**Designation date: 07/09/2012** **Ramsar Site no. 2082**

# Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

*Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).*

**Notes for compilers:**

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.

2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 14, 3rd edition). A 4th edition of the Handbook is in preparation and will be available in 2009.

3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

---

FOR OFFICE USE ONLY.

DD MM YY

Designation date | Site Reference Number

**1. Name and address of the compiler of this form:**

Julius Kipn'getich
Director
Kenya Wildlife Service
P.O. Box 40241 – 00100
Nairobi, Kenya
Email: director@kws.go.ke; kws@kws.go.ke
Tel: +254 (020) 3992000/3991000
Website: www.kws.go.ke

Dr. Judith Nyunja
Wetlands Programme Coordinator
Kenya Wildlife Service
P.O Box 40241-00100
Nairobi, Kenya
Email: jnyunja@kws.go.ke
Tel: +254 (020) 3992000 Ext 2258

**2. Date this sheet was completed/updated:**
03 September 2012

**3. Country:**

Republic of Kenya

**4. Name of the Ramsar site:**
The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.

Tana River Delta Ramsar Site

**5. Designation of new Ramsar site or update of existing site:**

**This RIS is for** (tick one box only)**:**
**a) Designation of a new Ramsar site** ☒; or

**b) Updated information on an existing Ramsar site** ❑

**6. For RIS updates only, changes to the site since its designation or earlier update:**

**a) Site boundary and area**

**The Ramsar site boundary and site area are unchanged:** ❑
or
**If the site boundary has changed:**
i) the boundary has been delineated more accurately ❑; or
ii) the boundary has been extended ❑; or
iii) the boundary has been restricted** ❑

and/or

**If the site area has changed:**
i) the area has been measured more accurately ❑; or
ii) the area has been extended ❑; or
iii) the area has been reduced** ❑

** **Important note**: If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

**b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:**

**7. Map of site:**
Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

**a) A map of the site, with clearly delineated boundaries, is included as:**

i**) a hard copy** (required for inclusion of site in the Ramsar List): ☒;

ii**) an electronic format** (e.g. a JPEG or ArcView image) ☒;

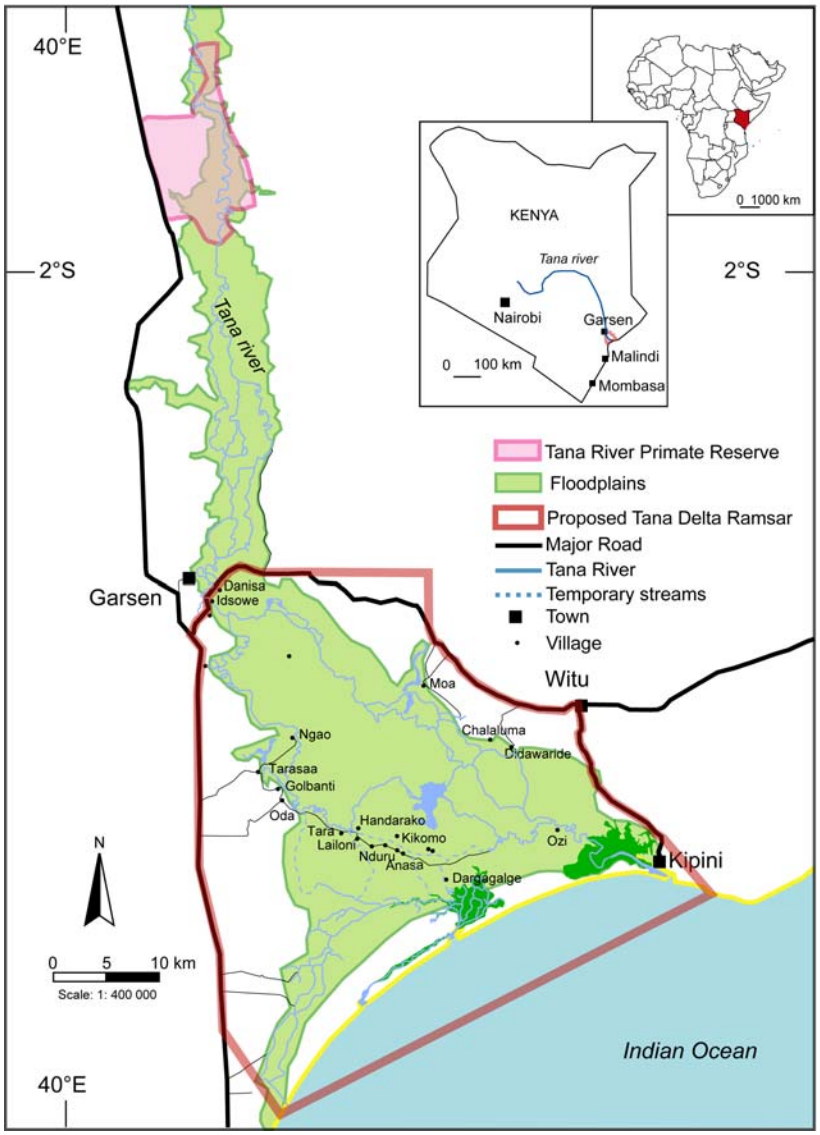


Fig: Tana River Delta Ramsar Site Boundary

iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables ☒**

**b) Describe briefly the type of boundary delineation applied:**

e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The boundary delineation is a composite of various types of boundary. The south-western boundary is formed by the Kilifi-Tana district boundary north of Marereni. The western boundary is formed by the Malindi-Garsen road up to Minjila, 6km south of the town of Garsen. The Minjila to Witu road forms the northern boundary up to Lango la Simba bridge and extends east to the north-eastern corner at S 2°16.17' E 40°18.75'. The boundary then runs south to 2°17.78 E 40° 18.75, where it rejoins the Minjila-Witu road at the site where the road leaves the floodplains and onto the terraces.

The eastern boundary is formed by the Witu - Kipini road and then down southeast to the coast at S 2°32.72' E 40°33.99'. The southern boundary is formed by the connection between the south-western and the south-eastern corners in Ungwana (Formosa) Bay.

**8. Geographical coordinates** (latitude/longitude, in degrees and minutes):
Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

The geographical coordinates of the proposed Ramsar site are as follows:
Centre of the site (approximate) S 2°26.42' E40°17.00' (in UTM 37M 642600 9729700)
Polygon corners in WGS84
Southwest corner (Ocean): S 2°45.00' E 40°12.' (in UTM 37M 632709 9696528)
Southwest corner (Road): S 2°40.05' E 40°08.42' (in UTM 37M 626758 9705107)
Northwest corner (Minjila): S 2°19.31' E 40°06.40' (in UTM 37M 623440 9743321)
North corner: S 2°16.' E 40°09.22' (in UTM 37M 628285 9750092)
Northeast corner: S 2°16.17' E 40°19.00' (in UTM 37M 645938 9749082)
Eastern Corner (Witu): S 2°23.00' E 40°27.30' (in UTM 37M 661775 9736527)
Southeast corner (Kipini): S 2°33.00' E 40°35.00' (in UTM 37M 674161 9718557)

**9. General location:**
Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

The Tana River Delta (TRD) Ramsar site is situated within the Tana Delta and Lamu Districts of the Coast Province (Eastern Kenya). It is roughly triangular in shape with its south-western corner some 40 km north of the coastal resort of Malindi (54,000 inhabitants), its northern tip close to the Tana Delta District capital Garsen (5,000 inhabitants) and its eastern corner close to the town of Kipini, which is situated some 65 km west of the Island of Lamu (13,000 inhabitants). The TRD Ramsar Site can be reached by road from Mombasa city, using the B8 and C112 roads from Mombasa, Malindi, Garsen, Witu and Kipini.

---

**10. Elevation:** (in metres: average and/or maximum & minimum)
The terrestrial parts of the Tana River Delta (TRD) Ramsar site are situated between sea level and up to about 37 m above mean sea level (a.m.s.l). The extensive freshwater floodplains are at less than 5 m a.m.s.l. with the surrounding terraces at less than 10 m a.m.s.l. The highest point in the TRD is the coastal dune, which peaks around 37 m a.m.s.l.

**11. Area:** (in hectares)
The Ramsar Site covers approximately 163,600 ha (1636 km$^2$) based on a flat projection.

---

**12. General overview of the site:**
Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The TRD Ramsar site comprises a variety of freshwater, floodplain, estuarine and coastal habitats around the outflow of the Tana River, the main east flowing river of Kenya, which drains some 132,000 km$^2$ (23% of the country but 32% of the run-off). The central part (37,000 ha) is constituted by low-lying floodplain grasslands between the main eastern (Matomba) and western (Oda) branches of the Tana River with scattered woodlands on higher ground. Except for some *Ficus sycomorus* remnants, most of the riverine forest along the main branches has been replaced either by mango trees or cultivation but along some of the secondary branches strips of species-rich riverine forest subsist and some old meanders enclose semi-evergreen coastal forest patches. The southern part consists of coastal floodplains (53,000 ha) under tidal influence including some 4,500 ha of mangrove

and is fringed by a high coastal dune (9,500 ha) covered by dense coastal scrub forest on the inland side. Parts of the central wetlands around the Bilisa Boka (or Bililo) Lake and around their connections to estuarine part are tidal freshwater systems the dynamics of which are related to the strong tides (amplitude between 2.5 and 4m). The coastal dune is breached at 4 main sites from north to south: the main river outflow at Kipini, the central Shikiko mouth, the small Mtoo Tana mouth and the 19th century river mouth at Mtoo Kilifi. Seaward of the coastal dune is a wide sandy beach. The western (25,000 ha) and eastern (14,000 ha) terraces surrounding the delta branches are mainly covered in dry *Acacia* and *Terminalia* woodland.

The freshwater floodplains provide essential dry season pasture for tens of thousands of heads of cattle belonging to semi-nomadic and sedentary livestock keepers. Recession agriculture and small-scale irrigation are practised along the river banks and in the adjacent floodplains. The terraces surrounding the wetland are increasingly cleared for rainfed agriculture and charcoal production, especially along roads. All freshwater wetlands but in particular the floodplain-adjacent lakes (Moa, Shakababo), the river branches and the oxbow lakes are used by artisanal fishers (who often also collect crocodile eggs), while the estuary and shallow coastal zone are exploited by coastal fishing communities. There are several tourism facilities ranging from high end to basic. The woodland and the forests, including the mangrove, are used for the extraction of woody and non-woody produce, including honey. The intertidal areas and floodplains contain large concentrations of resident and migratory waterbirds and important waterbird breeding colonies occur especially after substantial flooding. The coastal floodplains and forests are important wildlife habitat with various ungulates and occasional elephants. In the riverine forests, a range of Eastern African coastal forest endemic plants and animals occur, including the Tana Mangabey *Cercocebus galeritus* (Endangered) and the Tana River Red Colobus *Procolobus rufomitratus rufomitratus* (Endangered subspecies). A vulnerable coastal subspecies of the Blue Monkey, namely Pousargues's White-collared Monkey *Cercopithecus mitis albotorquatus* (Vulnerable B1ab (i, ii, iii, v)) is also present.

---

**13. Ramsar Criteria:**

Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

| 1 • | 2 • | 3 • | 4 • | 5 • | 6 • | 7 | 8 • | 9 |
|---|---|---|---|---|---|---|---|---|
| ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ |

**14. Justification for the application of each Criterion listed in 13 above:**

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

**Group A of the criteria: sites containing representative, rare or unique wetland types**

*Criterion 1: a wetland should be considered of international importance if it contains a representative, rare or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region*

The TRD is the second most important estuarine and deltaic ecosystem in Eastern Africa, after the Rufiji Delta in Tanzania. The Tana River provides a perennial but strongly seasonal and double peaked freshwater inflow loaded with fine fertile sediment and charged with nutrients that, in favourable years, can cover the vast freshwater and coastal floodplains. The TRD has extensive and diverse mangrove systems and marine brackish and freshwater intertidal areas, pristine beaches and shallow marine areas in Ungwana Bay forming productive and functionally interconnected ecosystems.

**Group B of the criteria: sites of international importance for conserving biological diversity**

*Criterion 2: a wetland should be considered internationally important if it supports vulnerable, endangered or critically endangered species or threatened ecological communities.*

Birds: The TRD, though insufficiently studied, is home to several communities of threatened and data deficient avifauna, both resident and migratory. Globally threatened species occurring in the wetland include the Basra Reed Warbler *Acrocephalus griseldis* (Endangered A2bc+3bc, the Lappet-faced Vulture *Torgos tracheliotos* (Vulnerable), and the Madagascar Pratincole *Glareola ocularis* (Vulnerable),

Marine turtles: Five species of threatened marine turtles have been recorded in the Ramsar Site. These are: the Hawksbill Turtle *Eretmochelys imbricata* (Critically Endangered A2bd), the Green Turtle *Chelonia mydas* (Endangered A2bd), and the Olive Ridley Turtle *Lepidochelys olivacea* (VulnerableA2bd) and the Leatherback turtle *Dermochelys coriacea* (Critically Endangered A1abd). The Loggerhead Turtle *Caretta caretta* (Endangered 1Abd) also occurs in the area. Hawksbill Turtle and Green Turtle are potentially breeding.

Fish: The fish fauna of the TRD has been insufficiently studied but several threatened species have been recorded e.g. in the sawfish family Pristidae, probably Narrowsnouth Sawfish *Pristis zijsron* (CITES Appendix I, Critically Endangered A2bcd+3cd+4bcd), Wide sawfish *Pristis pectinata* (CITES appendix I, Critically Endangered A2bcd+3cd+4bcd) and Knifetooth sawfish *Anoxypristis cuspidata* (CITES Appendix I, Critically Endangered A2bcd+3cd+4bcd),

Dugong: *Dugong dugon* (Vulnerable A2bcd) are occasionally observed. Some are reported stranded or drowned in nets indicating that dugongs are still present in small numbers in the TRD.

Terrestrial mammals: Recent observations have confirmed the presence of both Tana River Mangabey *Cercocebus galeritus* (Endangered C2a (ii)) and Tana River Red Colobus *Procolobus rufomitratus rufomitratus* (Endangered subspecies B1ab (iii, v)) in the riverine forest remnants of the TRD. Other species recorded are Golden-rumped elephant shrew *Rhynchocyon chrysopygus* (Endangered B1ab), Wild dog *Lycaon pictus* (Endangered C2a), Elephant *Loxodonta africana* (Vulnerable A2a), Hippopotamus *Hippopotamus amphibius* (Vulnerable A4cd), Lion *Panthera leo* (vulnerable A2abcd). Possibly Ader's Duiker *Cephalophus adersi* (Critically Endangered A4acd) also occurs in the TRD as the species was recently observed just to the North of the river mouth less than 10 km from the TRD Ramsar site boundary.

Plants: Over 600 plant species have been recorded in the TRD including *Cynometra lukei* (Endangered B1+2c), *Gonatopus marattioides* (Endangered B2ab(i,ii,iii,iv,v)), *Oxystigma msoo* (Vulnerable B1+2b), *Camptolepis ramiflora* (Vulnerable B1+2c), *Angylocalyx braunii* (Vulnerable B1+2b), *Chytranthus obliquinervis* (Vulnerable B1+2c), *Afrocanthium pseudoverticillatum* (in the red list erroneously labeled *Canthium robynsianum*) (Vulnerable B1+2c), *Dalbergia vacciniifolia* (Vulnerable B1+2b), *Drypetes natalensis* var. *leiogyna* (Vulnerable B1+2b), *Tricalysia ovalifolia* var. *glabrata, Uvariodendron kirkii* (Vulnerable B1ab).

*Criterion 3: a wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region*

The TRD is regionally important in terms of its mangrove communities. The mangroves and intertidal flats provide habitats for a number of coastal and marine prawns, shrimps, bivalves and fish. Many invertebrates that enrich the region's biodiversity and support other biodiversity particularly in the food chain and webs are believed to occur in the Tana Delta and may include

crustaceans, snails and insects which are probably a major food source for the birds and fish of the Tana Delta.

The TRD is a critical nursery ground for juveniles (early life stages) of Penaeid shrimps of the Giant tiger prawn *Penaeus monodon* (Fabricius, 1798), Indian white prawn *Penaeus indicus (*H. Milne Edwards,1837)*,* Kuruma shrimp *Penaeus japonicus* (Bate ,1888), Green tiger prawn *Penaeus semisulcatus* (De Haan,1844) and Speckled shrimps *Metapenaeus monoceros* (Fabricius, 1798). Molluscs species such as the mangrove whelk *Terebralia palustris* (Linnaeus, 1758) among others are likely abundant. The fresh and brackish water prawns that live in clear streams and rivers but returns to the sea to release larvae such as (*Macrobrachium scabriculum* (Heller, 1862), *Macrobrachium rude* (Heller, 1862) are also utilizing this region.

The TRD supports reproductive populations of sea turtles (Hawksbill Turtle *Eretmochelys imbricata,* and Green Turtle *Chelonia mydas*) and other species (Olive Ridley Turtle *Lepidochelys olivacea*, Leatherback turtle *Dermochelys coriacea* and Loggerhead Turtle *Caretta caretta*) use the area on migration. Populations of Tana River Mangabey *Cercocebus galeritus* and Tana River Red Colobus monkey *Procolobus rufomitratus ssp. rufomitratus* are present. Other primate species important for the East African bioregion present are Vervet Monkey *Chlorocebus pygerythrus hilgerti,* Pousargues's White-collared Monkey *Cercopitecus mitis albotorquatus* (Vulnerable B1ab(i,ii,iii,v)) and Yellow Baboon *Papio cynocephalus ibeanus*, as well as two nocturnal species *Otolemur garnetii lasiotis* and *Galagoides cocos*. Though rare, Dugong (*Dugong dugon*) and Topi *Damaliscus lunatus topi* are important for maintaining the biological diversity of these species in the East African bioregion.

*Criterion 4: a wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.*

The TRD is an important breeding, nursery and feeding ground for a number of coastal, estuarine and marine species, some of economic importance i.e. shrimps, prawns and fish species that make up the rich fishery of Ungwana Bay, in particular for Penaeid shrimp. These habitats provide shelter, food and protection. As one of the only estuarine staging posts on the West Asia - Eastern Africa coastal flyway it is a critical feeding ground for migratory waterbirds such as waders, gulls and terns. The TRD is also an important wintering ground for several waterbird species such as Madagascar Pratincole *Glareola ocularis* and a feeding ground for waterbirds in general including pelicans, cormorants, ibises (Glossy Ibis *Plegadis falcinellus* and Sacred Ibis *Threskiornis aethiopicus*), storks, spoonbills, herons, ducks (Fulvous Whistling Duck *Dendrocygna bicolor* and White-faced Whistling Duck *Dendrocygna viduata*), etc.. The TRD offers one of the very few coastal breeding sites for waterbirds such as the Yellow-billed Stork *Mycteria ibis*, White-breasted cormorant *Phalacrocorax lucidus* and possibly Saddle-billed Stork *Ephippiorhynchus senegalensis*. Historically the Tana Delta had significant breeding populations of the African Spoonbill, African Open-billed Stork, Black-crowned Night Heron, Great Egret, African Darter, Common Squacco Heron, Black Heron, Yellow-billed Egret and Purple Heron. However in recent years flooding conditions have not been favorable. The beaches in the TRD are a potential breeding area the Hawksbill Turtle *Eretmochelys imbricata* and the Green Turtle *Chelonia mydas.*

*Criterion 5: a wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds*

The Kenya national annual waterbird database hosted at the National Museums of Kenya indicates consistently large numbers of water birds in the TRD. Several partial counts of the TRD, especially those in early (usually February) indicates that in the year 2006 (approx. 10% of the TRD counted 6400 waterbirds), 2007 (approx. 10% counted 15100 waterbirds), 2008 (approx. 20% counted 26200 waterbirds), 2009 (approx. 10% counted 5200 waterbirds), 2010 (approx.. 10% counted 12600

waterbirds and 2012 (approx. 15% counted 13000 waterbirds). The database has shown that at least 75,000 waterbirds are present during the Palearctic migration and wintering periods (October to March). Between April and September the Tana Delta regularly supports over 20,000 waterbirds, mostly afrotropical species. It is likely that some of the birds utilize a larger area depending on the tides, disturbance and local feeding conditions.

*Criterion 6: a wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.*

Waterbirds that have been observed in significant numbers in the TRD (more than 1% of biogeographic populations) include Great White Pelican *Pelecanus onocrotalus* (occasionally over 2000 - >1%), Pink-backed Pelican *Pelecanus rufescens* (occasionally over 1000- >1%), Yellow-billed Egret *Mesophyx intermedia* (occasionally over 1000 - 1 %), Great Egret *Casmerodius albus* (occasionally over 3000 – 1%), Yellow-billed Stork *Mycteria ibis* (regularly over 1000 >1%), African Spoonbill *Platalea alba* (occasionally over 1000 – 1% when breeding), Greater Flamingo *Phoenicopterus roseus* (occasionally over 500 >1%), Spur-winged Goose *Plectropterus gambensis* (occasionally over 2500 – 1%), Madagascar Pratincole *Glareola ocularis* (regularly > 3000 – 40%), Collared Pratincole *Glareola pratincola* (regularly > 3000 - >1%), White-fronted Plover *Charadrius marginatus* (occasionally > 300 – 1%), Lesser Sandplover *Charadrius mongolus* (occasionally > 1500 - 1%), Caspian plover *Charadrius asiaticus* (occasionally > 2500 - >5%), Marsh Sandpiper *Tringa stagnatilis* (occasionally > 800 – 1%), Gull-billed Tern *Sterna nilotica* (occasionally > 1000- >2%), Caspian Tern *Sterna caspia* (occasionally > 200 – 2%).), Lesser Crested Tern *Sterna bengalensis* (occasionally > 1000 – 2%), Saunder's Tern *Sterna saundersi* (occasionally > 1000 - >1%), and African Skimmer *Rynchops flavirostris* (occasionally > 100 1%). Potentially Glossy Ibis *Plegadis falcinellus* of wich over 5000 are regularly counted at roosts during the Palearctic winter. A large proportion of these may be Palearctic migrants for which the 1% level is 1000.

*Criterion 7: a wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity*

The TRD Ramsar site supports significant populations of fish that are representative of wetland benefits and/or values and contributions to the biological diversity in the East African coastal waters (Western Indian Ocean). The delta artisanal finfisheries is estimated at producing average of five hundred tonnes per annum, with estimated three thousand artisanal fishermen making a living from fishing in the Tana River Delta alone.

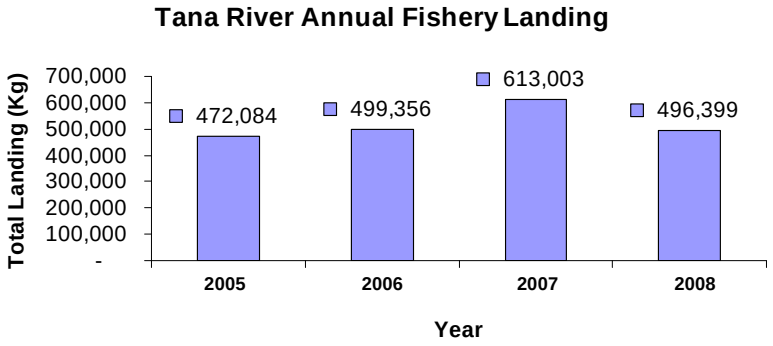


Figure 1: Tana River Annual Fish Landings

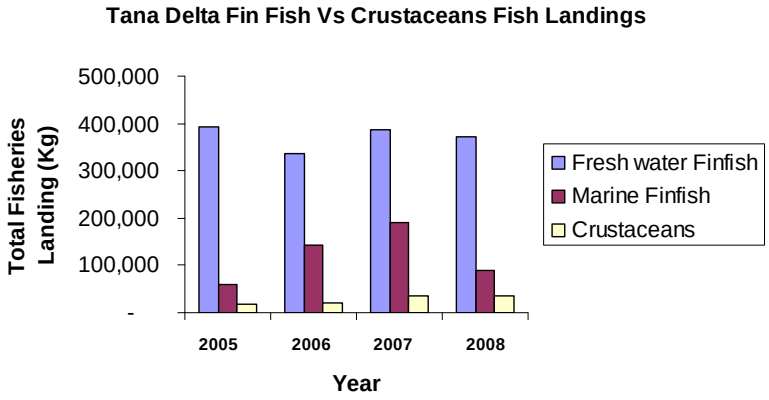


Figure 2: Tana Delta Finfish vs. Crustacean landing

The delta holds populations of *Pristis pectinata*, *P. zijsron*, *Anoxypristis cuspidata*, *Pardiglanis tarabini*, *Synodontis manni, Red tail Labeo sp., Awaous aeneofuscus, Glossogobius giuris, Oreochromis spilurus spilurus, Anguillidae* and *A. mossambica* among others. The most important prawn and shrimp species are Giant tiger prawn *Penaeus monodon,* Indian white prawn *Penaeus indicus,* Kuruma shrimp *Penaeus japonicus,* Green tiger prawn *Penaeus semisulcatus,* Speckled shrimps *Metapenaeus monoceros, Macrobrachium scabriculum,* and *Macrobrachium rude* which are dependant on the extensive and varied mangroves in the Tana River Delta.

*Criterion 8: a wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere depend*

The TRD Ramsar site is essential for a large number of fish and marine invertebrates in the area and region. The deeper coastal areas are considered to be very important for the migration of various fishes such as Anguillidae (*Anguilla mossambica* and *Anguilla bicolor bicolor)*, Gobiidae (*Glossogobius giuris*, *Oligolepis acutipennis*, *Awaous aenofuscus*), Eleotridae (*Eleotris fusca*), Mugilidae (*Liza macrolepis*, *Valamugil buchanani*), Lutjanidae (*Lutjanus argentimaculatus*), Ambassidae (*Ambassis gymnocephalus*) and pelagic fish. Mangroves are well known feeding and nursery areas for fish but also for crustaceans (crabs and shrimp) on which many fish species in the coastal area depend. If there are seagrass beds these are also very important nursery areas.

---

**15. Biogeography** (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):
Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

**a) biogeographic region:**
Afro-tropical region, Eastern Africa coastal forest hotspot, Western Indian Ocean.

**b) biogeographic regionalisation scheme** (include reference citation):
Eastern African coastal forest hotspot, see:
http://www.conservation.org/where/priority_areas/hotspots/africa/Coastal-Forests-of-Eastern-Africa/Pages/default.aspx

**16. Physical features of the site:**
Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

Tana River Delta:
The Tana River Delta Ramsar site covers the delta starting just upstream of the main split between the Matomba and Oda branches of the Tana River. Further upstream, north of the Ramsar site, there are braided channels, shifting meanders and floodplains with saline groundwater at shallow depth indicating a probably recent deltaic past. The definition of the Delta is therefore somewhat pragmatic with easily identifiable boundaries but the shifts in ecosystem types are gradual rather than abrupt. The size of the delta is estimated at approximately 163,600ha or 1,636 km². Mangrove forests cover about 4,500 ha or 45 km². There do not seem to have been a major recent change in mangrove area except for some expansion of *Avicennia* along the Kalota brook and some temporary loss of *Heritiera* following El Niño but regenerating well. The water courses in the delta have seen continuous shifting and changing with river mouths opening and closing and human interventions often, at least temporarily, redirecting the main flows. In the past few years the main river has shifted its course from the Oda to the Matomba branch in spite of various attempts to bring the river back to its "old" course. The local communities have closed the connection between the Oda branch and the Kalota brook causing a significant increase in salinity in the downstream system.

The wetland part of the TRD is constituted by floodplains dominated by alluvial deposits surrounded by sandy terraces and coastal dunes. The floodplain consists of Holocene alluvial sediments from the volcanic areas of the central highlands of Kenya, overlying marine tertiary deposits. The geology of the dry plain consists of unconsolidated pliocene marine sediments. The soils in the Delta are heavy clays with numerous shallow depressions while the prominent forested levees are sandy. The soils are saline and alkaline, poorly drained and prone to cracking when dry. There are indications of shallow deposits of evaporites (Gypsum). As the river approaches the sea, the swamp forests along the channels merge into tidal forests on the open creeks. A triangular area of 42km² along the coast and extending 33km upstream is subject to inundation. The flood regime in the Delta is bimodal, with a major flood in April-June, following rains over the catchments in March-May, and a minor flood in November to December. The flooding regime of the Tana River has been considerably modified since the 1980s as a consequence of upstream human activities, the construction of hydroelectric infrastructure and climate change. This has led to a decrease in the wet season floods and an increase in the dry season water flow resulting in degradation of the deltaic ecosystems. The riverlinked fresh water systems are generally of a neutral pH with conductivities below 200 μS/cm. Sediment loads (total suspended sediment concentration (TSSC) between 0.5 and 2 g/litre. Maximum depth in the river is generally less than 5 m (but there are some deeper channels in the estuarine part), the lakes are shallow (generally less than 2 m) and during flooding water depth on the floodplains is generally less than 1 m.

Precipitation increases downstream on the Tana, from about 250mm/yr at Mbalambala ($0^0$ 02'S/$39^0$03'E) to about 1000mm/yr over the Delta. The climate of the Tana River coastal zone is strongly influenced by the monsoon or "trade winds", the northeast monsoon and the southeast monsoon. The southeast monsoon blows from April to September and is characterized by strong winds, a cold dry season and a low tidal range. The northeast monsoon blows from November to March is characterized by less wind, a high tidal range and a more humid climate.

**17. Physical features of the catchment area:**
Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

The Tana River is the most important river in Kenya and its basin covers about 132,000 km², which corresponds to 23% of the country but produces 32% of the run-off. The river descends from the Central Highlands down to the Indian Ocean over some 1000 km. The major water catchment areas include Mount Kenya and the Aberdares, especially the high rainfall areas above 3000 m altitude. A third catchment area is in the Nyambeni Hills (0°23'N 37°87' E) at an altitude of around 750 m, just

upstream of Meru National Park to the Northeast of Mount Kenya. Most of the upper part of the catchment is protected land but land use practises on the lower slopes and along the catchment have significant bearing on the TRD as they influence the flood dynamics, as well as the loads of sediments and nutrients. The mean annual flow of the Tana River is about 178 $m^3$/sec (mean annual discharge 5.6 billion $m^3$/yr) but is highly variable between 90 and 300 $m^3$/sec or between 2.7 and 10.2 billion $m^3$/yr. Evaporation over the delta is estimated at 700 million $m^3$.

**Aberdares Ranges**– The Aberdares are an isolated Cenozoic volcanic mountain range with gently sloping moorland above 3000 m reaching up to almost 4000 m and incised by deep ravines with some of the most spectacular waterfalls in the country with the Karuru falls (272 m or 894 feet) the highest. To the west of the Aberdares there is a steep escarpment down to the Great Rift Valley but to the East slopes are gentler. Situated approximately 171km north of Nairobi and 17km west from Nyeri town, the Aberdares lie between longitude 36º31' and 36º57' East and latitude 0º08' °and 0º42' South. Most of the high altitude area is included in the 76,600 ha Aberdare National Park. Below 3000 m the alpine moorlands give way to bamboo and lower down to montane forest mostly within the Aberdare Forest Reserve on the wet eastern slopes. The water production areas have over 1500 mm annual rainfall in a bimodal pattern with maxima from March to June (long rains) and October to November (short rains). The Aberdare range is essentially the product of fissure volcanic eruptions but with their inner halves having incorporated into the downthrown sides of this area. The volcanic stones are mainly of alkaline type including basalts, rhyolites and their pyroclastic equivalents. The soils in most parts of the Aberdares are volcanic in origin. In large parts of the area, deep clay soils dominate in the lower areas while the higher parts are dominated by granulated sandy and clay soils. The soils easily dry up and disintegrate during dry periods and become soggy, sticky and waterlogged during periods of heavy rains with a high risk of landslides.

**Mount Kenya** - This is the second highest mountain in Africa culminating in the Batian (5199 m) and Nelien (5188 m) peaks that can only be reached with climbing gear. The third peak Lenana (4985 m) can be reached on foot. It's a solitary mountain of volcanic origin with a base diameter of about 100 km centred around 0°10' S 37°20' E. It's one of the major water towers of Kenya. Two of the country's largest rivers, Tana River and Ewaso Ngiro have their tributaries originating from its slopes. The central high altitude part with moorland, rocky and icy parts above 3200 m lies within the Mount Kenya National Park (71,500 ha) and is surrounded by the 199,500 ha Mount Kenya Forest Reserve that contains the main catchment areas between above 2000 m. The wet south-eastern slopes that supply the Tana River have close to 2,500 mm of annual rainfall in a bimodal pattern with maxima from March to June (long rains) and October to November (short rains). The soils of the lower region are Nitisols, rich in clay. In the large parts of hagenia and bamboo zones humic Acrisols as well as nutrient rich humic Andosols are found. Histosols occur mainly above 3,300m on water impermeable subsoil layer.

Below the protected upper catchments that supply most of the water, the land is intensively farmed, both through rainfed agriculture and irrigation schemes e.g. Mwea. The main Tana River coming down from the Aberdares and Mount Kenya runs through a series of reservoirs (Kindaruma, Kamburu, Gitaru, Masinga and Kiambere) that produce more than 400 MW of hydropower and supplies nearly 50% of Kenya's electricity. Agriculture is often practiced right down to the river's edge and soil erosion is a characteristic, threatening the longevity of the hydropower dams. Below the 200 m altitude contour at Mbalambala, just downstream of Meru and Kora National Parks, the Tana River enters the narrow (on average 5 km wide) lower floodplain that meanders through low rainfall rangelands (less than 400 mm annual rainfall). The lower floodplain has remnants (some 2600 ha) of high biodiversity gallery forest in small and decreasing patches. There are irrigation schemes between Garissa and Garsen at Bura, Hola and Sailoni but they are currently being rehabilitated. During exceptional rainfall events seasonal streams called Lagas can provide additional flow from the right bank of the river.

**18. Hydrological values:**

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

Through the natural flooding regime the TRD wetlands provide a series of water-associated supporting ecosystem services such as soil formation (trough silt deposits), photosynthesis, primary production, nutrient and water cycling that underlie the production of all the other services, cultural, regulating and provisioning. For example the wetlands regulate climate through carbon fixation in the dynamic floodplain forests and the mangrove. The large floodplains also attenuate the flood peaks. The high forest, both gallery forest and mangrove, provides wind breaks thus reducing wind erosion. Their root systems stabilise the river banks and the floodplain, terrace and dune field vegetation in general reduce erosion processes. The wetland vegetation purifies water by sediment trapping and nutrient conversion. In addition the mangrove system stabilises the shoreline by its sediment accumulation, thus countering impacts of sea level rise. The flow in itself reduces the inland migration of the salt wedge that would render increasing tracts of land less productive. The TRD wetlands also provide provisioning services such as food (recession agriculture, small-scale irrigation, livestock keeping, capture fisheries and the collection of wild plant and animal food products), fiber (timber for canoes, construction and beehives, reeds and palm fronds for roof thatch and weaving as well as wood fuel) as well as clay for pottery and construction. Many plants are used as local medicine and honey is collected in various areas. As most of the groundwater underlying the delta is saline, the groundwater recharge by the floods, especially in the sandy river banks and on old meanders and temporary river beds, is important as a source of safe drinking water. Cultural services include traditional knowledge systems that structure the various livelihood strategies (including remnants of hunter-gatherer societies, the Wata), an important ecotourism and cultural tourism potential.

**19. Wetland Types**

**a) presence:**

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

**Marine/coastal:** **A** • B • C • D • **E** • **F** • **G** • H • **I** • **J** • K • Zk(a)

**Inland:** L • **M** • **N** • **O** • **P** • Q • R • Sp • Ss • **Tp** **Ts** • U • Va • Vt • W • **Xf** • Xp • Y • Zg • Zk(b)

**Human-made:** 1 • 2 • **3** • **4** • 5 • 6 • 7 • 8 • **9** • Zk(c)

**b) dominance:**

i. List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

| | | |
|---|---|---|
| **Ts** | **Seasonal marshes on inorganic soil (the floodplains)** | **450 km²** |
| **A** | **Permanent shallow marine waters** | **235 km²** |
| **I** | **Intertidal forested wetlands (mangrove)** | **45 km²** |
| **4** | **Seasonally flooded agricultural land** | **40 km²** |
| **Xf** | **Freshwater tree-dominated wetlands** | **20 km²** |
| **G** | **Intertidal mud, sand or saltflats** | **15 km²** |
| **O** | **Permanent freshwater lakes** | **13 km²** |
| **M** | **Permanent rivers, streams, creeks** | **10 km²** |
| **E** | **Sandy shores** | **8 km²** |
| **N** | **Seasonal rivers, streams, creeks** | **8 km²** |

| | | |
|---|---|---|
| **J** | **Coastal saline lagoons** | **3 km²** |
| **F** | **Estuarine waters** | **3 km²** |
| **P** | **Seasonal freshwater lakes** | **2 km²** |
| **Tp** | **Permanent freshwater marshes** | **<1 km²** |
| **3** | **Irrigated land** | **<1 km²** |
| **9** | **Canals** | **<1 km²** |

**Remark:** Type A: permanent shallow marine waters most probably contains type B seagrass beds but these have not been evaluated separately.

**20. General ecological features:**

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

The Tana Delta has been accorded eco-regional importance under the East African Marine Eco-region (EAME) for being a system with diverse wetlands composed with fresh, brackish, saline, and marine waters. It is also recognised as an important bird area (IBA). The mosaic of riverine forests, grasslands, woodlands, lakes, mangroves, pristine beaches, sand dunes and coastal waters provides creates a diversity of habitats, ecosystems and landscapes with a rich flora and fauna and as such has a strong ecostourism potential that is currently undervalued.
The Tana Delta has eight mangroves species along the main river course between Ozi and Kipini, including comparatively large areas with tall *Heritiera littoralis* - the only place in Kenya where this species is found in any quantity. These mangrove forests play an important economic role as a fish, mollusc and shellfish nursery that nourishes the rich fisheries of Ugwana Bay.

The Tana Delta provides a large number of ecosystem services both to the local communities and beyond. As provisioning services, the area provides food through recession agriculture and small-scale irrigation, in part using the tidal bore. Its grassland resources are particularly important for mobile livestock keepers that, especially in dry years (such as 2009), can congregate from a very wide area of northeastern Kenya and even neighbouring Somalia. Capture fisheries are also an important livelihood and the area is also the key nursery for the economically important fisheries in Ungwana. The collection of wild plant and animal food products for both consumption and for traditional medicine is key for the local communities, especially for the vulnerable groups that have few or no monetary resources. Fiber from the wetlands and terraces provides timber for canoes and construction of houses but also for domestic animal enclosures, as well as for beehives. Other wetland and dryland vegetation is used for roof thatch and weaving products (especially from palms), as well as for woodfuel. Unfortunately, from small-scale production for local use increasingly charcoal is produced from high quality wood (e.g. the *Diospyros bussei* woodlands) and exported to the neighbouring towns. The deposited clay sediments are used for housing, brick-baking, pottery and also regularly refertilise the soils. Sandy deposits are also exploited but this entails risks for shifts in river beds. Local medicine, honey and palm wine are extracted from the vegetation. As the groundwater is generally saline, the surface water of the river and the recharge of groundwater through flooding are vitally important for humans, and domestic and wild animals.
With regard to the regulating services the dynamic riverine forests and mangrove are efficient fixators of carbon and the vegetation in general prevents or reduced wind erosion. This is extremely important considering the risks of decreasing rainfall and increasing wind stress with climate change. The evaporation from the wetlands and the evapotranspiration through the vegetation improve air quality. The biodiversity undoubtedly pays an important role in pollination services. Natural hazard regulation is provided by the flood peak reduction by the floodplains (one can imagine an embanked delta that transports the flood peak downstream until it breaks through to the Ocean through one of the old river mouths) and also by the strong coastal defences built up by the mangrove and the dune-stabilising vegetation. The cultural services of the TRD have been insufficiently studied but spiritual,

religious, inspirational, educational and aesthetic values abound as are the strong ties between the communities, their ancestral land and some of the biodiversity the pokomo claim they brought the red Colobus with them from Central Africa) providing sense of place and also mechanisms of conflict prevention and resolution (rituals by the elders of various communities with regard to grazing of the stubble after the harvest. The potential tourism and recreation value is very substantial but still underexploited.

**21. Noteworthy flora:**

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

The Tana Delta consists of a mosaic of various plant communities that are in themselves noteworthy, especially the coastal and riverine forest and the mangrove. The forests have been insufficiently studied (in comparison to the upstream areas between the Tana River Primate National Reserve and the forests on the edges of the Tana delta Irrigation project) and may still yield many surprises. Key species currently conformed are *Cynometra lukei* (Endangered B1+2c), *Gonatopus marattioides* (Endangered B2ab(i,ii,iii,iv,v)), *Oxystigma msoo* (Vulnerable B1+2b), *Camptolepis ramiflora* (Vulnerable B1+2c), *Angylocalyx braunii* (Vulnerable B1+2b), *Chytranthus obliquinervis* (Vulnerable B1+2c), *Afrocanthium pseudoverticillatum* (in the red list erroneously labeled *Canthium robynsianum*) (Vulnerable B1+2c), *Dalbergia vaciniifolia* (Vulnerable B1+2b), *Drypetes natalensis* var. *leiogyna* (Vulnerable B1+2b), *Tricalysia ovalifolia* var. *glabrata, Uvariodendron kirkii* (Vulnerable B1ab(iii)), Mombasa Cycad *Encephalartos hildebrandtii* (Near-threatened). With the exception of what may still survive around the Juba and Shebelli Rivers in Somalia these forests are at the northernmost edge of the Coastal Forests of Eastern Africa hotspot.
Eight mangrove species occur including especially fine stands of *Heriteria littoralis, Xylocarpus granatum* and *Bruguiera gymnorrhiza.*

---

**22. Noteworthy fauna:**

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

**Birds**

The TRD is an important bird area (IBA) that hosts a wide array of internationally and regionally important bird species, mainly confined to the open areas i.e. intertidal flats, beaches and sandbanks and resting ground. The lowland evergreen coastal forests provide suitable habitat for the Southern Banded Snake Eagle *Circaetus fasciolatus* (Near-threatened), while the wet grasslands provide wintering habitats for the Black-tailed Godwit *Limosa limosa* (Near–threatened. The mangroves are used as roosting sites especially during the high tides. Many of the important waterbird populations are inter-continental migrants which spend their non-breeding season at the site (see Annex 3). The recent observations of possibly over 10% of the world population of the Vulnerable Madagascar Pratincole *Glareaola ocularis* is a case in point, as are the regularly more than 2000 Collared Pratincole *Glarola pratincola.* An interesting recent sighting is 2350 Caspian Plover. The coastal forest remnants and mangroves in the TRD contain a series of East African Coast biome-restricted species (Birdlife criterion A3) such as: Mangrove Kingfisher *Halcyon senegaloides*, Brown-breasted Barbet *Lybius melanopterus*, Pale Batis *Batis soror*, Four-coloured Bush Shrike *Telophorus quadricolor*, Fisher's Greenbul *Phyllastrephus fisheri*, Scaly Babbler *Turdoides squamulata*, Black-bellied Glossy Starling *Lamprotornis corruscus*, Mouse-coloured Sunbird *Nectarinia veroxii*, Violet-breasted Sunbird *Nectarinia chalcomelas* and Zanzibar Bishop *Euplectes nigroventris.* During years with important floods substantial breeding colonies of several waterbird species (spoonbills, storks, herons, egrets, cormorants and darters)

occur, in recent years most prominently Yellow-billed Storks *Mycteria ibis* and White-breasted Cormorant *Phalacrocorax lucidus*.

**Marine Turtles**
Because of the pristine and hardly visited beaches the delta is potentially an importing breeding area for globally threatened turtles such as the Hawksbill Turtle *Eretmochelys imbricata* and Green Turtle *Chelonia mydas*. The study and protection of these breeding sites would help in ensuring the survival of these marine turtles.

**Rare and Endemic Invertebrates**
Invertebrates: Data is deficient as no thorough survey has been done at the TRD. Some butterflies listed as Endemic and Rare occur in the Tana River Primate National Reserve (TRPNR) some 30 km north of the TRD and may be present in the TRD. Records of some insects from National Museums of Kenya (NMK) database recorded from Bura irrigation scheme, Hola Tana River, Kora Rock and other near Tana River localities which may also be present at Tana River Delta.
The delta is an important home area for rare invertebrates such as the *Graphium angolanus, G. colonna, G. antheus, Papilio constantinus, Colotis amatus, C. protomedia, C. ione, Charaxes jahlusa kenyensis,* and *Acraea braesis*. The endemic butterflies found within the TRD include the *Acraea anemosa, A. satis,* and *Euphaedra neophron.*

The groups recorded from these localities and suspected to occur in Tana Delta include members of
Order: Hymenoptera (Ants): *Crematogaster castanea, Dorylus affinis, Polyrhachis schistacea*
Order: Coleoptera (beetles): *Idactus maculicornis, Idactus bettoni, Lasiopezus variegator, Plocaederus bennigseni, Helymaeus notaticollis, Macrotoma, Palmate, Nosoeme claripes, Stenethmus pinheyi,*
Order Diptera: *Ancala africana, Tabanus fraternus, Tabanus par*
Order Heteroptera (bugs): *Aeolocoris turgidus*
Order Neuroptera: *Myrmeleon obscurus, Neoloma nigripes*
Order Orthoptera: *Heteracris coerulescens*

**Important Amphibians:**
Important amphibians that have been identified within the Tana River Delta are the Tana River caecilian *Boulengerula denhardti* (Endemic), Schistometopum gregorii (near endemic), Schilluk Ridged Frog *Ptychadena floweri.*

**Rare Reptiles:**
Various rare reptiles have also been identified in the Tana River Delta. Examples of these include the Tana writhing skink *Lygosoma tanae* (near endemic) and *Lygosoma mabuiiformis*, Gecko *Hemidactylus brooki,* Chameleon *Chamaeleo gracilis, Chamaeleo dilepis, Philothammus hoplogaster* (restricted to coast), *Dipsadobaoa flavida broadleyi* and *Psammophis orientalis.* A disjunct population of a spectacularly coloured Blue-headed Agama *Acanthocercus atricollis* exists in the Kimpini area, provisionnaly classified as the subspecies *gregorii* but that may acuire specific status in the future.

**Fish:**
Tana River Delta is both home and feeding grounds to rare and threatened fish species such as the *Pristis pectinata, Pristis zijsron* and *Anoxypristis cuspidate*Other important species include *Synodontis manni* (IUCN Red List – data deficient), and *Pardiglanis tarabini* (IUCN Red List – data deficient). Two undescribed new cyprinid species are currently under review, a Red-tailed *Labeo* and a *Synodontis* sp. are restricted to the range. The river also has rare Anguillidae (A. *bicolor bicolor* and *A. mossambica*). Other species listed as data deficient in the IUCN redlist include: the pancake headed catfish *Pardiglanis tarabinii* which has only been found in the TRD and the Juba River in Somalia, *Nothobranchius microlepis, Nothobranchius patrizii*, *Nothobranchius willerti, Barbus paludinosus, Awaous aeneofuscus,* and *Glossogobius giuris.*

The delta supports more than 25 commercially important fish species. The numbers and varieties are biogeographically important.

**Endangered primates:**
The Tana River Red Colobus and the Crested Mangabey are also found within the Tana River Delta. Their home ranges have been restricted by agriculture and development within the delta.

**Mammals:**
In addition to the red-listed species the TRD has important populations of Buffalo *Syncerus caffer* (Lower risk/conservation dependent), Topi *Damaliscus lunatus ssp. topi* (Lower risk/conservation dependent), Lesser Kudu *Tragelaphus imberbis* (Lower risk/conservation dependent).

**23. Social and cultural values:**

**a)** Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

The Tana River Delta has great social and cultural values ranging from agriculture and livestock keeping, forestry, fish production, religious importance and archaeological sites. Agriculture in the Tana River Delta employs about 80% of the population who produce about 832 tons of food annually. The main crops grown are mangoes, rice, bananas, green grams, cotton, coconut, cassava and maize. Recurrent droughts, unreliable rainfall, crop raids and decrease in flooding have fragilized the agricultural activities in the past decades and rendered the local communities more vulnerable to food shortages and more dependent on economic inflow and remittences from the nearby towns. Forest resources provide weaving and basketry materials. The historical farming communities are the Pokomo and immigrant Mijikenda. These communities used a multi-strategy agri-system depending on the flooding extent to maintain their food production and cash income. Fishing was their main activity during the wet years when lakes and swamps provided major reproductive zones for the fish. During the drier years when fish resources were scarce, the Pokomo would mainly practice recession agriculture in the upper floodplains. Mango trees were planted during the 1970s and 1980s and provided the cash inflow necessary to buy non agricultural products. With the modification of the water regime in the 1980s and 1990s, the Pokomo took up news strategies to adapt to their changing environment (decrease in flooding extent). The decrease in water availability alongside with the decrease in sediment deposition through floods rendered recession agriculture less productive. The Pokomo therefore switched to rainfed crops with maize as their major production. Livestock keeping (small herds of sheep and goats and later cows) now provide the cash inflow as mango production has now dropped due to the drying up of the Oda branch of the Tana River. Agriculture still has a high potential in the district but is largely dependent on the utilization of the Tana River water resources.

The traditional pastoralists/livestock communities within the Tana River Delta are the Ormas, Wardei and Somali. They keep cattle, sheep, goats, camels, donkeys, chicken and ducks. The main challenges encountered are lack of reliable water sources and possibly overgrazing during extreme droughts. These have fragilized the cattle which are now more prone to diseases during the dry seasons. There are about 60,000 cattle in out of which 20,000 are permanently in the delta (Ministry of Livestock Development). These animals are kept here to provide milk for household consumption. The other 40,000 to 45,000 are moved to the hinterland during the wet season. There were more than 13,500 cattle sold in Tana Delta in the year 2006 at an average price of Kshs. 18,000 per mature bull (Ministry of Livestock Development). Most of the Orma also plant crops (intercropped maize) as livestock keeping is now less reliable and small herds are no longer enough to sustain an entire family.

The Malkote/Bajuni, Boni, Sanya (population of 500 individuals), Wakone, Wagoshi and the immigrant Luos and Luyhas practice fishing. Hunting and gathering is still practiced by the Wasanya, Boni and Watta. Prawn fishery, a major economic activity is also practised. Mangrove pole harvesting also occurs within the delta. The locals can be educated on how to conduct sustainable harvesting because some mangroves species regenerate quite fast. Commercial and prawn fisheries are dependant on the mangroves.

In the traditional setting the Pokomo council of Elders is called the **Gassa** while that of the Orma's are called **Matadeda**. They are seen as the safe custodians of the areas that were identified for common use and those that were to be protected. The council of elders have been managing the resources for a long time and are also revered for their wisdom and ability to resolve conflict within and from outside. The elders are also custodians and managers of the traditional sites and shrines.

Historical significance: traditional use of these products was historically managed by council of elders, the "Wazee wa gaza" it's been reported that very strict regulations were imposed on forest and water access and product utilization by these councils. However since independence the activities and powers of these councils have been restricted. Uncontrolled and unmanaged use of wetland resources has resulted in ecosystem degradation.

**Historical Sites:**
There are several historical sites found in the Tana River Delta. These include: Fumo Liongo graves, Waungwan, Wanawali Saba, Shariff Twahib grave (pilgrim site, Makubani shrine and Shaka ruins (all in Kipini), the colonial District Commissioner house in Kilelengwani and an Old Swahili/Shirazi Village ruin in Kau. The delta also has two historical cultural shrines in Bilisa which are Sheik Abdalla's Grave and Ziwa wa Waku/Kijo shrine. In Salama, we have Mudzi Uzunguni which is a colonial site and Chamadho forest shrine. In Galili we have Kone Ebba Shrine.

**b)** Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

The Tana River Delta, home to the Pokomo and Orma tribes has significant cultural values of international importance. The indigenous knowledge provided by the council of elders Gassa and Matededa respectively, have helped protect the natural and mangrove forests, lakes, shallow marine eco-systems, watering points (**Malkas),** rivers and streams, historical sites and shrines and sand dunes and beaches.

If Yes, tick the box [X] and describe this importance under one or more of the following categories:

i) sites which provide 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) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

For a very long time, the maintenance of the wetland was in the hands of the local communities. The indigenous people had their indigenous knowledge (IK) of which they used to interact sustainably with their natural resources. The traditional use of these products was historically managed by the council of elders, the "Wazee wa Gaza" it's reported that very strict regulations were imposed on forests and water access and product utilization by the council. The council of elders restricted which part of the forest to be used when and how, they had taboos and omens that were too used in the

guarding of the environment. The council of elders organized meetings to teach the growing children on how to manage the environment wisely. It is again recognized that these practices have over time faded gradually leaving the site under threats. The Pokomo traditionally combined several strategies to adapt to their naturally dynamic environment. In wet years when floods were too widespread to plant rice, they would concentrate on fishing activities. In the same way, in the drier years when fishing was less productive, people mainly undertook agricultural activities. In times of scarcity, hunting and gathering (for example, of water lilies) around the village allowed the Pokomo families to survive. It is reported that Pokomo solely went fishing in the lakes and swamps, and never in the river, so as to preserve breeding populations of fish. With the recent hydrological modifications and consequent drying up of the delta, these wise-use strategies of their natural resources have slowly been abandoned as pressure on food production increased and social structures were dismantled. The invasion by both the local people and the government into the TRD for settlement and large scale agriculture has caught the attention of concerned institutions for the naming of this site as a Ramsar site.

iv) sites where 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:

**24. Land tenure/ownership:**

a) within the Ramsar site:

The land in the proposed Ramsar site is public land held by the county government in trust for the people resident in the area. Some areas are community land held by local communities identified on the basis of ethnicity and culture.

b) in the surrounding area:

The surrounding area is both a Trust land (held and administered by various local government authorities as trustees under the constitution of Kenya and Trust Land Act Cap. 288); and private ownership. However, there is a dispute between the people and the Tana and Athi River Development Authority (TARDA) as per the ownership status.

**25. Current land (including water) use:**

a) within the Ramsar site:

A number of wetland related land use activities are carried out in the different wetland habitats in the Ramsar Site. The most notably activities are fishing, small-scale family-oriented agriculture, mangrove utilization, grazing, water supply, tourism and research.

**Fisheries**

Productive and profitable fisheries occur within the TRD Ramsar Site. Some of the fish species commonly caught within the site include snappers, catfish, tilapia, prawns, lobsters, crabs, octopus and shells. Fishing is done all year round by both artisan and commercial fishers, with less of a marked seasonal change in catches. The prawns and shrimps are caught in large numbers both for export and local consumption. The fresh water fish are caught in the many oxbow lakes such as Lake Moa.

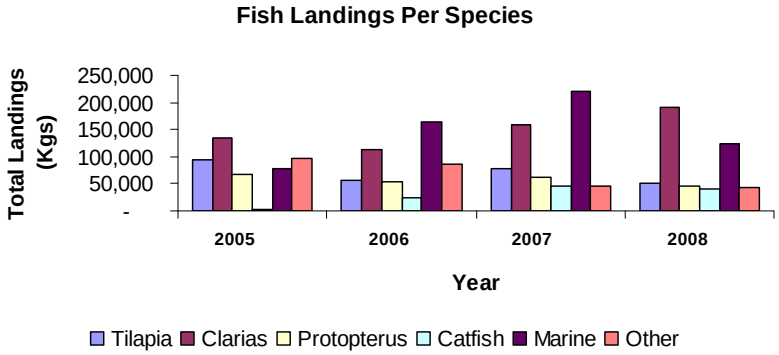


Figure 3: Fish Landings per Species

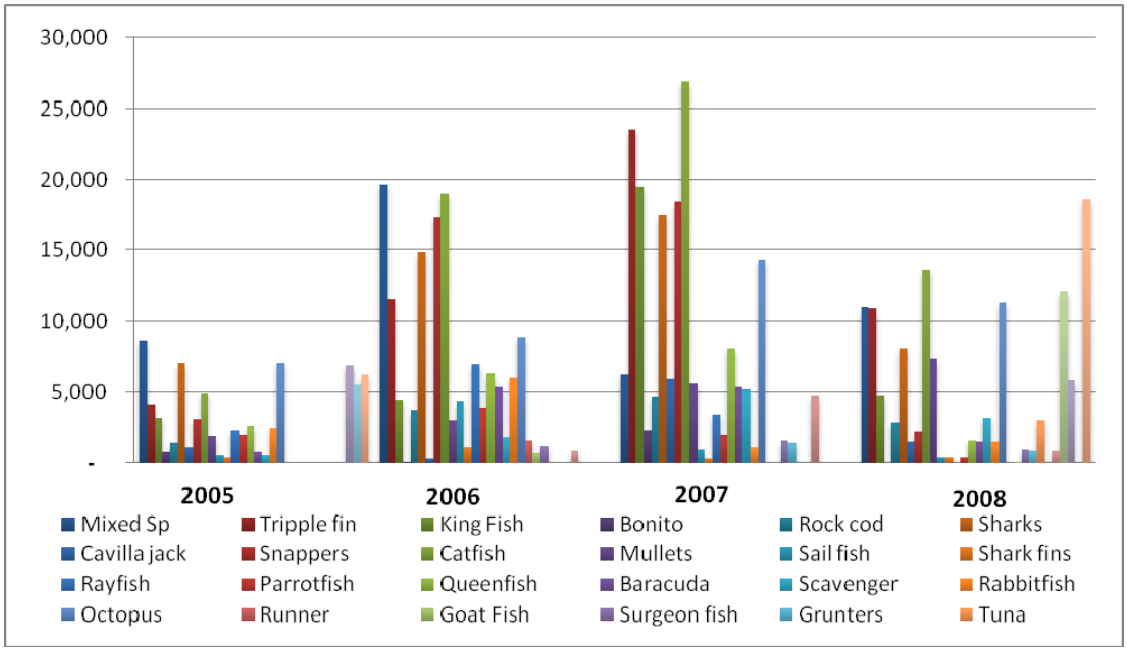


Figure 4: Marine Landings per Species

**Mangrove Utilization**

The communities within the delta depend on the mangroves directly for their livelihoods and day-to-day activities. Selective logging is carried out for house construction and firewood. Some of the mangroves can produce commercial quality poles.

**Grazing**

The Tana River delta is quite productive in terms of the biomass, especially grasses and shrubs. The pastoral communities utilize these pastures during the dry seasons since it is a drought refuge grazing area for enormous herds of cattle from Tana River, Lamu, Ijaara, and Malindi districts. Various watering pools are also available to water the livestock. The livestock numbers treble during the dry seasons and are favoured since they are free from tsetse flies.

**Tourism and Education**

The delta has various unique tourism attraction sites that are frequented by both local and international tourists in the forms of lodges, boat rides and wildlife conservation. The revenue

generated from these help sustain the local economy and income to the country through foreign exchange. Research opportunities are numerous and ongoing.

b) in the surroundings/catchment:

**Hydropower generation**

Water of the Tana River is used to generate electricity. There are seven dams located on the river course (upstream). These dams produce about 400 Mega Watts, the major source of electricity in the national grid. The water can also be used for water supply for domestic and large scale irrigation purposes.

**Crop cultivation** in the Central Kenya highlands is common and extensive upstream in form of horticulture (fruits, vegetables and cereals) for export and to feed the local population. The areas of Witu and Moa have conducive floodplains for rice farming and agro-forestry.

**26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:**

a) Within the Ramsar site:

The Tana River basin has suffered enormous degradation through deforestation of mangroves, improper land use practises, inadequate conservation measures, and increased obstruction and abstraction of water resulting in the modification of the terrestrial, fresh water and marine ecosystems. These changes in the hydrological regime of the river as a result of catchment degradation, weather and climate changes have resulted in salt-water intrusion. Farmers are now experiencing salt infiltration into farms who have never witnessed this before. This is perceived to result from rising sea levels and to be due to the fact that mangrove vegetation along the coast has been degraded through deforestation. The change in climate has not spared the flora and fauna either. Its impact can be perceived from the increased case of human-wildlife conflicts in the area, as wild animals (herbivores and carnivores) invade the villages as they hunt for food and water.The farming and pastoral communities are also turning to hunting and gathering in the wild, which is already practised by the Watta minority group. Cattle grazing has been practised in the area for centuries and has probably contributed to determining the ecological characteristics of the Tana River Delta. However, overgrazing as it now appears may be threatening grassland biodiversity. At the same time, expansion in small-scale agricultural activities as a result of human population increase and decreased productivity results in further encroachment on wetland forests. At stake is the wild fauna and flora, which currently face too much pressure. Clearing mature or regenerating forests for cultivation, dugout canoes construction, building materials and fuel wood also alter the delta.

b) in the surrounding area:

The catchment areas including Mt. Kenya and Aberdares have been interfered with in terms of deforestation, leading to change in rainfall patterns, weather and climate changes which in the long run has also affected the volume of Tana River waterflow, and the biodiversity. The damming of the River Tana may have severe impacts on the ecological balance downstream. These impacts will influence the biodiversity and people dependant on the natural resources in the floodplains and delta. There exists cotton plantations in Bura (1º05'S/39º58'E) and Galore (1º29'S/40º01E) amounting to 6,700 ha.

---

**27. Conservation measures taken:**

**a)** List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site: In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

Currently, there is no national and/or international category or legal status protecting the site. There are various marine parks that protect the marine biodiversity and landscapes under the Wildlife Act Cap. 376, amended in 1989.

**b)** If appropriate, list the IUCN (1994) protected areas category/ies, which apply to the site (tick the box or boxes as appropriate):

Ia ❑;Ib ❑; II ❑; III ❑; IV ❑; V ❑; VI ❑

**c)** Does an officially approved management plan exist; and is it being implemented? No

**d)** Describe any other current management practices:

Current management practices include the protection and monitoring of breeding turtles (nesting sites); the conservation of dugongs within the delta; awareness/sensitization and education programs to the population on good fishing practices; security and surveillance within the delta; research; mangrove re-forestation; tourism and resettlement of the native populations.

---

**28. Conservation measures proposed but not yet implemented:** e.g. management plan in preparation; official proposal as a legally protected area, etc.

The enlistment of Tana Delta wetland as a Ramsar Site.
Currently, there is a Land Use Master Plan being developed for the entire Tana delta ecosystem.

**29. Current scientific research and facilities:** e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

A number of scientific researches have been carried out on the site due to its unique biodiversity with the reports produced, published and stored in the Kenya Wildlife Service, the National Museums of Kenya and various institutions. Most of the studies focus on animal species, such as fish, reptiles, water birds, and large mammal and hydrological studies. Studies on the endangered Red Colobus monkey and Crested Mangabey populations, research on the bird populations, and the recent studies include a research on the Tana delta integrated sugar project by one of the local sugar company. Field research stations: Mchelelo and Boama research stations. Among the recommendations emphasize is given on environmental education, awareness and integration of environmental issues in public service and environmental capacity building. More research is also required particularly on previously un-sampled data like invertebrates of the Tana delta.

---

**30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:** e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

A lot of environmental awareness and education has been carried out in the TRD, mainly as community sensitization on the biological and ecological importance of the delta. Various Community Based Organizations have active environmental education and awareness programs including the Tana Delta Pastoralist Forum, Tana Delta Conservation Organization, Amani Women Group, Golbanti Ecotourism Group among others. Awareness is mainly carried out through public meetings and informal consultative meetings held with village elders and leaders. TADECO uses members' video houses to disseminate a film, *"Is Tana Sugar really sweet"?* Since April 2009, the film has been shown to more than 3,000 people in the delta and is available online http://www.tanariverdelta.org/tana/about/videos.html. 2,000 calendar posters for the period March 2009 – March 2010 with messages to conserve the Delta were produced and distributed in the Delta.

A Rocha Kenya set up a website on the Delta, its socio-economic, biological and ecological importance, and continually updates it through their website (www.tanariverdelta.org). Since the early 90's the East African Wildlife Society has carried out environmental education and awareness in TRD. Other organizations with awareness programs in TRD include the Kenya Wildlife Service and the Kenya Wetland Forum. Nature Kenya office in the TRD that was established in January 2009 acts as an information center for communities, leaders and provincial administration. There has been continued media coverage of TRD in print and electronic media from February 2008 to present. The media interest is occasioned by various development proposals in the Delta.

**31. Current recreation and tourism:**
State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Tourism in the areas has not developed much though there is high potential for it. That not withstanding there are a few tourist camps in the delta; Shekiko Tana Delta Dune Lodge, Mulikani Community Banda, Galtama Cottages, Kipini Conservancy, Camp Kenya and the Tana Delta Camp in Kipini. These facilities provide accommodation, boat rides and wildlife conservation to the general public.

---

**32. Jurisdiction:**
Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

The Tana River Delta Ramsar site is situated in the Lower Tana and Lamu Districts of the Coast Province, Kenya. A number of ministries and institutions are involved in the management of the site. These include: the ministry of agriculture, ministry of environment and natural resources, ministry of forestry and wildlife, ministry of tourism, ministry of water, Tana and Athi river development authority (TARDA), and the local council among others.

---

**33. Management authority:**
Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

The Director
Tana and Athi River
Development Authority
P.O. Box 47300 – 00200
Nairobi
psmrd@regional-dev.go.ke

The Director
Kenya Wildlife Service
P.O. Box 40241 –00100
Nairobi
kws@kws.go.ke;
director@kws.go.ke

Director General
National Environment
Management Authority
P.O. Box 67839 – 00200
Nairobi
dgnema@nema.go.ke

The Director General
Director General
National Museums of Kenya
P.O. Box 40658 – 00100
Nairobi
dgnmk@museums.or.ke

The Permanent Secretary
Ministry of Water and Irrigation
P.O. Box 49720 – 00200
Nairobi
ps@water.go.ke

The Permanent Secretary
Ministry of Agriculture
P.O. Box 30126

The Director
East African Wildlife Society
P.O. Box 20110 – 00200

Nairobi
inquiry@kilimo.go.ke

Nairobi
wetlands@eawildlife.org

The Permanent Secretary
Ministry of Regional Development Authorities.
P.O. Box 10280, 00100 Nairobi, Kenya. :
psmrd@Regional-dev.go.ke

The Director
Kenya Forest Service
P.O. Box 30513 – 00100
Nairobi
director@kenyaforestservice.org

---

**34. Bibliographical references:**

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.


1. Bennun, L. and P. Njoroge, 1999. Important Bird Areas in Kenya. East Africa. Natural History Society. Johnston S.D (1961). Distribution and Other Notes on Fresh Water Prawns (Atyidae and Palaeomonidae) Mainly from Indo-West Pacific Region
2. Bouillon, S., Dehairs, F., Schiettecatte, L.-S. & Borges, A.V. 2007. Biogeochemistry of the Tana estuary and delta (northern Kenya). Limnol. Oceanogr. 52: 46-59
3. De Vos L., Oyugi D.O., Nyingi D.W and Nguku J.K. 2002. Biodiversity research and monitoring in lower Tana subcomponent A10 (a): Assessment of Fishes and Fisheries
4. EarthTrends Environnemental Information `http://earthtrends.wri.org/pdf_library/country_profiles/coa_cou_404.pdf`
5. Food and Agriculture Organization of the United Nations. Fishery and Aquaculture – Kenya http://www.fao.org/fishery/countrysector/FI-CP_KE/3/en
6. GeographyIQ - World Atlas. Kenya Geography Facts and Figures http://www.geographyiq.com/countries/ke/Kenya_geography.htm, last accessed on 9th September, 2009
7. Hamerlynck, O., Nyunja, J., Luke, Q., Nyingi, D., Lebrun, D. & Duvail, S. 2010. The communal forest, wetland, rangeland and agricultural landscape mosaics of the Lower Tana, Kenya, a socio-ecological entity in peril. In: C. Belair, K. Ichikawa, B.Y. L. Wong, and K.J. Mulongoy (Eds.). Sustainable use of biological diversity in socioecological production landscapes. Background to the 'Satoyama Initiative for the benefit of biodiversity and human well-being Secretariat of the Convention on Biological Diversity, Montreal. Technical Series no. 52: 54-62.
8. Hamerlynck, O., Luke, Q., Nyange, T.M., Duvail, S. & Leauthaud, C. *in press*. Range extension, imminent threats and conservation options for two endangered primates: the Tana Red Colobus *Procolobus rufomitratus rufomitratus* (Peters, 1879) and the Tana Mangabey *Cercocebus galeritus* (Peters, 1879) in the Lower Tana Floodplain and Delta, Kenya. African Primates.
9. Kenya Marine Fisheries Research Institute (KMFRI), 2008. Ugwana Bay Fish Stock Assessment (Ongoing)
10. Kenya Wildlife Service (KWS), 1991. Aberdares National Park Management Plan. Kenya Wildlife Service
11. Kenya Wildlife Service (KWS), 1993. Tana River Primate National Reserve Management Plan. Kenya Wildlife Service
12. Kenya Wildlife Service (KWS), 2000. EIA of the Proposed Resettlement Programme from Tana River Primate National Reserve to Witu II. Kenya Wildlife Service

13. Kenya Wildlife Service (KWS), 2002. Management Plan for the Mt. Kenya. Kenya Wildlife Service
14. Kitheka, J.U., Obiero, M. & Nthenge, P. 2005. River discharge, sediment transport and exchange in the Tana Estuary, Kenya. Esturaine, Coastal and Shelf Science 63: 455-468.
15. Koyo Anderson, *et al*, 2005. National State of Wetland Ecosystem Report and Project Experience Report
16. Maingi, J.K. & S.F. Marsh 2002. Quantifying hydrologic impacts following dam construction along the Tana River, Kenya. Journal of Arid Environments 50: 53-79.
17. Malonza, P. K., Wasonga V. D., Muchai V., Rotich D., Bwong B. A., Bauer A.M., (2006). Diversity and Biogeography of Herpetofauna of the Tana River Primate National Reserve, Kenya. *Journal of East African Natural History* **95** (2): 95 -109.
18. Ministry of Fisheries Development, 2007. Tana River District Fisheries Department 2007, Annual Report
19. Ministry of Fisheries Development, 2008. Tana River District Fisheries Department 2008, Annual Report
20. Ministry of Livestock and Fisheries Development, 2005. Tana River District Fisheries Department 2005, Annual Report
21. Ministry of Livestock and Fisheries Development, 2006. Tana River District Fisheries Department 2006, Annual Report
22. National Museums of Kenya, 2002. Biodiversity Research and Monitoring in the Tana River National Reserve (TRPNR) and its Environs, Kenya.
23. Nature Kenya, 2008. Brief on Tana River Delta Biodiversity.
24. Ng,weno Fleur, 2008. The Tana Delta Report
25. Nguku, J. K., (2009). Distribution, Diversity and Population Status of Herpetofauna in Lower Tana River Forests, Kenya. MSc. Thesis. UON. (Not published)
26. Nyingi D.W., Carlson J.K, Matingi C and Gatune C. 2007. The status of sawfishes (Family Pristidae) on the Kenyan coast: Effects of trade, habitat destruction and over fishing. Samaki News Edition 5 (in press)
27. Pearson, D.J. 1982. The migration and wintering of Palaearctic *Acrocephalus warblers* in Kenya and Uganda. Scopus 6: 49–59
28. Seegers L., De Vos L and Okeyo D.O. 2003. Annotated List of Freshwater Fishes of Kenya - excluding the non-riverine Lake Victoria haplochromines. Journal of East African Natural History 92: 11-47
29. Taiti Simon W., 1993. Tana River Primate National Reserve Interim Management Plan. Kenya Wildlife Service
30. The East African. Kenya to Acquire 150 Nautical Miles of Indian Ocean in New 'Scramble'.http://www.theeastafrican.co.ke/news/-/2558/595738/-/view/printVersion/-/1sv4n6z/-/index.html
31. Wallingford H. R, June 2009.Wetlands Inventory and Mapping in The Nile Basin, Draft Final Report

---

Please return to: **Ramsar Convention Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**
Telephone**: +41 22 999 0170** • Fax: **+41 22 999 0169** • e-mail: **ramsar@ramsar.org**

## Annex 1: List of Fish in the Lower Tana River

| Family | Species | Common Name | Remarks | Reference | |
|---|---|---|---|---|---|
| Carcharhinidae | *Carcharhinus leucas* | Bull shark | Marine shark occasionally enters estuaries; data deficient (not listed) | 1 | Valenciennes, 1839 |
| Pristidae | *Pristis pectinata (t.s.u)* | Smalltooth sawfish | IUCN - critically endangered, Appendix I CITES, reported to occasionally enters estuaries, greatly impacted by habitat degradation and fished for its flesh and liver | 3 | Latham,1794 |
| | *Pristis zijsron (t.s.u)* | Longcomb sawfish | IUCN - critically endangered, Appendix I CITES, reported to occasionally enters estuaries, greatly impacted by habitat degradation and fished for its flesh and liver | 3 | Bleeker,1851 |
| | *Anoxypristis cuspidata (t.s.u)* | Pointed sawfish | IUCN - critically endangered, Appendix I CITES, reported to occasionally enters estuaries, greatly impacted by habitat degradation and fished for its flesh and liver | 3 | Latham, 1794 |
| Proteridae | *Protopterus amphibius (d.d)* | Kenya lungfish | data deficient (not listed) | 1, 2 | Peters,1844 |
| | *Protopterus annectens annectens* | Tana lungfish | | 1, 2 | Owen,1839 |
| Mormyridae | *Marcusenius macrolepidotus macrolepidotus* | Bulldog | | 1, 2 | Peters,1852 |
| | *Marcusenius devosii* | | | 1, 2 | Kramer, Skelton, van der Bank & Wink, 2007 |
| | *Mormyrus tenurustris* | | | 1, 2 | Peters,1852 |
| | *Petrocephalus catostoma tanensis* | Tana-churchill | | 1, 2 | Whitehead & Greenwood,1959 |
| Megalopidae | *Megalops cyprinoides* | | | 1, 2 | Broussonet,1782 |
| Anguillidae | *Anguilla bengalensis labiata* | African mottled eel | | 1, 2 | peters,1852 |
| | *Anguilla bicolar bicolar* | Short-finned eel | data deficient (not listed) | 1, 2 | McClelland,1845 |
| | *Anguilla mossambica* | African long finned eel | | 1, 2 | Peters,1852 |
| Clupeidae | *Pellona ditchela* | | | 1, 2 | Valenciennes in Cuvier & Valenciennes 1847 |
| | *Barbus mimus* | | | 1, 2 | Boulenger,1912 |
| Cyprinidae | *Barbus paludinosus (d.d)* | Straightfin barb | data deficient (not listed) | 1, 2 | Peters,1852 |
| | *Barbus toppinni* | | | 1, 2 | Boulenger,1912 |
| | *Barbus zanzibaricus* | Zanzibar barb | | 1, 2 | Peters,1816 |

| | | | | | |
|---|---|---|---|---|---|
| | *Labeo gregorii* | Gregori's labeo | | 1, 2 | Gunther,1894 |
| | *Labeo aff. Mesops* | Tana labeo | taxonomic status uncertain | 1, 2 | Gunther,1868 |
| | *Labeo* sp (red tail) undescrib. | | under description | 1, 2 | |
| | *Neobola fluviatilis* | Athi sardine | | 1, 2 | Whitehead,1962 |
| Shilbeidae | *Paraillia somalensis* | | | 1, 2 | Gunther,1894 |
| | *Shilbe intermedius* | Silver catfish | | 1, 2 | Forsskal,1775 |
| Clariidae | *Clarias gariepinus* | North African catfish | taxonomic status uncertain | 1, 2 | Ruppell,1829 |
| Ariidae | *Arius africanus* | African sea catfish | IUCN listed as data deficient | 1, 2 | Poll, Lanza & Sassi 1972 |
| Mochokidae | *Chiloglanis brevibarbis* | Short barbelled suckermouth | | 1, 2 | Vinciguerra,1897 |
| | ***Synodontis manni*** *(t.s.u)* | Feather-barbelled squeaker | | 1, 2 | Ruppell,1832 |
| | *Synodontis serpentis* | Tana squeaker | | 1, 2 | Burchell,1822 |
| | *Synodontis zanzibaricus* | Eastcoast squeaker | | 1, 2 | Playfair & Gunther, 1866 |
| | *Synodontis spec "lower Tana"* | | | 1, 2 | Boulenger,1902 |
| Aplocheilidae | *Nothobranchius microlepis (d.d)* | Small scaled nothobranch | IUCN listed as data deficient | 1, 2 | De Vos, 2000 |
| | *Nothobranchius patrizii (d.d)* | Blue notho | | 1, 2 | Whitehead,1962 |
| | *Nothobranchius willerti (d.d)* | Mnanzini nothobranch | | 1, 2 | Peters,1868 |
| Teraponidae | *Terapon jarbua* | Threr stripped tiger fish | | 1, 2 | |
| Cichlidae | *Oreochromis spilurus spilurus* | Sabaki tilapia | data deficient (not listed) | 1, 2 | Vinciguerra,1897 |
| Mugilidae | *Liza macrolepis* | Largescale mullet | data deficient (not listed) | 1, 2 | Vinciguerra,1927 |
| | *Valamugil buchanani* | Blue tail mullet | data deficient (not listed) | 1, 2 | Wildekamp,1992 |
| Eleotridae | *Eleotris fusca* | Freshwater gudgeon | | 1, 2 | Forsskal,1775 |
| Gobidae | *Awaous aeneofuscus (d.d)* | Freshwater goby | | 1, 2 | Gunther,1894 |
| | *Glossogobius giuris (d.d)* | Tank goby | data deficient (not listed) | 1, 2 | Smith,1849 |

d.d = Data Deficient - Data deficient indicates that although they have been collected and curated at the National Museums of Kenya, their biogeographical distribution and present occurrence remains unclear.

t.s.u = Taxonomic Status Uncertain - Taxonomic status uncertain means that the name provided may bear the wrong name or a synonym which is likely to change when taxonomic studies have been carried out

**Annex 2: List of Amphibians in the Lower Tana River**

| Common Name | Scientific Name |
|---|---|
| Pygmy leaf-folding frog | *Afrixalus pygmaeus* (Ahl, 1931) |
| | *Boulengerula denhardi (*Nieden, 1912) |
| Tree frog | *Chiromantis petersii* (Boulenger, 1882) |
| Gray Tree Frog | *Chiromantis xerampelina* (Peters, 1854) |
| Parker's Reed Frog | *Hyperolius parkeri* (Loveridge, 1933) |
| Transparent Reed Frog | *Hyperolius pusillus* (Cope,1862) |
| Red-legged running frog | *Kassina maculata* (Duméril, 1853) |
| Bubbling running Frog | *Kassina senegalensis* (Duméril & Bibron, 1841) |
| Ornate Tree Frog | *Leptopelis flavomaculatus* (Günther, 1864) |
| Red-banded Rubber Frog | *Phrynomantis bifasciatus* (Smith, 1847) |
| African Bullfrog | *Pyxicephalus edulis* (Peters, 1854) |
| | *Schistometopum gregorii* (Boulenger, 1894) |
| Tremolo Sand Frog | *Tomopterna cryptotis* (Boulenger, 1907) |
| Muller's Platanna | *Xenopus muelleri* (Peters, 1853) |

**Annex 3a: List of Reptiles in the Lower Tana River**

| Common Name | Scientific Name |
|---|---|
| **Red-headed rock Agama** | ***Agama agama* (Linnaeus, 1758)** |
| **Black centipede-eater snake** | ***Aparallactus guentheri* (Boulenger, 1895)** |
| **Velvety-green night adder** | ***Causus resimus* (Peters, 1862)** |
| Nile crocodile | *Crocodylus niloticus* (Laurenti, 1768) |
| White-lipped snake | *Crotaphopeltis hotamboeia* (Laurenti, 1768) |
| **Rofous egg eater, red form snake** | ***Dasypeltis medici lamuensis* (Gans, 1957)** |
| **Black mamba snake** | ***Dendroaspis polylepis* (Günther, 1864)** |
| **Yellow-throated plated lizard** | ***Gerrhosaurus flavigularis* (Wiegmann, 1828)** |
| **Great plated lizard** | ***Gerrhosaurus major* Dumeril, 1851** |
| Speke's sand lizard | *Heliobolus spekii* (Günther, 1872) |
| **Striped bark snake** | ***Hemirhagerrhis kelleri* (Boettger, 1893)** |
| **Brown house snake** | ***Lamprophis fuliginosus* (Boie, 1827)** |
| Southern long-tailed sand-lizard | *Latastia longicaudata* (Reuss, 1834). |
| **Yellow striped blind snake** | ***Letheobia unitaeniatus* Peters, 1878** |
| **Cape wolf snake** | ***Lycophidion capense* (A. Smith, 1831)** |
| **Flat –snouted wolf snake** | ***Lycophidion depressirostre* (Laurenti, 1768)** |
| **Sundevall's writhing skink** | ***Lygosoma sundevalli* (A. Smith, 1849)** |
| **Red spitting cobra** | ***Naja pallida* (Boulenger, 1896)** |
| Southern-eastern green-snake | *Philothamnus hoplogaster* (Gunther, 1863) |
| Speckled green snake | *Philothamnus punctatus* (Peters, 1867) |
| African green snake | *Philothamnus sp* |
| Eastern stripe-bellied sand snake | *Psammophis orientalis* (Broadley, 1977) |
| **Northern striped-bellied snake** | ***Psammophis sudanensis* (Werner, 1919)** |
| Striped skink | *Trachylepis striata* (Peters, 1854) |
| Variable skink | *Trachylepis varia* (Peters, 1867) |
| Nile Monitor lizard | *Varanus niloticus* (Linnaeus, 1766) |
| Hawksbill Turtle | *Eretmochelys imbricata* |
| Green Turtle | *Chelonia mydas* |
| Olive Ridley Turtle | *Lepidochelys olivacea* |
| Leatherback turtle | *Dermochelys coriacea* |
| Loggerhead Turtle | *Caretta caretta* |
| Tana River caecilian | *Boulengerula denhardti* |
| Mud-dwelling caecilian | *Schistometopum gregorii* |

NB: (Species on bold are first records in the area)

**Annex 3b: List of Expected Reptiles in the Lower Tana River**

| Common Name | Scientific Name |
|---|---|
| Reticulated Centipede Eater | *Aparallactus lunulatus* (Peters, 1854) |
| Burrowing asp | *Atractaspis bibronii* (A. Smith, 1849) |
| Puff adder | *Bitis arietans* (Merrem, 1820) |
| Graceful Chameleon | *Chamaeleo gracilis* (Hallowell, 1837) |
| | *Crotaphopeltis braestrupi* (Rassmussen, 1985) |
| Common Egg-eater | *Dasypeltis scabra* (Linnaeus, 1758) |
| Eastern Green Mamba | *Dendroaspis angusticeps* (A. Smith, 1849) |
| Cross-barred Tree Snake | *Dipsadoboa flavida broadleyi* (Rasmussen, 1989) |
| Boomslang | *Dispholidus typus* (A. Smith 1829) |
| Leopard tortoise | *Geochelone pardalis* (Bell, 1828) |
| Egyptian sand boa | *Gongylophis colubrinus* (Linnaeus 1758) |
| Neumann's sand lizard | *Heliobolus neumanni* (Tornier, 1905) |
| Western house gecko | *Hemidactylus angulatus* (Hallowell, 1852 |
| Bark Snake | *Hemirhagerrhis nototaenia* (Günther, 1864) |
| Speke's hingeback tortoise | *Kinixys spekii* (Gray, 1863) |
| The Cape House Snake | *Lamprophis capensis* (Duméril & Bibron, 1841) |
| Tana writhing skink | *Lygosoma mabuiiformis* (Loveridge, 1935 |
| Loveridge's Writhing Skink | *Lygosoma tanae* (Loveridge, 1935) |
| Black-necked spitting cobra | *Naja nigricollis* (Reinhardt, 1843) |
| Serrated Hinged Terrapin | *Pelusios sinuatus* (A. Smith, 1838) |
| East African Shovel-snout | *Prosymna stuhlmanni* (Pfeffer, 1893) |
| Link marked Sand Snake | *Psammophis biseriatus* (Peters, 1881) |
| Mozambique Sand Snake | *Psammophis mossambicus* (Peters, 1882) |
| Sand Snake | *Psammophis punctulatus* (Duméril & Bibron, 1841) |
| Rock python | *Python sebae* (Gmelin, 1789) |
| Rufous Beaked Snake | *Rhamphiophis rostratus* (Peters, 1854) |
| Red-headed Beaked Snake | *Rhamphiophis rubropuntatus* (Fischer, 1884) |
| Angola-snouted Blind Snake | *Rhinotyphlops mucruso* (Peters, 1854) |
| Yellow-striped Blind Snake | *Rhinotyphlops unitaeniatus* (Peters, 1878) |
| Twig snake | *Thelotornis sp* |
| Short-necked Skink | *Trachylepis brevicollis* (Wiegmann, 1837) |
| Tree skink | *Trachylepis planifrons* (Peters, 1878) |
| White-throated monitor | *Varanus albigularis* (Daudin, 1802) |

## Annex 4: List of Birds in the Lower Tana River

| Common Name | Scientific Name |
|---|---|
| African crowned Eagle | *Stephanoaetus coronatus* |
| African Darter | *Anhinga rufa* |
| African Open-billed Stork | *Anastomus lamelligerus lamelligerus* |
| African Spoonbill | *Platalea alba* |
| Ayres's eagle | *Hieraartus ayresii* |
| Basra Reed Warbler | *Acrocephalus griseldis* |
| Black Heron | *Egretta ardesiaca* |
| Black-crowned Night Heron | *Nycticorax nycticorax* |
| Caspian Tern | *Hydroprogne caspia* |
| Cattle Egret | *Bubulcus ibis* |
| Common Squacco Heron | *Ardeola ralloides* |
| Curlew Sandpiper | *Calidris ferruginea* |
| East Coast Akalat | *Sheppardi gunningi* |
| Eastern Yellow-billed Hornbill | *Tockus flavirostis* |
| Fischers' Turaco | *Turaci fischeri* |
| Glossy Ibis | *Plegadis falcinellus* |
| Great Egret | *Ardea alba* |
| Great White Pelican | *Pelecanus onocrotalus* |
| Greater Flamingo | *Phoenicopterus roseus* |
| Grey Heron | *Ardea cinerea* |
| Gull-billed Tern | *Gelochelidon nilotica* |
| Lappet-faced Vulture | *Torgos tracheliotos* |
| Lesser Crested Tern | *Sterna bengalensis* |
| Lesser Sandplover | *Charadrius mongolus* |
| Little Egret | *Egretta garzetta* |
| Little flycatcher | *Erythrocercus holochlorus* |
| Little Stint | *Calidris minuta* |
| Long-tailed Cormorant | *Phalacrocorax africanus* |
| Malindi Pipit | *Anthus melindae* |
| Marsh Sandpiper | *Tringa stagnatilis* |
| Pel's Fishing owl | *Scotopelia peli* |
| Pink-backed Pelican | *Pelecanus rufescens* |
| Purple Heron | *Ardea purpurea* |
| Red billed hornbill | *Tockus erythrorhynchus* |
| Sacred Ibis | *Threskiornis aethiopicus* |
| Saddle-billed Stork | *Ephippiorhynchus senegalensis* |
| Saunders' Tern | *Sternula saundersi* |
| Scaly Babbler | *Turdoides squamulatus* |
| Slender-billed Gull | *Chroicocephalus genei* |
| Sooty Gull | *Ichthyaetus hemprichii* |
| Southern Banded Snake Eagle | *Ciraetus fasciolatus* |
| Spur-winged Goose | *Plectropterus gambensis* |
| Tana River Cisticola | *Cisticola restrictus* |
| Whiskered Tern | *Chlidonias hybridus* |
| White-fronted Plover | *Charadrius marginatus* |
| Yellow-billed Egret | *Ardea intermedia* |

## Annex 5: List of Mammals in the Lower Tana River

| Common Name | Scientific Name |
|---|---|
| Tana River Mangabey | *Cercocebu galeritus galeritus* |
| Grivet Monkey | *Cercopithecus aethiops johnstonii* |
| Blue Monkey | *Cercopithecus albogularis* |
| Colobus Monkey | *Colobus badius rufomitratus* |
| Yellow Baboon | *Papio cynocephalus cynocephalus* |
| Golden Jackal | *Canis aureus* |
| Natal Red Duiker | *Cephalophus natalensis* |
| Tsessebe | *Damaliscus lunatus* |
| Dugong | *Dugong dugon* |
| Hippopotamus | *Hippopotamus amphibious* |
| Waterbuck | *Kobus ellipsiprymnus* |
| Serval | *Leptailurus serval* |
| African Elephant | *Loxodonta Africana* |
| Bat-eared Fox | *Otocyon megalotis* |
| Buffalo | *Syncerus caffer* |
| Kenya coastal galago | *Galagoides cocos* |
| Small-eared Greater Galago | *Otolemur garnettii lasiotis* |
| Sykes's monkey | *Cercopithecus mitis albotorquatus* |

## Annex 6: List of Invertebrates in the Lower Tana River

| Order | Scientific Name |
|---|---|
| Hymenoptera | *Crematogaster castanea* |
| | *Polyrhachis schistacea* |
| | *Dorylus affinis* |
| Coleoptera | *Stenethmus pinheyi* |
| | *Nosoeme claripes* |
| | *Palmate* sp. |
| | *Macrotoma* sp. |
| | *Helymaeus notaticollis* |
| | *Plocaederus bennigseni* |
| | *Lasiopezus variegator* |
| | *Idactus bettoni* |
| | *Idactus maculicornis* |
| Diptera | *Tabanus par* |
| | *Tabanus fraternus* |
| | *Ancala Africana* |
| Heteroptera | *Aeolocoris turgidus* |
| Neuroptera | *Neoloma nigripes* |
| | *Myrmeleon abscurus* |
| Orthoptera | *Heteracris coerulescens* |
| | *Penaeus monodon* |
| | *Penaeus indicus* |
| | *Penaeus japonicus* |
| | *Penaeus semisulcatus* |
| | *Metapenaeus monoceros* |
| Caenogastropoda | *Terebralia palustris* |
| Decapoda | *Macrobrachium scabriculum* |
| | *Macrobrachium rude* |

## Annex 7: List of Flora in the Lower Tana River

| Scientific Name | IUCN Status |
|---|---|
| *Abelmoschus ficulneus* (L.) Wight | |
| *Abrus precatorius* L. ssp *africanus* Verdc. | |
| *Abutilon mauritianum* (Jacq.) Medik. ssp *zanzibaricum* (Mast.) Verdc. | |
| *Abutilon pannosum* (G.Forst.) Schlecht. var scabrum Verdc.? | |
| *Acacia adenocalyx* Brenan & Exell | Potentially Threatened |
| *Acacia pentagona* (Schumach. & Thonn.) Hook.f. | |
| *Acacia robusta* Burch. ssp *usambarensis* (Taub.) Brenan | |
| *Acacia rovumae* Oliv. | |
| *Acacia stuhlmannii* Taub. | |
| *Acacia zanzibarica* (S.Moore) Taub. var zanzibarica | Potentially Threatened |
| *Achyranthes aquatica* R.Br. | |
| *Acridocarpus zanzibaricus* (Loudon) A.Juss. | Potentially Threatened |
| *Acrostichum aureum* L. | |
| *Adansonia digitata* L. | |
| *Adenia globosa* Engl. ssp *globosa* | Potentially Threatened |
| *Adenia gummifera* (Harv.) Harms var gummifera | |
| *Adenia keramanthus* Harms | Potentially Threatened |
| *Adenia kirkii* (Mast.) Engl. | Potentially Threatened |
| *Adenia rumicifolia* Engl. | |
| *Adenium obesum* (Forssk.) Roem. & Schult. | |
| *Aerva lanata* (L.) Schult. | |
| *Aeschynomene cristata* Vatke var pubescens J.Leon. | |
| *Afrocanthium pseudoverticillatum* (S.Moore) Lantz ssp *pseudoverticillatum* | Vulnerable |
| *Afzelia quanzensis* Welw. | |
| *Agathisanthemum bojeri* Klotzsch var bojeri | |
| *Agave sisalana* Perrine | |
| *Agelaea pentagyna* (Lam.) Baill. | |
| *Agelanthus kayseri* (Engl.) Polhill & Wiens | Potentially Threatened |
| *Agelanthus sansibarensis* (Engl.) Polhill & Wiens ssp *sansibarensis* | |
| *Ageratum conyzoides* L. | |
| *Alafia microstylis* K.Schum. | |
| *Alangium salviifolium* (L.f.) Wangerin ssp *salviifolium* | |
| *Albizia saman* (Jacq.) F.Muell. | |
| *Allophylus rubifolius* (A.Rich.) Engl. var alnifolius (Baker) Friis & Vollesen | |
| *Aloe* sp | |
| *Alternanthera sessilis* (L.) DC. | |
| *Ammannia senegalensis* Lam. var senegalensis | |
| *Ampelocissus africana* (Lour.) Merr. var africana | |
| *Anacardium occidentale* L. | |
| *Ancylobotrys petersiana* (Klotzsch) Pierre | |
| *Aneilema lamuense* Faden | |
| *Aneilema petersii* (Hassk.) C.B.Clarke ssp *petersii* | |
| *Angraecum dives* Rolfe | |
| Angylocalyx braunii | Vulnerable |
| *Aniseia martinicensis* (Jacq.) Choisy | |
| *Anisotes parvifolius* Oliv. | |
| *Annona senegalensis* Pers. Ssp *senegalensis* | |
| *Anthericopsis sepalosa* (C.B.Clarke) Engl. | |
| *Antidesma venosum* Tul. glabrescent form | |

| | |
|---|---|
| *Antidesma venosum* Tul. pubescent form | |
| *Apodytes dimidiata* Arn. | |
| *Areca catechu* L. | |
| *Aristolochia albida* Duch. | |
| *Asparagus falcatus* L. | |
| *Asparagus racemosus* Willd. | |
| *Asystasia gangetica* (L.) T.Anderson s.l. | |
| *Avicennia marina* (Forssk.) Vierh. | |
| *Azadirachta indica* A.Juss. | |
| *Azima tetracantha* Lam. | |
| *Azolla nilotica* Mett. | |
| *Balanites maughamii* Sprague ssp *acuta* Sands | |
| *Bambusa* sp | |
| *Barleria ramulosa* C.B.Clarke | |
| *Barleria setigera* Rendle? | |
| *Barleria usambarica* Lindau | |
| *Barringtonia racemosa* (L.) Spreng. | |
| *Basilicum polystachyon* (L.) Moench | |
| *Bauhinia tomentosa* L. | |
| *Blighia unijugata* Baker | |
| *Bolboschoenus maritimus* (L.) Palla | |
| *Borassus aethiopum* Mart. | |
| *Boscia coriacea* Pax | |
| *Bothriochloa bladhii* (Retz.) S.T.Blake | |
| *Brachiaria longiflora* Clayton | |
| *Bridelia cathartica* G.Bertol. | |
| *Bridelia micrantha* (Hochst.) Baill. | |
| *Bruguiera gymnorrhiza* (L.) Lam. | |
| *Bulbostylis densecaespitosa* (Lye) R.W.Haines | Potentially Threatened |
| *Cadaba farinosa* Forssk. Ssp *farinose* | |
| *Calyptrotheca taitensis* (Pax & Vatke) Brenan | |
| *Camptolepis ramiflora* (Taub.) Radlk. | Vulnerable |
| *Canavalia rosea* (Sw.) DC. | |
| *Canthium mombazense* Baill. | |
| *Caperonia fistulosa* Beille | |
| *Capparis erythrocarpus* Isert var rosea (Klotzsch) DeWolf | |
| *Capparis sepiaria* L. | |
| *Capparis tomentosa* Lam. | |
| *Carica papaya* L. | |
| *Carissa bispinosa* (L.) Brenan ssp *bispinosa* | |
| *Carissa spinarum* L. | |
| *Cassia abbreviata* Oliv. ssp *beareana* (Holmes) Brenan | |
| *Cassipourea euryoides* Alston | Potentially Threatened |
| *Cassytha filiformis* L. | |
| *Casuarina equisetifolia* L. | |
| *Catunaregam* sp | |
| *Cayratia ibuensis* (Hook.f.) Suesseng. | |
| *Ceiba pentandra* (L.) Gaertn. | |
| *Cenchrus ciliaris* L. | |
| *Ceriops tagal* (Perr.) C.B.Robinson | |
| *Chamaecrista telfairiana* (Hook.f.) Lock | |
| *Chassalia umbraticola* Vatke ssp *umbraticola* | Potentially Threatened |
| *Chloris mossambicensis* K.Schum. | |
| *Chlorophytum comosum* (Thunb.) Jacq. | |
| *Chytranthus obliquinervis* Engl. | |

| | |
|---|---|
| *Cienfuegosia hildebrandtii* Garcke | |
| *Cissampelos mucronata* A.Rich | |
| *Cissampelos pareira* L. var hirsuta (DC.) Forman | |
| *Cissus integrifolia* (Baker) Planch. | |
| *Cissus phymatocarpa* Masinde & L.E.Newton | |
| *Cissus rotundifolia* (Forssk.) Vahl var rotundifolia | |
| *Cissus sciaphila* Gilg | |
| *Clausena anisata* (Willd.) Benth. | |
| *Clerodendrum acerbianum* (Vis.) Benth. | |
| *Clerodendrum glabrum* E.Mey. var glabrum | |
| *Clitoria ternatea* L. | |
| *Coccinia grandis* (L.) Voigt | Potentially Threatened |
| *Coffea sessiliflora* Bridson ssp *sessiliflora* | |
| *Cola pseudoclavata* Cheek | |
| *Combretum aculeatum* Vent. | |
| *Combretum apiculatum* Sond. ssp *apiculatum*? | Potentially Threatened |
| *Combretum butyrosum* (G.Bertol.) Tul. | |
| *Combretum constrictum* (Benth.) M.A.Lawson | |
| *Combretum illairii* Engl. | |
| *Combretum paniculatum* Vent. ssp *paniculatum* | |
| *Commelina africana* L. s.l. | |
| *Commelina forskaolii* Vahl | |
| *Commelina zambesica* C.B.Clarke? | |
| *Commiphora campestris* Engl. ssp *glabrata* (Engl.) J.B.Gillett | |
| *Commiphora edulis* (Klotzsch) Engl. ssp *boiviniana* (Engl.) J.B.Gillett | |
| *Commiphora holtziana* Engl. | |
| *Commiphora lindensis* Engl. | |
| *Coptosperma graveolens* (S.Moore) Degreef var graveolens | |
| *Coptosperma nigrescens* (Hook.f.) Degreef | |
| *Corallocarpus ellipticus* Chiov. | |
| *Corchorus baldaccii* Mattei | |
| *Cordia faulknerae* Verdc. | |
| *Cordia goetzei* Guerke | |
| *Cordia monoica* Roxb. | |
| *Cordia somaliensis* Baker | Potentially Threatened |
| *Craibia brevicaudata* (Vatke) Dunn ssp *brevicaudata* | |
| *Crotalaria bernieri* Baill. | |
| *Crotalaria retusa* L. | |
| *Croton menyharthii* Pax | |
| *Cryptolepis hypoglauca* K.Schum. | |
| *Culcasia orientalis* Mayo | |
| *Cussonia zimmermannii* Harms | |
| *Cyanotis repens* Faden & D.M.Cameron ssp *repens* | |
| *Cyathula coriacea* Schinz | |
| *Cyclantheropsis parviflora* (Cogn.) Harms | |
| *Cynanchum viminale* (L.) L. s.l. | |
| *Cynodon dactylon* (L.) Pers. | Endangered |
| *Cynometra lukei* Beentje | |
| *Cyperus alopecuroides* Rottb. | |
| *Cyperus amomodorus* K.Schum. | |
| *Cyperus crassipes* Vahl | |
| *Cyperus exaltatus* Retz. | Potentially Threatened |
| *Cyperus frerei* C.B.Clarke | |
| *Cyperus halpan* L. | |
| *Cyperus longus* L. var longus | |

| | |
|---|---|
| *Cyperus maculatus* Boeck. | Potentially Threatened |
| *Cyperus obsoletinervosus* A.Peter & Kuek. | |
| *Cyperus phillipsiae* (C.B.Clarke) Kuek. | |
| *Cyperus rotundus* L. ssp *retzii* (Nees) Kuek. | |
| *Cyperus rotundus* L. ssp *tuberosus* (Rottb.) Kuek. | |
| *Cyperus squarrosus* L. | |
| *Cyphostemma adenocaule* (A.Rich.) Wild & R.B.Drumm. ssp *adenocaule* | |
| *Cyphostemma engleri* (Gilg) Descoings | |
| *Cyphostemma* sp G of FTEA | |
| *Dactyloctenium ctenioides* (Steud.) Bosser | |
| *Dactyloctenium geminatum* Hack. | |
| *Dalbergia melanoxylon* Guill. & Perr. | Vulnerable |
| *Dalbergia vacciniifolia* Vatke | |
| *Dalechampia scandens* L. var cordofana (Webb) Muell.Arg. | |
| *Datura metel* L. | |
| *Davallia denticulata* (Burm.f.) Kuhn var denticulate | |
| *Deinbollia borbonica* Scheff. forma glabrata Radlk. | |
| *Derris trifoliata* Lour. | |
| *Desmodium gangeticum* (L.) DC. | Potentially Threatened |
| *Dialium orientale* Baker f. | |
| *Dichrostachys cinerea* (L.) Wight & Arn. | |
| *Digitaria abyssinica* (A.Rich.) Stapf | |
| *Digitaria argyrotricha* (Andersson) Chiov. | |
| *Digitaria milanjiana* (Rendle) Stapf | |
| *Dignathia gracilis* Stapf | Potentially Threatened |
| *Diodia aulacosperma* K.Schum. var aulacosperma | |
| *Dioscorea dumetorum* (Kunth) Pax | |
| *Diospyros abyssinica* (Hiern) F.White ssp *abyssinica* | |
| *Diospyros bussei* Guerke | |
| *Diospyros consolatae* Chiov. | |
| *Diospyros consolatae* Chiov. | |
| *Diospyros ferrea* (Willd.) Bakh. | Vulnerable |
| *Diospyros greenwayi* | |
| *Diospyros mespiliformis* A.DC. | |
| *Dobera loranthifolia* (Warb.) Harms | |
| *Drake-Brockmania somalensis* Stapf | |
| *Drimiopsis botryoides* Baker ssp *botryoides* | |
| *Drypetes natalensis* (Harv.) Hutch. var leiogyna Brenan | |
| *Drypetes reticulata* Pax | |
| *Echinochloa haploclada* (Stapf) Stapf | |
| *Echinochloa scabra* (Lam.) Roem. & Schult. | |
| *Eclipta prostrata* (L.) L. | |
| *Ekebergia capensis* Sparrm. | |
| *Elaeis guineensis* Jacq. | |
| *Elaeodendron schlechterianum* (Loes.) Loes. | |
| *Elaeodendron schweinfurthianum* (Loes.) Loes. | |
| *Elytraria* sp | |
| *Endostemon gracilis* (Benth.) M.Ashby | |
| *Enicostema axillare* (Lam.) A.Raynal ssp *axillare* | |
| *Enteropogon sechellensis* (Baker) T.Durand. & Schinz | |
| *Erianthemum dregei* (Eckl. & Zeyh.) Tiegh. | |
| *Eriochloa meyerana* (Nees) Pilg. | |
| *Eriochloa parvispiculata* C.E.Hubb. | |
| *Erythroxylum fischeri* Engl. | |

| | |
|---|---|
| *Ethulia faulknerae* C.Jeffrey | |
| *Euclea natalensis* A.DC. ssp obovata F.White | |
| *Euclea racemosa* Murr. Ssp *schimperi* (A.DC.) F.White | Potentially Threatened |
| *Eugenia capensis* (Eckl. & Zeyh.) Sond. ssp *multiflora* Verdc. | |
| *Euphorbia breviarticulata* Pax ? | |
| *Euphorbia candelabrum* Kotschy | |
| *Euphorbia cuneata* Vahl | Potentially Threatened |
| *Euphorbia fluminis* S.Carter | |
| *Euphorbia gossypina* Pax var gossypina | Potentially Threatened |
| *Euphorbia kassneri* Pax | Potentially Threatened |
| *Euphorbia nyikae* Pax var neovolkensii (Pax) S.Carter | |
| *Euphorbia robecchii* Pax | Potentially Threatened |
| *Feretia apodanthera* Delile ssp *keniensis* Bridson | |
| *Ficus capreifolia* Delile | |
| *Ficus sycomorus* L. | |
| *Fimbristylis ferruginea* (L.) Vahl ssp *ferruginea* | |
| *Flacourtia indica* (Burm.f.) Merr. | |
| *Flagellaria guineensis* Schumach. | |
| *Flueggea virosa* (Willd.) Voigt ssp *virosa* | |
| *Fockea angustifolia* K.Schum. | |
| *Garcinia livingstonei* T.Anderson | |
| *Gardenia volkensii* K.Schum. ssp *volkensii* | |
| *Geophila repens* (L.) I.M.Johnston | |
| *Gerrardanthus lobatus* (Cogn.) C.Jeffrey | |
| *Gisekia pharnaceoides* L. var pseudopaniculata Jeffrey | |
| *Givotia gosai* Radcl.-Sm. | |
| *Glinus lotoides* L. | |
| *Glinus oppositifolius* (L.) A.DC. | |
| *Gonatopus boivinii* (Decne.) Engl. | |
| *Gonatopus marattioides* (Peter) Bogner | |
| *Gossypioides kirkii* (Mast.) J.B.Hutch. | |
| *Grewia densa* K.Schum.? | |
| *Grewia forbesii* Mast. | |
| *Grewia glandulosa* Vahl | |
| *Grewia plagiophylla* K.Schum. | |
| Grewia praecox K.Schum. ssp *latiovata* C.Whitehouse ined | |
| *Grewia stuhlmannii* K.Schum. | |
| *Grewia tenax* (Forssk.) Fiori | |
| *Grewia triflora* (Bojer) Walp. | |
| *Grewia truncata* Mast. | |
| *Grewia villosa* Willd. | |
| *Guilandina bonduc* L. | |
| *Gymnosporia heterophylla* (Eckl. & Zeyh.) Loes. | |
| *Gymnosporia senegalensis* (Lam.) Loes. | |
| *Halopyrum mucronatum* (L.) Stapf | |
| *Haplocoelum foliolosum* (Hiern) Bullock ssp *mombasense* (Bullock) Verdc. | |
| *Haplocoelum inoploeum* Radlk. | |
| *Harrisonia abyssinica* Oliv. | |
| *Heliotropium steudneri* Vatke? | |
| *Helixanthera kirkii* (Oliv.) Danser | |
| *Heritiera littoralis* Dryand. | |
| *Hermannia exappendiculata* (Mast.) K.Schum. | |
| *Hermannia oliveri* K.Schum. | |
| *Hibiscus cannabinus* L. | |

| | |
|---|---|
| *Hibiscus micranthus* L.f. | |
| *Hibiscus tiliaceus* L. | |
| *Hibiscus vitifolius* L. ssp *vitifolius* | |
| *Hilsenbergia petiolaris* (Lam.) J.S.Mill. | |
| *Hilsenbergia teitensis* (Guerke) J.S.Mill. | |
| *Hoslundia opposita* Vahl | |
| *Hunteria zeylanica* (Retz.) Thwaites | |
| *Hygrophila auriculata* (Schumach.) Heine | |
| *Hymenodictyon parvifolium* Oliv. ssp *parvifolium* | |
| *Hyparrhenia rufa* (Nees) Stapf? | |
| *Hyphaene compressa* H.Wendl. | |
| *Hyphaene coriacea* Gaertn. | |
| *Indigofera hirsuta* L. | |
| *Indigofera schimperi* Jaub. & Spach var schimperi | Potentially Threatened |
| *Indigofera strobilifera* (Hochst.) Baker ssp *lanuginosa* (Baker f.) J.B.Gillett | Potentially Threatened |
| *Indigofera tanganyikensis* Baker f. var paucijuga J.B.Gillett | |
| *Indigofera trita* L.f. | |
| *Indigofera vohemarensis* Baill. | |
| *Inhambanella henriquezii* (Engl. & Warb.) Dubard | Potentially Threatened |
| *Iodes usambarensis* Sleumer | |
| *Ipomoea aquatica* Forssk. | |
| *Ipomoea cairica* (L.) Sweet? | |
| *Ipomoea carnea* Jacq. ssp *fistulosa* (Choisy) D.Austin | |
| *Ipomoea garckeana* Vatke | |
| *Ipomoea macrantha* Roem. & Schult. | |
| *Ipomoea mombassana* Vatke ssp *mombassana* | |
| *Ipomoea pes-caprae* (L.) R.Br. ssp *braziliensis* (L.) Ooststr. | |
| *Ischaemum rugosum* Salisb. | |
| *Ixora narcissodora* K.Schum. | |
| *Jacquemontia ovalifolia* (Vahl) Hallier f. | |
| *Jasminum fluminense* Vell. | |
| *Jasminum meyeri-johannis* Engl. | |
| *Jatropha curcas* L. | Potentially Threatened |
| *Jatropha hildebrandtii* Pax var hildebrandtii | Potentially Threatened |
| *Jatropha stuhlmannii* Pax | |
| *Justicia flava* (Vahl) Vahl s.l. | Potentially Threatened |
| *Keetia zanzibarica* (Klotzsch) Bridson ssp zanzibarica | |
| *Kigelia africana* (Lam.) Benth. ssp *africana* | Potentially Threatened |
| *Kraussia kirkii* (Hook.f.) Bullock | Potentially Threatened |
| *Kyllinga cartilaginea* K.Schum. | |
| *Lablab purpureus* (L.) Sweet ssp *uncinatus* Verdc. | |
| *Lagenaria sphaerica* (Sond.) Naudin? | Potentially Threatened |
| *Lamprothamnus zanguebaricus* Hiern | |
| *Lannea alata* (Engl.) Engl. | |
| *Lannea schweinfurthii* (Engl.) Engl. var stuhlmannii (Engl.) Kokwaro | |
| *Lantana camara* L. | |
| *Lantana viburnoides* (Forssk.) Vahl | |
| *Launaea sarmentosa* (Willd.) Kuntze | |
| *Lawsonia inermis* L. | |
| *Lecaniodiscus fraxinifolius* Baker ssp *scassellatii* (Chiov.) Friis | |
| *Lecaniodiscus fraxinifolius* Baker ssp *vaughanii* (Dunkley) Friis | |
| *Lepisanthes senegalensis* (Poir.) Leenh. | |
| *Loeseneriella africana* (Willd.) N.Halle var richardiana (Cambess.) N.Halle | |
| *Loeseneriella crenata* (Klotzsch) N.Halle var crenata | |

| | |
|---|---|
| *Ludia mauritiana* J.F.Gmel. | |
| *Ludwigia* sp | |
| *Ludwigia stolonifera* (Guill. & Perr.) P.H.Raven | |
| *Luffa cylindrica* (L.) M.J.Roem. | |
| *Lumnitzera racemosa* Willd. | Potentially Threatened |
| *Macrotyloma uniflorum* (Lam.) Verdc. var verrucosum Verdc. | Potentially Threatened |
| *Maerua holstii* Pax | |
| *Maerua macrantha* Gilg | |
| *Maerua triphylla* A.Rich. | |
| *Majidea zanguebarica* Oliv. | |
| *Mangifera indica* L. | |
| *Manihot esculenta* Crantz | |
| *Manilkara mochisia* (Baker) Dubard | |
| *Manilkara sansibarensis* (Engl.) Dubard | |
| *Manilkara sulcata* (Engl.) Dubard | |
| *Margaritaria discoidea* (Baill.) Webster var fagifolia (Pax) Radcl.-Sm. | |
| Maytenus undata (Thunb.) Blakelock | Critically endangered |
| Megalochlamys tanaensis | |
| *Megalochlamys trinervia* (C.B.Clarke) Vollesen | |
| *Meyna tetraphylla* (Hiern) Robyns ssp *comorensis* (Robyns) Verdc. | |
| *Microcoelia exilis* Lindl. | |
| *Mikania chenopodifolia* Willd. | |
| *Mimosa pigra* L. | |
| *Mimusops obtusifolia* Lam. | |
| *Momordica boivinii* Baill. | |
| *Momordica trifoliolata* Hook.f. | |
| *Monanthotaxis fornicata* (Baill.) Verdc. | |
| *Monochoria africana* (Solms) N.E.Br. | |
| *Moringa oleifera* Lam. | |
| *Mucuna gigantea* (Willd.) DC. ssp *quadrialata* (Baker) Verdc. | |
| *Musa* sp | |
| *Mystroxylon aethiopicum* (Thunb.) Loes. | |
| *Neptunia oleracea* Lour. | |
| *Nerium oleander* L. | |
| *Nicotiana tabacum* L. | |
| *Nymphaea* sp | Potentially Threatened |
| *Ochna mossambicensis* Klotzsch | Potentially Threatened |
| *Ochna thomasiana* Engl. & Gilg | |
| *Ocimum gratissimum* L. ssp *gratissimum* var macrophyllum Briq. | Potentially Threatened |
| *Oldenlandia borrerioides* Verdc | |
| *Oldenlandia fastigiata* Bremek. | Potentially Threatened |
| *Oncella ambigua* (Engl.) Tiegh. | |
| *Oncocalyx ugogensis* (Engl.) Polhill & Wiens | |
| Opilia amentacea Roxb. | |
| *Ormocarpum kirkii* S.Moore | |
| *Oryza longistaminata* A.Chev. & Rochr. | |
| *Oxycaryum cubensis* (Poeppig & Kunth) Lye | |
| *Oxystelma bornouense* R.Br. | Vulnerable |
| *Oxystigma msoo* Harms | |
| *Ozoroa obovata* (Oliv.) R.Fern. & A.Fern. | |
| *Panicum infestum* Peters | |
| *Panicum laticomum* Nees | |
| *Panicum maximum* Jacq. | Potentially Threatened |
| *Panicum pinifolium* Chiov. | |

| | |
|---|---|
| Paullinia pinnata L. | Vulnerable |
| *Pavetta linearifolia* | |
| *Pedalium murex* L. | Potentially Threatened |
| *Pentarhopalopilia umbellulata* (Baill.) Hiepko | |
| *Pentatropis nivalis* (J.F.Gmel.) D.V.Field & J.R.I.Wood | |
| *Pentodon pentandrus* (Schumach. & Thonn.) Vatke var minor Bremek. | |
| *Persicaria senegalensis* (Meisn.) Sojak | |
| *Philenoptera bussei* (Harms) Schrire | |
| *Phoenix reclinata* Jacq. | |
| *Phyla nodiflora* (L.) Greene | |
| *Phyllanthus amarus* Schumach. & Thonn. | |
| *Phyllanthus chevalieri* Beille | |
| *Phyllanthus pinnatus* (Wight) Webster? | |
| *Phyllanthus reticulatus* Poir. var glaber (Thwaites) Muell.Arg. | Potentially Threatened |
| *Phyllanthus somalensis* Hutch | |
| *Phytolacca* sp? | |
| *Pistia stratiotes* L. | |
| *Platycerium elephantotis* Schweinf. | Potentially Threatened |
| *Plectranthus auriglandulosus* A.J.Paton? | |
| *Pleurostelma cernum* (Decne.) Bullock | |
| *Pluchea dioscoridis* (L.) DC. | |
| *Pluchea sordida* (Vatke) Oliv. & Hiern | |
| *Polyalthia stuhlmannii* (Engl.) Verdc. | |
| *Polygala amboniensis* Guerke | |
| *Polygala sadebeckiana* Guerke | |
| *Polygonum pulchrum* Blume | |
| *Polysphaeria multiflora* Hiern | |
| *Polysphaeria parvifolia* Hiern | |
| *Portulaca kermesiana* N.E.Br. var kermesiana | |
| *Portulaca peteri* Poelln. | |
| *Premna chrysoclada* (Bojer) Guerke | |
| *Premna resinosa* (Hochst.) Schauer ssp *holstii* (Guerke) Verdc. | Potentially Threatened |
| *Premna velutina* Guerke | |
| *Pristimera longipetiolata* (Oliv.) N.Halle | |
| *Prosopis juliflora* DC. | |
| *Pseudarthria hookeri* Wight & Arn. var hookeri | |
| *Psilotrichum sericeum* (Roxb.) Dalziel | |
| *Psychotria amboniana* K.Schum.? | |
| *Psychotria capensis* (Eckl.) Vatke ssp *riparia* (K.Schum. & K.Krause) Verdc. | |
| *Psychotria punctata* Vatke var punctata | |
| *Psychotria schliebenii* E.M.A.Petit | |
| *Psydrax polhillii* Bridson | |
| *Psydrax* sp A of FTEA | |
| *Pyrenacantha kaurabassana* Baill. | |
| *Pyrenacantha malvifolia* Engl. var malvifolia | |
| *Pyrostria bibracteata* (Baker) Cavaco | |
| *Pyrostria phyllanthoidea* (Baill.) Bridson | |
| *Rauvolfia mombasiana* Stapf | |
| *Rhipsalis baccifera* (J.Mill.) Stearn | |
| *Rhizophora mucronata* Lam. | |
| *Rhoicissus revoilii* Planch. | |
| *Rhus natalensis* Krauss | |
| *Rhynchosia* sp cf hirta (Andrews) Meikle & Verdc. | |

| | |
|---|---|
| *Rhynchosia viscosa* (Roth) DC. ssp *viscosa* var ? | |
| *Rinorea elliptica* (Oliv.) Kuntze | |
| *Ritchiea capparoides* (Andrews) Britten | Potentially Threatened |
| *Rotheca makanjana* (H.Winkl.) Steane & Mabb. | |
| *Rourea orientalis* Baill. | |
| *Ruellia* sp | |
| *Rytigynia parvifolia* Verdc. | |
| *Rytigynia* sp ? intermed. parvifolia Verdc. et celastroides (Baill.) Verdc. | |
| *Rytigynia* sp I of FTEA | |
| *Rytigynia* sp L of FTEA? | |
| *Saba comorensis* (Bojer) Pichon | |
| *Saccharum officinarum* L. | |
| *Sacciolepis curvata* (L.) Chase | |
| *Salacia elegans* Oliv. | |
| *Salacia erecta* (G.Don) Walp. | |
| *Salacia stuhlmanniana* Loes. | |
| *Salvadora persica* L. var cyclophylla (Chiov.) Cuf.? | |
| *Salvadora persica* L. var persica? | |
| *Sansevieria conspicua* N.E.Br. | |
| *Sansevieria fischeri* (Baker) Marais | |
| *Sansevieria gracilis* N.E.Br. | |
| *Sansevieria powellii* N.E.Br. | |
| *Sarcostemma viminale* (L.) R.Br. s.l. | |
| *Scadoxus multiflorus* (Martyn) Raf. ssp *multiflorus* | |
| *Scaevola plumieri* (L.) Vahl | |
| *Schoenefeldia transiens* (Pilg.) Chiov. | |
| *Scolopia rhamniphylla* Gilg | |
| *Secamone parvifolia* (Oliv.) Bullock | |
| *Senna occidentalis* (L.) Link | |
| *Senna siamea* (Lam.) Irwin & Barneby | |
| *Senna singueana* (Delile) Lock | |
| *Sesbania sericea* (Willd.) Link | |
| *Sesbania sesban* (L.) Merr. var nubica Chiov. | |
| *Sesuvium portulacastrum* (L.) L. | |
| *Setaria sagittifolia* (A.Rich.) Walp. | |
| *Sideroxylon inerme* L. ssp *diospyroides* (Baker) J. H. Hemsl | |
| *Solanum goetzei* Dammer | |
| *Solanum incanum* L. | |
| *Solanum* sp I | |
| *Sonneratia alba* Sm. | Potentially Threatened |
| *Sophora inhambanensis* Klotzsch | |
| *Sorindeia madagascariensis* DC. | |
| *Sphaerocoryne gracilis* (Engl. & Diels) Verdc. ssp *gracilis* | |
| *Sphenoclea zeylanica* Gaertn. | |
| *Spirostachys venenifera* (Pax) Pax | |
| *Sporobolus helvolus* (Trin.) T.Durand & Schinz | |
| *Sporobolus kentrophyllus* (K.Schum.) Clayton | |
| *Sporobolus virginicus* (L.) Kunth | |
| *Spragueanella rhamnifolia* (Engl.) Balle | |
| *Sterculia rhynchocarpa* K.Schum. | |
| *Stictocardia* sp aff laxiflora | |
| *Striga asiatica* (L.) Kuntze | |
| *Striga gesnerioides* (Willd.) Vatke | |
| *Strophanthus courmontii* Franch. | |

| | |
|---|---|
| *Strophanthus mirabilis* Gilg | |
| *Strychnos decussata* (Pappe) Gilg | |
| *Strychnos henningsii* Gilg | |
| *Strychnos madagascariensis* Poir. | |
| *Strychnos panganensis* Gilg | |
| *Strychnos spinosa* Lam. | |
| *Stylochaeton salaamicus* N.E.Br | |
| *Stylosanthes fruticosa* (Retz.) Alston | |
| *Suaeda monoica* J.F.Gmel. | |
| *Suregada zanzibariensis* Baill. | |
| *Synaptolepis kirkii* Oliv. | |
| *Synsepalum msolo* (Engl.) T.D.Penn. | |
| *Syzygium cuminii* (L.) Skeels | |
| *Tabernaemontana elegans* Stapf | |
| *Tacazzea apiculata* Oliv. | |
| *Tacca leontopetaloides* (L.) Kuntze | |
| *Talinum portulacifolium* (Forssk.) Schweinf. | |
| *Tamarindus indica* L. | |
| *Tarenna trichantha* (Baker) Bremek. | Potentially Threatened |
| *Tephrosia pumila* (Lam.) Pers. var aldabraensis (J.R.Drumm. & Hemsl.) Brummitt | |
| *Tephrosia villosa* (L.) Pers. ssp *ehrenbergiana* (Schweinf.) Brummitt | |
| *Terminalia brevipes* Pampan. | |
| *Terminalia catappa* L. | |
| *Terminalia prunioides* M.A.Lawson | |
| *Terminalia* sp aff spinosa Engl. | |
| *Terminalia spinosa* Engl. | |
| *Thespesia danis* Oliv. | |
| *Thespesia populnea* (L.) Corr. | |
| *Thevetia peruviana* (Pers.) Merr. | Potentially Threatened |
| *Thilachium thomasii* Gilg | |
| *Tinospora caffra* (Miers) Troupin | |
| *Tragia hildebrandtii* Muell.Arg. | |
| *Trema orientalis* (L.) Blume | |
| *Tricalysia ovalifolia* Hiern var glabrata (Oliv.) Brenan | |
| *Tricalysia ovalifolia* Hiern var ovalifolia | |
| *Trichilia emetica* Vahl | |
| *Triumfetta rhomboidea* Jacq. | |
| *Turraea nilotica* Kotschy & Peyr. | |
| *Turraea wakefieldii* Oliv. | |
| *Uncaria africana* G.Don ssp *africana* | |
| *Urochloa rudis* Stapf | |
| *Uvaria lucida* Benth. ssp *lucida* | Vulnerable |
| *Uvariodendron kirkii* Verdc. | |
| *Vanilla roscheri* Rchb.f. | |
| *Vepris eugeniifolia* (Engl.) I.Verd. | |
| *Vepris simplicifolia* (Engl.) Mziray | |
| *Vernonia hildebrandtii* Vatke | |
| *Vernonia homilantha* S.Moore | |
| *Vigna unguiculata* (L.) Walp. | |
| *Vismia orientalis* Engl. | |
| *Vitex ferruginea* Schumach. & Thonn. ssp *amboniensis* (Guerke) Verdc. var amboniensis | |
| *Vitex strickeri* Vatke & Hildebr. | |

| | |
|---|---|
| *Vossia cuspidata* (Roxb.) Griff. | |
| *Ximenia americana* L. var caffra (Sond.) Engl. | |
| *Xylocarpus granatum* Koen. | |
| *Xylopia longipetala* De Wild. & T.Durand | |
| *Zamioculcas zamiifolia* (Lodd.) Engl. | |
| *Zanthoxylum chalybeum* Engl. var chalybeum | Vulnerable |
| *Zanthoxylum holtzianum* (Engl.) ssp *holtzianum* | |
| *Zehneria pallidinervia* (Harms) C.Jeffrey | |
| *Ziziphus mucronata* Willd. ssp *mucronata* | |
| *Ziziphus pubescens* Oliv. | |