

**Title/Name of the area: ZAMBEZI RIVER DELTA
(CENTRAL MOZAMBIQUE)**

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Abstract

This EBSA assesses the Zambezi river delta mangrove and adjacent brackish habitats. This is the single largest mangrove stand in the entire eastern Africa covering some 100,000 ha. The diversity is high (8 mangrove species) and trees can reach some 30 m and attain extensive diameters. Zambezi delta mangroves attain high carbon stocks turning this as an ideal place for developing C credits initiative. Changing in water hydrology associated also with the dam upstream, issues of sedimentation and erosion as associated with observed mangrove dieback are some of the main challenging issues for these exuberant habitats in the Zambezi river delta. Brackish water wetlands is extreme large in the delta as well as fauna diversity and its abundance in immediate seas / Sofala Bank (one of the largest fishing ground in eastern Africa) are very high given mangroves sediments dynamics from mainly from Zambezi river.

Introduction

The Zambezi Delta is an extensive system with the triangular shape. The system is flat and alluvial. It covers an approximate area of 1.2 millions of hectares on the central coast of Mozambique. Along the coast, the Delta covers 200 Km of coastline from Quelimane City south to the Zuni River. The North bank has its limit Morrumbala escarpment and on the southern bank is bordered with the Cheringoma escarpment. The Delta is divided by two banks: North and South Bank. The North bank located in Zambezia Province and is characterized by an extensive area developed for agriculture. The south bank is best known as the Marromeu Complex, includes The Marromeu Buffalo Special Reserve and the four hunting concessions, including countadas 10, 11, 12 and 14 (Beilfuss and Brown 2006). The complex supports diverse and abundant populations of mammals and waterfowl (Bento and Beilfuss 1999). The floodplain is home to 120 pair's endangered Wattle Crane and a critical refuge for 30% of the global population of this species in years of extreme drought in the region (Bento 2002). Zambezi delta waters are estuarine or with brackish waters to around 50 Km inland the remaining 50Km or so is totally freshwater.

Mangrove forests is a dominant feature in the Zambezi delta. Statistics indicate that Africa contains approximately 21% of the mangroves in the world (Murdiyarsa and Kauffman, 2011). The current estimate of mangrove forest area in Mozambique varies from 396,100 ha (Barbosa et al 2001, Beentje & Bandeira, 2005) to 291,146 ha (Fatoyimbo et al., 2008). Based on a recent assessment, 28% of Mozambique mangroves occur in the Zambezi delta (81,521 to 110,908 ha). Globally, Mozambique ranks 13th in mangrove coverage; equivalent to approximately 2.3% of the global mangrove forest area (Giri et al. 2011).

Location

The Zambezi Delta is 200 kilometers north of the city of Beira along the Indian Ocean. From the mouth of the River Cuacua (in Quelimane City) and Zuni River in South. The delta apex is border with Mopeia village and Southern Bank is bounded by Chiringoma Plateau and the Northern Bank by Morrumbala plateau.

Feature description of the proposed area

The delta is characterized by extensive mangrove forest papyrus Swamp, one of the largest on the east coast of Africa. The grassland is very productive and supports a diversity of wildlife, including the African Buffalo, African Elephant, Lichtenstein's hartebeest, sable antelope, eland, zebra, hippopotamus, waterbuck, and reedbuck. Among the carnivores have lions, leopards, wild dog and spotted hyena (Dutton et al. 2001). The birds diversity and numbers is the highest in Mozambique, including large breeding colonies of pelicans, open billed stork, glossy ibis and white breasted cormorants. Other species that require special attention internationally and that occur in the delta include gray crown crane, saddlebill storks, woolynecked Storks, goliath herons, african skimmers, Pratincoles Redwing and the Caspian tern. On the coast we have humpback and minke whales and even the bottlenosed dolphin, dolphin and humpback dolphin rough-toothed. Mangroves are the most extensive on the east coast of Africa and supports the most lucrative shrimp industry and fish of the Sofala Bank, including shrimp.

Mangrove habitats area grouped into 6 larger communities, that is, 6 different types of mangrove forest: *Ceriops tagal*, *Avicennia-marina*, *Rhizophora-mucronata*, *Sonneratia-alba*, *Xylocarpus-granatum*, *Avicennia-mucronata*; the most dominant depicted in the Fig 1. There are 8 mangrove tree species in Mozambique: *Avicennia marina* (Forssk.) Vierh., *Bruguiera gymnorhiza* (L.) Lam., *Ceriops tagal* (Per.) C.B. Robinson, *Rhizophora mucronata* Lam. and *Sonneratia alba* Smith, *Heritiera littoralis* Aiton, *Lumnitzera racemosa* Willd. and *Xylocarpus granatum* Koenig. The fern mangrove, *Acrostichum aureum* L., is also common. Other plant associates found close to the mangrove areas include *Barringtonia racemosa* (L.) Roxb., *Hibiscus tiliaceus* L., *Phoenix reclinata* Jacq., *Thespesia populnea* (L.) Soland. ex Correa. The transition zone, between mangroves and terrestrial vegetation is occupied by grasses and herbs such as *Chenolea diffusa* Thunb., *Salicornia perrieri* A. Chev., *Suaeda maritima* Dumont, *Paspalum distichum* L., *Sporobolus virginicus* (L.) Kunth, *Arthrocnemum* sp. The herb *Sesuvium portulacastrum* L. occurs in saline areas (salt deserts) and is occasionally harvested as vegetables.

Feature condition and future outlook of the proposed area

Here is presented the data obtained from recent interviews to communities in Zambezi delta regarding valuation of mangrove habitats. Mangrove wood cut is practiced in the region both for commerce and domestic consumption. The main products are wood (for housing, boat construction and production of various domestic utensils) and poles. Non woody uses include medicinal and extraction of dye. *Ceriops tagal* was indicated by 62.5% of the interviewed as the preferred species, while 31.25% also pointed *Avicennia marina* (together with *Ceriops tagal*) and the remaining 6.25% indicated *Ceriops tagal* and *Xylocarpus granatum*. It is interesting to note that *Ceriops tagal* showed to be the most abundant species in the area (see structural report), what can partially explain this preference. Besides, its wood is described as one of the most durable, being thus a species with multiple uses.

Wood and poles are sold in bundles, and depending on the size, species and quality, the price may vary between 2-75 MT (up to 3 USD). The diameters at breast height (DBH) of trees selected for cut vary greatly, depending on the use. For construction, 57% of the interviewed preferred trees with a DBH between 5-10 cm, and other 25% would prefer a diameter between 10-15 cm. The remaining 18% do not have a preference, as size would depend on use.

Mangrove cut was described by 75% of the interviewed as mainly a male activity. Other 18% mentioned that both women and men cut mangroves, while 7% regarded it as a female activity. Most of the people (75%) have a perception that the pressure over mangroves has increased in the last 20 years; 19% think it has decreased while the other 6% have no perception. There is also a slight perception that the presence of big companies might increase the pressure over the mangroves. Such are the cases of Sena Sugar, (perception of 37.5% of the interviewed), Madal (6%), and Chinde Port (12.5%). Sena Sugar is a sugar factory that was installed since the colonial era, though production was interrupted during the years of civil war. The factory started re-operating in 2001, based in Sofala province, and having settlements in Zambezia province. Grupo Madal is an agro-industrial company based in Zambeze province since 1903. Its core business is extraction and export of coconut oil, but has other interests that include timber exploitation, animal ranching and game management and jatropa. Chinde Port is an important tertiary port in northern Mozambique, with seasonal or occasional activity. Main cargo include wood, building material and a variety of goods. Most of the interviewed however could not tell if these companies actually increase pressure over mangroves (44%). On what respects to the ecological importance of mangroves, locals are able to make a connection between mangroves and their role as nurseries for many marine species (87.5%) and source of fish (87.5%). protection of the coast line was perceived as mangrove role by only 12.5% of the interviewed. Mangrove community management is not practiced in the area, and 87.5% of the interviewed would be willing to embark in mangrove replantation activities and protection.

The hydrology of Zambezi river have changed in recent decades mainly due the construction of the Cahora Bassa dam that impacting on sediment budgets to the delta, together with possible sea related issues appeared to have impacted severely causing dye-back of mangrove forests in several locations of the delta.

Ongoing project in the delta include those on assessing C stocks above and below ground (on the pit) in mangrove forests.

Assessment of the area against CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	Description (Annex I to decision IX/20)	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	Low	Some	High
Uniqueness or rarity	Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
<p><i>Explanation for ranking</i></p> <ul style="list-style-type: none"> -Largest continuous mangrove stand in eastern Africa (around 100 000 ha) -Tallest mangrove stands in eastern Africa reaching some 25-30 metres height -The most extensive papyrus swamps on the eastern Africa (more then 60 000 ha). -Largest diameter observed in mangroves in Mozambique (36-43 cm) -Megafauna observed (whales, dolphins) -Main river feeding into the largest fishing ground in eastern Africa (Sofala bank) 					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
<p>The river system supports one of the most extensive mangrove areas on the east coast of Africa. In turn, The mangrove supports the lucrative fishing industry on the Sofala bank, including shrimp.</p>					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
<p><i>Explanation for ranking</i></p> <p>Many marine species dependents of hydrological processes of the Zambezi River and are threatened by changes in the timing and flow of the waters from the Zambezi River.</p>					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
<p><i>Explanation for ranking:</i></p> <p>Change in Zambezi river hydrology may impact on sediments budgets, therefore causing or influencing mangrove dieback.</p> <p>marine regimes (tides, cyclone impacts) may also influence sediment regimes therefore causing mangrove growth or dieback</p> <p>Mangrove deforestation for business (selling to inland areas)</p> <p>Sofala bank extensive fisheries in a positive direct impact of primarily the Zambezi river as inversely impacted by dam construction upstream</p>					

Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
<i>Explanation for ranking</i> Extensive and indeed largest mangrove carbon stocks in eastern Africa The Sofala Bank, adjacent to the Zambezi delta and other relatively minor rivers is largest fishing ground in eastern Africa Tallest and widest mangrove species in the Zambezi river delta Largest buffalo population in the world (some 13,000,000.00 in a small wetland area)					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
<i>Explanation for ranking</i> Not much known unless mangrove forest species, carbon stocks One of largest fauna diversity. More studies needs on fauna but would expect also a lot on fauna diversity Wetland flora is very high too					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
<i>Explanation for ranking</i> Most of the delta areas, specially away from populations areas such as Chinde (mangrove area), Luabo, Mopeia and Marromeu villange (inland away from estuary) are very pristine.					

Sharing experiences and information applying other criteria (Optional)

Other Criteria	Description	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	Low	Some	High
<i>Add relevant criteria</i>					
<i>Explanation for ranking</i>					

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Maps and Figures

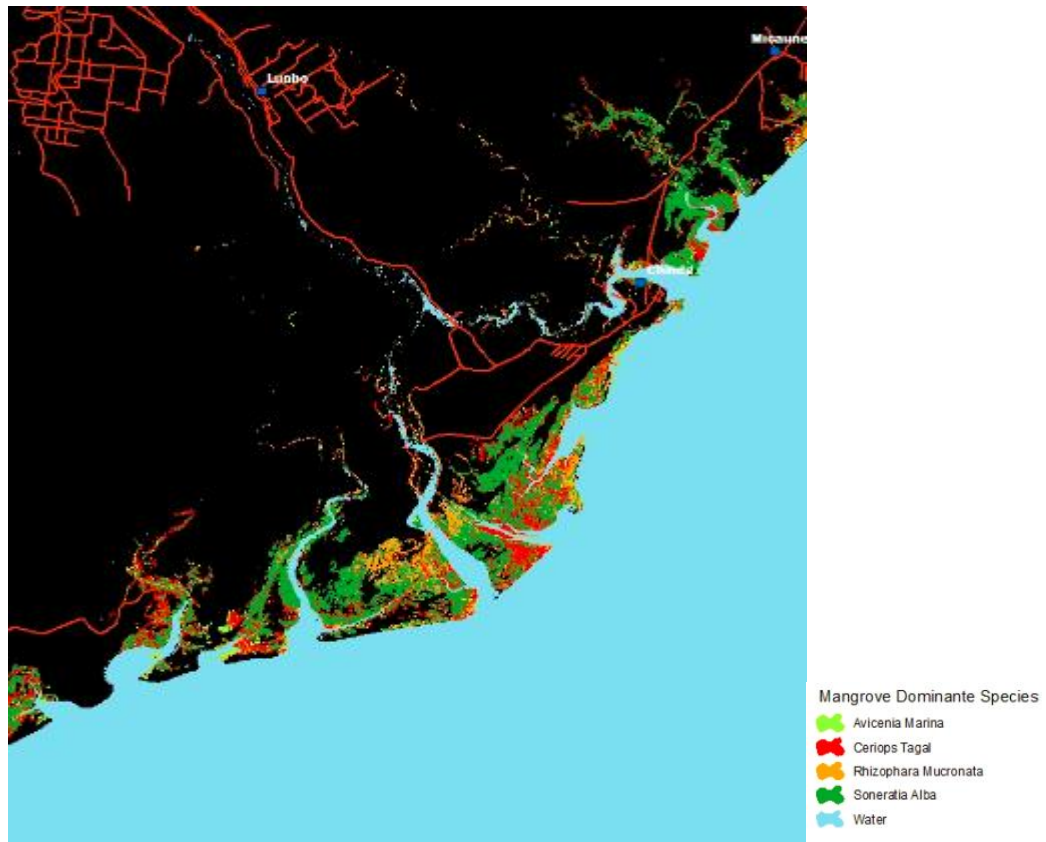


Fig 1. Strata of Zambezi delta predominant species habitats

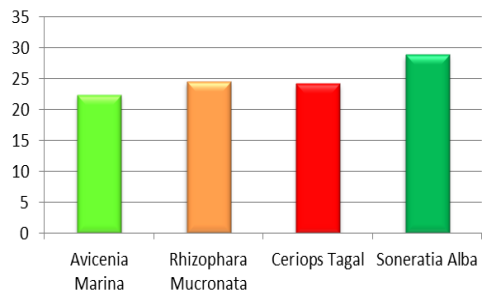


Fig. 2. Percentage cover of the dominant mangroves communities in Zambezi delta.



Fig 3. Forest of red mangrove (*Rhizophora mucronata*)

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