

# Inhassoro-Vilanculos

**MOZTIPA053**



Country: **Mozambique**

Administrative region: **Inhambane (Province)**

Central co-ordinates: **-21.72211 N, 35.18269 E**

Area: **953km<sup>2</sup>**

## Qualifying IPA criteria

A(i), A(iv), B(ii)

## IPA assessment rationale

Inhassoro-Vilanculos qualifies as an IPA under criterion A(i), as this area supports important populations of seven globally threatened species, namely *Ecbolium hastatum* (EN), *Elaeodendron fruticosum* (VU), *Ozoroa gomesiana* (VU), *Psychotria amboniana* subsp. *mosambicensis* (VU), *Solanum litoraneum* (EN), *Triaspis suffulta* (EN) and *Xylia mendoncae* (VU). It also qualifies under Criterion A(iv), due to the occurrence of *Encephalartos ferox* subsp. *emersus*, as this subspecies is range restricted and potentially threatened and the majority of its known global population lies within this IPA. This IPA holds 12 national endemic species and falls within the top 15 sites nationally for endemic and range restricted species; Inhassoro-Vilanculos therefore qualifies under sub-criterion B(ii) of the IPA criteria. The coastal miombo on primary dunes is a range restricted and threatened habitat covered by this IPA which supports seven endemic species. With further research, this site may qualify under criterion C(iii) of the IPA criteria in future, due to the presence of this habitat type.

## Site description

The Inhassoro-Vilanculos IPA is located along the coast of northern Inhambane Province within the Inhassoro and Vilanculos Districts. It covers an area of 953 km<sup>2</sup> between the latitudes -21.34° to -22.11°

and longitudes 35.09° to 35.4°. This IPA falls within the proposed Inhambane (sub-)Centre of Plant Endemism (CoE) (Darbyshire et al. 2019). To the east of this site is the Indian Ocean coast, while in the south is Vilanculos town, in north the mangroves of Govuro District and to the west the site boundary runs largely parallel to the EN1 road. The town of Inhassoro has been excluded from the site boundary.

The vegetation of this IPA is under significant human pressure, including the expansion of tourism which is particularly prominent along the coastal dunes (MICOA 2012; Massingue 2019). Despite the human pressure, this site contains a range of terrestrial habitats that support a notable number of plant species endemic to Mozambique, including deciduous miombo woodland, freshwater depressions, and semi-deciduous to evergreen dune thicket (Lötter et al. in prep.). In addition, Massingue (2019) notes the presence of coastal miombo on primary dunes, a range-restricted habitat that is only known from Inhassoro and Vilanculos Districts. Neighbouring this site are Temane IPA [MOZTIPA055] to the west and Mapinhane IPA [MOZTIPA056] to the south-west, while approximately 30 – 35 km offshore is the Bazaruto Archipelago IPA [MOZTIPA042]. The site also overlaps with the Inhassoro-Vilanculos Key Biodiversity Area (KBA) but is not formally protected at present.

## Botanical significance

Inhassoro-Vilanculos hosts seven range-restricted and globally threatened plant species. This includes three Endangered species: *Ecbolium hastatum* and the wild relative of the aubergine, *Solanum litoraneum* (both endemic to southern Mozambique); and the woody climber, *Triaspis suffulta* (a strict endemic of the Inhambane CoE). In addition, there are four Vulnerable species known from this site: *Elaeodendron fruticosum* (endemic to the Inhambane CoE, occurring across coastal areas of Gaza and Inhambane Provinces); *Ozoroa gomesiana* (a strict endemic of northern Inhambane Province, mostly within the Mapinhane, Inhassoro and Vilanculos IPAs);

*Psychotria amboniana* subsp. *mosambicensis* (endemic to southern Mozambique) and *Xylia mendoncae* (a strict endemic of northern Inhambane Province, occurring in Vilanculos, Inhassoro and Govuro Districts). The largest population globally of *X. mendoncae* occurs within this IPA, which is therefore the global stronghold for this species, with more than 65% of its population estimated to be within this IPA. From satellite imagery (Google Earth 2021), it is notable that this species prefers coastal deciduous miombo woodland, with *Brachystegia* sp. and *Julbernardia globiflora*, close to freshwater depressions. The habitats around the freshwater depressions are preferred areas for machambas. Despite this, *X. mendoncae* appears to be able to regenerate in secondary regrowth following shifting agriculture.

A further species of conservation interest is the cycad *Encephalartos ferox* subsp. *emersus*. Provisionally assessed as Endangered, this subspecies has now been confirmed to be endemic to the Inhambane CoE, in Inhambane coastal districts of Inhassoro, Vilanculos and Jangamo (Massingue 2019), occurring on ancient termitaria in seasonally flooded coastal plains (Burrows et al. 2018). This IPA contains a majority of the global population.

This IPA holds within its boundaries 12 national endemic species and six near-endemic species. The Mozambican endemics comprise the seven previously mentioned globally threatened or potentially threatened species, plus four Least Concern species, *Ammannia fernandesiana* (for which this may be the most important site globally), *Chamaecrista paralias*, *Triainolepis sancta* and *Zanthoxylum delagoense*.

Near-endemic plant taxa known from this site include *Commiphora schlechteri* (LC), *Crotalaria dura* subsp. *mozambica*, *Cussonia arenicola* and *Pavetta gracillima*. Additionally of interest is the saltmarsh species *Caroxylon littoralis*, restricted to the coastlines on the Mozambique Channel with an Area of Occupancy of around 48 km<sup>2</sup> (Friis & Holt 2017). This IPA represents one of only three locations for this species in Mozambique.

In addition to this, Vilanculos-Inhassoro hosts significant areas of coastal miombo on primary dunes. Throughout most of Mozambique, coastal miombo occurs towards the rear of the dune system; however, in this IPA miombo also occurs on primary dunes. Nationally this habitat is highly restricted, limited to a small area around Vilanculos and Inhassoro Districts, and is also threatened by encroaching agriculture and expanding townships (Massingue 2019). This IPA is, therefore, of great conservation importance for this habitat type.

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## Habitat and geology

In the broad sense, the Inhassoro-Vilanculos IPA region lies within the Swahilian-Maputaland Regional Transition Zone phytogeographical region according to Clarke (1998), covering much of coastal-belt Mozambique, and in the Southern Zanzibar-Inhambane Coastal Forest Mosaic Ecoregion according to Schipper & Burgess (2015), which stretches for ca. 2,200 km along the eastern coast of the African continent, from southern Tanzania to Xai-Xai (Gaza Province) in Mozambique. In a narrower

phytogeographical sense, this IPA falls within the northern extension of the Maputaland Centre of Endemism, recently proposed as the Inhambane (sub-) CoE (Darbyshire et al. 2019), which was proposed due to the high concentration of plant endemism found only within this area (Massingue 2019).

The climate is influenced by the warm current from the Mozambique Channel and is characterized to be a humid to sub-humid tropical climate, with two seasons (Lambrechts 2003; Cumbe 2007; Massingue 2019): a hot rainy season from August to February, and a dry and relatively cool season from February to July. In the rainy season, the average temperatures vary between 28 – 30°C, while in the dry season the temperatures vary between 18 – 27°C. Average annual rainfall ranges from 865 – 936 mm, with highest rainfall on the coast (Lambrechts 2003, Governo do Distrito de Inhassoro 2011, EOH 2015a, World Resources Institute 2021). The elevation of the IPA ranges from 0 – 55 m. It is part of the great coastal plains that stretch along a large extent of coastal Mozambique and is characterized by unconsolidated sandy soils of fine texture, with a very low clay content, originated from wind and/or marine activities, interspersed with areas of hydromorphic soils and soils derived from marine sediments soils found along the coastline. Red clay soils and sodic soils (mananga soils) dominating the inland zones (MICOA 2012).

The coastal vegetation of the Inhassoro-Vilanculos IPA is highly fragmented through a combination of threats (see below). Despite this, there are still significant areas of intact coastal habitats remaining that are of high conservation concern. In recent years, this IPA has been subject to several botanical surveys, which have helped to add, update, and confirm our understanding of plant diversity in the Inhassoro IPA region and improve understanding of the mosaic of habitats within this IPA. It lies within a frequently flooded landscape and so features a range of wetland types notably: riverine floodplains with swamps, seasonal coastal streams, coastal lakes and lagoons, and mangrove forests at the coast. Among these wetlands the most important are the Nhangonzo stream by the coast in the eastern most corner of this IPA (-21.72°, 35.24°) and the Govuro River floodplain further inland to the south (-21.75°, 35.14°), dominated by emergent and inundated vegetation and characterized by the presence of *Phragmites australis* and *Nymphaea* within the water bodies, and the abundance of *Hyphaene coriacea* and *Phoenix reclinata*, associated with termite mounds (MICOA 2012; Deacon 2014).

In the east of the IPA, there is a small extent of mangroves with *Rhizophora mucronata*, *Bruguiera gymnorhiza*, *Avicennia marina* and *Ceriops tagal*. Associated with this habitat are coastal saltmarshes, with scattered to dense samphires (*Sarcocornia* sp.) (MICOA 2012; Lötter et al. in prep.).

The coastal dunes support a mosaic of semi-deciduous to evergreen thicket and forest, ranging in density and structure. This vegetation type is dominated by *Acacia kraussiana*, *A. robusta* var. *usambarensis*, *Acokanthera oblongifolia*, and *Acridocarpus natalitius*, with plants of conservation interest including *Commiphora schlechteri* and, notably, *Ecbolium hastatum* (Lötter et al. in prep.).

Littoral miombo woodland covers significant areas of the IPA,

dominated by *Brachystegia spiciformis*, *B. torrei* and *Julbernardia globiflora* (Lötter et al. in prep.). Towards the coastline, the canopy is more closed (75% tree and shrub cover) and the understory is dominated by the grass *Halopyrum mucronatum* together with shrubby *Scaevola plumieri*. Further inland, the canopy is more open (35% canopy cover) and herbaceous cover is greater, featuring grasses such as *Eragrostis chapelieri*, *Melinis repens*, *Perotis patens*, *Schizachyrium sanguineum* and *Sporobolus pyramidalis* (Deacon 2014; EOH 2015b). Interestingly, this site also hosts miombo on primary dunes, a nationally scarce and threatened habitat known only from Vilanculos to Inhassoro, which is dominated by *Julbernardia globiflora* and rarely *Brachystegia spiciformis* (Massingue 2019). This important habitat protects inland terrestrial ecosystems from excessive marine influences and holds important plants for conservation interest including the Endangered *Triaspis suffulta* and *Ecbolium hastatum* among others. Further inland are deciduous forest and woodland mosaics, often with an open woodland of medium-sized trees and shrubs (of 30% cover) and with an herbaceous ground cover (60%) of *Megathyrus maximus*, *Schizachyrium sanguineum* and *Sporobolus pyramidalis*. This habitat holds similar tree species to the miombo woodland, with *Brachystegia spiciformis* and *Julbernardia globiflora*, but is dominated by deciduous species such as *Azelia quanzensis*, *Balanites maughamii*, *Sideroxylon inerme* subsp. *diospyroides*, and *Suregada zanzibariensis* (MICOA 2012; Lötter et al. in prep.). Moreover, this habitat holds several plants of conservation interest, namely *Chamaecrista paralias*, *Commiphora schlechteri*, *Psychotria amboniana* subsp. *mosambicensis* and *Zanthoxylum delagoense*. In the west of this site are a number of seasonal wetlands, associated with savanna vegetation. The woody component is dominated by *Hyphaene coriacea* accompanied by *Albizia versicolor*, *Annona senegalensis*, *Dichrostachys cinerea*, *Ozoroa obovata* and *Sclerocarya birrea*, alongside the endemic species *Chamaecrista paralias*; these wetlands are also where the endemic shrubby herb *Ammannia fernandesiana* can be found.

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## Conservation issues

Despite its importance for plant diversity and endemism, the Inhassoro-Vilanculos IPA does not lie within a formal protected area. However, most of the region is included within the recently identified Inhassoro-Vilanculos KBA (WCS et al. 2021). The area is not currently recognised as a RAMSAR site, despite the diversity of wetlands which are suitable for waterbirds and migratory birds (Lambrechts 2003; Golder Associates 2014; EOH 2015a; EOH 2015b; Google Earth 2021). IMPACTO (2018) determined that 63.4 ha of thicket/coastal dune forest located in a narrow strip along the northern and southern part of the Nhangonzo Estuary qualifies as a “Critical Habitat”. Moreover, the restricted primary dune miombo, a habitat type of conservation significance, also occurs within the coastal dune vegetation (Massingue 2019).

Along the coast, the Nhangonzo humid zone has recently been subjected to drilling of pools for prospecting of petroleum and natural gas, and seismic research. These activities have increased

vegetation damage by opening new access routes, and intensification of land use by local communities. However, according to the recent report by IMPACTO (2018), these areas will be no longer exploited, as it would contravene requirements present in the current exploitation license for Sasol Lda, which prohibits activities related to oil and gas exploitation within a range of 500 m from the coast.

Botanical surveys carried out in some areas of this site, especially the critical area of Nhangonzo, pointed out the existence of invasive plant species in the vicinity of villages and agricultural areas, such as *Agave sisalana*, *Lantana camara*, *Melinis repens* and *Opuntia ficus-indica*. There are also some exotic trees, such as cashew, mango and *Casuarina equisetifolia*, which occur in small numbers in disturbed areas (EOH 2015a, 2015b).

More generally, this IPA is currently under high pressure and degradation by local communities because of the harvesting of firewood, charcoal production, livestock grazing, agriculture with an associated increase in fire frequency, and expansion of settlements (MICOA 2012; Massingue 2019; World Resources Institute 2021; Google Earth 2021). The cultivated areas are concentrated by wetlands and along access roads and paths, and notably near Sasol’s oil flowlines which are widespread along the coastal stretch of Inhassoro IPA and themselves cause a level of habitat degradation (Deacon 2014; EOH 2015a 2015b; Google Earth 2021). It is also likely that the expansion of tourism infrastructure observed within this IPA, especially along the coastline, is also negatively affecting the integrity of the dune ecosystems, by gradually replacing the primary dune miombo vegetation (Massingue 2019). Coastal forest and woodland restoration and prevention of further habitat loss or degradation should be considered high priorities to enable the conservation of the threatened plant species of this IPA. Urgent action is required to protect the remaining vegetation given the scale of habitat loss to date.

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## Site assessor(s)

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## IPA criterion A species

SPECIES	QUALIFYING SUB-CRITERION	≥ 1% OF GLOBAL POPULATION	≥ 5% OF NATIONAL POPULATION	1 OF 5 BEST SITES NATIONALLY	ENTIRE GLOBAL POPULATION	SOCIO-ECONOMICALLY IMPORTANT	ABUNDANCE AT SITE
<i>Ecbolium hastatum</i> Vollesen	A(i)	✓	✓	✓	—	—	Unknown
<i>Elaeodendron fruticosum</i> N.Robson	A(i)	✓	✓	✓	—	—	Unknown
<i>Psychotria amboniana</i> K.Schum. subsp. <i>mosambicensis</i> (E.M.A.Petit) Verdc.	A(i)	✓	✓	✓	—	—	Occasional
<i>Ozoroa gomesiana</i> R.Fern. & A.Fern.	A(i)	✓	✓	✓	—	—	Common
<i>Xylia mendoncae</i> Torre	A(i)	✓	✓	✓	—	—	Occasional
<i>Triaspis suffulta</i> Launert	A(i)	✓	✓	✓	—	—	Scarce
<i>Encephalartos ferox</i> G.Bertol subsp. <i>emersus</i> P.Rousseau, Vorster & A.E.van Wyk	A(iv)	✓	✓	✓	—	—	Scarce
<i>Solanum litoraneum</i> A.E.Gonc.	A(i)	✓	✓	✓	—	—	Common

## IPA criterion C qualifying habitats

HABITAT	QUALIFYING SUB-CRITERION	≥ 5% OF NATIONAL RESOURCE	≥ 10% OF NATIONAL RESOURCE	1 OF 5 BEST SITES NATIONALLY	AREAL COVERAGE AT SITE
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## General site habitats

GENERAL SITE HABITAT	PERCENT COVERAGE	IMPORTANCE
Savanna - Dry Savanna	—	Major
Forest - Subtropical/Tropical Dry Forest	—	Major
Shrubland - Subtropical/Tropical Dry Shrubland	—	Major
Marine Intertidal - Salt Marshes (Emergent Grasses)	—	Minor
Marine Coastal/Supratidal - Coastal Sand Dunes	—	Major
Artificial - Terrestrial - Arable Land	—	Minor

GENERAL SITE HABITAT	PERCENT COVERAGE	IMPORTANCE
Savanna - Moist Savanna	—	Major
Forest - Subtropical/Tropical Mangrove Forest Vegetation Above High Tide Level	—	Minor
Wetlands (inland) - Seasonal/Intermittent/Irregular Rivers, Streams, Creeks	—	Minor

## Land use types

LAND USE TYPE	PERCENT COVERAGE	IMPORTANCE
Agriculture (arable)	—	Major
Tourism / Recreation	—	Minor
Forestry	—	Unknown
Extractive industry	—	Minor
Residential / urban development	—	Major
Harvesting of wild resources	—	Major

## Threats

THREAT	SEVERITY	TIMING
Residential & commercial development - Housing & urban areas	Medium	Ongoing - trend unknown
Residential & commercial development - Tourism & recreation areas	Medium	Ongoing - trend unknown
Agriculture & aquaculture - Annual & perennial non-timber crops - Shifting agriculture	Medium	Ongoing - trend unknown
Biological resource use - Logging & wood harvesting	Medium	Ongoing - trend unknown
Residential & commercial development - Commercial & industrial areas	Medium	Ongoing - trend unknown
Agriculture & aquaculture - Livestock farming & ranching - Small-holder grazing, ranching or farming	Low	Ongoing - trend unknown
Energy production & mining - Oil & gas drilling	Medium	Ongoing - trend unknown
Energy production & mining - Mining & quarrying	Unknown	Ongoing - trend unknown
Transportation & service corridors - Roads & railroads	High	Ongoing - trend unknown
Natural system modifications - Fire & fire suppression - Increase in fire frequency/intensity	Unknown	Ongoing - trend unknown
Invasive & other problematic species, genes & diseases - Invasive non-native/alien species/diseases	Medium	Ongoing - trend unknown
Human intrusions & disturbance - Recreational activities	High	Ongoing - trend unknown

## Conservation designation

DESIGNATION NAME	PROTECTED AREA	RELATIONSHIP WITH IPA	AREAL OVERLAP
Inhassoro-Vilankulos	Key Biodiversity Area	protected/conservation area overlaps	70

DESIGNATION NAME	PROTECTED AREA	RELATIONSHIP WITH IPA	AREAL OVERLAP
		with IPA	

## Management type

MANAGEMENT TYPE	DESCRIPTION	YEAR STARTED	YEAR FINISHED
No management plan in place		–	–

## Bibliography

Darbyshire, I., Timberlake, J., Osborne, J., Rokni, S., Matimele, H., Langa, C., Datizua, C., de Sousa, C., Alves, T., Massingue, A., Hadj-Hammou, J., Dhanda, S., Shah, T. & Wursten, B. 2019. **The endemic plants of Mozambique: diversity and conservation status.** *PhytoKeys*, Vol 136, page(s) 45-96

Burrows, J., Burrows, S., Lötter, M. & Schmidt, E. 2018. **Trees and Shrubs Mozambique.**

Google Earth 2020. **Google Earth Satellite Imagery.**

World Resources Institute 2020. **Global Forest Watch.**

Massingue, A.O. 2019. **Ecological Assessment and Biogeography of Coastal Vegetation and Flora in Southern Mozambique.**

Lötter, M., Burrows, J., McClelland, W., Stalmans, M., Schmidt, E., Soares, M., Grantham, H., Jones, K., Duarte, E., Matimele, H. & Costa, H. M. In Prep. **Historical Vegetation Map and Red List of Ecosystems Assessment for Mozambique – Version 1.0 – Final report.**

Friis, I. & Holt, S. 2017. **Salsola sp. A of Flora Zambesiaca from the coast of Mozambique is *Caroxylon littoralis* (Amaranthaceae subfam. Salsoloideae), hitherto only known from Madagascar.** *Webbia*, Vol 72, page(s) 63-69

Cumbe, A.N.F. 2007. **O Património Geológico de Moçambique: Proposta de Metodologia de Inventariação, Caracterização e Avaliação.**

Lambrechts, A. 2003. **Biodiversity Management Plan for Vilanculos Coastal Wildlife Sanctuary.**

Ministério para a Coordenação da Acção Ambiental (MICOA) 2012. **Perfil Ambiental e Mapeamento do Uso Actual da Terra nos Distritos da Zona Costeira de Moçambique: Distrito de Vilankulos.**

Clarke, G.P. 1998. **A new regional centre of endemism in Africa.**

**Aspects of the ecology, taxonomy and chorology of the floras of Africa and Madagascar..** Kew Bulletin Additional Series (pub. Royal Botanic Gardens, Kew)

Deacon, A.R. 2014. **Environmental Impact Assessment for Sasol PSA and LPG Project: Terrestrial Fauna Impact Assessment. Specialist Report 10. SASOL Petroleum Mozambique Limitada & Sasol Petroleum Temane Lda.**

EOH Coastal and Environmental Services (CES) 2015a. **Nhangonzo Coastal Stream Critical Habitat Biodiversity Assessment: Integrated Summary Report..**

EOH Coastal and Environmental Services (CES) 2015b. **Nhangonzo Coastal Stream Critical Habitat Biodiversity Assessment: Vegetation and Floristic Baseline Survey..**

Golder 2014. **Sasol Petroleum Mozambique Limitada and Sasol Petroleum Temane Limitada. PSA Development and LPG Project, Final Impact Assessment Report. Report Number: 1302793-12655-6..**

Governo do Distrito de Inhassoro 2011. **Plano Estratégico de Desenvolvimento Distrital (2011-2015).**

IMPACTO 2018. **Sasol Petroleum Mozambique. Categorização da Área de Nhangonzo, Inhambane, Moçambique. Referência do Documento: MSSP1701-IMP180407 – Rev 01..**

Schipper, J. & Burgess N. 2015. **Southern-east Africa: Mozambique, Tanzania, Malawi and Zimbabwe.**

WCS, Government of Mozambique & USAID 2021. **Key Biodiversity Areas (KBAs) Identified in Mozambique: Factsheets VOL. II. Red List of threatened species and ecosystems, identification and mapping of key biodiversity areas (KBAs) in Mozambique. USAID / SPEED+.**