SITE INFORMATION SHEET TEMPLATE

In support of a formal proposal to nominate a site for inclusion in the IOSEA Marine Turtle Site Network

1. Date of submission(DD/MM/YYYY):
The date on which the Site Information Sheet was completed.

01/11 / 2013

2. Name and address of compiler(s), if not the IOSEA Focal Point
Name and contact information (including affiliation) for the individual(s) who prepared this information sheet, for formal submission through the national IOSEA Focal Point.

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3. Country: *The name of the country in which the site is located.*

United Republic of Tanzania

4. Name of site: *The name of the site (alternative names should be given in brackets).*

Rufiji– Mafia Seascape

5. Geographical coordinates
*The geographical coordinates (latitude and longitude) of the **approximate centre** of the site, expressed in 'decimal degrees'. For example, the location of the IOSEA Secretariat in Bangkok is 13.763483°, 100.508157°. If the site consists of two or more discrete units, the coordinates of the centres of each of these units should be given. (Add any additional coordinates in a separate annex.)*

Decimal Degrees -7.9819° , 39.5725°

6. General location
Describe the general location of the site. This should include the site's distance (in a straight line) and compass bearing from the nearest significant administrative centre, town or city. The human population of the listed centre and its administrative region should also be stated. (See also the information requested under point 24: Site Map)

The Rufiji - Mafia Seascape is situated 135km (straight line) south of Dar es Salaam, Tanzania's commercial capital, on a 172.5° bearing. The population of Dar es Salaam is 4,364,541. Rufiji and Mafia Districts are both part of Coast Region. The population of Rufiji District is 217,274. The administrative centre of Rufiji District is Utete, which is located 75km from the Rufiji Delta and has

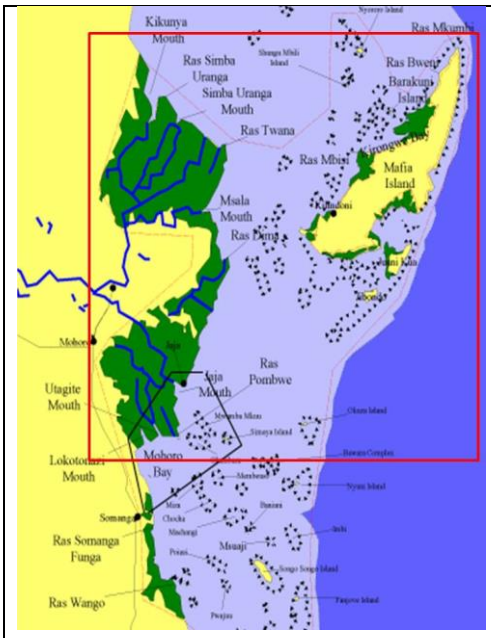
a population of 5,878.The population of Mafia District is 46,438. The administrative centre of Mafia District is Kilindoni, which has a population of 14,221.

(Source of population data: 2012 Population and Housing Census).

In the remainder of this document, the codes that appear in square brackets alongside each of the titles below refer to sections of a separate document describing the evaluation criteria, which will be informed by the proponents' submission. ***Proponents are encouraged to consult the Evaluation Criteria document[1] for more explanation of the rationale behind each criterion and of the detailed information to be used for evaluation purposes.***

7. Area [N3]

The approximate surface area of the site to be included in the network (in hectares or square kilometers). If the site is an island, indicate also the total surface area of the coastline directly relevant to turtle conservation. Area should correspond to the map provided under point 24.)



The total surface area of the site to be included in the network is 3,950 km^2 which comprises the Rufiji Delta, Mafia Channel and Mafia Island (Figure 1).

The Rufiji Delta is crescent shaped, 23km wide and 65km long, covering an area of approximately1,200 km^2.The Mafia Channel is a stretch of water between the Rufiji Delta and Mafia Island covering 2,000km^2.The Rufiji Delta protrudes 15km into the Mafia channel.

Mafia Island has a surface area of 750km^2 and a coastline of 130km, all of which is directly relevant to turtle conservation.

Figure 1. *Proposed network site.*

8. Physical features of the site[EB1- 4, S5, S6, N1]

Describe the principal physical characteristics of the site, including the marine turtle habitat types occurring at the site. List the ecosystem types included in the site (nesting beach, foraging habitat, reproductive habitat, migratory habitat) and the approximate area in hectares (or km^2) of each habitat type included. Indicate whether the site's physical attributes are shared by other sites in the country, or are exceptional/unique.

General physical characteristics

The **Rufiji Delta** is a key defining feature of the **Rufiji–Mafia Seascape.** The delta is created by the Rufiji River, the widest and longest river in Tanzania with a mean annual flow of some 800 m3 s-1, making it one of the largest rivers in Africa. **Thirty km from the coast**, the Rufiji River branches out into a series of channels forming the **Rufiji Delta** which is part of the Rufiji River basin, extending over some 177,000km^2 and draining over 20% of the country.

On its eastern side, the Rufiji Delta is connected to the **Mafia Channel** which is deep enough for navigation through the area.

Mafia Island lies 21km east of the Rufiji Delta and is the largest of a score of islands, atolls and tidal sandbars forming the Mafia Archipelago. Mafia Island itself is approximately 50km long by 15km

[1] Criteria for the Evaluation of Nominations to the Network of Sites of Importance for Marine Turtles in the Indian Ocean – South-East Asia Region, IOSEA Marine Turtle MoU Secretariat. http://ioseaturtles.org/sitenetwork-evaluation.php

across, and is surrounded by a barrier reef.

Ecosystem description

The Rufiji Delta supports a diversity of **estuarine, coastal and marine wetland habitats** that are all ecologically interlinked with the flow of the Rufiji River. The delta is traversed by numerous deltaic branches of the Rufiji River, of which nine are major. The tides travel up these branches over considerable distances, particularly when the Rufiji is low, and may penetrate as far as 25km inland. The estuary and delta of the Rufiji River are in a state of **dynamic equilibrium**. The geometry and course of the several tidal branches changes continuously by sediment deposition and erosion.

A system of **northerly flowing ocean currents** in the Mafia channel contributes to the high productivity of the area and influences fisheries production further north along the Tanzanian coast as well as the rest of the east Africa coast.

Mafia Island is rich in marine biodiversity. Over 50 genera of corals, more than 460 species of fish and five different species of marine turtle have been recorded in the waters around Chole Bay on the eastern coast of Mafia. Natural vegetation on Mafia ranges from tidal mangrove thickets and scrubby coastal moorlands to palm-wooden grassland and lowland rainforest. Large baobab trees are prominent along with the native *Albizia*. Patches of coastal high forest remain in localities all over Mafia; one of the most picturesque, the Chunguruma Forest, is a dense tree canopy interlaced with palms, lianes and epiphytes and has an abundant floor covering of ferns. A series of reed-lined lakes in central Mafia are probably the remnants of an old lagoon which was cut off from the ocean thousands of years ago.

Marine turtle habitats

Marine turtle habitats occurring at the site include sandy beaches, a network of coral reefs, extensive seagrass beds, scattered islands, and isolated sand cays.

- **Nationally important nesting beaches** are located on the east coast of Juani Island, situated on the south-east coast of Mafia and are utilized by both green and hawksbill turtles (total of 1,700km of beach). Green turtles also nest on beaches on the east and west coasts of Mafia itself. A small number of nests (<10 per year) are built on three small islets on the west coast of Mafia Island (Shungi-mbili, Mbarakuni and Nyororo). In the Rufiji Delta, sandy beaches are **patchy** and are located at Ras Dima, Simba Uranga, Jaja and Mbwera (total of 16km of beach, covering an area of approximately **5km^2**).
- **Foraging habitats (seagrass**) dominate **sub-tidal areas** across the Rufiji Delta and Mafia Channel (approximately **2,000 km^2**). Aerial surveys, satellite telemetry studies and flipper tag recoveries have confirmed the presence of foraging green turtles and dugongs in the Rufiji Delta and Mafia Channel. There are also dense seagrass beds on the central west coast of Mafia (300km^2) where both green turtles and dugongs have been observed during sea surveys (Sea Sense, unpublished data).
- **Foraging habitats (coral reefs) surround Mafia Island** (130km) where foraging hawksbill turtles are frequently observed by scuba divers**.** Coral reefs are also located near to Mbwera, Jaja and Pombwe in the southern Rufiji Delta stretching along 28km of coast, covering an area of approximately **60km^2.** Stranding data collected by Sea Sense NGO suggests that loggerheads and olive ridley turtles also utilize the coral reef habitats around Mafia Island.
- **Migratory habitat** is provided along the length of the Delta (**65km**). There is also some migratory movement of green turtles from nesting beaches in Mafia Island across the Mafia Channel to foraging sites along the southern Tanzania coast (Sea Sense, unpublished data).

Uniqueness of the site

The Rufiji – Mafia Seascape forms an exceptional and unique complex of estuaries, mangrove, coral reefs and marine channel ecosystems, which are found **nowhere else in Tanzania.** In view of its outstanding array of critical marine habitats, Mafia Island was gazetted as a Marine Protected Area in 1996 and is **recognized internationally as a critical site for biodiversity** (Mafia Island Marine Park General Management Plan, 2000).

The site is part of the wider Rufiji-Mafia-Kilwa Seascape, an area which was selected as one of eight high priority seascapes under the Eastern African Marine Eco-region (EAME) planning process.

9. Ecological resources [EB1- 4, S5, S6, N1]

Describe the ecological resources at the site, including marine turtles and other noteworthy biodiversity. Describe the marine turtle species / management units occurring at the site, if they are known. Where possible, provide an abundance estimate for each marine turtle species/management unit (e.g. in terms of average number of turtles nesting annually or foraging). **Evaluation Criteria EB1a and EB1b** *offer guidance on how to describe the relative importance of a site frequented by one or more marine turtle species. Indicate whether the site's ecological resources are shared by other sites in the country or are exceptional/unique.*

The Rufiji Delta is the largest in East Africa and has been identified as one of the **most important wetland areas in East Africa** (Ochieng, 2002). The Rufiji Delta – Mafia Channel ecosystem has **extremely high primary and secondary productivity** and supports a great abundance and diversity of fish, birds, invertebrates and other macro fauna **including the critically endangered dugong** *(Dugong dugon).*Mafia Island supports the **largest green turtle rookery** in Tanzania.

<u>Marine turtles</u>

Green turtles

Nesting

Mafia Island is the most important nesting site for green turtles in Tanzania. Half of all recorded nests built in Tanzania annually (450 – 500) are laid in Mafia Island (West, 2010).

Nesting activity is concentrated in Juani Island which is a small island (9km long and 3.5km wide) located in the south-eastern corner of Mafia Island Marine Park (MIMP). There are eight turtle nesting beaches on the eastern side of Juani, ranging from 109 metres to 330 metres in length. There are also a number of small sandy inlets, but most are submerged at high tide. Nesting activity is concentrated on four beaches (West *et al*, 2013) and occurs year round with a noticeable peak in April and May (Muir, 2005). An average of 124 ± 45 nests are laid in Juani per year.

A saturation flipper tagging programme was implemented in Juani Island in 2012 during the peak nesting months of April and May and repeated again in 2013 and 2014. In 2012, 60 emergences were recorded by 18 individual females during the peak season, compared with 96 emergences by 27 females in 2013 and 64 emergences by 18 females in 2014.

There are five green turtle nesting sites on the main island of Mafia at Mlongo, Bweni, Baleni, Kungwi and Jojo providing approximately 50km of nesting beach. An average of 60 ± 27 nests are laid at these sites each year.

The green turtle nesting population in Mafia Island is therefore likely to be **<100.**

In 2014, the marine turtle monitoring programme in Mafia District celebrated its 13th year. Since the monitoring programme began in 2001, 2,405 green turtle nests have been recorded in Mafia with an average of 186 ± 39 nests laid per year. Data were analyzed for the period 2002 – 2010 and showed that there was a **significant increase** (ANOVA test, $p<0.001$) in the annual number of nests recorded in Mafia Island.

Green turtle nesting is **sporadic** in the Rufiji Delta, due to the patchy and dynamic nature of beaches. Tracks of nesting green turtles have been recorded on beaches in the northern delta (Sea Sense, unpublished data) and two nests were reported to be built as recently as September 2012 at Ras Dima (West, 2012). However, there have been no records of successful hatchings due to egg

poaching by local fishers. Six green turtle nests were recorded on Simaya Island in 1993 (Darwall, 1996) but their fate is unknown. There are no records of other nesting species in the Rufiji Delta.

Foraging and migration

Scientific data confirms that the Rufiji Delta is an important foraging site and migratory corridor for green turtles and supports ecological connectivity **between sites of significance in the region**. A green turtle satellite telemetry project identified the Rufiji – Mafia Seascape as one of only five regional 'hot spots' for green turtle foraging activity and as an important migratory corridor for green turtles nesting elsewhere in the SWIO region (Bourjea *et al.* 2013). The project was implemented by the South West Indian Ocean Fisheries Project (SWIOFP) to better understand the distribution, movements and habitat preferences of green turtles in the South West Indian Ocean (SWIO) region. Results showed that:

- The Rufiji – Mafia Seascape was an important migratory destination for ~7% of turtles that were tagged as part of the SWIOFP project (8 out of 105 tagged turtles).
- Tracking data identified green turtles from four (of six) nesting sites in different exclusive economic zones (EEZ) foraging in the delta and Mafia channel during post nesting periods.
- Two other green turtles (tagged at two additional nesting sites) were also tracked close to the Rufiji – Mafia Seascape, which indicates that the area may potentially host migratory green turtles from six different regionally important nesting sites.

The Rufiji – Mafia Seascape also provides migratory corridors for green turtles nesting within Tanzania. Four green turtles were satellite tagged at Mafia Island in 2012, one of which travelled across the Mafia Channel into the Rufiji Delta on her migration to foraging grounds further north along the east Africa coast (West, 2012).

A relatively high rate of flipper tags are recovered in Tanzania each year (average of 10), 90% of which are recovered from the Rufiji Delta or Kilwa, just south of the Delta (Sea Sense, unpublished data). Most flipper tags originate from Seychelles, Comoros and Mayotte which support regionally important populations of green turtles, providing further evidence for the presence of foraging green turtles from regionally important nesting sites.

Local residents report that the extensive seagrass beds off the southern Rufiji Delta (*Kichinja Mbuzi & Toshi*) including Mohoro Bay (*Fungu ya Kasa*) are important feeding grounds for green turtles (Muir, 2005). These reports were supported by the findings of five aerial surveys conducted in the southern Rufiji Delta in 2008 and 2009 to map dugong distribution and abundance. Sixteen marine turtle (thought to be green turtles) observations were recorded during 5 hours 24 minutes of flying time in 2006 (Muir, 2006), five turtles were recorded during 2 hours 50 minutes of flying time in 2008 and 26 turtles were observed during 4 hours of flying time in 2008 (West, 2008).

Stranding data has confirmed that the Rufiji– Mafia Seascape supports populations of **foraging juvenile green turtles**. Morphometric data collected from 57 green turtle strandings recorded in 2012 showed that 70% were juveniles or sub-adults with curved carapace lengths (CCLs) ranging from 28cm to 65cm (Sea Sense, unpublished data).In 2007, a survey of marine turtle bycatch in the commercial prawn trawling industry was conducted over a period of three months from June to August. Each month, vessels trawled for between 20 and 26 days, with 4-5 hauls per day. Ten green turtles were captured in trawl nets, eight of which were juveniles (Muir & Ngatunga, 2009).

In view of the evidence presented, it is clear that the Rufiji – Mafia Seascape supports populations of green turtles occupying **different life history stages** and provides **strong ecological connectivity at a regional scale**, linking green turtle nesting sites, foraging grounds and migratory corridors.

Hawksbill turtles

Nesting

Hawksbill turtles (*Eretmochelys imbricata*) nest in small numbers at Mafia Island. Since nest monitoring commenced at Mafia Island in 2001, 37 hawksbill nests have been recorded (Sea Sense,

unpublished data). The majority of nests were recorded at Juani Island (n=23) with a smaller number of nests recorded at Shungi-mbili Island on the west coast of Mafia (n=7). Hawksbill nests have also been recorded on the main island of Mafia (n=7).

Foraging and migration

Mafia Island supports extensive coral reef habitat which is known to provide foraging grounds for both juvenile and adult hawksbill turtles. Recreational divers within Mafia Island Marine Park frequently report sightings within Chole Bay and at reefs close to the entrance to Chole Bay.

Stranding data for the period 2007 – 2013 also confirms the presence of hawksbill turtles in the Rufiji- Mafia Seascape. 76 hawksbill strandings were recorded in the area during this period (Sea Sense, unpublished data). Furthermore, a survey of marine turtle bycatch in the commercial prawn trawling industry conducted in 2007resulted in 16 turtles being captured incidentally in trawl nets from five of the six vessels with observers. Three of the turtles that were captured were hawksbills, two of which were juveniles (Muir & Ngatunga, 2009).

Other turtle species

Marine turtle stranding data indicates **species richness of marine turtles** in the Rufiji – Mafia Seascape and the site may be of **regional foraging and migratory importance** for species which are considered rare in the Western Indian Ocean region. Stranding data collected over the past 12 years confirms the presence of three other marine turtle species in the Rufiji– Mafia Seascape: loggerhead *(Caretta caretta),* leatherback *(Dermochelys coriacea)* and olive ridley *(Lepidochelys olivacea),* (West, 2010).

There is strong evidence to suggest that the Rufiji – Mafia Seascape supports populations of foraging and/or migrating loggerhead turtles. Between 2001 and 2005, flipper tags originating from South Africa were recovered from five loggerhead turtles that were caught off Songo Songo Island, immediately south of the Rufiji Delta (Muir, 2003), demonstrating that loggerhead turtles nesting in South Africa are migrating through waters close to the Rufiji Delta or traveling long distances to forage there. Three untagged loggerhead turtles were found stranded on beaches in the Rufiji Delta in 2008 and 2009. During a survey of marine turtle bycatch in the commercial prawn trawling industry in 2007, two loggerhead turtles were captured in the Rufiji Delta (Muir & Ngatunga, 2009).

Four leatherback turtles were caught in gill nets and drowned along the west coast of Mafia Island between 2001 and 2004 (Hamann *et al* 2006). More recently in 2012, a leatherback was found stranded on a beach in Jaja in the Rufiji Delta.

During the period 2007 – 2013, 10 olive ridley strandings were recorded in the Rufiji Delta, of which four individuals showed evidence of fisheries interactions. Since olive ridley turtles are known to occur in deltaic areas, it is possible that the Rufiji Delta provides important foraging grounds for this species although no empirical data exists to confirm this.

<u>Other species of biodiversity value</u>

In terms of other species of biodiversity value, the Rufiji Delta supports the most extensive **estuarine mangrove forest** on the eastern seaboard of the African continent with an estimated coverage of 532km^2 (Ochieng, 2002). Common mangrove species include *Rhizophora mucronata*, *Sonneratia alba* and *Ceriops tagal*, while *Avicennia marina* and *Bruguiera gymnorrhiza* occur less frequently. These mangroves sustain an extensive intertidal fishery, provide nursery grounds for a nationally important prawn industry and have considerable importance locally and regionally. Wildlife including **hippopotamuses, crocodiles, Sykes monkeys** and **water birds** such as kingfishers, herons, egrets and waders feed and shelter in the mangrove forests.

A diversity of **forest and woodland types** border the Rufiji Delta including riparian forests, swamp forests, fringing woodlands and thickets. There are also some very valuable dry coastal forests in the uplands away from the delta which contain biodiversity of local, national and international importance (Doody, 2003).

The Rufiji Delta ecosystem is endowed with valuable marine fisheries resources and is the most

productive fishing ground in Tanzania, contributing about 45% of the total annual production of prawns (Mhitu & Mwakosya, 2008). There are **four dominant prawn species;** *Penaeus indicus, P. monodon, P. semisulcatus* and *Metepenaeus monoceros,* all with significant economic value.

The Rufiji Delta ecosystem is also an important wintering ground for **migrating birds** including waders and terns. Research has shown that the Rufiji Delta qualifies, in its entirety, as a wetland of international importance as it most probably habitually accommodates over 20,000 water birds (Nasirwa *et al,* 2001). Certain species also reach the internationally agreed threshold levels of 1% of the bio-geographical population (curlew sandpiper, crab plover, terek sandpiper, greater sandplover, lesser sandplover, gull-billed tern, lesser-crested tern and Saunders's tern).The Rufiji Delta provides an important stop-over site for both Palearctic and Afro-tropical migrants using the East African flyway. Many of these water bird species are listed in the African-Eurasian Water Bird Agreement.

The Rufiji - Mafia Seascape is also home to the last known population of **dugongs** in Tanzania, a species that is critically endangered across most of its East African range (WWF, 2004).

Due to these high levels of biodiversity, inclusion of the Rufiji– Mafia Seascape in the network will provide additional **conservation benefits for a range of other species and habitats**. Of particular note are benefits provided to dugongs, which in Tanzania, survive only in the Rufiji - Mafia Seascape, despite a widespread historical distribution. Dugongs share the same seagrass habitats as marine turtles, are subject to similar threats and are protected by the same legislation in Tanzania. Furthermore, the Rufiji– Mafia Seascape is part of the broader Rufiji-Mafia-Kilwa Seascape which is the focus of extensive sustainable livelihood development activities that complement marine turtle conservation and protection.

Uniqueness of the site

The Rufiji– Mafia Seascape is of national and regional significance because there are **no other sites in Tanzania** where **all five species of marine turtle present** in the Western Indian Ocean region have been recorded or a population of dugongs exists.

Seagrass beds in the Rufiji– Mafia Seascape support foraging green turtles that belong to nesting populations that are of **regional significance** e.g. Seychelles and Comoros. This is the only site in Tanzania where this has been documented.

Inclusion of the Rufiji– Mafia Seascape in the network would contribute to the **representativeness of marine turtle habitats** due to the diversity of marine and coastal habitats that are able to support different species with different foraging strategies.

The site also supports a **range of marine turtle life history stages** that utilize those habitats (juvenile, nesting, foraging and migratory).

The network of **wetland habitats** present in the Rufiji– Mafia Seascape is also unique. The site has exceptional regional significance for its mangrove forests and high levels of associated biodiversity.

10. Cultural importance[S1]

Describe the cultural/religious / spiritual importance of the site (e.g. in terms of historical associations, spiritual traditions, religious significance etc.), as well as non-consumptive traditional beliefs/practices, in relation to marine turtles. If possible, provide references to published/unpublished historical or other accounts, which may give an indication of relative importance in a national context.

Historical importance of the site

The cultural history of the Rufiji Delta is strongly linked to the development of the coastal **Swahili culture** and the **trade links** between the East African coast and countries of the Persian Gulf and Red Sea. Tortoiseshell was often traded. The district is still home to many people of Arab origin and Islam is an integral part of the Rufiji culture, guiding both its religious and social systems (UNEP, 2012).

In the 1950s and 1970s the delta bustled with people who flocked there to trade in mangrove poles, logs and bark, fish, cashew nuts, prawns, cotton, rice and coconut. Rufiji was once one of the major

outlets to Arab and Far East countries for mangrove products and timber. This market was central in linking the delta islands, including Mafia Island, and the other parts of the coastal area. Coconut and other products from Mafia passed through this market. The delta's history of interaction with various traders included Arabs, Portuguese, Germans, English and Indians who visited the East African coast. More than 60 dhows docked at various ports in the delta each season to buy mangrove products for export when trade was strong. Trade has since declined.

Today, the shared use of natural resources is governed by both complex sharing of ecosystems between villages or lineages and by local perceptions of space as sacred groves or as having assigned spiritual values. Traditionally, the floodplain and hill tribes have had an informal mutual aid agreement that stipulates that, in years of bad rainfall, the floodplain people cannot refuse to provide the hill people with food, and vice-versa in years with insufficient floods. Numerous taboos exist on harvesting of certain species, and their harvesting requires complex rituals (UNEP, 2012).

Traditional beliefs in relation to marine turtles

Traditional beliefs associated with marine turtles are not well documented and it is unclear as to their religious or spiritual significance in Tanzania.

11. Jurisdiction [G1]

The name of the government authority with: (a) territorial jurisdiction over the site, e.g. state/province, region or municipality etc.; and the name/description of the authority with (b) functional jurisdiction for conservation purposes, e.g., Department of Environment, Department of Fisheries, traditional owners, etc.

Functional jurisdiction

Permanent Secretary, Ministry of Natural Resources and Tourism, Dar es Salaam, United Republic of Tanzania

Permanent Secretary, Ministry of Livestock and Fisheries Development, Dar es Salaam, United Republic of Tanzania

Regional Administrative Secretary, Kibaha, Coast region

Director of Forestry and Beekeeping, Dar es Salaam, United Republic of Tanzania

Director of Fisheries Development, Dar es Salaam, United Republic of Tanzania
District Executive Director, Rufiji District Council, Utete, Coast Region

District Executive Director, Mafia District Council, Kilindoni, Coast Region

12. Management authority [G1]

Name, address and contact details of the body responsible for the direct local conservation and management of the site.

District Executive Director

Rufiji District Council

P. O. Box 28,

UTETE, RUFIJI

Telephone: +255 23 2010304

Fax: +255 23 2010317

Email address:dedrufiji@gmail.com

District Executive Director

Mafia District Council

P. O. Box 85,

KILINDONI, MAFIA

Telephone: +255 23 2011338

Fax: +255 23 2011338

Email address: mafiadc@pwani.go.tz

Warden in Charge

Mafia Island Marine Park

P.O. Box 74,

UTENDE, MAFIA

Telephone: N/A

Fax: N/A

Email address: mafiaisland@marineparks.go.tz

13. Current protected status and governance framework [G1, S4]

Describe any applicable legislation/regulations (or traditional laws/norms) relevant to the protection/ conservation of marine turtles and their habitats at this site, and comment on their effectiveness. Include details of how any incompatible human activities and/or uses of land and sea at the site are prohibited or mitigated.

Mention any nationally relevant protected area status, international conservation designations and, in the case of transboundary sites, bilateral or multilateral conservation measures which pertain to all or part of the site. If a protected area or reserve has been established (at a national/regional level), give the date of its establishment and size. If only a part of the site is included within a protected area, the area of marine turtle habitat that is protected should be noted.

International designations may include sites listed under the UNESCO/World Heritage Convention, Man and Biosphere Reserve Network, Ramsar Convention, other site conservation networks, etc. Where appropriate, list the IUCN (1994) protected areas management category(ies) that apply to the site.

Legislative framework

National legislation towards marine turtles (not specific to the site)

Marine turtles in Tanzania are afforded general protection under **The Fisheries Act No. 22, 2003, Section 23 (1).** Protection for marine turtles was increased in 2009 to include protection of their foraging and breeding habitats. The **Tanzania Fisheries Regulations, 2009, Regulation 67 (1 - 4)** state that it is illegal to fish, possess, process, offer for sale, market or export any part of a marine turtle or purposely disturb or destroy the feeding, breeding or nesting ground of marine turtles. Any person who accidentally captures live marine turtles is required to return the animal to the sea immediately and report the incident to a District Fisheries Office. The penalty associated with contravening these laws as a first offence is a fine of not less than TZS 200,000 ($125) and/or imprisonment of not less than two years. In the case of second and subsequent offences, the fine increases to not less than TZS 300,000 ($188) and/or imprisonment for not less than three years.

The **Marine Parks and Reserves Act 1994** also provides protection for marine turtles. Part X, 22 (1) states that “no person within a marine park or reserve shall (a) fish, hunt, kill or capture any fish or animal or disturb any egg, nest, roe, or spawn within the marine park or reserve (b) gather, collect or remove any fish, animal, aquatic flora, or vegetation, whether live or dead, or any sand, minerals, or aquatic substrate; (c) sell or transport any fish, animal, aquatic flora, vegetation, or the products thereof or any sand, minerals, or aquatic substrate”.

The **Wildlife Conservation Act 1974** section 20 (1) states that “Nothing in this Act shall be construed as empowering the Director to grant any permission for the hunting, killing, capture or wounding of any animal in any national park in contravention of the provisions of the National Parks Act or in a marine park in contravention of provisions of the Marine Parks and Reserves Act, 1994''.

Coastal citizens are knowledgeable of the protected status of marine turtles and they are aware that it is illegal to fish for or trade in marine turtles. Laws protecting marine turtles are usually enforced

at a local level by District Authorities and statutory organs such as Beach Management Units, or in the case of Marine Protected Areas, by Village Liaison Committees. However, the trade and consumption of marine turtles is often conducted in secret or at offshore migrant fisher camps which presents a major challenge to the effective enforcement of laws protecting marine turtles.

Co-management approach to fisheries and its implementation at the site

The Government of Tanzania has adopted a **participatory co-management approach** to fisheries which was incorporated into the **National Fisheries Policy of 1997**. The Policy recognizes and promotes communities as vital partners in fisheries planning, management and development and therefore, they have an important role to play in protecting marine turtles and their habitats. Fisheries stakeholders have been empowered to form community-based groups known as Beach Management Units (BMUs) under the Fisheries Act No. 22 of 2003, Section 18, the Fisheries Regulations of 2005, Regulation 104, and generally under the Local Government Acts No. 7 and No. 8 of 1982. To provide a systematic approach to the establishment of BMUs throughout Tanzania, National Guidelines for Beach Management Units have been developed within the context of wider international fisheries management guidelines, including the FAO Code of Conduct for Responsible Fisheries. BMUs have legally empowered rights and responsibilities for fisheries resource management and conservation and in this regard, BMUs can formulate bylaws to manage and control resource exploitation, including exploitation of marine turtles. Penalties for those who contravene the bylaws are included.

In Mafia Island there are **eight BMUs** and in the Rufiji Delta there are **24 BMUs.** Each BMU has a well-defined jurisdictional area on land and sea with a clear boundary agreed in consultation with Local Authorities and communities. BMUs that share a common fishing ground have come together to form **Collaborative Fisheries Management Areas (CFMAs),** made up of four to five BMUs each**.** In Mafia, eight BMUs have formed **two CFMAs** and in Rufiji, ten BMUs have formed **four CFMAs.**

The CFMAs are managed jointly by neighbouring BMUs with the aim of working in partnership to manage the shared resources and improve environmental conditions and the livelihoods of coastal communities. Through the CFMA process, local frameworks for the management and protection of fisheries resources, including marine turtles and their habitats, are currently being developed. One of the CFMAs in Rufiji successfully designated a **'closed area'** for fishing over a period of two years to enable the recovery of depleted fish stocks. The area is also a known turtle foraging ground and there was widespread recognition amongst members of the CFMA that the closure would provide **conservation benefits for marine turtles**.

All BMUs in Mafia and Rufiji have received extensive **education and sensitization on marine turtle conservation** so that they can conduct awareness activities in their community targeting both local and migrant fishers. BMUs also have a mandate to enforce laws and bylaws related to the exploitation of fisheries resources and monitoring and surveillance activities form a part of their routine work. There are many cases of BMUs in Rufiji and Mafia taking action to **apprehend fishers** who were caught trading in marine turtle products.

Nationally relevant protected area status and its implications for marine turtle conservation

The south-eastern part of Mafia Island was gazetted as a **Marine Protected Area** in 1995 under the Marine Parks and Reserves Act 1994. The area is managed by the Marine Parks and Reserves Unit (Ministry of Livestock and Fisheries Development) and covers an area of 822km^2, including green and hawksbill turtle nesting beaches and foraging grounds.

Mafia Island Marine Park (MIMP) is distinguished from many other Marine Protected Areas in the Indian Ocean by the large number of people residing within the park boundary. It is estimated that there are 23,000 people residing within the park boundaries. In recognition of the importance of working in close collaboration with resident communities, a 10-year MIMP General Management Plan (GMP) was developed in 2000 through a participatory planning process.

The GMP that was implemented from 2000 to 2010 has now been revised and the current GMP serves as the primary management document for MIMP for the next ten years. The reviewed GMP reflects new and emerging issues, lessons learnt, changes in management objectives, and adaption to new information gained from monitoring and evaluation processes.

International designation

In recognition of the rich and diverse network of wetland habitats supported by the Rufiji Delta and its contribution to the maintenance of marine and coastal biodiversity, the site was named as a Wetland of International Importance under the **Ramsar** Convention in 2004. The site is managed by the Ministry of Natural Resources and Tourism under the Forest Act of 2002, Mangrove Management Plan of 1991 and Environmental Management Plan of 1997, which was developed by IUCN – World Conservation Union in collaboration with Rufiji District Council. The Ministry is collaborating with villages to control unsustainable exploitation of wetland resources through Participatory Forest Management where local communities are involved in the management of forest and wetland resources.

14. Land/sea tenure/ownership [G1]

Provide details of ownership of the site and ownership of immediate surrounding areas (e.g., state, provincial, private, etc.) which may have a bearing on the conservation of the site. Describe any local or customary law relevant to the land / sea tenure, and explain any terms that have a special meaning in the country or region concerned.

People in Tanzania, as individuals or as a collective, have the right to occupy and use land under two major categories of land occupancy: the granted right of occupancy and the deemed right of occupancy. Most land is village land, governed by the Village Land Act, No. 5 of 1999. The majority of rural residents either occupy land on a customary basis, which is recognized by the law, or acquire land through allocation by the village council. Land governed under the Village Land Act cannot be transferred without the consent and authorization of the village decision-making bodies, which include the village assembly and the village council.

Land tenure in both the delta and floodplain is complicated by several historical and recent factors. Officially, most of the floodplain and delta are classified as 'Hazard Land' which by law, should not be inhabited (but are). Traditional usufruct arrangements exist between the inner and outer delta communities whereby those on the coast are permitted to cultivate inland and those inland are permitted to fish on the coast. Village jurisdiction in coastal waters is not clear, and due to several forced migrations, people have attachments to more than one administrative unit (a village) and move between them (Havnevik, 1993).

The intact mangrove forest areas of the Rufiji Delta are held by the Government as forest reserves and managed by the Forestry and Beekeeping Division of the Ministry of Natural Resources and Tourism (MNRT). The 'islands' of the delta are also legally governed as forest reserves and have equal status to inland forest reserves despite the fact that some forest areas are in rice fields rather than mangroves due to encroachment by local farmers.

Communities residing within the boundaries of Mafia Island Marine Park are allowed to continue with their normal livelhoods and development activties provided that they comply with the Marine Parks and Reserves Act No. 29 of 1994 and its regulations which superseedes other existing legislations within the Park jurisdictions.

15. Socio-economic values and land/ocean uses and activities within the vicinity of the site [EB4, G5, S2, S5, S6]

Describe, in general terms, the principal social and economic values of the site, including human activities and land uses (past, current and planned) within the vicinity of the site (e.g., agriculture, fishing, resource extraction, grazing, water supply, urban/industrial development, tourism, outdoor recreation, education and scientific research), irrespective of whether or not they are considered to directly impact the conservation of marine turtles. Some indication of the relative importance of each form of land use should be given, whenever possible.

Rufiji Delta

In the Rufiji Delta, livelihood strategies revolve around three inter-related activities: farming, fishing and harvesting of forestry resources.

Farming

More than **90% of households** in the Rufiji Delta and its floodplain - which have a combined population of more than 150,000 - make their living from **rice farming** (Makoye, 2012). Agriculture in the 'outer Delta' is characterized by a shortage of land, sandy soils and high salinity due to tidal water. The flood of the Rufiji river (if favourable) brings a large amount of fresh water that lowers the salinity, and creates conditions suitable for rice production. This makes the agriculture flood dependent. During low floods, the water becomes more saline and hence lowers the crop output. Agriculture on 'higher ground' - on some Delta islands, consists of rain-fed rice and other crops like coconut. The wetland habitats of the delta are considered to be fairly resilient to pollution caused by agricultural practices upstream since a significant portion of the Rufiji River basin lies within the Selous Game Reserve where most catchment drainage is channeled before entering the lower floodplain and delta.

Farmers in the Rufiji floodplain and the delta area have developed a system of land use over time that is adapted to the unpredictable floods of the Rufiji River. The system is based on inter-planting and rotating rice, maize, beans, and, to a lesser extent, cotton.

Fishing

Fishing is the second major economic activity in the Rufiji Delta, both in freshwater systems and in the estuarine-marine systems of the delta. It is estimated that a total of **7,000 people** (about 20% of the delta population) make a living from fishing there (Shagude, 2004).

Most freshwater fishing takes place in the numerous permanent lakes of the floodplain, which provide breeding habitat for fish and are replenished in most years by floods. In the delta, fishing takes place in estuaries and in the shallow inshore waters along the coast. The majority of fishers use nets, although traditional traps and hooks are also still commonly used. The last Marine Fisheries Frame Survey, conducted in 2009 by the Ministry of Livestock and Fisheries Development, recorded **1,369 fishing vessels** in operation and more than **14,000 gill nets** which were the most common type of gear. More than 30 fish species are fished in the delta, the most important being *dagaa* (a general term for several small fishes such as mullet). **The total annual finfish catch is estimated to be around 1,403.50 metric tons in Rufiji District** (MLFD, Annual Fisheries Statistics Report, 2012).

The **prawn fishing industry** is the most important of the marine fisheries in the Rufiji Delta in terms of income and export value and employs more than 3,000 artisanal fishermen. Catches are in the order of **134.66 metric tons per year** (Mhitu & Mwakosya, 2008). Artisanal operators have dominated the Tanzania prawn fishery since the closure of the commercial prawn trawling industry in 2008 due to a serious decline in yield.

Prawn resources, together with other finfish species, contribute to the social and economic welfare of coastal communities in the delta. Artisanal fishermen sell fish products in major towns, especially Dar es Salaam. The marketing of fish and prawns from the Rufiji Delta is well organized and is largely controlled by businessmen from Dar es Salaam who provide boats, engines, cooling facilities and transport to the city.

Harvesting of forestry resources

The forests in Rufiji District contain a variety of valuable hardwood species which are exploited for cash income either by **mangrove cutting, charcoal production or logging** (timber). These are normally allowed by obtaining a license from the District Forest Officer.

The Rufiji Delta mangrove forest is exploited **for both the export market and local use**. Mangrove poles from the Rufiji Delta have been traded since ancient times for house and boat building; an export market has long existed in the Arabian Peninsula and Gulf States since the poles of the Rufiji Delta are held in high esteem due to their diameter and shape. Mangrove pole cutting and logging are largely controlled by businessmen from major centres who sometimes employ locals. Both activities are fuelled by high demands from Dar es Salaam and other centres.

Harvesting of mangrove products for subsistence use is small scale (Semesi, 1991). Mangroves are harvested and used locally in construction as poles, for boat-making, including for dhow ribs and rails, and to a lesser extent keels, as firewood and charcoal, and for preparing fish traps. Most of the houses in Rufiji are constructed with mangrove poles. In some fish landing areas and rice farms, people live in huts built on platforms supported by mangrove poles.Almost all households collect fuel wood from the forest or mangrove areas as a source of energy. Charcoal is made in kilns in the woodland areas for domestic purposes.

Current data on the extent of harvesting of forest products in the delta is scanty and inconsistent. In 2000, at least 12,000 trees (equivalent to 18,000 m^3 or 12,600 tons) were estimated to be harvested annually for the timber trade (Turpie, 2000; Graham et al., 2000). As a result of insufficient capacity, poor infrastructure and vast areas over which harvesting takes place, the timber trade in southern Tanzania is characterised by high levels of illegal harvesting, sale and transport.

Potential for tourism

Despite having a wide range of natural and historical assests, **tourism in the Rufiji Delta remains undeveloped**. Lack of funding, lack of a development plan, limited technical capacity, poor infrastructure, services and communications, low awareness at community level of the potential of tourism and negative attitudes to Rufiji District by the business community have all been cited as reasons why the tourism potential of the Rufiji Delta has not been realized.

<u>Mafia Island</u>

The population of Mafia Island is scattered throughout the main island together with the smaller islands of Jibondo, Juani and Chole. The majority of people in Mafia are subsistence farmers or fishers with a smaller proportion engaged in the tourism industry.

Farming

Mafia Island has long had a mixed economy dependent both upon subsistence and cash farming. The north of the island, where more bush land is available, is more heavily weighted towards subsistence farming and people grow dry and wet rice, cassava, beans, peas, corn, tomatoes and other crops. Most of the southern half of the island is planted up with coconut and cashew nut trees, which produce Mafia's longest-standing cash crops. Both coconuts and the smaller cashew nut crop are exported directly to the markets in Dar es Salaam. The price of coconuts has fallen on world markets in recent years, partly because of over-production and partly because of a lessening of demand while the price of cashew nuts is comparatively higher.

The destruction of crops by bush fires, wildlife (particularly wild pigs, monkeys, bats, squirrels, and hippopotami), tree parasites, and water pesticides have a negative impact on crops (particularly food crops). In addition, the lack of modern tools, training, and market opportunities for agricultural products hinders the development of agriculture in Mafia.

Fishing

Fishing is an important economic activity engaging thousands of local people in Mafia and the area has long been considered as a premier fishing ground for the Tanzania mainland coast. The decline of fisheries in near-shore areas throughout the Tanzanian mainland has led to an influx of fishermen from other areas into Mafia Island waters, causing occasional friction within villages in Mafia.

Most villagers, especially young men, engage in fishing, including fishing for finfish, crustaceans (lobsters, crayfish), and cephalopods (octopus and squid) as well as the gathering of other sea products like sea cucumbers, usually by women. Some fish are sold directly in villages or Kilindoni market; others are taken to Dar es Salaam either smoked or fresh. Catches are in the order of **3,212.99 metric tons per year** (MLFD, Annual Fisheries Statistics Report, 2012).

Traditionally most fishing activities in Mafia Island are carried out within the inshore waters using traditional fishing gear, methods, and techniques. Most fishers aim at bottom coral fish, which fetch higher prices at the market as compared to other small pelagic fishes. Recent developments have attracted fishers from other parts of the country for pelagic fishing using seine nets, which has considerably changed the fishing regime in Mafia to a semi-intensive activity. The activity has been triggered by the establishment of processing plants to exploit the diversity of fish resources. Mafia is now considered a centre for the fish trade inviting traders and investors from in and outside the country.

Tourism

Mafia is becoming an important tourism destination, servicing largely a global tourism market that links Mafia with Zanzibar, Rufiji, Kilwa, and the Selous Game Reserve in southern Tanzania with the northern tourism circuit of Ngorongoro, Serengeti, and Kilimanjaro Mountain.

The rich and diverse coral reefs form the major tourism attraction in Mafia. World renowned dive sites attract thousands of scuba divers each year. There is also a growing whale shark tourism industry. Other tourism resources in Mafia include cultural and archaeological sites.

The flow of passengers, aircraft movement, and cargo freight to and from Mafia has increased since 1999, and it is expected to rise even further by 2030, to about 1.4 million kilograms (kg) of cargo and about 180,000 passengers annually (SEA, 2008).

16. Factors adversely affecting the site's overall ecological character, as well as threats to marine turtles and their habitat at the site [EB4, S2]

Describe the human and natural factors negatively affecting the ecological character of the site, both within and in the vicinity of the site. These may include existing, new or changing activities/uses, major development projects etc., which have had, are having, or may have a detrimental effect on the natural ecological character of the site. For all adverse and change factors reported, supply measurable/quantifiable information (if such data exist), as well as information on the scale, extent and trend of the change factor and its impact. For example, describe in terms of the percentage of coastline (or other area) modified/affected by a particular threat; for egg collection, describe in terms of number of nests, per species, per year. Mention also data-deficient threats, where a threat is known to be present but is not quantified. Collectively, this information should provide a basis for monitoring of ecological character of the site.

The Rufiji– Mafia Seascape is described as a healthy and productive natural system (Turpie 2000) which is relatively resistant and resilient to disturbance. The Rufiji Delta's seagrass beds and Mafia's coral reefs are indirectly protected by the Rufiji River's aquatic systems. Aquatic vegetation in the Rufiji River and floodplain trap and absorb pollutants that enter the system from the catchment area including pollutants associated with human waste.

Population growth and associated threats affecting the site's ecological character

A growing population in the Rufiji Delta has led to increased demand for land, and shifting cultivation systems have resulted in extensive clearance of mangroves in some areas of the delta. A remote

sensing study by Wang *et al.* (2003) showed that during the period 1990 to 2000, 1,769 hectares of mangrove were lost in the Rufiji Delta. Most of the loss occurred at the upper end of the river mouths and near the edge of the mangroves and was caused by the expansion of agricultural activities. In addition some areas of mangroves have been cleared and replaced with solar evaporation pans for the production of salt.

Without strong management interventions and enforcement strategies, the unregulated clearance of mangroves has the potential to impact upon seagrass habitats utilized by foraging marine turtles since mangroves play an important role in maintaining water clarity by trapping sediments released by land based activities. The success of the artisanal prawn fishery is dependent on the survival of nursery grounds within mangrove forests and in this respect, prawn fishers have an important role to play in protecting mangrove habitats from clearance for agriculture.

Infrastructure development along the Rufiji Delta's coast is currently **limited,** largely as a result of the difficult access to coastal villages. Access is mainly from the west, by river and passage through mangroves. Coastal access involves use of dugout canoes and small wooden boats.Improvements to road networks together with a proposed bridge over the Rufiji River have yet to be implemented but the influx of large numbers of cattle and agricultural development are already a source of conflict amongst communities dependent on natural resources in the delta.

Over the past two decades, the Rufiji wetlands, woodlands and forests have come under increasing pressure from a wide variety of factors including population growth, unsustainable harvesting of both timber and fisheries resources, and the use of riparian forest and woodlands for fuel. The most valuable timber species, *Pterocarpus angolensis* is already scarce due to overexploitation (Turpie, 2000). Mangroves are also being degraded through conversion to single use options, such as rice farming, salt evaporation, lime making, firewood and illegal charcoal production. Shifting cultivation practices by local people also encourages the replacement of mangroves by sedges. On the basis of the positive relationship between mangrove areas and prawn production, extensive reduction of mangrove area is leading to a reduction in prawn production. Moreover, mangroves are endemic to very few coastal areas and substantial harvesting of this resource may lead to the disappearance of some species and thus decreased biodiversity.

Despite its small size, the villages of Mafia are relatively isolated due to poor roads and limited communications infrastructure. While movement within the island is difficult because of poor roads, getting to mainland Tanzania is also problematic. A passenger/cargo boat service operates between Mafia and Rufiji but the crossing can be hazardous during the south-east monsoon season. As a result, Mafia remains largely undeveloped.

Destructive fishing practices affecting the site's ecological character

The health and integrity of marine turtle foraging habitats in the Rufiji– Mafia Seascape are threatened by illegal and destructive fishing practices. **Dynamite fishing** continues unabated along much of the Tanzania coast and is particularly prevalent around Pombwe in the southern Rufiji Delta where it has degraded a network of coral reefs. Blasts are recorded daily at Pombwe and occasionally in Mbwera and Kiechuru (Sea Sense, unpublished data). Dynamite fishing is also increasing on the west coast of Mafia Island close to Nyororo Island due to the presence of a large migrant fisher camp (Sea Sense, *pers.obs.).*

Fisheries bycatch (directly affecting marine turtles)

Fisheries bycatch in the artisanal gill net fishery is a threat to marine turtles, particularly in the Rufiji Delta due to the high level of gill net usage in the area. The 2009 Marine Fisheries Frame Survey, conducted by the Ministry of Livestock and Fisheries Development, recorded 14,057 gill nets in use in the Rufiji Delta and 1,411 in Mafia District. As a comparison, the next highest number recorded in other districts was 917.

A survey of marine turtle bycatch in the artisanal gill net fishing industry was conducted at two fish landing sites in the Rufiji Delta and two in Mafia Island in 2005. Interview surveys were conducted with gill net fishers at the landing sites. The respondents stated that they caught on average

between one and ten turtles a year, both during the hotter and calmer months of the NE monsoon (November to March) and the cooler months of the SE monsoon (July – Sept). Gill net fishers interviewed in Pombwe in the southern delta stated that they occasionally caught 10 turtles a day, notably in the seagrass beds in Mohoro Bay, but the average figure was 2-5 (Muir, 2005).

At each landing site, enumerators recorded fish catches for all fishing gears during a consecutive ten-day survey period. No turtles or marine mammals were recorded.

A survey of marine turtle bycatch in the commercial prawn trawling industry was conducted in 2007 over a period of three months from June to August. The average number of fishing days per month was 26 with each vessel pulling a maximum of four hauls a day with a soak time of 2.5 to 3 hours. Sixteen marine turtles were captured during the survey, eight of which were captured in Zones 2 and 3 which cover the Rufiji Delta.

Only two species, green and hawksbill, nest in Tanzania. The population of nesting hawksbill turtles is small (<50 nests per year) and they tend to nest on small offshore islands rather than on the mainland beaches between November and March during the north-east monsoon. This corresponds to the closed prawn trawl season. Conversely, green turtles nest in greater numbers (approximately 500 nests per year) both on the mainland and islands throughout the year, peaking in April and May when the prawn trawl season is open. This indicates that reproductive green turtles are more threatened by this fishery than hawksbills.

Declining prawn yields in Tanzania over recent years led to a decision by prawn fishing stakeholders to close the commercial prawn trawl fishery for a period of two years from 2008 to 2010. Prawn production had declined from 1,320 tons in 2003 to 202 tons in 2007. The closure was extended and the fishery still remains closed in 2014 as stocks have yet to recover.

Direct take of marine turtles

Slaughter and consumption of green turtles (and to a lesser extent hawksbill turtles) is common in coastal villages but the level of take remains unquantified. Targeted marine turtle fisheries have not been observed in the Rufiji Delta so it is likely that most turtle consumption is a result of **incidental bycatch** in the artisanal gill net fishery. However, in Mafia Island, information from local informants indicates that green turtles are deliberately targeted using gill nets set at Ras Fikirini on the west coast of Mafia. The turtles are slaughtered at sea and traded in Kilindoni town.

There is a growing number of seasonal and permanent fisher camps at key nesting sites, particularly small offshore islands, which pose a threat to nesting and foraging turtles. High levels of marine turtle consumption takes place at migrant fisher camps and discarded carapaces are often found at the camps. Migrant fishers at Pombwe and Simaya in Rufiji District admitted to slaughtering and consuming sea turtles on a regular basis (West, 2012, 2013). As a result, it is likely that Simaya Island is no longer a viable nesting site. Similarly, nesting is now rare or has ceased altogether at Nyororo and Mbarakuni islands off northwest Mafia and Nyuni, Okuza and Songo Songo Islands in Kilwa, just south of the delta.

Egg poaching

Traditionally, turtle egg collection has been ubiquitous along the Tanzanian coast. Turtle tracks left in the sand during nesting show clearly the location of the nest and the eggs are normally found using a sharpened stick.

However, at sites where effective monitoring and conservation education are underway, the **threat of egg harvesting has been significantly reduced.** At Mafia Island, 49% of nests recorded during the first year of monitoring were poached by local fishers. However, in 2002, following the implementation of beach patrols, the introduction of a nest protection incentive scheme and a public awareness campaign, the incidence of poaching fell to 8% and declined further to less than 1% in 2003 and 2004 (Muir, 2004). Egg poaching in Mafia remains at less than 1% of recorded nests per year (West, 2013).

Nesting is rare in the Rufiji Delta but the **risk of poaching is high** since the beaches are very

remote and rarely visited by authorities. The actual level of egg poaching remains unquantified.

Agricultural development

The Southern Agricultural Growth Corridor of Tanzania (SAGCOT) is an agricultural partnership designed to improve agricultural productivity, food security and livelihoods in Tanzania. It was initiated at the World Economic Forum Africa summit in May 2010. Six cluster developments have been identified along the southern corridor of Tanzania, one of which is the Rufiji Delta. Changes in land use such as proposed by SAGCOT may significantly change water balances and water use patterns and there is increased risk of eutrophication of water sources by fertilizer run off. This will have a serious impact on marine turtle habitats in the delta. An environmental flow assessment on the Rufiji River is currently being planned to assess the impact of a proposed 22,000ha of irrigated rice.

Potential industrial developments

The Rufiji Delta remains undeveloped from an industrial development perspective.

Construction of a **hydroelectric power station** on the Rufiji River has been proposed by the Government of Tanzania since the 1970's but the project has never progressed. The so-called Stiegler Gorge (STIGO) power project still needs major funding but if the project wins approval, experts warn that river impoundment would have very negative impacts on floodplain fisheries and agriculture, the latter of which would most likely be changed to irrigated agriculture with artificial fertilization. Increased damming in the catchment area would lead to regulated discharges through the estuary such that there would be relatively less flow during the flood season and greater flow during the dry season. In the normal situation, low river flows occur for a limited time (several months) and the increased salinity during this period is then flushed out by the high flows of the rainy season. Damming of the river in the upstream areas may lead to above average flows; as a result, the higher dry season flows may push the salt wedge further seaward, while in the rainy season, the flushing and leaching effect would be reduced. The overall impact would be decreased variation of salt intrusion over the year. At the sea side of the delta, average salinity would increase, which would affect seagrass and mangrove habitats and the productivity of Delta fisheries.

Natural gas exploration is increasing in Tanzania with two significant gas discoveries already made in southern Tanzania. These discoveries confirm the presence of an active petroleum system and have enhanced exploration activities in the region. Exploration is ongoing at two deep-water blocks100km offshore from the Rufiji Delta.

A large deposit of gas (2-3 trillion cubic feet) was found as recently as June 2014 raising chances that a proposed liquefied natural gas (LNG) plant in central Tanzania could be bigger than initially planned. The impacts of deep-water hydrocarbon exploration on migrating marine turtles in Tanzania are unclear.

17. Conservation and management interventions taken [G2, G3]

Describe conservation and management interventions already taken at the site to address threats. Note that some of this information may have been recorded in abbreviated form in the IOSEA Site Data Sheets, available online (www.ioseaturtles.org/reporting). Any application of coastal and marine spatial planning, or integrated coastal/marine zone management planning, involving or affecting the site should be noted.

Describe the management planning process for the site, including the state of implementation of any management plan that has been developed and approved for the site. Describe any other conservation measures taken at the site, such as restrictions on development, management practices beneficial to wildlife, closures of hunting, etc. (Note that information on any monitoring schemes and survey methods should be given under point 19, below.)

Where applicable, describe the involvement of local communities and indigenous people in the participatory management of the site, including co-management activities, surveillance and enforcement, and performance evaluation.

Marine turtle conservation interventions

A network of ten community Conservation Officers (COs) conducts daily patrols of nesting beaches in Mafia and Rufiji Districts. COs have received training in practical marine turtle conservation techniques and actively relocate turtle nests at risk of poaching, predation or tidal inundation, collect morphometric data from stranded specimens and conduct informal marine turtle awareness raising activities in their locality. The COs also have a surveillance role and record and report incidences of illegal or destructive fishing practices to BMUs, village leaders or marine park wardens.

Ecosystem management

Mafia Island Marine Park (MIMP)

Gazetted in 1995, MIMP covers 822km^2 and more than 75% of the park is below the high water mark. The marine park supports a diverse range of tropical habitats including coral reefs, seagrass beds, mangroves, intertidal flats and a strip of lowland coastal forest. The area is recognized internationally as a critical site for biodiversity (MIMP General Management Plan, 2000).

The GMP is the principal guiding document that addresses conservation protocols with MIMP and sets out a zoning plan to manage and regulate multiple use areas that combine conservation and sustainable use and development.

The GMP is implemented by the park management in partnership with a range of stakeholders including communities and NGOs. The park is patrolled by wardens who maintain a permit system whereby extractive activities are prohibited in 'core zones' and within 'specified use zones', fishing rights are reserved for fishers resident within the park, using traditional gears such as hand-lines and fence or basket traps.

'Mangrove Management Project'

Tanzania was the first African country to formulate a management plan for conservation and development of mangroves, based on a full survey of mangrove resources and the socio-economic and institutional factors determining patterns of use. The '**Mangrove Management Project' (MMP)** was initiated in 1988, which aimed to regulate exploitation of mangroves via a small field team of forestry officers working in partnership with local communities. All mangrove forests in Tanzania, including those in the Rufiji Delta, were classified as Forest Reserves and zoned for different uses, with some areas strictly protected. A major long-term proposal of the management plan was to transfer tenure over mangroves to local communities (Adams, 1992). However, the tenure of mangroves still remains with the Government of Tanzania although communities participate in mangrove management through Participatory Forestry Management (PFM) practices which were introduced into law with the passing of the Forest Act of 2002. The Act provides a clear legal basis for communities, groups or individuals across mainland Tanzania to own, manage or co- manage forests under a wide range of conditions.

Under the MMP, **Village Natural Resource Committees** have been formed in several villages in the Rufiji Delta and sensitisation activities on mangrove conservation have been undertaken through training, meetings, seminars, radio programmes, interactive video and through primary school

teaching curricula.

'National Integrated Coastal Environment Management Strategy'

In 2002, the 'National Integrated Coastal Environment Management Strategy' was adopted by the Government of Tanzania as a framework for improving decision making, promoting and strengthening sectoral management, promoting local coastal management programmes and meeting regional and international commitments such as the Nairobi Convention, the Convention on Biological Diversity and the UN Framework Convention on Climate Change. A national steering committee oversees the implementation of the strategy and a number of inter-sectoral working groups have been established.

Seven specific strategies to address six priority issues provide the strategic framework for action in the National ICM Strategy. All of the strategies attempt to balance enhanced conservation with continued use of coastal resources as well as new pathways of environmentally sound development that will reduce poverty, vulnerability and increase the wellbeing of rural communities.

Strategy 3 is of direct relevance to marine turtle conservation: "to conserve and restore critical habitats and areas of high biodiversity while ensuring that coastal people continue to benefit from the sustainable use of resources". The MMP has been an integral part of the **ICZM programme** in the Rufiji Delta.

REMP

The Rufiji Environment Management Project (REMP) was implemented between 1998 and 2003 (funded by Royal Netherlands Embassy with technical assistance from the IUCN). The project worked through the Rufiji District Council to initiate **community-based approaches to environmental management, surveillance and enforcement** in the Rufiji Delta. Land-use maps were produced by teams of researchers, government officials and the communities themselves using a combination of modern and traditional means. The maps then formed the basis of participatory land use planning at village level, focusing on transfer of resource management authority from central government to the four pilot villages and on empowering women as prime resource users. **Four Village Environment Management Plans** (VEMPs) were subsequently developed, each containing a socio-economic and natural resources profile, land and natural resource use zonations in visual and descriptive format, bylaws which outline rules, punishments and authorities, forest management or co- management plans and names of those responsible and their institutions. The respective village, ward and district authorities ratified all four VEMPs and the bylaws contained in them are also nationally recognised.

Two of the villages have gazetted their forests nationally as Village Lands Forest Reserves. Forest law was reformed in 2002 and the Forest Act of 2002 provided for Joint Management Agreements (JMA) within National Forest Reserves. The remaining two villages have since prepared Joint (Forest) Management Agreement (JMA) proposals (Hogan *et al,* 2006). In 2010, one of the villages applied for registration as a member of the Forest Stewardship Council (FSC). An audit was completed in 2010 and it was officially approved for inclusion in the group FSC scheme.

REMP had large-scale **capacity-building impacts** including natural resource monitoring and management, communication, good governance and technical enterprise skills which were adopted by a critical mass of community members, who in turn have trained others. This resulted in impacts outside of the four pilot villages including an increase in enthusiasm for community environment management. Neighbouring villages requested inclusion in further VEMP processes and initiated their own rules and area designations while awaiting district facilitation (Hogan *et al,* 2006).

Part of the REMP work included cataloguing areas of high biodiversity within village areas. The information was then used to support the 2004 designation of the Rufiji Delta Ramsar site.

<u>Fisheries management and mitigation of turtle-fisheries interactions</u>

Fishery closure

Over the past decade, the prawn fishery in Tanzania has experienced serious declines in yields. The prawn production declined from 1,320 tons in 2003 to 202 tons in 2007. The trend and population dynamic indices of the past ten years justified a total closure of the trawl fishery to allow the recovery of the overexploited stock.

The South West Indian Ocean Fisheries Project (www.swiofp.net), conducted between 2008 – 2013, carried out several research surveys in the Rufiji– Mafia Seascape to assess demersal and crustacean fisheries. With respect to prawn stocks, surveys found that catch rates increased one year after the time of closure in 2008 to 41kg/hr (2009). However catch rates decreased to 26kg/hr in 2011 and the fishery remains closed. The decline in stock in the Rufiji Delta was linked with uncontrolled effort by artisanal fishers and pressure from the market demand, specifically businessmen from Dar es Salaam who provide fishing gears, preservation facilities and transport to the city.

2005 – 2011 Rumaki Seascape Project: facilitation of alternative livelihoods

In 2005, WWF launched the Rufiji Delta - Mafia Island - Kilwa District (RUMAKI) Seascape Project, the goal of which was to improve the socio-economic wellbeing of coastal communities through sustainable, participatory and equitable utilisation and protection of marine resources. The programme completed a two-year planning and setting up phase which involved extensive consultation with communities, Local and Central Government and other stakeholders to **establish knowledge, attitudes and perceptions and identify gaps in community awareness and understanding.** In 2006/7 there was a major focus on livelihoods initiatives. A network of microfinance groups was established throughout target villages and this was supported by the promotion of small-scale enterprise and aquaculture. A fisheries co-management component was also incorporated into the programme in collaboration with Fisheries Development Division (Ministry of Livestock and Fisheries Development).

In 2011, the Rumaki project won an award for best 'International Relief and Development Project of the Year' which recognizes a project that has provided major benefit to local communities.

Today, 24 villages have established **village-level fisheries management groups (BMUs)** in the Rufiji Delta and there are **four Collaborative Fisheries Management Areas (CFMAs)** which have been delineated, covering 1,754km^2 of sea (Kimsa: 306km^2, Mbwekieki: 208km^2, Mchimchunya: 356km^2 and Njisopoja: 884km^2). In Mafia District, ten villages have established BMUs and two CFMAs have been delineated covering 744km^2 (Jojibaki: 266km^2 and Dokichunda: 478km^2).

BMUs are demonstrably engaged in fisheries management and are **conducting monitoring and surveillance patrols, confiscating illegal fishing gear, enforcing local bylaws, compiling catch data, collecting revenues from the fisheries sector and submitting quarterly reports** to the District Executive Director.

Incorporating marine turtle conservation into BMU work programmes

Ongoing capacity development programmes for BMUs and CFMAs are being supported and implemented by the Government of Tanzania together with national and international NGOs (Sea Sense and WWF). Capacity development programmes are facilitating the formulation of **BMU and CFMA Management Plans** that **incorporate protection measures for marine turtles** and other endangered marine species such as dugongs. Establishment of the CFMAs has influenced the decision of some communities in the Rufiji Delta to plan for restriction of specific fishing gears that pose a risk to marine turtles and dugongs (i.e. **use of gill nets with a mesh size of 5 to 10 inches**) and close some reefs to allow for replenishment of fish stocks and protect marine turtle foraging and breeding grounds. **Reefs at three locations in the Rufiji Delta have been closed for the past two years and the closures are being enforced by the CFMA monitoring and surveillance committees.** There has been a **high level of compliance** amongst resident fishers; however, migrant fishers have been observed persistently ignoring the closures which has led to conflict within the community. It is widely accepted that BMUs need further training to plan and implement effective enforcement patrols and require improved support from District Authorities.

Some BMUs in Rufiji and Mafia Districts have already prepared **Fisheries Management Plans and Bylaws** which have been submitted to Rufiji and Mafia District Councils for approval.

18. Conservation interventions proposed, but not yet implemented [G2, G3]

Provide details of any concrete conservation measures that have been proposed, or are in preparation, for the site, including any proposals for legislation, protection and management. Summarize the history of any longstanding proposals that have not yet been implemented, and differentiate between those proposals that have already been officially submitted to the appropriate government authorities and those which have not as yet received formal endorsement, e.g., recommendations in published reports and resolutions from specialist meetings. Also mention any management plan that is in preparation but has not yet been completed, approved or implemented.

Dugong sanctuary

The Rufiji Delta is the last known refuge of the dugong in Tanzania. In 2003, a national dugong assessment was undertaken and data contributed to the production of 'The Status of Dugongs in the Western Indian Ocean and Priority Conservation Actions'. The report recommended the establishment of a **dugong sanctuary** in the Rufiji Delta together with the regulation of gill net use and commercial prawn trawling. However, the recommendation has not yet been taken forward.

Prolongation of the moratorium on commercial prawn trawling

The most recent prawn stock assessment in the Rufiji Delta, carried out under the SWIOFP project in 2010-11 found that stocks were yet to recover to allow for the lifting of the moratorium on commercial prawn trawling. Hence, a recommendation was made to develop a **management plan** to prolong the moratorium and also outline management measures for the small-scale prawn fishery as well. The management plan was finalised in 2012.

Compulsory use of TEDs

In 2010-11, surveys carried out by SWIOFP using paired stern trawlers found that equal values of prawn catch were caught by a net with a Turtle Excluder Device (TED) and a net without a TED. No sea turtles were captured throughout the two surveys. Large sized fish were not caught in the TED trawl net, suggesting that the gear was effective in excluding all bigger marine organisms and retaining small sized fish and prawns. It was **recommended that TEDs be implemented in commercial prawn trawlers** in Tanzania to reduce incidental catch of sea turtles. Currently, the use of TEDs is not mandatory. However, they will be considered in the future,once commercial prawn trawlers recommence operations in the territorial and inner seas of Tanzania.

Rumaki project follow-up

WWF Tanzania is at the beginning of a five year programme focusing on improving fisheries co-management in the Rufiji Delta and Mafia District which follows on from the Rumaki project. The CFMAs of Mbwekieki, Njisopoja, Mchimchunya, Kimsa, Jojibaki and Dokichunda have developed fisheries management plans which are awaiting approval by District Authorities. A component of the WWF programme is to **facilitate identification and implementation of marine turtle, dugong and whale shark protection measures that can be incorporated into the fisheries management plans.** A series of further meetings is planned with leaders of the CFMAs to plan and review species protection measures.

Upcoming 'Mangroves for the Future' project

Mangroves for the Future in the Western Indian Ocean (MFF WIO) is an initiative being developed by the Nairobi Convention Secretariat in partnership with the IUCN eastern and southern Africa Regional Office (IUCN ESARO), the Western Indian Ocean Marine Science Association (WIOMSA) and CORDIO East Africa

(CORDIO EA). MFF WIO has three objectives, each supporting one of three "pillars" of Knowledge, Governance and Empowerment:

- Objective 1: Improve, share and apply knowledge to enhance resilience and reduce vulnerabilities to

natural hazards and climate change in coastal and marine areas

- Objective 2: Strengthen ICM institutions and empower civil society (including local communities) to

engage in decision-making and management processes that affect the resilience of coastal

ecosystems and livelihoods

- Objective 3: Enhance coastal governance at all levels (regional, national, provincial, district and

community) to encourage integrated management programmes and investments that are ecologically and socio-economically sound and promote the resilience of livelihoods and ecosystems.

The project was presented to The Seventh Conference of the Parties to the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean (Nairobi Convention) in Maputo. Subsequently, Decision CP7/13 requested Contracting Parties to endorse the Mangroves for the Future Partnership and engage in dialogue to develop this initiative further in the Western Indian Ocean.

The **Programme situation analysis** has recently been completed and a Regional Consultant has been contracted to support the design of a **detailed Programme Framework Document**. Programme design will be carried out through consultation of key stakeholders to ensure that it is relevant to stakeholder needs and is focused around national and local priorities.

19. Current / proposed scientific research and monitoring[G4]

Describe any current and/or proposed scientific research on marine turtles and their habitats, as well as information on any special facilities for research. In particular, describe past and current marine turtle monitoring activities at the site (e.g., tagging, satellite tracking, genetic sampling, nesting and foraging ground surveys, ongoing beach monitoring, etc.). Describe the survey methodology in sufficient detail to allow for an assessment of its efficacy. Indicate the number of years of continuous monitoring, and whether data have been used to estimate trends in the size of the management unit. Cite relevant published papers in support of the submission.

<u>Ongoing research</u>

Beach monitoring and nest monitoring and relocation

Since 2001, **daily foot patrols** have been conducted at six known nesting beaches in Mafia District and since 2005, at four beaches in the Rufiji Delta (**West, 2010**). Nests are located and identified by day track counts. Threats to nesting females and incubating eggs are also recorded and any nest under threat from poaching, predation or tidal inundation is **relocated to a safer area**. All nests are monitored until hatching and then excavated to assess **clutch size** and **hatching success**. Standard protocols are used for all monitoring and protection techniques as described in Eckert *et al*., 1999.

Nesting data collected in Mafia District between 2002 – 2010 have been analysed and show a **significant increase in nesting activity** (ANOVA test, $p<0.001$) (West, 2011).

Nesting in the Rufiji Delta is very sporadic and poaching levels are high, hence data is insufficient to estimate trends in the size of the population.

Monitoring of marine turtle mortalities

Marine turtle mortalities have been monitored in the Rufiji Delta since 2007. Data are collected on date, location, species, sex (if known), curved carapace length and width and presence/absence of tags (Eckert *et al*., 1999). Detailed observations on external wounds/injuries are also recorded in order to establish a possible cause of death.

During the period 2007 – 2013, 459 marine turtle mortalities were recorded in the Rufiji Delta (Sea

Sense, unpublished data). Mortalities of all five marine turtle species found in the western Indian Ocean region were recorded: green (n=350), hawksbill (n=89), olive ridley (n=10), loggerhead (n=3), leatherback (n=1), unidentified (n=6). Many stranded individuals showed evidence of net entanglement while others had been deliberately slaughtered.

Satellite telemetry

In 2012 **four satellite tags** (Wildlife Computers SPOT 5) were deployed on nesting green turtles in Juani Island, Mafia District to determine post nesting migratory routes and identify the location of foraging grounds in Tanzania and the wider region.

All four turtles undertook **post-nesting migrations**; two remained in Tanzania, one travelled north and settled on a foraging ground close to Mombasa, Kenya and the fourth migrated to northern Somalia.

One of the turtles tagged in 2012 was recaptured on a nesting beach in Juani Island in 2014 and was **tagged for a second time.** She undertook a post-nesting migration, following an almost identical route to her migration in 2012 and settled on the same foraging ground (West, 2014, *in prep*.).

Seagrass monitoring

A detailed assessment of seagrass habitats at key locations in Tanzania is proposed under a three-year Western Indian Ocean regional dugong research programme. The work is being funded by a MASMA grant from the Western Indian Ocean Marine Science Association (WIOMSA).The seagrass component of the work will identify the **historical and current extent of available seagrass habitat** in the Rufiji– Mafia Seascape through **remote sensing techniques**. Beaches of the region will be systematically surveyed for beach-cast incidence of seagrass species to identify species composition and spot dives will be carried out in select areas to ground truth seagrass diversity in areas identified through the remote sensing techniques.

20. Current / proposed communication, education, and public awareness activities[S3]

Give details of any existing and/or planned site-based programmes, activities and facilities for communication, education and public awareness, including training. Comment on potential opportunities for future educational and outreach activities at the site.

There is a well-established marine turtle education and public awareness programme in the Rufiji – Mafia Seascape which has been implemented by Sea Sense NGO since 2001. Education and outreach activities focus on raising public awareness of marine turtle biology, marine turtle life cycles in relation to habitat use and threats to their survival. Awareness programmes target all sectors of the community including fishers, village leaders, ward councillors, school pupils and women's groups in order to help change attitudes and perceptions to marine turtle conservation and protection.

Public awareness raising

Educational activities are ongoing and currently include **community film and debate evenings, school competitions, beach clean-ups, bycatch awareness meetings with migrant fishers, Theatre for Development projects and Focus Group Discussions**.

Community outreach events were held in the Rufiji Delta on **World Environment Day (2008 and 2010**) and **World Fisheries Day (2012)** which incorporated the use of theatre, art and song to spread messages about the importance of marine turtle conservation. Similar events were held in Mafia District on **World Sea Turtle Day (2011, 2012, 2013 and 2014)** and **World Fisheries Day (2013).**

Awareness materials (**posters and t-shirts)** are distributed regularly.

The activities have a strong focus on **marine turtle biology and conservation**, the promotion of

community stewardship of marine resources, the **environmental and socio-economic impacts of illegal and destructive fishing practices** and **increasing accountability** amongst local leaders and decision makers. District Fisheries Officers participate in Sea Sense education activities as part of a **mentorship programme** to improve their knowledge and understanding and help build capacity for community engagement in marine turtle conservation.

The education programme has been instrumental in **changing attitudes towards marine turtle conservation** and has helped to build relationships between fishers, BMUs, local leaders and district authorities. The education programme has also **raised the profile of the fisheries sector** amongst district level decision makers and in both Mafia and Rufiji Districts, it has contributed to recent decisions by District Executive Directors to increase budget allocations to the sector (Sea Sense, *pers. obs*).

Training

Training programmes for BMUs in the Rufiji Delta are being implemented by WWF Tanzania and Sea Sense NGO and focus on **developing capacity** for improved decision-making regarding the use and management of marine resources. Training programmes consist of modules on marine ecosystems (including role of marine turtles), fisheries economics and value chains, governance and leadership, resource monitoring (data collection and analysis), monitoring and surveillance, management planning, reporting, communication and information dissemination and performance monitoring.

BMU training programmes have resulted in BMU members being able to develop **a 'way forward' for fisheries management** in their locality. BMU action plans developed as a result of the training programmes included: providing feedback on the training to their colleagues within the BMU; organizing meetings between BMUs and village councils to strengthen relationships; sensitizing citizens on fisheries issues at village assembly meetings; networking with neighbouring BMUs for joint patrols and sharing of experiences; lobbying ward councilors for the inclusion of fisheries issues on Ward Development Committee meeting agenda; awareness-raising of marine turtle conservation at migrant fisher camps and fish landing sites; organizing meetings with DFOs to discuss plans for issuing fishing licences and boat registrations; seeking advice on their operational activities from village leaders and DFOs; demanding training in areas where they have poor capacity.

Sea Sense NGO has conducted extensive monitoring of the impacts of the training programmes. Some positive changes have been observed as a direct result of the training:

- BMUs are getting more support from their village leaders for the implementation of BMU activities.
- BMU members that attended the training are sharing their new knowledge with fellow members.
- BMU members have started to form stronger working relationships with District Fisheries Officers and there have been many cases of joint enforcement patrols.
- BMUs are starting to sensitize their communities on Tanzania fisheries legislation and raise awareness about the impact of illegal and destructive fishing activities on marine turtles.
- BMUs are more committed to documenting their activities and sharing reports.

Future educational activities

The Tanzania Turtle and Dugong Conservation Committee has produced a draft '**National Awareness Strategy for Marine Turtles and Dugongs in Tanzania'** which includes strategies to raise awareness in coastal communities. The draft strategy is currently undergoing a period of consultation with key stakeholders and it is anticipated that the strategy will be formally adopted by the Ministry of Livestock and Fisheries Development for future implementation by NGOs, District

Authorities and Central Government.

21. Financial resources available for management of the site and other activities [G5]

Identify human and financial resources (including in-kind contributions) available to support immediate and near-term activities, as well as resources available to sustain site-based activities in the longer-term (e.g. in relation to monitoring, management interventions, surveillance and enforcement, and performance evaluation).

Governmental human and financial resources

The **Ministry of Livestock and Fisheries Development** has set aside $20,000 for the financial year 2014/2015 to support fisheries management, including marine turtle conservation in the Rufiji – Mafia Seascape. It is anticipated that this commitment will continue in future years.

The Ministry has an office in Mafia to coordinate fisheries management activities in Rufiji and Mafia Districts. The Officer In charge is working in collaboration with District Fisheries Officers at Rufiji and Mafia District Councils and related NGOs including WWF and Sea Sense.

Human resources provided by the District

At District level there is existing institutional and organizational capital including the **Environmental Management Team (EMT)** of technical experts and the statutory **District Council committees of Construction, Economics and Environment.** The Committees are made up of Ward Councillors.

Monitoring systems comprising databases and trained readers/enumerators have been established.

EU funding

WWF Tanzania have recently secured a five year grant from the **EU (€2,400,000)** to conduct a **fisheries co-management programme** in five coastal districts including Rufiji and Mafia. The programme will build on previous fisheries development programmes and focus on **strengthening capacity of BMUs** to develop, manage and conserve fisheries, implement surveillance and enforcement activties and establish effective, long-term and equitable fisheries co-management strategies. There is a major focus on the development of sustainable financing strategies to support BMU activities (including enforcement of laws protecting marine turtles and reducing consumptive use). BMU's and village leaders will be trained in-village and facilitated to develop sustainable financing plans. The process in each village will involve **training in financial managemen**t, recording and disbursement, identification of costs, identification of revenue collection opportunities and plan preparation. Facilitation will be done by a sub-contracted consultant with expertise in local governance financing.

Contribution of materials/equipment

WWF conducts annual awards events to acknowledge high performing BMUs. Based on annual BMU performance monitoring data and pre-agreed objective criteria, one BMU in each of Mafia and Rufiji Districts is selected for an award to the value of €2,000 in the form of materials or equipment to support management and operations of the BMU.

UK funding (DFID)

Sea Sense NGO has conducted community based marine turtle monitoring, conservation and education in Rufiji and Mafia Districts for the past twelve years. In 2013 Sea Sense secured a further two years of funding from the Department of International Development UK **(£290,000**). Funds are being used to support **marine turtle monitoring and conservation activities, education and sensitisation programmes** in coastal communities and **train BMUs in marine resource conservation and management** with the aim of driving behavioural change to reduce the

degradation of marine and coastal ecosystems that marine turtles depend upon.

22. Additional resource needs at the site [G5]

Where specific needs are identified (e.g. skilled personnel, specialised training, facilities, field equipment etc.) indicate how marine turtle conservation activities are presently impaired on account of their unavailability (e.g. inability to carry out regular surveys, to conduct certain types of research, to monitor certain parts of the range etc.) This information may be useful for compiling a general picture of deficiencies and resource needs that could be presented to potential programme sponsors.

Training needs

There is a need to conduct **capacity-building** activities for both District Fisheries Officers and community-based fisheries managers (BMUs) that include training on conservation of marine turtles, monitoring, control and surveillance activities, strong leadership and governance and conflict resolution.

There is also an urgent need to **increase awareness** of Tanzanian Fisheries Regulations **amongst government authorities** including District Fisheries Officers, District Magistrates and Zonal Officers. These authorities all play an important role in either the enforcement of fisheries laws, the preparation of court cases against illegal fishers or the issuing of appropriate fines and penalties in accordance with national fisheries legislation, which provides protection for marine turtles and their habitats. Currently, the level of knowledge of laws protecting marine turtles and their habitats is low and there is poor understanding of how illegal fishing practices such as the use of beach seines, poisons or dynamite impact marine turtles and their habitats. As a result, illegal fishers are able to operate with impunity with little fear of apprehension.

Field equipment needs

The provision of working equipment such as **motorized boats and motor cycles** is important in Rufiji and Mafia Districts to support enforcement patrols. A lack of equipment to conduct patrol and surveillance operations is hampering the effectiveness of 'closed areas' in the Rufiji Delta which may lead to BMUs abandoning the closure in the future. Such closures are an important strategy for protecting marine turtles and their habitats and reducing fishing pressure at critical sites. The declaration of closed areas by community based fisheries managers represents a major step forward in community based natural resource management and the recognition of marine turtles as a valuable component of marine ecosystems.

Expertise in livelihood enhancement and diversification

Expert input is needed to help enhance and diversify local livelihoods in Mafia and Rufiji Districts to reduce pressure on marine turtles and their habitats. Through the identification of the diversity of resources, skills, capacities and interests in the community, and those factors that have helped or inhibited people from making changes in the past, it may be possible to identify options for changing livelihood strategies that provide longer-term protection for marine turtles and their habitats.

23. References [e.g. S1, G2, G4]

List key references relevant to marine turtle records and to the site, including management plans, major scientific reports,

and bibliographies. When a large body of published material on the site is available, only the most important references need be cited, with priority being given to recent literature containing extensive bibliographies. Reprints or copies of the most important literature should be appended whenever possible. Provide website addresses of references where available.

Adams, M. 1992. Participatory Management of Tanzania's Mangroves. ODI Rural Development Forestry Network Papers 13 e-i.

Bourjea, J.,Dalleau, M.& Ciccione, S. 2013.Seasonal variability of migration corridors and foraging areas of nesting green turtles revealed by satellite tracking at regional scale. Proceedings of33rd International Sea Turtle Symposium, Baltimore , Maryland, USA 2-8 February 2013.

Darwall, WRT. 1996. Marine biological and marine resource use surveys in the Songo Songo archipelago, Tanzania. Report no. 3: Simaya Island. The Society for Environmental Exploration and the University of Dar es Salaam.

Doody, K. 2003. Experiential Environmental Learning. Facilitators Manual. Rufiji Environment Management Project.

Eckert, K. L., K. A. Bjorndal, F. A. Abreu-Grobois, & M. Donnelly (Editors). 1999. Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group, Washington DC, Publication No. 4.

Graham, A., Shah, A. & Olivier, R. 2000. The pattern of logging in Rufiji District. REMP, Utete – Rufiji.

Hamann, M., Limpus, C., Hughes, G., Mortimer, J. and Pilcher, N. 2006. Assessment of the conservation status of the leatherback turtle in the Indian Ocean and South-East Asia. IOSEA Species Assessment: Volume I. IOSEA Marine Turtle MoU

Havnevik, K. J. 1993. Tanzania –The Limits to Development from Above.Nordiska Afrikainstitutet, Sweden with Mkuki wa Nyota Publishers, Tanzania.

Hogan, R., Mwambeso, P.A., Nandi, R.X.L., Elbariki, R., Chande, M.O. 2006. Rural community capacity-building through increasing local control over forest resources - the case of Tanzania through the example of village communities in Rufiji District. *In:* Small-scale forestry and rural development: The intersection of ecosystems, economics and society. Pp 164. Proceedings of IUFRO 3.08 Conference. Hosted by Galway-Mayo Institute of Technology Galway, Ireland18-23 June 2006.

Mafia Island Marine Park General Management Plan. 2000. Ministry of Natural Resources and Tourism, United Republic of Tanzania. Pp68.

Makoye, K. 2012. Salty soils drive Tanzanian farmers into forest reserve. Thomson Reuters Foundation. 31 January 2012. http://www.trust.org/item/?map=salty-soils-drive-tanzanian-farmers-into-forest-reserve

Mhitu, H. A and C. A Mwakosya. 2008. Paper presented during a pre-licence meeting for prawn fishing at the Fisheries Division Office on the 9th January, 2008

MLFD, 2012, Annual Fisheries Statistics Report.

Muir, CE & Abdallah, O. 2003. Tanzania Turtle & Dugong Conservation & Research Programme – Annual progress report. Submitted to Commission for Science & Technology, Dar es Salaam.

Muir, C. 2005. The Status of Marine Turtles in the United Republic of Tanzania, East Africa. Sea Sense.

Muir, C. 2006. Aerial survey to assess the presence and distribution of dugongs in the Rufiji – Mafia area of Tanzania. Sea Sense unpublished report. 8pp.

Muir, C & Ngatunga, B. 2009. Rapid bycatch survey of the Tanzania Industrial prawn trawl fishery. Proceedings of 29th International Sea Turtle Symposium, Australia, 2009.

Nasirwa, O., Owino, A., Munguya, E. & Washira, J. 2001. Water bird Counts in the Rufiji Delta, Tanzania, in December 2000. Rufiji Environment Management Project.

Ochieng, C. Research Master Plan for the Rufiji Floodplain and Delta, 2003 – 2013. Technical Report No.28. Rufiji Environment Management Project.

Richmond, M., Wilson, J., Mgaya, Y. & Le Vay, L. 2002. An analysis of smallholder opportunities in fisheries, coastal and related enterprises in the floodplain and delta areas of the Rufiji River, Tanzania.

Semesi, A.K. 1991. Management plan for the mangrove Eco- system of mainland, Vol. 11: Mangrove Management Plan of all Coastal Districts, Ministry of Tourism, Natural Resources and Environment, Forest and Bee-keeping Division, Dar es Salaam.

Shagude,Y.W. 2004. Coastal impacts of water abstraction and impoundment in Africa: The case of Rufiji River.75p. Final Report submitted to START, March 2004. Published in Ocean Docs: E-Repository of ocean publications.http://iodeweb1.vliz.be/odin/bitstream/1834/187/1coastal.pdf.

Stedman-Edwards, P. 2000. TANZANIA**:** RUFIJI, RUVU AND WAMI. World Wildlife Fund. Chapter 14.

Strategic Environmental Assessment of Mafia Island. 2008. Volume II: Main Report. Prepared by:

International Resources Group, Washington, DC.

Turpie, J., K. 2000. The Use and Value of Natural Resources of the Rufiji Floodplain and Delta, Tanzania. Technical Report No.17 Rufiji Environment Management Project

United Nations Development Programme (UNEP). 2012. Rufiji Environment Management Project. Equator Initiative Case Study Series. New York, NY.

Wang, Y., Bonynge, G., Nugranad, J., Traber, M., Ngusaru, A., Tobey, J., Hale, L., Bowen, R. & Makota, V. 2003. Remote Sensing of Mangrove Change along the Tanzania Coast. Marine Geodesy, 26:1–14, 2003.

West, L. 2008. Sea Sense Annual Report 2008. 24pp.

West, L; Joynson-Hicks, C; Mbugani, J. 2010. Marine turtle strandings in Tanzania: The need for a review of fisheries legislation. Proceedings of 30th International Sea Turtle Symposium, India, 2010.

West, L. 2010. A multi-stakeholder approach to sea turtle conservation in the United Republic of Tanzania. Indian Ocean Turtle Newsletter, 11:44. http://www.iotn.org/pdf/IOTN11_10.pdf

West, L. 2011. Sea Sense Annual Report, 2012. 53pp.

West, L. 2012. Sea Sense Progress Report, July to December 2012. Technical report submitted to WWF. 23pp.

West, L. 2012. Sea Sense Annual Report, 2012. 40pp.

West, L., Mchomvu, B., Abdallah, O., Mapoy, S. 2013. Green turtle nesting activity at Juani Island, Tanzania, during the 2012 peak nesting season. Indian Ocean Turtle Newsletter, 17:12. http://www.iotn.org/iotn-17.php

West, L. 2013. Sea Sense Progress Report, January to June 2013. Technical report submitted to WWF. 36pp.

West, L. 2014. The first documented case of foraging ground philopatry in a female green turtle *(Chelonia mydas)* in Tanzania. Submitted to Africa Sea Turtle Newsletter (2).

WWF Eastern African Marine Ecoregion. 2004. Towards a Western Indian Ocean Dugong Conservation Strategy: The status of dugongs in the Western Indian Ocean Region and Priority Conservation Actions. Dar es Salaam, Tanzania. WWF. 68pp.

2012 Population and Housing Census. National Bureau of Statistics, Ministry of Finance, Dar es Salaam and Office of Chief Government Statistician, President's Office, Finance, Economy and Development Planning, Zanzibar. March 2013.

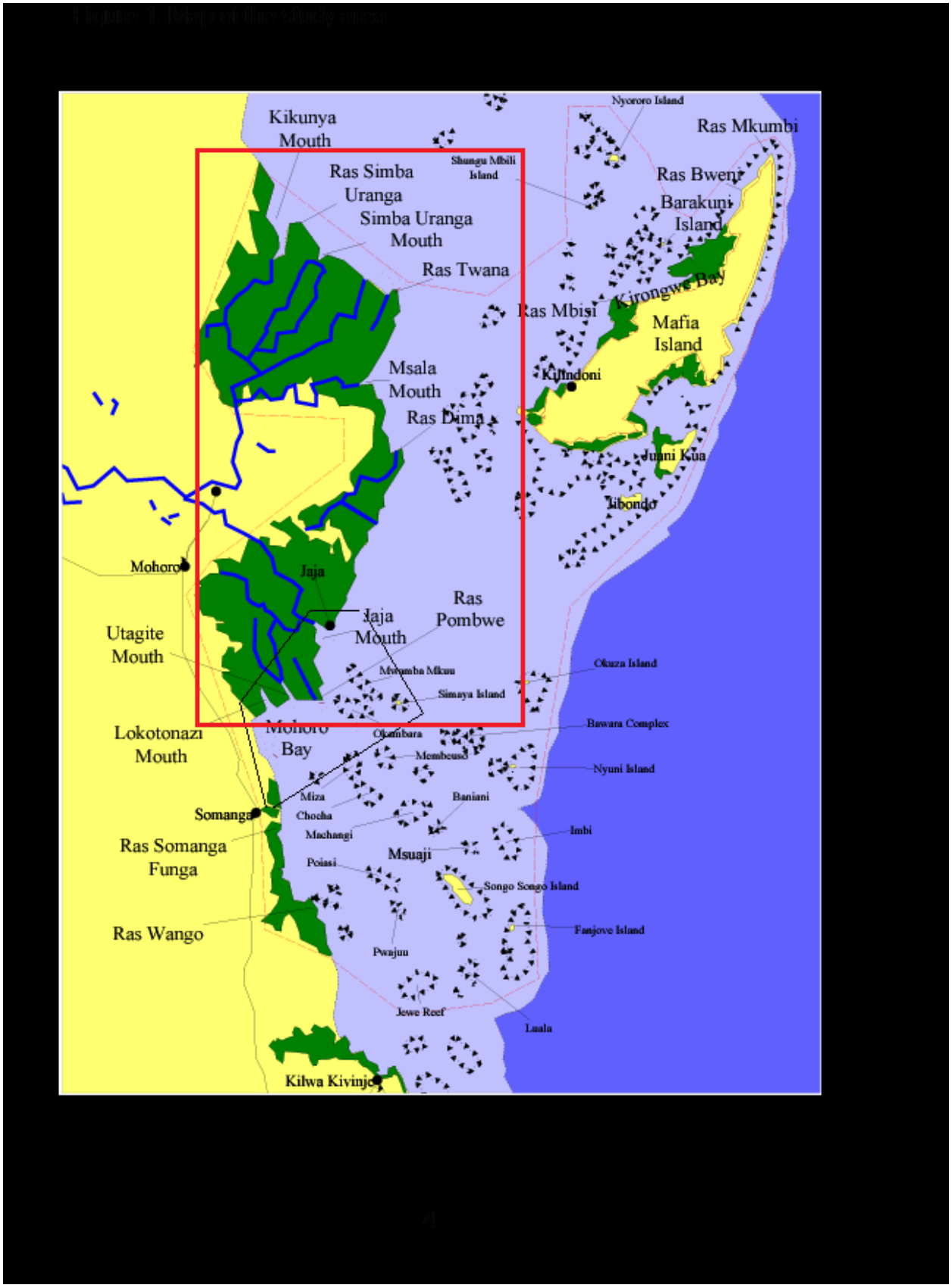
24. Site map[N2, N3]

The most detailed and up-to-date map of the site available should be appended to the Site Information Sheet in digital and/or hardcopy format. The ideal site map will clearly show the area boundaries of the site, scale, latitude, longitude and

compass bearing, administrative boundaries (e.g., province, district, etc.), and display basic topographical information, the distribution of the main site habitat types and notable hydrological features. It will also show major landmarks (towns, roads, etc.). Indications of land use activities are especially useful.

If applicable (and available), provide a zoning scheme to indicate areas where certain activities that might be incompatible with turtle conservation are permitted, buffer zones, and areas where such activities are not permitted (i.e. sanctuary areas).

The optimum scale for a map depends on the actual area of the site depicted. Generally the map should have a 1:25,000 or 1:50,000 scale for areas up to 10,000 ha; 1:100,000 scale for larger areas up to 100,000 ha; 1:250,000 for areas exceeding 100,000 ha. In simplest terms, the site should be depicted in some detail. For moderate to larger sites, it is often difficult to show detail on an A4 sheet at the desired scale, so generally a sheet larger than this is more appropriate. While an original map is not absolutely necessary, a very clear image is desirable. A map exhibiting the above attributes will be more suitable for scanning.



Map 1. Map of the Rufiji Delta (provided by the Site proponent).

Map 2. Google Earth map of the Rufiji Delta (provided by the IOSEA Secretariat).