

# A PROPOSED MARINE TRANSBOUNDARY CONSERVATION AREA BETWEEN KENYA AND TANZANIA

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Joint Technical Paper

Prepared By

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## Executive Summary

This technical document is the result of a process initiated several years ago to investigate the options for developing a coastal and marine Trans-Boundary Conservation Area (TBCA) between the Republic of Kenya and the United Republic of Tanzania. The two main agencies promoting this initiative are the Kenya Wildlife Service (KWS) and the Tanzania Marine Parks and Reserves Unit (MPRU). The aim of the TBCA between Kenya and Tanzania is to mainstream ecosystem management objectives and priorities into productive sector practices and policies. The concept seeks to strengthen capacity for restoring ecosystem health and conserving biodiversity at the local, national and trans-boundary level in the two countries. The proposed initiative seeks to pilot ecosystem-oriented approaches into spatial planning, water management, agriculture, forest, fisheries and protected area management.

The proposed site extends from the northern boundary of the Diani-Chale Marine National Reserve in Kenya to the southern boundary of Mkinga District in Tanzania, just north of the Tanga Coelacanth Marine Park. The area of interest harbours highly significant marine and coastal biodiversity. Due to its rich biodiversity and contribution to the socio-economics of coastal communities, the area has been recognized by several international agencies such as the World Wide Fund for nature (WWF) and the Convention for Biological Diversity (CBD) as an area of significance deserving special conservation attention.

The purpose of this technical paper is to provide a situation analysis of all issues relevant to the establishment of the proposed TBCA, and to provide a series of suggested options that may be followed in the future by those that will be responsible for the establishment of the TBCA. The analysis of habitats, species, socio-economic, legal and institutional issues is used to show that the establishment of a TBCA is justified and holds significant benefits for conservation and the well-being of the inhabitants of the area, while at the same time enhancing collaboration between the two countries. In terms of the environment it is apparent that the area consists of contiguous and connected habitats that are important at a regional level. The socio-political benefits of establishing a TBCA include improved management of natural resources through international cooperation, connecting people and cultures across borders, joint tourism initiatives, and cross-border learning opportunities.

The analysis identifies several threats (in addition to those posed by climate change) to the area that can be mitigated through the establishment of a TBCA. These include declining fisheries, destruction of marine and coastal habitats, deforestation, coastal flooding and salt water intrusion, sedimentation, pollution and the alteration of freshwater flows, terrorism and insecurity, and political apathy towards conservation issues.

Other transboundary initiatives globally and within Africa have been reviewed and a tentative institutional structure to operationalize the TBCA is presented. It is envisaged that a Marine Transboundary Steering Committee (MTBSC) would be established to steer the process of establishing and managing the TBCA (which would be the second such marine TBCA in Africa, after

the Ponta do Ouro – Kosi Bay marine TFCA between Mozambique and South Africa). Being an international matter, it is proposed that this Committee is established at Ministerial level by the responsible Ministries in each country. The MTBSC could operate under the auspices of either the Nairobi Convention or the East African Community. The Steering Committee would not consist of a permanent staff or administration but would operate and be hosted within the respective Ministerial systems, perhaps with a rotating Chair from each of the countries.

The proposed MTBSC would be constituted by representatives of all the major interest groups and stakeholders within the TBCA (ie. from both Kenya and Tanzania). For example, local and district/county authorities, MPRU and KWS, the private sector, BMU and CCA representatives, immigration, forestry services, etc .

It is envisaged that the existing gazetted parks and reserves would continue to operate within their jurisdiction according to the legislation that guides their activities, and be primarily responsible for the existing protected areas. However, the MTBSC provides the opportunity for the entire coastal area of the TBCA to be managed through a multi-use, zoned system; some areas with greater protection than others, and with some areas (eg. the urban areas in Kenya such as Diani), continuing to operate as such, but within the context of an overall system which allows greater communication between sectors and stakeholders both within each country and between them. In essence the MTBSC will provide a coordination mechanism to enhance collaboration between existing institutions, frameworks and stakeholders.

The technical paper then provides an indicative road map and timeframe for a series of actions that need to be undertaken to initiate the process, establish and operationalize the TBCA, as well as an indication of information and research gaps that will need to be addressed. Finally, suggestions with regard to infrastructure development, staffing and equipment requirements are presented.

## **1. Introduction and Background to the Process**

This technical document is the result of a process initiated several years ago to investigate the options for developing a coastal and marine Trans-Boundary Conservation Area (TBCA) between the Republic of Kenya and the United Republic of Tanzania. The geographic location of the area of interest in eastern Africa is shown in Figure 1 below.

More recently, UNEP, through the Nairobi Convention Secretariat, has initiated a series of discussions between the protected area management agencies in the two countries to take this process forward. A first meeting of the 'Core Group' comprising key personnel from the two agencies as well as others (such as fisheries) and NGOs active in the area of interest, was held in Nairobi, Kenya in November 2014. At this meeting a way forward was agreed upon, and decisions made to enable the process to proceed. This included a decision to obtain the services of a consultant to assist with drafting a technical document that could be used to promote and justify the idea of a TBCA. The Western Indian Ocean Marine Science Association has since been appointed to prepare this technical paper.

A second meeting of the Core Group was organised in Tanga, Tanzania from 27-29 March 2015, hosted by the Marine Parks and Reserves Unit of Tanzania. This gathering allowed several field sites in the area of interest on the Tanzanian side of the border to be visited, and for the group to engage with local communities. The meeting also served to endorse the Terms of Reference, work plan and timeframe for the development of this technical paper. The meeting also confirmed the composition of a team of experts from each country that were mandated to contribute to and review the technical paper to ensure that it ultimately receives support and endorsement by the authorities in both countries.

A third meeting of the Core Group to visit sites on the Kenyan side of the border and to review the draft technical paper was held in Kwale from 20-24 May 2015. Thereafter, the paper was finalised for presentation during the technical meetings preceding the COP 8 of the Nairobi Convention in the second half of June. It is envisaged that the COP 8 will provide the opportunity for the two countries to consider the concept at the highest levels, and potentially provide endorsement for the process of establishing the TBCA to proceed.

The two main agencies promoting this initiative are the Kenya Wildlife Service (KWS) and the Tanzania Marine Parks and Reserves Unit (MPRU). These protected area management agencies are tasked by national governments with promoting economic development by safeguarding and enhancing environmental services provided by Protected Areas, including tourism development, marine areas, watershed management, biodiversity conservation and other ecosystem services. Where protected areas lie on either side of an international frontier, different policies and legislation, planning and management structures, as well as the movement of wildlife, fishers, pastoralists, water, fire, and tourism across frontiers, challenges these national authorities to coordinate their planning and activities in order to achieve their intended objectives. The lack of such coordination can result in serious setbacks to national conservation and development strategies.

The proposed TBCA on the coast between Kenya and Tanzania provides the opportunity to focus attention on addressing the challenges facing the establishment of such a bi-national endeavour. Within the region, existing frameworks for the management of shared ecosystems are incomplete, inadequate, poorly enforced or not harmonized, and where harmonization attempts have been made (such as in the Greater Virunga Landscape between Rwanda and Uganda, and Mnazi Bay/Quirimbas Complex between Tanzania and Mozambique) the pace has been slow, as a result of many roadblocks (political, legal, policy and institutional). This coastal TBCA could provide a regional example of how to create structures and mechanisms for coordinating trans-boundary conservation initiatives, sharing of knowledge and lessons learned, providing technical support and skills development and channelling funding for trans-boundary conservation in the East African region.



Figure 1. Location of the proposed TBCA on the border between Kenya and Tanzania.

The aim of the TBCA between Kenya and Tanzania is to mainstream ecosystem management objectives and priorities into productive sector practices and policies. The concept seeks to

strengthen capacity for restoring ecosystem health and conserving biodiversity at the local, national and trans-boundary level in the two countries. The proposed initiative seeks to pilot ecosystem-oriented approaches into spatial planning, water management, agriculture, forest, fisheries and protected area management.

The proposed site extends from the northern boundary of the Diani-Chale Marine National Reserve in Kenya to the southern boundary of Mkinga District in Tanzania, just north of the Tanga Coelacanth Marine Park (see Figure 2). This report presents further details justifying this delineation of boundaries. The area of interest harbours highly significant marine and coastal biodiversity. Due to its rich biodiversity and contribution to the socio-economics of coastal communities, the area has been recognized by several international agencies such as the World Wide Fund for nature (WWF) and the Convention for Biological Diversity (CBD) as an area of significance deserving special conservation attention.

The area has a rapidly growing human population with nearly 60% of rural communities dependent on marine and coastal resources for their livelihoods. Overfishing, illegal and destructive fishing practices, illegal logging and unsustainable resource use patterns are major threats depleting natural resources. Other threats include pollution, increased sedimentations as a result of poor agricultural practices and disturbance or clearance of mangroves. Climate change and associated impacts are intensifying the vulnerability of communities and ecosystems prompting the need for appropriate adaptation measures.

The proposed TBCA is complementary in enhancing Kenyan and Tanzanian efforts to sustainably manage and conserve coastal and marine resources, contribute to poverty alleviation amongst impoverished coastal communities, and to promote the implementation of key regional and international instruments for the conservation of marine and coastal resources and biodiversity. Further, the protection of the TBCA between Kenya and Tanzania complements the Tanzanian efforts of protecting all small islands south of the border (Ulenge, Kwale, Kirui and Mwewe Marine Reserves).

Natural resource management and conservation issues have received considerable attention and investment in the area of interest. These efforts have significantly raised the level of awareness on conservation issues in the area, established several community-based conservation and fisheries management initiatives, and encouraged the two protected area management agencies to begin interacting with each other for their common benefit. This provides a sound foundation upon which to build.

In Tanzania, past investments and initiatives have included the Tanga Coastal Zone Conservation and Development Programme (TCZCDP – 1994 to 2004); and support for capacity development, equipment and infrastructural, especially in the establishment of the Tanga Coelacanth Marine Park (TACMP), from the World Bank-funded Marine and Coastal Environmental Management Programme (MACEMP – 2006 -2011)). Some work has also been conducted by local NGOs to address the ongoing problem of dynamite fishing. In Kenya, the Kenya Coast Development Programme (KCDP - World Bank) has also provided support to the concept by investing in various conservation activities on the south coast. Several NGOs including the East African Wildlife Society (EAWLS), Fauna and Flora International, CORDIO, and the Wildlife Conservation Society (WCS) have been actively involved in working with communities between Diani and the border to establish community-managed conservation/fisheries areas. At a regional level, WIOMSA has supported work on further understanding the issue of migrant fishers, a phenomenon that is common in the proposed TBCA.



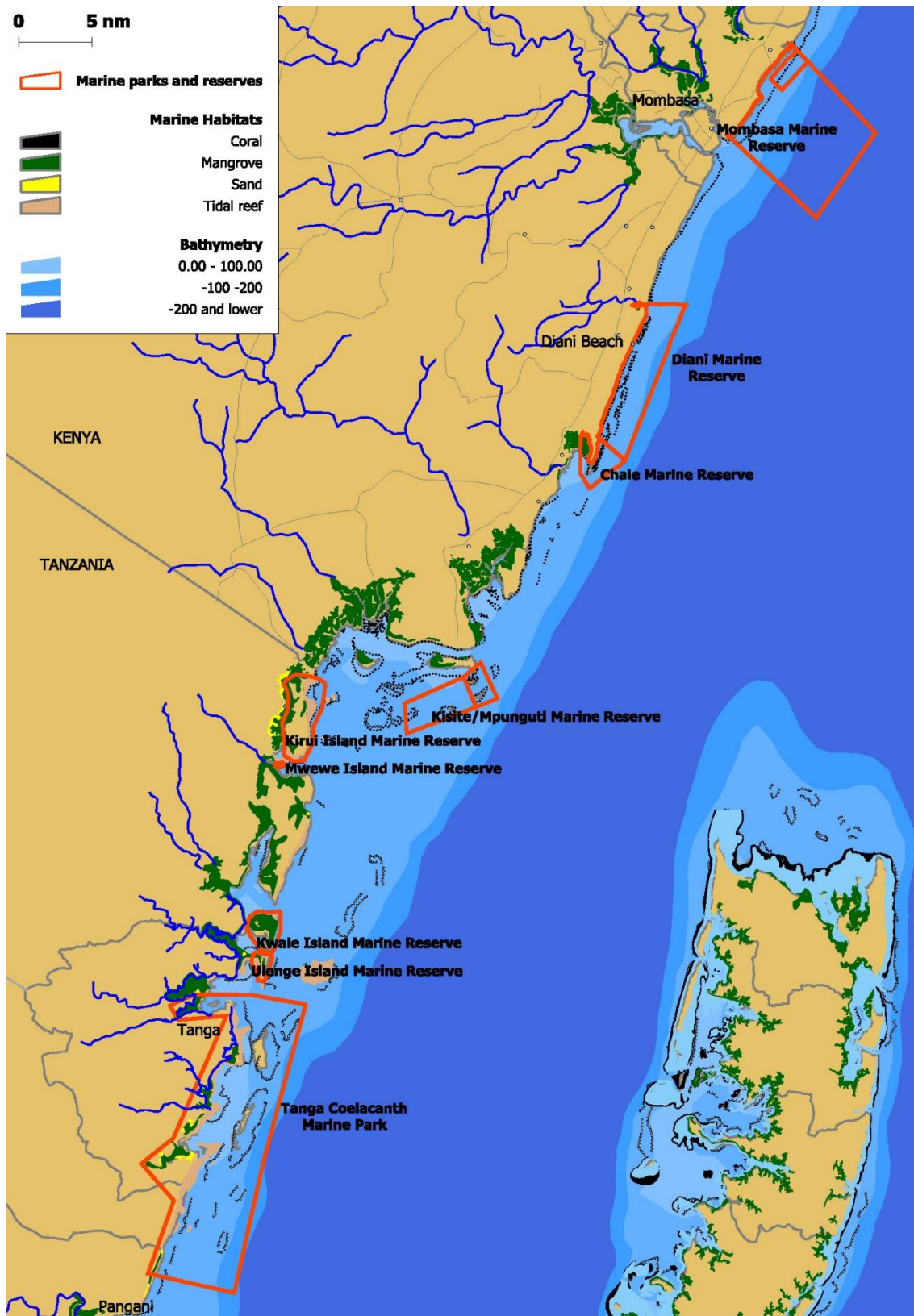


Figure 2. The area of interest between Mombasa in Kenya and Pangani in Tanzania showing existing marine parks and reserves.



This technical report has drawn on a wide range of available literature, as well as extensive interaction with stakeholders during field visits to the proposed TBCA in both Tanzania and Kenya. Stakeholders engaged with include representatives of the conservation agencies of both countries, Regional, District and County authorities, Community groups (including Liaison Committees and Beach Management Units among others), and experts in the various disciplines covered in this report.

The purpose of this technical paper is to provide a situation analysis of all issues relevant to the establishment of the proposed TBCA, and to provide a series of suggested options that may be followed in the future by those that will be responsible for the establishment of the TBCA. In order to achieve this the document first contextualizes the socio-ecological characteristics of the area by providing a description of the general environment (both social and ecological) drawing on information from various recent studies. The coastal and marine ecosystem is described in terms of climate and oceanography, habitats, and species. The socio-economics and livelihoods of the human population living in the area are discussed with emphasis on demographics and the different economic sectors such as fisheries, agriculture and tourism.

This section is followed by a description of the current legal, institutional and management regimes that are relevant to conservation activities in the area. This will include discussion of relevant acts of Parliament, national and regional policies, conventions and agreements that the countries have signed, and management frameworks that are employed by the respective conservation authorities.

The descriptive information presented is then followed by discussion of issues justifying the establishment of a TBCA. The ecological significance and benefits of joint management of an extended area on both sides of the border are combined with potential socio-political benefits to argue that joint management will be a better option from both an ecological and human development perspective.

Threats to the area that need to be considered that could disrupt the effective establishment of a TBCA, are then presented in the form of a threat matrix. These include issues such as climate change, un-regulated fisheries, political instability and regional insecurity.

Considering the information and arguments presented in the document, the report then goes on to make some suggestions as to possible practical arrangements and models that could be considered in developing and operating the TBCA. This includes consideration of other trans-boundary conservation initiatives and how these may or may not be suitable to guide the legal, institutional and management frameworks for the proposed TBCA.

Delineation of the proposed TBCA boundary is then presented spatially, based on criteria that have been developed by the Core Group that has been working on the TBCA process to date. These include criteria such as: seaward boundary – bathymetry (200m), or distance from shore (5nm); landward boundary – coastal wards.

The report ends off with a concise and practical roadmap in the form of a Gantt chart that could be used to roll-out the process. This will form an important part of the funding proposal that will be developed subsequent to completion of this technical document.

References and information sources used in compiling this report are then presented while Appendices are included describing information and research gaps that have become apparent through the process to date, and that will need to be addressed in the future; and infrastructural, staffing, equipment and other logistical requirements for the proposed TBCA to function.

## 2. Socio-ecological Context of the Area

### 2.1. Description of the Coastal and Marine Ecosystem

#### 2.1.1. Climate and oceanography

The atmospheric processes that influence climatic conditions in the region of the proposed TBCA are driven by processes that originate across the Indian Ocean (both north and south of the equator) as well as by processes that originate in the Pacific Ocean and that are transmitted into the Indian Ocean through so-called *teleconnections* (e.g. the Indonesian Through-flow (ITF) and El Niño/La Niña (Anderson and Samoily, 2015)). The main features of the climate in the area of interest are the Monsoons. During the austral winter (~May-October) the south-easterly Trade Winds (SE Monsoon) are dominant as a result of the (boreal summer) heating of the large landmasses of the Indian Subcontinent and Asia. During the austral summer (~November-April) however, the SE Trades are weaker and the monsoon reverses due to significant (boreal winter) cooling of the Indian Subcontinent and Asia, leading to the dominance of north-easterly Trade Winds (NE Monsoon) (Anderson and Samoily, 2015).

The rainfall in the region is seasonal. Rainfall is lowest during the SE Monsoon months of May/June through September/October. The major rains fall during the NE Monsoon, with the so-called ‘short rains’ over the months of October through November, and the main wet season (long rains) being from February/March to May, as the NE Monsoon subsides (Figure 3). Mean annual rainfall ranges between 1000mm and 1 600mm.

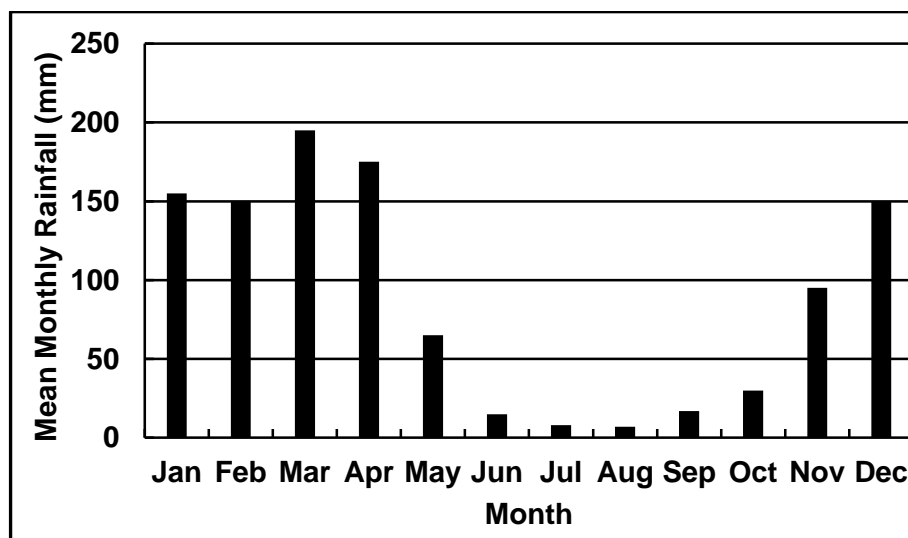


Figure 3. Mean Monthly Rainfall for Dar es Salaam 1990 to 2009 (Source: Anderson and Samoily, 2015)

The rainfall patterns impact on the coastal zone through freshwater run-off from several rivers in the proposed TBCA.

The coastal waters in the proposed TBCA are strongly influenced by the Indian Ocean’s oceanic currents and climate, including the El Niño Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) which in turn drive weather patterns, trade winds, rainfall and primary productivity. The principle ocean currents of the WIO are presented in Figure 4 (during the SE Monsoon) and Figure 5 (for the NE Monsoon). Anderson and Samoily (2015) describe the main ocean circulations patterns succinctly as follows: “The major current, running throughout the year, is the westward-flowing

South Equatorial Current (SEC) located in a band around approximately 15-20°S. The SEC is driven by a number of processes including forcing by the ITF and, through the SE Trades, by atmospheric processes associated with the heating of the Indian/South Asian landmass, as well as by equatorial oceanic heating and the formation of the Hadley Cells (Han et al., 2006; Schott et al., 2009 etc.).

During the boreal summer, with significant heating of the Indian subcontinent and Asia, the SEC is at its strongest, reaching velocities of ~1.5-2.0 m/s (ASCLME, 2012). In Figure 6 the SEC is seen to be deflected both to the north (NEMC) and to the south of Madagascar (SEMC) and impacts on the coast of Africa around southern Tanzania, northern Mozambique, where it splits to form the East African Coastal Current (EACC) running north, and the Mozambique Current (to form the Agulhas Current) running south into the Mozambique Channel. The EACC continues to run north, subsequently forming the Somali Current (SC) along the coast as a result of the strong airflow towards the Indian sub-continent. Strong coastal gyres (SG and GW) also develop with the Somali Current and upwelling takes place off the coast of Somalia (wedge shapes). The EACC eventually turns east to form an easterly-flowing current north of the Equator. The meridional Ekman transport effect is identified by 'ME' and the North/South aligned arrows either side of the equator.

In the NE Monsoon configuration, during the boreal winter, the monsoon reverses due to significant cooling of the Indian Subcontinent and Asia. The SEC (and the SE Trades) therefore also weakens as a result of this to a mean velocity of ~0.5 m/s, while the Somali Current effectively reverses, and can flow south as far as about 4°S, before both the currents turn east, and form the South Equatorial Counter-current (SECC). Note that during the NE Monsoon, the direction of the meridional Ekman Transport reverses."

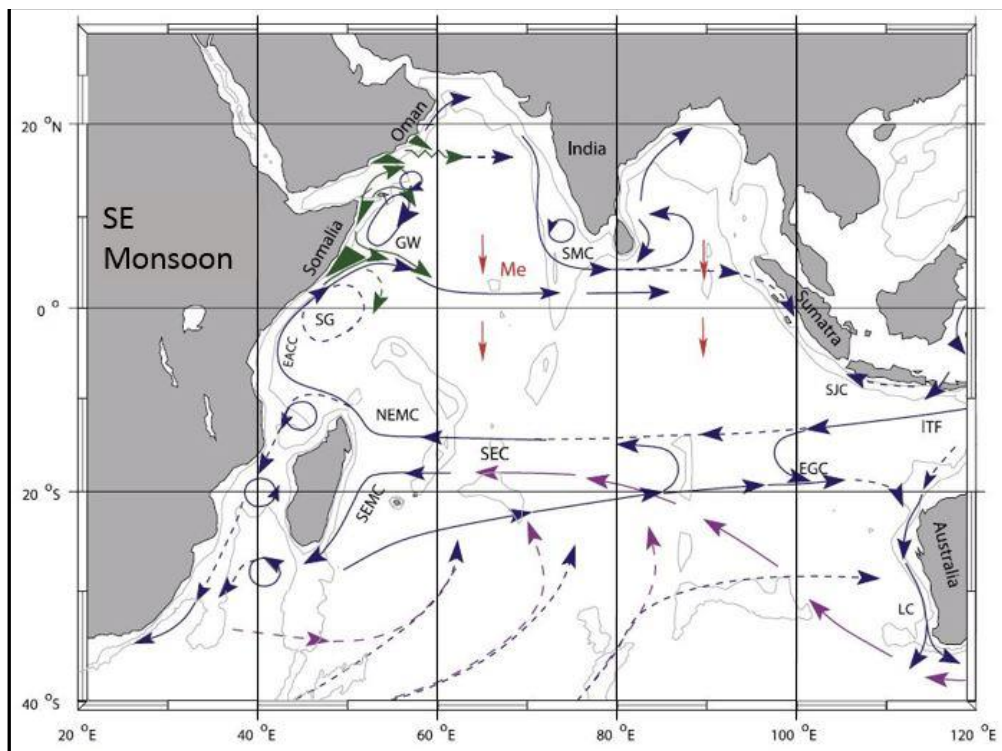


Figure 4. Representation of currents during the SE Monsoon (Source: Schott et al., 2009)

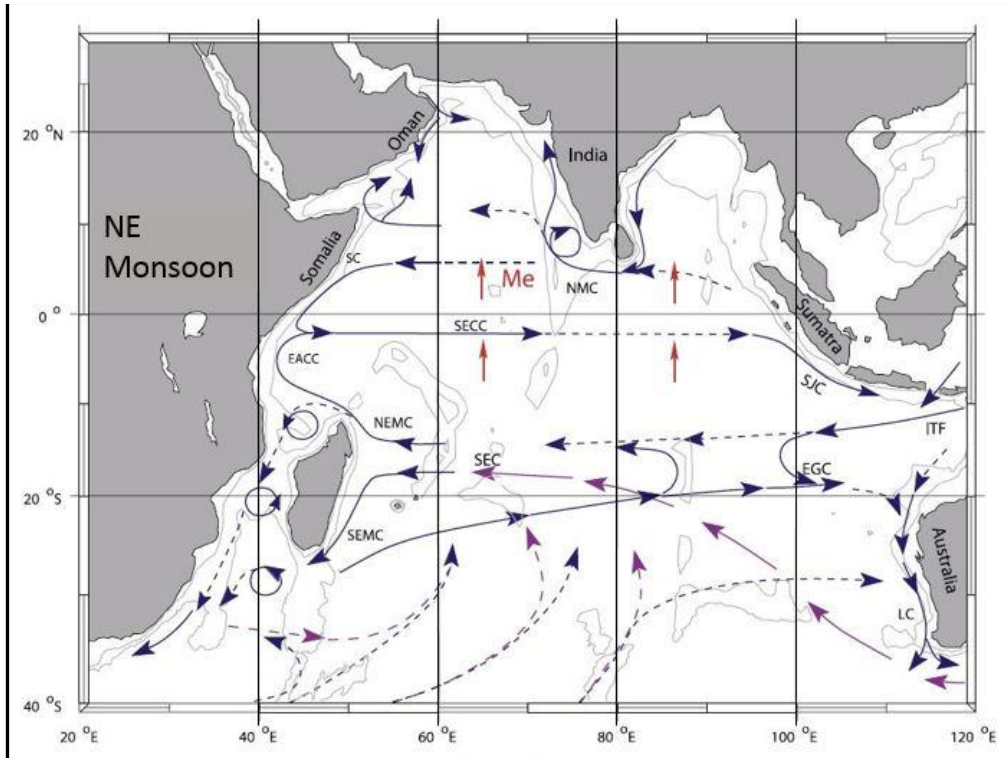


Figure 5. Representation of currents during the NE Monsoon (Source: Schott et al., 2009)

### 2.1.1. Habitats

Using Spalding’s (2007) and Obura’s (2012) definitions of ecoregions in the western Indian Ocean (WIO), the proposed TBCA falls within the Monsoon Coast Ecoregion, running from approximately Mogadishu in southern Somalia, through Kenya and northern Tanzania, to approximately Dar es Salaam (Figure 6). The five ecoregions depicted in Figure 6 are as follows:

No.	Geographic range
1	Somalia
2	Southern Somalia, Kenya, northern Tanzania – monsoon coast
3	Northern Mozambique Channel: southern Tanzania, northern Mozambique
4	Southern Mozambique Channel: central southern Mozambique
5	Delagoa: southern Mozambique, northern South Africa

(Spalding et al., 2007; Obura, 2012. In Samoilys et al., 2015)

The area of the proposed TBCA has also been recognised as an important seascape within the Tanga-Msambweni East African Marine Ecoregion as part of the WWF East African Marine Ecoregion (EAME) process (WWF, 2004). This significance of this is discussed later under Section 4 of this report.

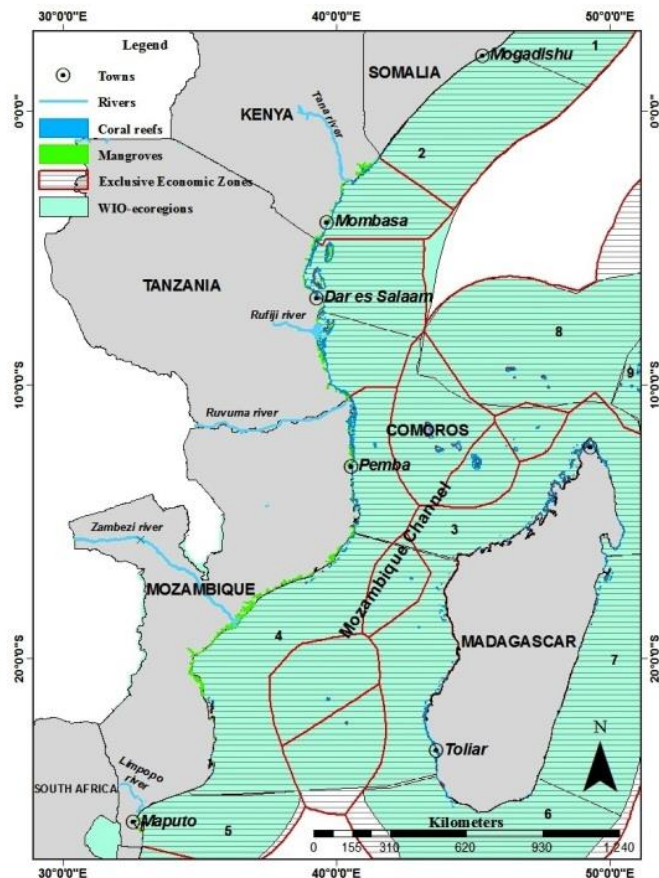


Figure 6. Map of the WIO showing the position of Tanzania and Kenya, as well as Comoros, Madagascar, Seychelles, Somalia, Mozambique and South Africa. Ecoregions are those defined by Obura (2012) based on the distribution of hard-coral species. (Source: Samoily et al, 2015).

The main marine habitats falling within the proposed TBCA are mangroves, rocky shores, coral reefs, seagrass beds, intertidal reef flats, muddy or sandy flats, and coastal forests. In addition, the area includes offshore canyons on the continental slope that is very close to the shore (average of around 5 nautical miles). Although several rivers enter the ocean in this area (eg. Ramisi River in Kwale County), and provide important estuarine habitats, none of the major river basins of Kenya or Tanzania are located here.

Although good spatial information exists for the habitats of some of the protected areas in the proposed TBCA, no single source shows this information as a continuous seascape. Therefore information has been combined from various sources (see references) to produce such a map that will be of use to the current process. Figure 7 shows the main habitats for the entire area between Diani and Tanga. The scale of the map does not allow locally specific features to be determined. However, it is instructive in showing the similarity of the coastline on both sides of the border, emphasising the continuous and connected nature of habitats and ecological processes in the area.





Figure 7. Map of areas of interest showing key habitats.

### Mangroves

As can be seen from Figure 5 mangroves form the most extensive coastal habitat in the proposed TBCA, dominating the shoreline in terms of coverage. The proposed TBCA has 9 of the 10 mangrove

species found in the WIO. *Rhizophora mucronata* and *Cerriops tagal* predominate and can be found in almost all mangrove forests. The rarer species are *Heritiera littoralis* and *Xylocarpus moluccensis*. Mangrove forests display a strong zonation of species controlled by the large tidal regime. The typical sea-to-land zonation pattern is *Sonneratia alba*, *R. mucronata*, *Brugeria gymnorhiza*, *C. tagal*, *Avicennia marina*, *X. granatum*, *Lumnitzera racemosa* and *H. littoralis*.

Tanga region has Tanzania's third-largest mangrove forest cover, approx. 13,192 ha (MMP, 2000), after Rufiji and Kilwa. Between 1998 and 2003, 176.4 ha of mangrove area were replanted (Wells et al., 2007). Natural mangrove cover is said to have been largely maintained in Muheza District and large areas have been replanted (a total of over 200 ha, with 400,000 seedlings). In TACMP, mangroves are predominant in river estuaries as well as on Yambe and Karange Island. A large area of mangrove forest spans the villages of Mtambwe, Ndumi, Mwambani Mchukuuni, Jambe Island and Geza as well as Mwarongo, Tongoni and a small strip south of Kigombe (CBD, 2012). Mangroves have been gazetted as forest reserves in Tanzania, which allow regulated extraction, since 1928. As a result, mangrove degradation and loss has occurred though at a slower rate than in most other countries in the region. The widespread and excessive exploitation of mangroves for timber, fuel and tannin is degrading some forests and putting them at risk (Spalding et al., 2010). The national Mangrove Management Project implements the Mangrove Management Plan (MMP, 1991) at a nationwide scale, which also encourages participatory monitoring with coastal villagers and includes regular replanting activities (Wells et al., 2007).

Estimates put Kenya's mangrove cover at between 5,300 to 6,100 km<sup>2</sup> with 67% occurring in the northern Lamu area and 10% further south in Kilifi and Kwale Counties. Smaller mangrove areas are found on the south coast in creeks around Shimoni and Vanga, and in the bays of Funzi and Gazi. Most of these forests do not occur in estuaries but in intertidal areas where there is submarine ground water discharge or seepage (Mwatha et al., 1998). The mangroves create a conducive habitat for finfish and crustaceans and are likely to support highly productive offshore fisheries (Samoilys et al., 2015). In Kenya, mangroves were declared government reserved forests in 1932 and are managed by County Forestry Officers, who supervise licensing, offtake and conservation. Legislation governing mangrove management comes under the Forest Act (2005). However, insufficient attention is paid to mangrove forest ecosystems. The Forestry Department is primarily concerned with terrestrial forests as their timber is deemed to be of far greater value (Samoilys et al., 2011).

Fortunately, many of the forests are in protected areas such as the Shimoni-Vanga area in the Kisite and Mpunguti Marine Park and Reserve. Despite the national protection status of these mangrove forests, they remain under threat from development (Bosire et al., 2008; Kairo and Dahdouh-Guebas, 2008; Spalding, et al., 2010).

### **Coral reefs**

Coral reefs are also very common in the proposed TBCA. Figure 5 shows that they are distributed extensively both north and south of the border. These reefs are typically shallow fringing reefs, sometimes enclosing a lagoon, with shallow and deeper patch reefs further offshore. The fringing reefs are often associated with seagrass beds (Obura, et al., 2012).

Obura (2012) recorded 369 hermatypic (hard) coral species in the WIO region. A total of 47 coral genera have been recorded within the TACMP with diversity increasing from 20 genera on the inshore fringing reefs, to 24 on the inner patch reefs and 28 on the outer patch reefs (Horrill, et al., 2000). Similar patterns are expected on coral reefs in the TBCA north of TACMP. Of the 407 km of coastline in the Tanga region, 97 km are bordered by distinct sections of fringing reefs and there are at least 55 outer and inner patch reefs recognized in the area, yielding a total of 376 km of reef edge



in the region (Horrill et al., 2000). If this figure is extrapolated to the areas north of the border in Kenya, the overall area of reef edge that would be included in the proposed TBCA is significant at a regional WIO level.

The reefs in the proposed TBCA are generally rich in marine biodiversity, and support many local fishing communities (McClanahan et al., 1999). In 1968, Tanga reefs were perceived as ranking among the 'best' along the Tanzanian coastline (Ray, 1968). However, since then structural reef damage, overfishing, and concomitant declines in reef associated fish species has been prevalent. For example, most of the decline in reef health has been attributed to structural damage from dynamite fishing, particularly to the south of TACMP (off Kigombe) and in close vicinity to Tanga City. Weighted nets, boat anchors and hulls flattening the top of shallow reefs, and trampling of those reefs exposed at spring low tides may play an additional role, and the large increase in fishers may play a role in the comparatively low fish abundances on reefs (Wells et al., 2007).

The reefs on the Kenyan side of the border tend to be better protected and managed than on the Tanzanian side. This is largely due to Kenya's long-standing and well supervised national marine parks (McClanahan et al., 2007, Samoilys and Obura, 2011). More recently, a network of community conservation areas (Maina et al., 2011) has been established. In the past, the government of Kenya tended to choose coral reefs to gazette as parks because of their aesthetic appeal and rich biodiversity. Later the government introduced marine reserves that were larger than the parks and encompassed neighbouring seagrass beds and mangrove forests. The reserves provide a more balanced ecosystem-based approach to marine conservation and management (Samoilys and Obura, 2011). Unlike the parks, they allow carefully managed fishing by local communities. The good management of marine parks in Kenya has also led to significant recovery in fish populations over the last 20 years (McClanahan and Graham, 2005, McClanahan, et al. 2007).

Corals are threatened by an increase in the SST caused by global warming. The warmer water bleaches corals and eventually kills them if raised water temperatures persist. This threat has been well documented in the WIO (Linden and Sporrang, 1999; Wilkinson, 2008; McClanahan et al., 2011). Levels of coral bleaching from the extreme temperature during the 1998 El Niño event and the subsequent recovery of coral reefs have been quantified in the WIO. They show that recovery rates and resilience to bleaching vary considerably within the region. The northern Mozambique and southern Tanzanian coral reefs appear to be the most resilient with the quickest rate of recovery (Obura, 2005; McClanahan et al., 2007a; Obura, 2011). Reefs throughout this region have been reported to be on a clear recovery trajectory after the bleaching even (Obura, 2011), which provides a positive indication that damaged reefs in the proposed TBCA could recover, both from bleaching and physical destruction, with time and adequate protection.

### **Seagrass beds**

Although there are numerous patches of seagrass beds within the proposed TBCA, their spatial extent is poorly documented. Seagrass beds are considered highly vulnerable to human activities, such as prawn trawling, seine and drag nets. Oil pollution, port construction and other coastal developments are emerging threats. The habitat is important as nursery areas for juvenile fish species and as feeding grounds for endangered species like dugongs and turtles (CBD, 2012). Seagrass beds are recognized as important to local fisheries too. Food fish such as rabbitfish (Siganidae), surgeonfish (Acanthuridae) and seagrass parrotfish (*Leptoscarus* spp.) preferentially graze the epiphytes on the seagrass while larger fish such as snappers, groupers and barracuda feed on the in-fauna of the seagrass beds (Samoilys et al., 2015).

Seagrasses are recognised as creating one of the most productive aquatic ecosystems on earth (Green and Short 2003). Their habitat ranges from high intertidal to shallow subtidal soft bottoms

such as sandy bays, mud flats, lagoons and estuaries where they tend to form extensive mono- and multi-specific meadows. They often occur in close proximity to coral reefs and mangroves. In the proposed TBCA they are restricted to shallow water as they depend on sunlight for photosynthesis (Samoilys et al. 2015).

Of the 60 seagrass species identified worldwide, 13 are found in the WIO. Tanzania, Kenya and Mozambique have the greatest diversity of seagrasses with 12 species widely distributed in each country. These are *Cymodocea serrulata*, *Cymodocea rotundata*, *Halodule wrightii*, *Halodule univernis*, *Halophila ovalis*, *Halophila minor*, *Halophila stipulacea*, *Enhalus acoroides*, *Syringodium isoetifolium*, *Thalassia hemprichii*, *Thalassodendron ciliatum*, and *Zostera capensis* (UNEP, 2009).

Kenya has 34 km<sup>2</sup> of seagrass beds (UNEP, 2009) while Tanzania has not yet fully mapped the extent of this habitat in that country. The only area that has been studied is Mnazi Bay where 50 km<sup>2</sup> of seagrass beds have been recorded (Richmond and Mohamed, 2005). There is an urgent need to obtain better information on the seagrass beds on the Tanga coast as it is recognised as one of the primary areas for this habitat in Tanzania. It is known that poor fishing practices such as the use of beach seines and dynamite fishing have accelerated since 2005 and continue to damage seagrass beds and their associated fauna and flora (Samoilys et al., 2015).

Some of the most extensive seagrass beds in Kenya are found within the proposed TBCA in the bays of Gazi (8 km<sup>2</sup>) and Funzi, as well as in the back lagoons around Diani–Chale Island (4.5 km<sup>2</sup>). Gazi Bay and the lagoons of Diani–Chale Island are more or less continuous and represent the largest seagrass area in Kenya (Ochieng and Erftemeijer, 2003).

Although these are key habitats and also play an important role as carbon sinks, seagrasses have not received sufficient research or conservation attention. As a result, there is little attempt to control the exploitation of fauna in seagrass beds outside protected areas (Samoilys et al, 2015).

#### **Rocky shores and intertidal mud flats**

Much of the coast line of both the mainland and islands in the proposed TBCA consists of rocky shores made up of fossilised coral, which is the geologically dominant component of the coastline close to the ocean. In many cases the shoreline is eroded leaving steep rocky faces on the landward side of intertidal areas. Terrestrial vegetation is found on the landward side, while marine habitats occur on the seaward side of these rocky faces. Figure 3 shows such a rocky shore in southern Kenya. Rocky shores support many species of macro-algae, with 105 species of red, green and brown algae identified within the TACMP (CBD, 2012).

Mud flats occur in shallow calm water bays on both sides of the border in the proposed TBCA. In Tanzania these occur from Kilanje Creek at Mtang'ate Bay northwards to the Kenyan border (UNEP, 2001), and in Tongoni within the TACMP. These ecosystems support a variety of aquatic fauna and are particularly important to burrowing shellfish and avifauna such as waders.



Figure 8. Rocky shore on Wasini Island, southern Kenya.

### 2.1.2. Species

This section draws heavily on, and essentially provides a summary of, the recent work undertaken by Samoily et al. (2015) in compiling a situation assessment of the East African coast as part of the Resilient Coasts initiative. More localised information on the proposed TBCA area has been drawn from the documentation supporting the nomination of Pemba – Kisite – Shimoni, and the Tanga Coelacanth Marine Park as Ecological and Biologically Significant Areas (EBSAs) under the global CBD methodology.

Apart from the marine species making up habitats as discussed above, there are several groups that contain species of special importance that need to be mentioned in the context of the proposed TBCA, as they have been recorded, or are likely to occur, in the area. The criteria used to include these species are taken directly from Samoily et al. (2015) and include some or all of the following: IUCN Red List; endemic to the WIO; known functional ecology in resilience; important food species for local fisheries; global rarity and aesthetic value; and vulnerable or resilient to climate change.

#### **Bony Fishes, Sharks and Rays**

##### ***Coelacanth***

One of the most notable fish in the region is the coelacanth, *Latimeria chalumnae*. Often referred to as a “living fossil fish”, its conservation status is considered endangered (CITES - Annex 1 species), and critically endangered (IUCN Red List). The coelacanth is the sole known remaining representative of a once widespread family of sarcopterygian (fleshy-finned) fish that were thought to have become extinct 70 million years ago. Two species of coelacanth are extant: the WIO species *Latimeria chalumnae*, and an Indonesian species, *L. menadoensis*, which is less widely distributed. Coelacanths are commonly found on sloping continental shelves. Initial reports suggested they occurred at depths of 300–400 m in sheltering caves and canyons that provided habitat for their prey. They have been sighted in the submarine canyons of the east and west coasts of the Mozambique Channel; the steep volcanic slopes of Comoros; areas off the northern Mozambique

coastline; and off the coast of northern South Africa. More recently they have been seen in much shallower depths of 75–100 m on the upper slopes of Pemba Channel canyons around Tanga (Samoilys et al, 2015).

One specimen was caught off the coast of Songo Mnara near Kilwa by deep-set gill net in September 2003. In 2004, fishers from Kigombe caught 4 specimens when using deep-set shark nets set between 50-200m depth. In a period of 3 months, 15 coelacanths were caught off the coast of Kigombe. As of January 2011, at least 37 specimens were captured as by-catch in the TACMP, mainly in the fishing villages of Kigombe, Mwarongo and Mwambani. It is thought that the major reason for the sudden appearance of coelacanths in catches is that shark nets had been set in deeper waters over the last 10 years, due to diminishing fisheries catches in the inshore waters (CBD, 2012).

The unprecedented catch incidents of coelacanths in Tanga area called for urgent management measures to protect the species in Tanzania, to sustain representative reef and deepwater ecosystems and ensure maintenance of the ecosystem processes on which coastal communities as well as coelacanths depend. The African Coelacanth Ecosystem Programme (ACEP) is the result of international and regional concern over rising incidents of accidental catches in deep-water gill nets, particularly in northern Tanzania. It worked with the Tanzanian government to establish the TACMP. However, the proposed deep-water harbour in Mwambani Bay near Tanga is likely to compromise its activities and put the local population of this extraordinary and rare species of coelacanth at risk (Samoilys et al., 2015).

Within the TACMP coelacanths seem to occur mainly along the outer island drop-offs. Due to the similarity in bathymetry further north in the proposed TBCA, there is good reason to postulate that coelacanths occur there too.

### **Bony Fishes**

Some 380 fish species have been identified in the waters of the proposed TBCA (Spalding et al., 2001) mostly from landed catches and observations during underwater surveys. The most important families in reef fish catches are Lethrinidae, Lutjanidae, Siganidae, Scaridae, Labridae and Mullidae. In TACMP there are large-scale differences in ecology and fish communities between reef areas that have been exposed to heavy fishing pressure and those that have been closed (Othina and Samoilys, 2005). Regular monitoring between 1995 and 2008 confirmed the low fish abundance and biomass in commercially exploited species, particularly groupers, snappers, emperors, grunts and rabbit fish. Despite a gradually increasing trend from 1998-2001 in population densities of these species, especially on closed reefs, fish abundance was largely declining since 2003 (Wells et al., 2007). Snappers, emperors, grunts and rabbitfish were the most important fisheries target groups. The biomass of this group was considered very low (at about 8kg/ha) compared to an average biomass of 250 to 300kg/ha on closed reefs (McClanahan et al., 2005).

The teleost fish species occurring in the proposed TBCA that are listed as threatened on the IUCN Red List or that are rare and have regional or global significance include the Napoleon wrasse, *Cheilinus undulates*; the Humphead parrotfish, *Bolbometopon muricatum*; the Giant grouper, *Epinephelus lanceolatus*; and the Red Sea, Arabian Gulf angelfish, *Apolemichthys xanthurus* (Samoilys et al., 2015).

### **Sharks and rays**

Sharks are among the most threatened of all marine species, suffering from heavy fishing pressure to supply the shark-fin trade, combined with low fecundity and a consequent long regeneration time. Their life-history is generally poorly researched and the group receives relatively little conservation attention. Several species are likely to occur in the proposed TBCA area including the Grey reef shark, *Carcharhinus amblyrhynchos*; the Whitecheek shark, *C. dussumieri*; the Black tip reef shark, *C. melanopterus*; the Blackspot shark, *C. sealei*; the Spot-tail shark, *C. sorrah*; the Black tail reef shark, *C. wheeleri*; the Milk shark, *Rhizoprionodon acutus*; and the White tip reef shark, *Triaenodon obesus*. These are mostly smaller species of less than 2 meters and occur in coastal waters, which makes them accessible to local fishermen. Shark fisheries have existed for centuries in eastern Africa because the meat preserves well when salted and dried and is traded along the coast (Samoilys et al., 2015).

Reef and oceanic sharks are widely dispersed in the oceans, but they have been taken in fisheries either targeted or as by-catch, which has reduced their populations. In eastern Africa the bull shark or Zambezi shark (*Carcharhinus leucas*) is often implicated in attacks on people, fuelling the general fear of sharks and diminishing enthusiasm for commitment to their conservation. The charismatic scalloped hammerhead sharks (*Sphyrna lewini*) used to be abundant near steep reef slopes off Pemba Island, Tanzania, but their numbers have dwindled (Last and Stevens, 2009), probably due to the gill netting of juveniles in inshore waters and the overfishing of adults by foreign offshore fishing fleets (Samoilys et al., 2015). Great white sharks, *Carcharodon carcharias*, have also been periodically caught in the region, but the TBCA is likely to be on the very edge of their natural range, with larger concentrations further south in the more temperate waters off South Africa.

Whale sharks, *Rhincodon typus*, are widely distributed off the eastern African coast. This is a planktivorous, broad-ranging species. Their seasonal migration patterns cover thousands of kilometres. They can also be resident year-round in equatorial zones. They are found in many areas with surface seawater temperatures of 18–30 °C and range across the entire Indian Ocean, as well as in the waters of the proposed TBCA. These sharks are considered *Vulnerable* under the IUCN Red List, and several other international instruments refer to them including those of CITES, UNCLOS, and the FAO (Obura et al., 2012).

The numbers of these sharks appear to have increased on the southern coast of Kenya in recent years, particularly around Diani, Galu and Chale Island. In 2011, an average of 20 whale sharks was spotted daily whereas the previous average had been 20 in a year. There has been speculation that the increase in shark numbers is linked to greater volumes of mantis shrimp. It may also be related to better monitoring as a result of greater interest in this species (Samoilys et al., 2015).

Whale shark tourism has rapidly grown in importance with regular seasonal sightings in Diani and at Mafia Island in Tanzania. Protection of this concentration at Diani and within the proposed TBCA thus provides both conservation and economic benefits.

Several rays also occur in the proposed TBCA, including Manta ray, *Manta alfredi*. Rays are usually caught by local gill net fishermen, who salt their catch and sell it. This unsophisticated method has been popular in the region for decades. In Tanga, Tanzania, rays comprise 72% of the catch from gill nets (Anderson, 2004). The manta ray is the largest batoid fish in the world. They are most commonly found in productive coastal areas and are often encountered by divers around island groups, in shallow bays, tidal channels and offshore seamounts and pinnacles (Dewar et al., 2008; Luiz et al., 2009; Marshall et al., 2009). Manta rays in eastern Africa have been included in the dried



shark-meat trade for centuries. The effect on the species has not been documented highlighting the need for more research and better conservation strategies (Samoilys et al., 2015).

The *Critically Endangered* knifetooth sawfish (*Anoxypristis cuspidate*) and longcomb sawfish (*Pristis zijsron*) have been sighted on rare occasions in Kenya in the lower reaches of the Tana River and in Ungwana Bay to the river's north (Samoilys et al., 2011a). Recent surveys in Tanzania have also confirmed the presence of large-tooth sawfish (*Pristis microdon*) that are still captured occasionally from most localities on the mainland coast, including in Tanga (Gill Braulik, WCS, per comm., 2014). All sawfish are listed on Appendix 1 of CITES. They are the sole living family Pristidae within the order Pristiformes. Guitarfish also occur in the WIO, but there are no data and since they are likely to be exploited they are probably highly depleted (Samoilys et al., 2015).

### **Invertebrates**

The octopus, *Octopus cyanea*, forms the basis of important fisheries in the proposed TBCA. Research conducted on the Tanga coast prior to the establishment of TACMP indicated that densities of octopus were comparatively low with about 0.05 individuals/50m<sup>2</sup>, possibly due to severe fishing pressure (Wells et al., 2007). However, octopus species grow extremely fast, increasing in weight by up to 200g in 10 days, and can potentially support a highly productive fishery if it is well-managed. Population trends within the proposed TBCA should be carefully explored for that purpose.

Coconut crab (*Birgus latro*) is endemic to the lower Mpunguti Island, having previously been more widespread. Coconut crab is the only member of the genus *Birgus* and is the largest land-living arthropod.

Mainly spiny and slipper lobsters are exploited and reported from the proposed TBCA area. A 1995 survey on the Tanzanian side of the border found low counts of lobsters on coastal and inner patch reefs, and no dedicated surveys have been conducted since then. Reef health monitoring recorded that spiny lobster densities seemed to vary largely between closed and open reefs (Wells et al., 2007), and tended to be higher on closed reefs and should be continuously monitored.

Low counts of giant clams (*Tridacna* spp.) and spider conches (*Lambis* spp.) were recorded for coastal and inner patch reefs in the vicinity of the TACMP (Wells et al., 2007). Populations seemed to have remained relatively stable since that time.

### **Marine Mammals**

There are some 37 species of marine mammals in the WIO. There are 8 baleen whales, 2 or 3 sperm whales, 13 toothed whales, 13 dolphins, and 1 dugong. The eastern African coastline harbours important breeding grounds for several whale species. About 17 whale and 13 dolphin species are thought to occur in Mozambique, Tanzania and Kenya. (Berggren and Coles, 2009). The exact number is yet to be determined as marine mammal surveys in the WIO have not been thorough. Whales and dolphins are subject to several chronic dangers. They get entangled in fishing nets and drown. Chemical pollution (heavy metals, pesticides and other toxins) accumulates in their bodies from ingesting contaminated prey. Marine debris, particularly plastics, is mistaken for food. Deep-water beaked whales and delphinids are sensitive to acoustic disturbance caused by offshore exploration for oil and gas (Samoilys et al., 2015).

### **Dugongs**

The dugong (*Dugong dugong*) is considered endangered in eastern Africa with the last remaining viable population (>300) found in the Bazaruto Archipelago in Mozambique. The dugong once ranged from Somalia to Mozambique and across to western Madagascar (WWF, 2004), but numbers

have plummeted since the 1960s as it is fished for its meat and is the accidental victim of seine, gill-net and trawl fishing. Habitat destruction and human encroachment have also contributed to its decline.

Dugongs are protected in both Kenya and Tanzania, yet their numbers continue to decline. In northern Tanzania Dugongs were known to inhabit seagrass beds off the Tanga coast. Today sightings are highly irregular with one caught in 2000 at Buyuni near Pangani and another sighted in May 2006 by divers at 10m depth near Kigombe, It is believed that a small population might still exist near the Kenyan border at Mbaya/Kigomeni.

In Kenya, it is believed that dugongs may now remain only in very small numbers in the Lamu-Kiunga region (Dutton, 1998) and in Funzi Bay in the south of the country. There has been only one recent sighting in the northern area of Lamu-Kiunga. One dugong has been sighted each year (2007–2009) in Funzi Bay in southern Kenya. There have been two sightings off Kisite-Mpunguti Marine Reserve further south (Samoilys et al., 2015).

### **Whales**

Humpback whales, *Megaptera novaeangliae*, pass by the proposed TBCA on their annual south-north-south migration. This species are listed as *Vulnerable* (IUCN Red List). Like many whales, they feed in the Antarctic but breed further north in the tropics and subtropics during the austral winter. Most of the humpbacks are mothers with calves, and the busiest months are July to September. Those animals migrating past the proposed TBCA are believed to be part of a subpopulation comprising more than 6000 animals from South Africa to Kenya. Evidence suggests these WIO humpbacks may be divided into two distinct genetic substocks (the mainland and the islands) while the Comorian substock may represent a connection between the two. Recent observations suggest Mozambique's Bazaruto Archipelago is a major wintering ground for humpbacks with significant concentrations around Zanzibar too.

The East African Humpback Whale Network (2008) encourages people to report humpback whale sightings. All information from Mozambique, Tanzania and Kenya contributes to a greater understanding of migration routes, behaviour patterns, population abundance and threats (Richmond and Bisang, 2009). In 2011 nearly 2,000 sightings were recorded between June and December: ~1,300 in southern Mozambique, 572 in Tanzania, and 69 in Kenya (Samoilys et al., 2015).

Minke, sperm and pilot whales, as well as orcas have periodically been sighted off the Kenyan coast and could be occasional visitors to the proposed TBCA (Kenya Marine Mammal Network, 2013).

### **Dolphins**

Coastal species that are likely to be encountered in the proposed TBCA are spinner (*Stenella longirostris*), humpback (*Sousa chinensis*), and Indo-Pacific bottlenose dolphin (*Tursiops aduncus*). Spotted dolphin (*Stenella attenuata*), may also occur within the coastal waters in the area, although they are a more oceanic species. The Kisite-Mpunguti area in southern Kenya, which includes Kisite-Mpunguti Marine Protected Area (38 km<sup>2</sup>), has been recognised by its diverse ecosystems and habitats including, coral reefs, seagrass meadows and mangrove forests, which support a rich biodiversity including sea turtles, dolphins, whales and coral reef fish species. This area has 2.8 times the biomass of the Tanga district, in northern Tanzania (McClanahan et al., 2006) and the highest number of species recorded in visual transects along the Kenyan coast (McClanahan et al. 2010), highlighting the ecological importance of the area as a food resource for Indo-Pacific bottlenose dolphins.



All four dolphin of these species have high conservation value. Their coastal ranges, life history and habits make them susceptible to human activity, which makes them an indicator species for the broad impact of human encroachment on the coastal marine environment (Samoilys et al., 2015).

### **Marine Turtles**

All of the five WIO species of marine turtles are found in the proposed TBCA waters: the olive ridley (*Lepidochelys olivacea*), green (*Chelonia mydas*) hawksbill (*Eretmochelys imbricate*), leatherback (*Dermochelys coriacea*), and loggerhead turtle (*Caretta caretta*). The species with the greatest abundance in the WIO is the green turtle, followed by the hawksbill. All five species are on the IUCN Red List either as *Critically Endangered* (hawksbill, leatherback) or *Endangered* (green, olive ridley, and loggerhead) (Samoilys et al., 2015). While the area is not recognised as a major turtle nesting site in eastern Africa, it encompasses important feeding grounds, and is likely to support foraging individuals of all five species. The feeding grounds of the bottom-feeding sea turtles (green, hawksbill, olive ridley and loggerhead) include seagrass beds, coral reefs, sand and mud flats, and mangrove ecosystems, all prevalent in the proposed TBCA. Turtle populations in Tanzania and Kenya have generally declined, mainly due to loss of the nesting sites (e.g. Maziwe Island south of the TACMP no longer supports nesting populations of these species), but also due to incidental and deliberate capture in gill nets. Pangani District, south of the proposed TBCA, is still considered an important feeding and nesting area for marine turtles (CBD, 2012). Taking of turtles is prohibited in both Tanzania and Kenya.

The health of turtle populations is an important conservation indicator, and this has been used as a key element of marine spatial planning initiatives, such as that used in eastern Africa during the WWF eco-regional planning process (WWF, 2004).

### **Shore and seabirds**

The mangrove swamps, coastal wetlands, salt pans and sand banks in the proposed TBCA provide suitable feeding and roosting habitats for a number of bird species, such as egrets and migrant waders. Important species that can be found on this coastline include the greater sand plover (*Charadrius leschenaultii*), curlew sandpiper (*Calidris ferruginea*) and crab plover (*Dromas ardeola*). Kibo Saltpans (300 ha) in northern Tanga is an Important Bird Area. An area 4400ha South of Tanga and just outside the TACMP is an Important Bird roosting / feeding area.

Some of the offshore islands of the proposed TBCA provide important breeding localities for seabirds. Kisite Island is an Important Bird Area (IBA), hosting species such as the sooty tern (*Sterna fuscata*) and large numbers (up to 1000 breeding pairs recorded) of crested tern (*Thalasseus bergii*) and roseate terns (*Sterna dougallii*) (CBD, 2012).

## **2.2. Socio-economics and livelihoods**

The proposed TBCA would need to exist within the context of large and vibrant human population that lives in the area. The overall system envisaged once the TBCA is delineated and gazetted is further elaborated in Section 7, but will essentially involve an overall area that allows multiple uses within its boundary, ranging from strictly controlled conservation areas to areas where normal economic activities continue. In order to plan for this multiple use scenario, it is important to understand the current demographic characteristics of the population as well as the economic activities and livelihoods that sustain them. This section summarises the key elements of the human population on both sides of the border and describes the main economic sectors in the proposed TBCA, emphasising some of the opportunities that could be enhanced through the TBCA process.

### 2.2.1. General overview

As with many WIO countries, overall population in both Kenya and Tanzania has been steadily increasing placing more pressure on natural resources. The percentage of the populations that lives within 25 km of the coast is significant; 13.6% in Tanzania and 6% in Kenya (UNEP, 2009). A coastal population density 171 per km<sup>2</sup> in Kenya and 154 per km<sup>2</sup> in Tanzania places heavy demands on marine and coastal ecosystems, requiring careful management to ensure that these resources are sustained. Poverty levels are high in both countries with the human development index (HDI) score for Kenya 0.52 and Tanzania 0.48<sup>1</sup>. Rural poverty, and that of people living near the coast is generally higher than urban poverty. For example in Kenya, poverty levels on the coast have been shown to be as high as 62% compared to the national rural average of 49% (Samoilys et al., 2015). While poverty levels have been gradually reducing in Tanzania, the percentage of rural poor has remained largely unchanged in Kenya in the last two decades.

These high poverty levels often lead to a trend of diminishing access to resources for the poor, encouraging the illegal use of fishing gear, and fishing within protected areas, for example. The overall livelihoods strategy of most coastal households is one of diversification. Many households will be involved both in fisheries and in agriculture and animal husbandry (the main livelihood strategies), using part of the production for self-consumption and selling any surplus to provide income for essential services such as healthcare and education (Samoilys et al., 2015).

Among people over 25 years of age living on the Tanzania mainland, 12.3% have completed or dropped out at lower grades of primary schools, 45.8% at higher grades of primary schools and only 5.1% at lower secondary level and 0.7% at upper secondary level (URT, 2006). Kenya's coastal region has one of the lowest literacy levels in the country (15%) with even lower secondary education enrolment rates (14.4 %) (Samoilys et al., 2015). Just under 15% of the coastal population has a secondary education and 66% a primary education while 69% can read and write (GoK, 2009). Nearly 20% of the coastal adult population has never attended school, primarily women (63%) and the rural population (76%).

The proposed TBCA falls within Kwale County in Kenya and the Mkinga District in Tanzania. Kwale County falls within the Coast Region. The coastline between Diani and the Tanzanian includes important natural sites such as the mangrove stands and seagrass beds of Gazi and Funzi Bay, and the Ramisi River Estuary, and is an important tourist destination with many sandy beaches, providing good revenues since the 1970s. The poverty rate for Kwale County is 71%. Only 10% of the population have attended secondary school<sup>2</sup>. For effective development of the area, there is an urgent need to ensure that communities obtain access to water, sanitation, reliable education and health services, security of tenure for agricultural land, and access to markets for fish and cash crops. Most people earn a living as fishers and small-scale farmers. Reef and nearshore resources are the main sources of income for many households (Samoilys et al., 2015).

Mkinga District is one of three coastal districts in Tanga Region in Tanzania and shares many similarities with Kwale County, both in terms of natural environment and the cultural and socio-economic characteristics of the inhabitants. Apart from Tanga City and the associated port, infrastructural development is limited. This area lies some 200 km north of Dar-es-Salaam and is predominantly rural, with many communities relatively isolated, especially in the coastal zone

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<sup>1</sup> <http://hdr.undp.org/en/countries>

<sup>2</sup> In Lamu and Kilifi Counties, one-third of the population has not attended school at all.

between Tanga City and the border. As with on the southern Kenyan coast, most people near the coast on the Tanzanian side earn a living from fishing and/or small-scale farming, and there is significant movement across the national boundary in both directions in pursuit of fisheries resources and trading opportunities. As family ties exist across the political border, significant contact at a social level are maintained.

### 2.2.2. Economic Sectors

#### Fisheries

Fisheries in Tanzania are governed by the Fisheries Act of 2003. This and other legislation relevant to the proposed TBCA is discussed in greater detail in section 3.1. The government institution responsible for the management of fisheries in Tanzania is the Fisheries Development Division (FDD) of the Ministry of Livestock and Fisheries Development (MLFD). Their role since government decentralisation has been one of overall policy-setting, developing overarching national fisheries management laws and regulations, leading development cooperation programmes etc. as well as fulfilling the very important role of supervision and guidance of District-level fisheries officers (DFOs), who are now employed directly by their respective local government authorities. In an effort to strengthen co-management approaches in fisheries, the establishment and management of Beach Management Units (BMUs) is now provided for in Regulation 133 of the Fisheries Regulations, 2009, while Regulation 134 identifies the roles for BMUs.

Membership of a local BMU is obligatory for all fishers from the locale, who are then represented at BMU-level through a 15-member elected Committee. Full BMU Assemblies are also able to meet to provide further opportunities to discuss local fisheries issues and concerns, and BMUs are formally nested within local governance structures although there have been conflicts between BMUs and village governments. BMUs play a role in a number of aspects of fisheries management in Tanzania including the collection of data at their respective landing sites. The presence of such a local management body will no doubt serve the fisher community well as the institution matures and with the continued support of the FDD, NGOs and donor-funded fisheries management and development programmes (Anderson and Samoilys, 2015).

A more recent development has been the legal ability of BMUs to aggregate into so-called Collaborative Fisheries Management Areas (CFMAs), although a similar model was rolled-out in Tanga Region in the late 1990s (Wells *et al.* 2007). Of the 21 BMUs in Mkinga district (see Table 1.), 9 consider themselves part of a CFMA (Anderson and Mwangamilo, 2013). BMUs in Mubeza District are replaced by Liaison Committees, with 18 of these structures within the TCMP area (Kalombo, pers. comm.).

Fishing and associated activities are important sources of income for coastal people in Tanzania. The fishing industry provides employment opportunities and foreign exchange earnings through fishing, boat building and repair, fishing-gear supply, net mending, engine repair and supply, fish transport, fish sales, fish processing and food vending (MLDF, 2010). There are five times more people working in fish processing and marketing than as fishers.

Table 1. . Number of BMUs per district in Tanzania (source: Anderson and Mwangamilo, 2013).

Region	District	No. of BMUs
Tanga	Mkinga	21
	Tanga Town	4
	Pangani	11
Pwani	Bagamoyo	9
	Mkuranga	11
	Mafia	10
	Rufiji	23
DSM	Temeke	23
	Kinondoni	5
Lindi	Lindi Rural	10
	Lindi Municipal	15
	Kilwa	30
Mtwara	Mtwara Urban	27
	Mtwara Rural	9
<b>Total =</b>		<b>208</b>

Marine fisheries in Tanzania are estimated to produce between 50 and 80 thousand metric tonnes per annum (Anderson and Samoilys, 2015). Information on total catches from 1950 to 2005 is shown in Figure 9 below. Figure 10 shows that, for at least small pelagic species, a significant proportion of the catch originated from the Tanga Region in 2010.

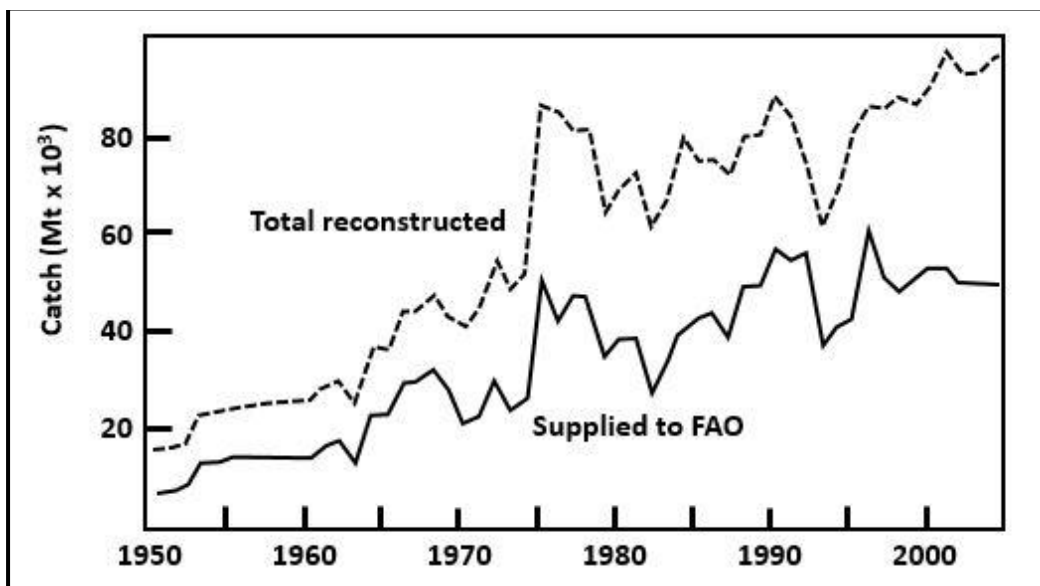


Figure 9. A Reconstruction of Tanzania's Marine Fisheries Catch. (Redrawn from Jacquet & Zeller, 2007 by Anderson and Samoilys, 2015)

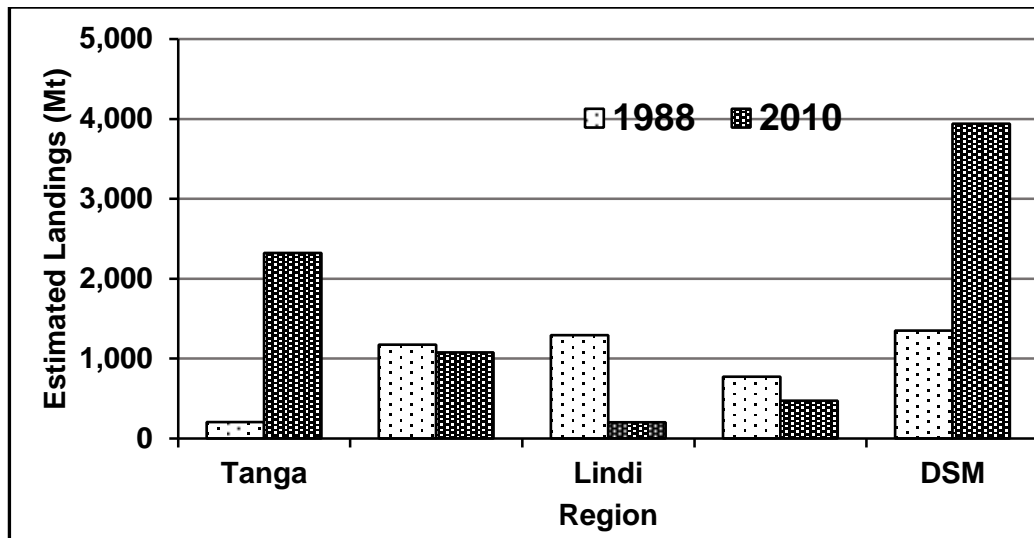


Figure 10. Weight of landings (Mt) of Small-pelagic fish by region in 1988 & 2010 (Anderson and Samoily, 2015)

In the proposed TBCA fisheries are generally artisanal and small-scale. A large number of species are taken, and composition varies according to gear type, season and habitat (e.g. whether reefs or seagrass beds), and other fishing grounds. The predominant finfish groups taken in the fishery are emperors and snappers (changu), rabbitfish (chafi), rays, sharks, kingfish, and other large pelagic species, and small sardines (dagaa). Handlines are mostly used to catch snappers and emperors (39%) and rabbitfish (19%); fish traps are predominantly used for rabbitfish (81%); and shark nets catch mostly rays (71%) (Anderson, 2004). An analysis of catches landed at Kigombe village prior to the establishment of the TACMP from 1995-1999 showed that 40% were inshore fish, 32% rays, 21% offshore fish, 6% sharks, and 1% other species (Horrill, 1999).

Fishery resources in Kenya are managed by the Ministry of Fisheries Development through the Fisheries Act (Cap 378) and the Maritime Act (Cap 371). The Ministry is mandated to provide for the exploration, exploitation, utilization, management, development and conservation of fisheries resources, and undertake research in marine and fresh water fisheries, and is supported by KMFRI in this regard. Under decentralisation, inshore fisheries are managed at a County level, with County fisheries officers overseeing activities at a series of sub-stations. Kwale County has around 10 of such sub-stations (County Fisheries Officer, pers. comm.). As with in Tanzania significant progress has been made in recent years in legislating and empowering local communities through a BMU system. Of an estimated 80 BMUs nationally, 19 have been established in Kwale County (KCDP, 2013).

Most of Kenya's coastal and marine fishing is artisanal for several species for which different types of gear are used (McClanahan and Mangi 2004; Samoily et al. 2011d). Artisanal fishing is confined to a narrow shoreline strip (2.5–3 nautical miles) from small traditional vessels (Ochiewo, 2004; Samoily et al. 2011d). Fishers use a variety of gear: cast nets, gill nets, beach and reef seines, purse seines, ring nets, hook, handlines and longlines, spear guns, and basket traps (see Samoily et al 2011d). Illegal fishing gear, particularly the beach seine, is widely used because the ban on these destructive types of gear is poorly enforced (Samoily et al., 2015).

Artisanal fishers land at least 95% of the marine catch. More than 60,000 coastal people depend on these fisheries for their livelihoods). Artisanal marine fishery production has fluctuated between 4 000 and just under 9 000 metric tonnes annually over the last two decades (Figure 11) (Gitonga and Achoki, 2003). Marine fishery products are demersal, pelagic, sharks and rays, crustaceans, molluscs, echinoderms and big-game fish. The demersal fish are dominated (> 38%) by emperors, snappers

and parrotfish (McClanahan and Mongi, 2004; Maina et al., 2013). Pelagic fish make up 27% of the catch.

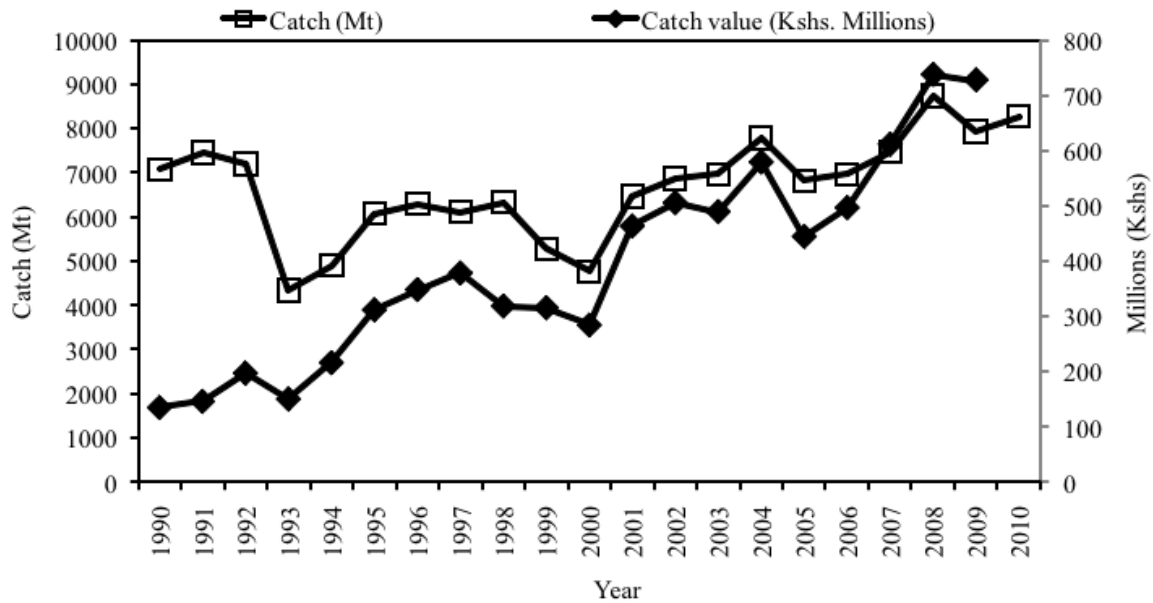


Figure 11. Quantity (metric tonnes) and value (KES millions) of artisanal marine production in Kenya, 1990–2010 (Source: Samoily et al., 2015).

Table 2 indicates that fishing activities in Kwale County are significant at a national level with a well established network of landing sites and BMUs. In Vanga, beach seining is used inshore (56%) and in the reef (44%), while ‘chachacha’ (traditional gear used to catch half beaks) is used in the inshore area only (100%). Diving and hooks and lines are used only in the reef. Ring nets are used offshore (56%) and in the reef (44%), while a high percentage of traps (95%) are used in the reef (Fondo, 2004).

Table 2. Fishing activities per county (source: KCDP, 2013)

District / County	Landing sites	Vessels	Traders	BMUs	Fishers	Factories
Lamu	26	647	68	26	3587	0
Tana River	4	28	17	4	142	0
Malindi	16	699	120	6	2330	0
Kilifi	11	889	513	11	384	1
Mombasa	11	314	141	14	918	6
Kwale	40	75	135	19	3358	0

Some of the richest inshore grounds on the Kenyan coast are found around Shimoni, Vanga, Funzi Island and coral reef areas on the border with Tanzania (Fondo, 2004), within Kwale County in the proposed TBCA.

Deep-sea recreational fishing for big game fish (marlin, sailfish, tuna and others) takes place from the outer reef to about 15 nautical miles offshore during a nine-month season. Shimoni and Diani are considered prime areas for sport fishing.

Kenya ranks among the top exporters in the WIO for marine aquarium fish (Okemwa et al., 2006). It is a highly competitive business based on more than 190 species of aquarium fish belonging to 35 families. The fish are exported to Austria, Denmark, France, Germany, Hong Kong, Hungary, Israel, Italy, Japan, Netherlands, Poland, Romania, South Africa, the United Kingdom and the USA (Samoilys et al., 2015). This activity may provide opportunities in the proposed TBCA, if undertaken in a controlled manner.

### Agriculture

As with in other areas of the Tanzanian coast communities in Tanga Region and the proposed TBCA depend largely on agriculture (58.9%) and small business enterprises (21%) for their livelihood (Table 3; URT 2006a). More than 75% of the population works in the agriculture sector in Lindi, Mtwara, Pwani and Tanga Regions (Table 3). It is believed that the statistics for those employed in the fisheries sector may be higher than shown, possibly due to their activities being combined with the agriculture sector in some cases.

Tanzania's economy depends on agriculture, which accounts for more than 25% of GDP, provides 85% of exports, and employs about 80% of the work force<sup>3</sup>. Those involved in this sector are generally smallholder farmers cultivating food crops. Cash crops are grown in smaller quantities including coconuts, cashew nuts, pineapples, mangoes and tropical fruits. Animal husbandry is not a traditional occupation, but people keep zebu cattle, goats, sheep and chickens in small numbers (King, 2003).

Table 3. Percentage of employed by sector and region on the Tanzanian coast

<sup>3</sup> CIA WorldFact Book, 2013 data. <https://www.cia.gov/library/publications/the-world-factbook>.



Region	Agriculture	Business operations	Formal employment	Elementary occupations	Fishing	Live-stock	Industries
Dar es Salaam	13.0	46.2	19.0	13.0	1.4	1.0	5.2
Lindi	85.8	8.1	2.5	2.0	1.1	—	—
Mtwara	86.6	6.3	2.0	3.3	1.1	—	—
North Pemba	51.7	20.3	4.5	8.4	7.6	6.7	—
North Unguja	64.0	15.2	3.5	2.8	12.5	—	—
Pwani	78.5	10.4	3.5	3.1	2.4	1.2	—
South Pemba	51.9	20.7	6.7	10.4	7.7	1.2	1.1
South Unguja	64.9	16.4	4.8	4.5	6.0	1.0	1.4
Tanga	77.5	12.5	3.8	2.4	1.1	1.7	—
Urban West	14.8	53.4	17.2	6.7	2.8	—	4.2
Overall average	58.9	21.0	6.8	5.7	4.4	2.1	3.0

Source: URoT 2006a

In Mkinga District several commercial sisal plantations contribute to providing employment, although the product is exported and processed elsewhere.

In Kenya the agriculture sector accounts for about one-third of GDP and employs 85% of the rural labour force. Agriculture is also important to the wellbeing of coastal communities. Dependence on subsistence agriculture ranges between 90% (Kilifi County) and 60% (Lamu County) (Samoilys et al., 2015)). Coastal agricultural production is a mix of subsistence and commercial food and cash crops (Table 4). As shown in Table 4, the main crops grown in Kwale County are maize, cassava and rice. The coastal region of Kenya has 3.3 million ha of arable land while another 190,000 ha could be put under irrigation. There is also potential for ranching and alternative livestock production in 80% of the region (Samoilys et al., 2015).

Table 4. Food and cash crops grown in coast counties

County	Food crops	Cash crops
Kilifi	Maize, cowpeas, cassava	Coconut, cashew nuts, mangoes, citrus fruits
Kwale	Maize, cassava, rice	Coconut, cashew nuts, bixa, citrus, mangoes
Lamu	Maize, cowpeas, simsim, cassava, green grams, pigeon peas, bananas	Cotton, bixa, cashew nuts, coconut, mangoes, citrus fruits
Malindi	Maize, cowpeas, cassava	Coconut, cashew nuts, mangoes, citrus fruits
Mombasa	Maize, cowpeas, fruits, vegetables	Coconut, cashew nut, simsim (sesame), sunflower

Source: GoK 2008

In terms of commercial agriculture in Kwale County, sugar cane is being reintroduced near the Ramisi River (KISCOL) on the south coast following its 1988 collapse.

The coastal region could be self-sufficient in food if irrigated cultivation was practised more. The region is a net importer of cereals and other food, and crops such as coconut and cashew nuts are not realising their potential.

Nearly 70% of the coastal region is semi-arid and supports livestock but not crops. Only 25 out of the 85 large ranches in the region are operational. Tana River County followed by Kwale and Kilifi Counties have the most livestock (cattle, sheep, poultry, camels) (GoK 2001). Variation in rainfall patterns and vegetation types means that different areas sustain different types of livestock (Samoilys et al., 2015)

### **Forestry**

Coastal forests comprise mangrove and terrestrial forests, both of which have biological and economic significance. The forestry sector (with coastal forests making up a sizeable but unquantified percentage) accounts for about 3% of GDP in Tanzania. Coastal forests are exploited for timber, poles, honey and wax, wood carving materials, medicinal plants, fuel wood, building materials and food. Rural communities in Tanzania depend on wood and charcoal for cooking. Fuel wood accounts for at least 92% of the country's energy consumption and around 95% of wood products.

Coastal forests are at risk from excision, unsustainable felling, overgrazing and charcoal burning. These threats are a result of human encroachment, poverty, unregulated exploitation, weak district and national institutional frameworks and policy gaps (Samoilys et al., 2015).

Though fragmented and small, coastal forests in Kenya contribute 4% to the coastal economy. They serve as water catchment areas and are a tourist attraction. Besides providing income generating opportunities, they are also centres of endemism for a wide variety of globally threatened fauna and flora. Some forests are of great cultural and spiritual significance.

Some communities have benefitted through tourism interest in coastal forests. For example, Shimba Hills communities in the Mwaluganje Conservancy supplement their incomes through tourism lodges. Women in Gazi and Wasini in Kwale District and at Mida Creek in Kilifi District have constructed boardwalks in mangrove forests for ecotourism (Maina et al., 2011). Other communities have attempted apiculture with little success because of economies of scale and lack of processing and marketing knowhow. All these initiatives would benefit from training in governance and management systems (Maina et al., 2011).

Several woodlots have been planted in the coastal areas of the proposed TBCA to provide poles and timber. Stands of Eucalyptus and Pine are common in the Lunga Lunga area on the southern coast of Kenya, for example.

### **Tourism**

Tourism is the leading contributor to Tanzania's Services sector which generates 47% of the country's GDP (2013). Although wildlife is Tanzania's showcase attraction with up to 90% of all tourists going on game-viewing or hunting safaris (TCMP, 2001a), beach and coastal tourism has potential, especially when combined with coastal conservation efforts. Diversifying away from the national parks to the beaches makes sound economic sense. While a few locations such as Zanzibar are saturated, other locations, as in southern and northern Tanzania, have good development

potential. However, dynamite fishing is harming coastal tourism through its destruction of coral reefs and safety concerns for tourists (Tanga dynamite monitoring network; Guard et al., 1998; TCMP, 2001b; Wells et al., 2007).

The Tanga coastline, and particularly the existing marine parks and reserves in the area, provide an opportunity for tapping into the tourist markets. The area is relatively easy to access by air with a fully operational airport in Tanga City, and a tarmac road running along the coast from Tanga to the Kenyan border. As will be discussed later, tourism is one of the sectors that could be enhanced through the establishment of a TBCA, especially if it is linked with the attractions of the southern coast of Kenya. Tanga currently has relatively few accommodation establishments (Table 5) and very few that of the high standard demanded by international tourists provide an opportunity for improvement.

Table 5. Accommodation facilities in three coastal regions of Tanzania (source: ASCLME, 2011)

Region	Number of Rooms		Number of Beds		Number of Staff		No. of Establishments	
	2006	2009	2006	2009	2006	2009	2006	2009
Dar es Salaam	4,412	6,123	5,873	9,230	3,852	5,282	107	170
Coast	568	1,341	866	1,446	687	970	18	40
Tanga	449		730		300		39	39
<b>TOTAL</b>	<b>5,429</b>	<b>7,464</b>	<b>7,469</b>	<b>10,676</b>	<b>4,839</b>	<b>6,252</b>	<b>164</b>	<b>249</b>

In Kenya, tourism is an important foreign exchange earner and a pillar of Kenya's Vision 2030 (GoK, 2007). Tourism revenues accounted for 45% of the coastal economy in 2009 (GoK, 2009). Between 1998 and 2004, coastal tourism accounted for 52–68% of Kenya's tourism earnings (GoK 2005). Nearly half of the tourists who travel to Kenya visit the coast for its climate, sandy beaches, coral reefs, mangroves, river and estuarine systems, marshes and wetlands, marine parks and reserves, terrestrial game parks and reserves, and a cultural setting that blends African, Arab, Portuguese and Western lifestyles (GoK, 2005).

The southern coast has well developed infrastructure to support tourism, with a range of accommodation and activity options available. This aspect could be enhanced through the proposed TBCA concept, as mentioned. In recent years, tourism on the coast has been seriously impacted by security concerns; an aspect that will need to be considered very carefully in future tourism planning.

### Ports and shipping

Tanga Region in Tanzania is serviced by one major port. The port of Tanga is situated 200 km north of Dar es Salaam, close to the Kenya border. It is a lighterage port where ships are worked at stream

buoys by means of lighters and pontoons for loading and offloading cargo. The port has two shallow-water berths built in 1914 and 1954. Alongside the multipurpose jetty, there are 12 anchorage berths and a quay for lighterage and local shipping with 3.8m draft at full tide and 2.55 metres at low tide. Only very small vessels and pontoons can operate safely. The harbour provides safe anchorages for seven vessels with lengths of up to 213 metres and drafts from 6.4- 9.45 metres. There are three outer anchorages with a depth of over 9.45 metres at low water. Port access is along a 6 km-long, deepwater, natural channel that follows the course of the river. The tanker berth has a maximum draft of 3.5 metres, and uses a submarine pipeline to discharge fuel oil to a storage point on the quay.

The port provides stevedoring services to all geared vessels 24 hours a day with night ship-working on request. Three tugs and 18 barges provide lighterage services between anchorages and the lighter quay 24 hours a day. Facilities include one 40-ton tower crane, one 120-ton port crane and five (5-ton) portal cranes. There are two transit sheds for exports and one for imports, a total storage area of over 20,000 square metres. A modern 13,000 square metre container yard is in use, with a capacity of 500 TEUs. Containers are afforded a 15-day free storage period for both imports and exports. Other facilities include refrigerated container services, fresh water provision, ship chandlery, fire-fighting services, and a medical service in town. Annual traffic totals 194,000 tons, including 66,000 tons of imports and 129,000 tons of exports. This includes 6,500 TEUs of container traffic, bulk, liquid-bulk and break-bulk cargo. More than 90% of annual traffic is moved by road and the remainder by rail. The port handles about 50 liner ships, 40 coasters, 25 coastal tankers and 75 passenger vessels per year. The East African Conference lines make fortnightly calls, two container lines make fortnightly calls, and two coasters call monthly to transport cement to the southern ports. Local passenger ferries make weekly calls to Pemba (ASCLME, 2011). More recently, Tanga has hosted several survey vessels working offshore in oil and gas exploration.

The port and supporting services clearly play an important role in the regional economy, and the Tanzanian Ports Authority (TPA) plans to improve access and facilities to allow greater volumes of shipping and goods to pass through. This poses a potential threat to conservation efforts in the proposed TBCA, and developments in Tanga City will need to be followed carefully, with a process of stakeholder engagement including players from both the port as well as the oil and gas sector.

Kenya serves as an outlet for several landlocked countries in the region. Port and shipping activities are integral to the country's development (Hoyle, 2000) and to the economic prosperity of the coastal region. Maritime activities account for 15% of the coastal economy. Although there are no major ports in the proposed TBCA on the Kenyan side of the border, the port of Mombasa, which lies to the north, is the largest in East Africa, handling 20 million tonnes in 2011 (Kenya Port Handbook, 2012–2013). Containers (40%) comprise the majority of vessels docking at Mombasa followed by general dry cargo (22%) and bulk oil tankers (18%). Liquid bulk items (mostly petroleum, oil and lubricants) are the lead import item by weight (Kenya Eco. Update, 2010). Shimoni, within the proposed TBCA has a smaller port managed by the Kenya Ports Authority.

### **Mining**

Tanzania has a large and growing mining industry exporting \$995,000,000 worth of minerals in 2008. Tanzania is Africa's third largest gold producer exporting gold valued at \$932,000,000 in 2008. The Williamson diamond mine in Tanzania produced 134,000 carats of diamonds in 2008. Tanzania is also the world's sole source of the gemstone tanzanite and is a producer of other precious stones, notably sapphire and garnet.

Tanzania has a substantial cement industry and produced 1.76 Mta of cement in 2008. Expansion of the cement industry since 2008 has Tanzania producing over 3Mta in 2010 with new plants coming

on line in 2011. In 2007 the mining sector contributed 3.7% of the gross domestic product. This contribution has been attributed to both large scale mining operations as well as medium- and small-scale mining activities. However, medium- and small scale mining has been an important contributor to local economies, providing a means whereby large numbers of people can complement income derived from other primary activities, such as subsistence or seasonal agriculture.

The mining sector of Tanzania contributes 42.9% to foreign earnings. The value of output in the mining sector grew by 10.7% in 2007 after increasing by 15.6% in 2006. Formal employment in the mining sector amounted to about 8,000; an estimated 500,000 artisanal miners produced coloured gemstones, diamond, gold, and other commodities (ASCLME, 2011).

In Tanga Region the major mining activities are limited to cement and lime production. Tanga Cement Company Limited has an open pit mine producing 700 000 tons a year of Portland Cement for local use and export to other parts of east Africa. Maweni Limestone Limited produces 60 000 tons of Quicklime and hydrated lime from an open pit for export mainly to Kenya and Uganda (ASCLME, 2011). Tanga region is also rich in minerals like amethyst, garnets, tourmaline, kyanite, gypsum, feldspar, kornerupine, zircon, bauxite, ruby, turquoise, rhodolite, sapphire, graphite, marble, chrysoberyl, alexandrite, and gold. All these are exploited (TACMP GMP, 2011). Local coastal communities also partake in informal coral mining for building material (ASCLME, 2011). Salt pans are also prevalent, with some within or in close proximity to existing conservation areas. Kibo Match in northern Tanga (Mkinga District) conducts one of Tanzania's largest salt mining businesses using solar evaporation, with 909.3 tones valued at 35.6 million TSH in 2006 (URT, 2008). In the TACMP salt is produced at Mwarongo, Mchukuuni, Maere, and Machui and Chumvini villages. Salt is also produced through boiling by small-scale miners, using a comparatively large amount of firewood mostly from mangrove forests. It is estimated that it takes two truckloads of wood to produce 1.4t of salt when using a boiling pan. Almost all the salt produced along the coast is sold to the internal market (TACMP GMP, 2011).

Mining currently accounts for a single-digit percentage of the GDP of Kenya. Mineral deposits that occur at the coast in economic quantities include titanium, niobium, limestone, iron ore, baryte, gypsum and salt (GoK, 2009). Silica sands used for glass manufacture are mined in Arabuko Sokoke in Kilifi District and in the Msambweni area of Kwale District. Ballast used for construction is mined at Kokotoni along the Mombasa–Nairobi road in Kilifi District. Niobium and iron ore in the Mrima Hills of Kwale County have not yet been exploited.

Base Titanium Ltd., a subsidiary of an Australian mining company, has a presence in Kwale County and began exporting ilmenite in 2013. Once its mining operation is fully commissioned, the company will extract 330,000 tonnes of ilmenite, 80,000 tonnes of rutile (14% of global production), and 30,000 tonnes of zircon annually over 13 years. This will yield an estimated \$300 million in taxes and royalties to the government (Samoilys et al., 2015).

### **Oil and Gas**

According to the available data (seismic data, drilling, etc), Tanzania has strong hydrocarbon potential, however, it is still largely underexplored. Several companies are conducting oil and gas exploration, however, no crude oil discovery has been made to date

Tanzania has made natural gas discoveries in four locations. Two of them - Songo Songo off the south eastern coast, and Mnazi Bay in southeast Tanzania - are in production. Estimated gas potential ranges from 2 to 3 trillion cubic feet. In 2008 Songo Songo's daily production was 70mcf

(63mcf for electricity and 7mcf for industries), while Mnazi Bay’s daily production was 1mcf (for electricity). Both projects have an expected lifetime of 20 years.

Oil and Gas is not yet a major sector in Kenya, and its contribution to GDP is not detailed in the national accounts. There are good prospects for new oil and gas fields. Inland, the discoveries made in Uganda raise hopes, and a Chinese company operating in northern Kenya recently hit a “very high concentration of gas”, and is drilling deeper, expecting an oil discovery. Offshore, the coast of Kenya is considered “priority 1” (1) for prospecting. The Kenyan government is encouraging foreign interest in oil exploration under the coordination of the National Oil Corporation of Kenya Limited. For example, East African Exploration Limited is active off the coast of Kwale County and has already started with several CSR initiatives in coastal communities such as Vanga.

There is a modest upstream oil industry with a refinery in Mombasa, and this port is also considered as the gateway to the “northern corridor”, covering the supply of Kenya, Uganda, Rwanda, Burundi, Eastern DRC and Southern Sudan. Thus, the capacities of Mombasa port for oil and gas storage, and transportation to the landlocked countries (pipelines, road, rail) have a regional strategic importance (ASCLME, 2011).

As shown in Figure 12 there are several exploration blocks that occur within the vicinity of the proposed TBCA. Exploration has already started, with survey vessels operating out of Tanga Port. The emerging oil and gas industry is a potential threat to the proposed TBCA, and its activities will need to be carefully monitored and those involved in the industry included as key stakeholders in the process towards the establishment of the TBCA.

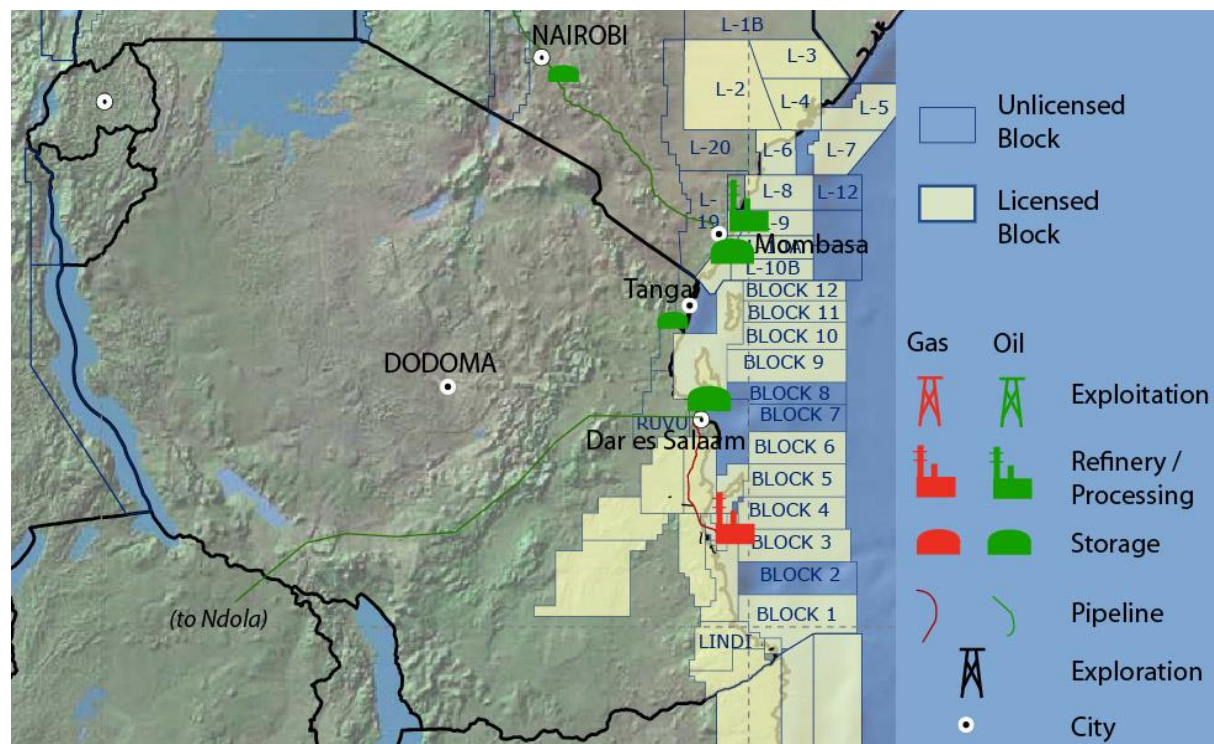


Figure 12. Oil and Gas in Tanzania (adapted from Deloitte, 2009)

### Mariculture

Mariculture is still relatively undeveloped in Tanga District and Kwale County but has growing potential, and is considered a viable alternative option for food security if effort is invested to build the necessary technical skills (Samoilys and Kanyange, 2008). If done correctly, mariculture provides

communities with comparatively more stable access to food and income. Moreover, initiatives are already in place to promote mud crab fattening, lobster sheltering and prawn farming. If improved, these can relieve fishing pressure from the wild stocks. Seaweed farming hold some potential and lessons learned from other areas such as Zanzibar where this activity has had some success need to drawn upon.

In Tanzania, while the Aquaculture Development Strategy (2008) outlines the government's programme for sectoral development, there is currently limited capacity and funding within the Aquaculture Division (MLFD) to realise the strategy and effectively plan and manage the development of the sector. Under the current management dispensation, private sector investors are limited, and while a few large scale aquaculture projects have been or are currently being proposed by the private sector, few if any have been realised. The exception to this would be the seaweed culture sub-sector that has ostensibly been driven by private sector interventions at the village level. In many respects, current developments are being driven by the donor community, and the international and local research institutions that are trialling and developing appropriate culture technologies. In terms of planning, it is evident that the sector is developing in an ad hoc manner with developments primarily being driven by the various mandates of the donor organisations. In terms of sustainable development frameworks, in 2001 the Tanzanian Coastal Management Partnership published a comprehensive mariculture guideline source book. The document provides a basic framework for sustainable mariculture development, and if applied correctly can significantly contribute to the sustainable development of the sector (ASCLME, 2011).

In Kenya mariculture development has been an uncoordinated process to date with projects being initiated in an ad hoc manner. The country lacks a developmental framework to guide sectoral development, and in this regard, it would be appropriate for the State Department of Fisheries of Fisheries to commission a mariculture sector development plan to guide future interventions in the sector. The plan needs to take cognisance of the current institutional constraints to development and constraints to specific sub-sectors (e.g crab culture, finfish and prawn polyculture) and identify new opportunities (e.g small scale grouper culture, coral culture). Institutional constraints such as the current lack of extension capacity, the need for additional extension capacity and demonstration facilities at Kwetu, and a focused research and development agenda for mariculture development at KMFRI need to be addressed and funded. The policy and regulatory environment needs to be reviewed such that an enabling investor environment is created. Where appropriate, regulations will need to be altered. For example, the current requirement for all mariculture operations to require an EIA irrespective of production volumes needs to be reassessed - such a regulation is likely to deter small scale investors into the sector. In terms of governance, clarity is required in terms of institutional roles and responsibilities. In this regard the role of the Coastal Development Authority (CDA) which has a developmental mandate, and the SDF and KFS need to be clarified such that institutional responses to development are coordinated, and in this regard, one organisation becomes responsible for coordinating sector development (ASCLME, 2011).

### **3. Legal, institutional and management context**

#### **3.1. Regional and international agreements and policies**

Numerous international agreements, conventions and policies related to environmental issues have been signed by both Kenya and Tanzania, and are thus relevant to the proposed TBCA. Some of these global or continental frameworks are shown in Table 6 below.



Table 6. Status of ratification of international and regional environmental Instruments

<b>Convention</b>	<b>KE</b>	<b>TZ</b>
UN Convention on the Law of the Sea	√	√
Convention on Biological Diversity	√	√
United Nations Framework Convention on Climate Change	√	√
Kyoto Protocol to the UNFCCC	√	√
Convention on Wetlands of International Importance (Ramsar Convention)	√	√
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	√	√
African Convention on Conservation of Nature and Natural Resources	√ <sup>1</sup>	√ <sup>1</sup>
Convention on the Protection of the Underwater Cultural Heritage	X	X
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention)	√	√
Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes	√	√
International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)	√	√
Convention on Persistent Organic Pollutants	√	√
International Watercourses Convention	X	X

<sup>1</sup> Accession

More specifically relating to the issue of the proposed transboundary initiative, proceedings of the United Nations Conference on Environment and Development (UNCED, Rio de Janeiro - 1992) and the Agenda 21 documentation called on nations to enter into regional and international cooperation. The Convention for Biological Diversity (CBD) calls for such cooperation. The Nairobi Convention for the protection, management and development of the marine and coastal environment in the Western Indian ocean is a regional legal agreement that offers a regional platform for intergovernmental dialogue between countries/governments and agencies in the Convention area to address transboundary issues on transboundary resources. The Nairobi Convention is an important framework for promoting regional collaboration. It was signed in 1985 and came into force in 1996 as part of UNEP's Regional Seas Programme. The convention's particular

strength is that it has been ratified by all the signatories, as have its two initial protocols. These are the Protocol on Specially Protected Areas and Wildlife and the Protocol on Cooperation in Combating Marine Pollution in Cases of Emergency. The latter protocol is primarily to combat oil pollution from ships.

A subsequent Protocol on Land-based Sources and Activities recognizes that pollution from land-based sources and activities constitutes one of the major threats to the sustainability of the WIO's marine and coastal ecosystems. It is awaiting ratification or accession by the contracting parties. The draft Protocol on Integrated Coastal Zone Management may be negotiated and adopted in the near future. It will provide a framework for regional and national integrated coastal zone management for sustainable development including climate change adaptation and mitigation measures.

The Environment and Natural Resources Management Protocol of the East African Community (EAC), also includes trans-boundary environments and natural resources in its application, scope, principles and objectives (see articles 2 to 5 of the Protocol), while article 9 specifically obliges Partner States to develop mechanisms that will ensure sustainable utilization of trans-boundary ecosystems and adopt common policies and strategies for sustainable management of trans-boundary natural resources.

### **3.2. National legislation and institutions**

Both Tanzania and Kenya have a range of Acts, regulations, guidelines and policies, and responsible institutions, that are relevant to the environmental management of the coast in general, but also to activities within the proposed TBCA.

#### ***Tanzania***

Tanzanian environmental legislation is complex. Tanganyika (now mainland Tanzania) and Zanzibar (the islands of Pemba and Unguja) united to become one country in 1964. Tanzania's subsequent constitution distinguishes between union and non-union matters. The environment is a non-union matter resulting in separate legislation and administrative authorities governing environmental issues and marine fisheries for mainland Tanzania and Zanzibar. An exception is the Deep Sea Fishing Authority Act (1998), which is a union matter and is common to both. To further complicate matters, the Tanzanian administration is decentralizing, vesting district councils with greater authority.

The constitution does not have explicit provisions on environmental protection and management. However, there are comprehensive legal and institutional frameworks for coastal and marine environments. Despite this, environmental legislation, which is sector based, tends to overlap and conflict. This dilutes the legal protection for coastal and marine environments (UNEP 2009b). Tanzania's customary law is often at odds with its statutory law and is diminishing in importance as the body of written law expands to cover areas hitherto under customary laws and practice (Mgaya and Juma, 2001).

The National Environmental Management Act (NEMA) (2004), which applies to the sustainable management of the environment in mainland Tanzania, overrides other environmental laws. Other laws are scattered across various sectors (Mgaya and Juma 2001). Tourism legislation—the Hotels Ordinance (1963) and the Tourist Agents Licensing Act (1969)—encourages development. This has tended to stress coastal habitats. Forests are governed by the Forest Ordinance Chapter 389 (1957) as amended variously in 1964, 1979 and 1991, and the Tanzania Forestry Research Institute Act (1980).

Mining and extraction legislation includes the Petroleum (Exploration and Production) Act (1980), the Mining Act (1998), and the Mining (Environmental Management and Protection) Regulations

(1999). This last covers sand mining and extraction, a common activity in Tanzania's coastal and marine environment (Mgaya and Juma 2001).

Key legislation governing fisheries includes the Fisheries Act (2003), the Tanzania Fisheries Research Institute Act (1980), the Marine Parks and Reserves Act (1994), and the Deep Sea Fishing Authority Act (1997). Legislation relating to lands and urban development includes the Land Ordinance (1923), the Town and Country Planning Ordinance (1996) Cap 378, the National Land-use Planning Commission Act (1999), and the Village Lands Act (1999). In the wildlife sector the National Parks Ordinance (1959) and the Wildlife Conservation Act (1974) are important. The industrial sector has the National Industries Licensing and Registration Act (1967) and the Merchant Shipping Act (1967).

The National Environment Policy (1997) provides the framework for introducing environmental considerations into the mainstream of decision-making.

Other policies and instruments guiding environmental management are the National Forest Policy (1998); the Forest Action Plan (1990/91–2007/08); the Management Plan for the Mangrove Ecosystem in Tanzania (1991); the Agricultural and Livestock Policy (1997); the National Tourism Policy (1991) (reviewed 1996); and the Integrated Tourism Master Plan (1996–2005). Others are the National Fisheries Sector Policy (1997), the Draft Investment and EIA Guidelines for Marine Parks and Reserves in Tanzania and the Draft Mariculture Development Guidelines; the National Land Policy (1995); town and city master plans; district and village land-use plans; the Wildlife Policy of Tanzania (1998); the Sustainable Industrial Development Policy (1996); and the ICZM Policy.

The National Higher Education Policy (1999) emphasizes basic sciences, including environmental science. The national curriculum includes the study and prediction of climatic and global change as a result of human activity on the environment; environmental pollution including water and air pollution with the disposal of toxic and radioactive wastes; disaster management; energy conservation; environmental conservation and enrichment; the effects of chemicals, drugs, pharmaceuticals and fertilizers on the environment; and biodiversity and genetic engineering.

ICZM policy and regulatory instruments include the National Integrated Coastal Environment Management Strategy; the National Steering Committee on Integrated Coastal Management; the Integrated Coastal Management Unit; inter-sectoral working groups; the development of a climate change adaptation strategy; and several ICZM projects.

The government has begun to involve communities in the policy, legislation, regulation and management of coastal and marine resources. This is tacit acknowledgement of the limitations of the methods of government managing authorities, which tend to be punitive rather than participatory. Most of the policy initiatives to address management challenges, which are funded by development agencies and international organizations, operate on the principle of co-management and ICZM.

Existing guidelines include Mariculture Guidelines and Guidelines and Procedures for development of Investments in Marine Parks, Reserves and Small islands. Beach Management Unit Guidelines were also developed to safeguard the establishment of Beach Management Units in all water bodies so as to involve fishing communities in the management of fish resources in their respective areas.

Several other management plans have been developed, including the Dar-es-Salaam Marine Reserves System, Mafia Island Marine Park, and Mnazi Bay and Ruvuma Estuary Marine Park. Other guiding documents include the Marine Parks and Reserves Unit (MPRU) Strategic Plan 2006-2010, and Guidelines and Procedures for Undertaking Environmental Impact Assessment in Marine Parks

and Reserves. The guidelines constitute an important tool that provides the basis for selecting sound investment proposals in accordance with the objectives of the Marine Parks and Reserves Act (1994) (ASCLME, 2011).

National institutions have been vested with environmental oversight authority by various pieces of legislation. However, the uncoordinated and overlapping jurisdiction of these avenues of enforcement impedes effective management (Mgaya and Juma 2001). The Division of Environment in the Office of the Vice President is responsible for research,<sup>4</sup> policy, planning, monitoring and coordinating broad-based environmental programmes and projects. It also oversees civil society participation in environmental activities. Its location in the Office of the Vice President affords it easy access to inter-ministerial cooperation and goodwill as evidenced in the National Environment Policy and the National Environmental Action Plan.

The National Environmental Advisory Committee advises the Minister of State for Environment. The director of Environment is responsible for the terrestrial environment and pursues the integration of environmental considerations in development policies, plans, programmes, strategies and projects. The National Environment Management Council (NEMC) serves as an advisory think tank to the government and conducts a number of activities aligned to the UN's Agenda 21. These include pollution prevention and control; environmental education and public awareness; and natural resource conservation and management. NEMC has sponsored the preparation of the national marine contingency plan; the inventory of activities destructive to the aquatic environment; a wetlands inventory and management strategy; an inventory of projects related to natural resources; environmental impact assessment reviews; and an assessment of community participation in natural-resource management.

Every ministry, as well as regional and local authority is required to have an environment section responsible for ensuring EMA compliance. This attempt at an integrated approach is confounded by the fact that the different bodies are subject to different laws and instruments. Local government authorities are subject to the local government legislation. District and urban authorities have been vested with the power to control local pollution in rivers, streams, water courses, wells and other sources of water supply. Yet other regulatory institutions have similar functions under different laws. Fortunately the law provides the opportunity for every institution to perform its functions in cooperation or in conjunction with others, but the law does not put this cooperation as a condition (Samoilys et al., 2015).

The four institutions that are most likely to play a pivotal role in the development and management of the proposed TBCA are the Marine Parks and Reserves Unit (MPRU), the Fisheries Development Division (FDD), the Tanzania Forest Service (TFS), and District Authorities (which includes communities), and significant coordination and collaboration between these institutions will be required.

The Marine Parks and Reserves Unit (MPRU) was constituted under the Marine Parks and Reserves Act (1994) and falls under the Ministry of Livestock Development and Fisheries. Its board of trustees oversees its administration to safeguard marine resources through sustainable use. MPRU recognizes the significance of coastal habitats, including mangroves, as fish nurseries, bird areas and barriers against flooding. One of its tenets is the importance of creating resilience in threatened

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<sup>4</sup> Includes publishing the National State of Environment Report every four years.

habitats by helping local communities to manage their natural resources. MPRA works with TFS mangrove forest officers.

The FDD under the Ministry of Livestock Development and Fisheries is responsible for managing the fisheries sector. The Division has its own management plans based on the Fisheries Master Plan (2002), facilitated by the Japanese Government. There are also specific Management plans, such as District Integrated Coastal Zone Management Plans (Pangani, Mkuranga and Bagamoyo districts) under the Tanzania Coastal Management Partnership funded by USAID. Other initiatives include the Collaborative Fisheries Management Areas (CFMAs), which have been established to deal with the conservation of shared fishing grounds among neighbouring fishing villages, Marine Parks and Reserves. A draft Prawn Management Plan has also been developed to manage the prawn fishery for commercial purposes, while an Aquaculture Management plan has been developed to manage aquaculture development within the country. Beach Management Units are assisted by government to develop their own resource Management Plans for their areas according to their capacity. The implementation of all these plans does, however, depend on the available human and financial resources.

Monitoring, control and surveillance capacity in the Fisheries Development Division concentrates mainly on small scale fisheries. The Division and District Authorities are equipped with patrol boats distributed in most of the coastal districts for the purpose of curbing illegal fishing practices. The Division has also been assisted by the MACEMP project to enhance surveillance and patrols within coastal districts.

The Tanzania Forest Services (TFS) comes under the Ministry of Natural Resources and Tourism. It is responsible for managing and conserving national forest resources, including reserves (natural and plantation), bee reserves and forests on public lands. TFS was established in 2011 to take over from the Forest and Beekeeping Division although this division is still responsible for developing, reviewing and overseeing the implementation of forest policy, laws and regulations.

The TFS mandate extends to coastal forests, including the restoration of degraded mangroves. The TFS budget is limited and does not extend to programmes for mangrove management, but the allocation per hectare for mangroves is comparatively higher than for all other forest types. There are mangrove forest officers in every district containing mangroves. This notwithstanding, TFS does not have sufficient human and financial resources to counter the increasing pressure on coastal forests, political apathy and sectoral conflicts (e.g. the Ministry of Housing and Settlements issuing title deeds for land in protected areas).

### **Kenya**

The constitution of Kenya 2010 reinforces the importance of natural resources and the environment. Chapter 5, Environment and Natural Resources, contains principles and obligations on the environment; protection and conservation of the environment; enforcement of environmental rights; the use and development of natural resources; agreements relating to natural resources; and environmental legislation. The constitution also provides for the establishment of an environment and land court to address legal disputes related to environmental and land resources and processes. Kenya's newly devolved system of government calls for collaboration between national and county administrations. The central government has jurisdiction over the use of international waters and water resources, marine navigation, and the protection of the environment and natural resources including fishing and water. The county government is responsible for fisheries and implementing national policies.

Legislation relevant to the marine environment is substantive (nearly 50 pieces of legislation) but confusing. The framework involves at least 14 government ministries and a further 9 authorities. Duplication, omission and poor implementation dilute regulatory effectiveness.

The National Biodiversity Strategy and Action Plan (2000) harmonizes the fragmented and multiple laws on the environment across different sectors. However, its marine and coastal aspects are rarely referred to. It is likely that few coastal people are aware of its existence. Co-management with communities has also become the norm in many of the newer policies and regulations although few communities are aware of their rights (Samoilys et al., 2011c).

The Environmental Management and Coordination Act (EMCA) (1999) provides the legal and institutional framework for managing and protecting Kenya's environment. It is being reviewed to align it to the 2010 constitution. Moreover, the Kenya Forest Service (KFS), KWS, and National Museums of Kenya also have jurisdiction over mangroves, which leads to confusion in enforcement and management (Samoilys et al., 2011c).

The EMCA can declare any area of the sea to be a protected coastal zone. The National Environment Council, established by Section 4(1) of the EMCA, undertakes policy formulation and provides direction for the purposes of the EMCA. The National Environment Management Authority (NEMA) was established under the act to implement policy. It became operational in 2002. Section 55 mandates NEMA, in consultation with the relevant agencies, to prepare a survey of the coastal zone and an ICZM policy to encourage effective methods for managing and protecting the marine and coastal environment and its river basins and estuaries. The EMCA imposes stringent penalties for pollution and hazardous-waste dumping. Prosecutions are rare, and regulations envisaged under section 55(6) for the prevention, reduction and control of pollution have yet to be issued.

The provisions of Section 55(7) relate directly to Kenya's obligations under UNEP's Global Programme of Action for the Protection of the Marine Environment from Land-based Activities. It mandates the minister to issue regulations to control pollution in rivers and estuaries from pipeline and outfall structures in vessels, aircraft and other engines used in the coastal zones.

The Environmental Impact Assessment and Audit Regulations (2003) require the inclusion of environmental management plans in all EIA reports. The Physical Planning Act (1996) assists in protecting the coast's physical environment and to sustain tourism and other socioeconomic activities.

The County Government Act of 2012 provides for the integration of economic, physical, social, environmental and spatial planning in the county planning framework. The national spatial development framework must also include a strategic assessment of the environmental impact of development, and public service delivery should ensure environmental sustainability.

The Public Health Act (1986, revised 2012) Cap 242 has jurisdiction over public health management. The Wildlife Conservation and Management Act (2013) broadly provides for the protection of vulnerable ecosystems along the coastal zone through MPAs managed by KWS.

The Forest Act (2005) is a substantial improvement on preceding legislation. It established KFS and encourages private-sector and community participation in the management of forests. Mangrove areas and coastal forests, including *kaya* forests, are recognized as areas requiring better management. Community forest associations, enshrined in the act, engage with the government on sustainable management. The act prohibits dumping waste in mangrove forests. Previous studies have shown a severe loss of vegetation and reduced fish populations from sewage sludge, oil spills and other urban waste (UNEP 2009b).

The Kenya Maritime Authority Act (2006) is reinforced by the Merchant Shipping Act (2009) and any other legislation relating to the maritime sector. It established the Kenya Maritime Authority, which advises the government on legislative and other measures for implementing international conventions, protocols and agreements. It also safeguards the marine environment from pollution and responds to marine environment incidents.

The Coast Development Authority Act (1990) established the Coast Development Authority to coordinate development projects in the coastal zone and in the EEZ. It covers most of the upstream areas connected with land-based sources and activities. The Water Act (2002) gives the minister powers to gazette catchment areas as protected areas. It outlaws actions that degrade the quality of water in rivers. Untreated sewage and wastewater discharged into the sea is one of the principal sources of pollution in the coastal zone. NEMA has recently gazetted wastewater regulations.

The Agriculture Act (1963) Cap 318 oversees degradation of the coastal zone by POPs and fertilizers. The Fertilizers and Animal Foodstuffs (Amendment) Bill (2013) will regulate the use of POPs. The Public Health Act (1986, revised 2012) Cap 242; the Pharmacy and Poisons Act (1957) Cap 244; and the Narcotic Drugs and Psychotropic Substance Control Act (1994) need to be amended to provide for the reduction and elimination of POPs containing dioxins, furans, hexachlorobenzene, and polycyclic aromatic hydrocarbons.

The Mining Act (1940) prohibits the discharge of poisonous substances into waterways and recognizes the effect of mining on the seabed and Kenya's EEZ. The Mining Bill (2012), once enacted, will replace the existing legislation. The EMCA and the EIA and Audit Regulations regulate mining activities along the coast. However, they have not been enforced with sufficient rigor for the mining of salt and limestone, which could cause permanent damage to the physical environment.

The Merchant Shipping Act (2009), which repealed the Lakes and Rivers Act (1930), prohibits marine pollution, ensures security and protects marine environments. Under Section 410, the act regulates marine pollution by drawing from various international maritime conventions and agreements. The Science, Technology and Innovation Act (2013) established KMFRI to conduct aquatic research in Kenyan waters and riparian areas including the EEZ but does not specify the scope and field of research.

Kenya has enacted land laws aligned with the Constitution of Kenya 2010 to regulate the use of land resources, including tenure, user rights and alienation. Even so, unsustainable coastal development continues, often with impunity, due to corruption and lack of enforcement (Samoilys et al. 2011c).

In term of policy instruments the Draft National Environment Policy (2012) aligns sectoral policy with the EMCA. It is a framework for integrating environmental considerations into sectoral policies, development plans and decision-making processes and for regional and international cooperation in environmental management. It calls for sustainable management of terrestrial and aquatic resources to raise the livelihoods and standard of living for coastal communities.

The National Oceans and Fisheries Policy (2008) is rooted in the provisions of the Convention on the Law of the Sea (1982), the Maritime Zones Act (1989) Section 5 and the Presidential Proclamation of June 2005. It affirms Kenya's sovereignty over the exploration, exploitation, conservation and management of ocean resources. It focuses on resource management in territorial waters and the EEZ. It addresses most aspects of fisheries management and development, including environmental conservation, regional cooperation, research, surveillance and monitoring, social responsibility and governance. The preparation of specific fishery management plans is given high priority, but certain regulations need to be adapted to allow for these plans to be effective (Samoilys et al. 2011c). This

policy and the ICZM Action Plan have similar objectives and should be harmonized to avoid duplication.

The Draft Wetland Policy (2009) recognizes the economic importance of coastal, marine and inland wetlands and proposes stringent measures to counter the (primarily human) threat to their longterm sustainability. Its integrated approach complements other sector policies and fulfils Kenya's obligations under the Ramsar Convention and other multilateral environmental agreements and protocols. Education on the importance of wetlands, a greater consultative process with civil society and political good should pave the way for adoption of this policy. No clear legal framework governs wetland conservation and management. Different aspects are handled by KWS, KFS, NEMA, the State Department of Fisheries (SDF), water sector institutions, regional development authorities and communities (Samoilys et al. 2011c).

The National Land Policy (2009) underpins a system of land administration and management that allows all citizens to gain access to land and to use it. It calls for the equitable and environmentally sustainable use of land resources and requires policies, regulations and laws to be aligned with the EMCA. Its guidelines for formulating land use and management practices take into account the fragile nature of the coastal zone. As land use has major implications for the coastal and marine environment, reform in land tenure is imperative for achieving the ICZM Action Plan's objectives. The Regional Development Authorities Policy (2007) calls for equitable socioeconomic development through the sustainable use of natural resources.

The government acknowledges the role that environment plays in spurring economic growth and reducing poverty in the National Poverty Reduction Plan (1999–2015); the Poverty Reduction Strategy Paper launched in 2001; and Kenya's Vision 2030, which cites environmental degradation as a cause of poverty and argues for environmental protection. The Draft Forest Policy (2012) calls for the sustainable use, conservation and management of forests and trees; sustainable land use through soil, water and biodiversity conservation; the participation of the private sector, communities and others in forest management to conserve water catchment areas and create employment; farm forestry to produce timber, wood fuel and other forest products; and dryland forestry to produce wood fuel, wood and non-wood forest products. It calls for forest extension services for farmers and forest research, training and education as well.

The numerous statutes relating to the conservation of the coastal zone can result in duplication, overlap, inconsistency and ineffectual penalties. Although the EMCA prevails in cases where sectoral policies conflict, its effective implementation requires that statutes and substantial financial and technical support be harmonized. There are still no clear government policy guidelines for managing mangroves. Mangrove cutters must be licensed, but their numbers are not controlled. The ICZM Policy brings together all those involved in the development, management and use of the coastal zone within a framework that facilitates the coordination and integration of activities and decision-making processes. The ICZM Action Plan (2010–2014) is a first for Kenya as it protects fragile ecosystems while pursuing sustainable development. Its thematic areas are integrated planning and coordination; sustainable economic development; conservation of coastal and marine environment; environmental risks and management of shoreline change; capacity building, information and public participation; and implementation through institutional and legal frameworks.

Marine waters are state-owned public property, and private ownership or leasing is not permitted. Historically, the government has founded and managed MPAs with scant stakeholder engagement, but the Fisheries (Beach Management Unit) Regulations (2006) support co-management. BMUs allow fishers to manage their landing sites and in so doing conserve the biodiversity and livelihood of coastal communities. Management plans for community conservation areas are central to the



success of the Darwin Initiative Project that the East African Wildlife Society Marine Programme has implemented since 2009. It combines improved livelihoods with the conservation of marine resources to reduce pressure on the ecosystem. Marine and land-based alternative livelihood opportunities have increased in Shimoni, Majoreni and Vanga through a network of six community-conserved areas. This improvement is partly attributable to the BMU regulations, which allow the fish traders, boat owners, fish processors and other beach stakeholders, who traditionally depend on fisheries activities for their livelihoods, to organize sustainable beach management<sup>5</sup>.

The Forests Act (2005) legislates for community involvement in forest management. Kenya's 10 forest conservancies have community representation on the forest conservation committees. However, there is no national mangrove harvesting plan, a concept that is still new to coastal communities (Samoilys et al. 2011c).

Institutions with a mandate for coastal environment management have evolved over time. The EMCA authorizes NEMA to exercise general supervision and coordination over all environmental matters. It established the National Environment Council, which is charged with policy formulation, setting national goals, objectives and priorities for protecting the environment and fostering stakeholder cooperation. It also established provincial and district environment committees.

Other institutions are specific to sectors or resources. They include KFS for forest management; Kenya Forestry Research Institute for forestry research; State Department of Fisheries for Fisheries management; KMFRI for fishery research; Kenya Maritime Authority for the regulation of maritime goods and services; Kenya Ports Authority for port and harbour management; and KWS for wildlife management including in MPAs. Others are the CDA for coastal regional development; the Water Resources Management Authority; National Museums of Kenya; public universities for capacity building and research; and various local authorities responsible for Mombasa and other municipalities in the coastal region (Samoilys et al., 2015).

The four institutions that are most likely to play a pivotal role in the development and management of the proposed TBCA are KWS, County Authorities, (especially County Fisheries staff and community-level structures), SDF, and KFS.

### **3.3. Current management systems for marine protected areas**

#### ***Tanzania***

The proposed TBCA already has an impressive network of gazetted marine protected areas. Each are managed by the responsible national agency according to their mandates. A brief description of the current management arrangements under the MPRU (Tanzania) and KWS (Kenya) is presented below.

Figure 2 shows the 5 marine protected areas in Tanga Region. These are, from south to north, TACMP, Ulenge Island Marine Reserve, Kwale Island Marine Reserve, Mwewe Island Marine Reserve, and Kirui Island Marine Reserve. TACMP is one of 3 gazetted Marine Parks under Tanzanian legislation, while the smaller islands are part of a network of 15 Marine Reserves. There are 4 categories of MPA in Tanzania:

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<sup>5</sup> Conservation and sustainable management of Kenya's marine and coastal resources, <http://www.eawildlife.org/projects/wetlands/marine?format=pdf>

- Marine Parks – larger, with resident communities, and allow multiple uses, although a zonation system is used including core zones, specified use zones, general use zones, and a buffer zone.
- Marine Reserves – smaller, and are no take zones
- Collaborative Fisheries Management Areas (CFMAs)
- Community Managed Areas (CMAs)

In some areas Privately Managed MPAs have been established through contractual agreement (eg. Chumbe Island in Zanzibar (TACMP GMP, 2011; Manager TACMP, pers comm.).

The objectives of MPAs in Tanzania are to protect, conserve and restore species and genetic diversity; stimulate rational development of underutilized natural resources; promote sustainable use of resources; recovery of over-exploited or damaged areas and resources; ensure stakeholder and user involvement; and promote community-oriented education and dissemination of information.

TACMP was gazetted as a Marine Park in August 2009 under Government Notice No. 307 of the MPRs Act No. 29 of 1994 and covers an area of 552 km<sup>2</sup>. The smaller islands were established as Reserves in 2010 under GN 212 of the MPRs Act No. 29 of 1994.

Marine parks and reserves in Tanga are managed under the institutional framework illustrated in Figure 13 below.



Figure 13. Institutional structure under which the TACMP and the Tanga Marine Reserves are managed.

The TACMP has 45,000 people living in the park, in 9 villages and 9 city suburbs. Eighteen Village Liaison Committees (VLCs), and 18 community Enforcement Units assist in collaborative

management of the Park. The Park personnel are guided by the Marine Parks and Reserves Act of 1994 and the MPRs strategic plan. TACMP has a General Management Plan. Guidelines and procedures for undertaking environmental impact assessment in an MPA, and guidelines and procedures for investment in the MPA, are also used as tools to assist in management. Specific regulations for TACMP are currently under development (TACMP GMP, 2011; Manager TACMP, pers comm.).

The four smaller Marine Reserves do not yet have GMPs or staff, equipment and infrastructure, and are currently managed remotely by the staff of TACMP. These 4 Reserves have at least 10 villages in close proximity to them (TACMP GMP, 2011; Manager TACMP, pers. comm.). Structures from these communities will be essential in assisting the MPRU to manage the Reserves. This is particularly important as the MPRU faces several challenges in the management of the marine parks and reserves in Tanga. These include infrastructural, equipment and staffing shortages, as well as budgetary constraints.

Of particular significance to the proposed TBCA is that the MPRU park and reserve management work closely with local authorities and committees at a village level that have been established to contribute to management of the environment within and adjacent to the protected areas. This approach is somewhat different to the approach taken with MPA management in Kenya.

### **Kenya**

In Kenya, the Wildlife Conservation and Management Act (2013) broadly provides for the protection of vulnerable ecosystems along the coastal zone through MPAs managed by KWS. This act focuses on terrestrial wildlife resources, and a specific act for marine living resources may enhance the effectiveness of KWS activities on the coast (Samloilys et al., 2015).

In Kenya, (in direct contrast with Tanzania) Marine Reserves are larger, with resident communities, and allow multiple uses, although a zonation system is used including core zones, specified use zones, general use zones, and a buffer zone. Marine Parks are smaller and are no take zones. In the past, the government of Kenya tended to choose coral reefs to gazette as parks because of their aesthetic appeal and rich biodiversity. Later the government introduced marine reserves that were larger than the parks and encompassed neighbouring seagrass beds and mangrove forests. The reserves provide a more balanced ecosystem-based approach to marine conservation and management (Samoilys and Obura, 2011). More recently, a network of community conservation areas (Maina et al., 2011) has been established in and adjacent to the marine reserves. Unlike the parks, the reserves allow carefully managed fishing by local communities.

Figure 5 shows the three Kenyan Marine Protected Areas in the proposed TBCA. These are from the north to south: Diani Chale Marine Reserve; Mpunguti Marine Reserve; and Kisite Marine Park. Although Diani-Chale Marine Reserve was proclaimed in 1995, it has not yet served its intended function due to difficulties with obtaining community support for the initiative. The proposed TBCA provides the opportunity to revitalise the functioning of this Reserve through direct intervention in awareness raising and the establishment of a management presence in the area.

The Kisite Mpunguti MPA was established to enhance biodiversity conservation through a participatory approach; to provide suitable breeding and feeding habitats for marine organisms; and to promote sustainable nature tourism. The area was selected due to its pristine coral reefs; scenic setting and beauty; potential for nature tourism, recreation and relaxation; protection of spawning

grounds; importance as breeding habitat for birds and coconut crabs; rare combination of terrestrial (islands) and marine life, and it's potential as a conservation and research centre. Kisite Mpunguti is managed from a Park Headquarters and associated personnel, infrastructure and equipment, situated in Shimoni village. Activities such as patrols are coordinated from here, with a ranger field station located on one of the Mpunguti Islands. This is permanently staffed by rotational personnel who are equipped with a patrol vessel to monitor and patrol the islands and the MPA waters (Kisite Mpunguti MPA Warden, pers. comm.).

Kenya has traditionally followed a less people-centred approach to marine conservation than has Tanzania. This has resulted in significant successes in biodiversity conservation with many studies showing the effectiveness of MPAs in protecting biodiversity (eg. McClanahan et al., 2005; 2007). However, the MPAs are coming under increasing pressure from neighbouring communities suggesting that new approaches may be necessary to enhance the overall conservation effort on the coast.

The network of CCAs and active participation of BMUs in the areas between the existing protected areas provide opportunity for closer collaboration in a broader management approach that extends well beyond current MPAs. Figure 14 shows the extent of such community driven conservation areas (CCAs) near the border on the southern coast of Kenya, and in the vicinity of Kisite Mpunguti MPA.



success of the process to show that the proposed TBCA has the potential of providing greater benefits than following the *status quo* where the existing parks and reserves are managed independently by the two countries and also as units on their own, rather than as part of the larger seascape proposed by the TBCA.

#### **4.1.1. Contiguous and connected habitats**

The analysis of habitats and species presented in Section 2 strongly indicates that the area between Mombasa in Kenya and Pangani in Tanzania is part of one continuous ecosystem, despite the political boundaries that have been put in place between the two countries. Figure 15 shows that the arrangement of a mainly mangrove coast with scattered offshore islands and extensive fringing and patch coral reefs, together with a steep dropoff relatively close to the shore is common throughout the TBCA. In addition the area shares common oceanographic conditions and weather patterns. The species and communities that these habitats support are also similar throughout the area, with site specific differences depending on site specific conditions.

The larger scale driving processes (climate, weather, oceanography) are connected, as are the ecological interactions. It is highly likely that genetic connectivity is high in this area and that populations are not separated at this genetic level. Given this connectivity, and the understanding that it is more effective to conserve larger seascapes in an ecosystem-based approach to marine conservation, rather than small pockets of biodiversity, it would be justified from a biological perspective to manage the entire area as one seascape, acknowledging the interactions that occur between the different elements on both sides of the border, and indeed between the existing protected areas.

#### **4.1.2. Regional significance**

Several independent processes have identified the area proposed for the TBCA as ecologically significant within the WIO region, recognising that it is an area that is special within the region, and should be considered as one continuous seascape, rather than managed as if it were made up of independent small ecosystems.

#### **The Convention on Biological Diversity EBSA process**

The Convention for Biological Diversity (CBD) has initiated a global process of identifying Ecologically and Biologically Significant Areas (EBSAs) in various bio-regions of the world. In paragraph 36 of decision X/29, the Conference of the Parties to CBD (COP 10) requested the Executive Secretary to work with Parties and other Governments as well as competent organizations and regional initiatives, to organize, including the setting of terms of reference, a series of regional workshops, with a primary objective to facilitate the description of EBSAs through the application of scientific criteria in annex I of decision IX/20. A workshop was subsequently convened in Mauritius from 31 July to 3 August 2012.

The criteria used to describe the EBSAs included the degree of uniqueness or rarity of habitats, ecosystems or species that an area supported; the level of importance of the area in terms of life-



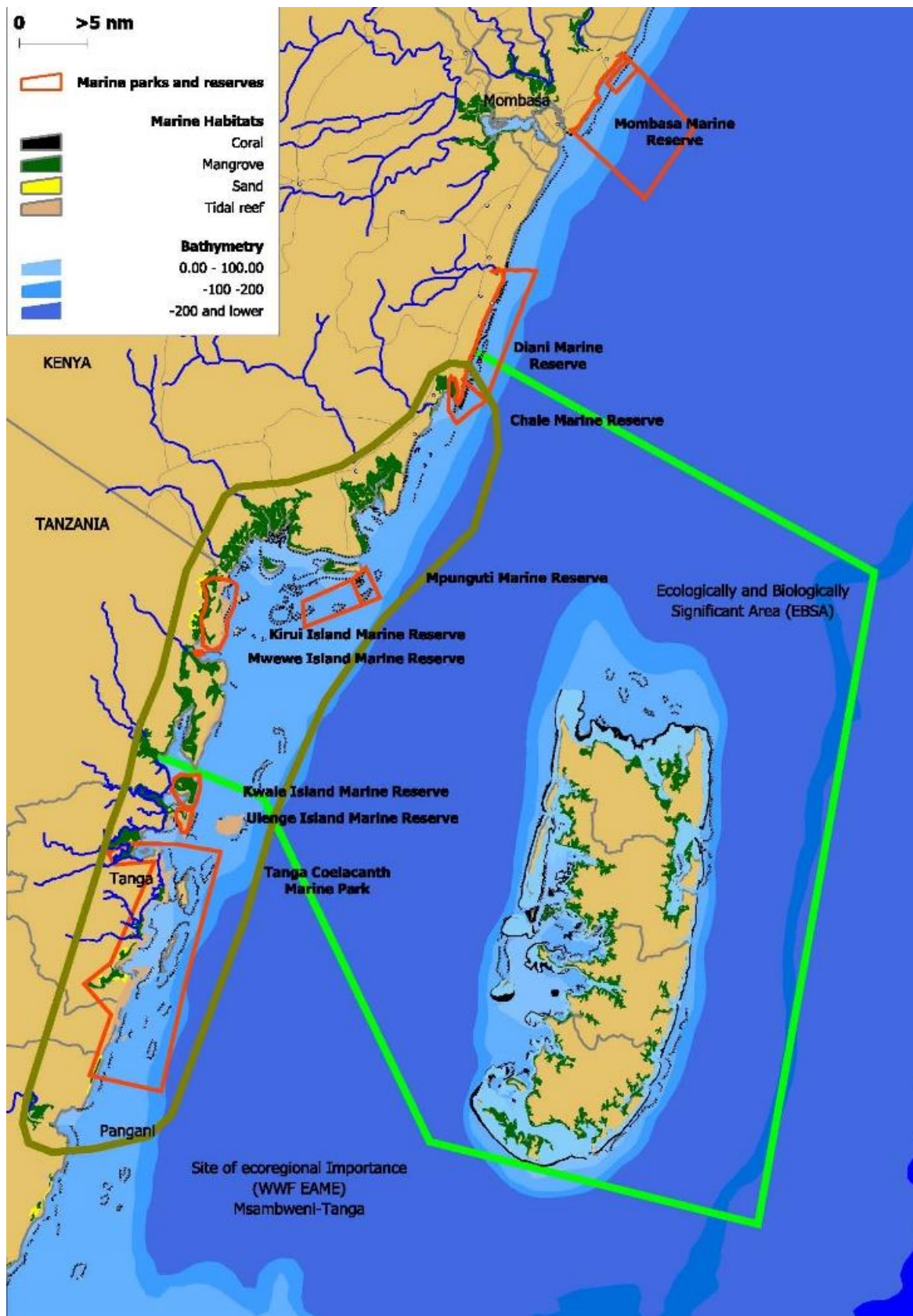


Figure 15. Map showing position of existing marine parks and reserves, habitats, and the areas identifies by the CBD as EBSAs, and by WWF as a site of eco-regional importance. history stages of species; Importance for threatened, endangered or declining species and/or habitats; Vulnerability, fragility, sensitivity, or slow recovery of habitats and species; comparative

level of biological productivity; biological diversity; and naturalness of the area. The country specialists from Kenya and Tanzania prepared several submissions as a follow-up to the workshop. Of these, two (Tanga Coelacanth Marine Park; Pemba-Shimoni-Kisite) in the region of the proposed TBCA were accepted (CBD, 2012). Figure 14 shows the location of both of these EBSAs.

### **WWFs Seascapes of eco-regional importance**

A Biodiversity Visioning workshop was held in Mombasa in April 2001 as an initial step of the East African Marine Ecoregion programme (EAME) of WWF. Participants at the workshop included scientific experts and representatives of various stakeholders, including government agencies and NGOs (local and international). The vision that was developed encapsulates the stakeholders' wishes for a healthy and productive marine environment that would benefit local and international communities. It also represents their desire that both international and local communities participate in the management of the marine environment- aiming to maintain biodiversity values, ecosystem processes and a supply of protein to poor people.

Participants identified the twenty-one most important seascapes of the EAME, from a biological point of view. These areas were mapped and ranked in terms of their biological importance (global, ecoregional or sub-regional). The area between approximately Diani in Kenya and Pangani in Tanzania was identified as a seascape of ecoregional importance and called the Msambweni-Tanga ecoregion (EAME, 2004). The location of this area is shown on Figure 15.

### **Resilient Coasts**

A comprehensive Situation Assessment was carried out during the preparatory phase of the Resilient Coasts initiative (Samoilys et al., 2015), supported by the Swedish International Development Corporation Agency (SIDA) through the UNEP Africa Marine and Coastal programme which is executed by the Secretariats of the Nairobi and Abidjan Conventions. The report was developed by the Resilient Coasts partner organisations – IUCN ESARO, CORDIO, Nairobi Convention Secretariat and WIOMSA. The Situation Assessment explains the ecology and social profile of coastal systems in Mozambique, Tanzania and Kenya in order to contribute to the development of effective strategies to enhance the resilience of marine and coastal systems in the Western Indian Ocean. Special consideration is given to the effects and consequences of climate change and economic development (Samoilys et al., 2015).

Several areas on the east African coastline were identified as significant areas for future focus in the WIO according to their ecological and socio-economic importance and characteristics. Five meta-ecosystem sites (mangrove forests, coral reefs and seagrass beds) were identified, including Funzi Bay and Ramisi River Estuary in southern Kenya, both included in the proposed TBCA area (Samoilys et al., 2015).

## **4.2. Socio-political benefits**

### **4.2.1. International cooperation**

The proposed TBCA will provide the opportunity to further the aims of collaboration called for by the global community in terms of environmental protection and management (ie. UNCED, RIO, 1992; CBD). In addition, regional collaboration in environmental matters would be enhanced as called for by the Nairobi Convention and the East African Community.

The proposed TBCA between Kenya and Tanzania provides an opportunity to enhance cooperation between two neighbouring states that share common environments, from both a biophysical, socio-economic and cultural perspective in the coastal areas near the border between the two countries.



#### **4.2.2. Peace Parks**

The notion of peace parks is a global one, with the World Conservation Union (IUCN) identifying 227 transboundary protected area complexes around the world that incorporate 3 043 individual protected areas or internationally designated sites. The idea was and remains compelling: an opportunity to think beyond political boundaries to accommodate gene pools, water flow, wildlife movement and the propagation of plant species; an opportunity to unlock regional economic development, share the conservation of biodiversity and promote regional peace and stability by demonstrating the benefits of cooperation. The dream of contiguous transfrontier conservation areas (TFCAs) in southern Africa began its realisation in the mid-1990s in the discussions of visionary leaders as they contemplated a new era of regional peace, democracy and development.

In the years since, it has been the political will of leaders in southern Africa, and the efforts of an organisation set up to champion the peace parks concept, that has seen the vision of peace parks taking shape on the subcontinent. Spearheaded by Dr Anton Rupert, and with President Nelson Mandela and HRH Prince Bernhard of the Netherlands as co-founding patrons, Peace Parks Foundation was founded on 1 February 1997 to facilitate the creation of TFCAs throughout southern Africa. The concept of the region's peace parks is as glorious as it is audacious: vast conservation areas that straddle national borders, of sufficient extent to incorporate entire biomes; of sufficient integrity to restore the ancient patterns of diverse ecological communities, and of sufficient vision to reconnect the shared cultures of tribal peoples, dislocated when colonial rulers arbitrarily imposed Africa's borders and cut through some 190 culture groups ([www.peaceparks.org](http://www.peaceparks.org)).

Eighteen TFCAs have either been, or are in the process of being established in southern Africa, including Africa's first marine TFCA, the Ponta do Ouro-Kosi Bay TFCA, which forms part of the larger Lubombo Transfrontier Conservation and Resource Area between Mozambique, South Africa and Swaziland. Figure 16 shows the location of the eighteen TFCAs in southern Africa.

#### **4.2.1. Connecting communities and cultures across artificial borders**

The human population in the proposed TBCA share many aspects of culture, religion and livelihoods, and many have cross-border family ties, despite being separated by political boundaries. According to the people of Jimbo fishing village that lies in Kenya within a few hundred meters of the border with Tanzania, up to 50% of the residents of the village have arrived and settled there from Tanzania in the last thirty years, an example of how closely connected families are in these border lands (pers.ob.). Trading along the Swahili coast has been ongoing for centuries and elements of these coastal economic activities remain. The border areas in both countries are remote and have not benefitted greatly from development driven by central governments. Migrant fishers frequently follow fish resources across the border in both directions and interact closely with local residents (WIOMSA, 2011).

The proposed TBCA has the potential of bringing people on both sides of the border closer together to address common environmental and livelihood issues under the umbrella of a strengthened bi-national management system that is inclusive of all stakeholders. This has positive implications for both the environment and the people living in these areas. This needs to go hand in hand with reviewing immigration and permitting (fisheries) procedures between the two countries so that cross border interaction can be stimulated in a legal and controlled manner.



Figure 16. Location of the TFCAs in southern Africa. Their status is as follows:

**TREATY SIGNED:**

- 1. /Ai/Ais-Richtersveld TP\*(Namibia/South Africa);
- 2. Kgalagadi TP\*(Botswana/South Africa);
- 3. Kavango Zambezi TFCA\* (Angola/Botswana/Namibia/Zambia/Zimbabwe);
- 4. Great Limpopo TP\* (Mozambique/South Africa/Zimbabwe).

**MoU SIGNED:**

- 5. Lubombo TFCRA\* (Mozambique/South Africa/Swaziland);
- 6. Maloti-Drakensberg TFCDA\* (Lesotho/South Africa);
- 7. Iona-Skeleton Coast TFCA (Angola/Namibia);
- 8. Greater Mapungubwe TFCA\* (Botswana/South Africa/Zimbabwe);
- 9. Chimanimani TFCA (Mozambique/Zimbabwe);
- 10. Malawi-Zambia TFCA\* (Malawi/Zambia).

**TFCAs IN PROCESS:**

- 11. Maiombe Forest TFCA (Angola/Congo/DRC);
- 12. Liuwa Plains-Mussuma TFCA\* (Angola/Zambia);
- 13. Lower Zambezi-Mana Pools TFCA\* (Zambia/Zimbabwe);
- 14. ZIMOZA TBNRMP (Mozambique/Zambia/Zimbabwe);
- 15. Kagera TFCA (Rwanda/Tanzania/Uganda);
- 16. Niassa-Selous TFCA (Tanzania/Mozambique);
- 17. Mnazi Bay-Quirimbas TFCMA (Tanzania/Mozambique);
- 18. Western Indian Ocean TFCA (Comoros/France/Madagascar/Mauritius/Mozambique/Seychelles/Tanzania).

\* Peace Parks Foundation directly involved

TP : Transfrontier Park

TFCA : Transfrontier Conservation Area

TFCDA : Transfrontier Conservation and Development Area

TFCMA : Transfrontier Conservation Marine Area

TFCRA : Transfrontier Conservation and Resource Area

TBNRMP : Transboundary Natural Resource Management Project

(Source: [www.peaceparks.org](http://www.peaceparks.org))

#### **4.2.2. Joint tourism initiatives**

The proposed TBCA has the potential to enhance tourism initiatives in the area, indirectly contributing to economic well-being and conservation efforts. Tourism is expected to be one of the sectors that can be further promoted through joint efforts from both Kenya and Tanzania. Current tourist facilities and activities are limited, especially on the Tanzanian side of the border.

Since the islands of the Tanga Marine Reserves have been gazetted investors have shown interest in developing eco-tourism ventures on the uninhabited Kwale, Mwewe and Kirui Islands. One contract to invest in luxury tented lodge accommodation on Kirui has already been signed by MPRU HQ.

Opportunities may also exist for offering packages that include stays at destinations on both sides of the border, an attractive alternative allowing tourists to experience a broader range of attractions and localities in one trip. The potential to offer packages that include transfers by boat to different accommodation establishments within the proposed TBCA needs to be investigated.

In terms of opportunities for communities to benefit from tourism over and above formal employment in tourism services, several options may arise, especially if best practice and experiences from other parts of Kenya and Tanzania are tapped into. For example the MPRU has empowered communities to offer tourism services to tourists visiting Bongoyo, Sinda and Mbudya Islands in Dar es Salaam. The communities who were previously involved in dynamite fishing have started becoming involved in conservation activities as a result. The communities earn income through selling food and refreshments to visitors to the islands as well as offering activities such as tour guiding (Manager, Dar-es Salaam Marine Reserves, pers. comm.).

Overall there is scope to further market the attractions of the proposed TBCA more aggressively, and offering a transboundary experience may enhance this sector on both sides of the border. Security issues and international travel advisories remain a concern, and ensuring the general perception that security of visitors is not an issue of concern needs to be a high priority.

#### **4.2.3. Cross border learning**

There is the potential to link up Kwale County with Tanga Region in Tanzania, where there is a solid culture of institutional support and community awareness of marine resource management and conservation (Wells et al. 2007). Experiences in natural resource management have been different under the varying governance systems in the two countries. Both have seen some successes and some failures. The closer collaboration envisaged in the proposed TBCA provides opportunity for experiential learning through exchange visits and joint activities by both management authorities and local community members. Previous interactions between communities on both sides of the border that were supported by the TCZCDP among others, need to be re-invigorated.

### **5. Threats**

#### **Climate change**

Climate change is an overarching phenomenon impacting on all other threats so is briefly discussed here in the context of eastern Africa. This is followed by a threat matrix outlining the main threats envisaged in the proposed TBCA.

Climate variability has been found to be the norm at both spatial and temporal scales and these have been identified globally to suggest at least quasi-biennial (2-3 years), inter-annual (3-7 years), quasi-decadal (8-13 years), inter-decadal (17-23 years) and multi-decadal (40-80 years) periodicity

(Tourre et al., 2007). However, trends in rainfall patterns, wind patterns, are likely to be linked to anthropogenic climate change (Anderson and Samoily, 2015).

The area of the proposed TBCA is exposed to a greater or lesser extent to changes and variability in the main drivers of change at a global level. Atmosphere and climate, ocean thermodynamics and circulation patterns, and ocean acidification impact all the regions and localities covered. Ecological impacts on marine life may result from factors such as coral bleaching and ocean acidification or changes to water temperature, ocean currents, salinity, or river run-off. Climate change also affects coastal communities directly through, for example, growing competition for freshwater resources, the threat of sea-level rise to coastal infrastructure, and the increasing frequency of extreme weather events such as tropical cyclones and droughts.

Increased greenhouse gas emissions affect the ocean in three major ways. They warm the sea-surface temperature (SST) and cause ocean acidification and deoxygenation (Turley et al., 2011). The latter two effects are poorly understood, particularly in eastern Africa. One secondary effect is rising sea levels caused by melting polar ice caps. Another is coral bleaching and coral death caused by rising SST (Samoily et al., 2015).

Acidification will have a significant impact on marine resources and fisheries because the changes to ocean chemistry will affect marine organisms that rely on pH-sensitive chemical reactions (Samoily et al., 2015).

Changes predicted in the WIO and eastern Africa according to the IPCC (2013) and other sources are shown in Table 7:

Table 7. State and expected trends of climate change in the WIO region.

	1950 – 2010	2090
<b>Temperature</b>	Temperature raise : +0.6°C (Mozambique) to 1.1°C (Mauritius)	Temperature raise: +2.8°C (Mauritius) to + 3.9°C (Tanzania)
<b>Precipitation</b>	Annual precipitation drop, except for Seychelles	- Annual precipitation raise for Comoros , Kenya, Seychelles and Tanzania - Annual precipitation drop for Madagascar, Mauritius and Mozambique - Longer dry season and intensification of precipitation
<b>Sea level rise</b>	Sea level rise: 0.4mm/year to 1.68 mm/year	Sea level rise up to 56 cm (more than 2m for some localities in Mozambique)
<b>Cyclones</b>	Increase in frequency of intense cyclones	No notable change predicted, some new areas prone to cyclone in Madagascar

Table 8. Main threats to the proposed TBCA.

Threat	Threat Level	Description of threat/possible mitigation measures
1. Declining fisheries	High	Poverty and lack of alternatives, combined with an increase in fishers and gears have led to declining catches. If this trend continues and benefits of the TBCA are not obvious, community support will be eroded. Improved management of MPAs and areas surrounding them through co-management approaches are critical and communities need to be made aware of tangible benefits of closed areas, gear limitations and improved management (adherence to fisheries regulations).
2. Destruction of marine and coastal habitats	High	Increased reef activity and trampling of intertidal habitats, destructive fishing practices such as the use of dynamite, and ring nets set in shallow water, dredging for construction material, and potential port development all pose risks to the TBCA. Physical alteration of the coastline can also occur through inappropriate hotel and infrastructure development for the tourism industry. Fisheries regulations need to be enforced, MCS improved, closed areas set aside for conservation purposes, illegal fishing methods effectively prosecuted, and environmental best practice (eg. EIAs) followed in the case of large scale modifications to the coastal marine environment.
3. Deforestation	Medium	Unsustainable harvesting of coastal forests, especially mangroves, lead to destruction and alteration of a primary habitat in the TBCA area. Careful forest management with improved collaboration between the agencies responsible, adherence to management guidelines, and replanting initiatives all need to be instituted, and no-take areas respected.

4. Coastal flooding and salt water intrusion	Medium	This is a potential impact of climate change with possible intensified storms, increased rainfall, and tidal surges, combined with increasing sea level. This is exacerbated by destruction of mangroves and other coastal habitats that act as natural protection to these events. Salt water intrusion is made worse through overuse of coastal ground water resources, sometimes associated with tourism development or agricultural practices. Coastal development needs to take these factors into consideration and 'climate smart' designs implemented to ensure communities, infrastructure and coastal land are protected from these threats.
5.Sedimentation	Medium	Increased sedimentation from land-based sources threatens the coastal environment through smothering coral reefs, mangroves and seagrass beds. While important nutrient inflows come from this source, increased erosion through poor land-use practices in the river catchments can lead to habitat destruction. This is likely to increase with predicted increase in the number and intensity of rainfall events. Catchment management and the link between practices inland and coastal areas needs to be recognised and joint management implemented between stakeholders.
6.Pollution	Medium	Pollution of the coastal zone can come from inland sources (pesticides, agricultural fertilizers, sewage, mining activities etc.) or from activities in the marine environment (Oil and gas developments, shipping activities). The link between land-based activities and potential impacts on the coast needs to be integral in all management efforts. In terms of potential marine sources of pollution, oil spills probably pose the greatest threat. Following international best practice and adherence to global and national regulations for these activities is essential, especially in the TBCA where impacts would be very serious to both biodiversity and livelihoods.

7.Alteration of fresh water flow	Low	Freshwater inflow into the marine environment is critical to the healthy functioning of coastal environments. Besides providing nutrients to the coastal zone, estuarine environments rely on sufficient fresh water flows. These environments support productive ecological systems and livelihood options for coastal communities. Water abstraction upstream is the main threat to this inflow. These threats need to be managed with the agriculture and mining sector, which both require large amounts of water from rivers in the proposed TBCA area.
9.Terrorism and Insecurity	High	Recent insecurity on the coast of Kenya and the travel advisories issued by several countries supporting tourism in both Kenya and Tanzania, has had a profound effect on the coastal economy. This threat to the tourism sector could have serious negative repercussions for the propose TBCA where tourism activity will be a major supporting sector. International and national efforts to address the issue of terrorism need to be intensified, and the negative perceptions about the Kenyan coast and east Africa as a tourist destination need to be addressed through improved marketing and diplomatic efforts.
10.Lack of political support for TBCA process	Medium	It is critical that the TBCA initiative receives the political support (regional, national and local) required to ensure that it has the momentum to go forward effectively. This support needs to be fostered by the proponents of this initiative from the very early stages, with continuing engagement with stakeholders at all levels into the future as the process unfolds.

## 6. Proposed way forward

### 6.1. Existing opportunities and potential options for joint management

Given the background information presented thus far, and the justification for the proposed TBCA presented based on this information, it remains to present some ideas for the actual mechanism that would need to be put in place to actualise the concept. This section looks at opportunities for the actualisation and, based on an analysis of other arrangements for TBCAs in Africa, provides a proposed framework to implement the concept.

### **6.1.1. Previous cross-border discussions between Kenya and Tanzania in the proposed TBCA**

As mentioned previously, there is historic and ongoing liaison between the communities that live on either side of the border in the proposed TBCA. Strong links exist from both a cultural and economic perspective. The communities close to the border share common resources for their survival inextricably linking their day-to-day lives. During the field visits as part of the process of developing this technical paper, it was possible to meet with these communities and obtain their view on the possibility of closer collaboration with their neighbours, even though they were resident in different countries. On both sides of the border, community members indicated that it would be a positive idea to work more closely together, providing an opportunity to address common concerns and seek solutions to problems that they face, including issues of immigration, and rights to fish in particular areas. Both sides acknowledged that there were issues around resource use and that it was important to improve the level of communication between all stakeholders.

Several people mentioned previous cross-border interactions that they had had, often facilitated by projects working in the area. They spoke positively about the periods when these interactions happened, and were disappointed that they had ceased in recent years, probably as a result of particular projects and initiatives coming to an end. It appears that this history of interaction between the inhabitants close to the border provides an opportunity to build upon during the process of establishing the proposed TBCA. The communities are supportive of the idea, and believe that it will enhance management of the resources in the area, that are used by all.

### **6.1.2. Lessons learned from other cross-border initiatives**

There have been many examples of cross-border conservation efforts globally and in Africa which provide some guidance as to the range of implementation arrangements that may be possible for the proposed TBCA (eg. Mount Elgon between Uganda and Kenya; Maluti-Drakensberg between South Africa and Lesotho; Lubombo between South Africa, Mozambique and Swaziland; Virunga between Uganda, Rwanda and the DRC; Nyika Plateau between Malawi and Zambia etc). These may be based on formal or informal agreements that declare common interests, agree on objectives, state guiding principles, and plan and implement management programmes. The concept may be initiated at a high political level (agency head, Minister, or even Head of State), be a locally-based initiative (eg. between staff members of a particular protected area), or a third party initiative (eg. when an NGO advocates and supports a conservation initiative) (Sandwith et al., 2001).

Agreements on transboundary protected areas range from bi-lateral treaties that bind the parties (countries) to a long-term accountable cooperative process (this would be the strongest form of support for the concept), through administrative instruments such as MoUs developed between key agencies, departments or Ministries, to more limited agreements to address specific issues, and informal agreements between managers on different sides of a border to promote friendly cooperation. Treaties are often negotiated at the level of regional economic integration bodies such as SADC or EAC, which often have mandates to promote this kind of transboundary collaboration.

Each situation is different and there is no one correct way of approaching this kind of agreement. Based on an analysis of the various options, a proposed scenario for the marine TBCA between Kenya and Tanzania is presented below. It should be noted that the nature of this agreement will need to be investigated further as the process evolves. This process would require specialised legal input to ensure that the choice of agreement fits the needs of the situation to the satisfaction of both parties.



## **6.2. Possible TBCA institutional, legal and management arrangements**

It is envisaged that a Marine Transboundary Steering Committee (MTBSC) would be established to steer the process of establishing and managing the TBCA. Being an international matter, it is proposed that this Committee is established at Ministerial level by the responsible Ministries in each country. The MTBSC could operate under the auspices of either the Nairobi Convention or the East African Community. The legal formulation of such a collaboration will require input by a team of lawyers experienced in international law. The Steering Committee would not consist of a permanent staff or administration but would operate and be hosted within the respective Ministerial systems, perhaps with a rotating Chair from each of the countries.

The proposed MTBSC would be constituted by representatives of all the major interest groups and stakeholders within the TBCA (ie. from both Kenya and Tanzania). For example, local and district/county authorities, MPRU and KWS, the private sector, BMU and CCA representatives, immigration, forestry services, etc .

It is envisaged that the existing gazetted parks and reserves would continue to operate within their jurisdiction according to the legislation that guides their activities, and be primarily responsible for the existing protected areas. However, the MTBSC provides the opportunity for the entire coastal area of the TBCA to be managed through a multi-use, zoned system; some areas with greater protection than others, and with some areas (eg. the urban areas in Kenya such as Diani), continuing to operate as such, but within the context of an overall system which allows greater communication between sectors and stakeholders both within each country and between them. In essence the MTBSC will provide a coordination mechanism to enhance collaboration between existing institutions, frameworks and stakeholders.

In terms of the institutional processes to be followed, especially at a local authority level, experience needs to be taken from past initiatives such as the TCZCDP in Tanzania, and the process of establishing CCAs and BMUs in Kenya, in terms of the most effective way to organise environmental management efforts on a large scale, especially with regards to arrangements at a local authority level. It is envisaged that the process of setting up the TACMP will also provide important procedural lessons for the establishment of a large multi-use area. It is probable that establishing of the proposed TBCA would need to follow the legal route of each country. However, this would be guided by a common set of principles and guidelines so that it will be legally and institutionally possible to manage the proposed TBCA collaboratively, at least in terms of the common goals and outcomes envisaged by the initiative.

This approach will enhance both development of the area and conservation needs in a transparent and forward-thinking manner that will enhance the future of this currently remote, yet environmentally rich area of the coast.

The following organogram (Figure 17) illustrates the envisaged institutional framework for the proposed TBCA.

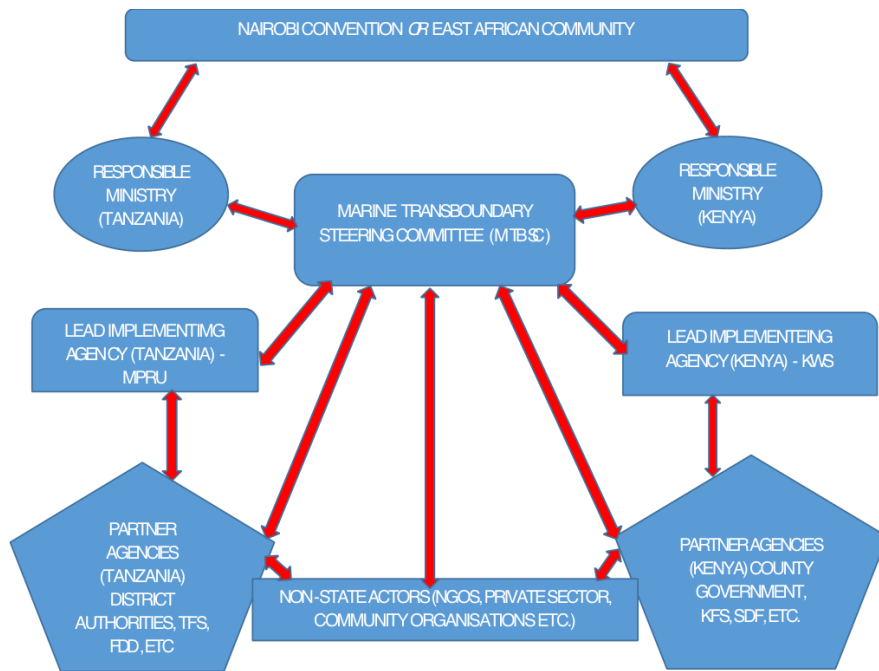


Figure 17. Suggested Institutional Framework for the proposed TBCA.

## 7. Delineation of TBCA

It is proposed that the TBCA extend from the northern boundary of the Diani Chale Marine Reserve in Kenya to the southern boundary of Mkinga District in Tanzania (between Ulenge and Kwale Islands Marine Reserves). The landward boundary would be the coastal wards in both countries and the seaward boundary would correspond with the 200 m depth contour. The 200 m contour roughly approximates a distance of 5 nautical miles offshore. This is shown in Figure 18. The boundaries as indicated have been debated by the core group taking into consideration ecological, administrative, logistic, and other aspects in an attempt to ensure the TBCA will enhance efforts to promote sustainable natural resource use and conservation in this unique area. Existing realities and the potential to utilise the TBCA process to truly operationalise the MPAs in the area, as well as

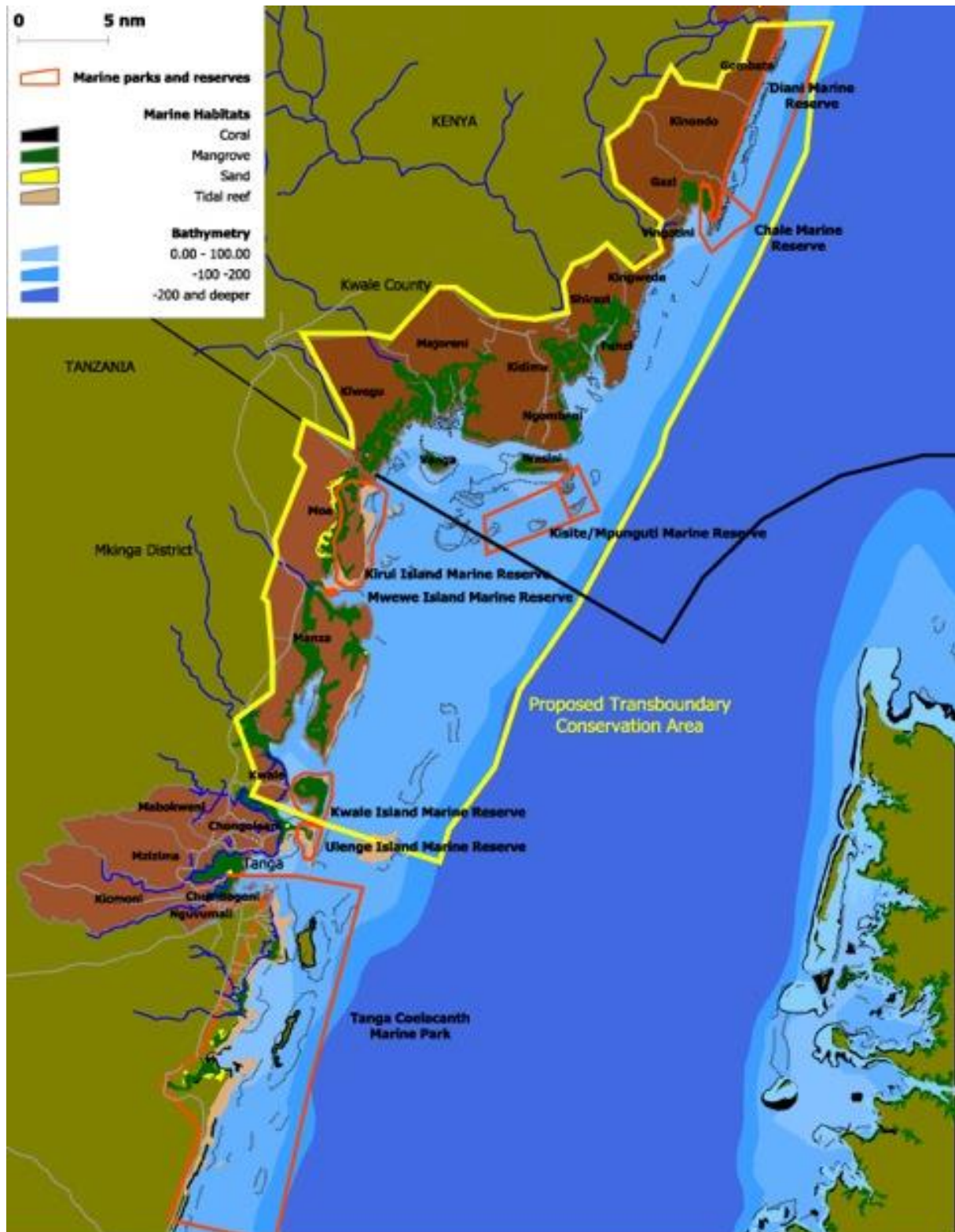


Figure 18. Map showing the preferred option for the delineation of the proposed TBCA. The yellow line demarcates the boundaries.

encourage community based conservation efforts in the areas between existing MPAs, have been important in the deliberations leading to this suggestion. It should be noted that the TACMP has been purposefully excluded from the proposed TBCA for reasons related to acceptance by stakeholders, rather than for ecological reasons.

## 8. Practical roadmap

ACTIVITY	TIMEFRAME (Months)																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Country endorsement of the proposed TBCA in principle	█																		
2. Preparation and submission of concept for funding	█																		
2. Preparation of funding proposal to GEF and other agencies		█	█	█	█	█	█	█											
3. Legal review of coordination mechanisms				█	█	█													
4. Establishment of Coordination Mechanism							█	█	█										
5. Review of institutional and capacity capacities to implement TBCA										█	█	█							
6. Review of Infrastructural requirements to operationalise TBCA										█	█	█							
7. Baseline surveys on socio-ecological aspects of TBCA												█	█	█	█	█	█	█	█
8. Six monthly meeting of Coordination Mechanism															█				
9/ Preparation of TBCA GMP															█	█	█	█	█
10. Ongoing stakeholder engagement, awareness raising and on the ground management activities																			█
11. Strengthening network of CCAs between existing MPAs																			█

There are a number of steps that will need to be followed should the concept of the proposed TBCA receive support in principle from the two countries. It will be important to first begin the process of sourcing funds to take the initiative further. A concept proposal will be developed in the first instance and submitted to various agencies to determine their willingness to fund this initiative. This is likely to be a longer term process that should not hold up other critical measures that need to be undertaken to kick-start the initiative. It will be necessary to determine the best legal and institutional arrangement to suit this particular situation. Once this is established and agreed upon between the parties, the coordination mechanism (the proposed MTBSC) will need to be established to guide the process further. It is envisaged that this MTBSC would meet on a 6-monthly basis.

Interim funding could then be used to address some of the key information gaps that exist in order to inform subsequent steps. These steps would need to include obtaining a better understanding of the institutional and infrastructural needs to support the TBCA, better baseline information on the socio-economics and ecosystems within the proposed TBCA, preparation of guidelines or a general management plan for the TBCA, and ongoing work with communities within the TBCA. These timing and duration of these activities would depend on factors unknown at present. However, it is

envisaged that these initial activities would need to be completed within the next 18 months to 2 years in order for momentum with this initiative to be maintained.

The following Gantt chart summarises these activities and timeframes for the next 20 months.

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## Maps

- Bathymetry contours: GEBCO Atlas
- Kenya MPAs: KMFRI
- Kenyan habitats: KMFRI
- Tanzanian habitats: IMS/UDSM and the EAF/14 Project
- Tanzanian fish landing sites: L. Scott digitised
- EAME region of importance: WWF EAME Report
- EBSA: WIO EBSA report
- Roads: United States Geological Survey
- Rivers: United States Geological Survey
- Cities and towns: United States Geological Survey
- Administrative boundaries (eg. districts and wards): United States Geological Survey

## **Appendices**

### **Appendix 1. Information and research needs**

During the compilation of this document it became apparent that there were certain information and research gaps that needed to be addressed as part of the process of establishing the proposed TBCA. These gaps will need to be filled to be able to achieve the goals set for the TBCA and to ensure that the initiative follows international, regional and national best practice in its operations. The information that needs to be gathered will inform the process and allow for management decisions to be made that are justified and knowledge-based. While additional requirements will continue to present themselves, the following are the key aspects that have been identified to date.

#### **1. *Legal review of coordination options***

This will be necessary to identify the best option for a coordination mechanism that will be effective in guiding the TBCA process. While some options have been presented in this paper, the legality and appropriateness of these options need to be assessed by a qualified legal team with experience in international law.

#### **2. *Institutional assessment***

As outlined in this report, there are many and varied agencies in both countries that will be either directly or peripherally involved in making sure that the TBCA works according to plan. Information is missing the capacity of the various institutions and agencies involved to carry out the activities associated with the TBCA, A review is necessary to identify where capacity is lacking and where skills need to be improved, or staff numbers increased to achieve the desired outcomes.

### **3. Infrastructure audit**

Information on the current and required levels of infrastructure and equipment required to operationalise the TBCA concept has been compiled and is presented in more detail in Appendix two. However, this has been based on limited assessment in the field, and a thorough audit is needed to assist with preparation and planning for the TBCA.

### **4. Baseline studies on ecological and socio-economic aspects**

The information presented in this study on the current status of both the human population living in the TBCA area, and the ecological systems in the area, is often outdated or non-existent. In order to effectively move forward with the TBCA concept it will be critical that a sound baseline is developed against which progress can be monitored. While research will be an ongoing long-term requirement to allow for adaptive management and to improve the functional of the proposed TBCA, baseline information gaps need to be addressed early on in the process. This is particularly important in the process of setting up the TBCA and critical with respect to the process of establishing zones for different uses within the area.

It is anticipated that the first 3 activities could continue almost immediately, without waiting for longer-term project funding to become available, as they may form part of the normal work requirements mandated to the governments agencies involved.

## **Appendix 2. Infrastructural and other requirements**

The process of compiling information for this paper allowed an initial assessment of the current status of staffing, infrastructure, and equipment that is in place to support conservation activities in the proposed TBCA. The process has also allowed some insights to be obtained as to the basic requirements that will need to be met in order to fully operationalise the TBCA.

As elaborated in the text, although Diani Chale has been designated as a Marine Reserve since 1995, it is not operational. The TBCA provides an opportunity to revitalise conservation activities in that area. There is currently no personnel, infrastructure or equipment allocated to this area. Similarly, the newly gazetted marine reserves in Tanzania, north of TACMP, and included in the proposed TBCA, have no dedicated resources allocated to these areas.

Current efforts are concentrated in Kisite Mpunguti in Kenya (KWS) and TACMP in Tanzania (MPRU). Both of these MPAs have a headquarters on site, and personnel, infrastructure, and equipment to support conservation in each. However, both have challenges in terms of staffing levels and other requirements, including budgetary constraints that compromise conservation activities. The islands north of TACMP are currently managed remotely by the staff of TACMP, which is already understaffed. This has led to minimal management activity in the newly proclaimed Reserves.

There are two main requirements identified here that will need to be addressed as part of developing the TBCA concept, and establishing a working system of management on the ground.

**1. *An MPRU Station to be established at Moa Village***

Moa is a safe landing site situated within striking distance of the new marine reserves. It is proposed that a permanent presence is established here with the necessary personnel, infrastructure and equipment to effectively manage the reserves, and to engage neighbouring communities in the conservation effort as part of the overall TBCA. The needs for such a station would be the normal requirements to allow on-the-ground management (patrols, outreach etc.) to be effectively conducted.

**2. *A KWS Station within the Diani Chale Marine Reserve***

There is currently no facilities or staff in this area. It is proposed that a station that is adequately staffed and equipped is established at a suitable location near the reserve to enable effective and ongoing management to proceed. The TBCA process provides the opportunity to motivate for this as part of the effort to link important conservation areas both within Kenya and across the border. Again the normal requirements will be needed to allow this station to effectively carry out its conservation duties.

In both Tanzania and Kenya, greater efforts need to be made to pool resources with other agencies that are involved in management of the coastal and marine environment. While some collaboration already exists, there is no doubt that closer collaboration and joint programming and planning (that would be enhanced and facilitated by the TBCA initiative) would improve the efficiency and effectiveness of management efforts in the area.

In terms of the respective marine conservation agencies in each country, there will be a need to allocate resources to allow for the management requirements of the proposed TBCA to be met. While it is anticipated that some of the development costs could be covered through project funding, there will be a need to provide personnel and ongoing support to ensure sustainability of the initiative. There will be an urgent need to carry out a detailed audit of requirements, should the proposed TBCA receive endorsement by the countries. Some of these requirements will be built into funding proposals that are currently being prepared, but the respective agencies will need to refine these requirements for their own planning purposes into the future.