above sea level (in metres): 235

- [ ] Entire river basin
- [ ] Upper part of river basin
- [ ] Middle part of river basin
- [x] 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.

Two types of floods have been identified in the Luvuvhu River (Bruwer, 1987). The first of these are high floods that overtop the banks of the river after it exits Lanner Gorge into the Pafuri floodplain area. Others are smaller floods of the lower floodplain when the river overtops its banks at the Luvuvhu/Limpopo confluence as a result of backflooding of the Limpopo River flood. This can happen even though the Luvuvhu River is not in flood.

4.4.3 - Soil

- [x] Mineral

(Update) Changes at RIS update: No change (●) Increase ( ) Decrease ( ) Unknown ( )

- [ ] No available information

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

Please provide further information on the soil (optional)

Geological differences between catchment of the Luvuvhu and the Limpopo rivers (Sibasa basalt and granitoid rocks respectively), lead to a marked difference in alluvial deposits flanking these two rivers (Tinley, 1978). Soils which flank the Luvuvhu River consist mainly of very deep, red, occasionally calcareous, neocutanic clay of the Oakleaf form (World Reference Base Soil Group (Acrisols, Lixisols, Arenosols, Cambisols)). The outer fringes of the Luvuvhu river floodplain are usually characterised by deep to moderately deep, red and brown, paraduplex, calcareous clay (Valsrivier form World Reference Base Soil Group (Luvisols, Lixisols)). On the other hand, the soils, which are associated with the levee of the Limpopo River, consist mainly of very deep brown, neocutanic and stratified, loam or fine sand (Oakleaf). The soils of the Limpopo floodplains are dominated by very deep, brown, calcareous and sodic, neocutanic and paraduplex clay (Oakleaf and Valsrivier forms) (Venter, 1990)

4.4.4 - Water regime

Water permanence

Presence?	Changes at RIS update
Usually permanent water present	

Source of water that maintains character of the site

Presence?	Predominant water source	Changes at RIS update
Water inputs from surface water	☑	No change

Water destination

Presence?	Changes at RIS update
To downstream catchment	No change

Stability of water regime

Presence?	Changes at RIS update
Water levels fluctuating (including tidal)	No change

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

The Limpopo and the Luvuvhu Rivers show high seasonal variability in flow. Both the rivers have to rise a few metres to overspill their banks (the Luvuvhu, for example, needs to rise more than 7 m at the bridge in the Kruger National Park). The pans (Van der Waal, 1996) are generally shallow and can be alternatively dry or filled for more than one consecutive year. It is suggested that the pans could become dry once in three years in normal situations. Maximum depths (at overflow level either into the river or to the next pan) of some of the pans are recorded in Annex V. It is essential for the pans to be connected with the rivers in a flooding event in order to ensure recolonisation and exchange of fish and certain invertebrate species with the rivers. In recent years there has been a concerted effort by the Kruger National Park to implement environmental flows in its perennial river systems, including the Luvuvhu River with a focus on low flow management, with recent successes.

(ECD) Connectivity of surface waters and of groundwater	The Ramsar sites position as at the confluence of the Limpopo and Luvuvhu Rivers allows for recharging of the Limpopo Transboundary alluvial aquifer during flood season

4.4.5 - Sediment regime

Sediment regime unknown ☐

(ECD) Water turbidity and colour	Dry season flows the Luvuvhu River very good clarity, during summer (wet season) flows high turbidity in Limpopo River
(ECD) Water temperature	pan water temperatures range between 22-33 degrees C (Malherbe et al, 2017)

4.4.6 - Water pH

Alkaline (pH>7.4) ☑

(Update) Changes at RIS update: No change ◉ Increase ○ Decrease ○ Unknown ○

Unknown ☐

Please provide further information on pH (optional):

the pH may range between 6.7 and 10.6.

4.4.7 - Water salinity

Fresh (<0.5 g/l) ☑

(Update) Changes at RIS update: No change ◉ Increase ○ Decrease ○ Unknown ○

Unknown ☐

Please provide further information on salinity (optional):

pan electrical conductivity typically ranges between 274–4270 micro-siemens per centimeter (Malherbe et al, 2017)

(ECD) Dissolved gases in water

pan Oxygen saturation ranges between 12-220% and DO content between 1-18 mg/L (Malherbe et al 2017)

4.4.8 - Dissolved or suspended nutrients in water

Eutrophic ☑

(Update) Changes at RIS update: No change ◉ Increase ○ Decrease ○ Unknown ○

Unknown ☐

Please provide further information on dissolved or suspended nutrients (optional):

Conductivity may range between 88 and 1249 mS/m in the pans.
Dissolved oxygen is normally less than 5 mg/l, according to Moore et al (1991). 6 mg/l-dissolved oxygen is the guideline value and 4 mg/l would be a critical value for key species such as invertebrates.

(ECD) Water conductivity	pan electrical conductivity typically ranges between 274–4270 micro-siemens per centimetre (Malherbe et al, 2017)

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:

The Limpopo River basin is extremely large and at this stage it is not possible to quantify the different land uses. It is reasonable to estimate that commercial and subsistence agriculture, together with cattle and game farming probably constitute the major land uses along this river. A few small towns do occur along the river and its tributaries. The area that bounds the southern border of the Makuleke Property is sparsely populated and is mainly used for grazing. The Chickwarakwara irrigation project is situated in Zimbabwe, opposite Mabiligwe, north of the Limpopo River. The rest of the area in Zimbabwe is tribal land and is utilised by the local population for small-scale agriculture and stock farming, as well as a concession area for trophy hunting. The predominant current land uses in the Luvuvhu River basin are natural veld (51%) and national parks / nature reserves (30%). Cultivated lands comprise 13% (including irrigated lands which occupy 3% of the catchment).

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)	not relevant for site

Regulating Services

Ecosystem service	Examples	Importance/Extent/Significance
Maintenance of hydrological regimes	Groundwater recharge and discharge	High
Pollution control and detoxification	Water purification/waste treatment or dilution	Medium
Hazard reduction	Flood control, flood storage	High

Cultural Services

Ecosystem service	Examples	Importance/Extent/Significance
Recreation and tourism	Nature observation and nature-based tourism	High
Spiritual and inspirational	Cultural heritage (historical and archaeological)	High
Scientific and educational	Important knowledge systems, importance for research (scientific reference area or site)	High

Supporting Services

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

Other ecosystem service(s) not included above:

The Luvuvhu/Limpopo region represents one of the major biodiversity "hotspots" in South Africa (Tinley, 1978), with many species of a wide range of animal groups occurring only in this very small area of the country. Given the arid nature of the region, the low potential for agricultural yield and animal husbandry, together with the fact that anthrax is endemic in the area, the most suited land-uses are nature conservation and ecotourism. Ecotourism currently represents the only viable option for sustainable, long-term use of this area, with a good potential for generating revenue without impacting on the unique biodiversity present here (Venter, et al. 1994).
There has been no agricultural production in the Madimbo area since the SANDF took over in 1968, the Banyini Pan (which includes the Mahanga and Nyavadi sub-pans) is now within the Makuleke Contractual National Park.

Within the site: <100 eco-tourism

Outside the site: <10000 community

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

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 ☑

Description if applicable

The area is well known for its archaeological sites and extensive excavations are still being undertaken in the area. More than 30 archaeological sites of continuous human settlement dating back to the first century AD have been identified. The area is very historically significant to the Makuleke Community. It has several sites illustrating their traditional ways of living, such as hunting, fishing and ploughing. The Makuleke Royal family graveyard is valuable for the Makuleke community. Every year on the 24th of September they visit the site to perform "the ancestral calling and thanks giving" ceremony. There is an old store at the Crook's Corner built by a Portuguese, Fernandez, from Mozambique. The Crook's Corner was used for trade to people from Mozambique, Zimbabwe and South Africa. Closer to it there is a grave for the famous hunter, Vekenya, well known for hunting in all three countries sides, South Africa Zimbabwe and Mozambique. All pans still have good memories to the Makuleke elders. Some of pans were named after the people living close to them.

iii) the ecological character of the wetland depends on its interaction with local communities or indigenous peoples ☑

Description if applicable

In 1999, Makuleke community created the Community Property Association (CPA), through which they gained ownership of 22,000 hectares of the northernmost part of the KNP between the Limpopo and Luvhuvu rivers. The land was returned to them after they reached a mediated settlement with many government departments and with South African National Parks Board (SANParks) and the new democratic government.

This accomplishment returned full ownership and title to a piece of land that contains by far the richest combination of wild plants, animals and stunning landscapes in the entire park, along with a host of tangible rights. In return for these rights they guaranteed to use the land in a way that is compatible with the protection of wildlife. The Makuleke Region of the Kruger National Park (KNP) is an attempt to harmonise the protection of biological diversity with their interests as rural people.

To give effect to this agreement, some 24,000 hectares of land within the KNP between the Luvhuvu and Limpopo Rivers was transferred from the State and returned to the community. It was then reproclaimed as a contractual park, effectively reincorporating it back into a national park. Although ownership changed hands, the land effectively remained within the same ecological management system.

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

There are strong ties to ecosystem and cultural services of the Makuleke Ramsar pans to Makuleke community and in particular the elders who were aware of the forced removal from their land in the 1960s. There are a number of projects currently underway to capture these links and reintegrate those aspects back into the management of the site for shared socio-ecological and conservation benefits.

4.6 - Ecological processes

(ECD) Primary production	
(ECD) Vegetational productivity, pollination, regeneration processes, succession, role of fire, etc.	.

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
National/Federal government	☐	☑
Local authority, municipality, (sub)district, etc.	☑	☐

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

The majority of the Ramsar site falls within the boundary of the land owned by the Makuleke Communal Property Association (MCPA) and therefore owned by the Makuleke community after land restitution following the Restitution of Land Rights Act (1994) and a settlement agreement signed in 1999. The Banyini Pan (which includes the Mahanga and Nyavadi sub-pans) and the rest of the wetland system is in the Makuleke's portion of the Madimbo Corridor. A small portion of the site (south of the Luvuvhu River) is owned by the state. Governance of the Ramsar site within the Makuleke Contractual National Park is undertaken by a Joint Management Board consisting of 3 members of the MCPA and 3 members of SANParks. This is supported through a Joint Management Committee for operations of the area inclusive of the eco-tourism operations and other actors. The KNP as represented by SANParks remains the conservation management authority throughout the Ramsar site.

5.1.2 - Management authority

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

The department responsible for the jurisdiction of the site is Department of Forests, Fisheries and Environment (DFFE) and its designated management entity, South African National Parks (SANParks). In terms of the territorial jurisdiction, the area belongs to the Makuleke Community after the land was successfully restituted in terms of the Restitution of Land Rights Act (Act no 22 of 1994). The Makuleke community decided to retain the conservation status of the land i.e. the land is a Contractual National Park and the functional jurisdiction is held jointly by the Makuleke Communal Property Association and South African National Parks (SANPARKS) in particular Kruger National Park through a Joint Management Board. Furthermore, the Ramsar site falls within what is know as the Pafuri-Sengwe node of the Great Limpopo Transfrontier Park, which has a trilateral rotation of an International Co-ordination office.

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

Mr Aubrey Maluleke (Park Co-ordinator, Makuleke Contractual National Park), Mr Richard Sowry (Section Ranger, Pafuri Section KNP), Dr Eddie Riddell (Water Resources Manager, KNP)

Postal address:

Makuleke Communal Property Association PO Box 305

SASELAMANI 0928

Joint Management Board
C/o: Punda Maria Camp Kruger National Park Private
Bag X402 Skukuza
1350

E-mail address: eddie.riddell@sanparks.org

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	Changes	In the surrounding area	Changes
Housing and urban areas			☐		☑	
Tourism and recreation areas			☑		☐	

Water regulation

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Water abstraction			☑		☑	

Agriculture and aquaculture

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Annual and perennial non-timber crops	Low impact	Low impact	☐	No change	☑	No change
Wood and pulp plantations	Low impact	Low impact	☐	No change	☑	No change
Livestock farming and ranching	Low impact	Low impact	☑	No change	☐	No change
Marine and freshwater aquaculture	Low impact	Low impact	☐	No change	☑	No change

Energy production and mining

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Mining and quarrying	Low impact	Low impact	☑	No change	☑	No change

Natural system modifications

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Dams and water management/use			☐		☑	

Invasive and other problematic species and genes

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Invasive non-native/ alien species	Low impact	Medium impact	☑	No change	☑	No change

Pollution

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Household sewage, urban waste water	Low impact	Medium impact	☑	No change	☑	No change
Agricultural and forestry effluents	Low impact	Medium impact	☐	No change	☑	No change

Climate change and severe weather

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Temperature extremes	Medium impact	High impact	☑	increase	☑	increase

Please describe any other threats (optional):

A number of water supply schemes currently exist in the Luvuvhu River (DWAF, 1990) basin and existing dams regulate 55 million m3 of the 395 million m3 mean annual runoff (MAR). The total water requirement in 1985 was estimated to have been 192 million m3/a ,(49% of Virgin MAR), including both consumptive and non-consumptive uses. The number of people dependent on the basin for water during 1983 was 317 100. An increasing trend towards urbanization within the basin is occurring and is expected to continue. Urban and industrial use is 6% of the total use at present and could grow to 13% over the corresponding period to 2010. A trend towards more intensive land uses (urban, irrigation and afforestation) can be expected outside the Kruger National Park. Irrigation demand comprises some 43% of the water requirements of the basin at present. The total amount of water required by forestry (10%) and necessary ecological purposes (42%) are unlikely to change significantly but the proportion of total demand (versus irrigation) will decrease. In 1987, planted afforestation reduced the MAR to 376 million m3/a, while runoff at the river outlet under 1987 conditions of development and abstraction averaged approximately 315 million m3/a.

The potential for further irrigation development in the Luvuvhu Basin is high (DWAF, 1990). Within the central basin area, most schemes utilize river flow directly and do not have any impounded water supply. Their combined abstractions utilize all the low flows in the river, particularly during the critical period of August to November. Downstream in Mozambique, redevelopment of old irrigation schemes is also in progress.

The projected water requirements in 2010 based on a low-, and high-growth rate scenario is likely to be in the order of 222 million m3/a (56% MAR) and 246 million m3/a (63% MAR) respectively (DWAF, 1990). The total water demand and requirements of all the sectors and users will thus increase by between 16% and 28% over the period of 25 years from 1985 to 2010.

If increased growth is going to result in a decrease in allocation for ecological purposes (likely scenario) over the next 12 years, there will be between 38% (low growth rate) and 67% (high growth rate) reduction in allocation of MAR to lower Luvuvhu valley.

5.2.2 - Legal conservation status

Global legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Other global designation	Great Limpopo Transfrontier Park	https://www.peaceparks.org/tfcas /great-limpopo/	whole
UNESCO Biosphere Reserve	Vhembe Biosphere Reserve	https://www.vhembebiosphere.org/	partly

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
National Park	Kruger National Park	www.sanparks.org	whole

Non-statutory designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Important Bird Area		http://datazone.birdlife.org/site/factsheet/kruger-national-park-and-adjacent-areas-iba-south-africa	whole
Other non-statutory designation	National Freshwater Ecosystem Priority Area	https://www.sanbi.org/documents/national-freshwater-ecosystem-priority-areas-nfepa-project-update-may-2011/	whole

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 ☐

5.2.4 - Key conservation measures

Legal protection

Measures	Status
Legal protection	Implemented

Habitat

Measures	Status
Catchment management initiatives/controls	Partially implemented
Hydrology management/restoration	Partially implemented

Species

Measures	Status
Threatened/rare species management programmes	Partially implemented
Control of invasive alien plants	Implemented

Human Activities

Measures	Status
Communication, education, and participation and awareness activities	Implemented
Regulation/management of recreational activities	Implemented

Other:

In accordance with the National Parks Act (1976, as amended) the primary objective in the management of the Kruger National Park is to maintain the area as intact and as natural as possible and to utilize the Park for the educational and spiritual benefit of visitors. Maintaining the full spectrum of species in the various biotic communities of the Park is of the highest priority.

Co-management happens through the Joint Management Board, which is made up of representatives of the Makuleke CPA and SANParks (South African National Parks) on a 50/50 basis.

The proposed area also borders the Limpopo Transfrontier Conservation Area (TFCA) with Mozambique and Zimbabwe and also part of the Great Limpopo Transfrontier Park (GLTP)

A comprehensive water resources classification program is now underway by the national Department of Water & Sanitation for the Limpopo Water Management Area, which will lead to a legally gazetted environmental flow provision for the Makuleke Ramsar Site likely from 2024 onwards.

5.2.5 - Management planning

Is there a site-specific management plan for the site? Yes

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 ◉

Please indicate if a Ramsar centre, other educational or visitor facility, or an educational or visitor programme is associated with the site:

Day visitors, game drives and picnic site occur throughout the site as part of SANParks environmental outreach program

5.2.6 - Planning for restoration

Is there a site-specific restoration plan? No need identified

Further information

No major restoration efforts are required in this Ramsar site. Some small scale activities have been undertaken over the past decade, such as road culvert stabilisation in the Luvuvhu floodplain, and erosion gully stabilization in the Makwadzi pan.

5.2.7 - Monitoring implemented or proposed

Monitoring	Status
Water regime monitoring	Implemented
Water quality	Implemented
Plant species	Implemented
Animal community	Implemented
Birds	Implemented

Research has been solicited on various aspects, including working with guides employed at the eco-tourism lodges to provide citizen science level data on pan inundation and avifaunal use. A current detailed research project is currently underway that should inform the baseline for pan ecology, led by University of Venda & University of Mpumalanga entitled: “Biodiversity, trophic structure and connectivity of temporary aquatic ecosystems in the Kruger Makuleke Contractual National Park". Several other ad-hoc research projects are usually undertaken within the Ramsar site at any one time and provide a continuous input to improve the scientific understanding of the ecosystem.

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

Antrobus, R .2014. The Influence of Pan Characteristics on their Seasonal Usage by Mammals Within the Makuleke Ramsar Wetland System. MSc Thesis, University of the Witwatersrand, Johannesburg
Bailey, A.K. & Pitman, W.V. 2016. Water Resources of South Africa, 2012 Study (WR2012). Wr Research Commssion, Pretoria, South Africa. Report TT 683/16
Bredenkamp, G.J. & van Rooyen, N. 1993. A survey of the riparian vegetation of the Levubu River in the Kruger National Park. EKOTRUST CC. 64 pp.
Bruwer, C (ed). 1987. Flow requirements of Kruger National Parks rivers. Proceedings of a Workshop held from 14 to 19 March 1987 at Skukuza in the Kruger National Park. Technical Report NO.TR 149. Department of Water Affairs and Forestry, Pretoria. 141 pp.
De Vos, V. & Bryden, H.B. 1996. Anthrax in the Kruger National Park: temporal and spatial patterns of disease occurrence. Salisbury Medical Bulletin 87 Special Supplement: 26 31.
Department of Water Affairs (2014) Development of a Reconciliation Strategy for the Luvuvhu and Letaba Supply System. Report No. P WMA 02/B810/00/1412/10
Department of Water Affairs and Forestry (DWAF). 1994. Proceedings of the Luvuvhu Instream Flow Requirements Workshop, Mountain View, Louis Trichardt 26-29 July, 1994. 300 pp.
Dyamond, K (2017). Macro-Invertebrate Diversity within the Makuleke Wetlands in the Pafuri Region of Kruger National Park. MSc Thesis, University of Johannesburg, Johannesburg.
Gertenbach, W.P.D. 1980. Rainfall patterns in the Kruger National Park. Koedoe. 23:35 43.
Gertenbach, W.P.D. 1983. Landscapes of the Kruger National Park. Koedoe. 26:9-122.
Heritage, G.L. 1994. The geomorphology of the Luvuvhu River. In: Department of Water Affairs & Forestry.
Keates, C., Conradie, W., Dalu, T., Dondofema, F., Riddell, E. S., & Wasserman, R. J. (2022). Phylogenetic placement of the enigmatic Floodplain water snake, Lycodonomorphus obscuriventris FitzSimons, 1964. Koedoe, 64(1), 1-9.
Malherbe W, Ferreira M, van Vuren JHJ, Wepener V, Smit NJ. 2017. The Aquatic Biodiversity and Tourism Value of Selected South African Ramsar Sites. Water Research Commission Report WRC Report No. TT 732/17 ISBN 978-1-4312-0920-0
McKenzie, D. 2022. The Importance of the Makuleke Wetlands Ramsar Site as an Important Breeding Locality for Yellow-billed Stork Mycteria ibis. Afrotropical Bird Biology: Journal of the Natural History of African Birds.

6.1.2 - Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)
<5 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
<6 file(s) uploaded>

6.1.3 - Photograph(s) of the Site

Please provide at least one photograph of the site:


Mahanga (within Banyini Pan) (*SANParks, 08-04-2021*)


Mahanga (within Banyini Pan) (*SANParks, 08-04-2021*)


Luvuvhu and Limpopo River confluence at Crook's Corner (*SANParks, 08-04-2021*)


Luvuvhu River floodplain (*SANParks, 10-09-2020*)


University of Venda scientists explaining pan ecological character to members of the Makuleke Communal Property Association and Ministry officials (DFFE) at Hapi Pan (*SANParks, 23-03-2022*)


The Luvuvhu River flowing through the Lanner Gorge before entering the Makuleke Ramsar site floodplains (*SANParks, 18-11-2022*)


The Luvuvhu River floodplain during the dry season (*SANParks, 12-10-2022*)


fever tree forest at Gwalala (*SANParks, 26-04-2017*)


dry season game utilization of the floodplain (*SANParks, 13-09-2018*)


in-field discussions with elders of the Makuleke community on how they utilised the resources of the pans before their forceful removal from the land in the 1960s (*SANParks, 22-02-2022*)


Mambyumbvanyi Pan (*SANParks, 09-04-2021*)


Mapimbana Pan (*SANParks, 09-04-2021*)


Nwambi Pan (*SANParks, 10-04-2021*)


Xagova Pan (*SANParks, 26-04-2017*)


Nghila Pan (*SANParks, 26-04-2017*)


Nwambi Pan (dry season) (*SANParks, 08-09-2020*)

6.1.4 - Designation letter and related data

Designation letter
<1 file(s) uploaded>

Date of Designation 2007-05-22