

# Pemba Channel Conservation Area (PECCA)



## Draft General Management Plan

Revised October 2010



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## ACRONYMS

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



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This plan could not have been completed without the close cooperation and enthusiastic support and inputs of a number of individuals and organizations. These include the stakeholders of PECCA who actively participated in the several meetings and consultations, and contributed tangibly. They all are commended for the great work.

## EXECUTIVE SUMMARY

Pemba Channel Conservation Area (PECCA) (which derive its name from Pemba Channel) lies between the latitudes 04° 54'S and 05° 26'S, and is bisected by the longitude 30° 45'E. The area is located on the western seaboard of the Pemba Island straddling the entire coast line from the southern tip to the northern one. PECCA was declared a Conservation Area on September 23rd 2005, through the declaration order under the Fisheries Act of 1988. It stretches from the south of Pemba Island at the southern tip of Ngazi Islet with a two-mile width band stretching along the rest of the western coast of Pemba Island to its northern tip at Ras Kigomasha covering an area of 42 nautical miles. On the western side of PECCA is a deep Pemba channel which drops sharply to a depth below 1000m separating Pemba Island from the mainland Tanzania.

The declaration of PECCA is provided for under section 7(1) of the Fisheries Act No. 8 of 1988. As of 23rd September 2005, the marine waters of Pemba Channel became part of the Pemba Channel Conservation Area (PECCA). PECCA was established under the Pemba Channel Marine Conservation Area Order which was published in the Government Gazette as the legal supplement (Part II, Vol. CXIV No. 6111). PECCA is administered and managed by the Department of Fisheries and Marine Resources Zanzibar within the Ministry of Agriculture, Livestock, and Environment.

PECCA comprises all marine waters off the west coast of Pemba starting from the beach of Kangani (5°25.8'S; 39°40.4'E) in the south to the beach of Kigomasha (4°53.7'S; 39°42.0'E) in the north. The Misali Conservation Area Order has thus been repealed. The order prohibits the use of certain destructive fishing gear and methods such as beach seine, spear fishing, explosives, poison, dragged nets (*kigumi*), etc and provide for a system of permits and fees for the use of the area by non-residents. All terrestrial areas within the overall boundaries of PECCA are excluded, but the terrestrial part of Misali Island remains protected under the Misali Forest Order.

Although no information is available specifically for PECCA, it is likely that it has mean monthly maximum temperatures of about 28-32°C and mean monthly minimum temperatures of about 18-22°C (UNEP, 2001). Terrestrial temperature varies between 21 and 34°C (Beentje, 1990). Mean rainfall is c. 1860 mm per annum, which falls mostly between March and May ('long rains') and November and December ('short rains'). The rainy seasons starts in March or April and lasts in May. June to October is the dry season and temperatures are clement. There are short rains which take place in November and December and at times in January and the rest of the year is dry spell. As there are no river flowing into the sea, the runoff from the nearby agricultural farms and commercial establishments drains into the bay bringing in sediments, silt, nutrients and even pollutants and other runoff from terrestrial as they discharge freshwater.

Pemba Island is divided into political 2 regions namely northern and southern regions; 4 districts namely Micheweni, Wete, Chake Chake and Mkoani, 72? *shehias* and over 360 villages. According to the 2002 population census, Pemba Island had a population of 362,166 inhabitants, which represented 37% of Zanzibar population of 984,625 people. Forty five percent of the population in Zanzibar lives on the coast and a total of 146,955 people live in the *Shehias*. This figure represents almost half of Pemba Island population, even though only a part of it lives in the proposed PECCA (whereas the other part lives more inland, thus outside the

proposed boundaries). . Resource-use in the conservation area include fishing, collection of sea cucumber and mollusks, aquaculture (seaweed farming and mollusk culture), agriculture, harvesting of mangrove and forest products, lime making, beekeeping, small business and tourism operations.

Most communities depend heavily on the coastal and marine resources for their livelihoods. The coastal population exploits living marine resources including fish and mollusks, as well as the mangrove stands in the transition zone. These resources are not only used by the west coast population but also by fishers from the east coast, where the deep waters are difficult to negotiate with traditional fishing vessels. Fishers from Unguja and as far as mainland Tanzania also come to fish in the Pemba Channel and to cut mangroves on the west coast. Unfortunately, the insufficient control of fishers, fishing methods and catch are increasingly impacting on the marine resources and signs of destruction and overexploitation can already be seen. Enforcement of the prohibition to fish in the non-extractive zone as well of control of fishing activity and regulation of gear used in the extractive zone are insufficient. Nevertheless, Misali Island has clearly served to increase the fishers' awareness of the importance to preserve Pemba's high diversity of fish.

This is the first management plan for the PECCA. 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 PECCA. Management planning and a clear strategy for management is a prerequisite if PECCA is going to begin monitoring its own effectiveness. This document has been prepared in close consultation with the management of PECCA and a considerable number of stakeholders and stakeholder group representatives. The plan specifies management goals and strategies for the PECCA related to the conservation's mission and goals. It also identifies the major existing and potential threats and issues facing the conservation area from ecological, social and cultural perspectives. It is also designed to provide a framework for interactive management.

## **Table 1. How to use the PECCA 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 PECCA is presented in section one of the general management plan. 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 PECCA 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 PECCA. 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 PECCA.*

*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 PECCA 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 PECCA 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**

Pemba Channel Conservation Area (PECCA) is located on the western seaboard of the Pemba Island straddling the entire coastline from the southern tip to the northern one. It stretches from the south of Pemba Island at the southern tip of Ngazi Islet with a two-mile width band stretching along the rest of the western coast of Pemba Island to its northern tip at Ras Kigomasha covering a distance of 42 nautical miles. The coastline is uniquely heavily indented with countless large and small bays, and a braided network of deep channels separated by shallow sandbanks, peninsulas and archipelagos of islets of different shapes, sizes and geology. Fringing the coastline is a healthy stand of mangrove forest. On the western side of PECCA is a deep Pemba channel which drops sharply to a depth below 1000m separating Pemba Island from the mainland Tanzania. Pemba is surrounded by deep waters and is a true oceanic Island. PECCA (which derive its name from Pemba Channel) lies between the latitudes 04° 54'S and 05° 26'S, and is bisected by the longitude 30° 45'E. It was declared a Conservation Area on September 23rd 2005, through the declaration order under the Fisheries Act of 1988.

PECCA boundaries which starts at the Highest Tidal Water Mark comprises all marine waters off the west coast of Pemba starting from the beach of Kangani (5°25.8'S; 39°40.4'E) in the south to the beach of Kigomasha (4°53.7'S; 39°42.0'E) in the north to include the waters around all small islands including Misali Island which was a marine conservation area since 1993. The Misali Island Conservation Area Order was repealed. The order excluded all terrestrial areas within the overall boundaries of PECCA but Misali Island remained protected under the Misali Forest Order.

The islets in PECCA include Misali Island. North of Misali there is a unique group of islets (Vikunguni, Kashani, Mapanya, Kokota, Funzi, Pembe and Uvinje) where there are also fish landing sites and seasonal camping. Fundo and Njao are two long islets along the northwest coast of Pemba where there are settlements and fishing and agricultural activities. On the south-western corner of Pemba, the inhabited Makoongwe islet lies next to the Kwata, an islet consisting of leached and weather coral outcrops that is seldom used by humans but is a significant breeding site for birds. The Matumbini reef complex includes several islets including Panza, Ngazi, Jombe and Muinzi that are not inhabited, though there are seasonal fishers camping sites. Most of these Islands are protected by fringing coral reefs and are covered mostly by coral rag bush and surrounded by extensive seagrass beds. The boundaries of PECCA are defined in the proclamation order of the Conservation. On the northwest, PECCA is bordered by Ngezi-Vumawimbi Nature Forest Reserve at Mkia wa Ng'ombe and Bandari kuu shehia .



Figure 1. Map of Pemba Island showing location of Pemba Channel Conservation Area

## **1.2 History of PECCA**

The whole of Pemba Island can be considered of high regional and global significance because there are only a few islands in the WIO that equal Pemba's diverse and ecologically sound marine environment. Although Pemba natural resources seem to be in a relatively healthy state, from view point of general observation, there are however clear signs that they require adequate conservation and management initiatives, particularly to protect the valuable marine biodiversity so that they can continue to provide sustainable yields of marine protein-rich food and cash earning to the local population as well as contributing to the much needed foreign exchange to the national economy. The west coast of the island undoubtedly plays the major role in generating and maintaining the region's high marine biodiversity and justifiably, a conservation area that is now known as the Pemba Channel Conservation Area (PECCA) was initiated in order to ensure sustainable resources utilization guided by a well thought out General Management Plan. Misali Island has been the focus of marine conservation initiatives in the PECCA. North of Misali there is a unique group of islets (Vikunguni, Kashani, Mapanya, Kokota, Funzi, Pembe and Uvinje) where there are fish landing and seasonal camping sites. Fundo and Njao are two long islets along the northwest coast of Pemba where there are settlements, fishing and agricultural activities. On the south-western corner of Pemba, the inhabited Makoongwe islet lies next to the Kwata, an islet consisting of leached and weathered coral outcrops that is seldom used by humans but is a significant breeding site for birds. The Matumbini reef complex includes several islets that are not permanently inhabited but there are seasonal fishers' camping sites. Linked to the Matumbini Island by an extensive mangrove area is Panza Island as well as a number of small islets (Nduwani, Mzingani, Ngezi, Panani and Mwinzi), all of them with fringing reefs supporting important fishery of finfish and other marine organisms. The complex is exposed to deep sea and is rich in coral fauna and mangrove vegetation, and was proposed for conservation in the early nineties. The PECCA environment is still in a relatively healthy state but there are clear signs of stress on some ecological systems. Exploitation of marine resources is almost approaching their Maximum Sustainable Yields (MSY) while fishing effort is increasing and use of destructive resources exploitation methods is becoming out of control. The methods which are harmful and destructive to the environment and the organisms therein include use of dynamites, small mesh size fish nets, spear guns, metal hooks for extracting octopus from crevices/caves, dragging nets, etc. Further threats to the marine environment include unsustainable harvesting of mangroves, uncoordinated and unregulated tourism activities, coral bleaching, urbanization, agricultural and industrial activities. Root causes in summary include increasing numbers of fishers that rely on the inshore resources, lack of compliance with laws and regulations, lack of alternative livelihoods, insufficient public awareness, lack of a common vision for tourism, poor coordination between government institutions, poor environmental management and land use planning, climate change and poverty that lies at the heart of many of the root causes and results in a growing population being increasingly dependent on current methods of using the natural resource base.

Taking the lead from the Ministry of Agriculture, Livestock and Environment in Zanzibar and in particular the DFMR, the main intervention proposed to counter the rising degradation was the establishment of a multi-zone and multiple resource use conservation area that would be known as the Pemba Channel Conservation Area (PECCA). From the outset it was understood that the intervention will be to assist people to improve their lives by putting in place an effective management for the sustainable use of the natural resource base.

It was proposed that PECCA will include all of the west side of Pemba from its northern tip at Ras Kigomasha to the southern tip of Panza Island. The complete establishment of PECCA was intended to involve a phased approach with different steps in each phase that include the identification and establishment of core conservation areas and multiple-use areas under sustainable management regimes which would inevitably require this good General Management Plan.

The declaration of PECCA is provided for under section 7(1) of the Fisheries Act No. 8 of 1988. As of 23rd September 2005, the marine waters of Pemba Channel became part of the Pemba Channel Conservation Area (PECCA). PECCA was established under the Pemba Channel Marine Conservation Area Order which was published in the Government Gazette as the legal supplement (Part II, Vol. CXIV No. 6111). PECCA comprises all marine waters off the west coast of Pemba starting from the beach of Kangani (5°25.8'S; 39°40.4'E) in the south to the beach of Kigomasha (4°53.7'S; 39°42.0'E) in the north. The Misali Conservation Area Order has thus been repealed. The order prohibits the use of certain destructive fishing gear and methods such as beach seine, spear fishing, explosives, poison, dragging nets (*kigumi*), etc and provide for a system of permits and fees for the use of the area by non-residents.

All terrestrial areas within the overall boundaries of PECCA are excluded, but the terrestrial part of Misali Island remains protected under the Misali Forest Order.

### **1.3 Need for a GMP**

A GMP represents the first step in the formal process used by PECCA Authority in planning, developing and managing its resources. It sets the management objectives and strategies to achieve the stated objectives of the PECCA. This GMP is a working document that should be updated periodically, and should be used to actively and appropriately manage the PECCA, ultimately leading to the sustainable use of marine resources. The management objectives outlined in this Plan represent short term, measurable steps toward attaining this goal. More specifically to:

- Identify the key elements of the PECCA 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 and commercial and tourist developments to ensure that environmental guidelines are observed and to minimize negative environmental impacts.
- Provide a basis for the development of subsidiary legislation, 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 PECCA that involves all stakeholders was adopted. This involved seeking information/experiences, not only from the key stakeholders, i.e., the communities who are the key actors in the implementation of GMP but also from government institutions, NGOs and private sector who are direct and indirect involved in coastal and marine resources management.

#### **Partnership**

There is always the need to establish networking partnerships (where none exist) and/or improve networking partnerships (where they already exist). In the course of undertaking the development of GMP, a close working collaboration was established with DFMR in particular the conservation areas management team and its marine conservation unit. 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 PECCA 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 PECCA 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 PECCA 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 PECCA. 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.

A participatory approach was used for discussions with communities in the PECCA, in the process of identifying key issues and threats that can be associated with the GMP. The information obtained was used to identify issues of concern, define objectives and management strategies. The study team has undertaken an open and transparent consultation process to ensure that the views of communities and stakeholders are fully incorporated in the GMP. A more detailed description of the key stakeholders and consultations held are presented in Part 3.

## 2.0 PHYSICAL FEATURES

### 2.1 Climate

PECCA has a tropical maritime climate, as does all Zanzibar and can be broadly divided into two monsoon periods, the northeast monsoon with trade winds blowing from the northeast between November and March, and the southeast monsoon with trade winds blowing from the southeast between April and October (UNEP, 2001). The northeast monsoon is generally characterized by lower wind speeds, calmer seas and higher sea surface temperatures, and the late northeast monsoon is the usual bleaching period in this region. The southeast monsoon is generally characterized by higher wind speeds, rougher seas and lower water temperature (Table 1). The long rains (*masika*) fall mid-March to early June; the short rains (*vuli*) are October to December. Rainfall may be similar to that on coral rag areas in Unguja which averages 1000-1500 mm a year (Swai, 1983).

**Table 2. Climate conditions which occur in PECCA**

Season	Months	General conditions
<i>Kusi</i> SE monsoon	April-October	usually wet; strong southern winds
<i>Leleji</i> Calm period	Sep-Oct	cool; mostly calm with intermittent winds; moderate rain.
<i>Kaskazi</i> NE monsoon	November-March	hot; humid; usually dry; moderate NE winds; few squalls.
<i>Leleji</i> calm period	Feb-Mar	cool; mostly calm with intermittent winds; moderate rain.

### 2.2 Geomorphology

PECCA is characterized by numerous low lying vegetated, limestone islets with a maximum altitude of about 5m above mean sea level (Othman, 1997). It lies on an area of shallow reef flats with lagoon interspaced by several channels. Water depths within the channels vary from 18-50m with the deepest waters towards the western opening into the Pemba Channel.

#### 2.2.1 Bathymetry

Water depth reaches a maximum of 1000m in the Pemba Channel and only narrow shelves occur off the mainland coast in the north around Pemba Island. To the south of the Pemba Trough, however, water depths are less than 200m resulting in a continental shelf over 80km<sup>2</sup> which includes many coral islands, reefs and Sand bars.

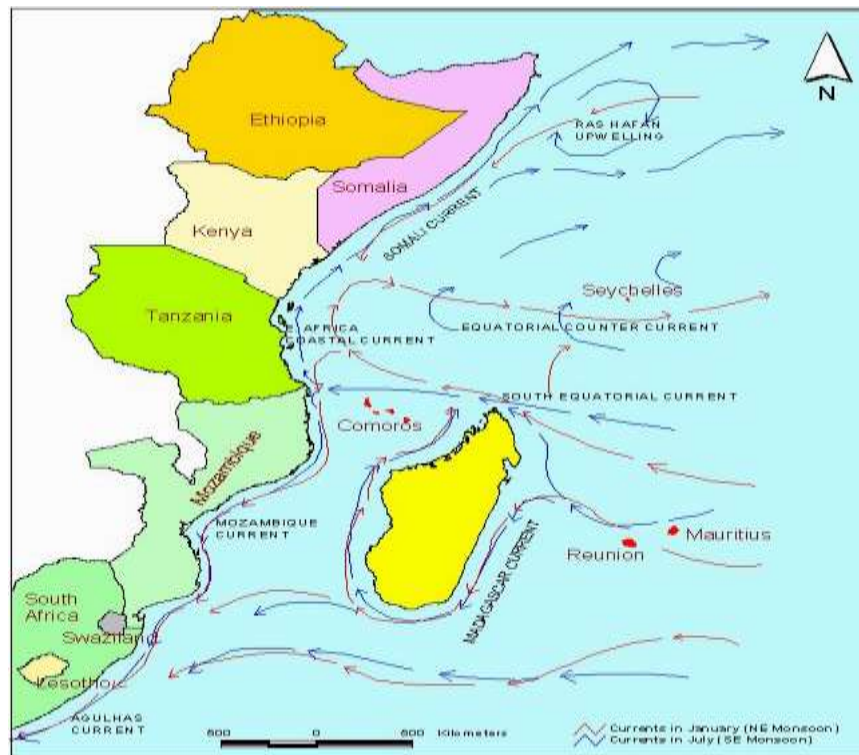
## 2.2.2 Geology

The PECCA geomorphologic structure consists of narrow intertidal sand flats which are connected to wider sub-tidal sand bottoms. The subtidal sand bottom extends out in the ocean deepens progressively to the channel; the fringing reefs 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 island of Pemba is considered to have separated from the mainland Africa about 10 million years ago and is older than Unguja Island which was formed later in the beginning of the Pleistocene age. Pemba's long geological history has created a unique island with a straight coastline on the east while the west coast is a heavily convoluted coast. Pemba Island is a true oceanic Island surrounded by deep waters on all sides that reach to about 800 to 1000 meters depth.

## 2.3 Oceanography

### 2.3.1 Currents

Horrill *et al.* (1994) carried out the only known study on currents. There are strong tidal currents around the island, especially at the northern end. The permanent north flowing East African Coastal Current (EACC) influences the western side of the conservation area. The currents in the Misali Channel are very strong due to the deep waters on the western side of the island and reverse with each tidal cycle. This often results in strong eddies close to shore.



**Figure 2. Main currents influencing PECCA**

### 2.3.2 Temperature

Although no information is available specifically for PECCA, it is likely that it has mean monthly maximum temperatures of about 28-32°C and mean monthly minimum temperatures of about 18-22°C (UNEP, 2001). Terrestrial temperature varies between 21 and 34°C (Beentje, 1990).

### 2.3.3 Rainfall

Mean rainfall is c. 1860 mm per annum, which falls mostly between March and May (long rains) and November and December (short rains). The rainy season (masika) starts in March or April and lasts in May. June to October is the dry season and temperatures are clement. There are short rains (vuli) which take place in November and December and at time in January. The rest of the year is dry spell. As there are no river flowing into the bay, the runoff from the nearby agricultural farms and commercial establishments drains into the bay bringing in sediments, silt, nutrients and even pollutants and other runoff from terrestrial as they discharge freshwater.

## 3.0 BIOLOGICAL FEATURES

### 3.1 Mangrove

The area is extensive and rich in mangrove resources. Mangroves are found on the fringes of numerous mangrove creek found along the highly indented coastline and can be conveniently grouped into the following blocks, Kisiwapanza-Matumbini, Michenzani-Shidi-Mwambani, Mkoani-Makoongwe-Makombeni, Wambaa-Jambangome, Tundaua-Kilindi, Weshu-Misali, Ziwani-Kisiwani-Pembeni and Mtambwe-Wete-Fundo ( Mushi et al., 2009).

All ten species of mangroves known to be present in Zanzibar in varying degrees of relative density and dominance have also been reported in the mangrove survey done in 2009 in PECCA (Table 2). Mushi et al., (2009) found that in terms of relative density the most common species were: *Rhizophora mucronata* (31.05%), *Xylocarpus granatum* (24.7%), *Ceriops tagal* (24.6%) and *Bruguiera gymnorrhiza* (17.9%), Whereas in terms of relative dominance, the species were *R. mucronata* (34.64%), *X. granatum* (25.95%), *B. gymnorrhiza* (23.83%), *C. tagal* (13.18%), *Pemphis acidula* (0.93%) and *Avicennia marina* (0.77%).

*C. tagal* was the most exploited species accounting for 60% of all encountered cut trees, followed by *X. granatum* (18.32%), *R. mucronata* (10.6%) and *B. gymnorrhiza* (12.89%). Also *C. tagal* was found to have a greater regeneration rate (56%) followed by *R. mucronata* (26%) and *B. gymnorrhiza* (16%) and *X. granatum* (0.9%).

**Table 3. Mangrove species found in PECCA**

No.	Tree species	Family	Local name
1	<i>Avicennia marina</i>	Verbenaceae	Mchu
2	<i>Bruguiera gymnorrhiza</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

In Pemba Island, Micheweni block is leading the other units in individual species densities for *C. tagal*, *X. granatum*, *B. gymnorrhiza*, *A. marina*, *S. alba* and *P. acidula*; and ranked the second for *R. mucronata* density. On the other hand, PECCA 'A' forms a distinct peak for *C. tagal*, and the second for *R. mucronata*. PECCA 'B' is having highest density of *L. racemosa* and *P. acidula*, and ranked the second and closer to PECCA 'A' for *R. mucronata*. Muwambe block is leading for having high density of *X. granatum* followed by Ngezi block. The results are reported for each of the 6 units/area in turn in each case, the species present in each management units are listed or mentioned followed by a report on the relative density, dominance, (dbh) distribution; height, exploitation; regeneration and other observations noted during the survey.

### 3.2 Sea grasses

Sea grasses are flowering plant that leave submerged in the marine waters. There are 12 species of sea grass that are found in Pemba coastal waters which include; *Thalassia hemprichi*, *Halodule uninervis*, *H. wrightii*, *Halophila stipulacea*, *H. ovalis*, *Thalassodendron ciliatum*, *Cymodocea rotundata*, *Cymodocea serrulata*, *Syringodium isoetifolium*, *Zostera capensis* and the long, blade-like *Enhalus acoroides* typical of sandy.

Sea grasses form dense beds which cover large areas of coastal waters and perform a wide spectrum of biological and physical functions. Sea grasses 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 helping to stabilize sand and reduce coastal erosion. Washed up sea grass also help to stabilize beach sand. The following genera are the most dominant *Halodule*, *Cymodocea*, *Thalassia*, *Syringodium*,

and *Thalassodendron*. Pemba Channel has some of the deepest sea grass bed in the East African marine ecoregion.

### **3.3 Macroalgae (Seaweeds)**

Seaweeds are the most abundant plant life and common along areas of beach in PECCA that are periodically exposed and submerged by the tide as well as on coral reefs. They are unlike land plants in that they lack 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.

Utalimani was the only reef where macro-algae were observed in significant quantities and occupied 8% of the benthic cover. Other groups of algae were also observed at the same reef. The observed algal growth coupled with the low hard coral cover indicate that the reef is going through a phase shift as a result of the massive Crown-Of-Thorns-Starfish (COTS) outbreak in 2008 .

### **3.4 Coral Reefs**

According to the Rapid Assessment Report (2005), Pemba Island's steep reefs with their high diversity and coral growth and sloping down in excess of 64 metres have been considered to be of ecoregional importance and unique as the only oceanic reefs in the EAME. The 1,100 km of coral reef around Pemba Island represent 50% of the coral reefs in Tanzania and support a high diversity of coral genera, fish and over 40 species of sponges. Coral cover in Pemba Island was 40 to 60% with 40 genera observed representing two thirds of the coral genera known to occur in Tanzania. The dominant species are *Porites sp.*, *Montipora sp.*, *Montastrea sp.*, *Diploastrea sp.*, *Acropora sp.* and *Galaxea sp.* The 40 coral genera observed in Pemba are present in the 9.4 km ring of coral reef surrounding Misali Island. Coral reefs have been predominantly recorded to the west of Misali Island with some coral outcrops to the east and small reef areas to the north and south. Studies recorded that coral cover within the reef areas was intermittent and ranged from small outcrops and patchy reefs to physically complex coral walls. The number of coral genera and morphotypes indicates high species diversity around Misali Island. Fleshy algae and soft coral growth were minimum, which implied that the hard corals were able to establish themselves without competition from these organisms. It is important to note that only Misali has been studied to any extent and that it is likely that many more species of coral occur in the coastal waters along the west side as a result of the diverse habitats and complex current regime.

With an outstanding variety of reefs, Pemba has coral communities that range from shallow to deep reef (down to 64 meters depth) and some highly diverse and productive reefs with large biomass of filter feeders at the head of lagoons such as the one off Ras Mkumbuu in the target area. By being located at the lagoon head, these reefs receive a larger load of organic material than reefs located closer to the open ocean. Large coral formations were seen in these areas, reflected in a large diversity and number of fishes.

According to Richmond and Mohammed (2000), the marine environment was in general in a good condition, with a slow recovery of the shallow water corals of which about 80% were killed during the 1998 El Nino bleaching event. Hard coral cover at shallow depths of 0-15 m was still poor but in deeper waters healthy coral communities had survived.

### **Hard corals**

Average hard coral cover around the six PECCA sites was 22%, with large variations from 69% at the coral garden to 2% at Shimba reef. Fundo gap had 48% while that of Swiss, Njau and Utalimani was 5%, 7% and 3% respectively. Swiss and Shimba were dominated by rubble, Utalimani by rock and Njau by rock and sand. In total 39 hard coral genera were found, with Fundo and coral garden having the highest (33 and 31, respectively) and Swiss reef having the lowest with 12. Two genera were observed only in Shimba, one at only Fundo and another one at only Swiss.

### **3.5 Fishes**

The marine habitat diversity is reflected in the diversity of fish species. The north Pemba channel, with its steep drop off causing upwelling, supports important concentrations of sailfish, black marlin and tuna and the Latham Island, are globally important congregations of black marlin (*Makaira indica*) that only occur in these densities in East Africa and Australia. The deep channels contain many other pelagic species in large numbers, while the reefs are as diverse as the best reefs observed by the Rapid Assessment Team anywhere else in the WIO, including the diverse granitic islands of the Seychelles and the Radamas Islands in north-western Madagascar. A total of 350 species of fish have been recorded in Misali Island and it is suspected that there are many more. A remarkable lack of sightings of the *Caranx* group as well as larger fish such as groupers and humphead wrasses during the rapid assessment dives is, however, cause for concern. Very few Moray eels were noted in a region that should support scores of these fish. The Pemba channel is a world renowned big game fishing area.

Even though all the three families of indicator species were recorded in every site the numbers were generally low (Table 4) indicating that reefs within PECCA are experience high fishing pressures. Coral garden showed the highest total number of the species while Swiss and Utalimani recorded the lowest.

The presence of considerable numbers of large predators such as the black marlin, yellowfin tuna and hammerhead shark indicate a significant interaction with oceanic species. Different species of fish inhabit the various marine habitats in the Pemba channel. Larger predatory fish, including skipjack tuna, billfish, kingfish, sailfish, marlin and rays of different species are found in the channel. The reef fish are diverse and spectacular with impressive various colours, form and behavior. Enriched by upwelling the Pemba channel supports large concentrations of sailfish, black marlin and tuna. Other fish include small shoaling damselfish being the most abundant, emperors, Nemipteridae, Belonidae, rabbit fish, parrot fish, snappers, goat fish, tunas and mackerels, fusiliers and hammerhead shark are some of the important fish species caught in and around the reef.



<b>Table 4. Number of indicator fish species in 7 sites of PECCA</b>			
<b>Dive Site</b>	<b>Fish type</b>		
	Angel	Parrot	Trigger
Coral garden	16	18	14
Fundo gap	11	8	8
Njao gap	10	7	13
Swiss	5	15	1
Shimba	4	16	19
Utalimani/Mapinduzi	13	5	3

(Source: Assessment of Marine Conservation Areas of Zanzibar, 2010)

The low hard coral cover and fish species indicates that most reefs around PECCA are under a lot of pressure. What was observed during the survey and past experience confirm that the pressure is coming from both the natural and anthropogenic fronts. Observations at the Njao gap site lay testament to the use of blast fishing on the reef. Two holes filled with rubble were observed at an area that is otherwise a flat sandy patch with dispersed coral growth forms. Whereas clear evidence of divers caused damage was observed at the Coral garden site. The low coral cover at the Utalimani site on the other hand, can be attributed to the massive outbreak of COTS that took place in 2008. The different groups of algae that were seen growing at the reef show that the reef is undergoing a phase shift. And that the reported threats of COTS in other reefs should be taken very seriously.

Commercial fish, harvested in Pemba channel are the big game fish which are sought after by big sport fishing vessels from tourist hotels and yacht boats from Tanga and even Kenya. Other fish mostly reef fish belong to the families of Lethrinidae, Siganidae, Serranidae, Mullidae, Nemipteridae, and Labridae. Other marine resources include octopus and squids (Cephalopodidae) and sea cucumbers (Holothuroidae). Pelagic species include sardines, indian mackerels, tuna and marlin, while octopus, squids and sea cucumbers are also important fishery component in the artisanal fisheries.

### **3.6 Sea Turtles**

There are eight species of marine turtles worldwide, six 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 are also found in Zanzibar waters. Two species are the most common. These are the green and hawksbill turtles and are known to nest (Khatib et al., 2002). Turtles nest on the islands sandy beaches of Misali Island, Matumbwini complex, Fundo Island and Njao only to mention a few.

The hawksbill is classified by IUCN as critically endangered while others are categorized as endangered. Marine Turtles spend almost their entire lives at sea except when the females come 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.

A nest recording programme that was initiated in Pemba Island in 1995 has shown that Pemba is a significant nesting area for sea turtles with a minimum of 120 nests over a 12 month period. Turtle nesting sites identified by this programme are located in the target area, with major sites in the islets of Misali and Makoongwe. Unfortunately turtles are eaten widely on Pemba in spite of this being an illegal practise, and turtle products are also exported although not openly. Such actions constitute serious threats to the turtle populations and breeding areas. Poorly planned tourism has also been cited as a threat to turtle nesting sites. Fortunately, the right interventions apparently have had positive effects thus far as has been shown by pilot sites for environmental education. Under MACEMP the pilots can be resumed, expanded and institutionalised, for instance through incorporation into the school curriculum.

### **3.7 Marine Mammals**

Marine mammals in PECCA include dolphins and whales. Two common species of dolphins: the Indo-Pacific bottlenose (*Tursiops aduncus*) and the spinner (*Stenella longirostris*) which are the species most often encountered in Zanzibar coastal waters (Amir *et al.*, 2005). Other cetaceans that have been sighted and recorded in the area include humpback dolphins (*Sousa chinensis*), Risso's dolphins (*Grampus griseus*), and common bottlenose dolphins (*Tursiops truncatus*) (Amir *et al.*, 2005).

Whale species regularly sighted in the Pemba Channel are the humpback whales (*Megaptera novaeangliae*) and the sperm whales (*Physeter catodon*). Humpback whales migrate seasonally from temperate waters where they eat to warm tropical waters where they breed and calve. The humpback whale apparently migrating through the Pemba channel between Pemba and the coast of mainland Tanzania. They come to Pemba from July to November every year where they raise their calves before they migrate back to the temperate region. The Pemba-Zanzibar Channel is one of the centres of dugong (*Dugong dugon*) population in Tanzania.

### **3.8 Invertebrates**

There are a healthy populations of invertebrates in the coastal waters along the west side of Pemba, including crustaceans (shrimps, prawns, lobsters and crabs), holothurians (sea cucumbers), cephalopods (octopus and squids) and edible shell molluscs (such as *Anadara sp.*). There are variety of crabs, including hermit crabs and the large coconut crab, *Birgus latro*, which is found in the forest and is mainly nocturnal in the coastal waters along the west side of Pemba. This species is listed in the IUCN Red List as Data Deficient. It is reported to be eaten occasionally. Butterflies are numerous, especially in the forest. Eight species were recorded by Ely *et al.*, (1997a) but there are probably many more. According to the Rapid Assessment (2005) large quantities of octopus are exploited on Pemba Island, Misali Island being a favourite site, involving somewhat destructive methods. Large middens of shells were sighted around villages,

an indication that molluscs are heavily utilised as a source of protein. It is interesting to note that the Giant Clam (*Tridacna sp.*) is still found in reasonable numbers at most of the sites investigated, while there was a definite shortage of sea cucumbers on most of the shallow reefs. Sea cucumber is collected and dried for export to countries such as China where it is considered a delicacy. Other insects and invertebrates have not been surveyed.

### **3.9 Birds**

The tentative list of bird species for Ngezi Forest according the Rapid Assessment (2005) contains 26 species, including three endemic subspecies of Pemba; the Pemba African Goshawk (*Accipiter tachiro pembaensis*), the Bronze-naped Pigeon (*Columba delegorguei*) and the Pemba Black-breasted Glossy Starling (*Lamprotornis corruscus vaughani*) and four endemic species of Pemba and classified by the World Conservation Union (IUCN) as globally threatened; the Green Pigeon (*Treron pembaensis*), the Russet Scops Owl (*Otus pembaensis*), the Pemba Sunbird (*Nectarinia pembae*) and the Pemba White-eye (*Zosterops vaughani*). The aerial survey revealed Kwata Islet to be a significant breeding island for birds.

### **3.10 Reptiles**

Large numbers of reptiles were observed in Misali Island, although species diversity is low. Twenty-seven terrestrial mammal species, 13 of which are bats, occur on Pemba island. The Pemba blue duiker (*Cephalophus monticola pembae*) is possibly endemic to Pemba. The Zanzibar Red Colobus (*Colobus badius kirkii*), an endangered Zanzibar endemic, was translocated to Ngezi Forest but its status is uncertain. The Pemba flying fox (*Pteropus voeltzkowii*) is a subspecies endemic to Pemba and is classified as endangered by IUCN. Threats to flying fox include loss of habitats (due to forest clearance and degradation), loss of roost trees (felling), roost disturbance and direct hunting. The flying fox is considered a traditional delicacy in Pemba yet there is a rising consciousness of its value and the need to protect it. There is a large concentration of flying fox near Chake Chake with a population of around 2,000 individuals. There is a limited but interesting fauna of terrestrial reptiles. One snake has been recorded, and a second (a black one) reported informally. Two skinks (the coral rag snake-eyed skink may be a subspecies endemic to Pemba) and one gecko have also been recorded (GMP, 2005).

## **4.0 SOCIO-ECONOMIC VALUES**

### **4.1 Population**

Pemba Island has two regions namely northern and southern, 4 districts namely Micheweni, Wete, Chake Chake and Mkoani, 72 *Shehias* and over 360 villages. Chake Chake is the capital, centrally located on the island. According to the 2002 population census, Pemba Island had a population of 362,166 inhabitants, which represented 37% of Zanzibar population of 984,625 people. 45% of the population in Zanzibar lives on the coast and a total of 146,955 people live in the *Shehias*. This figure represents almost half of Pemba Island population, even though only a part of it lives in the proposed PECCA (whereas the other part lives more inland, thus outside the proposed boundaries). Table 3 below shows the population of villagers along PECCA.

**Table 5. Population of villagers along PECCA**

NORTHERN REGION			SOUTHERN REGION		
DISTRICT	VILLAGES	POPULATION	DISTRICT	VILLAGE	POPULATION
<b>MICHEWENI</b>	Makangale	9135	<b>CHAKE</b>	Chanjaani	6134
	Konde	8849		Ziwani	6651
	Mgogoni	6033		Ndagoni	3534
		Kwale		5306	
		Mgelema		1188	
		Kilindi		2753	
		Tibirinzi		5323	
		Chachani		3140	
		Mvumoni		3708	
				Wesha	3209
<b>WETE</b>	Mtambwe	5772	<b>MKOANI</b>	Ngombeni	4573
	Kaskazini	2134		Makoongwe	1359
	Fundo	3247		Shidi	1011
	Kisiwani	4559		Michenzani	5651
	Gando	10064		Chokocho	4201
	Utaani	3679		Kisiwa	2721
	Mtambwe	8458		Panza	2603
	Kusini	2110		Wambaa	3312
	Bopwe	6589		Mbuguani	1809
	Ukunji	5845		Makombeni	2295
	Kipangani			Uweleni	
	Piki				

Source: PECCA Management Plan, 2005

### **Traditional use of the sea and marine resources**

The people on Pemba have for years been reliant on the sea and a very close and traditional association with the marine landscape still prevails, which is characteristic of the WIO. This sea-use culture is probably nowhere in the WIO better represented than in PECCA, although there may be isolated areas where it is represented as well.

The information available about Pemba's cultural heritage is far from complete and further studies are warranted. Kwata Islet demands archeological research. The island is important for conservation as it appears to be an important breeding site for birds and pieces of pottery are usually reported by those who visit the island, which may indicate connection in the past that could possibly date as far back as the 8th century. Like Kwata Islet, there may be many other places on Pemba that still hide evidences of the Swahili civilisation and that should be investigated.

## 4.2 Fishing

Most communities depend heavily on the coastal and marine resources for their livelihoods. The coastal population exploits living marine resources including fish and molluscs, as well as the mangrove stands in the transition zone. These resources are not only used by the west coast population but also by fishers from the east coast, where the deep waters are difficult to negotiate with traditional fishing vessels. Fishers from Unguja and as far as mainland Tanzania also come to fish in the Pemba channel and to cut mangroves on the west coast.

Unfortunately, the insufficient control of fishers, fishing methods and catch are increasingly impacting on the marine resources and signs of destruction and overexploitation can already be seen. Enforcement of the prohibition to fish in the non-extractive zone as well of control of fishing activity and regulation of gear used in the extractive zone are insufficient. Nevertheless, Misali Island has clearly served to increase the fishers' awareness of the importance to preserve Pemba's high diversity of fish.

In the coastal areas of Zanzibar 80 to 90% of the local fishing takes place in waters close to mangrove-vegetated areas, creeks and bays. The same is true along the west side of Pemba, where most communities depend on traditional fisheries in the nearshore areas. Lacking efficient fishing vessels and gears, fishers have been operating in inshore waters for decades. Most of the fishing takes places on the west coast of Pemba, which is used not only by local fishers but also by fishers from the exposed east coast and even Unguja and mainland Tanzania. The Zanzibar Frame Survey identified 108 landing sites in Pemba. Muongoni Bay and Matumbini in the south and Misali Island in the centre are major fishing grounds in the target area, as well as Msuka and Kiuyu in the north of the island. Misali Island is heavily exploited.

Most people are involved in fishing and/or collection of shellfish such as crab and various types of molluscs. Significant numbers of women rely on marine resources, especially through shells and octopus collection. Most fishers fish in inshore waters as they lack appropriate fishing vessels and gears, and sometimes use destructive gears to increase their catch. Fish is used for household consumption and sold fresh in the villages or in the nearest markets. There is hardly any processing of fish products in Pemba. A small proportion of the fisheries products (1–5%) such as sea cucumbers, shells, octopus and lobsters are exported.

The west side communities in particular are heavily dependent on the coastal and marine resources, especially through artisanal fishing. In most of the target area, it is the poorest groups that are involved in fishing activities, which make up between 11 and 39% of their income

In Fundo Island and Tondooni agricultural yields are very low as the coral based soil is shallow and less fertile. Here, most households engage in fishing activities or seaweed production child labour being a problem as children start fishing at an early age. The problem of child labour was especially evident in Ndagoni.

Octopus fishing is very popular in Pemba and it is done by using simple spears and hooks. This activity has enormous potential to expand and benefit many more fishers.

### **4.3 Seaweed farming**

The only mariculture activity undertaken by coastal communities in the area is seaweed cultivation. Seaweed farming activities take place in Pemba. However, but the major problem is market. If successful, mariculture can become an alternative source of income for a large percentage of the population living in coastal communities who are disadvantaged, including retired fishers and particularly women who work in inshore waters. Mariculture thus has the potential to increase employment, income generation and food security.

### **4.4 Bivalves collection**

Many mollusks are dependent on the mangrove derived nutrients e.g. *Anadara sp* and *Pinctada sp.* and that is why a variety of mollusks are found in PECCA which is mostly collected by women.

### **4.5 Agriculture**

The majority of people in Pemba are involved in agriculture, fishing and animal husbandry. According to the 2002 Census, 52% of the population in Pemba was employed in the agriculture sector and 8% in fishing activities. Most fishers are also farmers or livestock keepers. In Fundo island richer households are exclusively dedicated to clove and other businesses. In the urban areas around Wete, Chake Chake and Mkoani areas, people have better economic opportunities than in rural areas, including access to markets and non agricultural income generating activities.

About 74% of land is cultivated in Pemba, as compared to 42% in Unguja where the land is less productive .Zanzibar's economy is greatly dependent on the agricultural sector, which constitutes 40% of Zanzibar's GDP. Pemba grows cloves, fruits and vegetables, coffee, rubber and many other tropical crops, mainly in smallholding farming. Zanzibar remains amonoculture economy because of its dependence on cloves export for running its socio-economic programmes.

Apart from clove production as commercial crop, most people in western coastal communities engage in agricultural activities for subsistence, such as cassava, cocoyam, maize, millet, sweet yams, orange, banana, and mango. The use of crude tools and low level of technology and farming techniques, plant diseases, and adverse weather conditions are some of the problems they encounter that lead to low production. An additional problem, often heard from farmers in small islets, is the lack of transport to take their products to the main markets in Pemba. During fruit season large amounts of fruit are wasted and rot due to lack of alternative uses apart from immediate consumption.

Agricultural activities in Pemba not only have direct benefit to the human population in the island but also indirect benefit to the marine environment by releasing the pressure on marine resources. However, farming needs to be further developed if such desirable effect is to be obtained. For instance, several local initiatives can take place including training farmers to

produce alternative products such as dried fruits, which create an alternative use for the excess production.

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#### **4.6 Lime stones**

People on Pemba also exploit coral bricks, lime, stones and aggregates (broken stones) to generate income, especially in areas with coral based soil such as Fundo Island and Tondooni

#### **4.7 Trading in small businesses and masonry**

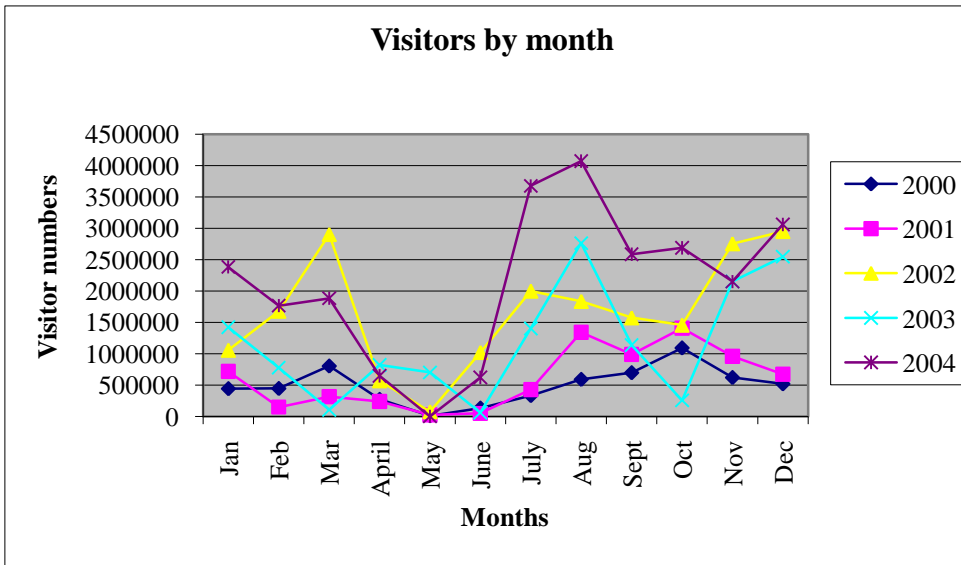
For a big percentage of PECCA population, small businesses contribute a lot to their income.

#### **4.8 Tourism**

Unlike Unguja Island, tourism development in Pemba is still in its early stages. In 2005, Pemba Island was only attracting between 5 and 10% of Zanzibar's tourists lagging behind Unguja in infrastructure, accommodation, restaurants and emergency services development. The target area boasts coral reefs with diverse ornamental fish and nocturnal marine life and other organisms such as sea turtles, dolphins, whales and pelagic fish species (marlin, sword fish, billfish and tuna species), and for that reason it has potential to expand tourism activities.

PECCA is an important destination for foreign tourists who come mainly for the marine resources (snorkeling, diving, and swimming) but also for the beach (sand, turtles) and to a lesser extent to see the forest and endemic species.

Visitor numbers have steadily increased since 1999 when the first recording of visitors started, and in 2004 there were 4759 visitors. Tourism is highly seasonal with very low numbers of visitors in the rainy months from April to June. Highest numbers are in August, December and March (the European holiday seasons) (Figure 2).



**Figure 3. Monthly number of visitors in PECCA**

Source: GMP 2005

There are three hotels on the northwest coast of Pemba and four near Wambaa north of Mkoani. Three more tourism developments have been allocated for the northern peninsula. Dive operators using PECCA include:

- Fundu Lagoon Resort, which probably provides the most regular visitors (every day, under an arrangement with PECCA);
- Swahili Divers (a few times a week);
- Floating Beach Resorts (frequently).

Diving is the main activity for tourists. The main diving season is August-March, and dive groups average six individuals (Lim, 1999). The proportion of visitors who come mainly for the trails and other activities is not currently known. Visitor facilities include a shelter and picnic table with information boards, and a nature trail through the forest. The rangers provide a guiding service. There have been a number of proposals for both terrestrial and marine trails (Forstle *et al.*, 1997). Four more tourism developments have however been allocated for the northern peninsula. The major commercial diving sites in the target area are in Ras Kigomasha, the west northern tip of the peninsula, Njao Island, the area around Misali and the group of islets north of Misali, and Panza Island.

The natural attractions of Pemba Island indicate that it would be better suited to a more specialised type of tourism such as ecotourism and sport-based activities, complemented by cultural attractions. With around 30 archaeological sites, the west coast of Pemba Island has the highest concentration of archaeological sites in Zanzibar.



## **4.9 Salt Extraction**

Nearly many creeks in Pemba produce mangroves salts including Kangagani, Micheweni and some area of PECCA. The feasibility depends largely on climatic condition of the area.

## **4.10 Economic Infrastructure**

The infrastructure in Pemba is less developed than Unguja.

### **4.10.1 Energy**

Pemba does not have its own source of energy. In late 2009, the laying of underwater cable started to supply electric energy from mainland national grid from Tanga. This project has completed and now Pemba gets reliable supply of electric power to all towns and villages.

Firewood and charcoal are the main sources of energy for 99% of the population in Pemba with obvious negative effects on mangrove and other forests. Women spend considerable amounts of time and effort collecting firewood for cooking and water purification.

### **4.10.2 Telecommunication network and postal services**

A good number of cellular phones networks coverage is available in PECCA namely Tigo, Vodacom, Celtel, and Zantel. Most of district headquarters and towns are provided with postal services.

### **4.10.3 Roads**

The condition of roads in Pemba is generally very poor. The north-south central spinal route from Konde in the north to Mkoani in the south of the island is being substantially upgraded and the Chake Chake to airport route is considered to be in reasonable condition. The remaining roads on the island are very poor.

## **4.11 Social Services Infrastructure**

### **4.11.1 Education**

In Pemba Island the literacy rate is 48% and the net enrolment rate 62%. Around half (51%) of the fishers interviewed by the Rapid Assessment Team (2005) were younger than 30 years old and most have started fishing at childhood. Child labour in Pemba has been reported (at levels of up to 63% of children being engaged in labour) as a manifestation of economic hardship at household level. Child labour is reflected on the education level as many children start fishing at

an early age instead of attending formal education. Around half of the fishers interviewed (48%) were illiterate.

#### **4.11.2 Water supply**

The water supply network is recognized as inadequate and only 44% of the population in Pemba gets their water piped, protected wells or springs and 68% of the population has no toilet facility.

#### **4.11.3 Health services**

Malaria and diarrhoea are common diseases in the area, affecting mainly children. In a study of the patterns of livelihoods in rural Pemba 90% of the 456 households covered reported to have experienced some food shortages, and 18% of the children were malnourished and underweight. HIV/AIDS is also a major concern and the fishermen who camp in fishing grounds throughout the island are more vulnerable

### **4.12 Cultural Values**

Many studies have shown that there is a wealth of sites of historical and cultural importance on Pemba Island, with a high concentration in PECCA. The cultural heritage that is found on Pemba, both tangible and intangible, represents virtually the entire evolution of the Swahili civilisation and reflects a long-evolved traditional culture of sea-use.

On Pemba Island examples can be found of sites dating from all periods since the 8th century when the Swahili history started with no gaps (even though there are exceptions of earlier sites on Unguja Island such as Unguja Ukuu). In no other place can the same range of historical assets be seen over such a relatively short distance.

Bandari Kuu is one of the three earlier sites on Pemba Island, dating from the 8th century. The others are old Tumbe in the north and Bandari ya Faraji on the east coast.

The ruins of the 14th century mosque, at the height of Swahili civilisation, are evidence of the largest Muslim community of that era, which enabled the spread of the ideology.

The concentration of pillar tombs (resembling the “pyramids of Egypt” of the east African coast), indicates a large concentration of eminent or religious people that were buried in Ras Mkumbuu and a strong veneration of those people.

There is no archaeological evidence of mosques dating from the 10<sup>th</sup> century or earlier with the exceptions of Ras Mkumbuu, the Shanga mosque from the 8th century and the Chibuene remains of Muslim burials from the 10th century on the coast of Mozambique. Ras Mkumbuu, Shanga and Chibuene provide the earliest evidences of Islamic civilisation in East Africa South of the Sahara. The entire span of building construction representing Swahili history and culture can be found on Pemba Island. The Swahili culture is not typically orthodox Muslim. In

PECCA this is amply elaborated by the fact that there are numerous shrines which have been used for centuries.

### **Sacred natural features associated with old traditions and beliefs**

Some natural features on Pemba Island have a special meaning for the local population and are considered sacred. Examples are Misali Island (the island itself is considered sacred and three caves on the island are used as shrines), Ngezi Forest and Ras Mkumbuu (the forest was considered a sacred site associated with a number of taboos and traditions), and caves, stones, tree trunks and sites in the sea that are used as shrines.

## **5.0 STAKEHOLDERS AND KEY MANAGEMENT ISSUES**

### **5.1 Stakeholders**

The PECCA GMP is intended to be a transparent document describing the objectives, strategies and actions behind the management of the PECCA. Key stakeholders of PECCA are:

#### **Government Institution**

- Department of Fisheries and Marine Resources
- Department of Environment
- Department of Cash Crops, Fruits and Forest
- Zanzibar Investment Promotion Agency
- Commission for Tourism
- Department of Antiquity
- Local government (four Districts: Mkoani, Chake Chake, Wete and Micheweni)

#### **NGO's**

- Misali Island Conservation Association (MICA)
- Pemba Channel Conservation Area (PECCA) Management Committee
- Wete Environmental Conservation Club (WECOC)
- YODESO – Wete
- Community (Fishers and Seaweed farmers)

#### **Hotel Operators**

- Fundu Lagoon Ltd
- Manta Reef Lodge
- Swahili Divers
- Jondeni Guest House

An important step in establishing effective stakeholder relationships is to identify the stakeholders and their roles within the marine environment. Table 4 summarizes the stakeholder

groups of PECCA and their expected role in the development and implementation of the GMP. Further details of the stakeholder groups can be found in Appendix.

**Table 6. Summary of stakeholders on PECCA and their roles**

<b>Stakeholder</b>	<b>Role</b>
NGOs	Partnerships with environmental, cultural, heritage and non-governmental/non-profit groups on PECCA and within the Pemba
Water sports	User group encompassing activities such as diving, snorkeling, sailing, power boating, kayaking, kite surfing and windsurfing. 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 Tanga and Shimoni in Kenya.
Fishermen artisanal fishing user group	High value placed on the tradition of fishing
Industry	User group including industries in addition to tourism on PECCA which directly or indirectly affect the area, such as energy production, oil and gas storage, construction.
Law enforcement	The law enforcement agencies, including the community guards, customs, police KMKM and prosecutors office, advise on legal matters, the formulation of legislation, and maintaining/enforcing the legal attributes of the marine Conservation Area (MPA)
Government	Permitting and maintaining the law. Communication towards user groups. The PECCA Management manages the conservation on behalf of Government.
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 PECCA on a daily basis
Community	The local community depends on the wellbeing of the PECCA indirectly for income and employment. Educational establishments use the marine Conservation Area as an education tool and for cultural and social activities

## **5.2 Key Management Issues**

The general issues that were identified by various stakeholders in the different consultative approaches have been synthesized and categorized under the following major headings:

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

These issues are actually compilations of related threats and activities that have similar impacts, and would likely be abated using similar strategies. A brief description of each main issue follows.

### **5.2.1 Legal and policy implementation**

#### **Poor management and ineffective law enforcement**

- Use of illegal fishing gears and methods are prohibited by law but enforcement has been poorly implemented. Beach seine nets, drag nets and surrounding nets are generally operated across reefs and seagrass beds causing significant damage over time.
- Small mesh size fish nets are not selective and therefore they remove even the juvenile fish of little or no value and in so doing they negate grow-out for next season and even impact natural recruitment and population dynamics.
- Poisoning and dynamite fishing kill all the organisms in the area of application without mercy to adults or juveniles.
- Dynamite fishing and use of spear guns for fishing also causes a lot of damage to the coral reefs. As a result of falling Catch per Unit Effort (CPUE), local fishers in various well organized fishing villages are complaining of rise in unsustainable and destructive fishing methods and express their inability to intervene.

#### **Inadequate financial and management capacity**

Financial capacity of the PECCA 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**

- There have been no conservation/management oriented research programs; rather, most research topics have been results oriented.
- There is limited information on biological resources in the PECCA and also so for available livelihoods and resource use trend.
- Monitoring of resources-use in the PECCA is only carried out haphazardly 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, stock assessment 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.
- Coordination between conservationists including public institutions and organizations is lacking; this needs to be established so that management programs may benefit from research/science.
- There is deficiency in sectoral collaboration that warrants haphazard planning and carrying out of business operations and other development programs. Relevant information and data are not obtained prior to such undertakings and EIAs are rarely carried out.
- Lack of initiative to research on appropriate fishing gear and tools, which can be registered and adopted for use. At present the sector is dominated by small-scale fishers using poor traditional fishing vessels and tools.
- There is also a lack of an in-built monitoring and evaluation system. 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**

- There is limited information on biological resources in the PECCA and also so for available livelihoods and resource use trend.
- Monitoring of resources-use in the PECCA 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, mangrove stock assessment 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.

### 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 PECCA 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 7. Summary of issues threatening PECCA**

<b>Issues</b>	<b>Less Threat</b>	<b>Moderate Threat</b>	<b>High Threat</b>	<b>Significant High Threat</b>
<b>Historical issues</b>				
Poor fishing gear using mainly canoes and dhows.				<b>x</b>
Lack of law enforcement				<b>x</b>
Lack of funding				<b>x</b>
<b>Current Issues</b>				
Conflict between fishers, divers, tour operators, seaweed farmers, tourists and others				<b>x</b>
Conflict of interest between box trap (DEMA) fishers and divers			<b>x</b>	
Over utilization of resources and over fishing				<b>x</b>
Use of destructive fishing gears and methods				<b>x</b>

Damage to corals due to dropping and hauling up of the anchors.			<b>x</b>	
Coral reefs are also destroyed by illegal fishing practices and over fishing.				<b>x</b>
Beach hotels has blocked entry routes for the local communities and fishers			<b>x</b>	
Unplanned expansion of tourist development along beaches			<b>x</b>	
Enhanced waste generation at beaches, due to tourism, settlement areas and tourist sites.			<b>x</b>	
Environmental degradation along the sea beaches caused by investors			<b>x</b>	
Destruction of seaweed structures by night fishers.			<b>x</b>	
No land demarcation for sea weeds farming.			<b>x</b>	
Low seaweed prices offered by buyers				<b>x</b>
Seaweed farmers are not prepared to alternative activities				<b>x</b>
Lack of improved working tools and gear for seaweed farmers				<b>x</b>
Exploitation on forests resources due to population increase				<b>x</b>
Extensive mangrove clearing leading to ecosystem destruction and beach erosions.			<b>x</b>	
Erosion of cultural norms and tradition among locals		<b>x</b>		
Dependence on fishing, due to lack of alternative activities				<b>x</b>
Lack of positive impact on fisher's income due to poor traditional fishing gear/vessels.			<b>x</b>	
Unemployment due to illiteracy and very low level of conservation awareness				<b>x</b>
Overloading bearing capacity due to permitting for various activities in the conservation area			<b>x</b>	
Lack of income generation activities to communities				<b>x</b>
Lack of benefits to communities from tourism developments			<b>x</b>	
Turtle nesting sites have been taken for development of tourist hotels.		<b>x</b>		



Research does not reach people/users.				X
<b>Management Issues</b>				
<i>Governance</i>				
Deficiencies in sectoral policies, regulations and legislations.			X	
Lack of participation of communities and other stakeholders into decision making				X
Lack of committees to represent different stakeholders in the area.				X
Lack of information sharing on what is taking place in the area.				X
Poor implementation of activities, lacking planned schedule				X
Lack of regular meetings and different seminars involving stakeholders.				X
Lack of a strong base security within the area				X
Lack of regular trainings on issues regarding the conservation area				X
Lack of a common vision for tourism			X	
Lack of empowerment to fishers through provision of working tools			X	
Lack of strategies put in place to reduce poverty.				X
Lack of code of conduct to guide tourists and tour operators			X	
Poor government support			X	
Lack of commitment by the government to promote conservation activities				X
Mismanagement of historical sites			X	
Unemployment due to illiteracy				X
Population increase and demand for income				X
Poor mangrove management			X	
Lacks of empowerment strategies for alternative activities.				X
Youths ages of 15-20, engaged in fishing activities rather than going to school				X
Lack of code of conduct to guide tourists and tour operators			X	

Poor laws and regulations enforcement for tourists			<b>x</b>	
Insufficient public awareness contributes to low rate of compliance.				<b>x</b>
Absence of dolphin viewing regulations			<b>x</b>	
<b><i>Resources</i></b>				
Shortage of working facilities for coordination				<b>x</b>
<b><i>Finance</i></b>				
Lack of adequate finances to implement activities				
<b>Monitoring</b>				
Poor monitoring of activities at sea.				<b>x</b>
Lack of information on local resources-use patterns and practices and others				<b>x</b>

## **6.0 MANAGEMENT GOAL AND OBJECTIVES**

### **6.1 Mission Statement**

The Pemba Channel 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 key issues and threats facing PECCA have been identified following stakeholders input and experience for the last decade. The following strategies are considered critical for PECCA to deal with and should form the basis of management actions in pursuit of the vision, mission, and goals. 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 PECCA.

#### **Actions**

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.

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.

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 PECCA 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 PECCA. It will be essential that information is made available to tourists visiting both PECCA, 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.

**Strategy 2: 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.

**Action**

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 MPAs in Zanzibar.

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

**Strategy 3: Market MBCA as a wilderness and nature based tourism destination**

**Actions**

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

Develop a website

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

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

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 4: Promote whale and dolphin watching in PECCA**

There is a great need for the establishment of whale and dolphin watching in PECCA.

### **Actions**

Implement a scheme to protect marine mammals and other protected species by establishing of whale and dolphin watching in PECCA.

Develop protected species populations management plans.

### **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.

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.

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

Conduct research into the turtle population with respect to population trends, biology, foraging patterns and interaction with commercial and recreation use and take action to reduce or eliminate any adverse impacts.

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.).

### **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 PECCA. 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 PECCA mainly comes from plastic bags, 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 PECCA on the tourism industry.

### **Monitoring**

Establish monitoring protocols with clearly defined goals and objectives to assess the impact of plastic bags, 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 Programme

Strategy	Actions	Performance indicator	Implementation	Time Frame	Estimated Budget (US\$)
<b>Enforce regulations</b>	Strengthen capacity to undertake regular and targeted patrols	<ul style="list-style-type: none"> <li>Staff and resources capacity strengthened</li> <li>Regular patrols</li> </ul>	PECCA and key partners	2011-2015	400,000
	Promote community reporting of suspected illegal fishing activities	<ul style="list-style-type: none"> <li>Reporting of illegal fishing activities improved</li> </ul>	PECCA and community	2011	
	Provide adequate resources to enable the implementation of the management plan	<ul style="list-style-type: none"> <li>Performance evaluations</li> </ul>	PECCA 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"> <li>Voluntary compliance improved</li> </ul>	PECCA 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"> <li>Improvement in compliance</li> </ul>	PECCA and key partners	2011-2015	
	Establish village-based dolphin committees	<ul style="list-style-type: none"> <li>Village-based dolphin committees established</li> </ul>	PECCA and key partners	2011	
<b>Review existing regulations and enact new and relevant ones</b>	Implement a scheme to protect marine mammals and other protected species	<ul style="list-style-type: none"> <li>A scheme to protect marine mammals and other species implemented</li> </ul>	MCU and management team	2011	200,000
	Develop appropriate management and regulations for whale and dolphin watching ecotourism	<ul style="list-style-type: none"> <li>Regulations for whale and dolphin watching ecotourism developed</li> </ul>	MCU and management team	2011	
	Research and develop mitigation methods, including innovative ways	<ul style="list-style-type: none"> <li>Research project</li> <li>Mitigation methods developed</li> </ul>	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"> <li>• Whale watching established</li> </ul>	MCU and management team	2011-2012	
<b>Establish Sustainable Finance Mechanisms</b>	Develop a comprehensive business plan to define the needs and potential financing sources	<ul style="list-style-type: none"> <li>• A long-term financing plan developed</li> </ul>	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"> <li>• Funds secured</li> </ul>	MCU and management team	2011	
<b>Market MBCA as a wilderness and nature based tourism destination</b>	Develop and distribute promotional material for the MBCA to key tourism and information centres.	<ul style="list-style-type: none"> <li>• Promotional material is available</li> </ul>	MCU and key partners	2011-2015	500,000
	Develop a website	<ul style="list-style-type: none"> <li>• Website developed</li> </ul>	MCU	2011	
	Lobby relevant agencies to ensure MBCA is featured in tourism marketing and included on tourism routes	<ul style="list-style-type: none"> <li>• MBCA is featured in tourism marketing</li> </ul>	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"> <li>• Road signage erected</li> </ul>	PECCA	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"> <li>• Resource-use conflicts resolved</li> </ul>	PECCA and key partners	2011-2015	

<b>Promote scientific research</b>	Identify information gaps and develop research programmes aimed at gathering data on biodiversity and exploited species	<ul style="list-style-type: none"> <li>• Research projects</li> <li>• Scientific reports, papers and publications</li> </ul>	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"> <li>• Research projects</li> <li>• Scientific reports, papers and publications</li> </ul>	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"> <li>• Research projects</li> <li>• Scientific reports, papers and publications</li> </ul>	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"> <li>• Monitoring data and reports</li> </ul>	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"> <li>• Research projects</li> <li>• Scientific reports, papers and publications</li> </ul>	MCU and management team and key partners	2011-2015	
	Solicit research funding support	<ul style="list-style-type: none"> <li>• Funds secured</li> </ul>	MCU and management team and key partners	2011-2012	
<b>Plan and implement an integrated program of survey and monitoring to increase knowledge of natural and cultural resources and visitor use</b>	A systematic monitoring program needs to be established for the MBCA that evaluates fundamental resources	<ul style="list-style-type: none"> <li>• Monitoring system established</li> <li>• Monitoring data and reports</li> </ul>	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"> <li>• Monitoring data and reports</li> </ul>	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"> <li>• Monitoring data and reports</li> </ul>	MCU and key management issue	2011-2015	
Develop an effective education and awareness	Facilitate opportunities for local tourism operators to establish and	<ul style="list-style-type: none"> <li>• Visitor facilities open to public</li> </ul>	PECCA and key management issue	2011-2015	500,000

programme for the conservation area	manage visitor facilities				
	Commission educational and informative material including signage, posters, pamphlets and relevant literature	<ul style="list-style-type: none"> <li>• Posters, pamphlets, signage, literature</li> </ul>	MCU and key management issue	2011-2015	
	Providing education and information that maximizes voluntary compliance	<ul style="list-style-type: none"> <li>• Education and information provided</li> </ul>	MCU and key management issue	2011-2015	
	Encourage field excursions to the area by local schools, community groups and other stakeholder groupings.	<ul style="list-style-type: none"> <li>• Field excursions established</li> </ul>	MCU and key management issue	2011-2015	
<b>Reduce Pollution</b>	Raise awareness	<ul style="list-style-type: none"> <li>• Awareness raised</li> </ul>	MCU and key management issue	2011-2015	300,000
	Establish Pollution Prevention Principles	<ul style="list-style-type: none"> <li>• Pollution Prevention Principles established</li> </ul>	MCU and key management issue	2011-2015	
	Set enforcement methods	<ul style="list-style-type: none"> <li>• Enforcement methods set</li> </ul>	MCU and key management issue	2011-2015	
	Establish monitoring protocols with clearly defined goals and objectives to assess the impact of pollution.	<ul style="list-style-type: none"> <li>• Monitoring protocol established</li> </ul>	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 PECCA 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 PECCA 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 PECCA:

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 PECCA.
- The zones have been designated according to the preference by stakeholder and the need to maintain the ecological, cultural and social integrity of PECCA.

- 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 Areas designated as sensitive resource conservation zones**

#### **1) The Fundo Gap**

This area has high hard coral cover and diversity. Although the state of the corals is still good there are vivid signs of destruction that call for immediate conservation intervention. It can become a seed bank for regeneration of the other severely destroyed areas. It is therefore highly recommended to be considered as a specific user zone.

#### **2) The Shimba site**

Its close proximity to the shore and shallow depths make it much accessible by a big number of artisanal fishers using different fishing gears and crafts, some of which are severely destructive to coral reefs. A good number of tour operators and tourists also go to the same place for diving, snorkeling, dolphin viewing etc. Over- utilization of the area can obviously be seen. Observation over a period of time has shown a great deal of environmental destruction and decline in resources potential. It is therefore recommended to be considered as a no-take area for the first period of this GMP and moderation may be done accordingly depending on the monitoring and evaluation results.

### **8.4.2 Areas designated as specified use zones**

The area from Kaangale to Matumbini, south of Panza Island should be specific for trolling lines, long lines and traps.

- Eastern side of Misali Island should be used for line fishing and traps only
- Western side of Kashani Island along blue water will be specific for dolphin watching
- Mangrove forests will be for moderated resources extraction and research purposes
- Natural Mangrove open spaces may be used for EIA approved mariculture operations
- Beaches will be for recreations and picnic
- Inter-tidal zone will be reserved for seaweed farming activities

### **8.4.3 Areas designated as general use zones**

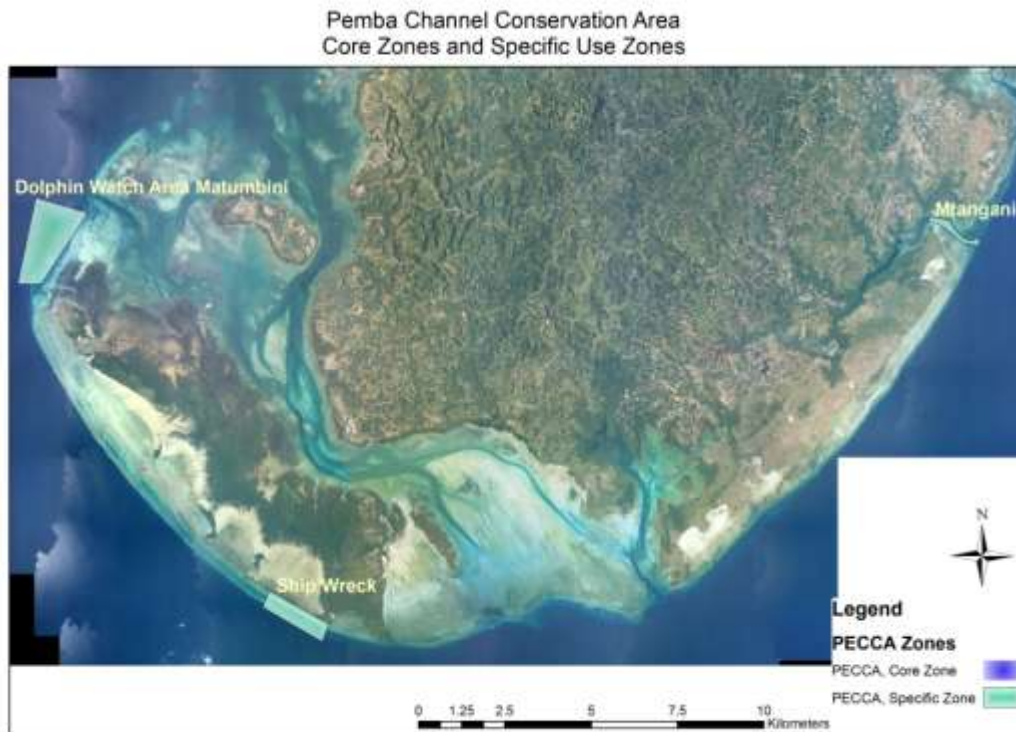
Areas which are not in core and specific zones

Pemba Channel Conservation Area  
Core Zones and Specific Use Zones



Pemba Channel Conservation Area  
Core Zones and Specific Use Zones





**Figure 4. MBCA core and specific use zones**

## **9.0 GOVERNANCE**

### **9.1 Policies, Legal and Institutional Framework**

A range of relevant policy and legislation tools exist to support implementation of GMP. That is from National legislation to PECCA legislation through international treaties and conventions. 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.

### **9.2 Policies**

Policies which are relevant for the GMP are presented. These include the Fisheries Policy (2002), the Environment Policy (1992), National Forest Policy (2005) 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 of 2000 states that the objectives of fisheries management are to:

- Increase fish catches in artisanal fisheries in a sustainable manner
- Stop the use of destructive fishing gear



- Promote the conservation of the marine environment through enforcement of the legislation, community participation and environmental education.

The policy promotes collaborative management and the development of local by-laws to guide local fishing, as well as co-management of coastal zone areas to ensure sound management practices, and it encourages coordination through integrated and holistic approaches. It does not go into detail or specify levels of community involvement and processes to achieve it, but states that the aims are to: “institute management plans, which will cater for the multiple use of the coastal zone ecosystems”.

The National Environmental Policy of 1992 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 policy promotes the protection and management of the country’s environmental assets in order to sustain development, using an integrated approach, appropriate research, monitoring, data gathering, environmental education, protection of indigenous species, and use of EIA procedures, among other activities.

The National Forest Policy of 2005 was prepared to establish priorities for integrated management and conservation. The policy deals with management, conservation and biodiversity of forest, mangrove and watershed habitats, forest products, and capacity building and financial policies. In relation to PECCA, its primary relevance is that it promotes community-level planning and management, the establishment of national parks and identifies the need for preparing management plans for protected areas, and retaining revenue from tourism generated funds for management. Policy 4 concerns the conservation and management of Zanzibar’s mangrove resources and identifies the need to set aside mangrove areas permanently.

The Tourism Policy of 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**

There are a number of other management plans exist which relate in part to the MBCA. For example, the Mangrove Management Plan, relates to the management of mangroves close to the

MBCA. 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.

#### **9.4 Fisheries**

The 1988 Fisheries Act has yet to be revised to reflect this, but nevertheless provides the necessary legal support for much of the enforcement of MIMCA, allowing for the establishment of closed fishing areas, prohibiting the capture of sea turtles, and banning the use of destructive fishing methods such as explosives.

#### **9.5 Investments**

The Zanzibar Investment Promotion Act (1986) requires investors to minimise 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.

#### **9.6 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.

#### **9.7 Natural resources**

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.

## **9.8 Environment**

The Environmental Management for Sustainable Development Act (Environment Act), No 2 of 1996 is the main supporting legislation for some of the earlier sustainable development policies. Part VIII of the Act covers Protected Areas and Biological Diversity and allows for the establishment of protected areas. It defines four categories (Controlled Areas (subsequently referred to as Conservation Areas), Reserves, Parks, and Sanctuaries), and gives powers to communities to make their own environmental management plans. The Act provides for revenue collection and management, and, at the recommendation of the Chief Conservator, for local community participation in management decisions for a given conservation area. It also requires the establishment of a National Protected Areas Board as a consultative authority to provide policy guidance. The board draws members from ministries responsible for natural resources, environment, local government, finance as well the scientific community and Tanzania mainland counterparts. The functions of the Board include to:

- Formulate, advise and coordinate the implementation of the policies of the government on PAs
- Recommend to the Minister responsible for the national protected area system those areas which are suitable for national protected area status
- Approve management plans for national protected areas
- Designate the appropriate lead institution to manage the national protected area system established under the Act.

Under a 1999 supplement to the Environment Act, a Zanzibar Nature Conservation Areas Management Unit is to be set up that will manage protected areas.

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 which is a missing link in the conservation areas. 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.”

## **9.9 Key Legal Instruments in Marine Protected Area Management**

As a result of the sectoral management approach, there are different legislation and acts that influence coastal resource management in Zanzibar. Fisheries Act 1988 in general and No. 8 of 1988 in particular, laws related to PECCA, Forest Act of 1996, The Town and Country Planning Decree, 1955, Zanzibar Investment Promotion Act 1986, District and Town Councils Act of 1994 (Town and Country planning, Zanzibar Investment Promotion Act, COLE and District and Town Councils Act provide the legal basis for tourism development)

The Environment Act of 1996 establishes a National Fund for Protected Areas Management, which once implemented will receive government subventions, donations, entrance fees and permits, and fines for violations of the Act. The 1999 supplement allows for the establishment of a Nature Conservation Development Fund that will help to support the work of the Nature Conservation Areas Management Unit. Neither of these Funds is operational and currently revenue from entrance fees is managed at PECCA under separate arrangements.

### 9.10 Government 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.

### 9.11 International Treaties

**Table 5. International treaties and conventions relevant to PECCA**

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]
UNESCO	World Heritage Convention 1975 [Ratified 1977]

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

### **9.12 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

### **9.13 Management of PECCA**

The management and operational frame work for the management PECCA 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 PECCA are in the domain of the Manager supported by delegated professionals and support staff in the field.

The management of the PECCA operates at the levels of the village and district. In each of the 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 Sheihas 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 PECCA activities

The District Conservation Committees (DCCs), in turn, articulate the views of the VCCs to District authorities and the Standing Committee.

#### **9.14 PECCA 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 PECCA 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 9 permanent employees seconded from the DFMR is responsible for daily management of the area, with patrol officers based in the area for patrolling, recording and training activities.

#### **9.15 PECCA Physical Resources**

PECCA has 2 motor vehicles, 4 motorcycles. 2 patrol boats and diving equipments to comb for the entire area; and there are also computers, printers, photocopies and radio communication equipment installed. There is a field office new building at Weshu. All the physical resources are supported by MACEM.

#### **9.16 PECCA Finance Resources**

MIMCA is financed through a combination of government subvention, donor funding, and visitor fees. The government subvention covers some of the salaries and the office costs. Currently, all activities of the MIMCA are funded by MACEMP. Seventy percent of the revenue raised is retained for the management activities of MIMCA and 30% is retained and granted to the local communities to support development programme as a form of benefit sharing.

Tourists and most visitors are charged a daily entrance fee that includes guided walks in the forest and turtle nests, as follows.

- US\$5 for international visitors,
- US\$2 (Tsh 2000) for residents
- US\$20 for large boats anchoring
- Tsh 2000 for small boats anchoring
- US\$200 for filming

Additional donor funding has come from the McArthur Foundation, Canadian International Development Agency (CIDA), the Mcknight Foundation, AWF, the Dulverton Trust and Kili Climbers. Donor funding has always/usually been channelled through a technical assistance agency.

As the GMP 2005 report puts PECCA will still be dependent on donor support for some time, given the lack of sustainable independent funding sources available to it within-country. The third phase of MICODEP is committed to providing support for PECCA and a number of closely relating activities, and will be an important source of donor support. This project phase has three main objectives:

- promoting livelihood security for the 36 villages
- Empowering communities for sustainable use and management of PECCA
- Protecting PECCAs biodiversity

The associated, proposed ‘Tanzania Community-based Coastal Resources Management and Sustainable Livelihood Project’, to be supported by the Japan Social Development Fund (JSDF) (expected budget of US\$1.8 million) may provide some support.

An urgent priority is to develop a strategy for achieving financial sustainability. Although revenue from entrance fees shall grow and looks promising for PECCA, 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**

Fees will be efficiently collected to ensure that the effort of patrol officers are not merely weighted toward the collection of fees, but rather the enforcement of zoning provision that will govern unsustainable resource use.

Visitor’s entrance fees will be paid by tour operators, and hoteliers, that bring their visitors to the conservation area, by purchasing tickets or vouchers from the PECCA office. PECCA management will not be involved in issuing licenses or collecting revenues from artisanal fishers.

### **10.3 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 PECCA order. The most important elements in achieving the required controls are detailed budgeting, clear account procedures and transparent reporting. The manager 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 PECCA 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.

#### **10.4 Distribution of Net Revenue**

The money collected will be used for the management of PECCA 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 PECCA surrounding villages involved in the conservation of the area, percentage of which is still negotiated.

#### **10.5 The Permit System**

##### **10.5.1 Local resident fishing licenses**

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

##### **10.5.2 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 Amendments Act 2003 is the Director of the Department of Fisheries and Marine Resources, Zanzibar.

##### **10.5.3 Water sport licenses/tickets**

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

##### **10.5.4 Filming licenses**

Issued to any person(s) entering PECCA 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.

##### **10.5.5 Study tour/research license**

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



## **Issuing Authority**

The licensee Issuing Authority for the above mentioned activities according to is the PECCA management.

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

## **11.0 COMPLIANCE AND MONITORING**

### **11.1 Compliance and Enforcement**

Implementation of the management strategies as outlined in this plan will be effective to curb illegal activities in the PECCA only when law enforcement team are highly visible on site. This will require a carefully developed compliance and enforcement plan. The plan will be prepare in consultation with relevant law enforcement agencies such as KMKM, marine Police etc. The primary goals of this strategy are to encourage a high level of public awareness and support the values of PECCA, 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 PECCA.

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 material to inform stakeholders of the purposes of PECCA, details of restrictions and to raise awareness on the conservation values of the PECCA.

## **11.2 Performance Assessment (Evaluation)**

Performance assessment program for PECCA 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 bench mark 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 PECCA 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.

## **11.3 Reviewing the GMP**

The management plan for PECCA will operate for five years unless revoked or amended sooner by another management plan for PECCA. 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 PECCA.

## **12.0 MANAGEMENT GUIDE**

### **12.1 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.

### **12.2 Activities Prohibited in All Zones**

Outlines below are activities that are prohibited within the Menai bay Marine Conservation Area as a whole or those are restricted within particular zone types. It follows the resource-use strategies for zone types outlined in section 6.4 of the previous chapter. 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:

#### **12.2.1. Prohibited extraction of living resources**

- Use of beach seine nets, including those known locally as “juya” “kavogo”, juya la kusini, juya la kojani, kokoro or “mtando”
- 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

### **12.2.2 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

### **12.2.3. 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)

### **12.2.4 Prohibited tourism activities**

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

### **12.2.4 Introduction of alien species of plants and animals**

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

### **12.2.5 Prohibited marine transportation and shipping activities**

- Shipping activities
- Speeding of commercial marine vessels

## **12.3 Guide to Regulated Activities**

### **12.3.1. 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 PECCA
- 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 PECCA 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.

### **12.3.2 Mud brick making and coral mining**

- Mud brick making will be restricted to PECCA 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.

### **12.3.3 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 PECCA residents who have obtained a permit to do so.
- Harvesting mangroves for commercial purposes within the PECCA boundaries is prohibited.
- Non-residents caught harvesting mangroves within PECCA 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.

### **12.3.4 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 PECCA 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 PECCA area

### **12.3.5 Salt making**

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

### **12.3.6 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

### **12.3.7 Scientific research**

- All scientific research within the PECCA 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 PECCA
- All the results from scientific research carried out in the Menai bay will be forwarded to PECCA 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 PECCA as soon as they become available
- Failure to abide by these requirements may result in a ban on further scientific research within the PECCA for the individuals/institutions involved

### **12.3.8 Regulated tourism activities**

- Sea-planes

### 13.0 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.

#### 13.1 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.

#### 13.2 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 PECCA
Maps of currents	No updated information available
Bathymetric	No updated information
Tide tables	No updated information available
Baseline habitat maps Division	only for terrestrial vegetation through the Forestry
Community descriptions	Environmental Management plan for each
village Species list	No information
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

#### 13.3 Monitoring and Review

A strategic programme for monitoring the health of natural resources in the PECCA 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 PECCA management. Success Projects to ensure PECCA 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 PECCA for operators to fulfill.

#### **13.4 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 PECCA stakeholders.

#### **13.5 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 PECCA 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.

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