

Menai Bay Conservation Area (MBCA)



Draft General Management Plan

Revised October 2010



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ACRONYMS

CBD	Convention on Biological Diversity
COLE	Commission for Land and Environment
CNR	Commission for Natural Resources
CORDIO	Coral Reef Degradation in Indian Ocean
DCCFF	Department of Commercial Crops, Fruits and Forestry
DFMR	Department of Fisheries and Marine Resources
DoE	Department of Environment
EAME	Eastern African Marine Ecoregion
EDG	Environment Development Group
EIA	Environmental Impact Assessment
GEF	Global Environment Facility
GMP	General Management Plan
ICM	Integrated Coastal Management
IMS	Institute of Marine Science
IUCN	The World Conservation Union
JSDF	Japanese Social Development Fund
LA 21	Local Agenda 21
M&E	Monitoring and Evaluation
MACEMP	Marine and Coastal Environment Management Project
MANREC	Ministry of Agriculture, Natural Resources, Environment and Cooperatives
MEMA	Matumizi Endelevu ya Maliasili na Maendeleo ya Jamii (Sustainable Use of Natural Resources and Community Development)
MICA	Misali Island Conservation Association
MICODEP	Misali Island Conservation and Development Project
PECCA	Misali Island Marine Conservation Area
MPA	Marine Protected Area
MSRASD	Ministry of State for Regional Administrative and Special Departments
NGO	Non Governmental Organisation
OUV	Outstanding Universal Value
PECCA	Pemba Channel Conservation Area
PRS	Poverty Reduction Strategy
SEA	Strategic Environmental Assessment
SMOLE	Sustainable Management of Land and the Environment
ToR	Terms of Reference
UNDP	United Nations Development Programme
URT	United Republic of Tanzania
VCC	Village Conservation Committee
WECOC	Wete Environmental Conservation Club
WHS	World Heritage Site
WIO	Western Indian Ocean
WWF	World Wildlife Fund
ZILEM	Zanzibar Integrated Land and Environmental Management Project
ZPRP	Zanzibar Poverty Reduction Plan

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EXECUTIVE SUMMARY

Currently, the Menai Bay Conservation Area (MBCA) lies between latitude $6^{\circ}10'S$ - $6^{\circ}30'S$ and longitude $39^{\circ}10'E$ - $39^{\circ}36'E$. The MBCA encloses an area of about 470 km^2 which starts at the high water mark, on the eastern side extending around the peninsula at Kizimkazi to Mtende Mnarani and on the western side extending past the peninsula where Fumba forms confluence with Nyamanzi (Fig. 1). The MBCA was declared a marine conservation under section 7(1) of the Fisheries Act No. 8 of 1988. The area was officially gazetted by an order published in the legal supplement (part II) of the Zanzibar Government Gazette vol. CVI No. 5755 of 9th August, 1997.

The MBCA comprises a number of small-uninhabited islands (islets), including Pungume, Kwale, Miwi, Nyemembe, Komonda, Vundwe and Sume. Others are Tele, Nguruwe and Ukanga. The MBCA is administered and managed by the Department of Fisheries and Marine Resources of Zanzibar within the Ministry of Agriculture, Livestock, and Environment.

MBCA enjoys the Zanzibar's climate, which is tropical but with influence of the seasonally changing monsoon winds of the Indian Ocean. Two distinct monsoon wind periods occur; the northeast monsoon (Kaskazi) which prevails from November to February and the southeast monsoon (Kusi) that blows from April to September. In between the changing monsoons there is an intermediate easterly wind (Matlai). The northeast monsoon is characterized by higher air temperatures ($> 30^{\circ}\text{C}$) and weaker winds while the southeast monsoon is marked by lower air temperatures (approximately 25°C) as well as stronger winds and rough seas (UNEP, 2001).

Zanzibar encounters high humidity which varies from 87% in April to 76% in November (Griffith, 1950). Zanzibar has an average annual precipitation of about 1750 mm. Rains are influenced by seasonally changing monsoon winds. The long rain season (Masika) starts in mid-March/April and continues until May. There is also a short rain season (Vuli) during November and December and at times up to January.

The marine habitats represented within the MBCA are categorized as follows:

- Intertidal: formed at the interface between land and sea including mangroves, rocky shores and sandy beach and dune areas.
- Sea bed (benthos): supporting seagrass beds, coral reefs, burrowing and bottom dwelling organisms including mollusks, crustaceans, invertebrates, reef and bottom living fish.
- Open water: supporting planktonic and pelagic marine organisms including fish and cephalopods. Other mid-water species such as whales, dolphins and sea turtles are also found.

The West, Central and South Districts which fall within the current MBCA have 20 villages plus 7 new villages of Chukwani, Kiembe Samaki, Kigaeni, Kajengwa, Jambiani, Paje and Bwejuu which have been added for the proposed extension of the area. The population in the villages within the MBCA was 11,324 in 1998 and had increased to 27,000 according to census data 2002. The rapid population growth and the associated human impacts have a strong influence on

the coastal and marine ecosystem. If it is assumed a 3% annual growth, the population size in 2010 is estimated at 33,000.

Resource-use in the area include fishing, collection of sea cucumber and mollusks, aquaculture (seaweed farming and crab culture), tourism operations, harvesting of mangrove and forest products, lime making, beekeeping, agriculture and small business. Fishing is concentrated in inshore waters, putting considerable pressure on the limited fish stocks. Increased number of fishers, adoption of destructive fishing practices that include surrounding nets, use of pesticides and local poisonous weed called “Utupa” and dynamiting has resulted in the decline in fish stocks. The decline in fish resources is also attributed to increased influx of visiting fishers from outside the area. These factors have contributed to the degradation of Menai Bay’s habitats, with ultimate negative impacts on the local fish catches resulting in low income and living standards of the coastal communities in the area. The situation therefore calls for immediate and efficient management plan.

This is the first management plan for the MBCA. Recent changes in environment and natural resources management have highlighted the need for a strategic document to guide management decision making and to better defined mission, goals and objective of the MBCA. Management planning and a clear strategy for management is a prerequisite if MBCA is going to begin monitoring of its own effectiveness. This document is based on assessment report (assessment of Zanzibar marine protected areas), close consultation with the management of MBCA and on comments from stakeholders, the public and government institutions. The plan specifies management strategies and actions for the MBCA related to the conservation’s goal. It also identifies the major existing and potential threats and issues facing the conservation area from ecological, socio-economic and governance perspectives. It is also designed to provide a framework for interactive management.

Table 1. How to use the MBCA GMP

This management plan has been designed to be a dynamic document, accessible via hard copy, electronic copy and relevant websites. It should be kept up to date with additional material to allow adaptive management as situations and issues change during consultations and implementation. The content and purpose of each part is given below:

Part 1: Background Information and description of the area

The historical background of MBCA is presented in section one of the general management plant. Additional information is given on the need for the GMP. Approaches to the report which are based on participatory, partnership and sustainability are described together with detailed methodology to capture and analyze pertinent data and information.

Part I emphasizes on the GMP development and its importance for MBCA which has been done through active consultations with stakeholders.

It also describes the physical and biological features within the area as well as socio-economic and cultural values within and along MBCA. Those using the management plan may refer to the information and data for research and development focus on key resources.

Part II: Management Issues, Strategies and Actions

This is the second part of the working document which states mission, goal and objectives of the GMP. It also presents key management issues and problems with regard to resource use in the area and translate them into management strategies and actions. This part has also provides information on the identified areas for zoning (core, specific and general zones) which have been done through resources survey, GIS and remote sensing.

Part II will be of interest to those wishing to develop a more in depth understanding of concerns and issues facing the MBCA.

This part is of concern to those with an interest in the MBCA zoning plan and the rationale behind the identification of those areas for zoning.

Part III: Governance, Compliance, Monitoring and Management Guide

Part III is of concern to those with an interest in the MBCA governance, internal resources monitoring and management guide to be implemented.

Governance in terms of policies, legal and institutional frameworks are presented and the GMP is implemented in compliance with the policies, regulations and frameworks. Monitoring and evaluation of GMP are presented for effective implementation of GMP.

This part also includes activities prohibited in MBCA and by activities which are regulated as part of the plan implementation.

Part III is to guide the management and stakeholders in implementation of GMP and use and extraction of resources within the conservation area.

1.0 BACKGROUND INFORMATION

1.1 Location and Area

The Menai Bay Conservation Area (MBCA) lies along the coast of the southwest of Unguja Island, Zanzibar. It is found between latitude $6^{\circ}10'S$ - $6^{\circ}30'S$, and longitude $39^{\circ}10'E$ - $39^{\circ}36'E$ (Fig. 1). It encloses an area of about 470 km² which starts at the high water mark along the shoreline on the eastern side extending around the peninsula at Kizimkazi to Mtende Mnarani and on the western side extending past the peninsula where Fumba forms confluence with Nyamanzi. It covers an extensive marine area which includes the seabed and substrata extending out in the bay to range of above a 10 meter contour depth at spring low tide. With a population of approximately 27,500 people residing in 20 villages along the coast of MBCA; its boundaries fall in three administrative districts of West, Central and South and in two regions (Urban-West and South).



Figure 1. Map of Unguja Island showing location and current boundary of MBCA

The current boundary of MBCA stretches from Ras Machenje (in west district) to Mtende lighthouse (in South district) (Fig. 1). It encompasses several small islands and sand banks each with its own spectacular coral reefs. The islets in the bay include Pungume, Kwale, Miwi, Nyemembe, Komonda, Vundwe, Sume, Tele, Nguruwe, and Ukanga, which are covered mostly by coral rag bush and surrounded by coral reefs and sea grass beds. The boundaries of MBCA are defined in the proclamation order of the Conservation Area. Most of the islets are not habitable; however, some of them are used by fishers as camping sites to reach offshore fishing grounds. The islands of Pungume and Kwale, for example, are strategically located near Zanzibar town and easily accessible from Dar es Salaam, and have been favourite camping sites (dago) for fishers.

1.2 History of MBCA

Resident communities along the coast of Menai Bay Conservation Area as well as the rest of Zanzibaris have for generations depended on marine and coastal resources for their livelihood. Harvesting of marine resources and fish stocks were conducted in accordance with the traditional management principles. Historically, with traditional management practices including seasonal closure of fishing areas and control of fishing gears and visiting fishers, sustainable harvesting of resources was made possible; and in turn it guaranteed food security to the local populace. Closed season regulations to protect the marine environment have been operative in Menai Bay even before the establishment of the MBCA. The islands of Pungume and Kwale used to be closed for fishing during the southeast monsoons, and some villages also practiced a system of closed season for octopus.

In the early 1980s, fisheries in the Menai Bay area deteriorated drastically, leading to lower fish catches. This was a result of an increased influx of fishermen in large numbers (from within and outside the area) and deployment of destructive fishing practices (including sea bottom drag nets, other small mesh size nets, dynamiting, use of pesticides and local poisonous weed called “Utupa”). The decline in fish resources was also a result of increased demand for fish to supply to the insatiable markets of the city of Dar es Salaam and Zanzibar Town that also offer high prices to make business more lucrative. The traditional “dago” system, referring to seasonal visits by fishermen camping in the area, was replaced by permanent settlements on some of the Bay area islets. Studies done by the Institute of Marine Science on Zanzibar in 1992 confirmed extensive reef damage in Menai Bay (Horill, 1992). Environmental challenges such as the use of destructive fishing gears, overfishing and habitat destruction are highly complex and require an integrated approach to address them.

The first step toward combating the challenges mentioned above was the formation of an informal management committee involving local communities around Fumba, Bweleo, Kisakasaka (Kombeni), Dimani and Nyamanzi (Dimani) in 1992, with the assistance of the Commission of Natural Resources to monitor fishing activities of visiting fishers in the area. The villagers initially volunteered to undertake agreed tasks through for example watching out for culprits and taking them to the responsible lawful authorities. However, they did not have the necessary legal powers to apprehend lawbreakers nor the necessary knowledge on arresting procedures. There were also no policies or bylaws at the village level to back them up.

In 1994, at the invitation of the then Commission of Natural Resources, WWF began to provide support to boost up management measures originally initiated by the local communities on the Fumba Peninsula to manage the resources in MBCA. This was instrumental to have the area designated a conservation area. The government of Zanzibar officially designated Menai Bay as a conservation area in August 1997.

The setting up of Menai Bay Conservation Area is provided for under section 7(1) of the Fisheries Act No. 8 of 1988. The area was officially gazetted as a multiple-use marine conservation area by an order published in the legal supplement (part II) of the Zanzibar Government Gazette vol. CVI No. 5755 of 9th August 1997. The MBCA is administered and managed by the Department of Fisheries and Marine Resources, Zanzibar within the Ministry of Agriculture, Livestock, and Environment. The activities in the conservation area were supported by WWF which provided both technical and financial assistance. The order prohibits the use of certain destructive fishing methods such as beach seines, spear fishing, explosives, poison, drag

nets (*kigumi*), etc and provide for a system of permits and fees for the use of the area by non-residents.

This management plan proposed that the waters from Kizimkazi peninsula to Mazizini on the southwest coast and from Kizimkazi peninsula to Bwejuu on the southeast coast of Unguja Island (Fig. 2) be included in the conservation area. These waters provide rich seagrass and coral habitats for numerous species including many fish species, turtles and dolphins. These waters are also favoured for recreational uses. At the time of writing, new proposed MBCA has not been officially declared. This means that the obligations outlined in this plan do not yet apply as matter of law. However, it is the policy of the DFMR that new proposed areas should be protected as if they were already gazette. Although Chumbe Island Coral Park (CHICOP) falls within the boundary of a new proposed MBCA, it will still be a private entity managed by CHICOP management.



Figure 2. Map of Unguja Island showing location and new proposed boundary of MBCA

1.3 The Need for a General Management Plan

A GMP represents the first step in the formal process used by the MBCA management in planning, developing and managing its resources. It was developed to fulfill the stated goals and objectives of the MBCA in a sustained manner. More specifically to:

- Identify the key elements of the MBCA that make it a site of National and International significance.
- Articulate threats to the marine resources and other issues relating to management.

- Outline strategies to minimize threats.
- Provide framework for working in partnership with local communities to develop sustainable resource use and to diversify income-generating activities to support resident's livelihood.
- Provide framework to work with local government authorities, economic enterprises including tourism developments to ensure that environmental guidelines are observed in order to minimize negative environmental impacts.
- Provide a basis for the development of subsidiary legislations, subsidiary planning documents, operational plans and day-to-day management decisions.

1.4 Approach and Methodology

The approach and methodology used involved undertaking both desk and field studies, whereby for desk studies, search and collection of relevant literature was conducted and review done. For field work, diving, reconnaissance surveys and consultations with stakeholders were made.

1.4.1 Approach

Participatory

A participatory approach to the development of the GMP of MBCA that involves all stakeholders was adopted. This involved seeking information/experiences, not only from the key stakeholders, i.e., the local communities who are the key actors in the implementation of the GPM but also from government institutions, NGOs and private sectors who are directly and indirectly involved in coastal and marine resources management.

Partnership

There is always the need to establish networking partnerships (where none exists) and/or improve networking partnerships (where they already exist). In the course of undertaking the development of this GMP, a close working collaboration was established with DFMR in particular the marine conservation unit (MCU) and the management team of the three marine conservation areas. The joint team utilized the opportunity to assist in the establishment of networking partnerships among the groups of stakeholders. Throughout the project, the consultant interacted and discussed work progress and forward planning with the core team from DFMR.

Sustainability

Sustainable development offers an alternative to conventional development of coastal and marine resources. The study was conducted and made operational in a way, ensuring sustainability in line with MBCA vision, mission and goals.

1.4.2 Methodology

The GMP is accomplished largely through meetings, field interviews and survey, telephone conversation, community outreach and written communication.

Consultations

Stakeholder consultations and literature review were the main methods used in the GMP development. A preliminary review of the available information on the MBCA and related literature, which included legislations and national and international policies was done. The GMP drafted in 2005 was carefully read and pertinent baseline information was captured. The report helped to identify areas where further information would be needed in order to identify areas of focus for the GMP report. Furthermore, the review helped to identify key stakeholders.

A consultation and communication plan was developed in which the first step was to consult DFMR and MBCA management team in Zanzibar prior to visiting the conservation area in Pemba. The area visit was vital in order to see its location, its new boundaries, assess the marine resources, coastal areas, mangroves and other physical features in order to gauge the issues and zoning that are likely to be of interest in the GMP. Alongside field consultations, the team obtained additional secondary literature relevant to the development of GMP in MBCA. Besides consultations, several meetings were held with management of MBCZ, DFMRs staff and government and non-government stakeholders were visited together with formal and informal meetings.

2.0 PHYSICAL FEATURES AND PROCESSES

2.1 Climate

The MBCA enjoys the Zanzibar's climate, which is tropical under the changing influence of the seasonally changing monsoon winds of the Indian Ocean. Two distinct monsoon periods occur, the Northeast monsoon (Kasikazi) which prevails from November to February and the Southeast monsoon that blows from April to October (Kusi). In between the changing monsoons there is an intermediate easterly wind (Matlai). The Northeast monsoon is characterized by higher air temperatures ($> 30^{\circ}\text{C}$) and weaker winds while the Southeast monsoon is marked by lower air temperatures (approximately 25°C) as well as stronger winds and rough seas (UNEP, 2001). As a result of stronger winds and rough sea, small fishing crafts like dugout canoes cannot be used during this time. Reverse weather conditions dominate between December and March during the north-east monsoons (Kasikazi) and at this time, the area becomes attractive to visiting fishers and other alike visitors.

2.2 Geomorphology

MBCA is characterized by a mixture of tropical habitats of mangroves, coral reefs and seagrasses. Large seagrass beds extend on the sandy sea-bottom, supporting rich living marine communities. Although MBCA does not possess a true coral reef, given the size of the one extending along the eastern coast of Unguja, it is still rich in coral formations, coral gardens and smaller coral reefs partially, or sometimes completely surrounding most islets (Muhando, 1995).

The MBCA comprises a number of small-uninhabited islands (islets) (Fig. 1 and 2). These islets include Pungume, Kwale, Miwi, Nyemembe, Komonda, Vundwe and Sume. Others are Tele, Nguruwe, and Ukanga. Sand banks are found adjacent to some of these islets such as Kwale and Pungume. Pungume, Vundwe and Kwale are the most important islets to sea birds, other organisms and camping fishers during northeast monsoon winds (Kaskazi) (Muhando, 1995). Ukanga islet situated at the eastern part of Kisakasaka village is surrounded by mangrove forest

on the western side. Most islets, typically covered by coral bush, are also surrounded by coral reefs and seagrass beds near shores, which in addition to provision of forest-related products to the community, they also form major fishing grounds for the artisanal fishermen.

2.2.1 Bathymetry

The MBCA is mostly shallow, averaging 10 m at low tide and reaching a maximum of 100 m. A series of islets and sand bars flank the southwestern boundary of the MBCA. Ukombe, is a submerged reef with 17 m drop offs on the western side and less impacted. Kwale Island has gentle slopes. Komonda, Pungume and Nguruwe have relatively tall forests. Most of these Islets are uninhabited and have remnants of natural coastal forests. These peculiarities have created primeval living and breeding areas for numerous marine creatures, among which are several fish species of commercial significance and harbor endemic species of animals such as duikers.

2.2.2 Geology

The geomorphologic structure of the coast of MBCA consists of narrow intertidal sand flats which are connected to deeper and wider subtidal sand bottoms. The subtidal sand bottoms extend out in the ocean and deepen progressively to the channel; with no fringing reefs to protect the subtidal and intertidal sand flats from waves. The base rock consists of coralline limestone formations of Pleistocene age (Kent et al., 1971). It is characterized by coral rag, and sediments dominated by carbonates. The bay encompasses several coral reefs, lots of marine life and dense mangrove forests. The main island of Unguja (Zanzibar) itself is considered to be part of a continental shelf which was uplifted during Early to Mid Eocene (Kent et al., 1971). The island is fairly flat with only some minor positive relief features, particularly on the northwestern side, where the Masingini Ridge rises to about 100 m above the mean sea level. The ridge is the only part of the island where the bedrock is composed of sandstones and could therefore be considered to be the source of siliciclastic sediments found on the beaches of the western coast of the island and in few patches off Zanzibar town (Shaghude and Wannäs, 1998).

2.3 Oceanography

2.3.1 Currents

Three currents, the South Equatorial Current (SEC), the East Africa Coastal Current (EACC), and the Equatorial Counter Current (ECC) influence the coastal waters of MBCA as with the rest of the coastal waters of Zanzibar (Fig. 3). Flowing across the Indian Ocean, starting from Australia, the Indonesian islands of Sumatra and Java, the South Equatorial Current meets the coastline of Africa approximately at the border of Mozambique and Tanzania. When the current meets the shores of southern Tanzania and northern Mozambique the current divides with a large portion swerving northwards to become the East Africa Coastal Current. The smaller southern flow forms the Mozambique Current (MC). The north-flowing EACC is a steady current, strongest during the southeast monsoon when surface currents can exceed 3 metres per second, especially when southerly winds are strongest. Depending on the strength of the

northeast monsoon winds, the northward flowing EACC in any particular time of the year changes direction to eastward and flow offshore as ECC.

Sheltered from the open ocean to some extent, the MBCA is under the influence of the East African Coastal current flowing in a northerly direction that crosses the Zanzibar channel all year round. Specific areas are more directly influenced by various smaller, local currents created by the presence of coral formations, sand banks, islets or islands. The speed of the currents within MBCA varies between 0.25 and 2m/s, being fastest during the SE monsoon and lowest during the NE monsoon.

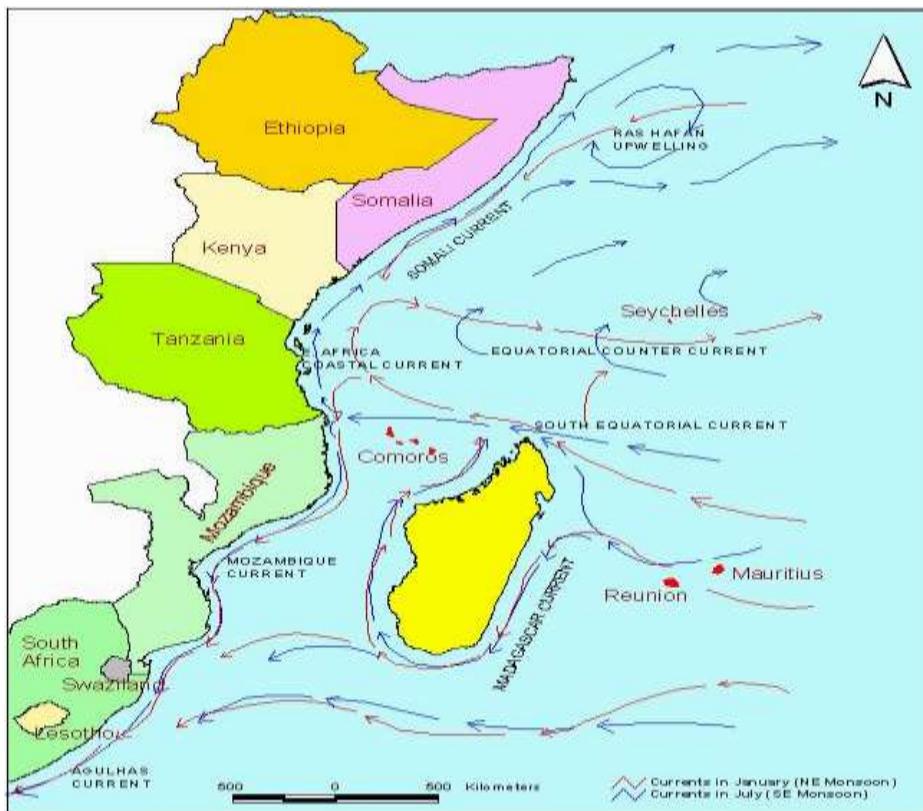


Figure 3. Main currents influencing MBCA

2.3.2 Tides

Apart from the influence of ocean currents on MBCA, the inshore waters of the bay are also affected by tidal currents with varying directions determined by the presence of reefs, sandbanks and islets. The average amplitude of the tides in the bay is between 1.5 and 2 m, occurring during spring tides (around new and full moon), and can exceptionally reach up to 4 meters. The tides around the bay and the island of Unguja are characterized by semi-diurnal tides with maximum spring tidal range of 4m; thus, classified as a mesotidal coast (Davies, 1964).

2.3.3 Temperature

The Northeast monsoon is normally associated with high air temperatures ($28\text{-}32^{\circ}\text{C}$), high surface water temperature up (as high as 31°C) and a few showers. Winds are moderate to strong. Beyond June, into the Southern monsoon, the climate is cooler and drier, but the consistently strongest winds are normally experienced during this season, slowing down to November. The maximum annual average air temperature is 30°C and the minimum annual average warmth is 22.3°C . Zanzibar encounters high humidity which varies from 87% in April to 76% in November (Griffith, 1950).

2.3.4 Rainfall and Sediments

Like other parts of Zanzibar, MBCA has bimodal pattern of rainfall with an average annual precipitation of about 1750 mm. The rains are influenced by seasonally changing monsoon winds, most of it falling over a short period. The long rainy season (Masika) starts in mid-March or April and lasts until May. June and July are dry but fairly cool months whereas August, September and October are drier although temperatures are yet clement. There are short rains (Vuli) which normally occur during November and December and at times up to January. The rest of the year is dry spell. As there are no rivers flowing into the bay, only run-off from the nearby agricultural farms residential and commercial establishments drain into the bay bringing in sediments, silt, nutrients and even pollutants.

2.3.5 El Nino

In late 1997 and early 1998, the seawater along the east coast of Africa became warmer than average by $2\text{-}3^{\circ}\text{C}$. This caused hard corals on most reefs to lose their symbiotic algae, which led to discoloration and whitening or bleaching. The bleached corals can survive for several months but if the high water temperatures continue, many coral colonies die. The rise in water temperature is a global phenomenon that has been called the El Nino event, usually starting at around the end of the year. During the El Nino of 1997-98 many coral reefs in the Indian Ocean suffered with the death of many coral colonies. In certain parts of Zanzibar, Tanzania Mainland, Kenya and Seychelles over 70% of corals died.

3.0 BIOLOGICAL FEATURES

The marine habitats represented within the MBCA are categorized as follows:

- Intertidal: formed at the interface between land and sea including mangroves, rocky shores, sandy beach and dune areas.
- Sea bed (benthos): supporting coral reefs, seagrass beds and including surface dwelling animals and plants and in fauna (burrowing creatures like molluscs and crustaceans), invertebrates, reef and bottom living fish.
- Open water: supporting planktonic and pelagic sea creatures including finfish and other endangered species such as whales, dolphins and sharks.

There is, of course, regular exchange between each of these habitats for feeding and reproduction and continuous movement of water and animals between the deep waters surrounding MBCA, the coral reefs, seagrass and mangrove areas. As the waters around MBCA are relatively shallow, without much exchange between coastal and deep water currents, corals and other organisms on reefs are exposed to any terrestrial influences. This includes freshwater runoff, sediments, nutrients and any form of pollution, which all stress and eventually kill marine organisms

3.1 Marine Flora and Fauna

With the exception of mangroves, little is known of the distribution of the marine flora within each marine habitat mentioned above. To enable comprehensive management and monitoring of the marine environment it is essential that an accurate habitat map is prepared for the marine conservation areas. Research into community structures within these habitats would enable a better appreciation of the biological values and enable a monitoring program to be developed. The mangrove, seagrass and coral reef communities of MBCA have different species zonation within them and play a wider role in the well-being of the coast by providing a range of ecological services.

3.1.1 Mangroves

Mangroves are valuable as sources of firewood, charcoal, medicines and building materials for houses and boats. They are a source of income for many people engaged in selling mangrove forest products. Mangrove forests are also utilized for beekeeping. Mangrove trees, which dominate the mangrove forests, are perfectly adapted to the very specific conditions prevailing in the brackish water environment, half terrestrial, half marine habitat. Mangrove stands cover the sheltered bays and inlets in the northern and north-eastern parts of MBCA. MBCA has the second largest mangrove stand in Unguja Island after Chwaka Bay, extending over an area of 900 ha in total, reaching adjacent to the coral rag bush characterized by red soils (Makame et al, 2005). According to Muhando (1995), mangrove vegetation in Menai Bay is found in the bays at Nyamanzi, Kisakasaka, and North of Uzi Island and at the northern part of Pete channel. A thin belt of mangrove occurs south of Muungoni to northern part of 'Diko la Ng'ombeni'. The most extensive mangrove forest is found near Uzi-Nyeke. Ukanga islet near Kisakasaka, is surrounded by mangroves on the western side and has been declared a reserve (Makame et al op cit). Additional areas of mangroves can be found at Muungoni, Ng'ambwa, Fumba and Kiomoni near Kizimkazi Dimbani.

There are 10 species of mangroves worldwide, all of which are found in Zanzibar (Table 1). All 10 species have been reported to occur in MBCA. They are *Rhizophora mucronata*, *Avicennia marina*, *Bruguiera gymnorhiza*, *Ceriops taga*, *Sonneratia alba*, *Xylocarpus granatum*, *X. molluccensis*, *Heritiera littoralis*, *Pemphis acidula* and *Lumnitzera racemosa* (Shunula and Whittick 1996, Juma et al. 2001, Shunula 2002).

Table . Mangrove species found in Menai Bay Conservation Area

No.	Scientific name	Family	Local name
1	<i>Avicennia marina</i>	Verbenaceae	Mchu
2	<i>Bruguiera gymnorhiza</i>	Rhizophoraceae	Msinzi or muia
3	<i>Ceriops tagal</i>	Rhizophoraceae	Mkandaa
4	<i>Heritiera littoralis</i>	Sterculiaceae	Msikundazi or mkungu
5	<i>Lumnitzera racemosa</i>	Combretaceae	Kikandaa or mkandaa dume
6	<i>Rhizophora mucronata</i>	Rhizophoraceae	Mkoko
7	<i>Sonneratia alba</i>	Sonneratiaceae	Mililana
8	<i>Xylocarpus granatum</i>	Meliaceae	Mkomafi
9	<i>Xylocarpus molluccensis</i>	Meliaceae	Mkomafi dume
10	<i>Pemphis acidula</i>	Lythraceae	Mkaa pwani

3.1.2 Seagrasses

Seagrasses are flowering plants that live submerged in the marine waters. They form dense beds which cover large areas of coastal waters and perform a wide spectrum of biological and physical functions. Seagrasses serve as breeding, nursery and feeding areas for many invertebrates and vertebrate species. They are a source of food for herbivorous invertebrates, fish and turtles. They trap and bind sediments thereby reducing particulate pollutants over coral reefs and provide protection to shorelines by dissipating wave energy. No direct human uses of seagrasses have been recorded so far in Menai Bay Conservation Area.

Twelve species of seagrass have been identified in Zanzibar coastal waters. These include *Thalassia hemprichi*, *Halodule uninervis*, *H. wrightii*, *Halophila stipulacea*, *H. ovalis*, *Thalassodendron ciliatum*, *Cymodocea rotundata*, *Cymodocea serrulata*, *Syringodium isoetifolium*, *Zostera capensis* and *Enhalus acoroides*. The most dominant species are *Thalassia hemprichi*, *Thalassodendron ciliatum* and *Syringodium isoetifolium*. Very few studies have been conducted to assess seagrass communities in MBCA. However, the following genera have been recorded: *Halodule*, *Cymodocea*, *Thalassia*, *Syringodium*, and *Thalassodendron*, although mixed stands also occur.

3.1.3 Seaweeds

Seaweeds are abundantly found in marine and brackish-water environments (in estuaries, in seagrass areas, in mangrove forests, on littoral and coral rocks). They are unlike land plants in that they lack true roots, stems and leaves. They appear in a diverse array of forms from branching to soft encrusting types on rock surfaces. As well as being primary producers, they also provide critical habitat for a variety of organisms. Seaweed (marine macroalgae) can be classified under Cynophyta (blue-green algae), Chlorophyta (green algae), Phaeophyta (brown algae) and Rhodophyta (red algae). Kwale and Kizimkazi were the only sites where macro-algae communities were observed in significant quantities, with percentage cover of 16% and 12% respectively. While this could be a natural state of the sites as they are more exposed to wind and wave action (conditions typically associated with *Sargassum* dominance), it should be an area of concern especially for Kwale. The reef had the highest incidence of algal attack, with parts of the reefs being killed or overgrown by macro-algae. It is clear that the site is under heavy pressure and proper management measures need to be in place to save it from a complete phase shift to an algal reef.

Chemical products like Agar and Carrageenans derived from some seaweed species including *Eucheuma* (red algae) are used in foods, drinks, pharmaceuticals etc. Seaweed farming is therefore practiced in Zanzibar and exports are done to enhance such chemical extracts.

3.1.4 Corals reefs

Coral reefs are unique in that they are formed entirely by biological activity. The stony structures that support the diverse assemblage of fishes and invertebrates are essentially massive deposits of calcium carbonate produced by coral animals, with additional calcium carbonate coming from calcareous algae, such as *Halimeda* spp. and other calcium carbonate producing organisms (Knowlton and Jackson 2001). Corals are divided into hard and soft species. Soft corals are the most numerous in the coral formation of MBCA. Hard corals can further be conveniently divided into reef building (hermatypic) and non-reef building corals (ahermatypic). The hermatypic reef builders require sunlight to live and thrive and are therefore restricted to areas less than 30 m deep. Non-reef builders (ahermatypic) can normally live without sunlight and are usually found at deeper depths. The warm, clear waters found in tropical seas year round, are essential for the coral to produce the large amounts of limestone required to build coral reefs. Corals in the genera *Acropora*, *Porites*, *Galaxea*, *Montipora* are the main reef builders.

Recent surveys, using scuba, suggest that average hard coral cover around the five MBCA sites (Box 2) was 33% with the lowest recorded at Paje Kijambani (19%) and the highest being Pungume (48%). However, even though the Paje Kijambani reef had the lowest hard coral cover; it had by far the highest coral cover with soft corals covering around 75% of the substrate. It should also be noted that even though Pungume showed the highest hard coral cover it exhibited the lowest diversity and generic richness with only 22 recorded genera (out of 53 genera recorded across MBCA) and with the genera *Montipora* accounting for over 80%. In total 53 hard coral genera were found, with Kizimkazi having the highest (44) of which 9 were only observed there. Twenty two hard coral genera were recorded at Paje Kijambani while 32 and 31 genera were observed at Bombweni and Kwale respectively. The most dominant coral

reef genera in MBCA are *Acropora*, *Montipora*, *Porites*, *Millepora*, *Lobophyilla*, *Echinopora* and *Favia*. Good coral reefs in the area are found adjacent to the islets and sand banks and dominated by one or two genera (Horrill et al. 1994; Muhando, 1995).

Main threat to the reefs within the conservation area is the unregulated number of recreational visitors that could very well be counting beyond the carrying capacity of reefs. The cumulative effects of all these stresses have the potential to destroy coral reefs and shift them to less diverse and productive state covered by algae (Grimsditch et al 2009). This is exactly what is appearing to be happening at Kwale.. Without urgent and significant interventions the coral reef system will continue to deteriorate with far-reaching consequences to the tourism industry and the livelihood of the fisher population. However with good management and appropriate conservation measures it is very likely that the ecosystem health in the MBCA can considerably recover.

Table 3. Diversity of reef types in 5 sites of MBCA

Reef area	Reef type
Kwale	A fringing reef on the west side of Kwale island and a reef close to a sand bank on the north.
Pungume	A fringing reef dominated largely by Montipora to the East of Pungume Island.
Kizimkazi	A fringing reef off the village of Kizimkazi. The reef is a continuation of the barrier reef covering almost the whole of the east coast.
Bombweni	A hole with a steep slope of coral heads from the top to just before the bottom where sand dominates, just off the Jambiani village.
Paje Kijambani	A soft coral dominated flat reef just off Paje village

3.1.5 Fishes and other marine resources

The fish fauna of the MBCA is not well documented. Official statistics from the DFMR indicate that the most economically important species that occur in the MBCA include large pelagic fish such as mackerel and tuna (Scombridae), jacks and trevallys (Carangidae), marlin and sailfish (Istiophoridae), barracudas (Sphyraenidae) and Serranidae (Groupers). Large demersal species, including snappers and seaperches (Lutjanidae), emperors (Lethrinidae), breams (Nemipteridae), rabbitfishes (Siganidae), parrotfishes (Scaridae) and goatfish (Mullidae) are also common. Around 108 species of reef fish from 30 different families have been reported to occur in the Bay.

In a recent survey conducted on five sites of MBCA (Box 2) showed the highest number of indicator fish at Paje Kijambani, indicating the reef as one with the least fishing pressure. This can be due to the fact that the reef is characterised by rough seas and strong currents for most of the year which restricts both the number of fishermen visiting the area and the fishing methods that can be safely practiced. The low number of indicator species for the rest of the sites indicates that the reefs are facing strong fishing pressure. Uncharacteristic holes composed of

coral rubble in areas otherwise completely dominated by hard coral growth at Pungume are indicative of even incidences of blast fishing.

Numerous other species of sharks and rays occur in MBCA. Other harvested marine resources include cephalopods (cuttlefish, squids and octopus), holothuroidea (sea cucumber/becche-dermer), molluscs (gastropods and bivalves), crustaceans (lobsters, prawns/shrimps and mangrove/mud crabs).

3.1.6 Sea turtles

There are 8 species of marine turtles worldwide, 6 of which occur in the Indo-Pacific region. Five species of turtles occur in Tanzania waters. These are green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), loggerhead (*Caretta caretta*), olive Ridley (*Lepidochelys olivacea*) and leatherback (*Dermochelys coriacea*) (Frazier, 1975). All these species are also found in Zanzibar waters though the last three are not so common.

In Zanzibar and Menai Bay in particular, 2 species are the most common. These are the green and hawksbill turtles and are known to nest on clean sandy beaches (Khatib et al. 2002). Turtle nests can be seen around Unguja Ukuu and Muungoni. Clark and Khatib (1993) reported that between 10 and 40 nesting per year could be observed at Kizimkazi peninsula and between 10 and 20 at Fumba beach.

The hawksbill is classified by IUCN as critically endangered based on a population decline of over 80% in the past 50 years, while others are categorized as endangered. Marine turtles spend almost their entire lives at sea except when the females go ashore to lay their eggs. Turtles travel vast distances throughout their lives and often return to the very same beaches that they were themselves hatched on. Individuals will take around 30 years to reach maturity.

3.1.7 Marine mammals

Marine mammals in Menai Bay Conservation Area include dolphins and whales which belong to the cetacean group. The most common species of dolphins occurring in MBCA are the Indo-Pacific bottlenose (*Tursiops aduncus*) and the humpback (*Sousa chinensis*) dolphins (Amir et al. 2002, 2005). According to the latest population size estimates based on mark-recapture analyses of photographically identified dolphins, there were 136 (95% CI 124-172) Indo-Pacific bottlenose dolphins and 63 (95% CI 57-95) humpback dolphins in the study area in Menai Bay in 2002 (Stensland et al. 2006). Both species are resident in the study area in Menai Bay based on mark-recapture analysis of photo-identification data (Stensland et al. 2006). Other species reported include the spinner dolphin (*Stenella longirostris*), Risso's dolphin (*Grampus griseus*) and common bottlenose dolphin (*Tursiops truncatus*).

The occurrence of Indo-Pacific bottlenose and humpback dolphins in the waters of Menai Bay provide potential for dolphin watching tours (Amir and Jiddawi 2001). To date the dolphin tourism has not been conducted sustainably and represents an additional threat to the

conservation status of the dolphins in the MBCA (Berggren *et al.* 2007, Stensland and Berggren 2007, Christiansen *et al.* 2010). However, gillnet fishing has been identified as potentially the most serious threat to both Indo-Pacific bottlenose and humpback dolphins in the area based on the minimum number of dead dolphins reported as bycatch (Amir *et al.* 2002, 2005). Any activities in Menai Bay shown to be detrimental to dolphins and whales should be controlled as necessary.

Humpback whales (*Megaptera novaeangliae*) migrate seasonally from temperate waters to warm tropical waters where they breed and calve. The humpback whale apparently migrating through the Zanzibar channel between Unguja and the coast of mainland Tanzania. Humpback whales have been regularly sighted in Menai Bay Conservation Area from June/July to November every year. In the last few years, there has been an increase in reports of humpback whales visiting the area (Fishermen, pers. Commn). The results from the 2008 field season give further support to the notion that Menai Bay Conservation Area and other coastal waters of Zanzibar possibly represent a previously undiscovered breeding area for humpback whales. The group compositions observed in Menai Bay Conservation Area are characteristic of a humpback whale breeding area. The high number of calves observed in the area indicates that humpback whales give birth to their young in or very close to Zanzibar waters. The recordings of singing males in the area also showed that males visit the waters to look for breeding opportunities (Per Berggren and Fredrik Christiansen, Zanzibar Humpback Whale Research Project, pers. commn).

3.1.8 Benthic invertebrates

Countless invertebrates inhabit the sandy bottom, the seagrass beds, the coral reefs and other rocky formations. They include sponges, sea anemones, brittle stars, sea squirts and feather stars.

3.1.9 Terrestrial habitat and flora

The Adder's duiker has become very rare in Zanzibar, but a small number can still be found on Chumbe Island (where a few specimens were re-introduced to serve as a free-ranging breeding nucleus) as well as on Vwatu Island in the MBCA. The dry bush habitat of MBCA is also a home for the blue duiker as well as a small number of antelopes, wild pigs, galagos, tree hyrax, African civet, and several mongoose species. Many other animals and birds inhabit MBCA and the surrounding areas. In the dense coral rag bush, the Sykes monkey can be found.

About hundred bird species have been identified in MBCA, among which are herons, egrets, African fish eagles, brown noddy, terns, plovers and sandpipers. The brown noddy and sooty terns are believed to breed on the small islets in the Bay.

The islands of Pungume and Kwale are also important habitats for sea birds. The South Coast of Zanzibar Island, covering the two adjacent Bays of Kiwani and Kombeni, is considered an Important Bird Area (IBA). The soft sediment of coral silt attracts large numbers of Palearctic

waders and the mangroves are important roost-sites. Common species found in the area include the terek sandpiper (*Xenus cinereus*), the crab plover (*Dromas ardeola*) and the roseate tern (*Sterna dougallii*).

4.0 SOCIO-ECONOMIC VALUES

4.1 Population and Settlement within the MBCA

The MBCA is covered by three districts namely, West, Central and South Districts in 2 regions. It is bordered by 20 villages and 2 new villages of Bwenjui and Chukwani. The population in the villages within the MBCA was 11,324 in 1998 and increased to 27,000 according to census data 2002. This can be projected to 3% yearly population increase. The rapid population growth and the associated human impacts have a strong influence on the coastal and marine ecosystem. If it is assumed a 3% annual growth, the population size in 2010 is estimated at 33,000.

Menai Bay supports the livelihood of inhabitants from 20 villages of Nyamanzi, Kisakasaka, Dimani, Bweleo, Fumba, Kibondeni, Tunguu, Bungi, Kikungwi, Uguja Ukuu Kaepwani, Uzi, N'gambwa, Pete, Kitogani, Muungoni, Muyuni, Kizimkazi Dimbani, Kizimkazi Mkunguni, Mtende and Mzuri. The available census data from 2002 indicates that the number of residents is estimated to be 27,502 inhabitants.

4.2 Villages Profile

Most of the villages in MBCA are situated within the coral rag area which is a land area that is made up by coral rock and is characterized by poor soil conditions. The main economic activity for men living in the villages surrounding Menai Bay is fishing followed by agriculture, livestock keeping, carpentry and petty business. Women are primarily engaged in seaweed farming, agriculture, firewood collection, weaving of coconut strands for rope making and other related products. Both men and women also take part in the growing tourism industry which brings 15,000-20,000 tourists every year for whale and dolphin watching and snorkeling on the reefs. The MBCA coastal resources, wildlife, isolated sand bars and rugged island scenery attract many visitors. Its proximity to the capital of Uguja Island, Stone Town makes it receive an increasing number of visitors each year.

Most villagers around Menai Bay own houses built of locally available and cheap materials such as coral lime fossil coral and coconut thatch material. The households normally comprise around five individuals living in small 2-bedroom houses mostly without electricity and reliable source of domestic water. In most of the areas, social services and infrastructure are literally poor or non-existent. Roads are in very poor condition and they may be inaccessible during rainy seasons. Furthermore, lack of reliable means of transport makes it difficult for the villagers to send their products to the market. Health services are deficient and villagers rely on small dispensaries which are situated more than eight kilometers from some villages.

Although from the outlook of per-capita income the villagers around Menai Bay are poor, a material lifestyle analysis based on a survey of 133 households conducted in 2003, found that the Menai Bay residents are better off than many others in Tanzania (Tobey, Torell et al. 2003). For example, 73 percent of the villagers surveyed in Menai Bay have access to pipe water

(although not in their houses), compared to 28 percent for rural Tanzania. Also, 68% of the households were reported to have ability of taking three meals per day compared to 42.8% for rural Tanzania. Finally, only 16 percent of the Menai Bay residents were reported as being illiterate compared to a national average of 33 percent.

A number of villages and settlements are located along the MBCA, which together comprise the homes of several thousand people. Although these settlements are not at the heart of the MBCA, the existence of the MBCA is an important factor for these residents. It can impose additional planning restrictions on what they can do. The large number of visitors to the MBCA can be both positive in supporting the local economy but can also have adverse effects, for example, by excessive immigration in local settlements. Generally, the existence of MBCA is a source of local pride and the area is used for fisheries and tourism activities.

4.3 Fisheries

Fishing is a major activity in Menai Bay with an increase in recent years in fishing efforts (DFMR unpublished data). This area is regarded as one of the best in Zanzibar for catching small and large individuals of fish species. Artisanal fishing takes place predominantly in shallow waters within the Bay and mangrove forests. The most common fishing crafts are outrigger canoes which are small and not suitable for offshore waters. The most common fishing gears are gillnets, shark nets, small-scale purse seine nets and a variety of fishing lines. The most important fishery resource in MBCA is finfish, both demersal and pelagic (skipjack tuna, kingfish, sailfish, marlin, sharks, rays, skates). Others include prawns, crabs, lobsters, octopus, squids, edible mollusks, ornamental/curio mollusks, and holothurians. Octopus collection is mainly done by women and children in the intertidal reef flats.

Fishing is traditional and the most important economic activity in Menai Bay. The residents are heavily dependent on the marine environment for their daily livelihood. Fishing provides most of the households with cash and food, whereas agriculture provides subsistence needs. Fishing is also a major revenue earner for fishers from other regions sharing the resources in the MBCA.

Over 80% of the total catch is consumed locally and the remaining 20% is sold to restaurants, hotels and markets in Stone Town, Zanzibar Municipal. Most of the fishermen sell their products at auctions directly at the landing site. Some are sold to fishmongers who go to the landing sites while some are sent to the main market in town. Some fishermen have contracts with tourist hotels for a daily basis fish supply. During the 2003 survey, fishermen maintained that lack of storage facilities was a major problem facing their operation due to post-harvest loss.

Women are engaged in intertidal fishing on the reef flats, collecting different varieties of shellfish, octopus, etc. for home consumption and sometimes for sale. In some areas like Nyamanzi and Ng'ambwa, women are also engaged in seaweed farming and bivalve farming.

Insufficient fishing gears, inadequate modern fishing vessels that would allow fishers to go further offshore, limited suitable sites for seaweed farming and lack of education are among the common problems facing fishers and seaweed farmers in the MBCA. Destructive and even illegal fishing methods and gears are also perceived to impact negatively on the fish stocks and are a cause of concern as this is common even with outside/migrant fishers. Other reasons that

negatively impact on fish stocks include the destruction of coastal and marine habitats, climate variability and seasonal changes. In the stakeholders consultations some fishers mentioned factors such as weak conservation and protection efforts, lack of awareness or education and the impacts of the open access system as being major causes of resources depletion and environmental destruction. However, a few fishers said that fish stocks have increased since the creation of the MBCA.

Other problems fishers experience include loss, theft and damage of their fishing gears, an increasing number of fishers using the same fishing grounds, adverse weather (strong monsoon winds), increasing numbers of sea urchins etc. that make their activities more difficult or even dangerous. Decreasing fish stocks is also attributed to the increasing number of fishers from other places outside the conservation area and mainland Tanzania. Lack of reliable markets as well as low prices for seaweed are yet other major problems. In general, there is a reasonable awareness of the effects of the destruction of mangrove, sea grass and coral habitats on the fish stocks.

4.3.1 Molluscs collection

A variety of mollusks are found in Menai Bay, the common ones being gastropods and bivalves. They are collected mainly by women. Bivalves are collected from the intertidal zone by different methods depending on the kind of substrate on which they are found. If they live under a muddy/ sandy sea bottom, they can be dug up by simple tool. If they are attached to rocks or coral rag, they must be extracted. Mollusks for meat are collected during every spring tide (i.e. twice per month) and most of what is collected is consumed within the households and not sold commercially. Collection of mollusks demands intense physical labor among women. The wild harvest is currently unsustainable because the catch is unregulated and reportedly harvests are declining.

Over 21 species of mollusks are collected but out of these, some are more prevalent and favored than others. Mass removal of mollusks, particularly the gastropods may be detrimental to the ecosystem in that it may upset the food chains and other ecological dynamic processes. Most species fall under the major classes of Gastropoda and Bivalvia. Common families and species, just to mention a few would include Abalones (*Haliotis pustulata*), Limpets (*Cellana radiata*), Top shells (*Trochus maculatus*), Turbans (*Turbo marmoratus*), Periwinkles (*Littoraria scabra*), Sundial shells (*Architectonica perspectiva*), Conch Shells (*Lambis lambis*), Cowries (*Cypraea tigris*, *Cypraea testudinaria* etc), Helmet shells (*Cassis cornuta*, *Cypraeocassis rufa*), Triton shells (*Charonia tritonis*), Rock shells (*Chicoreus ramosus*), Tulip shells (*Pleuroploca trapezium*), Vase shells (*Vasum ceramicum*), Auger shells (*Terebra dimidiata*), Harp shells (*Harpa harpa*), Cone shells (*Conus litteratus*), Mussels (*Perna picta*), Arcidae (*Anadara antiquata*), Wing oysters (*Pinctada margaritifera*), Oysters (*Saccostrea cucullata*), Giant clams (*Tridacna maxima*), Cockles (*Plagiocardium pseudolima*). Some of the species are very valuable and may fetch between 1,000 Tsh. and 20,000 Tsh. per piece depending on type and quality. The cowries, helmet shells and triton shells are more targeted. The abundance of these species varies by area and season, a situation that makes the price fluctuate throughout the year. The opercula of some of the molluscs, including *Chicoreus ramosus* and *Pleuroploca trapezium* are highly prized and can be sold for up to Tsh. 20,000/kilogram.

Women are now forced to collect molluscs further off shore because they are no longer readily available in the immediate inshore waters. This fact indicates that stocks are being depleted and calls for immediate remedial actions, including conservation measures.

4.3.2 Bivalve Culture

The rate of harvesting of the mollusk species from the wild calls for immediate management interventions before the populations get seriously depleted and cause adverse impacts on ecosystems. Efforts to reduce the level of harvesting may include among others, imposing legislation and farming. Some effort has been initiated to culture some of the common species through enclosure system (Hauke *et al.*, 2005; Jiddawi and Mmochi, 2005). The species cultured are *Pinctada margaritifera*, *Isognomon isognomon*, *Modiolus sp.* and *Anadara sp.*

4.3.3 Sea cucumbers collection

About 30 species of sea cucumbers have been reported to occur in Zanzibar waters (Coleson and Jiddawi, 1996) with, *Holothuria scabra* and *H. nobilis*, being the most important species. However, the stocks of the valued sea cucumbers have been overexploited and the most abundant species present are the low value species which are *Thelonata ananas*, *Actinopyga echinata*, *Stichopus variegatus* and *Bohadschia sp* (Jiddawi and Ohman, 2002). Sea cucumbers are collected in shallow waters by hand, with snorkel and scuba gear or as bycatch in drag nets. Usually women collect the sea cucumbers in intertidal areas whereas men use SCUBA techniques to dive for these organism in deeper waters. Diving for sea cucumbers is common along the whole coast of Menai Bay Conservation Area. Most of the coastal communities collect sea cucumbers during spring tides for sale. They are boiled and dried for sale to Chinese traders based in town. Tanzania was the second largest exporter as of 2000 after Madagascar according to Food and Agriculture Organization (FAO) statistics; but exports are declining due to over-fishing.

4.3.4 Seaweed farming

Seaweed farming has been increasing in most of the coastal areas of Menai Bay with the exception of Fumba and Muungoni areas where the rocky bottom does not all easy and firm fixing of the support stakes. Two species which are commercially farmed are *Eucheuma spinosum* which sells at 100 Tshs per kg and *E. cottonii* which sells at 200 Tshs per kg. At Uzi where they use the floating/raft culture method, *E. cottonii* which is favored more by the sea weed companies flourishes very well. The species also grows well at Bweleo. Expansion of commercial farming (off-bottom method) of *E. spinosum* in several areas is hindered by the rocky bottom nature. Women take greater role in sea weed farming and, reportedly, some women at Unguja Ukuu dropped octopus fishing and molluscs collection for seaweed farming. However, the enthusiasm and pace of seaweed farming has fallen over the last few years.

4.4 Tourism and Recreation

In addition to its exceptional value in terms of biological productivity and fishery resources, the MBCA contains a vast array of tourism and recreational opportunities. Tourism is the activity with the highest commercial value within the MBCA. Activity-specific and up-to-date information regarding marine tourism in Menai Bay is difficult to obtain. Approximately 20,352 visitors travelled to MBCA during the tourist season of 2004/2005 (Table 2). In addition, a substantial number of visitor nights are spent in restaurants and hotels within the boundaries of MBCA per year. Tourism in MBCA has followed a general pattern of low visitations in the 1980's to rapid expansion through the 1990's and 2000's. Tourism increased significantly, with around 12,000 tourists visiting the area in 2000/2001.

Table 4. Number of visitors visited Menai Bay Conservation Area from July 2004 – June 2005 (Source: MBCA unpublished data)

Month	Visitors
July	2,452
August	2,967
September	2,261
October	2,490
November	1,584
December	1,307
January	1,844
February	1,738
March	2,279
April	733
May	154
June	543
Total	20,352

Visitors are charged US\$ 3 per person per day as an entry fee to the area. It is estimated that the direct financial contribution to MBCA is in excess of US \$ 61,056 annually. Communities in the area are also involved in tourism operations as their part-time activity, and the sector has created formal employment for the enthusiastic population groups.

Tourism in MBCA is geographically focused on two major accessible areas of Kizimkazi, (where its tourism is mainly associated with dolphins) and Fumba, (where its tourism is mainly associated with coral reefs and sand banks).

Dolphin tourism provides an important source of revenue for Kizimkazi. In addition to the income for the operators themselves, many other local businesses benefit from the presence of tourists. These include providers of services such as accommodation, snorkeling equipments, local shops, etc. This industry tourism can have significant educational value: with appropriate interpretation and information facilities, the public can increase their understanding and appreciation not only of the cetacean species themselves, but also of the wider marine environment.

Dolphin watching takes place in Menai Bay all year round and the main tourism season being October to February. This activity started in the area since 1989 but it was in 1992 that it started gaining a place on the commercial market (Berggren et al. 2007).

During the past few decades, the dolphins in this area have been hunted directly for their meat, oil and blubber, as well as being killed indirectly as bycatch in fisheries (Amir et al. 2002). In 1992, dolphin tourism was started off the south coast of Zanzibar by villagers from Kizimkazi, gradually replacing the previous dolphin hunt in the area (Amir & Jiddawi 2001). The industry has become a major contributor to the local economies of Kizimkazi, where the economic opportunities are otherwise very limited (Berggren et al. 2007). Today, Kizimkazi is one of the few areas in the world where a cetacean hunt has been directly replaced by cetacean tourism as a socio-economic alternative (Berggren et al. 2007). Still, for dolphin tourism to persist as a long-term ecologically and economically viable industry, it is important that dolphin tourism is conducted in a non-invasive way so as to not have long-term negative effects on the population.

The focus of tourism activity in these two areas means that the other part of MBCA is accessed by small number of tourists, resulting in a very low level of tourism impacts over the majority of the MBCA. The very nature of tourism being widely scattered and involving a large number of private operators makes it difficult to control. This has frequently led to situations where the unchecked proliferation of tourist enterprises has led to problems of waste, pollution, disturbance to wildlife and negative impact on local cultures. Moreover unplanned tourism development and a rush to beach plots have gradually led to construction of the tourism facilities clustered along the shore. The ribbon or chain of tourist structures along the shore has consequential effect of obstruction of access to the beach by other local marine resource users, a potential and an emerging use conflict between investors and local communities. MBCA is also popular for sunbathing, scuba diving and sport fishing. Data indicating current levels of these uses at the area are largely unavailable. Rather, general information exists in the form of overall trends for visitation to the area whereby sunbathing is leading followed by scuba diving and sport fishing.

4.4.1 Underwater tourism attractiveness

There are several different identified diving sites in MBCA that can provide the unique experience and satisfaction to underwater enthusiasts. Mwamba Mweupe is one of such case in point. Another site is at Pungume Island which is rich, with extensive foliose coral beds that would hold a candle to any such sites in the world (but only in terms of the foliose coral). Two other areas potential for tourism development identified during the diving survey include Kijambani and Bombweni along Paje and Jambiani villages, respectively (See appendix 1).

Paje Kijambani

The reef is located at approximately 1 nautical mile off the Paje village. The area is just outside the east coast barrier reef and is strongly characterized by wave and current action. The reef is generally flat and is found at a depth between 20-30 meters. While virtually all of the established dive sites within MBCA and indeed Zanzibar are dominated by either hard corals or rock, this site is unique due to the dominance of soft corals (Appendix 1). The 76% soft coral cover and 16% hard coral cover account for a total coral cover of 92% which is higher than any other surveyed reef. It is also the reef that recorded the highest number of indicator fish species. Additionally other recreational interesting species that include schools of fusiliers, jackfish, moray eels and nudibranchs were also observed. The depth at which the reef is found and the strong current faced while diving make this area a potential dive site for only experienced divers.

Bombweni

The reef is located at approximately 1 nautical mile off the Jambiani village. With respect to its surrounding environment (shallow water of around 6 meters deep) the site can be described as a hole with a depth of around 17 meters. It has a steep slope of coral heads from the top to just before the bottom where sand dominates. The 32 coral genera recorded here show high hard coral diversity but the low numbers of recorded indicator fish indicate high fishing pressure. However presence of other reef fish species including groups of colorful sweet lips, palette blue, emperor angel fish, large schools of snappers and rare species of eel together with its close proximity to Jambiani (a popular tourist destination) makes it a potentially attractive dive site.

Marine tourism however has great potential to be ecologically sustainable. More and more individuals and organizations are coming to the conclusion that the industry could be better managed. In many parts of the world, this sort of tourism is promoted as an environmentally sustainable industry which can replace extractive industries while at the same time providing financial support for local economies (Agardy, 1995; Moscardo, 1997). Providing opportunities for tourism and recreation will be an important element of the MBCA strategy, in view of the area's growing outdoor tourism industry and indeed considerable evidence of the strong links between tourism and MPAs from around the world.

4.5 Agriculture

Agriculture takes place around the Bay although soils are characterized by coral rag with poor nutrients. In some places, crop farming is not very promising because of soil infertility. Coconut is the only significant cash crop for the local community. Fruits, bananas and root crops as cassava are grown as well.

4.6 Small Businesses

4.6.1 Mangrove and forestry products

Communities in Menai Bay have for generations depended on mangrove resources, either directly or indirectly. Women use forests for fetching firewood for domestic use and for sell. Men on the other hand depend on forest for construction material and charcoal making. Mangrove harvesting for production of charcoal and firewood forms a major economic activity for the household economy. Most of the firewood and charcoal is being transported and sold in Zanzibar town for use in homes, schools, hospitals and bakeries.

The wood is also used for boat building and construction of houses. Building poles are harvested from both the coral rag bush and mangrove forests. The price incentive created by the greater demand assures people who are engaged in the business a profitable venture. Women are also getting involved in the activity. In some places, coral rag bushes are located far from the village setting and in other areas mangroves are quite close to villages/hamlets, for example Kisakasaka and Unguja Ukuu. Although harvesting is advised to be carried out on a sustainable manner, control measures have not been successful.

4.6.2 Lime making

Local communities also engage themselves in lime making using palm and mangrove wood and fossil coral. Long stretches of the Menai Bay coastline are fringed by rocky limestone cliffs.

4.6.3 Bee keeping

Bee-keeping industry is one of the traditional activities in Zanzibar. It plays a major role in socio economic development and environmental conservation. Some local people are doing bee-keeping activities within mangrove forests and generate income for their families. The activity seems to have a promising future in contributing to local livelihood.

4.7 Economic Infrastructure

4.7.1 Energy

Firewood is the most dependable form of energy in all villages. Firewood, charcoal and coconut husks are used for cooking or brick making. Some of the villages are connected to the National Electricity Grid as elaborated below.

Only Fumba and Bweleo villages in the West District have power supply. Nyamanzi, Dimani, Kisakasaka, Kibondeni and Chukwani Buyu/ Mazizini (Mbweni) villages have no power supply. The level of power supply to villages in the Central District is not different from other districts as it is only Unguja Ukuu and Kikungwi villages that are connected to the national grid.

Uzi, Ng'ambwa, Bungi and Tunguu villages have no electricity. All villages in South District have power supply except Mtende, Kitogani, Muyuni A, Muyuni B and Muyuni C villages.

4.7.2 Telecommunication network and postal services

A good number of Cellular phone networks coverage is available in the areas namely Tigo, Vodacom, Celtel, and Zantel. All villages in the South District have very good network coverage except for Muungoni village. In the West District save for Nyamanzi Dimani and Kibondeni villages, most of the villages including Chukwani Buyu/ Mazizini (Mbweni) have very good network coverage. For the Central District however, coverage is not as good as the West District with only Unguja Ukuu and Kikungwi villages with mobile network coverage; while Uzi, Ng'ambwa, Bungi and Tunguu villages have no coverage at all. Postal services are also available in some areas.

4.7.3 Roads

The road network in some of MBCA villages is pitiable while in others it is fairly good. Nearly all villages in West District have poor infrastructure and poor access roads. The situation in the Central District is no different. Both Ng'ambwa and Uzi villages in the district have poor and intermittent road access (due to the tides); and tidal inundation of the land connection to the main part of Unguja Island. Bungi village has good main road network near the village but other infrastructure is poor. Kikungwi village has no public transport. The South District villages of Mtende, Muungoni, Muyuni A, Muyuni B and Muyuni C are well served with good road networks while Mzuri Makunduchi, Kizimkazi Mkunguni, Kizimkazi Dimbani and Kitogani have fairly good roads.

4.8 Social Services

4.8.1 Education

The education policy in Zanzibar is to provide basic education for all children until Form III although in some areas only primary education until Standard VII has been attained. This policy seems attainable as there are policy directives to have schools within the reach of each village. In MBCA however, the implementation of this policy differs from District to District. District- wise, the performance shows that not all villages in the West District have schools. Even in those villages where schools are found, they are of primary level education (standard 7) and these are at Dimani, Kisakasaka, Fumba and Chukwani Buyu/ Mazizini (Mbweni) villages. It is only Bweleo village which has both Primary and secondary schools. As there is no school at Nyamanzi, pupils from this village have to travel to Kombeni School which runs classes up to Standard 2. Looking at the Central District, the education status is almost the same as in the West District. It is only Ng'ambwa village which has Primary and secondary schools. Unguja Ukuu and Kikungwi villages have Primary and elementary schools respectively. There are no schools at Bungi, Tunguu, and Uzi villages. The South District education situation is far better

than the other two districts with most villages having primary schools. Mzuri Makunduchi, Kizimkazi Dimbani and Kitogani schools have put basic environmental studies in its curricular.

4.8.2 Water supply

Most households in MBCA obtain water from protected sources, such as piped water or protected springs and wells. However, not all the house hold and villages have access to safe and clean water. Most villages in the West District have clean running water supplies accessible in the whole village or to a certain part of the village. Bweleo, Kibondeni and Chukwani Buyu/ Mazizini (Mbweni) villages have no running water supplies. Besides pipe water, Dimani village also has water well. Water supply situation in the Central district is poor as it is only Unguja Ukuu village that has pipe water supply. Uzi, Ng'ambwa, Kikungwi, Bungi and Tunguu have no clean water supply. The South district is gifted with water as all villages have clean water supply except Kitogani village.

4.8.3 Health services

Health service facilities in Menai Bay are in the domain of Government and there is no private service provider. Health Services are very few and wherever they are available they are mainly dispensaries. There are no Hospital services available at all in MBCA. Nyamanzi and Kisakasaka villages in the West District are the only villages that have dispensaries while Dimani, Bweleo, Fumba and Kibondeni villages have no health facilities. Villagers have to travel to neighboring villages for health services. In the Central District, health services are obtained at Ng'ambwa village where there is a dispensary. The rest of the villages-Uzi, Unguja Ukuu, Kikungwi, Bungi and Tunguu lack health care facilities. The people of Kikungwi village however have access to the hospital services in the neighboring village. All villages in the South District have dispensaries except for Mzuri Makunduchi village.

4.9 Cultural Values

Many villages close to the MBCA contain important archaeological and historic remains. Many are of local and international importance. They include BiKhole ruins of Bungi, Kizimkazi Dimbani Old Mosque, Cave of Machaga of Pete, cave of Kuumbi of Jambiani and cave of Mwanampambe of Kajengwa Makunduchi, all of them are protected legally. Still there are many of them which have local and international importance but so far have no legal protection. It is important, when making decisions about the management of the MBCA that all aspects of the historic environment are taken into account in an appropriate way.

5.0 STAKEHOLDERS AND KEY MANAGEMENT ISSUES

5.1 Stakeholders

This management plan is intended to be a transparent document describing the objectives, strategies and actions behind the management of the MBCA. The plan is designed to be accessible to:-

- MBCA
- Department of Fisheries and Marine Resources
- Department of Environment
- Commission of Tourism
- Institute of Marine Sciences
- State University of Zanzibar
- Ministry of Education
- Ministry of Health
- Ministry of Employment, Women, Youth and Children
- Fishmongers/Buyers
- Consumers
- Gear makers
- Boat builders
- Dolphin boat operators
- Boat owners
- Hotels/Restaurant owners
- NGOs (Fisheries and community extension workers)
- CBOs (Fishermen's cooperative, committee or co-management group.
- Other community committees or groups
- District/Village Government
- Courts
- KMMK/Police
- Donors
- Visitors
- Schools
- Marine Transport Vessels
- Zanzibar Port Corporation
- Government planning and finance authorities

An important step in establishing effective stakeholder relationships was to identify the stakeholders and their roles within the marine environment. Table 5 summarizes the stakeholder groups of MBCA and their expected roles in the development and implementation of the GMP.

Table 5. Summary of the stakeholder groups and their expected roles in MBCA

Stakeholder	Role
NGOs/CBOs	Partnerships with environmental, cultural, heritage and non-governmental / non-profit groups on MBCA and within Zanzibar.
Water Sports	User group encompassing activities such as diving, snorkeling, sailing, power boating, kayaking, kite surfing, windsurfing, jet-skiing and surfing. Divers and snorkelers are a particularly important stakeholder group as they depend highly on the well being of the marine resource.

Marinas and Boat services	User group catering for charter boats, and privately own vessels, mainly operating from the Stone Town.
Fisher folk	High value placed on the tradition of fishing.
Industry	User group including industries in addition to tourism on MBCA which directly or indirectly affect the area, such as energy production, oil and gas storage, construction.
Hotels, restaurants and other tourism business operators	Supporting the tourism sector.
Law enforcement	The law enforcement agencies, including the community guards, customs, police and prosecutors office, advise on legal matters, the formation of legislation, and maintaining/enforcing the legal attributes of the Marine Conservation Area (MCA)
Government	Permitting and maintaining the law. Facilitation and Communication towards user groups. The MBCA Management manages the conservation on behalf of Government.
Training and Research	Capacity building, information and data on marine resources.
Tourism	The tourism sector is dependent on the marine environment to a great extent, especially the condition of beaches and coral reefs for diving. Tourists use the MBCA on a daily basis.
Community	The local community depends on the well being of the MBCA indirectly for income. Educational establishments use the marine Conservation Area as an education tool.

5.2 Key Management Issues

Management of the environment considers the key issues and strategies to address them. Preparation and implementation of general management plans must basically be focussed on the stakeholders who are the key players. These may differ from managers, resource users to donors.

Basically, this management plan emanates from long term initiatives of stakeholders and their views and vision based on the observed obvious management issues which form the basis of the need for special management program in the Menai Bay Conservation Area. Following inception of the conservation idea, stakeholders' consultations were pursued as a major tool for establishing this GMP. Consultation approaches included individual discussions, consultative meetings/workshops and participatory planning on the approach and methodology. The management issues identified by stakeholders are summarized into the following topics:

- Legal and policy implementation
- Socio-economic concerns and market services
- Research and monitoring
- Education and awareness
- New and emerging issues

5.2.1 Legal and policy implementation

Poor management and ineffective law enforcement

So far enforcement of fisheries patrols has not been fully effective. This situation has been exacerbated for shortage of personnel. As a result, illegal fishing activities have been increased. Illegal fishing including undersize mesh size, illegal gear, and use of chemicals is consistently reported to occur in some sites in MBCA. Dynamite fishing is also reported to occur in some areas. However, the areas where this method is used have limited extension. Legislation to ensure sustainable fishing exists, but enforcement is low. Furthermore, the current fishing effort, being clearly unsustainable in some areas is expected to grow in the future under ever-increasing local market demand. The use of illegal fishing gears and methods in the MBCA would be significantly controlled if patrols are conducted regularly.

Despite the existence of proposed guidelines for dolphin watching activities, these are not generally followed and there are no penalties for violation of the guidelines. There is no enforcement presence for violation of other regulations. The potential financial benefit of dolphin watching tourism to local communities and to the conservation of resources is undeniable. However, if the situation remains as it is currently, unmanaged and uncontrolled, it could disrupt local communities (through inequitable distribution of revenue generated and disturbance to daily activities) and contribute to a reduction of the very resources (i.e. dolphins and fisheries), on which the communities are dependent.

Habitat degradation

It has been reported that beach seines, drag nets, surround nets, poisoning, dynamite fishing and spear guns are generally operated over the reefs and seagrass beds hence causing significant damage to the reefs, seagrasses and fish over time. The area's rich fishing grounds have been exploited for many years by villagers using traditional fishing gears and methods such as traps, hand lines, weirs and fences, leaving the area relatively intact for fairly long. However, fishing is concentrated in inshore waters, putting considerable pressure on the fish stocks and their habitats. Therefore, increased fishing effort and destructive fishing practices including surrounding nets, use of dynamites, pesticides and local poisonous weed called "Utupa" have contributed to the degradation of Menai Bay's habitats resulting in decline in the local fish catches which in turn impacts negatively on individual fisher's income and living standards of the coastal communities in the area. In a 1995 study, fish catch was considered by fishers to be declining, especially that of demersal species. Biological assessments conducted recently (Assessment of Zanzibar Marine Protected Areas 2010) have shown that the Menai Bay's reefs have been considerably degraded, both from human intervention and natural phenomena such as the 1998 coral bleaching event. Destructive fishing practices notably dynamite and bottom dragged nets (e.g. kigumi), overfishing, sedimentation and pollution constitute the main human induced sources of physical alteration and degradation of habitats on coral reefs, sea grass beds and mangroves. The low numbers of indicator fish species observed during the survey by the diving team (Assessment of Zanzibar Marine Protected Areas 2010) has shown that reefs within MBCA are faced with tremendous fishing pressure.

Studies done by the Institute of Marine Science on Zanzibar in 1992 confirmed extensive reef damage in MBCA. The study suggested the reasons to be destructive fishing methods and anchor damage. Relative to other extractive uses of the Menai Bay, tourism has great potential to the damage of coral reefs. For instance, vessels sometimes anchor on coral reef on snorkeling stops after dolphin watching. The reefs are also damaged by inexperienced diving and snorkeling tourists. Most divers do not break corals, but a small percentage of divers who swim close to the coral may break coral branches on each dive. Fragile branching corals are most susceptible to breakage. Internationally, the carrying capacity of coral reefs has been determined to be about 5,000 divers per site per year (Harriott 2002). Because tourism is an important activity on the MBCA, it requires careful management by MBCA management. Thus, there is strong motivation to protect and conserve reefs that are the subject of tourism interest. Tourism should be managed by a combination of zoning plans, plans of management of intensively used sites, code of practice and permits.

Inadequate rules and regulatory framework

Visitation to MBCA has been increasing, particularly those engaged in dolphin and whale watching and diving. Concerns are being raised about the effects on visitation on the dolphins and their foraging activities. Uncontrolled pursuit of the dolphins could interfere with behaviors and ability of the dolphins to feed in this area. There is a growing body of evidence which points to dolphins responding negatively to the presence of marine vessels. Studies have shown that disturbances caused by vessels cause dolphins to increase their swimming speed and move

away from the source of the disturbance. This effect is especially pronounced when boats approach groups of dolphins at high speed, dolphin pods are chased, move over feeding/resting areas or move over locations where mothers are present with young calves (Stensland and Berggren 2007, Fredrik et al. 2010). A significant level of disturbance caused by vessels in one area can lead to several days of dolphin absence or low abundance (Hastie, 1991). These disturbances may have negative effects on the long-term health and residency of the dolphins. If the source of the disturbance persists over a long period of time, dolphins may abandon an area altogether (Corkeron, 1990). Suggested guidelines (Berggren et al. 2007) for appropriate behavior exist but are currently not followed or enforced.

Incidental catch

Threatened and protected marine animals (turtles, dolphins and whales) are killed during fishing operations. For example, Amir et al. (2002, 2005) reported that bycatch of dolphins in gillnet fisheries is the most serious threats in the area. The threat is particularly acute for dolphins and turtles, because of their slow life histories and limited potential rates of increase. The bycatch of dolphins occur year round and all recorded catches have been in drift and bottom set gillnets used by local fishers from villages off MBCA. The total annual byactch for thr fisheries was estimated to 13 Indo-Pacific bottlenose dolphins in the drift gillnets and 4 humpback dolphins in the bottom-set gillnet fishery (Amir 2010). The estimated annual byactch represent an annual mortality of 9.6% of the estimated number (136) of Indo-Pacific bottlenose dolphins and 6.3% of the estimated number (63) of humpback dolphins in the area. Every year, several humpback whales swim into fishing gear and get entangled in drift and bottom set gillnets in Menai Bay Conservation Area especially from July to September when these whales are most abundant in the area. For example, in the humpback whale bycatch mitigation and disentanglement workshop conducted in Eacrotanal Hall in Zanzibar from 14 to 15 July 2010, it has been reported in 2009 alone 13 incidents of humpback whale entanglement in fishing gear were reported off the Menai Bay Conservation Area. It is unfortunate that most of these humpback whales swimming away with the fishing net. This situation is negative both for the whales entangled as well as the fishermen who lose a valuable fishing net and an important way of income. It has also been reported that turtles are hunted purposely for meat. Collection of turtle eggs is also a common practice for people who take them for delicacy.

Coastal erosion

Loss of mangrove, coral reefs and seagrass beds due to overexploitation and illegal fishing methods are not only cause destruction of habitat, but also cause beach erosion. Coastal erosion is also caused by sand mining for building purposes. Sand mining is done in many coastal areas in MBCA which is illegal.

Inadequate financial and management capacity

Financial capacity of the MBCA to fulfill her mandate is not there. Due to inadequate government budget allocation, the human resources development as well as service delivery to the general public has been insufficient. The inadequacy and uncertainty of funds have impacted

negatively on management operations ranging from recruit of staff, training, research and monitoring activities.

5.2.2 Socio-economic concerns and market services

- Conflicts between users. Small-scale fishing has been concentrated in the shallow inshore waters, because of limits on the operations of the fishing fleet. Small-scale fishing tends to spark conflicts with tourism business and conservation interests over competition for resources. This is because of the way fishing activities overlap and interfere with tourism sites. These conflicts have been caused because of the utilization and access of resources in the same area. There is also friction with the MBCA authority over the fishing industry's disregard for established regulation on certain species of fish and frustration over the authority's limited means for enforcement and supervision.
- Weak market support services to address the provision of market information, standards and quality assurance.

5.2.3 Research and monitoring

This management plan has been devised based on current understanding of the functioning of the area and its economic value. There are gaps in this understanding and there will be an ongoing need to improve understanding through research. A good number of studies have been done but most of them have not been for conservation/management purposes; rather these studies have been for academic purposes. As a result, there is limited information on biological resources in the area and also so for available livelihoods and resource use trend. Increasing use by visitors, surrounding development and climate and sea level change can impact on the health and ecological functioning of the area, as well as its value at different spatial scale.

Monitoring of resources use in the area is only carried out irregularly such that no readily available analytical fisheries production data, marine and forest habitats conditions, human demography and livelihoods. There is need for information on local resources use patterns and practices and study of utilization needs and trends. Permitting for various activities in the conservation area has not considered carrying capacity of the activities. Optimum levels must be established for activities in the various areas including fishing grounds, tourist areas etc.

Research and monitoring are essential to enable the respective institutions responsible for management of the resources in the area to adapt management plan. Three key focal areas for research and monitoring associated with the MBCA include visitor numbers and behavior, physical characteristics, nutrients, biodiversity and populations of exploited species.

There is currently no framework to guide and use monitoring data. An effective monitoring and evaluation system requires performance indicators, data and information and capacity to

monitor and review with the objective of identifying constraints and the adoption of remedial measures to remove the constraints.

5.2.4 Education and awareness

Lacking entrepreneurship knowledge and skills to perform business prevents communities from initiating alternative means for livelihood. Sustainability can only be achieved through relieving pressure on the existing resources.

Existing communication gap between tour operators and tourists constrain information transfer from the former to the latter on what to and what not to do during the tour operations.

Lack of training: There is no requirement for captains and/or guides to be trained in dolphin behavior/ecology, tourist management, or first aid. Likewise, tourists are not always educated before or during the trip about dolphin behavior/ecology.

5.2.5 New and emerging issues

Damaging climate change, driven by greenhouse gases, is now widely recognised as a defining issue of our times. The historic environment is not immune from the impacts of climate change. Shifts, for example, in monsoonal winds, rainfall, temperature and sea level rise could all take their toll in fishing and tourism activities in the area.

For instance, coral reefs are particularly sensitive to climate change because they bleach easily if there are changes to sea surface temperatures (SSTs). The increasing water temperatures as a result of global warming will almost definitely result in coral bleaching and indeed some indications were registered during the diving survey. Incidences of Crown of Thorns Starfish (COTS) outbreaks are being reported in reefs throughout Zanzibar and even though few COTS were observed during the survey, the probability of the same happening within MBCA is very high.

The reefs then become more vulnerable to other threats, such as: overfishing; pollution; creatures that eat them; sedimentation from storm surges and snorkelers; and coastal developments. To mitigate the damage to coral weakened by warming waters, the recent IUCN reports have called for the adoption of a range of measures, such as: improved reef monitoring, use of marine protected areas, transplanting healthy coral to degraded reefs and use of coastal and fishing management schemes which are proposed in the management strategies.

Table 5. Summary of management issues threatening MBCA as identified by stakeholder consultations and analyzed by using less, moderate, high and significant threats.

Issues	Less Threat	Moderate Threat	High Threat	Significant High

				Threat
Legal and policy implementation				
Lack of funding				x
Socio-economic concerns and market services				
User conflict due to influx of fishers into ocean waters				x
Conflict between fishers and divers.			x	
Conflict between (DEMA) fishers and divers			x	
Use of destructive fishing gears and methods				x
Illegal hunting of threatened and protected aquatic organisms, Turtles, Dolphins and Whales			x	
Over utilization of resources				x
Increased number of scuba fishers in low depth waters				x
Illegal fishing in both deep and low depth waters				x
Resource conflicts between visitors and local people				x
Lacking code of conduct to guide tourists and tour operators			x	
User conflicts between ownership of tourist hotels and fishers				x
Fishing traps found at sea, are destroyed and fish is stolen		x		
Humiliations as dogs are used to scare people from the area.	x			
Pressure on beaches and corals has also increased		x		
Destructive fishing practices result into depletion of fish resources				x
Environmental degradation by breakup of corals by divers and powerboats users			x	
Careless dumping of wastes in the mangrove forest		x		

Haphazard camping at Pungume and Kwale islands				x
Lack of alternative income generation activities to communities				x
Research and monitoring				
Insufficient Government help to fishers			x	
Deficiencies in sectoral policies, regulations and legislations			x	
Lack of procedure for quick decision-making for legal actions in case of arrests.				x
Lack of clear roles and responsibilities of parties for various development			x	
Destruction of reefs by human activities			x	
Destruction of corals by fishers' and tour operators			x	
Education and awareness				
Lack of management / legislation / enforcement				X
Inadequate baseline information, research and monitoring			x	
Lack of law enforcement				x
New and emerging issues				

6.0 MANAGEMENT GOAL AND OBJECTIVES

6.1 The Menai Bay Conservation Area's Mission Statement is:

To conserve the biological diversity and other natural and cultural values of the area in the long term, while providing recreational, social and economic benefits for the present and future generation.

6.2 Management Goal

- The goal of this general management plan is to manage the use and harvesting of marine and fisheries resources at ecological sustainable levels, and manage the development of marine tourism in order to maximize economic benefits to the community.
- In the context of this management plan, ecologically sustainable development includes monitoring and research to demonstrate the sustainable harvest of marine resources,

identifying the habitats and aquatic environments on which marine resources depend, and, enhancing social and economic benefits for all people.

6.3 Objectives

- Conserving biodiversity to retain the conservation importance and value of the area.
- Maximizing long-term socio-economic benefits from the area over the long term.
- Improving research and monitoring
- Increasing public awareness of the conservation importance, economic value and management requirements of the area
- Promoting ecotourism

7.0 MANAGEMENT STRATEGIES AND ACTIONS

The following strategies are considered critical for MBCA to deal with and should form the basis of management actions to achieve the key management objectives. Stakeholders should be involved as much as possible and partners consulted, especially the community in the 19 villages for information and best practice sharing.

Strategy 1: Manage unsustainable practices by enforcing regulations

Unsustainable practices relating to fishing and tourism are harming the reefs, other marine habitats and dolphins in MBCA.

Actions

Strengthen capacity to undertake regular and targeted patrols with the view to eliminating illegal fishing activities. These patrols provide important opportunities for communication and engagement with fishers and discourage illegal activities by providing a physical presence. Issuing penalty infringement notices is also a deterrent to illegal activities.

Promote community reporting of suspected illegal fishing activities and continue to use information derived from fishery compliance risk assessments, reports and historical patrol activities to priorities, plan and target patrols, inspections and compliance operations to achieve a high level of compliance with the Fisheries Regulations.

Provide adequate resources to enable the implementation of the management plan.

Provide education and information to fishers and tourism operators on sustainable practices that maximize voluntary compliance. Voluntary compliance is best achieved with effective education programs that promote a sense of shared responsibility for maintaining healthy fisheries and tourism for future generations.

Encourage support for dolphin conservation and promote community development through distribution of educational information to tourists. The number of tourists visiting MBCA is increasing every year. However, there is currently very little information available to them regarding the status of the dolphins, threats to the dolphin population, research currently

underway or other important aspects of MBCA. It will be essential that information is made available to tourists visiting both Kizimkazi Dimbani and Kizimkazi Dimbani, preferably in exchange for an entrance fee. Educational materials would aim to: (a) provide relevant information on many aspects of the biology and ecology of the dolphins, (b) encourage tourists to pay an entrance fee to contribute towards community development and, (c) elicit local and international support for conservation activities.

Establish village-based dolphin committees, to help ensure community support for the designation and protection of dolphins. In order to initiate the process of developing any dedicated dolphin protection in MBCA, it will be essential that community committees are established where currently none exist. Discussions with these committees (and other members of the village), regarding the specifics of any potential protection (location and regulations) should be initiated as a matter of priority.

Strategy 2: Review existing regulations and enact new and relevant ones

There is a great need for effective mitigation measures to address disturbance and bycatch of marine mammals and sea turtles in gillnet fisheries.

Actions

Implement a scheme to protect marine mammals and other protected species by establishing monitoring of species taken as bycatch by stationing of observers on board approximately 5 percent of all fishing vessels.

Develop appropriate management and regulations for whale and dolphin watching ecotourism in collaboration with the tourism operators to ensure its sustainability. Once whale and dolphin watching regulations are established, enforcement of these regulations should be encouraged through regular monitoring. Involving tourism operators in establishing regulations encourage effective community participation, enforcement and patrolling.

Research and develop mitigation methods, including innovative ways of setting fishing gears. Development of mitigation measures should involve fishermen and include research on their socio-economic, biological and ecological impacts.

Encourage modification of gillnets by incorporating weak-links in the nets to prevent entanglement of humpback whales.

Promote whale watching during the winter months when humpback whales are in the coastal waters of Zanzibar, which could put an end to the entanglement problems in the area.

Strategy 3: Establish Sustainable Finance Mechanisms

Conservation financing mechanisms should be evaluated as part of a business plan that includes a sustainable financing strategy. The business plan should be based on an evaluation of the costs of operating MPAs or protecting marine resources. A range of potential customers willing to pay for goods and services can then be identified as potential financing sources for marine conservation. Business plans are being developed for single MPAs and for networks of MPAs.

Actions

Develop a comprehensive business plan to define the needs such as management, capacity building and research and monitoring programmes and potential financing sources for an MPA network under MCU in Zanzibar. The business plan should analyze the costs of administering existing and proposed marine conservation areas to estimate the total investment needed to effectively manage MPSAs in Zanzibar.

Improve revenue collection, allocate adequate funds into fisheries management and seek new sources of financing to support vital management activities.

Strategy 4: Market MBCA as a wilderness and nature based tourism destination

Actions

Develop and distribute promotional material for the MBCA to key tourism and information centres.

Develop a website

Lobby relevant agencies to ensure MBCA is featured in tourism marketing and included on tourism routes.

Erect appropriate road signage informing passing visitors and tourists of the existence of the MBCA.

Identify actual and possible resource-use conflicts in the area and develop a participatory zoning plan which will help mitigate conflicts and lead to sustainable resource use.

Strategy 5: Promote scientific research

Actions

Identify information gaps and develop research programmes aimed at gathering/consolidating data on biodiversity and exploited species.

Encourage research into the diversity and distribution of invertebrates within the marine conservation area.

Encourage further research on biology, distribution, abundance and behaviour of dolphins in the area.

The economic impacts of management measures should be fully investigated and analyzed to ensure a fair review process and the adoption and implementation of the improved management measures.

Engage local research institutes and universities to collaborate on priority research projects.

Solicit research funding support.

Strategy 6: Plan and implement an integrated program of survey and monitoring to increase knowledge of natural and cultural resources and visitor use

Actions

A systematic monitoring program needs to be established for the MBCA that evaluates fundamental resources, such as fish, dolphins, seagrass coral reef conditions, sea surface temperatures, etc, through space and time – providing the means to establish trends of resource quality (e.g., species populations, community structure, etc.).

Monitor marine flora and fauna to gain an understanding of factors which influence marine communities in the area.

Monitor recreation and commercial use to determine the impacts of human use on marine communities.

Strategy 7: Develop an effective education and awareness programme for the conservation area

Actions

Facilitate opportunities for local tourism operators to establish and manage visitor facilities which act as a focal point where visitors can go to learn more about the area, its conservation importance, the ecology of the area, the cultural and archaeology significance of the area, and the need for rationale behind existing management interventions.

Commission educational and informative material including signage, posters, pamphlets and relevant literature to be housed in the visitor centre and other appropriate localities that will enhance visitor experiences.

Providing education and information that maximises voluntary compliance.

Encourage field excursions to the area by local schools, community groups and other stakeholder groupings.

Actions

MBCA to address the lack of Integrated Coastal Zone Management

Suggested improvements from stakeholder input include insisting on a comprehensive Environmental Impact Assessment for any new developments within the MBCA. Educate the government through outreach and frequent consultations about the importance of the marine environment to the island and the impacts of development.

Support the pursuit of an ecosystem approach to ICZM

To work together with the DOE in implementing the ICZM strategies.

The cross-sectoral representative of central and local governments.

Support and establish a close working relationship with national and international conservation organizations.

Strategy 8: Reduce Pollution

Pollution on MBCA mainly comes from sewage, fuel, litter and garbage. These directly affect the health of the marine environment and humans using the marine environment. As Zanzibar depends on a perceptibly healthy and clean marine environment for attracting tourist activity pollution levels must be reduced.

Actions

Raise awareness

Continue with awareness programmes in schools and solid waste management programmes, working in partnership with other NGO's. Identify and target main sewage polluters (hotels, lodges, tour operators, island camping and boat operators) and oil polluters (e.g. barge in the port) with specific outreach materials. Approach religious groups and other civil society about making offerings and help reduce littering of the marine environment.

Establish Pollution Prevention Principles

Clearly define implications of PPP for potential polluters

Set enforcement methods

Establish enforcement procedures by working closely with government and law organizations

Seek for government support

Prepare pollution control proposal to the government seeking support for pollution reduction, emphasizing the importance of MBCA on the tourism industry.

Monitoring

Establish monitoring protocols with clearly defined goals and objectives to assess the impact of sewage, hydrocarbons and garbage.

At first sight the likely impact of climate change on the MBCA does not appear dramatic, but there could be significant changes to the character of the area. It will be necessary therefore to analyse the risks to the MBCA of climate change and to develop appropriate adaptation strategies to minimise its effects.

7.1 Management Program

Strategy	Actions	Performance indicator	Implementation	Time Frame	Estimated Budget (US\$)
Enforce regulations	Strengthen capacity to undertake regular and targeted patrols	<ul style="list-style-type: none"> • Staff and resources capacity strengthened • Regular patrols 	MBCA and key partners	2011-2015	400,000
	Promote community reporting of suspected illegal fishing activities	<ul style="list-style-type: none"> • Reporting of illegal fishing activities improved 	MBCA and community	2011	
	Provide adequate resources to enable the implementation of the management plan	<ul style="list-style-type: none"> • Performance evaluations 	MBCA and key partners	2011	
	Provide education and information to fishers and tourism operators on sustainable practices that maximize voluntary compliance	<ul style="list-style-type: none"> • Voluntary compliance improved 	MBCA and key partners	2011-2015	
	Encourage support for dolphin conservation and promote community development through distribution of educational information to tourists.	<ul style="list-style-type: none"> • Improvement in compliance 	MBCA and key partners	2011-2015	
	Establish village-based dolphin committees	<ul style="list-style-type: none"> • Village-based dolphin committees established 	MBCA and key partners	2011	
Review existing regulations and enact new and relevant ones	Implement a scheme to protect marine mammals and other protected species	<ul style="list-style-type: none"> • A scheme to protect marine mammals and other species implemented 	MCU and management team	2011	200,000
	Develop appropriate management and regulations for whale and dolphin watching ecotourism	<ul style="list-style-type: none"> • Regulations for whale and dolphin watching ecotourism developed 	MCU and management team	2011	
	Research and develop mitigation methods, including innovative ways	<ul style="list-style-type: none"> • Research project • Mitigation methods developed 	MCU and management team	2011-2012	

	of setting fishing gears				
	Promote whale watching during the winter months when humpback whales are in the coastal waters of Zanzibar	<ul style="list-style-type: none"> Whale watching established 	MCU and management team	2011-2012	
Establish Sustainable Finance Mechanisms	Develop a comprehensive business plan to define the needs and potential financing sources	<ul style="list-style-type: none"> A long-term financing plan developed 	MCU and management team and key partners	2011	
	Improve revenue collection, allocate adequate funds into fisheries management and seek new sources of financing to support vital management activities.	<ul style="list-style-type: none"> Funds secured 	MCU and management team	2011	
Market MBCA as a wilderness and nature based tourism destination	Develop and distribute promotional material for the MBCA to key tourism and information centres.	<ul style="list-style-type: none"> Promotional material is available 	MCU and key partners	2011-2015	500,000
	Develop a website	<ul style="list-style-type: none"> Website developed 	MCU	2011	
	Lobby relevant agencies to ensure MBCA is featured in tourism marketing and included on tourism routes	<ul style="list-style-type: none"> MBCA is featured in tourism marketing 	MCU and management team and key partners	2011-2015	
	Erect appropriate road signage informing passing visitors and tourists of the existence of the MBCA	<ul style="list-style-type: none"> Road signage erected 	MBCA	2011	
	Identify actual and possible resource-use conflicts in the area and develop a participatory zoning plan which will help mitigate conflicts	<ul style="list-style-type: none"> Resource-use conflicts resolved 	MBCA and key partners	2011-2015	

Promote scientific research	Identify information gaps and develop research programmes aimed at gathering data on biodiversity and exploited species	<ul style="list-style-type: none"> • Research projects • Scientific reports, papers and publications 	MCU and management team and key partners	2011-2015	600,000
	Encourage research into the diversity and distribution of invertebrates within the marine conservation area	<ul style="list-style-type: none"> • Research projects • Scientific reports, papers and publications 	MCU and management team and key partners	2011-2015	
	Encourage further research on biology, distribution, abundance and behaviour of dolphins in the area.	<ul style="list-style-type: none"> • Research projects • Scientific reports, papers and publications 	MCU and management team and key partners	2011-2015	
	Investigate and analyze the economic impacts of management measures to ensure a fair review process and the adoption and implementation	<ul style="list-style-type: none"> • Monitoring data and reports 	MCU and management team and key partners	2011-2015	
	Engage local research institutes and universities to collaborate on priority research projects.	<ul style="list-style-type: none"> • Research projects • Scientific reports, papers and publications 	MCU and management team and key partners	2011-2015	
	Solicit research funding support	<ul style="list-style-type: none"> • Funds secured 	MCU and management team and key partners	2011-2012	
Plan and implement an integrated program of survey and monitoring to increase knowledge of natural and cultural resources and visitor use	A systematic monitoring program needs to be established for the MBCA that evaluates fundamental resources	<ul style="list-style-type: none"> • Monitoring system established • Monitoring data and reports 	MCU and key partners	2011-2015	250,000
	Monitor marine flora and fauna to gain an understanding of factors which influence marine communities in the area.	<ul style="list-style-type: none"> • Monitoring data and reports 	MCU and key partners	2011-2015	
	Monitor recreation and commercial use to determine the impacts of human use on marine communities	<ul style="list-style-type: none"> • Monitoring data and reports 	MCU and key management issue	2011-2015	
Develop an effective	Facilitate opportunities for local tourism operators to establish and	<ul style="list-style-type: none"> • Visitor facilities open to 	MBCA and key	2011-2015	500,000

education and awareness programme for the conservation area	manage visitor facilities	public	management issue		
	Commission educational and informative material including signage, posters, pamphlets and relevant literature	• Posters, pamphlets, signage, literature	MCU and key management issue	2011-2015	
	Providing education and information that maximizes voluntary compliance	• Education and information provided	MCU and key management issue	2011-2015	
Reduce Pollution	Encourage field excursions to the area by local schools, community groups and other stakeholder groupings.	• Field excursions established	MCU and key management issue	2011-2015	
	Raise awareness	• Awareness raised	MCU and key management issue	2011-2015	300,000
	Establish Pollution Prevention Principles	• Pollution Prevention Principles established	MCU and key management issue	2011-2015	
	Set enforcement methods	• Enforcement methods set	MCU and key management issue	2011-2015	
	Establish monitoring protocols with clearly defined goals and objectives to assess the impact of pollution.	• Monitoring protocol established	MCU and key management issue	2011-2015	

8.0 ZONING SCHEME

8.1 Justification for Zoning Scheme

Zoning is the primarily management tool of multiple-use marine protected areas. Its aim is to harmonize otherwise conflicting conservation and livelihood objectives by spatially separating extractive resource use areas from sensitive habitats. In similar cases in order to avert conflicts in resource use as well as accommodate multiple uses, zoning schemes have been used. Zoning schemes divide the multiple-use areas into use-zones that have different levels of protection depending on their respective conservation and economic importance. Zoning provides all users with a greater amount of clarity and predictability. Beyond this, the regulations in zones permitting resources-use ensure that resources-use activities are productive and sustainable. Zoning schemes can however only be implemented through a full public consultative process.

8.2 Aim of MBCA Zoning Scheme

The aims of this zoning scheme are:

- To protect critical and species-rich habitats including sub-tidal areas, mangroves, forest, bird nesting, fish spawning, turtle-breeding grounds.
- To safeguard beliefs and customs of local residents by protecting the sacred sites.
- To protects the biodiversity and ensure aesthetical values of MBCA are maintained.
- To safeguard traditional/local community fishing grounds and provides a means for continued but controlled use.
- To provide a geographic basis against which to evaluate resource use and to monitor and review the effectiveness of the management plan.
- To provides a framework for surveillance and patrolling activities by focusing enforcement in zones with higher levels of protection.

8.3 Definition of Zone Types

There are four designated types of zones which have been developed for the management purposes within MBCA:

Sensitive Resource Conservation (Core) Zones, Specified use zone, General Use Zone and the Buffer Zone.

- Zones types were designated and mapped through a participatory zoning workshop and inputs from scientific assessments carried out in MBCA.
- The zones have been designated according to the preference by stakeholder and the need to maintain the ecological, cultural and social integrity of MBCA.
- Some Sensitive Resource Conservation Zones (core zones) are designated, where the impact on the local communities is limited but where the most critical habitats exist. Close monitoring will assess and document the impacts of the closure, including impacts on adjacent areas through the ‘spill over’ effect. Based on the results of this monitoring the boundaries and location of these zones will be modified, as appropriate.
- Sensitive Resource Conservation Zones have been designated to cover significant areas of coral reefs, sea grass beds and mangroves

8.4 Scheme of Designated Areas

8.4.1 Designated areas of high conservation needs within the MBCA

The following are the designated areas whose ecological status call for highest level of protection through elimination of all direct human activities deemed to cause adverse impacts, including complete closure of extractive resource-use.

“Area A”-Mwamba Mweupe:

This area is rich in nutrients that are brought in through inflows from the overlying terrestrial areas. It therefore becomes the source of such nutrients for the other areas on the western side of the MBCA. The area is also rich in biodiversity including planktonic organisms that are distributed to other areas through wave actions. It has a protection advantage, in that its increasing depths make it difficult for artisanal fishers to reach and operate there easily.

“Area B”- Area in the south of Tele Kubwa Reef:

Protection of this area will enhance regeneration of the severely destroyed coral reefs, eventually resulting in higher productivity and therefore advantageous to all villages in the Fumba Bay

Area C” –Unguja Ukuu mangrove area surrounding the river flowing into Kilindi wetland and the wetland itself:

This is a breeding, feeding and grow-out area for a variety of aquatic organisms. It is rich in nutrients and biodiversity and it plays a great role in ecosystem stabilization.

“Area D”-Coral reef area to the north of Pungume Island:

There has been a great destruction of coral reefs in this area and the only solution is to protect the area in order for the coral reefs to regenerate. On the other hand, a scientific investigation has found out that a small portion of the area has a rare species of *Foliose* which is not found anywhere else in the MBCA and this needs to totally be conserved.

No-take zones and buffer zones where limited fishing activity is allowed around the no-take zones should be established at:

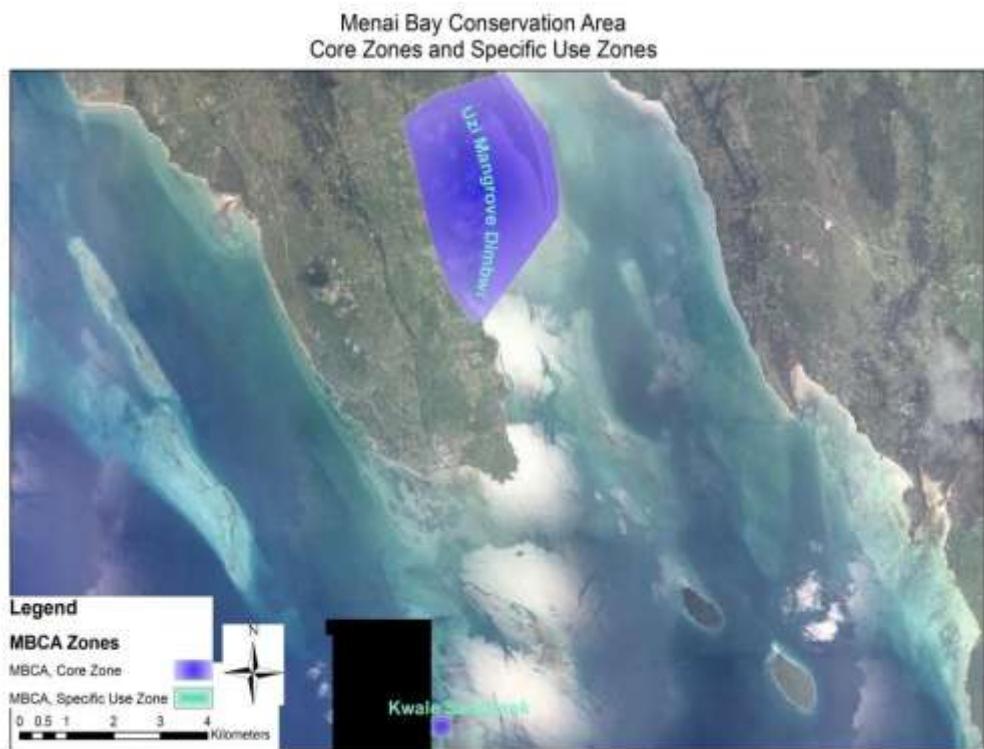
- **Kwale reefs:** where the intervention is urgently needed as the reefs are showing advance signs of stress and are in the verge of collapsing and
- **Kizimkazi Dimbani reef:** because it's high hard coral diversity can potentially become a seed for ensured regeneration of reefs in the surrounding areas and most possibly improve the resilience of MBCA coral system to phenomenon like climate change which is a major threat to coral reefs worldwide.

8.4.2 Areas designated as specified use zones

Bombweni

8.4.3 Areas designated as general use zones

Areas which are not in core and specific zones



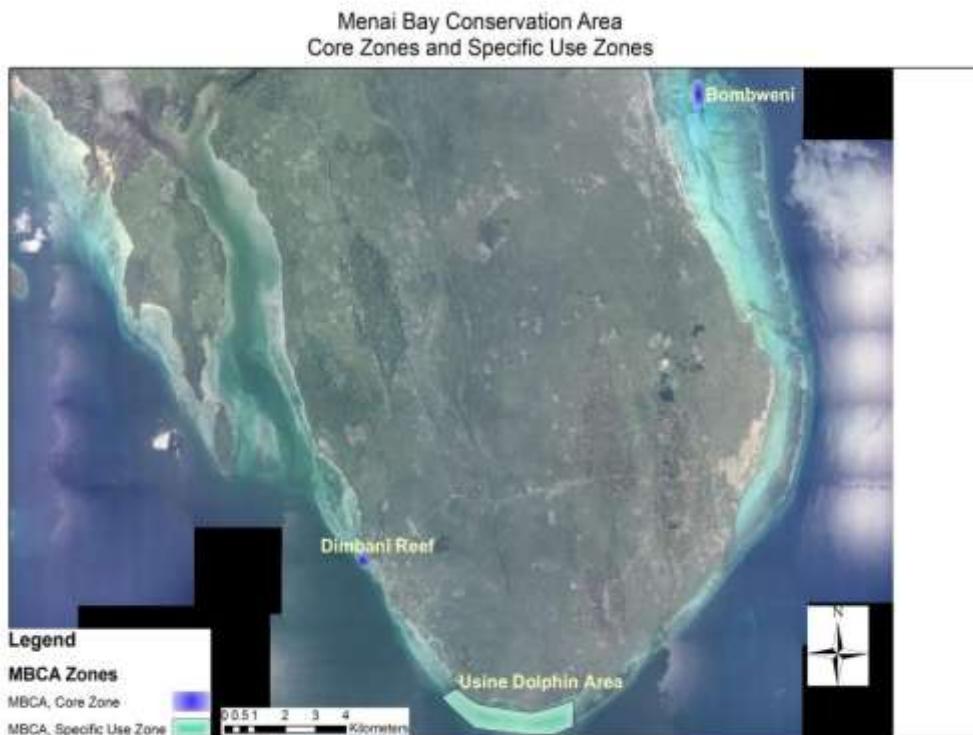


Figure 4. MBCA core and specific use zones

9.0 GOVERNANCE

9.1 Statutory and Policy Frameworks

Several government departments and agencies have statutory or management responsibilities in the MBCA. As a result of this sectoral management approach, there are different legislation and acts that influence coastal resource management in MBCA. A range of relevant legislation tools exist to support implementation of GMP. That is from National legislation to MBCA legislation through international treaties and conventions.

It is vital that all government departments, agencies and other statutory bodies should continue to recognise the need for special treatment where the MBCA is concerned, in respect of policy formulation and implementation, and future funding commitments and programmes of work.

9.2 Current Policies

Policy is important as it gives guidance from the Revolutionary Government of Zanzibar. If made public it also has legal consequences because it gives direction to everyone in the community. Current policies which are relevant for the implementation of MBCA GMP include the Fisheries Policy (2000), the National Forest Policy (2005), the Environment Policy (1992), and Tourism Policy (2004). These policies affect sectoral activities and

influence resource use in the conservation area. The new forestry, environment and fisheries policies allow for the effective participation of local communities.

The Fisheries Policy 2000 recognizes the need for better understanding of the current status of coastal and marine habitats and associated species, improved control of use of resources, and higher levels of awareness in coastal villages. It underscores the importance of involving communities in conservation and encourages the establishment of conservation areas.

The National Environmental Policy 1992 of Zanzibar acknowledges that “the coastal environment is an area of great ecological diversity and complexity, major economic importance and rapid development” and highlights the need for an integrated approach to management. The policy thus recommended that a programme for Integrated Coastal Area Management be developed.

The National Forest Policy 2005 was prepared to establish priorities for integrated management and conservation. The policy dealt with community-level planning and management, conservation and biodiversity of forest, mangrove and watershed habitats, forest products, and capacity building and financial policies.

The Tourism Policy 2004 sets the framework for tourism development in the archipelago and is conducive to community participation in the sector. In addition to the development of long-term programmes towards better and timely strategies for resources utilization and environmental protection, the policy mentions the creation of a zoning system to encourage the establishment of marine parks areas. The policy emphasizes sustainable projects, the enforcement of Environmental Impact Assessment (EIA) requirements for tourism developments, the use of technologies that impact less on the environment such as solar energy, and monitoring programmes to understand the impacts of tourism development.

Zanzibar takes special attention to its islets, with a view to avoiding any development that will impact on their biodiversity and often undisturbed nature. The Zanzibar Tourism Zoning Plan proposes that no further islets should be allocated to hotel developers.

The GMP must be implemented in compliance with these policies.

9.3 Legal

The Fisheries Act No. 8 of 1988 in particular provides the legal basis for the management of MBCA. The GMP will be implemented mainly in the overall context of legal frameworks for natural resource management. All national legislation that supports environmental conservation and sustainable use of the marine and coastal resources will be adapted and enforced. Some of these environment related legal frameworks that are of relevance to the GMP.

9.4 Investments

The Zanzibar Investment Promotion Act (1986) requires investors to minimize pollution ‘by providing acceptable sewage disposal arrangement and ensure that the chemical, biological substances and agents under their control are without risk to health. The

Zanzibar Nature Conservation Trust (ZNCT) supports the government in undertaking conservation activities through formal agreements.

9.5 Land use

The Land (Distribution) Decree (1966) makes any grant of land conditional upon good husbandry and soil conservation. · Land Alienation Decree (Cap. 94). · Town and Country Planning Decree (Cap. 85) require that town plans be adhered to; Prohibits construction close to the beaches since this can block access, spoil the scenery, and degrade the beach, cause problems of noise and destabilize the beach. Public Land Decree (Cap. 93) Removal of Natural Produce Rules deals with collection of stones, sand, gravel and rocks that require a permit. The National Land Use Plan was prepared in 1996 under the auspices of the now abolished Commission for Land and Environment (COLE). The purpose of the Plan was to be used as guidance but its status is uncertain and its content outdated. Land use planning that ensures the protection of the west coast's biodiversity and sustains the coastal population calls for a Strategic Environmental Assessment (SEA) of the area.

9.6 Natural Resources

Forest Reserve Decree (Cap. 120) and woodcutting Decree (Cap. 121) are for the establishment of forest reserves, protection and management of forest and bush.

Wild Animals Protection Decree (Cap. 128) deals with protection of wildlife species of Zanzibar (the green turtle and marine mammals). The Wild Birds Protection Decree (Cap. 129) prohibits hunting and trade of many bird species throughout the year, but allows hunting from 1st October to 31st March. The Fisheries Legislation (Revised 1988) deals with marine Conservation Areas, sanctuaries, and controlled areas which may be created by order, pollution prevention, prevention on dynamiting, control on spear fishing and beach seining, sea life including corals, shells, trade and export.

9.7 Environment

In the case of the development of new area, this need for integrated management of natural resources stated in the Environmental Act of 1996 once again underscores the need for an overdue SEA. The Act provides a legal basis for the establishment of ICM in Zanzibar. Another issue listed was the need to “developing environmentally sensitive area; including forests, mangroves and small islets and water catchments” requires a Scoping Study to assess environmental impacts. The Act aims to guarantee “uses of renewable resources in the public domain which are indispensable to meet basic daily living needs of individuals, families and communities and are compatible with the Act’s principles of sustainable development.”

9.8 Relationship to other Management Plans

There is a number of other management plans exist which relate in part to the MBCA. For example, the Mangrove Management Plan which relates to the management of mangroves close to the MBCA. Management Plan for Sustainable Coastal Livelihoods at Jambiani which relates to the management of beach erosion. It is important that these plans take account of each other as far as practicable and that major policies in all these plans do not act against each other.

9.9 Vision, Strategies and Programmes

The Vision 2020 is a national development tool to be used in planning for the development of the quality of village life. The document describes the country's main socio-political and economic objectives and strategies for a period of 20 years. The Government of Zanzibar launched in 2002 Zanzibar's Poverty Reduction Plan (ZPRP), which is the first step on the road to implementing the Zanzibar Vision 2020. The Poverty Eradication Programme is a five years action plan, The five action priorities are: community-based projects, improvement of health services for "poor", better education facilities for all, improved agricultural productivity and better use of natural resources, and public service reform and capacity building.

According to the Zanzibar Biodiversity Strategy for the fisheries sector, "the overall objective of aquatic biodiversity in Zanzibar, as perceived by the Sub-Commission of Fisheries, is to stop further damage on biodiversity and improve it to sustainable levels". This overall objective shall be achieved in two ways: a) total protection of rare and endangered species (e.g. turtles and coconut crabs) and habitats facing irreversible destruction; and b) rational and sustainable exploitation of the biodiversity resources. The Zanzibar Biodiversity Strategy defines the strategy and action plan for the tourism sector. Other guidelines for the tourism sector exist, such as the Guidelines to Investors, which do not address sufficiently environmental concerns, and the Guidelines for the Preparation of Preliminary Environmental Reports for Hotel Projects. Nevertheless, there is a need for a SEA as well as a Tourism Plan and guidelines to be conducted in the target area.

In 2003 the National Integrated Coastal Management (ICM) Strategy was published to provide a framework and process for linking different sectors and balancing their decisions about conservation and use of coastal resources. Some of the means to achieve this balance include local level integrated planning and management and stakeholder involvement in the coastal development process and policies.

One of the most important achievements in efforts to conserve turtles in Zanzibar was the establishment of the Zanzibar Sea Turtle Conservation Committee in February 2002 as a recommendation of the Sea Turtle recovery plan for Zanzibar.

9.10 International Treats

Table 7. International treaties and conventions relevant to MBCA

CITES	Convention Of International Trade In Endangered Species 1975 [Ratified 1979]
CBD	Convention On Biological Diversity 1992 [Ratified 1995]
CMS/Bonn	On The Conservation Of Migratory Species Of Wild Animals
Ramsar	Convention On Wetlands of International importance 1971 [Ratified 2000]
MarPol	International Convention For The Prevention Of Pollution From Ships
Nairobi Convention	UNEP Convention for the Protection, Management and development of the marine and coastal environment of Eastern African Region 1985
UNCLOS	United Nations Law of the Sea Convention 1982 [Ratified 1985]

The GMP programmes are implemented in compliance with the vision, strategies and programme of the government and international treats.

9.11 Institutional Framework

Zanzibar is part of the United Republic of Tanzania. The union creates a unique political situation, since Zanzibar under the Union Constitution retains a wide range of autonomy in most areas of government and its economy. The Revolutionary Government of Zanzibar deals with matters concerning Zanzibar, whereas the Union Government deals with those in respect to the Tanzania Mainland. The Constitution governing the Union designates only 22 subject areas, including the following: Research, Meteorology, Harbours, Management of the Exclusive Economic Zone, and Mineral Oil Resources. Authority over territorial waters and matters of natural resource management are within Zanzibar's exclusive jurisdiction. Zanzibar Islands have five administrative regions: Urban West, Zanzibar North, Zanzibar South, Pemba North, and Pemba South. The regions are sub-divided into districts, constituencies, wards and "Shehias". As such the administrative structure of government is well established up to the local level. There are many national ministries that are mandated to manage some components of marine and coastal resources and the environmental issues. The main ones are:

Ministry of Agriculture, Livestock and Environment

Department of Environment .

Department of Fisheries .

Ministry responsible for Transport .

Ministry of State for Regional Administration

9.12 Management Framework

A management framework can be considered an operational tool to guide stakeholders in managing the various activities permitted within the MPA. The management framework also provides guidance on management actions that will likely be necessary to ensure the objectives of the MBCA are being met. The management and operational framework for the MBCA is set out in accordance with fisheries Act No 8 of 1988, Orders made under sections 7 (1) and 32 of 2002. The management committee is the organ responsible for the management of the conservation area, receiving advice from the Advisory Committee on the management issues. Day to day management and operations of the MBCA are in the domain of the Manager supported by delegated professionals and support staff in the field.

The management of the MBCA operates at the levels of the village, district and country. In each of the 20 villages covered by the conservation area there is a Village Conservation Committee (VCC) (which has been replaced by the Fisheries Coordination Committee, FCC) that works in cooperation with the Shehas and a fisheries officer based

in the village. The VCCs's role includes articulating the views and concerns of the villages to the staff and the management and steering committees, and their aim is to ensure full village participation in the MBCA activities. The District Conservation Committees (DCCs), in turn, articulate the views of the VCCs to District authorities and the Standing Committee.

9.13 MBCA Human Resources

In accordance to the Order of 2002, the management committee has the mandate to employ any person or find an agent as executants or perform any of its responsibilities, however the overall staffing for the MBCA will evolve on a need basis depending on available financial resources. Staff job description and responsibilities will be defined, and ongoing training undertaken as relevant. In the meantime a team of around 3 staff seconded from the DFMR is responsible for daily management of the area with 14 other staff who are permanent employed as patrol officers and other duties based in the area for patrolling, recording and educational activities. 18 staffs are on contract which mainly involves people from the communities within the conservation area. 3 staff has already gone for further training supported by MACEMP.

9.14 MBCA Physical Resources

MBCA has 2 motor vehicle, 10 motorcycle and 3 boats. There are also radio communication equipment installed in each village to communicate among themselves and with head office and GPS equipment are also available. There are four small offices in Kizimkazi (2), Kikungwi (1) and Fumba (1). The Kzimikazi office is built by MACEMP and will function as a central office of MBCA where the management will be based to implement daily activities. Diving equipments, computers, photocopiers and printers are provided by MACEMP.

9.15 MBCA Financial Resources

The main sources of funding for MBCA are from government, international donor agencies, and visitor entrance fees. The government financial support covers some of the salaries and most of the office costs. All the financial resources for the activities at the moment are supported by World Bank through the MACEMP. Before MACEMP the funding of MBCA was provided by WWF.

The current tourists' daily entrance fee that includes sunbathing, dolphin watch watching, diving and snorkeling is US\$ 3 for international visitors and Tshs 1000 for residents. Researchers are required to pay US\$ 100 per duration of the research and filming activities.

All revenues collected from MBCA are retained by the Department of Fisheries and Marine Resources and divided into two parts. Seventy percent is for the management purposes and 30% is for the community development activities..

What are the future options? As the GMP 2005 report puts MBCA will still be dependent on donor support for some time, given the lack of sustainable independent funding sources available to it within-country. An urgent priority is to develop a strategy for achieving financial sustainability. Although revenue from entrance fees shall grow and looks promising for MBCA, it is unlikely that tourist visits will be able alone to finance operating costs on a permanent basis.

10.0 INTERNAL RESOURCES

10.1 Financial Management Strategy

The principle of sustainability, as applied to the use of conserved natural resources, should ideally extend to the financing of the area itself. The financing plan will be designed to fund long term operating costs, from the collection of permits, conservation area entrance and user fees.

10.2 Collection of User Fees

Visitor's entrance fees is paid by tour operators, and hoteliers, that bring their visitors to the conservation area, by purchasing tickets or vouchers from the MBCA office in town on respective offices in the village. MBCA management also collect camping fees from artisanal fishers.

10.3 The Permit System

10.3.1 Local resident fishing licenses

Issued to all Zanzibar fishermen, for their every day fishing activities

10.3.2 Game/sport fishing licenses

Issued to all game fishing boats the entering the conservation area for recreational purposes, and can have a validity of two weeks, one month or one year to carry out sport fishing activities. These conditions apply to both locals and non local residents.

Issuing Authority

The issuing authority for licenses in all the fishing activities will be in accordance to the Fisheries Act No. 8 of 1988 is the Director of the Department of fisheries and Marine Resources Zanzibar.

10.3.3 Water sport licenses/tickets

Issued to any person entering the conservation area for recreational purposes, like snorkeling, diving, swimming and others

10.3.4 Filming licenses

Issued to any person(s) entering MBCA for purpose of undertaking filming activities; and the license is divided into three categories, the Tanzania's, Non Tanzanian and group of people filming together.

10.3.5 Study tour/research license

Issued to any person(s) under entering MBCA for purpose of taking study tour or research activities. It is divided into three categories, the Tanzanian, the non Tanzanian and group of people under taking the study tour/research together.

10.3.6 Accounts system

All revenues accruing from the conservation area will be held in the conservation area account. The terms and condition for the use of fund will be in accordance to the MBCA order. The most important elements in achieving the required controls are detailed budgeting, clear account procedures and transparent reporting. The manager in collaboration with the MCU will be responsible to prepare a forecast of revenue for the conservation area, based on discussions with tour operators, hoteliers and commercial marine users, and plan the operating cost accordingly. The budget will then be submitted to the Advisory Committee for comments, and then to the Management Committee for approval. Disbursement of funds from the MBCA development fund will be the responsibility of the manager upon approval by the Management Committee subject to control procedures. Such procedures will be detailed by the Management Committee on advice of the Advisory Committee.

10.3.7 Distribution of net revenue

The money collected will be used for the management of MBCA including costs for Advisory and Management Committee meetings, patrols and administration activities, and by various development activities within the community, and shall be disbursed in the manner approved by the Management Committee. A share of the fund will be used for the benefit of the MBCA surrounding villages involved in the conservation of the area. It is proposed that the collected revenue from visitor entrance fees to be distributed among the following groups: fishermen groups, tourism operators and community development projects, percentage of which to be negotiated.

10.4 Communication and Information Sharing

Appropriate information dissemination techniques and consultations will be adopted to sensitize stakeholders to regulations and ensure that all groups have proper opportunities to give feedback on issues of concern to them. In the longer term, conservation objects will be best achieved through education and awareness creation among local and business communities, as well as tourists.

Ongoing interactions with local communities will primarily be undertaken by MBCA staff in conjunction with village environmental and fishing committees. An environmental education and awareness-raising Programme will be developed in association with schools and other community groups. A priority will be to establish mutually agreed policy frame work with tourism and other commercial investors, through participatory development of relevant policy planning documents.

The MBCA management through its information center will provide both official and informal visitors with reader friendly information about the conservation area and inform them about MBCA policies, regulations and ongoing activities. Use of newsletter, public sign, audio visual material and other appropriate media will be considered as appropriate

10.5 Compliance and Monitoring

10.5.1 Compliance and enforcement

Implementation of the management strategies as outlined in this plan will be effective to curb illegal activities in the MBCA only when law enforcement team are highly visible on site. This will require a carefully developed compliance and enforcement plan. The plan will be prepared in consultation with relevant law enforcement agencies such as KMKM, marine Police, fisheries patrol team and community. The primary goals of this strategy are to encourage a high level of public awareness and support the values of MBCA, maximize compliance with relevant parts of the Fisheries Act, regulations and orders and management plans, and enforce the legislation transparently, lawfully, equitable and fairly. These goals will be reflected in the compliance and enforcement plan for MBCA.

Other important elements of the compliance and enforcement plan will be to continue to facilitate an on-site management presence in all parts of the conservation area throughout the year including regular patrols both land and sea, and to develop surveillance, compliance and enforcement services through a cooperative arrangement with agencies including KMKM, Marine Police, Navy and Fisheries Patrol team.

Another element of compliance and enforcement plan will be the production and distribution of educational materials to inform stakeholders of the purposes of MBCA, details of restrictions and to raise awareness on the conservation values of the MBCA.

10.5.2 Performance assessment (evaluation)

Performance assessment program for MBCA will be developed in collaboration with the scientific community, local communities, private operators and government institutions. The primary purpose of the performance assessment program is to identify whether management is effective. Performance assessment also provides a means of identifying where management can be improved and also provides a basis for re-evaluating the MPA's strategic objectives, management goals and strategies, and the effectiveness of compliance and enforcement. The program will be applied through the identification of applicable environmental indicators, which are derived from the legislative framework,

IUCN Management guidelines, strategic objectives and goals, and an analysis of the Biodiversity and the potential pressure on the major values of the Conservation Area. The indicators will measure the state (or condition of the environment), pressure (threats and impacts) and response (reaction to pressure) of the environment. Indicators will be monitored over short and long timeframes (temporal variability) and over a number of sites (spatial variability). They are developed to track changes in important elements or dynamics in the MPAs and surrounding environments and the impacts of human activities.

Baseline surveys are a necessary first step in performance assessment providing a benchmark for monitoring, and building upon the existing data. A monitoring program using the environmental indicators to document and evaluate biodiversity condition and trends over time, will be established and will build upon the baseline data.

The performance assessment framework and performance reports will be produced in consultation with relevant stakeholders.

Key elements of the performance assessment for MBCA will be:

- water quality monitoring, this will include water quality measures (turbidity, chlorophyll and nutrients) and pollution (oil)
- monitoring of key species targeted by artisanal fisheries i.e. snappers for reef fishery etc.
- monitoring the impact of human visitation, specifically relating to critical habitats and mooring and anchoring of vessels
- marine and terrestrial introduced species, specifically their means of introduction and impact on natural values
- process indicators which will focus on the success of the management plan and the implementation of management strategies.

As mentioned above this work involve liaison with relevant research institution and individuals.

10.5.3 Reviewing the GMP

The management plan for MBCA will operate for five years unless revoked or amended sooner by another management plan for MBCA. The GMP will be reviewed approximately two years before the expiry.

Results from the performance assessment program will be used to undertake the review of the plan. The result of the review will be used in the development of the next general management plan for MBCA.

11.0 MANAGEMENT GUIDE

11.1 Conflict Resolution

User conflicts over the same area among different groups have been common. Resource conflicts have also contributed to over utilization of resources. Strategies to ease these conflicts have been put in place and if well implemented, the situation may be contained.

11.2 Activities prohibited in all zones

In order to conserve and protect the habitat and marine resources of the MBCA, specific activities will be prohibited. Outlines below are activities that are prohibited within the MBCA as a whole or those are restricted within particular zone types. Following implementation of this management plan, regulations will be drawn up in line with this plan and legislated by the order under the Fisheries Act, 1988 and its subsequent amendments. All activities prohibited under the existing national legislation shall be prohibited in all zones within the conservation area boundaries. In addition, the following activities are prohibited:

11.2.1 Prohibited extraction of living resources

- Use of beach seine nets”
- Any activity involving mechanical damage to, or breakage of, coral and other benthic habitats or organisms, whether by hand or by use of poles or other implements
- Killing of turtles, whether accidental or deliberate, including removal of turtle eggs
- Killing of dolphin and purpose, whether accidental or deliberate
- Trawling
- Use of propelled spear-guns and harpoons
- Use of dynamite
- Use of chemicals and poisons for fishing
- Use of SCUBA gear to collect any marine organism, other than for research purposes and subject to prior authorization
- Mangrove cutting for commercial sale
- Mining of live coral from inter-tidal and sub-tidal areas
- Using of monofilament or likembe
- In addition, the use of pull nets with stretched-mesh size of less than 2.5 inches, mosquito nets – including clothes (tandilo) a – will be phased out within the boundaries of the Conservation Area

11.2.2 Prohibited extraction of non-living resources

- Mining of dead coral from inter-tidal and sub-tidal areas
- Sand mining from beaches and sub-tidal areas
- Any form of seabed mining
- Hydrocarbon exploration and drilling (other than the existing gas well, where exploitation will be subject to review by the Manager and other relevant authorities)
- Production of salt by heating sea water using fuel wood or other hydrocarbons

11.2.3 Prohibited construction and development

- Port development and/or dredging (marina development and permanent docking facilities – including wood jetties - will require submission of an EIA and prior approval of the Manager)

11.2.4 Prohibited tourism activities

- Jet skis
- Landing of amphibious plane
- Sport fishing
- Sale and buying of marine curios in the reserves
- Over speeding of boats

11.2.5 Introduction of alien species of plants and animals

- Alien species of flora and fauna are prohibited in the MBCA

11.2.6 Prohibited marine transportation and shipping activities

- Shipping activities
- Speeding of commercial marine vessels

11.3 Guide to regulated activities

11.3.1 Fishing activities

- All fishing will be prohibited in the core zones
- All fishing in the Specified Use zones will be restricted to artisanal fishers who are resident in the MBCA
- All artisanal fishers in the conservation area will be issued a fishing license and will provide all required information on the type of vessel/gear they use
- Lobster and octopus fisheries may be subject to minimum catch weight limits
- Destructive and illegal gears will be phased out with due compensation
- Sport fishing will be restricted to designated areas within the Marine Park
- Sport fishing will be subject to prior issuance of sports fishing license and payment of the appropriate fees
- Sport fishers may be bound by minimum and maximum size restrictions. Furthermore, the fishing of some species, to be determined by the Manager may be restricted to catch and release only
- Sport fishers will show permits and provide catch information to any duly authorized MBCA staff.
- Furthermore, and, as deemed necessary by the Warden and subject to scientific justification, a Marine Conservation observer may be posted on sport fishing vessels, at the sport fisher's expense.

11.3.2 Mud brick making and coral mining

- Mud brick making will be restricted to MBCA residents who will have to obtain a permit to do so.
- Sea Coral Mining will be prohibited save for occasions when it will be absolutely necessary and at the request of the village government, and for non commercial purpose the Manager will give a permission to do so.
- Land Based Fossil Mining will be permitted on special designated site.

11.3.3 Mangrove harvesting

- Harvesting of mangrove products, especially tree cutting, will be strictly regulated under a permit system.
- In addition, the following will apply:
 - Mangrove harvesting will be strictly prohibited in all core zones
 - Mangrove harvesting for charcoal and firewood for kilns will be forbidden
 - Mangrove harvesting will be restricted to MBCA residents who have obtained a permit to do so.
- Harvesting mangroves for commercial purposes within the MBCA boundaries is prohibited.
- Non-residents caught harvesting mangroves within MBCA boundaries will be prosecuted to the full extent of the law.
- Even when a permit has been granted, clear felling of mangroves should be limited.
- Further regulation may establish limits on the species of mangroves that may be harvested.
- Permit issuance may be subject to a limited number of mangroves to be cut and may require the applicant to plant seedlings.
- Prior to harvesting, a cutting site may be specifically approved by the Manager or one of his/her representatives.

11.3.4 Non-mangrove forest products

- Harvesting of non-mangrove products will be subject to a permit system.
- Pole cutting will be strictly prohibited in all core zones
- Pole cutting will be restricted to MBCA residents who have obtained a permit to do so. The number of permits issued will be limited. Even where a permit has been issued, the cutting of poles may be subject to replanting alternatives as a condition of cutting natural trees
- Burning of any forest products is illegal in the MBCA area

11.3.5 Salt making

- Commercial salt making will require a permit and subject to the EIA clearance.

11.3.6 Construction

- Construction for residential purpose or at small scale will be permitted in the general use and specified use zone.

- Large scale Commercial construction will be permitted after satisfying EIA requirement

11.3.7 Scientific research

- All scientific research within the MBCA boundaries will be subject to prior issuance of a scientific permit by the Manager, at his/her discretion but subject to scientific justification
- A scientific permit allows for the limited collection of specimens for scientific reasons, but not for bio-prospecting purposes
- A differential fees system will be applied to Tanzanians and non-nationals, though the fees may be waived if the Manager deems the planned research to be in the interest of the MBCA
- All the results from scientific research carried out in the area will be forwarded to MBCA in the most useful format (and in GIS format wherever possible)
- Any publications based on scientific research carried out in the Menai Bay should be forwarded to MBCA as soon as they become available
- Failure to abide by these requirements may result in a ban on further scientific research within the MBCA for the individuals/institutions involved

12.0 RECOMMENDATIONS

The following recommendations provide an outline of the extra issues needing to be addressed in the longer term. These should be dealt with as and when the opportunity arises.

Detailed Zoning Plan

A revision of the initial zoning plan has been done during the development of the GMP. The shoreward and seaward boundaries of the marine Conservation Area however; should be explicitly defined in consideration with existing policies and legislation (especially the Land and Forest Policies). A system should be developed based on GIS which is linked to a website for easily access to and interaction with by stakeholders.

Information Gaps

The following sources of information have been identified as useful for protected areas by Kenchington, R. A. 1990. (*Managing Marine Environments*; published by Taylor and Francis, New York). The development of those that are not available to the marine Conservation Area management would increase the management capacity of the institution. This should be done as soon as and when the opportunity arises.

Information Source	Comments
Geological maps pending	GIS topography map and map of MBCA
Maps of currents	No updated information available
Bathymetric	No updated information
Tide tables	No updated information available
Baseline habitat maps	Only for terrestrial vegetation through the Forestry Division
Community descriptions village Species list	Environmental Management plan for each
Status of commercial important species	No information
Endangered, threatened, endemic species status	No Information
Aerial photographs	No updated info
Hydrological survey	Not done
Land use plans	Not yet developed
Topographical maps	Available
Economic valuation	Not done
Cultural valuation	Not done
Traditional user	Known
Current use/usage levels	Not done

Monitoring and Review

A strategic programme for monitoring the health of natural resources in the MBCA is needed. Any historical monitoring data should be summarized and used to form a comprehensive monitoring plan. Fish stock monitoring can be established with the

fishermen. Partnerships with national and international academic institutions should be sought to increase the amount of research available to MBCA management. Success Projects to ensure MBCA management activities are also monitored for success. Extensive usage statistics should also be sought for hotels, tourists, cruise ships, divers and the other key users. For divers, this information should be captured from the sale of dive tags. To record the numbers of divers visiting the various dive sites should be a legal requirement in the MBCA for operators to fulfill.

Update Website

A Website should be developed and be updated on monthly basis for conservation and marketing purpose. There are a number of reasons why an effective website is beneficial. Generally, the population on the Internet is well-educated and affluent. Most own a computer; others have access to one. Internet users and are interested in convenience. Many prefer the ease of finding information directly from their computer screens. This includes researchers, holidaymakers, local people, government and a range of other MBCA stakeholders.

Frequent stakeholder consultations and Information dissemination

Stakeholders should be consulted on a regular basis and in a structured fashion to increase the feedback that the MBCA receives. Bi-monthly meetings at a set location with all stakeholders who wish to take part are one option. Such meetings should be used to identify key issues and as a marketing and update platform.

Boundary Description

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