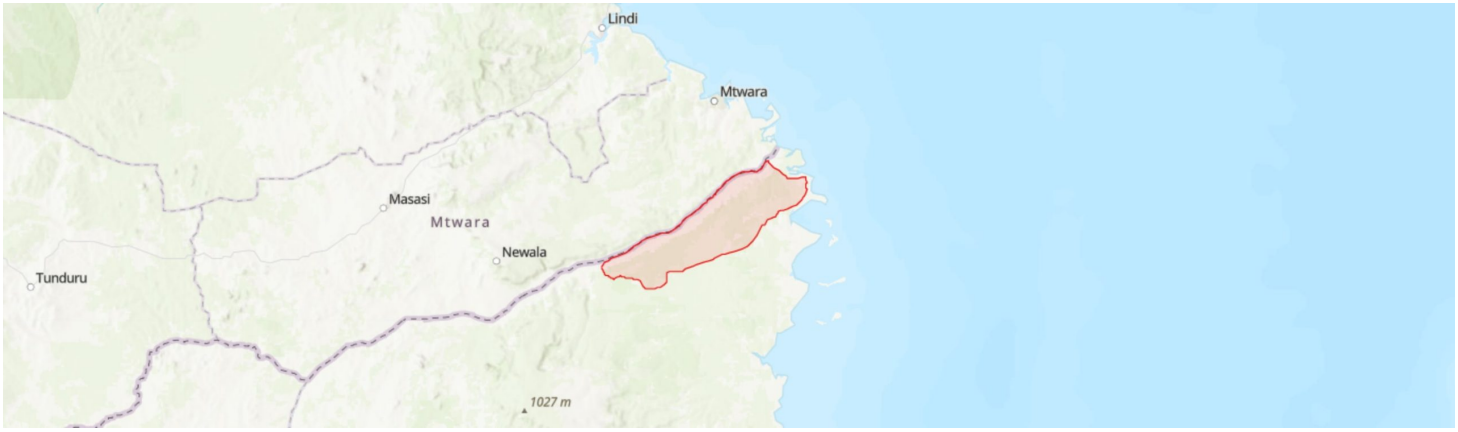
Lower Rovuma Escarpment

Escarpas do Baixo Rovuma (Test version)

MOZTIPA023



Country: **Mozambique**
Administrative region: **Cabo Delgado (Province)**
Central co-ordinates: **-10.79189 N, 40.12267 E**
Area: **1999km²**

Qualifying IPA criteria

A(i), B(ii), C(iii)

IPA assessment rationale

The Lower Rovuma Escarpment is one of the most important sites for plant diversity and local endemism in Mozambique and qualifies as an IPA under all three criteria. Under criterion A(i), it holds important populations of 54 globally threatened plant species, of which 19 are assessed as Endangered and one (Diospyros magogoana) is currently assessed as Critically Endangered. Other globally threatened species are likely to be added to this list when a full Red List for the region is finalised. The site holds at least 22 qualifying species under criterion B(ii) and hence significantly exceeds the 3% threshold for this criterion. It also holds nationally important areas of Rovuma coastal dry forest, a threatened habitat, and this IPA holds the largest extent of continuous woody coastal vegetation in the whole of Cabo Delgado Province, hence qualifying under criterion C(iii).

Site description

The Lower Rovuma Escarpment IPA is situated in Palma and Nangade Districts of northeast Cabo Delgado Province. This landscape-scale site extends for ca. 90 km WSW to ENE between the towns of Nangade inland and Quionga and Palma on the coast, parallel to the Rovuma River valley which here forms the international border with Tanzania. The IPA covers the Mozambique side of the Rovuma floodplain and escarpment and the adjacent low undulating plateau. It contains a range of habitats, some of which are scarce elsewhere in Mozambique or in East Africa more generally, and includes the largest contiguous extent of dry coastal forest in East Africa (Clarke 2011). It is therefore a key site within the Coastal Forest of Eastern Africa biodiversity hotspot (CEPF 2020). This large area could potentially be subdivided into discrete management units but maintaining the integrity of the landscape as a whole is critical to its conservation (Timberlake et al. 2010).

Botanical significance

Of the rich and varied mosaic of habitats represented within this IPA, the extensive intact areas of coastal dry forest and thicket are of primary botanical significance (Timberlake et al. 2011). These are the most extensive areas of forests within the proposed Rovuma Centre of Plant Endemism (Burrows & Timberlake 2011). Three main forest blocks are recorded within the IPA: (1) the Nhica do Rovuma – Macanga River Block, an extensive area of up to 300 km2, containing two core forest areas; (2) the Pundanhar Block which contains c. 120 km2 of forest; and (3) the Nangade Block, a much smaller and more disturbed area with only c. 5 km2 of undisturbed forest remaining (Clarke 2011). Together, these forest blocks comprise two of the four "high priority" sites for the conservation of coastal dry forest in northeast Mozambique proposed by Timberlake et al. (2010). The extensive intact forest and woodland vegetation within the IPA is in marked contrast to the northern side of the Rovuma Escarpment in southeast Tanzania where much of the natural vegetation has been heavily denuded or replaced by farmland and settlement.
These forests are characterised by high species turnover and a high number of highly range-restricted and threatened species (Timberlake et al. 2011; Darbyshire et al. 2019, 2020). Over 50

globally threatened plant species are present, including several for which this site contains the majority of the global population, notably Casearia rovumensis (EN), Crossopetalum mossambicense (EN), Garcinia acutifolia (VU), Pyrostria sp. nov. "makovui" (EN), Vangueria domatiosa (EN), Vitex franceseana (EN) and Xylopia lukei (EN). It is also the only known Mozambican site for Coffea schliebenii (VU) which is otherwise scarce in the Lindi region of Tanzania, and for Combretum lindense (not yet evaluated on the Red List), Didymosalpinx callianthus (EN) and Diospyros magogoana (currently CR but without the Mozambique population included in the assessment) which are otherwise known only from a single location each in Tanzania.

The seasonal pan landscape that dominates parts of the IPA also supports rare and threatened species, including the recently described endemics Convolvulus goyderi (EN) and Ochna dolicharthros (VU) (Crawford & Darbyshire 2015; Darbyshire et al. 2020).

Botanical exploration of this vast area is incomplete and has focussed on only small sections to date. The likelihood of further discoveries of new species to science is high, particularly among the under-explored herbaceous flora (Darbyshire et al. 2020), whilst undescribed species already known to occur at this site include Combretum sp. A and Deinbollia sp. A of Burrows et al. (2018). Several scarce species that have so far only been recorded from the environs of Palma may also be found within this IPA following a more complete survey; these include Ammannia pedroi (VU) and Striga diversifolia (DD) in more open habitats and Pavetta lindina (EN) in forested areas.

Habitat and geology

The geology and landscape of this region is dominated by a gentle isocline of Quaternary or Neogene sedimentary deposits which runs northwest from the coast towards the Mueda Plateau in Mozambique and the Makonde Plateau in Tanzania, with the Rovuma River cutting a sharp channel of ca. 10 km wide into the deposits. On the Mozambique side, the slopes and top of the steep Rovuma escarpment are freely drained and support a dense woody vegetation on red-brown sandy/clay loam soils. Some outcrops of iron-rich sandstones, likely of the Mikindani Formation of mid-Neogene origin (ca. 10 – 15 mya), are recorded in the east of this region and these may be more widespread than currently documented along the escarpment given that sandstone outcrops were observed in association with some of the dry forest patches across this region (Timberlake et al. 2010). Further south in Cabo Delgado, for example at Quiterajo [MOZTIPA021], there is a close association between Mikindani sandstone and dry forest patches. This rock gives rise to a coarsely sandy well-drained red soil. In the southern and central portion of the IPA and continuing southwards, the gentle undulations in the sedimentary deposits give rise to a series of large shallow seasonal pans which support a much more open grassland / savanna landscape underlain by more clay-rich soils (Timberlake et al. 2010; Clarke 2011).

A detailed description of the main vegetation types of this region is provided by Timberlake et al. (2010) and Clarke (2011), with summaries of the woody vegetation provided by Burrows et al. (2018) under their "Rovuma Basin Coastal Thicket-Forest" and "Rovuma Coastal Woodland" vegetation types; what follows is a brief summary.

The dry forest patches often occur as small lenses within a mosaic of miombo woodland. In areas of intact forest, the canopy is typically 8 – 20 m tall with emergent trees up to 40 m in some areas. The composition of these forests varies considerably across the IPA. In the western portion of the site in Nangade District, forest dominated by Scorodophloeus fischeri and Guibourtia schliebenii occurs, sometimes with Hymenaea verrucosa, but this forest type is not recorded further east in Palma District, where a more mixed tree assemblage occurs. Here, Manilkara sansibarensis, M. discolor, Terminalia (formerly Pteleopsis) myrtifolia and Ochna mossambicensis can be common. Canopy emergents include Afzelia quanzensis, Berlinia orientalis, Dialium holstii, Hymenaea verrucosa, Milicia excelsa and Terminalia myrtifolia. A range of Rubiaceae and Diospyros spp. are important in the understorey (Timberlake et al. 2010; Clarke 2011). Whilst some extensive and intact patches occur, much of the forest appears to be secondary in nature, and is believed to have regenerated over the past 50 – 60 years, as evidenced by the numerous multi-trunked larger trees, indicating widespread coppicing, and by the frequent occurrence of charcoal in forest soil profiles (Clarke 2011). Frequent throughout the region are large termitaria up to 20 m in diameter that support patches of dense woody vegetation that can include dry forest species. Hirtella zanzibarica is particularly characteristic of termitaria woodland, with Hymenaea verrucosa and Berlinia orientalis also frequent (Timberlake et al. 2010).

In areas with a high water table, both in the lowlands towards the coast and in the ecotone between the seasonal pans and the well-drained wooded areas, the range-restricted tree Berlinia orientalis (VU) can dominate, often in association with Brachystegia spiciformis. This assemblage is somewhat intermediate between a miombo woodland and a dry forest (Clarke 2011). Typical miombo woodland is frequent on well-drained soils throughout the region, with dominant species including B. spiciformis, Parinari curatellifolia and Uapaca nitida, and other common components including Bobgunnia madagascariensis, Julbernardia globiflora, Pterocarpus angolensis, and Sclerocarya caffra (Timberlake et al. 2010; Clarke 2011).

Significant areas of the vegetation have experienced varying degrees of disturbance and subsequent fallow periods, which have given rise to extensive seral scrub forest and thicket assemblages, containing a mixture of miombo and pioneering dry forest species (Clarke 2011).

Extensive edaphic grasslands and lightly wooded grasslands occur both on the Rovuma floodplain, where a palm savanna with large trees of Borassus aethiopum is found, and in the pan landscape where the smaller palms Hyphaene compressa and Phoenix reclinata occur together with scattered miombo tree species.

The climate of this region is highly seasonal, with a prolonged dry season from May to November and a short hot and wet season mainly between December and April. Annual rainfall, at 900 – 1100

mm per year, is amongst the lowest along the East African coastline (Clarke 2011).

Conservation issues

At present, none of this extensive site is protected for nature conservation. A portion of the Nangade (western) forest block is designated as a Hunting Concession, with a camp and some staff in place at least in the late 2000s, which afforded some protection for the forest in order to preserve hunting stocks (Timberlake et al. 2010). The eastern-most parts of the site were included in the proposed Palma National Reserve, which was intended mainly to protected the rich marine and coastal resources of this area but with the inclusion of some of the terrestrial habitats. However, this reserve has not come to fruition, nor to date has the proposed Rovuma River mouth Trans-Frontier Conservation Area shared with Tanzania. The entirety of the IPA is included within the vast Palma Key Biodiversity Area.

Timberlake et al. (2010) estimate approximately 65% of the forest cover has been lost in the area of Nangade-Palma-Mocímboa da Praia. However, the most severe losses have been seen outside of the IPA boundary, around and between Palma and Mocímboa where the landscape is now severely degraded with only small pockets of high-biodiversity-value habitat remaining. It is for this reason that this area is excluded from the IPA, although there are still some important forest patches there that would benefit from conservation efforts. Whilst woody vegetation is extensive within the IPA, much of the forest appears to be secondary in nature (see Habitat and Geology above). The first wave of deforestation is likely to have occurred in the Portuguese colonial period when there was extensive timber exploitation. This region witnessed heavy military action during the war for independence and the post-independence civil war (1960s – 1991) which led to significant depopulation, and it is during this time that the extensive woody vegetation appears to have reestablished. Since the 1990s, parts of this region have experienced rapid repopulation, driven in part by improved transport routes and in part by exploration for oil and gas across the region (Timberlake et al. 2010, 2011; Darbyshire et al. 2020). However, the population remains low relative to other parts of the coastal lowlands, with particularly low numbers of people in the areas with seasonally inundated soils, and Palma District has one of the lowest population densities in East Africa (Clarke 2011). The recent violent insurgency in coastal Cabo Delgado since 2017 has temporarily halted much of the migration into the region, but in the longer term there is likely to be a continuing trend of population growth and increased pressure on resources once stability returns.

The most significant threat to this IPA is the ongoing and widespread clearance of forest and woodland for shifting subsistence agriculture, aided by burning. This is particularly evident along transport routes and in the western portion of the IPA where large areas are being actively cleared. Uncontrolled fires primarily impact the miombo woodland as these have a much higher fuel-load due to the abundance of grasses. However, they can also penetrate the seral scrub forests and thickets and in the longer term can result in a gradual erosion of the dry forest margins (Clarke 2011).

Some charcoal production and firewood extraction occur in this region but these are not considered to be a severe threat. The main concern is that exhaustion of wood supplies closer to Palma and around the city of Mtwara in Tanzania, may result in increase exploitation of the woodlands and forests of the Rovuma Escarpment in the future. Commercial and illegal logging have not been considered a major threat until now (Clarke 2011). There are some logging concessions in parts of the IPA, particularly in the west, but these are intended to be sustainable. Most illegal logging to date has targeted widespread woodland species such as Afzelia quanzensis, Millettia stuhlmannii and Pterocarpus angolensis (Timberlake et al. 2010). However, there is a concern that the growing lawlessness in northeast Cabo Delgado associated with the insurgency may result in increased illegal logging in the forests.

Oil and gas exploration in 2007 – 2008 resulted in an extensive network of cut lines being made across the landscape to allow for vehicle access. These were each 3 – 5 m wide and avoided the felling of larger tree species, with the smaller species being coppiced to promote regrowth. The lines were closed in late 2008 and are showing good signs of regeneration. Subsequent industrial activity in the region has focused offshore, with two large liquefied natural gas (LNG) extraction operations underway. Onshore infrastructure is centred on the Afungi Peninsula to the southeast of Palma and so not directly impacting the Lower Rovuma Escarpment area, but is likely to result in accelerated migration into the region once the regional security concerns are overcome; this is likely to be a significant future threat.

Given the significant threats to the future of these critical habitats, there is an urgent need to protect the Lower Rovuma Escarpment landscape and to ensure that any exploitation of its resources is sustainable in the long term.

Site assessor(s)

Iain Darbyshire, Royal Botanic Gardens, Kew

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
Hexalobus mossambicensis N.Robson	A(i)	✓	✓	✓	–	–	Occasional
Monanthotaxis suffruticosa P.H.Hoekstra	A(i)	✓	✓	✓	–	–	Unknown
Monanthotaxis trichantha (Diels) Verdc.	A(i)	✓	✓	✓	–	–	Unknown
Xylopia lukei D.M.Johnson & Goyder	A(i)	✓	✓	✓	–	–	Occasional
Crossopetalum mossambicense I.Darbysh.	A(i)	✓	✓	✓	–	–	Occasional
Salacia orientalis N.Robson	A(i)	✓	✓	✓	–	–	Unknown
Garcinia acutifolia N.Robson	A(i)	✓	✓	✓	–	–	Unknown
Combretum lindense Exell & Mildbr.	A(i)	✓	✓	✓	–	–	Unknown
Baphia macrocalyx Harms	A(i)	✓	✓	✓	–	–	Frequent
Berlinia orientalis Brenan	A(i)	✓	✓	✓	–	–	Common
Millettia makondensis Harms	A(i)	✓	✓	✓	–	–	Frequent
Clerodendrum lutambense Verdc.	A(i)	✓	✓	✓	–	–	Scarce
Premna hans-joachimii Verdc.	A(i)	✓	✓	✓	–	–	Occasional
Premna tanganyikensis Moldenke	A(i)	✓	✓	✓	–	–	Scarce
Vitex carvalhi Gürke	A(i)	✓	✓	✓	–	–	Scarce
Vitex franceseana I.Darbysh. & Goyder	A(i)	✓	✓	✓	–	–	Occasional
Casearia rovumensis	A(i)	✓	✓	✓	–	–	Occasional

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.Darbysh. & J.E.Burrows							
Convolvulus goyderi J.R.I.Wood	A(i)	✓	✓	✓	✓	–	Scarce
Grewia limae Wild	A(i)	✓	✓	✓	–	–	Occasional
Memecylon torrei A.Fern. & R.Fern.	A(i)	✓	✓	✓	–	–	Unknown
Ochna dolicharthros F.M.Crawford & I.Darbysh.	A(i)	✓	✓	✓	✓	–	Occasional
Chassalia colorata J.E.Burrows	A(i)	✓	✓	✓	–	–	Occasional
Coffea schliebenii Bridson	A(i)	✓	✓	✓	–	–	Occasional
Didymosalpinx callianthus J.E.Burrows & S.M.Burrows	A(i)	✓	✓	✓	–	–	Occasional
Leptactina papyrophloea Verdc.	A(i)	✓	✓	✓	–	–	Occasional
Oxyanthus biflorus J.E.Burrows & S.M.Burrows	A(i)	✓	✓	✓	–	–	Scarce
Oxyanthus strigosus Bridson & J.E.Burrows	A(i)	✓	✓	✓	–	–	Occasional
Psydrax micans (Bullock) Bridson	A(i)	–	✓	✓	–	–	Unknown
Tricalysia schliebenii Robbr.	A(i)	✓	✓	✓	–	–	Occasional
Tricalysia semidecidua Bridson	A(i)	✓	✓	✓	–	–	Occasional
Vangueria domatiosa J.E.Burrows	A(i)	✓	✓	✓	–	–	Occasional
Vepris allenii I.Verd.	A(i)	✓	✓	✓	–	–	Occasional
Pyrostria makovui K.W.Matheka, Goyder & I.Darbysh.	A(i)	✓	✓	✓	–	–	Occasional
Erianthemum lindense (Sprague) Danser	A(i)	✓	✓	✓	–	–	Unknown

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
Gonatopus petiolulatus (Peter) Bogner	A(i)	✓	✓	✓	–	–	Scarce
Guibourtia schliebenii (Harms) J.Leonard	A(i)	–	✓	✓	–	–	Occasional
Millettia impressa Harms subsp. goetzeana (Harms) J.B.Gillett	A(i)	✓	✓	✓	–	–	Unknown
Pavetta macrosepala Hiern var. macrosepala	A(i)	✓	✓	✓	–	–	Unknown
Platysepalum inopinatum Harms	A(i)	–	✓	✓	–	–	Scarce
Sterculia schliebenii Mildbr.	A(i)	–	✓	✓	–	–	Scarce
Vismia pauciflora Milne-Redh.	A(i)	✓	✓	✓	–	–	Scarce
Mildbraedia carpinifolia (Pax) Hutch.	A(i)	–	✓	✓	–	–	Unknown
Acacia latistipulata Harms	A(i)	✓	✓	✓	–	–	Occasional
Vismianthus punctatus Mildbr.	A(i)	✓	✓	✓	–	–	Unknown
Peponium leucanthum (Gilg) Cogn.	A(i)	–	✓	✓	–	–	Scarce
Zanthoxylum lindense (Engl.) Kokwaro	A(i)	✓	✓	✓	–	–	Unknown
Landolphia watsoniana Rombouts	A(i)	–	✓	✓	–	–	Unknown
Vitellariopsis kirkii (Baker) Dubard	A(i)	–	✓	✓	–	–	Unknown
Diospyros magogoana F.White	A(i)	✓	✓	✓	–	–	Unknown
Diospyros shimbaensis F.White	A(i)	–	✓	✓	–	–	Unknown
Ormocarpum sennoides DC. subsp.	A(i)	–	✓	✓	–	–	Unknown

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
zanzibaricum Brenan & J.B.Gillett							
Strychnos xylophylla Gilg	A(i)	–	✓	✓	–	–	Scarce
Xylia africana Harms	A(i)	–	✓	✓	–	–	Unknown
Rothmannia macrosiphon (K.S chum. ex Engl.) Bri dson	A(i)	–	✓	✓	–	–	Scarce

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
Rovuma Coastal Dry Forest	C(iii)	–			

General site habitats

GENERAL SITE HABITAT	PERCENT COVERAGE	IMPORTANCE
Forest - Subtropical/Tropical Dry Forest	–	Major
Savanna - Moist Savanna	–	Major
Shrubland - Subtropical/Tropical Moist Shrubland	–	Major
Grassland - Subtropical/Tropical Seasonally Wet/Flooded Lowland Grassland	–	Major
Wetlands (inland) - Seasonal/Intermittent Freshwater Marshes/Pools [under 8 ha]	–	Major
Artificial - Terrestrial - Arable Land	–	Minor
Artificial - Terrestrial - Subtropical/Tropical Heavily Degraded Former Forest	–	Major

Land use types

LAND USE TYPE	PERCENT COVERAGE	IMPORTANCE
Agriculture (arable)	–	Minor
Forestry	–	Minor

Threats

THREAT	SEVERITY	TIMING
Energy production & mining - Oil & gas drilling	Low	Past, not likely to return
Agriculture & aquaculture - Annual & perennial non-timber crops - Small-holder farming	High	Ongoing - increasing
Biological resource use - Gathering terrestrial plants	Low	Ongoing - increasing
Natural system modifications - Fire & fire suppression - Increase in fire frequency/intensity	Low	Ongoing - increasing

Conservation designation

DESIGNATION NAME	PROTECTED AREA	RELATIONSHIP WITH IPA	AREAL OVERLAP
Palma	Key Biodiversity Area	protected/conservation area encompasses IPA	–

Management type

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

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