Bilene-Calanga

MOZTIPA049

Country: **Mozambique**
Administrative region: **Gaza (Province)**
Central co-ordinates: **-25.21076 N, 33.16372 E**
Area: **1366km²**

Qualifying IPA criteria

A(i)

IPA assessment rationale

Bilene-Calanga qualifies as an IPA under sub-criterion A(i) with four species at this site meeting the required threshold: one Critically Endangered species, Memecylon incisilobum, and three Vulnerable taxa, Raphia australis, Millettia ebenifera and Psychotria amboniana subsp. mosambicensis. With the entire known population of M. incisilobum known from Bilene-Calanga IPA, conservation of this site is paramount to preventing the extinction of this highly threatened species. Furthermore, as this IPA also hosts the largest known population of Raphia australis, protection of wetland habitat here would also make an important contribution to the overall resilience of this species. Conservation of the Bilene-Calanga site is incredibly urgent due to the pressures from expanding agriculture and deforestation faced, particularly while important habitats remain largely intact and may recover from disturbances. At present, only seven species meeting criterion B(ii) are known from this site. This represents less than 2% of Mozambique's endemic and range restricted species, which is less than the 3% threshold required for this site to qualify under sub-criterion B(ii).

Site description

Bilene-Calanga is an IPA that spans the boundary between two provinces, Gaza, falling within Xai-Xai and Bilene Districts, and Maputo, falling within Manhiça District. Bounded to the north-east by the Limpopo river, this site represents the easterly edge of both the Maputaland Centre of Plant Endemism in the narrow sense (Darbyshire et al. 2019) and the Maputaland-Pondoland-Albany Biodiversity Hotspot (CEPF 2010).
This site is 1,400 km2 in area and runs from the Limpopo estuary in the east to Calanga, by the Incomati River, in the west. To the south-east the site is bounded by a number of lagoons, including Lagoa Uembje, that run parallel to the coastline at Praia do Bilene. The town of Praia do Bilene itself has been excluded from the IPA. To the north, the boundary runs south of the EN1 road.
This site has been delineated to include a number of habitat patches of importance for two key species: Memecylon incisilobum, a Critically Endangered species known only from this site globally, and Raphia australis, a Vulnerable species with the majority of the global population occurring in the wetlands of this site (Matimele et al. 2016, 2018). The key habitats for these two species have been delineated within the site map for information but should not be treated as core zones as the whole landscape is important for the integrity of this site, particularly for Raphia australis which is dependent on hydrology beyond its habitat.

Botanical significance

Bilene-Calanga is of high botanical significance as the only site from which the Critically Endangered species Memecylon incisilobum is known. Limited to a dense coastal forest fragment (-25.190°, 33.208°) within Chihacho sacred forest, this species is known to have a global range of 4 km2 consisting of less than 250 individuals (Matimele et al. 2018). Searches have been conducted in neighbouring forest patches which appear similarly intact; however, M. incisilobum has never been recorded elsewhere (Matimele 2016). While local beliefs surrounding this sacred forest have prevented degradation, such practices are not observed by people from outside the area. In 2010 a cellphone mast was erected in the centre of the

forest, with an access road causing additional degradation, while the forest edge continues to be degraded by burning used to clear adjacent agricultural land (Matimele et al. 2018). Conservation action to prevent further degradation of this forest patch is critical to preventing the extinction of Memecylon incisilobum.
The IPA as a whole has been delineated to include the best habitat for another globally threatened species, Raphia australis (VU). This species, known commonly as Rafia or Kosi Palm, flowers once every 20 – 30 years and dies soon after (Burrows et al. 2018). The best habitat is concentrated within swamp wetlands, with several habitat patches highlighted within the IPA map. However, conservation action is required across the site to ensure that the integrity of these wetlands is not indirectly degraded. R. australis is dependent on drainage lines in coastal swamp forest (Burrows et al. 2018), and the disruption of water availability, through conversion of land to agriculture, would have a strongly detrimental impact on R. australis at this site. Estimates suggest that around 4,000 mature individuals, out of a global population of 5,500 – 7,000 individuals, are present at this site (Matimele et al. 2016). Bilene-Calanga is, therefore, of prime importance in preventing the extinction of Raphia australis.
Another globally Vulnerable taxon, Psychotria amboniana subsp. mosambicensis, is known from this IPA, occurring in Chihacho sacred forest. This taxon is endemic to southern Mozambique, from Maputo city in the south to the Save River in the north. The final Vulnerable species present at this site is Millettia ebenifera which, like P. amboniana subsp. mosambicensis, is also endemic to coastal Mozambique, where habitat is highly threatened by habitat clearance (Richards, in press [d]). There are eight endemic species known from this site in total; this includes two as yet undescribed species, Pachystigma sp. A of Flora Zambesiaca (Bridson 1998), which is known only from this IPA, and Eugenia sp. A of Trees and Shrubs of Mozambique (Burrows et al. 2018) which is known throughout the coastal region of southern Mozambique.

Habitat and geology

Bilene-Calanga IPA is predominantly underlain by Quaternary interior dunes with sandy soils, and some recent alluvial deposits underlying the swamp wetlands and rivers to the south-west (MAE 2005; Impacto Lda. 2012c). Average temperatures range between 24 – 26°C and average precipitation for the Bilene-Macia District is between 800 and 1,000 mm annually (MAE 2005).
Towards Praia do Bilene town, at the south-east boundary, the vegetation is predominantly coastal grassland dominated by species from the genera Eragrostis, Triraphis and Urelytrum. Inland, there are also patches of scrub, with species including Albizia adianthifolia, Sclerocarya caffra and Terminalia sericea (Impacto Lda. 2012).
Areas of semi-deciduous, coastal forest occur within the habitat mosaic, including Chicaho sacred forest (-25.183°, 33.178°) and Ngondze forest (-25.086°, 33.172°). These two forests have been sampled as part of a permanent plot by Fernandes et al. (2020). These authors found that common tree species include Afzelia quanzensis, Albizia adianthifolia, Apodytes dimidiata, Dialium schlechteri and Strychnos gerrardii, while shrubs such as Psydrax locuples, Eugenia mossambicensis and Artabotrys monteiroae occur in the understorey. Herbaceous cover varies depending on canopy shade- in areas of deep shade Asparagus species and the fern Polypodium scolopendria were recorded to grow in abundance.
Although many of the forest patches in this IPA appear similar, thorough searches have found that only one, a dense fragment of the Chihacho sacred forest, is home to the Critically Endangered species Memecylon incisilobum, providing the only known habitat globally for this species. This patch of forest is known to have good leaf litter and numerous lianas (Matimele et al. 2018).
There are a number of wetlands at this site, occurring along drainage lines, with associated swamp forests that are important habitat for Raphia australis (VU) (Matimele 2016). Pandanus livingstonianus is frequent within these swamp forests occurring in large colonies across the IPA (C. Datizua, pers. comm. 2021); this may be of conservation interest as some sources recognise P. livingstonianus as endemic to Mozambique (Burrows et al. 2018), however, other sources dispute this delimitation of the species.
Other tree species in the swamp forests include Syzygium cordatum and Voacanga thouarsii, while the understorey features the fern species Stenochlaena tenuifolia- a species characteristic of these swamp forests in Mozambique (Burrows et al. 2018; Hyde et al. 2021). On the edge of these swamps is open Syzygium cordatum woodland, with the herb Asparagus densiflorus and the shrub Vangueria monteiroi recorded as widespread in the understorey of some of these forest patches (Hyde et al. 2021).
Towards both the river Limpopo and Incomati are areas of floodplain. Much of these areas have been transformed by agriculture as local people, reliant on rain-fed agriculture, seek land with more reliable moisture levels. The remaining habitat is mostly grassland, and, although the composition of this area has not been fully documented, the endemic species Tritonia moggii is known to occur in floodplain slightly north-east of this IPA (Rulkens #s.n.) and may well also occur within its boundaries.

Conservation issues

Bilene-Calanga IPA does not fall within a protected area. However, this site represents the eastern edge of the Maputaland-Pondoland-Albany biodiversity hotspot. This hotspot covers the eastern coasts of southern Africa, identified based on the high level of biodiversity and high level of threat to this biodiversity (CEPF 2010). The Critical Ecosystem Fund Partnership (CEPF) went further in highlighting the importance of the Bilene-Calanga area, by designating two, adjacent Key Biodiversity Areas (KBAs) that overlap with this IPA: Manhiça, to the south-west, and the Xai-Xai and Limpopo Floodplain, to the north-east. The sites were identified in 2008 as part of a network across the Maputaland-Pondoland-Albany biodiversity hotspot of priority areas for conservation, with the two KBAs at Bilene-Calanga recognised for their provision of ecosystem services and the high pressure on these areas from conversion of land to agriculture (CEPF 2010). Together the two KBAs at Bilene-Calanga formed part of “the Mozambique Coastal Belt corridor”, recognised for its potential to provide ecological resilience and connectivity in the face

of future perturbations, particularly climate change.
In 2021, a revised assessment of KBA sites was conducted in Mozambique, which resulted in the unification of much of the area covered by the Manhiça and Xai-Xai and Limpopo Floodplain KBAs into a single KBA (Manhiça-Bilene). This site is triggered by three species, including the IPA priority species, Memecylon incisilobum (CR) and Raphia australis (VU), alongside Orange-fringed River Bream (Chetia brevis- EN), a highly threatened species limited only to the Incomati river system (Roux and Hoffman 2017).
The range of inundated habitats, including the floodplains at either side of this IPA and the swamp forests, are highly suitable for agriculture such as rice or sugarcane cultivation (Matimele et al. 2016). To the east of this IPA, on the Limpopo River flats, extensive areas of land have already been converted to rice farming, while Xinavane, to the north-west of the IPA in Manhiça District, has several hectares of sugar plantation (Impacto Lda. 2012d). The Ministry of Agriculture and Rural Development is planning further agricultural concessions as part of their development strategy, as well as incentivising sugarcane cultivation as a food crop and for biofuel (CEPF 2010; Matimele 2016). Bilene-Calanga IPA is therefore under great pressure from agricultural expansion, particularly the wetlands on which Raphia australis (VU) is dependent.
Associated with this expansion of agriculture, fires used by local people to clear land for arable farming or to renew pasturelands also threaten Raphia australis, alongside other swamp forest species such as Pandanus livingstonianus. Raphia australis also faces an additional threat of harvesting for market trade. There is rising demand for the rachises of R. australis leaves which, due to their buoyancy, are used to construct boats. Rachises from this site are often sent south to the coastal villages around Maputo (C. Datizua, pers. comm. 2021).
The forest of Chicacho, as a sacred forest, has been somewhat protected from degradation. However, these beliefs are not observed by people from outside the local area. Land in this area has been converted to agriculture, with clearance burning observed on a visit in 2015 (Matimele 2016). Continued burning of adjacent land will erode the forests edges which, given the already fragmented nature of this site, may reduce moisture availability and alter the species composition within this forest. In addition, harvesting of Afzelia quanzensis and subsequent timber processing were observed during site surveys in 2019 (Fernandes et al. 2020). As the population of Bilene has expanded, there has been greater extraction of wood for charcoal and, together with clearance burning, this has caused a ca. 20% loss in forest area between 2011 and 2016 (Matimele et al. 2018).
Although the Memecylon forest fragment is strikingly dense compared to the surrounding vegetation, the construction of a telecommunications mast in the centre of this forest in 2010, along with an accompanying access road, has led to degradation within this forest patch (Matimele 2016). With the presence of M. inicislobum, a Critically Endangered species known only from this locality, Bilene-Calanga meets Alliance of Zero Extinction site criteria. It has been estimated that the entire global population of M. incisilobum could be lost in around 20 years at the current rate of degradation (Matimele et al. 2018). Urgent conservation action is therefore needed here to prevent further losses and restore degraded areas of this unique site if the extinction of this species is to be prevented. A collaboration between Botanic Gardens Conservation International and Instituto de Investigação Agrária de Moçambique, funded by the Franklinia Foundation and the Global Trees Campaign, is investigating how to conserve M. inicislobum at this site. These partners plan to survey habitat and evaluate the population size of M. incisilobum to devise an appropriate conservation plan for this species (C. de Souza, pers. comm. 2021). Ex situ conservation through seed banking, as M. incisilobum is predicted to have orthodox seed storage behaviour (Wyse & Dickie 2018), and cultivation in botanic gardens could also complement in situ conservation.

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
Memecylon incisilobum R.D.Stone & I.G.Mona	A(i)	✓	✓	✓	✓	–	Occasional
Raphia australis Oberm. & Strey	A(i)	✓	✓	✓	–	–	Frequent
Millettia ebenifera (Bertol.) J.E.Burrows & Lötter	A(i)	✓	✓	✓	–	–	Unknown
Psychotria amboniana K.Schum. subsp. mosambicensis (E.M.A.Petit) Verdc.	A(i)	✓	✓	✓	–	–	Unknown

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

General site habitats

GENERAL SITE HABITAT	PERCENT COVERAGE	IMPORTANCE
Marine Coastal/Supratidal - Coastal Sand Dunes	–	Major
Grassland - Subtropical/Tropical Seasonally Wet/Flooded Lowland Grassland	–	Major
Forest - Subtropical/Tropical Dry Forest	–	Major
Forest - Subtropical/Tropical Swamp Forest	–	Minor
Artificial - Terrestrial - Arable Land	–	Minor

Land use types

LAND USE TYPE	PERCENT COVERAGE	IMPORTANCE
Agriculture (arable)	–	Minor
Tourism / Recreation	–	Minor

Threats

THREAT	SEVERITY	TIMING
Residential & commercial development - Housing & urban areas	Medium	Ongoing - trend unknown
Residential & commercial development - Tourism & recreation areas	Low	Ongoing - increasing
Agriculture & aquaculture - Annual & perennial non-timber crops - Shifting agriculture	High	Ongoing - increasing
Transportation & service corridors - Roads & railroads	Medium	Past, likely to return
Natural system modifications - Fire & fire suppression - Increase in fire frequency/intensity	High	Ongoing - trend unknown
Biological resource use - Logging & wood harvesting	High	Ongoing - trend unknown
Agriculture & aquaculture - Annual & perennial non-timber crops - Agro-industry farming	Unknown	Future - inferred threat

Conservation designation

DESIGNATION NAME	PROTECTED AREA	RELATIONSHIP WITH IPA	AREAL OVERLAP
Manhiça-Bilene	Key Biodiversity Area	IPA encompasses protected/conservation area	1400

Management type

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

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