



UNITED REPUBLIC OF TANZANIA
MINISTRY OF LIVESTOCK AND FISHERIES DEVELOPMENT

MAFIA ISLAND MARINE PARK

GENERAL MANAGEMENT PLAN



BOARD OF TRUSTEES
MARINE PARKS AND RESERVES UNIT

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District authority in Mafia provided immeasurable moral and material support throughout the planning and implementation process of MIMP General Management Plan of 2000. This time around they have been equally supportive in the cause of revising this plan.

Indeed, the principal stakeholders, including villagers and commercial investors within Mafia Island Marine Park are warmly acknowledged for their enthusiasm, patience and invaluable contributions made in developing this revised general management plan.

PREAMBLE

This document is the revised general management plan for the Mafia Island Marine Park. It replaces the general management plan that was implemented from 2000 to 2010 and will serve as the primary management document for the Mafia Island Marine Park during the next ten years.

This revised document is the result of MIMP's experience of over ten years of implementing the strategies and activities detailed in the General Management Plan of 2000. It was necessary to revise and adjust the former General Management Plan in order to reflect new issues, lessons learnt, or changes in management objectives, adapting the contents according to new information gained from monitoring and evaluation.

Not only this document intends to update stakeholders on the outcomes of successfully implemented strategies and accomplishments that were merely plans on paper over ten years ago but also disseminate useful information about the MIMP and its management strategies, activities and products. The hope is that this information, which charts the next 10 years of MIMP, will enhance the communication and cooperation which is so vital in protecting important national marine resources.

Revisions have been made in both the content and form of the original work. Where necessary, the content has been brought up-to-date and within current knowledge. The form of this revised edition has undergone a slight change in format to facilitate its easy readability.

In this revised GMP, Vision and Mission statements of MPRU have been added. Likewise, major achievements recorded by MIMP over the past ten years of implementing the original GMP have been outlined. Generally, the changes are relatively few though the Co-management part has been improved significantly. The reason behind was the need for updating strategies and clarifying certain explanations to various stakeholders.

The review process for this plan was carried out based on principles laid down in the Marine Parks and Reserves legislation.

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APPROVAL PAGE

Implementation of this Revised General Management Plan has been endorsed by the Advisory Committee of the Mafia Island Marine Park (MIMP), pursuant to sections 5 and 15 of the Marine Parks and Reserves Act No. 29 of 1994, at its meeting on 14th May 2011.

Mr. Sadiki Bakari Sadiki
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MIMP Advisory Committee

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Warden-in-Charge, MIMP
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Implementation of this Revised General Management Plan has been approved by the Board of Trustees for Marine Parks and Reserves, pursuant to sections 4 and 15 of the Marine Parks and Reserves Act No. 29 of 1994, at its thirtieth (30th) Ordinary Board Meeting on 5th July, 2011.

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Board of Trustees

Dr. Abdillahi Chande
Unit Manager, MPRU
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This Revised General Management Plan has been adopted by the Minister of Livestock and Fisheries Development pursuant to section 14 of the Marine Parks and Reserves Act No. 29 of 1994

Hon. Dr. David Mathayo David (MP)
Minister of Livestock and Fisheries Development
United Republic of Tanzania

VISION

"Marine Protected Areas in Tanzania become the joy and pride for all".

MISSION

"To establish and manage Tanzania's marine protected areas for sustainable use"

MOTTO

"Let us share the gift of nature together"

ACRONYMS

AC	Advisory Committee
CPUE	Catch Per Unit Effort
DAQ	Division of Aquaculture
DFID	Department of Foreign International Development (UK)
DoFD	Division of Fisheries Development
DRTE	Division of Research, Training and Extension
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
GIS	Geographical Information System
GMP	General Management Plan
GPS	Global Positioning System
ICM	Integrated Coastal Management
MACEMP	Marine and Coastal Environment Management Project
MCS	Monitoring, Control and Surveillance
MIMP	Mafia Island Marine Park
MLFD	Ministry of Livestock and Fisheries Development
MOU	Memorandum of Understanding
MPRU	Marine Parks and Reserves Unit
NGO	Non-governmental Organization
TAFIRI	Tanzania Fisheries Research Institute
URT	United Republic of Tanzania
VEUs	Village Enforcement Units
VLCs	Village Liaison Committees
WIC	Warden-in-Charge
WWF	Worldwide Fund for Nature

FOREWORD

Tanzania's coastal strip has historically been a centre of wealth creation, through trade, extraction of natural resources, and most recently from tourism and mariculture. Through the centuries, this wealth has attracted people to Tanzania's coastal areas, both from within the country and beyond its borders, creating a rich and varied cultural heritage. Alongside this human realm, Tanzania's marine and coastal areas are also rich in biological diversity, harbouring a wealth of fish species, marine invertebrates, marine mammals, reptiles, birds and plant life. As such, they have increasingly come to the attention of those concerned with the conservation of our country's natural heritage, in terms of its wildlife, biodiversity and scenic splendour.

The present population along Tanzania's 1,400 km coastline is approaching 10 million people. Outside of the trading hubs of Dar es Salaam, Zanzibar and Tanga, the livelihoods of many coastal people has increasingly come to depend upon small-scale use of fisheries, mangroves and non-living organisms including mineral resources, to provide all the essentials of life. Increasingly, these marine and coastal natural resources, and the associated biodiversity, have come under a severe threat from over-use, unplanned commercial development and destructive practices.

In this context, the Government of Tanzania has a twin obligation; both to safeguard the livelihoods of coastal people and future generations, and also to ensure the continued survival of the rich variety of living organisms bequeathed by nature.

To respond to this challenge the Tanzanian government established the Board of Trustees for Marine Parks and Reserves in 1996, to oversee a system of marine protected areas wherein special management effort can be focused. Whereas the marine reserves provide total protection from extractive resource-use to small areas, the marine parks aim to achieve the sustainable accommodation of livelihood, environmental and commercial interests. The key to success of this ambitious undertaking is an active and equal partnership between government, communities and investors. As such we must be confident constantly to evaluate our performance, to heed constructive suggestions and to welcome contributions from outside.

Mafia Island was the first marine park to be gazetted under this national initiative. I have every reason to say that over the past ten years MIMP has managed to live to the expectation of the nation. Not only that the ecosystem has improved tremendously but also there are vivid indicators of improved sustainable livelihood among key stakeholders.

This Revised General Management Plan for MIMP is the main instrument that specifies how management of the Mafia Island Marine Park is to be conducted in the next ten years. It is an instrument not just for planning but also for operational management. Indeed it has documented the way to reach management goals and describe how to manage the resources, at present and in future. The document contains a description of the resources especially its current status, management objectives and more importantly is how these objectives are to be achieved. Another important feature of this Revised GMP is that it outlines how the plan has been reviewed and the consultative process which was followed.

Hence, the great challenge ahead is for MIMP to put this revised GMP into practical effect so that the Park would continue to be a leader in community based marine protected area management not only for Tanzania, but also for the whole East African region and beyond. Indeed, it is my pleasure to take this opportunity to extend all possible good wishes to managers and stakeholders in fulfilling our mission towards meeting the marine conservation and sustainable livelihood challenge.

Hon. Dr. David Mathayo David (MP)
Minister of Livestock and Fisheries Development
United Republic of Tanzania

EXECUTIVE SUMMARY

This Revised General Management Plan (GMP) translates the Tanzania Government's commitment to the conservation of marine resources into a plan of action for the management, use and development of the Mafia Island Marine Park.

The Marine Parks and Reserves Act No. 29 of 1994 provides the legislative basis on which to establish marine protected areas in Tanzania, under the guidance of the Minister responsible for Fisheries Sector, and the Board of Trustees of Marine Parks and Reserves. The Resolution of the National Assembly to declare the Mafia Island Marine Park was passed on 27th April 1995 with an effective date of 1st July 1995. The marine park boundary was officially gazetted on 6th September 1996. The Marine Parks and Reserves Act No. 29 of 1994 provides that a General Management Plan shall be adopted for each marine park. It shall contain, amongst other things; a description of the park; and local resident users; a statement of its objectives; and an account of the means and methods by which those objectives will be achieved, including a zoning plan.

The marine park area extends across some 822km², more than 75% of it is below the high water mark. The area hosts an outstanding mosaic of tropic marine habitats including coral reefs, seagrass beds, mangroves, and inter-tidal flats. In addition, a remnant block of threatened lowland coastal forest survives along the eastern seaboard of the island, roughly half of it within the marine park boundary. Two species of sea turtle use Mafia's beaches as nesting grounds and the area has been recognised internationally as a critical site for biodiversity. Several sites of historic ruins lie within the marine park area, some dating back to the 13th Century. Mafia Island's separation from the mainland and the absence of industrial development have ensured that its surrounding waters are some of the least contaminated in Tanzania. The marine park area has national importance as one of the few remaining reef complexes within Tanzania's coastal waters in relatively intact condition.

Mafia Island is distinguished from terrestrial parks in Tanzania and indeed from other marine protected areas in western Indian Ocean region, by the large number of people residing within the park boundary. Extrapolation of the most recent available census data from 2000 indicates that the number of residents may be as high as 23,000. Up to 50% of these people depend heavily on the exploitation of marine resources for their livelihoods. Another 10 – 15% has traditionally relied on extracting various resources from Mlola coastal forest lying within the park boundary. However, in the past three decades both marine and forest resources have been in decline. The effects of dynamite fishing, uncontrolled coral mining use of small-meshed nets and beach-seine nets and the practice of shifting cultivation in the forest had made conservation measures an urgent priority by the time the park was established in 1995.

Since then, the development of a small-scale but nonetheless economically important tourism industry within the marine park has added further complexity to the prevailing socio-economic situation. In recognition of the importance of working in close collaboration with all groups with an economic or cultural interest in the marine park area, especially resident communities, the initial management plan and this revised version were developed through a participatory planning process.

The objectives of the Mafia island marine park, drawn from both the Marine Parks and Reserves Act No. 29 of 1994 and from subsequent community consultation, are:

- (i) The conservation of biodiversity and ecosystem processes;
- (ii) The promotion of sustainable resource use and rehabilitation of damaged ecosystems;
- (iii) The involvement of local residents in the development and management of the park, ensuring that they have priority access to resources and economic opportunities.
- (iv) The stimulation of rational development of under utilised natural resources;
- (v) The promotion of environmental education and information dissemination;
- (vi) The facilitation of research and monitoring of resource conditions and uses;

In addition as an outcome of a participatory planning workshop held at Mafia Island Lodge in September 1999, the following were added to the specific objectives of the Mafia Island Marine Park:

- (vii) The conservation of historical monuments, ruins and other cultural resources;
- (viii) The facilitation of appropriate eco-tourism development.

The broad aim of the management actions and strategies is to fulfil these objectives in a manner that does not create conflict between user groups, or compromise the conservation goal of the park. To some extent this will be achieved by adopting a collaborative approach that continues to involve communities and other stakeholders in all stages of planning and implementation. Additionally, there is a mechanism at the heart of management strategy to assist the integration of conflicting interests, namely the zoning plan.

The zoning plan divides all areas within the park boundary into 3 types of use-zones; *Core*, *Specified-use* and *Regulated-use*. The types of zones have different regimes of protection and permitted activities depending on the respective importance to conservation and economic activity of the areas designated under each. The aim is to harmonise otherwise conflicting conservation and livelihood objectives by spatially separating extractive resource-use areas from sensitive habitats. This plan provides detailed guidance as to which type of activities are prohibited either from the park as a whole or from particular zone types and provides the basis for further legislation.

Alongside the zoning plan, the marine park will continue to implement a series of community-based programmes to assist the development of supplementary income generating activities, including under-utilised resources and tourism and to disseminate appropriate technologies for improved sustainable livelihood. The primary aim of these programmes, to be implemented mainly through environmental education, is to relieve pressure on existing marine and forest resources. Also, allow some areas to be reserved for the conservation of biodiversity and ecosystem processes and allow utilisation in the remaining areas in order to achieve sustainable levels.

CHAPTER 1

INTRODUCTION

This chapter briefly introduces the purpose of this revised management plan, its intended audience and a short history of the development of the Mafia Island Marine Park to date.

1.1 WHY A GENERAL MANAGEMENT PLAN

This revised General Management Plan (GMP) has been prepared to guide the management and development of Mafia Island Marine Park (MIMP) for at least the next 10 years. The preparation of this document underscores the commitment of the Board of Trustees of the Marine Parks and Reserves to manage areas designated as marine parks through a general management plan in compliance with section 14 of the Marine Parks and Reserves Act No. 29 of 1994.

The planning efforts that resulted in the production of this revised general management plan have relied heavily on participatory planning approach facilitated by interactive workshops. Park management authorities, local residents, business and local communities and other government and non-governmental stakeholders have worked together to develop a collective interpretation of the issues and problems facing this park.

This revised management plan is the principal planning document for the marine park, and aims to provide a strategic framework for long-term conservation and sustainable development. More specifically it also seeks to:

- ◆ Identify the key elements of the marine park 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 these threats;
- ◆ Provide a framework for working in partnership with local communities to develop sustainable resource-use and to diversify income generating activities to support residents' livelihoods;
- ◆ Provide a 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 further subsidiary legislation, planning documents, operational plans and day-to-day management decisions.

1.2 TARGET AUDIENCE OF THE GENERAL MANAGEMENT PLAN

This plan is intended to be a broadly accessible document that will inform all interested parties in a transparent manner of the concepts and strategies behind the management of the marine park. As such, the plan is designed to be read by:

- ◆ Marine parks and Reserves staff in Tanzania;
- ◆ Other Government staff involved in the management of the marine parks in Tanzania;

- ◆ Government staff involved in the broader field of natural resources management;
- ◆ Local communities;
- ◆ Investors in Mafia including tourist operators and commercial fisheries operators;
- ◆ Researchers, scientists and other technical experts working in related fields;
- ◆ People involved in marine protected areas management around the world; and
- ◆ Visitors to Mafia with a particular interest in conservation and development issues.

1.3 HISTORICAL DEVELOPMENT OF THE MAFIA ISLAND MARINE PARK

The idea of establishing a marine park in Mafia Island began in the 1960s, when recommendations were made for the protection of coastal areas and marine resources in Tanzania through the establishment of marine parks, reserves and sanctuaries (Ray, 1968). These resulted in the declaration of eight small reserves along the Tanzanian coast under the Fisheries (Marine Reserves) Regulations of 1975. Two of these are in what is now the Mafia Island Marine Park (MIMP), namely; Chole Bay and Kitutia Reef. The small size of these areas and the lack of financial and human resources for enforcement made these areas not be managed accordingly. Dynamite fishing and other destructive and unsustainable resource utilization continued unabated. The inadequacy of management of these small areas led to the realisation that the creation of a larger marine protected area would make it possible to combine conservation of reefs and other key coastal and marine areas with management of resources to ensure sustainable long-term local economic development.

From 1988, baseline studies were conducted through the Frontier-Tanzania project, a collaborative programme of the University of Dar es Salaam (including the Institute of Marine Sciences, Zanzibar) and a UK-based conservation research organisation. The studies aimed to determine the status of coastal, marine and other natural and cultural resources, and to establish whether their use could be sustainable. The results provided important baseline information for developing recommendations for the marine park management plan.

In 1991, The Principal Secretary of Ministry of Natural Resources, Tourism and Environment appointed a Steering Committee to oversee the development of the marine park. The Committee included representatives from the Fisheries Division, the Institute of Marine Sciences (IMS), the Member of Parliament (MP) for Mafia, the Worldwide Fund for Nature (WWF), the Regional Natural Resources Office (Coast Region), and Wildlife Conservation Society for Tanzania. The Steering Committee recognised the need for an assessment of the legislative basis for marine protected areas in Tanzania. In September 1991, an FAO legal team, working in collaboration with the Attorney General's chambers, developed the legal framework for the Marine Parks and Reserves Act and Regulations. Also during the year 1991, the World Wildlife Fund (WWF) initiated a programme of support for the development of the marine park.

The Steering Committee next recognised the need for a public forum at which the inhabitants of Mafia Island and other interested parties could air their views. The result was a major public workshop held in October 1991 in Mafia, to consult the communities and initiate the planning process. The workshop was attended by over 70 participants, divided equally between residents of Mafia and mainland Tanzania and including representatives from national, regional and local government agencies and institutions. The outcome of the workshop was positive and the Ministry of Natural Resources, Tourism and Environment published the proceedings.

A lengthy but ultimately successful process was started, culminating in the preparation of the Marine Parks and Reserves Act No. 29 of 1994. Under the provisions of this Act, the National Assembly passed a Resolution on 27th April 1995 declaring part of Mafia Island to be a marine park, with effect from 01 July 1995. The boundaries of the Park were later gazetted under Government Notice No. 200 published on 6th September 1996.

1.4 ACHIEVEMENTS

There have been many achievements in the MIMP since the institution of the Marine Parks and Reserves Act No. 29 of 1994 and the implementation of the General Management Plan since year 2000. An overview of the MIMP major accomplishments is outlined hereunder:

- i) MIMP has managed to slow down the risks and threats to marine environment from human activities.
- ii) Destructive fishing methods particularly; fish dynamiting, poisoning and beach seining have been reduced significantly.
- iii) Tourism development in the Park has been regulated adequately leading to an increase in revenue from tourism. For example, in June 2010, MIMP revenue collection from tourism and fisheries sectors increased to T. Shillings 320 million compared with only T. Shillings 10.6 million realized in 2001. Again, 30% of the amount generated in 2010 has been ploughed back to MIMP Villages and District Authority to facilitate social services (water supply, education and health).
- iv) Sensitive marine areas including spawning and nursery areas have been protected adequately.
- v) Turtle nesting beaches have been protected.
- vi) Degradation of coral reefs has been reduced significantly.
- vii) Research into marine process has been greatly facilitated by availability of undisturbed sites.
- viii) MIMP has created awareness among key stakeholders that MPA can play an important role in protecting the biodiversity in marine environment just like the way National Parks are doing in the terrestrial environment. Consequently, the idea of establishing MPA is slowly finding a formal place in the management of Tanzanian fisheries.
- ix) The measures have enhanced fishery yield; Research has shown that MIMP intervention over the past twelve years has rejuvenated fisheries by providing protection for over-exploited species. Several populations of marine organisms have recovered so well that fish densities might be comparable to those that existed three decades back. Likewise, a comparison of Catch per Unit Effort (CPUE) between the Park and an outer area has shown that the former has higher rates than the later. The same applies when size of individual fish being caught are compared. For example, in 2009, fishers in all the 13 villages increased their total catch (fish and octopus) to an estimated 3,854 metric tones compared to 1,394 metric tones recorded in 2002, when monitoring of catch data was initiated.
- x) Recovery of mangroves has been noted in the Park, an achievement which can be attributed to MIMP initiative in fostering awareness and replanting campaigns.
- xi) Dugong sightings have increased, which may suggest that the population is increasing over time.
- xii) Sea grass beds have improved.

- xiii) Supplementary income generating activities have been introduced. For example, by June 2009, the number of villagers involved in additional income generating activities (pearl and sea-weed farming; bee-keeping, handcraft products and tourism-related activities) has increased to 3,000 earning a total of about T. Shillings 200 million per annum from zero in 1999, when income generating activities were first initiated.
- xiv) MIMP has introduced adoption of environmentally-friendly fishing gears. For example, by June 2010 a total number of 466 fishers benefited from fishing gear exchange scheme in which a total of T. Shillings 382 million was spent to procure fishing gears including outboard engines, dhows, gill-nets and other accessories in order to improve their capacity in conducting ecologically-friendly fishing.
- xv) There has been general increase of key natural resources and rare species. For example, the status of MIMP natural resources has shown a steady upward trend since 2000 with on going recovery of hard corals, mangroves, finfish stocks, octopus, marine turtles, dolphins, dugongs and whale sharks as a direct and positive result of improved marine environment.
- xvi) Core zones are being protected successfully whereby extractive resource-use is prohibited entirely. However, controlled tourism and scientific research are permitted.
- xvii) Specified-use zones which provide intermediate level of protection within the park warrant primary conservation and are important to resident resource-users.
- xviii) General-use zones have also been properly managed and provide priority access for sustainable resource-use to park residents and outsiders, thereby relieving resource-use pressure from zones with higher level of protection.
- xix) Collaborative management and community participation has improved. Stakeholders in communities have joined efforts and strengthen involvement of different groups of stakeholders in the effective implementation of integrated multi-use approach and conflict resolution among themselves. Mechanism for increased participation has been established from the grass root through Village committees to the district level with emphasis on broad base representations of the key stakeholders and gender.
- xx) Research and Monitoring has produced significant scientific data, hypothesis testing, mapping, trend documentation, and wide dissemination of these findings world-wide through a number of different technical platforms.
- xxi) Education and outreach programmes have provided basic frames of references on environmental education to majority of youngsters and old people in Mafia District and beyond.
- xxii) Enforcement and Regulations have improved over the past decade through community participation.
- xxiii) The potential benefits of cultural heritage resources are gradually being recognized and are achieved through a number of extension initiatives.
- xxiv) Institutional cooperation has been strengthened leading to joint enforcement operations with other relevant authorities including District and National government authorities.
- xxv) MIMP has managed to put in place a system of collecting revenue (resource rent) and share it among principal stakeholders.
- xxvi) Generally, the GMP of 2000 had a total of 65 outlined planned activities whereas MIMP managed to accomplish 47 of the activities that is to say 72 percent achievement. On the other hand, 14 or 21% of the planned activities have been implemented to a varied degree of success and only 4 or 6% are yet to be implemented.

1.5 CHALLENGES

Despite of the substantial achievements as outlined above, MIMP is still faced by a number of challenges including the following:

- i) Fishing pressure caused by influx of outside fishers to the marine park continues to be a problem. This negative practise causes localised over-fishing. Some popular commercial resources such as sea cucumbers, lobsters and gastropods (curio shells) have clearly been heavily over-exploited in some areas of the park almost to a point of exhaustion hence undermining fisheries productivity and biodiversity.
- ii) Use of unsustainable fishing gears and other practices including the use of outlawed fishing gears and methods by some residents and outside fishers is still a problem. The gears such as pull nets and other small meshed nets that drag the sea-floor result in mechanical damage to sensitive benthic habitats (coral reefs and sea- grass) reducing the productivity and biodiversity of the habitats steadily thus depleting their tourism value.
- iii) Although fishing by processing plants is prohibited inside the Park but commercial fish processors exerts increased pressure on the resource since the number of agents or collectors supplying the raw materials to the fish processing plants is increasing over time. This tendency is exerting more pressure on high valued fish species including octopus, squids, and lobster. In most cases they over collect under-sized organisms.
- iv) Live sea coral mining is still a problem and demand seems to be increasing. Although dead sea coral collection is allowed, by special permits, to park residents for domestic purposes only it seems the demand is still very high tempting increased exploitation of live corals. Indeed, live sea coral mining for commercial sale has damaging consequences as it causes loss of reef habitat, a reduction of fish productivity and biodiversity; and potentially erosion of beaches and other sensitive coastlines.
- v) Unsustainable cutting of mangroves for dhow construction by park residents causes disruption to the reproductive cycle and abundance of commercial and other fishes; and some invertebrate species, which take refuge in mangrove areas. It may also cause erosion of beaches and degrade the visual environment for tourism.
- vi) Use of coastal forest resources including clearance of natural forest vegetation for agriculture, felling of indigenous trees for timber and extraction of poles for house construction by park residents cause loss of forest cover and biodiversity on the terrestrial parts of the park.
- vii) Deliberate killing of threatened species such as dugong and marine turtles by fishers who place their shark nets around nursery and feeding areas during peak breeding undermines conservation efforts. Dugongs (sea cows) are hunted for their meat, whereas, the turtles are sought for their meat, shells and eggs.
- viii) Development attempts in some historical and cultural sites which have notable scenic beauty by tourism operators and private developers undermine the integrity of cultural and historical resources including ruins and sacred sites, which should be maintained according to traditional requirements.
- ix) Tourism development; is picking up, whereas the number of visitors is gradually increasing as tourism facilities are improving. The main issues of concern in the ongoing tourism development include:-
 - ◆ over-exploitation of local fresh water supplies;
 - ◆ improper disposal of solid wastes, wastewater and sewage;
 - ◆ habitat damage, especially mangrove clearance to create beach fronts;
 - ◆ over-crowding in snorkelling, SCUBA diving areas and anchors damage coral reefs;
 - ◆ disturbance of the coastline from construction too close to the shore;
 - ◆ visual pollution from anaesthetic construction;

- ◆ friction with local residents over land acquisition and access rights;
 - ◆ overcrowding in tourism areas by local homes for prospects for employment in tourist hotels;
 - ◆ cultural erosion, unwanted behaviours including prostitution and drug abuse.
- x) Potential pollution especially from oil and gas exploration as well as oil spills from ships is another challenge facing the park. Currently there is exploitation of gas at, Songo Songo Island and Mkuranga which are potential threats to corals and the Park in general.
- xi) Narrow income base for local communities due to underutilized income generating opportunities. This presents a major challenge to the prospect of sustainable resource-use as the resource-users are compelled to adopt more destructive harvesting techniques.
- xii) Inadequacy of infrastructure taking into consideration the remoteness of the Park. The challenge is compounded by lack of economic air and convenient sea transport, poor telecommunication and poor condition of the internal roads that make investments and maintenance costs inevitably high in the Park.
- xiii) Low support from the Police and Judiciary including poor prosecution by police and lenient sentences being imposed by magistrates to offenders involved in unsustainable resource-use practices hardly generate deterrence and at most encourages continued environmental destruction in the Park.
- xiv) Low support of some local community members on marine conservation issues; low environmental awareness, poverty, political and external influence among local communities undermine conservation efforts being undertaken by the Park Management.

1.6 THE GENERAL MANAGEMENT PLAN REVIEW PROCESS

The development or revision of GMP is the responsibility of MIMP but as outlined in the legislation; the Park is supposed to make sure that all interested parties, in the resources which is being managed, should participate in the process of its development or revision. Consequently, all MIMP interested parties were offered the opportunity to participate in the review of this General Management Plan. As a matter of fact, the identification and consultation with principal stakeholders in various village communities was one of the first steps to be conducted in the course of developing this document. The initiative was undertaken believing that the earlier the interested parties are involved in the process the greater the sense of ownership of the final General Management Plan they will have. Indeed, by participating in the process they have become more aware of their rights and responsibilities towards resource management and would tend to comply better with management provisions.

Comments and suggestions collected from principal stakeholders in various villages were consolidated into a discussion paper, which was discussed during a two day consultation workshop held from 02nd to 03rd February 2011 in Mafia. The Workshop was attended by over 90 stakeholders including representatives from all MIMP villages and other key stakeholders from the District and National authorities. All steps in the consultation with interested parties including comments on discussion paper have been formally structured and described in this General Management Plan. Key suggestions have been integrated into management actions and strategies Chapter.

Likewise, the public consultation process included representatives of all management agencies that have responsibility for management of activities or resources that are related to or affect marine resources or to the environment that supports them. The rationale behind their inclusion was recognition of the need to influence the management of impacts on the ecosystem and protect those habitats and resources that are critical within the Park.

The development of this General Management Plan required extensive information about the marine resources and the social, economic and natural environments within which MIMP operates. The gathering of information, in the form of data or expert knowledge, including Local Ecological Knowledge, was conducted through various studies and the results were made available to MIMP.

I thought to be added that public comments sought through meetings and surveys were analyzed and formally responded to. Then an initial draft General Management Plan was developed and released. Public comments were again sought, analyzed and formally responded to, before consolidating the final document. The final General Management Plan was developed after completion of the whole process. This was reviewed by the Advisory Committee and the Board of Trustees before submission to the Minister for adoption.



Participants of the stakeholders' workshop on review of MIMP GMP

CHAPTER 2

RESOURCE DESCRIPTION

The waters around Mafia Island host an outstanding mosaic of tropical marine habitats including coral reefs, sea grass beds, mangroves, and inter-tidal flats. In addition, a remnant block of threatened lowland coastal forest survives along the eastern seaboard of the island. The area has been recognized internationally as a critical site for biodiversity. It has national importance as one of the few remaining reef complexes within Tanzania's coastal waters in relatively intact condition and the productive fisheries and other marine resources provide food and income for the local community.

2.1 AREA AND LOCATION

Mafia Island and its chain of small islets lie approximately 120 km south of Dar Es Salaam and 20 km offshore from the eastern extent of the Rufiji Delta (Fig.1). Rufiji delta is one of the largest delta systems in Africa. To the east of Mafia Island there is an open water of the Indian Ocean. The main island of Mafia is about 48 km long and 17 km wide at its widest point. Several smaller islands and islets are scattered to the west and south (Fig. 2).

Mafia Island Marine Park covers an area of 822 km² and is located between S 07° 45' 07" and E 39° 54' 01" and S 08° 09' 40" and E 39° 30' 00". Appendix 1 of this plan provides a detailed description of boundaries. The park covers the southern part of Mafia Island and includes the inhabited islands of Chole, Juani, Jibondo and Bwejuu as well as several uninhabited islets and the associated waters.

2.2. PHYSICAL ENVIRONMENT

2.2.1 Bathymetry

More than half of the marine area of the park is less than 20 metres depth below mean tide levels, including much of Chole Bay. The extensive area south of Chole Bay include, Juani and Jibondo Islands and several reef areas south of Bwejuu Island. Extensive intertidal flats stretch along the southern part of Mafia Island, around Juani and Chole Islands, and between Jibondo Island and Kitutia Reef. A deeper channel of 20 – 30 metres carries tidal water through Kinasi Pass and Chole Bay as far as Chole channel. The waters on the south-western side of the marine park, especially west of Kitutia are also deeper reaching down to 40 meters.

Map showing the location of Mafia island on the Tanzanian coast



Fig. 1 Map showing the location of Mafia Island on the Tanzania coast



Fig. 2 Map of Mafia Island Marine Park showing boundaries

2.2.2 Currents

The main oceanic current affecting Mafia Island is the permanent north flowing current known as the East African Coastal Current (EACC). This reaches a maximum speed of 4.5 knots during the peak of the south-east Monsoon in June-July, but is countered to some extent during the contrary north-east Monsoon during Dec-Jan. The flow of the main current into and through the marine park area is interrupted by islets and reefs, and is also strongly influenced by diurnal tidal currents generated by a tidal range of up to 4 meters. This results into a complex and multi-directional current system.

2.2.3 Tides

The tidal range in the marine park is consistently large throughout the year. The mean spring-tide range is 3.3 metres with a maximum of 4.0 metres. The mean neap-tide is approx. 1.5 metres.

2.2.4 Geology and Topography

Mafia Island is of recent origin and was formed during the Pleistocene period when basal limestone rock was laid down while the islands were raised above the sea level through lifting of the continental shelf. The entire island consists of coral rag overlain by sandy loam soil, with a maximum altitude of 20 meters. Soils are mainly alkaline with a mean pH of 7.5.

2.2 CLIMATE

The Tanzania coastal climate is influenced by two monsoons, the North-East Monsoon (*Kaskazi*) blowing from November-March and the South-East Monsoon (*Kusi*), from April-August. There is an intermediate easterly wind (*Matlai*) during September-October. The temperature regime is fairly stable, rarely exceeding 33°C or dropping below 20°C. The island experiences two rainy seasons namely: the main rains from March-May and the lesser rains from November-December. Average rainfall is 2000 mm a year with 85% falling between December and May. The main dry season is July-October.

2.3 BIOLOGICAL ENVIRONMENT

2.3.1 Sub-tidal habitats

The sheltered western side of Mafia Island is heavily influenced by sedimentary materials discharged from the mainland. The direct influence of the Rufiji Delta is unclear. Sub-tidal habitats are largely sandy or soft-bottom, including extensive sea grass beds. There are a number of hard reefs to the south-west of Mafia, further from the reach of the Delta and sheltered by Bwejuu Island. The eastern side of the island is exposed to the full force of the Indian Ocean and a 33 km outer fringing reef stretches along the full length of the eastern seaboard of Mafia, Juani and Jibondo islands, with Kitutia Reef lying just beyond the Southern most extent. The outer reef is characterised by rocky reef walls and platforms dominated by soft coral and algae, giving way to sandy platforms between 20-50 metres. Mafia Island lies at the edge of the continental shelf and the bathymetry shelves steeply into the open ocean.

Sub-tidal areas between Kitutia Reef, Ras Kisimani and Chole Channel, and throughout Chole Bay, are sheltered from these more extreme influences and are most conducive to the development of species-rich coral and sponge-dominated reefs. There are also significant patches of seagrass in these areas.

This varied array of habitats endows the marine park area with relatively high levels of marine biodiversity by Western Indian Ocean standards. The predominantly north flowing current may place particular emphasis on the importance of reefs at the Southern end of the marine park, especially Kitutia Reef, in terms of the dispersal of seed and larvae of corals, fish and other marine organisms (Horrill & Ngoile 1991).

Habitat distribution, level of disturbance and species diversity vary between the western and eastern sectors. Habitats in the western sector towards the Rufiji Delta show greater levels of disturbance and are in comparatively poorer condition and contain lower species diversity than those in the eastern sector. In contrast, Chole Bay and the outer part of Kinasi Pass have higher habitat and species diversity and are less disturbed. The deeper reef walls in Chole Bay and on the outer reef are still relatively pristine. This gradient partly reflects human resource-use pressure and is partly natural. The presence of mangroves, seagrass beds, algae, sponge and soft coral beds, means that the Chole Bay areas possess examples of the majority of tropical marine ecosystems.

2.4.2 Mangroves and inter-tidal habitats

On the main island, mangroves are concentrated along the western and southern coast, including the northern shore of Chole Bay. The mangroves on the southern coast form a broken band ranging from 30-80m in width. The densest stands are found in the channel separating Ras Kisimani from Mafia Island, and at Mchangani in the north-east of Chole Bay. Mangroves also fringe Chole Island and the sheltered north and west sides of Juani. The eastern coast of Mafia, Jibondo and Bwejuu have virtually none. All eight species of mangroves common in Tanzania are present in Mafia (Semesi, 1991). The dominant genera are *Rhizophora*, *Ceriops*, *Avicennia*, *Bruguiera* and *Sonneratia*. *Lumnitzera* and *Xylocarpus* are only present at Ras Kisimani. *Heritiera*, with a stand height of 15m is present as a dominant species at one site in Chole Bay.

There are other extensive inter-tidal flats throughout the park as described in 2.2.1 above. These flats were formerly abundant in molluscs and other invertebrate fauna, but have been heavily exploited. They remain an important and productive habitats for octopus.

2.4.3 Terrestrial habitats

Greenway (1938) recognised 7 categories of natural vegetation on Mafia Island, including evergreen forest, 2 kinds of coastal thicket, mangroves, marsh, heath and palm grassland. However as back as the 1980s, the remaining patches of the *evergreen coastal forest*, formerly found around Chunguruma and Kilindoni, were cleared for coconut plantation and only 6 categories of natural vegetation remain.

Of these remaining habitats, the *evergreen coastal thicket* in the east of the main island, known as Mlola Forest is of greatest conservation importance. This habitat has strong affinities with lowland coastal forests on the Tanzanian mainland, and on Zanzibar and Pemba, that are recognised globally for their high diversity and level of endemism. On Mafia the forest stretches some 30km along the eastern seaboard of the main island from Bweni in the north to Chole Bay, varying in width from 1-2km. Slightly more than half of the length of the forest strip is within the marine park boundary. The remaining forest north of the park boundary is expected to be gazetted as a District Forest Reserve soon. The forest has relatively high species diversity and contains several plant and animal species confined to only a few small forest sites in coastal Tanzania. It is also the only remaining significant refuge on Mafia for forest-associated vertebrates such as duiker and the black-and-rufous elephant shrew, as well as valuable but threatened timber trees such as mvule, *Milicia excelsa*. The forest plays an important function as a windbreak, sheltering inland crops from the potentially lethal effects of hot, saline winds and storm damage unleashed from the Indian Ocean. A smaller strip of coastal thicket also survives along the east coast of Juani though it is relatively unstudied.

2.4.5 Fauna

Two species of turtle, the Green *Chelonia mydas* and the Hawksbill *Eretmochelys imbricata*, have small but significant breeding populations in the southern Mafia area. Nesting sites are scattered along the east coast, on sandy beaches behind the outer fringing reef, particularly at Kifinge Bay, Mchangani and along the eastern shores of Juani and Jibondo. Egg-laying takes place from Dec-Jan (Hawksbills) and April-June (Green).

A two-part study of the bird fauna of Mafia in 1992 and 1994 recorded 130 species, though this is not thought to be a complete list. Mafia provides a staging ground for various palearctic migrant species and the park area in particular provides feeding ground for various palearctic migrant species and the park area in particular provides feeding grounds for a variety of wading birds, as well as nesting areas for open-billed storks *Anastomus lamelligerus* and fish eagles *Haliaeetus vocifer*. Colonies of the Comoros lesser fruit bat *Pteropus seychellensis comorensis* occur mainly on Chole Island but also on the main island near Utende (Clark. 1994) specifically at the office of the Park (MIMP. 2001).

The marine park area once provided habitat for dugong *Dugong dugon*, categorised as Vulnerable by IUCN, and dugong were regularly caught in shark nets in the 1960s and 1970s. Later on, it was believed that dugong disappeared from the present park area for some 20 years. However, of recent fishers have been reporting an increased number of dugong sightings, which is indeed a new development partly attributed to the effectiveness of MIMP management regime.

Coral reef-associated fauna appear to be relatively diverse in Mafia by comparison with other sites in the Western Indian Ocean. Some 380 species of fish have been recorded, alongside with 48 genera of corals. Little or no taxonomic work has been done with other marine invertebrate groups.

A leaf-litter toad *Stephopaedes kimhowellii* is recorded only from Mlola Forest and may be endemic. The writhing gecko *Lygodactylus mafianum* is known only from Mlola Forest and a small forest at Kisiju on the mainland. The duiker *Cephalophus caeruleus pembae* is a sub-species endemic to Pemba and Mafia.

2.4.2 Flora

A total of 656 species of higher plant are recorded from Mafia Island, though the list may not be definitive (Greenway and Rodgers 1988). Out of these up to 6 species may be completely endemic to Mafia (*Oldenlandia aegialodes*, *Xyris parvula*, *Spermacoce* sp., *Eriocaulon ciliipetalum*, *Eriocaulon strictum* and *Clerodendrum myricoides*). Two other species are known only in Mafia and 2-3 other small coastal forest sites on the mainland *Tristemma schliebenii* and *Diospyros mafiensis*, and one species has been recorded only on Mafia and Pemba Islands that is *Philippia mafiensis*. A further 8 species found on Mafia are either endemic to East African coastal forests, which is a highly threatened vegetation type or are endemic to East Africa and coastal forests, which is a highly threatened vegetation type or are endemic to East Africa and are considered rare. Further work is required to establish which of these species occur within the marine park boundary. The coastal forest species are confined to Mlola Forest which lies partly within and partly outside the marine park boundary.

Twelve species of seagrass and 134 species of marine algae have been recorded within the waters of the Marine park area.

2.5 HUMAN SETTLEMENT

2.5.1 History of settlement

The first mention of Mafia in historical records is in connection with the Shirazi who dominated trade on the East African coast from their headquarters at Kilwa during the 11th to 13th centuries. Although they were probably not the first inhabitants of Mafia, the Shirazi are known to have had settlements at Ras Kisimani on the Main Island, and Kua on Juani Island. Both sites are within the marine park. The earliest layers of the surviving foundations at Ras Kisimani have been dated back to the late 12th century though most of the area of the former town has been engulfed by the sea. Both towns were certainly in existence well before the arrival of Portuguese colonialists in 1498. The surviving ruins at Kua which include standing walls and archways are probably not the original settlements, and may date to the 16th or 17th century. Kua continued as the main town on Mafia until early in the 19th century when it was attacked and destroyed by invaders from Madagascar. By that time, Mafia was under the control of the Omani, Sultan Said of Zanzibar, whose representatives ejected the invaders and established a new town on Chole Island. The town was known as Chole Mjini and the main island of Mafia became Chole Shamba. The ruined walls of a number of Chole Mjini houses can be seen today though the construction of the buildings was evidently less durable than those

at Kua. In 1890 German colonialists negotiated the purchase of Chole Mjini from Sultan Sayyid Ali and in 1913 moved their headquarters from Chole to Kilindoni to provide a more accessible anchorage for a coastal steamship. The ruins of the German two-storey Boma and promenade at Chole still dominate the landing beach. Kilindoni remains to this day as the administrative and commercial capital of Mafia.

2.5.2 Current population

In terms of administrative units, there are 13 villages lying wholly or partly within the MIMP boundary. Four villages lie entirely within the boundary of the marine park, including the three island villages of Chole, Juani, and Jibondo, plus Kungwi village near Mlola Forest. Another island, Bwejuu is wholly within the boundary and is a sub-village of Kilindoni. The remainder of Kilindoni is outside the boundary. Parts of 9 other mainland villages are within the boundary (Table 2.1.). If 2000 national census figures are extrapolated, the population estimate in 2011 for the communities residing within the boundary of MIMP is about 23,000 out of about 48,689 people living in the whole of the Mafia District.

TABLE 2.1: Villages and current population within MIMP

No.	Village	Sub-villages within MIMP	Population (MIMP)
1.	Chole	All	1,021
2.	Juani	All	998
3.	Jibondo	All	1,707
4.	Kungwi	All	2,496
5.	Baleni	Kifinge, Mwawani, Nduji and Kipola	3,278
6.	Marimbani	Mbogani	1,349
7.	Kiegeani	Utende A & B, Kiegeani, Kipama, Unyambwa	2,507
8.	Chem chem	Usewe, Changarama and Jongani	2,299
9.	Miburani	Kitoni and Mdundani	1,673
10.	Mlongo	Ras Kisimani, Mlongo and Bondeni	813
11.	Kilindoni	Bwejuu	657
12.	Ndagoni	Kipandeni	2,357
13.	Jimbo	Mlali	1,914
TOTAL			23,069

Source: 2003 – 2025 Makisio ya Idadi ya Watu. Wilaya ya Mafia Aprili, 2008

2.6 RESOURCE-USE WITHIN THE MARINE PARK

2.6.1 Living marine resources

Mafia is considered throughout coastal Tanzania as a premier fishing ground and has attracted fishers from other parts of Tanzania at least since the 1960s when fishing first became a significant activity amongst local residents. Fishing today is of particular importance to the island communities on Juani, Jibondo, Bwejuu and to a slightly lesser extent Chole, and it provides the majority of income on all these islands. Amongst the over 1,500 community members on Jibondo Island, fisheries resources provide some 70 – 80% of livelihoods, especially since the demise of lime production and many have no other source of revenue. Fishing is less vital in other villages within the park, generally taking second place to agriculture, but is nonetheless an important seasonal source of income when other resources are scarce. Finfish and octopus are by far the most important fisheries resources within the park, to a lesser extent lobster also provide significant income. However, currently there is a moratorium on sea cucumber exploitation in Tanzania Mainland. Shells for the curio trade were formerly a significant source of export income, but the trade had dwindled to an almost negligible level by 1999.

Traditionally, harvesting marine resources from inter-tidal area is the activity of women. Foremost is octopus fishing, conducted for 4 – 5 days in each spring tide. Since 1990, the rising price and improved marketing conditions for octopus, allied to a decline in fish catches, has increasingly attracted men into octopus collection both on inter-tidal flats and by free-diving. In Bwejuu an estimated 60% of octopus catches are now caught by men. The majority of catches are from diving in sub-tidal areas.

2.6.2 Fishing gears

Fishing on Mafia has always been at a small-scale, artisanal level. The majority of boats are small 5m outrigger canoes with sails (*ngalawa*) and paddling canoes (*mitumbwi*) with a smaller number of larger 7-8 metre sailing vessels (*mashua*). Fishing gears themselves however, have changed in their importance over time. Prior to the 1960s the little fishing that was done was by line and the catch centred on medium-sized pelagics such as kingfish and carangids. In the 1960s and 1970s, shark nets were introduced and quickly became dominant. The decline in sharks and rays gradually brought about a shift to smaller-mesh nets and, to a lesser extent, a return to hand-lines. During the 1980s and early 1990s the use of two destructive techniques; dynamite and beach-seine nets, became increasingly common and caused substantial sub-tidal habitat damage. Both techniques have been eliminated from the park.

In the past 15 years, especially following the establishment of the marine park in 1995, the fishing gears responsible for the majority of catches are surround nets and other pull-nets, known locally as *Mtando*, *Nyavu za kuzungusha* and *Nyavu za kuvuta*. These nets along with *mtambo* for octopus account for a substantial majority of catches, probably 70-80%. Other gears used, in order of priority, include shark nets (*jarife*), free-diving for sea cucumber (currently outlawed) and lobster, hand lines (*mshipi*), gill nets (*nyavu za kupweleza*), box traps (*madema*), fence traps (*wando*) and long-lines (*kocho*).

Boat building is a traditional activity, particularly on Jibondo and Chole, however, the boatyards on both islands are currently in decline. Large cargo-carrying dhows were once regularly constructed, typically using timber from Lindi region. Orders for large boat construction are now rare, though smaller *mashuas* and repairs to existing boats still supports a smaller number of craftsmen.

2.6.3 Catch trends

There is little data collected for a prolonged period which can give an accurate assessment of catch trends, moreover the picture is complicated by the ever increasing number of fishermen and changing gears over the past 3 – 4 decades. Nonetheless, anecdotal evidence from older fishermen is unanimous in indicating that trends have decreased throughout the past 30–40 years since fishing became a widespread activity in the 1960s, but that the severe decline occurred from the mid – 1980s to the mid – 1990s. Fishermen tend to attribute this largely to dynamite fishing but it seems likely that over-fishing, habitat damage and use of small - mesh nets have all played a role.

Until the 1960s, catches were centred on medium-sized pelagic species, especially kingfish, trevallies, jacks and small barracuda. In the 1960s and 1970s gave way to the larger species caught in shark nets, principally sharks and rays, with the occasional catches of dugong and turtle. In the past 30 – 40 years, catches were dominated by smaller reef-associated species with faster breeding rates such as emperors, snappers and rabbit fish, small semi-pelagic species such as sardines and a smaller number of trevallies and jacks.

2.6.4 Marketing of marine resources

Fishing on Mafia has always provided both food and cash income. Traditionally, fish were sun-dried and sent to coastal markets in southern and central Tanzania. The fact that fish were landed and kept in the village for drying, combined with the relatively low price for dried fish, meant that plenty of fish were available to local households for food. Things changed around 1985-90 when the availability of outboard engines and ice gave rise to private fish traders who began to transport fresh fish directly to Dar es Salaam. Traders generally arrive from the mainland for the main spring-tide fishing period and may stay for 5-10 days until their ice-boxes which are of about 2 tonnes are filled. Most of the local catch is therefore, now sold directly from

fishing boat to trading boat rather than being landed. This and the ever rising price of fish, is increasingly deterring fishers from carrying fish home to local households.

Rising fish prices and outboard engines have also attracted an increasing number of outside fishers to Mafia since 1980 and fishing pressure in terms of number of fishers probably reached a peak during the mid-1990s. Government statistics indicate that between 1984 and 1990, the number of visiting fishers increased dramatically with more than 70% of vessels registering in Kilindoni coming from outside Mafia District. Control of illegal fishing gears since 1995 when the Park was established has probably begun to reduce the pressure.

In 1989, a private-owned company, Hellas, established a commercial processing plant on Mafia at Kilindoni. Its business has depended almost exclusively on octopus from Mafia and Kilwa, and prawns from Kilwa and Rufiji, complemented by significant numbers of lobster. It has never traded fin-fish. In 1998 Hellas was joined by a Kenyan-Tanzanian venture, Tanpesca, seeking to exploit the same market using a floating processing facility. The third, South African-owned Company, Ikon East Africa Ltd, established a processing plant for finfish on Mafia in 1998-99. However, Hellas has ceased operating suggesting that there are insufficient octopus and prawn resources in the Kilwa-Mafia vicinity to support two commercial companies. Ikon has also ceased operating owing to both investment and fish supply problems. To date, Tanpesca is the only remaining company still operating in Mafia using land-based processing facilities. It largely obtains its raw material supply from a commercial shrimp farm at Jimbo.

Sea cucumber fishery is banned in Tanzania Mainland but there are some fishers still harvesting it illegally and its products exported to the Far East through buyers from Zanzibar and Dar es Salaam.

2.6.5 Coral Mining

Mining of live coral for commercial lime production was an important source of income prior to the establishment of the marine park in 1995. Until then some minority, particularly from Jibondo, Bwejuu and Chole, were dependent on coral mining for their livelihoods (Anderson 1995; Norton, 1995). It may have provided up to a quarter of cash income in Jibondo and Bwejuu. Live and fossilised coral blocks are also the traditional construction material for domestic houses, particularly in the island villages where there is a lack of alternative building materials. Dulvy *et al.* (1995) estimated that during the early 1990s some 90 tones of fossilized offshore limestone were collected annually in the vicinity of what is now the marine park. The main mining areas in the marine park are the reef flats and east and south of Jibondo and around Ras Kisimani. Since 1995, coral mining has continued at a much-reduced level for subsistence use.

2.6.6 Agriculture and livestock

Until the 1970s, coconuts were the mainstay of the Mafia economy and fishing was a relatively new activity. Coconut palms had been cultivated on Mafia at least since the 19th century, more recently in large plantations by two major commercial operations; Mafia Coconuts Limited and the National Coconut Development Corporation. Following the severe drop in prices for coconut oil and coir globally, both companies went into decline and now provide little in the way of commercial activity. However, small-holdings of coconut trees still provide an important source of income throughout Mafia. The coconuts are mostly transported to the mainland in large dhows. Locally, coconut coir is used to make doormats and ropes, while the leaves are used for roofing and their ribs for making brooms and fishing traps. The possession of coconut trees by residents in the marine park area is still a sign of wealth since it represents a secure source of income by comparison to the risks of the fishing industry.

Small-scale agriculture is practised throughout Mafia, both for subsistence crops and as a primary occupation for cash income. Farming is predominant on the fertile soils around Mlola Forest, in Baleni, Kungwi, Kirongwe and Jimbo. The main economically important crops are coconuts and cashew nuts; fishing is a very minor activity in these villages. Chole Island also has relatively productive alluvial loam soils with coconuts and oranges as main crops. Cassava is the predominant subsistence crop and is widely grown throughout Mafia. Other crops and fruits include bananas, rice, maize, pumpkins, okra, tomato, sweet potato, mangos, limes, and pineapples.

The main livestock are cattle, goats and chickens and are kept both for subsistence and as a lesser source of cash income. East Coast fever has had a big impact on the cattle keeping and livestock husbandry in general.

2.6.7 Mangroves and forest products

Prior to the decline of coral mining after 1995, mangroves in the marine park area were heavily utilised as a source of fuel for lime production. Although this has since then declined, mangroves remain important for boat- building and repair and building poles, though the great majority of mangrove building poles are imported from the Rufiji Delta. Dead mangrove branches are collected for firewood whereas the leaves, fruits and bark are collected for medicine and colour dyes.

The coastal forest within the marine park area is important as a source of building poles to local people, especially residents of nearby villages such as Kungwi, Baleni, Kirongwe and Jimbo. Important target species include Mkuu kalemba myeupe *Ludia mauritania*, Mkuu kalemba myeusi *Diospyros consolatae*, Mtibwe, Mtalawanda and Msingino. Medicinal plants, firewood, raffia fibre, rubble for building, game (duiker, bush-pigs and monkeys) and mushroom collection are also of significant importance. Most of these products, with the exception of firewood, are collected on a subsistence basis. Firewood has been collected in the past not only for domestic fuel, but also to burn coral rag collected from the cleared forest areas to produce lime. At times, large consignments of both mangrove and forest-derived firewood have been transported from the Island to the mainland for commercial sale. This has caused significant clearance of trees and is a cause of concern to communities. Certain sites within the forest are considered sacred by local people and are used for ceremonies.

2.6.8 Mariculture

Mariculture activities on Mafia Island have been boosted by the establishment of 170 *hectars* of commercial shrimp farm at Jimbo, with its associated hatchery located at Kilindoni Township. The facilities are owned by Alphakrust Company Limited. Beside the commercial enterprise there are also small-scale mariculture activities taking place in Mafia. These include; seaweed farming, crab fattening as well as milkfish and shrimp farming.

Seaweed farming, which in Zanzibar developed into a major foreign currency earner during the 1990s, was first tried in Mafia in 1992 on Jibondo Island. It was abandoned after a marketing failure. In 1999 a second trial was initiated, again in Jibondo Island, with support from the Marine Park Management and the Zanzibar Seaweed Company (ZASCO). The first harvest was made in November 1999 and marketed through Dar Es Salaam/ Zanzibar based private company. To-date more than 1000 residents mainly women are involved in sea weed farming especially at Jibondo Island.

On the other hand, farming of milkfish and crab fattening is being promoted in different communities by government and nongovernmental organizations including the WWF as a potential source of sustainable livelihood to Mafia residents.

2.7 TOURISM

There has been tourism development in Mafia Island since 1950s in the form of the Mafia Island Game Fishing Club at Utende. In 1971 the Government-owned Mafia Island Lodge was constructed. Since 1995, five more high-cost lodges have been constructed at Utende and Mlongo beach. There are currently 152 tourist beds available inside the marine park, (Table 2.2):

Table 2.2 Tourist Hotels within MIMP

No.	Lodge	No. of beds
1.	Mafia Island Lodge	80
2.	Kinasi Lodge	28
3.	Dolphins (Pole Pole Lodge)	18
4.	Chole Mjini Lodge	16
5.	Shamba Kikole Lodge	10
TOTAL		152

Tourists engage in a variety of activities including SCUBA diving, snorkelling, swimming, sport fishing, sailing, windsurfing and visits to cultural sites and Mlola Forest. Although the coral reefs of Mafia offer some of the best snorkelling and SCUBA diving opportunities in East Africa, visitation has been low up to now. From 1997–2007 occupancy rates have remained within an average of 30%. Despite the growth of this sector in the national economy and the progress of a number of initiatives in Mafia, occupancy levels of 40 – 50%, which are common in other destinations, are yet to be realised. As the existing lodges have started to attract better occupancy rates, it is quite possible that further proposals for additional lodge developments in the marine park area will be received.

The main obstacle appears to be the lack of reliable, regular economic transport to and from the island, both for passengers and for cargo. However, communication facilities are now improved with mobile telephone facilities all over Mafia including the main area of tourism development at Utende. Furthermore, with the upgrading of Mafia airport and construction of a jetty at Kilindoni harbour, the flow of passengers will increase so are the tourists. However, the lack of sandy beaches also appears to be a hindrance, especially in the face of increasing competition from other destinations in the western Indian Ocean, especially Zanzibar and Kenya but also Thailand, Sri Lanka, Seychelles and Mauritius.

2.8 SIGNIFICANCE OF MIMP

The following statements summarise the reasons why Mafia Island is considered important enough to be set-aside as a marine park. They encompass a range of international, national and local perspectives:

- ◆ The marine park forms one of the finest complexes of tropical marine and coastal habitats in the region.
- ◆ It is in one of the few remaining relatively pristine marine ecosystems in Tanzania.
- ◆ Has a relatively unusual topographical structure, that is, the expansive areas are sheltered and shallow or inter-tidal, which provides conditions conducive to highly productive fisheries.
- ◆ Its geographical location together with its topography endows it with a relatively high diversity of marine habitat types, and in turn relatively high overall species richness.
- ◆ It contains an important remnant of coastal forest with relatively high biodiversity.
- ◆ The area provides nesting grounds for 2 endangered species of sea turtle.
- ◆ It provides feeding grounds for wading birds, as well as important nesting areas for open billed stork and fish eagles.
- ◆ It has a large colony of the fruit bat *Pteropus seychellensis comorensis*, which may be an endemic subspecies.
- ◆ The coral reefs offer some of the best snorkelling and SCUBA diving in the region.
- ◆ The area is relatively undeveloped and retains clean seas and an uncontaminated environment.

- ◆ It contains cultural and historical resources, some of which date back almost 1000 years, that encompass Shirazi, Arab, Portugese, German and Swahili occupation and reflect the diverse cultural history of the East African coast.



CHAPTER 3

MANAGEMENT ISSUES

Several workshops and consultative meetings held between the marine park and stakeholders since 1991 and the experiences of the marine park management, have identified several management issues that constitute the basis of the need for a special management effort in the marine park. These have been grouped under the following headings:

- Natural resource management issues
- Cultural resource management issues
- Socio – economic management issues
- Tourism management issues
- Research and monitoring management issues

3.1 NATURAL RESOURCE ISSUES

3.1.1 Fishing pressure

Over-fishing can have grave consequences for fisheries yields, for livelihoods and for conservation. As the number of fishermen in a given fishery increases, the catch-per-fisherman inevitably falls. When fishing pressure surpasses the maximum sustainable level, catches decline quickly, and the livelihoods of local communities follow. This in turn compels fishermen to resort to more destructive techniques that produce a higher short-term yield, but which quickly have disastrous consequences to fisheries productivity and biodiversity.

Prior to the establishment of the marine park, Mafia's fishery, like those throughout Tanzania, was an open-access resource. Fishermen throughout Tanzania were free to fish in Mafia provided they held or obtained valid national fishing licenses. Even the current regulation has hardly been enforced in the past. The steady decline of near-shore fisheries throughout the Tanzanian mainland over the past 20–30 years, from use of dynamite, beach-seines and from over-fishing, has led to a steady influx of outsiders into the Mafia, especially from southern Tanzania, but also Zanzibar, Dar es Salaam and Kilwa. Many such outside fishermen have settled in Mafia, their entry into local villages has been facilitated by relatives who came before them. Others visit Mafia on a seasonal basis by constructing semi-permanent fishing camps in villages near to the fishing grounds. Most village leaderships have been content to allow such camping in return for appropriate payments, but this in itself has been the cause of friction within villages from time-to-time.

It is not possible at this stage to make a scientific assessment of whether or not the number of fishers in marine park area has surpassed a sustainable level, especially in view of the absence of longitudinal catch data and the complication of multi-gears small-scale fishing. However, anecdotal accounts of the long-term trends in fin-fish catches strongly suggest that it has, especially until habitats and fish populations have had a chance to recover from the damage caused by nearly 20 years of dynamite fishing. The octopus fishery appears to be more resilient than the fin-fishery, but anecdotal evidence again indicates over-fishing. Some inter-tidal flats such as those around Chole are virtually areas fished. The case of sea cucumber, lobster and gastropods (curio shells) is less ambiguous; all have clearly been heavily over-exploited almost to the point of exhaustion.

3.1.2 Destructive and unsustainable net fishing

The use of beach-seines and other fishing nets that drag the sea-floor result in mechanical damage to sensitive benthic habitats. Coral reefs and sea-grass habitats are particularly targeted for such fishing and are also the most susceptible to damage. Drag-nets also stir up bottom sediment, which can further harm corals in particular. Such damage reduces the productivity and diversity of the habitats affected, and steadily depletes their tourism value. Reduced productivity is reflected in lower fishery yields, which has a direct adverse impact on the local communities' livelihood.

The second issue with net fishing is mesh-size. Small mesh nets, less than 3 inches, especially when used in littoral areas in the manner of a beach-seine, remove large numbers of juvenile fish. These have relatively little value in terms of catch, but their removal can heavily compromise the size of future catches.

The following nets have been commonly used within the marine park area since the 1970s and cause damage to benthic environments to a greater or lesser degree (Table 3.1):

Table 3.1 Destructive fishing nets used within, or in the vicinity of, MIMP

English name	Kiswahili name	Description / comment
Beach-seine	<i>Juya</i> <i>Kojani (Juya la Kojani)</i> <i>Kavogo (ya kusini)</i>	Illegal under Marine Parks and Reserves Regulations, 2006 and virtually eliminated in MIMP in recent years. MIMP residents usually quickly report occasional intrusions by outsiders.
Seine nets/ Pull – nets	Nyavu za kuzungusha Nyavu za kuvuta	These types of nets have been in use on Mafia for at least 20 years, especially on Chole, Juani and Jibondo. They are illegal under existing legislation. Mesh size generally 2.5". Weighted nets are set in a circle and dragged into a boat, generally across reef or seagrass area causing significant damage over time.
Surround nets	<i>Mtando</i>	Arrived on Mafia from southern Tanzania around 1997. A variation of the above type of nets where a scoop net (tandio) is stretched under the seine net to draw in the catch. The tandio is generally only ¼ or ½ inch mesh size. They are illegal under the existing legislation.
Bottom-set net (Gillnet)	<i>Tambo</i>	A weighted set-net sometimes with a heavy-knit mesh. Usually left for one hour or more after setting and then pulled into a boat. Mesh-size usually 2.5". Less damaging than pull-nets but also less effective and less-used. They are legal with 3" mesh size and only when used in Specified-use and General-use Zones.

Continued use of the surround nets and pull-nets in some parts of the marine park is equally important to the livelihoods of residents in some villages, especially Juani, Chole and Jibondo. In these villages, where the majority of people are dependent on fishing for more than 50% of their livelihoods, such nets may account for up to 70% of catches. Yet these nets are causing substantial damage to sub-tidal, especially coral reef, areas in Chole Bay and throughout the southern area from Mange Reef to Chole Island Reef to Chole Island. Replacement of these nets with sustainable gears or their complete elimination as they are illegal is one of the central challenges facing the marine park.

Destructive fishing

The method of net fishing pictured below is called 'mfando'. It is widely practised in southern Tanzania including Mafia, mainly in shallow areas where the weighted nets cause damage to corals and seagrasses. Poles are often also used to hammer the reef to bring out the fish. Mesh sizes of 1/4 to 1/2 inch capture a lot of juvenile fish. The method is widely considered to be unsustainable.



A long surround net is set in shallow water and is gradually pulled into a small circle. A square scoop net (bandio) of smaller mesh size is then passed underneath the surround net with one side remaining attached to the boat. The scoop net is then doozied back to the boat and the catch is hauled in. The catch consists mostly of small demersal fish, many of them are juveniles.



3.1.3 Dynamite fishing

The use of dynamite or explosives for fishing is the most immediately destructive human activity to have affected the marine environment in Mafia Island. Usually conducted in rocky reef areas, a single dynamite blast kills all pelagic organisms, fish and larvae, and destroys the 3-dimensional complexity of the reef, within an average of 10 metres radius of the blast. Reef complexity provides essential shelter for juvenile fish and other marine organisms and the productivity and diversity of the reef is drastically reduced over time.

Dynamite fishing began around Mafia as early as the late 1970s but became a significant problem during the mid-1980s and continued to worsen until the establishment of the marine park in 1995. By 1997, following both national and local anti-dynamite campaigns, the practice had been virtually eliminated from the marine park. It is essential for the marine park to ensure that it does not return.

3.1.4 Trampling of inter-tidal habitats

Collection of octopus, shellfish and seaweed in inter-tidal or shallow sub-tidal areas can cause damage to the areas through trampling. In particular reef flat, which provides important habitat for larval and juvenile stages of fish and other organisms which, is gradually destroyed and the productivity of the area is becomes reduced.

3.1.5 Commercial fish processing

There have been various initiatives to develop industrial fish-processing on Mafia Island in the past 20 years. Such developments can provide a valuable marketing outlet for local fishermen that can enhance livelihoods, and may be welcomed if conducted in a sustainable manner. The following are however issues of potential concern.

- ◆ Fish processing plants are unsightly, noisy, they generally have high freshwater consumption and they produce a lot of organic waste material. These factors would come into conflict with tourism interests or local communities if there were not clear spatial separation in terms of land- use planning;
- ◆ Fish processing can produce substantial nutrient-rich waste material. If this were allowed to contaminate near-shore waters, it could pose a threat to coral reef health;
- ◆ Allowing too many competing companies to enter the local market could place unnecessary pressure on resources. If companies are in competition they may raise prices for local products and subsequently encourage non-fishermen, or outside fishermen, to join the fishery to take advantage of the demand. This increases the day-to-day pressure on the marine resource in question and utilisation becomes less sustainable.

3.1.6 Coral mining

Mining of coral, especially live coral, can have obviously damaging consequences. Extensive mining causes loss of reef habitat, a reduction in fish productivity and biodiversity and potentially erosion of beaches and other sensitive parts of the coastline.

Coral mining is also a traditional source of relatively high quality building material on Mafia, both as building blocks and for lime production. From the 1950s until 1995, coral mining for commercial sale additionally provided a significant proportion of cash income to communities in at least 4 villages within MIMP namely; Bwejuu, Jibondo, Juani and Chole.

A vast proportion of the historical damage caused to reefs within MIMP was from coral mining for *commercial* building projects, such as road and airstrip construction, and for house construction in Kilindoni. By comparison the amount of coral mined for the purposes of building *domestic* houses and buildings in *villages within MIMP* itself are relatively minor. The marine park has extensive sub-tidal and inter-tidal limestone resources, much of which is located relatively far from sensitive habitats and coastlines. Elders residing in MIMP are strongly persuaded from their own historical observations that small-scale mining can regenerate within a 10 year period and need not cause significant ill-effects in the meantime.

Some MIMP villages, notably Bwejuu, lack any alternative construction material in the vicinity of the village. The cost of importing alternative materials from elsewhere is prohibitively expensive to most villagers. In particular there is no readily affordable alternative to lime to provide a durable exterior; cement and paint being too costly for the great majority of residents.

Nevertheless, there are alternative building materials available to most of the communities within MIMP. There are substantial deposits of fossil coral suitable both for construction blocks and to make lime, in the vicinity of Baleni and Kungwi villages. Fossil coral, if burned on an open kiln, requires substantially more firewood than sea coral, to convert to lime. So the introduction of fuel-efficient kiln technology would be a valuable solution. Successful construction trials using sun-dried mud bricks on Chole Island were conducted in 1994 (Darwall, 1995) and there is no immediately apparent reason why such technology should not be promoted further.

It is likely that subsistence level coral mining that, if it were regulated appropriately, would not cause significant adverse effects on biodiversity, fisheries productivity or beach stability. However, a concerted, complementary effort to promote alternative building materials would minimise the need for residents to mine sea coral.

3.1.7 Mangrove utilization

Unsustainable cutting of mangroves can cause disruption to the reproduction cycle and abundance of commercial species including fishes, as well as some invertebrate species, which take refuge in mangrove forests. It may also cause erosion of beaches and other soft-sediments of the coastline. Likewise, destruction of mangrove areas also degrades the visual environment for tourism.

Mangroves are also a valuable resource for resident communities in MIMP. Historically a large part of their importance has been for use as firewood in lime production. Nonetheless, even with the significant reduction in coral mining in recent years, mangroves remain valuable, especially for boat building and repair, and house construction

Studies have not been undertaken to ascertain mangrove distribution and density. This makes it difficult to manage the resource sustainably. As with coral mining, it is conceivable that there is a sustainable level of subsistence mangrove harvesting that, if it were regulated appropriately, would not cause significant adverse effects on biodiversity, fisheries productivity or beach stability.

3.1.8 Use of coastal forests

◆ Clearance of coastal forests

Clearance of natural forest vegetation for coconut and cashew plantations or small-scale shifting cultivation has been the main cause of loss of forest cover on Mafia. The practice has caused the final demise of the remaining evergreen coastal forest that formerly occurred at Changarama and around Kilindoni, and it continues to deplete the remaining lowland coastal forest at Mlola and Kirongwe. This type of land-use is clearly not sustainable in terms of maintaining biodiversity.

◆ Tree felling for timber

The felling of timber trees in Mlola and other forest areas has scarcely been regulated in the past and although it is potentially sustainable at some level, it has caused drastic loss of indigenous timber species such as mvule (*Milicia excelsa*), mkole (*Mdodonun gracile*), mzambarau (*Syngizium cuminii*), mche (*Avicenia marina*) and mkomafi (*Xylocarpus granatum*). The last stock assessment of Mlola revealed that scarcely 1% of stems are more than 30cm diameter and less than 0.25% of stems are over 50cm.

◆ Extraction of poles and non-timber forest products

A study on Mlola Forest conducted in mid 1990s indicated that there was a very low abundance of mature trees of the species targeted for pole cutting, suggesting that the marine park should strictly continue to limit or ban altogether such pole cutting within the forest boundary. Moreover, when the northern sector of the forest is gazetted as a District Forest Reserve, all extraction of the stems will automatically be prohibited from that part of the forest. There may be some merit in standardising the respective regulations to avoid

confusion. On the other hand, local residents are concerned in that trees being planted under the marine park and other initiatives such as WWF LCF agro-forestry programme do not mature in good time to provide alternative source of poles. This may be a justification to allow some strictly controlled pole extraction in the *Specified-use Zone* of Mlola Forest, for a limited number of years only, but at the same time all efforts should be devoted towards encouraging the development of alternatives.

The forest is also a source of firewood, both for subsistence and commercial use. The demand for firewood and charcoal is escalating in population centers like Kilindoni where charcoal stoves are preferred to kerosene, gas and electricity all of which are more expensive. Demand for fuel wood, if not addressed through development of alternative sources of energy for domestic heating, will continue to exert heavy pressure on both forest and mangrove resources.

Other important products harvested from forest areas include raffia fibre (ukindu), honey and medicinal plant material. Honey collection within the forest can pose a potential fire risk and in any case bee-keeping is being promoted in various villages outside the forest. Farming of medicinal plants is more problematic as local communities are persuaded that only wild grown materials have the desired healing properties.

The impact on the integrity of the forest ecosystem or on natural regeneration of subsistence-level use of non-timber forest resources is unknown. It seems likely that under healthy circumstances, a controlled level of utilisation would be sustainable, but the condition of Mlola Forest is currently seriously degraded.

3.1.9 Turtle conservation

Turtles are caught mainly in shark nets and occasionally in seine nets. Fishermen generally claim that turtles are not specifically targeted, but fishermen have been observed to place shark nets around turtle nesting and feeding areas particularly during the period of December–March coinciding with the peak breeding and nesting season. Females are also hunted on beaches during the nesting season, and eggs are collected.

Although the population of turtles using nesting beaches in the marine park area is not very large, there are relatively few other main breeding sites for turtles on other parts of the Tanzanian coast, and certainly few that are protected. Reports indicate that the turtle numbers have increased noticeably in the Marine Park, but not dramatically, in the last 10 years.

Several tourism lodges were developed in the Utende area before environmental impact assessment (EIA) regulations were in place. Clearance of mangroves to create beaches could potentially become a problem if not regulated through EIA procedures.



Threats to mangrove and coastal forests



Patches of Miola Forest on the east coast of Mafia have been cleared in the past for shifting cultivation. Until active protection began in 1997-98, timber and pole cutting had virtually denuded the forest of large and medium-sized trees. The regeneration process is now beginning.

3.2 CULTURAL RESOURCES ISSUES

3.2.1 Protection and interpretation of historical and cultural sites

In a continuous effort to capture the growing eco-tourism industry, shrubs, thickets and strangling fig trees constantly overgrowing Kua Ruins are regularly cleared off by motivated Juani villagers and a signboard is now in place. This historical site is now easily visible and always accessible to visitors and tourists even during the rainy season. In addition to the ongoing cleanliness, the Park Management is in the process of displaying interpretation signs, collecting more information about the site and providing more training to its custodians the “Juani villagers”.

The Park Management wishes to invite other serious and professional investors who will be willing to look after the historical sites within the Park area especially Kua Ruins where visitation is relatively high. So far, with the approval of Antiquity Division, Chole Mjini Lodge has rehabilitated the German Boma and other cultural ruins in Chole Island. Otherwise, clearing of shrubs, thickets and strangling fig trees is being maintained and extended at the expense of Kua ruins site and initiated to other historical sites including Ras Kisimani and Mlola Forest caves in order to encourage visitation to these remotely located sites. However, the inadequacy of funds limits the implementation of the activity. All historical and cultural sites in the Park have been given the status of *Core Zones* whereby new developments are entirely prohibited.

3.2 SOCIO – ECONOMIC ISSUES

3.3.1 Narrow income base for local communities

Residents of Mafia Island are poor compared to most districts in mainland Tanzania. Communities live a predominantly subsistence, “hand-to-mouth” lifestyle based on exploitation of marine resources, coconut and cashew production and subsistence agriculture. The mainly shallow sandy soils that dominate much of the area which means that agricultural productivity in most parts of Mafia is poor and commercial opportunities are constrained. Most staple foods and some vegetables are imported from the mainland.

Electricity is lacking in all but two villages, Kilindoni and Utende, where only the most affluent domestic houses are connected. The island communities have scant water supplies. Most residents who manage to accumulate wealth from marine resource exploitation and coconuts to leave their villages and establish houses in Kilindoni or even the mainland. As a result there is very little money circulating in village economies and small business is virtually difficult outside of Kilindoni.

Educational opportunities are equally poor. Mafia District was the last District in Tanzania to build a secondary school the first one was built at, Kitomondo, less than 20 years ago. Currently there are about six secondary schools in the District whereas in more affluent parts of Tanzania one might find more than 20. The schools provide teaching from Form I – IV. To date, owing to the limited facilities in these schools not more than ten students have ever graduated to complete advanced level of secondary school education (Form V – VI). This socio-economic situation presents a major challenge to the prospect of sustainable resource use. In the face of declining marine resources, rather than switching out of fishing to other forms of livelihood, the narrow income generating base compels resource-users to adopt ever more destructive fishing techniques. If sustainable marine resource use is to become a reality, local communities urgently need technical assistance to broaden the income base and develop new, sustainable sources of revenue.

3.4 ECO-TOURISM

3.4.1 Regulating eco-tourism development

Eco-tourism on Mafia is still in its early stages of development. Despite relatively low occupancy rates to date, it is likely that visitor numbers will increase in the immediate future following governments initiative to improve air and sea transportation to and from the Island. As such new developments are being proposed.

The capacity to accommodate further lodges in the vicinity of Utende and Chole is uncertain. The population of Utende has increased in recent years as a result of the influx of staff at existing lodges, their families, relations and other hopefuls attracted by the prospect of employment. Supplies of freshwater during the dry season already appears to be under pressure, though no hydrological survey has been undertaken. Equally important, Mafia’s ability to compete successfully with other coastal destinations in the region may depend on improving its existing air transport facilities.

More generally unregulated tourist development within the park could lead to a number of problems. In the absence of relevant legislation at the time of their development, existing lodges at Utende and Chole were not subject to environmental impact assessment scrutiny. The main issues of concern include:

- Over-exploitation of freshwater supplies;
- Improper disposal of solid waste, wastewater, sewage, chlorinated and other contaminated water;
- Habitat damage, especially mangrove clearance to create beachfronts;
- Disturbance of the coastline from construction too close to the shore;
- Visual pollution from anaesthetic construction;
- Friction with local residents over land acquisition and access rights.

3.4.2 Over-settlement in tourism development areas

Over-settlement in villages associated with tourism development is quite apparent at Utende where the population has increased significantly due to the development of the following lodges; Kinasi, Pole Pole, Shamba Kilole and a number of diving centres. Potential and actual problems in this regard include:

1. Disturbance to visitors in lodges by noise in neighbouring houses and local bars;
2. Disturbance to visitors by beach boys
3. Additional pressure on local resources including freshwater and land;
4. Over-development and crowding of local houses.

The Marine Parks and Reserves Act, No. 29 of 1994 [sections 18 – 20] contains provision for the regulation of such settlement within a marine park. The marine park could work in collaboration with the District Authorities and Village leaderships to develop appropriate mechanisms to manage and regulate this issue in an appropriate way.

3.4.3 Visitor management

There is a need for an information centre in the park to provide visitors with the means to learn about the local physical and cultural environment, the activities of the marine park and the code of conduct for visitors. There are also issues of security for tourists, and cultural erosion that need to be addressed. The presence of relatively affluent visitors can attract undesirable elements, as experienced with the “beach boys” in both Mombasa and Malindi in Kenya. There is also ample evidence from other tourist areas around the world that the presence of visitors from different cultures and traditions can result in younger generations adopting foreign culture at the expense of their own. In some cases prostitution, drug taking and other unwanted behaviour could be introduced. Whilst there is no immediate threat for the latter in Mafia, such issues can be addressed in advance, initially through development of a Tourist Management Plan.

3.4.4 Snorkelling and anchor damage

Snorkelling and SCUBA divers can cause significant damage to coral reef areas, especially from accidentally kicking corals with fins. Tourism boats frequently visiting the same snorkelling and diving sites can cause damage through anchorage if there are no mooring facilities.

Tourist numbers are currently low on Mafia and ill-effects from snorkelling and anchors are probably negligible to date. However, this may change if numbers start to increase.

3.5 RESEARCH, MONITORING AND DATA MANAGEMENT

With the exception of the Frontier-Tanzania programme (1980–1993), research carried out in the marine park has been sporadic and often without particular research priorities. Consequently, there has been an emphasis on basic research on resources with a limited quantitative information on livelihoods, demography and resource-use trends. For example, artisanal catch data collected during the early 1990s was not adequately monitored and maintained.

From a management perspective, there is a particular demand for:

- ◆ Basic ongoing monitoring of all forms of resource–use, especially fish catches;
- ◆ Basic ongoing monitoring of marine and forest habitat condition;
- ◆ Information on local resource–use patterns and practices both traditional and recent;
- ◆ Information on human demography and livelihoods;
- ◆ Research into both sea and fossil coral mining, including an assessment of available resources and the impacts and rates of regeneration of historical sea coral mining;
- ◆ Studies on mangrove utilisation needs and trends;
- ◆ A study on the status of freshwater resources around Utende;
- ◆ Oceanographical studies
- ◆ A study on marine biodiversity and species and larval distribution patterns.

Most of the above research thematic areas may be beyond the capacity of the marine park management hence, collaboration with relevant research institutions is essential, both in terms of conducting research and developing database facilities.

Research and Monitoring



Monitoring the condition of sub-tidal marine habitats is an important component of the marine park's research and monitoring programme.



Green Turtles are common nesters in MIMP waters

Participatory fish catch monitoring is essential in order to help fishing communities to assess the sustainability of their fishing activities.



CHAPTER 4

PURPOSE AND OBJECTIVES

The starting point in identifying the purpose of the Mafia Island Marine Park is necessarily to refer the guiding legislation, the Marine Parks and Reserves Act No. 29 of 1994.

4.1 THE PURPOSE OF MAFIA ISLAND MARINE PARK

The Marine Parks and Reserves Act No. 29 of 1994 provides [under section 10] the general purposes for establishing all marine parks and reserves in Tanzania. These same purposes are adopted for the Mafia Island Marine Park, namely;

- i) to protect, conserve, and restore the species and genetic diversity of living and non living marine resources and the ecosystem processes of the marine and coastal area;
- ii) to manage the marine and coastal area so as to promote sustainability of existing resource use; the recovery of areas and resources that have been over exploited or otherwise damaged and to rehabilitate damaged ecosystems.
- iii) to ensure that villagers and other park residents are involved in all phases of planning, development and management of the marine park, and have priority in the resource use and economic opportunities.
- iv) to stimulate the rational development of under utilised natural resources;
- v) to promote community orientated education and dissemination of information concerning conservation and sustainable use of resources in the marine park; and
- vi) to facilitate research and monitor resource conditions and uses within the marine park.

In addition as an outcome of a participatory planning workshop held at Mafia Island Lodge in September 1999, the following were added to the specific purposes of the Mafia Island Marine Park:

- vii) to conserve and protect the historic monuments, ruins and other cultural resources that have been identified as of significance to the history of Mafia Island; and
- viii) to facilitate the development of appropriate eco-tourism.

To clarify how these 8 purposes will be synthesised in a coherent approach, the following integrated goal is adopted for MIMP:

4.2. THE GOAL OF MAFIA ISLAND MARINE PARK

The goal of the Mafia Island Marine Park is to conserve the diversity, abundance and function of all physical and biological resources, in order that they may continue to be enjoyed and productively utilised by present and future generations.

4.3 MANAGEMENT OBJECTIVES

The following detailed objectives aim to fulfil the 8 purposes outlined above in section 4.1 giving them clearer focus according to the situation in the Mafia Island Marine Park. These objectives guide the direction and content of the implementation actions and strategies outlined in Chapter 5.

It is understood, without stating it as a specific objective, that the marine park will at all times endeavour to maintain an effective and financially efficient staff and infrastructure, to provide the operational basis and subsequently fulfil the objectives outlined below.

4.3.1. Objectives for conserving biodiversity and ecosystem processes

Biodiversity and ecosystem conservation is one of the defining goals of the marine park. Known biodiversity hotspots such as the Chole Bay coral reefs and Mlola Forest are currently threatened by destructive resource-use techniques and over-exploitation. At the same time significant gaps remain in available technical knowledge. The objectives under this purpose are:

- i) to document all endangered, threatened and critical species and habitats in the marine park, including breeding grounds and spawning sites;
- ii) to ensure all important habitats and species assemblages central to the maintenance of biodiversity resources and ecosystem stability in the marine park are represented and effectively protected in higher level protection zones of the zoning scheme; and
- iii) to ensure that all other detailed management planning, including alternative livelihood development and tourism, is guided by a concern for the ecological integrity of the marine park.

4.3.2 Objectives for Sustainable resource-use and rehabilitation of damaged resources

Sustainable resource-use is another defining goal of the Mafia Island Marine Park. In recent years most marine and forest resources within the park area have been in significant decline. The causes are destructive resource-use and over-exploitation. This has undermined the livelihoods of resident communities and posed an increasing threat to condition of key natural habitats. The objectives under this purpose are:

- i) to maintain the diversity and abundance of economically important species within the marine park, both marine and terrestrial;
- ii) to broaden the income base for resident communities and ensure that groups currently over exploiting resources, in particular, acquire access to new economic opportunities;
- iii) to regulate to sustainable levels the use of potentially unsustainable resource-extraction techniques, such as coral mining, seine-net fishing and harvesting of forest products, and where necessary replace them with sustainable alternatives;
- iv) to promote rehabilitation of the condition and productivity of degraded habitats such as damaged or bleached coral reefs and degraded forest areas.

4.3.3 Objectives for community participation in management and access to resources

Community participation is the third defining goal of the marine park. The park has an unusually high number of people residents within its boundaries by comparison with other protected areas. Most of the residents are directly dependent on natural resource exploitation for their livelihoods. The support and collaboration of local communities is central to achieving conservation and sustainable resource-use goals. The objectives under this purpose are:

- i) to involve local residents and other stakeholders in consultation and decision-making in a meaningful way, and where appropriate to accommodate their views, ideas, knowledge and traditional practices;
- ii) to ensure local communities have priority access to resources and other economic opportunities within the marine park, provided that the communities in question have the relevant capacity and provided that it does not disadvantage inward investment.
- iii) to ensure gender considerations are placed at the centre of management planning, community participation and resource allocation;
- iv) that local communities take on increasing responsibility for sustainable resource management, enforcement of regulations and protection of key habitats.

4.3.4 Objectives for under-utilised resources development

The main long-term threat to habitat conservation and resource sustainability in the marine parks is over-exploitation of resources, especially those associated with coral reefs, mangroves and forests. There is a need to broaden the income and resource base for resident communities. One way to achieve this may be to develop under-utilised resources. Within this it is understood that economic development *per se* is not necessarily within the resources or mandate of the marine park *except* where it is specifically targeted at relieving pressure on over-exploited resources. The objectives under this purpose are:

- i) that under-utilised natural resources within and around the marine park, including opportunities for mariculture, agriculture, silviculture or agro-forestry, are sustainably developed;
- ii) that the benefits from innovative projects are specifically directed towards residents involved in unsustainable-resource, so as to relieve pressure from over-exploited resources.

4.3.5 Objectives for promoting environmental education and information sharing

The marine park has a large and varied types of stakeholders, with a wide range of interests. The active co-operation and support of all stakeholders is critical factor in fulfilling the park's primary goals. It is important that all stakeholders have a clear understanding of the purpose of the marine park and the role they can play in its operation. The objectives under this purpose are that:

- i) community understanding of the purpose of marine park, its environment and the long-term impacts of unsustainable resource-use, is enhanced;
- ii) tourists' and visitors' enjoyment and understanding of the marine park environment is enhanced and informative and attractive information material is readily available;
- iii) information is exchanged between MIMP and all stakeholder groups including communities, tourism operators and other commercial investors, in a free and transparent manner.

4.3.6 Objectives for research and monitoring of resource condition and use

The marine park environment, and therefore also its management agenda, is complex and dynamic, partly because of the nature of marine systems and partly the large number of people active within its boundaries. The marine park management must be able to respond to changes with appropriate management measures. To do this it needs reliable scientific information. The objective under this purpose is that:

- i) Adequate information is available to the park management to allow it:
 - ◆ to define and monitor conservation goals;
 - ◆ to ascertain sustainable levels of resource-use; and
 - ◆ to track changes in the prevailing socio-economic situation.

4.3.7 Objectives for cultural resources conservation

The marine park area has a long history of human settlement dating back at least to the 13th century. The sites of ancient settlements and surviving ruins remain of high cultural importance to today's communities, and are also of interest to visitors and tourists. The objectives under this purpose are that:

- i) cultural resources within the marine park are identified and their importance determined according to their local, national and international significance; and
- ii) the integrity of all cultural and historical resources, including ruins and sacred sites, is maintained according to traditional requirements.

4.3.8 Objectives for appropriate eco-tourism development

The marine park's resources are a significant tourism asset. They provide an opportunity for national and foreign visitors to enjoy a premier natural environment, and can potentially generate revenue nationally, for the District and for local communities, as well as for the marine park. The objectives under this purpose are;

- i) sustainable and environmentally sound tourism is successfully developed and maintained within the marine park;
- ii) local communities share in the benefits that accrue from tourism within the marine park; and
- iii) the impact of tourism development on the integrity of the physical and cultural environment is minimised.

CHAPTE R 5

MANAGEMENT ACTIONS AND STRATEGIES

The actions and strategies outlined in this chapter describe how the marine park will implement activities that will achieve the objectives outlined in the previous chapter. The actions and strategies will act as guidance for the preparation of Strategic Plan and annual operational plans for the marine park.

5.1 GUIDING PRINCIPLES FOR MIMP MANAGEMENT ACTIONS AND STRATEGIES

The 8 purposes and subsidiary objectives outlined in Chapter 4 present a complex and potentially conflicting interests for the marine park. In implementing this GMP it will be important to identify a framework that will permit integration and prioritisation of the different components.

The Park has a relatively large community of over 23,000 people residing within the marine park boundary. The majority of these people are substantially dependent on utilising the very same marine, and to a lesser extent forest, resources that are the focus of conservation efforts. Commercial fish processing and tourism operations, potentially beneficial to the development of sustainable resource-use within the park, further complicate the cast of stakeholders. These facts clearly raise the possibility of resource-use conflicts in conservation, tourism development, and exploitation. Eventuality all these can be minimised by adhering to the following principles.

◆ **Adoption of an integrated, multiple-user approach, especially through application of a zoning scheme**

Integration of the variety of interests within the marine park area demands multiple-user approach that is inclusive but regulatory. This is customarily achieved in practice through application of user-zones, aiming to integrate potentially conflicting ‘uses’ by separating them spatially. The MIMP zoning scheme is elaborated in greater details in Chapter 7.

◆ **Collaborative management and community participation**

Effective implementation of an integrated multi-user approach will depend on the active involvement of all stakeholder groups in the planning and implementation process, particularly resident communities, and also commercial tourism and fisheries operations. The Marine Parks and Reserves Act No. 29 of 1994 provides that these groups are represented on both the Board of Trustees and the Advisory committee. The marine park will undertake regular consultation with these groups. This collaborative approach will necessarily extend to other parts of the government, particularly at district level, including the judiciary and the police, but also at regional and national level.

5.2. MANAGEMENT ACTIONS AND STRATEGIES

For effective implementation of this revised GMP, MIMP will develop action plans which will articulate the programs and projects to be used to address the resource management issues identified in the Park and to fulfill the expectations of stakeholders as well as purposes and policies of the nation. Each of the action plans will be composed of *strategies* sharing common management objectives and activities, in order to accomplish common goals of the Park.

Nonetheless, general actions and strategies for the achievement of the objectives set out in Chapter 4 are outlined in the following sections 5. 2.1 – 5. 2.8.

5.2.1. Action and Strategies to conserve biodiversity and ecosystem processes

Action: Conduct stock assessment of major marine fish species and develop effective data and information flow system to enhance resource conservation and productivity.

Strategies:

- ◆ Identify critical areas, habitats and sites by extending existing knowledge on:
 - the distribution of marine and terrestrial biodiversity within the park;
 - the status and distribution of species and habitats considered to be endangered, threatened and / or critical, whether internationally, nationally or locally;
 - the status in the vicinity of the park of high profile target species such as turtles, sharks, rays, groupers, dugong, whale sharks and dolphins;
 - ecological processes responsible for maintaining the productivity and diversity of marine and terrestrial resources, including spawning grounds, current patterns, seed and larvae dispersal, reproductive cycles etc.
- ◆ Systematically identify threats of critical habitats, species and ecosystem processes.
- ◆ Eliminate resource–use practices that are damaging critical habitats, species, and ecosystem processes, whether physically, chemically or otherwise.
- ◆ Separate other incompatible activities from critical habitats through the zoning scheme and limit pressure on specified-use zones through permits.
- ◆ Maintain effective enforcement of regulations, orders and agreements through patrolling and community-based enforcement.
- ◆ Ensure that all subsidiary plans are guided by concerns for the ecological integrity of the marine park including EIA Guidelines, the Tourism Management Plan, and land utilisation plans.
- ◆ Establish conservation plans for turtle and other species where necessary.
- ◆ Undertake regular monitoring of indicators of biodiversity and critical habitat condition.
- ◆ Monitor trends in aquaculture development in relation to potential impacts.

5.2.2 Action and Strategies to promote enforcement, sustainable resource–use and rehabilitate damaged resources

Action: Develop cost-effective Monitoring, Control and Surveillance (MCS) system plan to instil compliance to rules and regulations.

Strategies:

- ◆ Eliminate blatantly unsustainable and destructive resource–use practices including remnants of dynamite fishing, beach–seines and shifting cultivation.
- ◆ Promote supplementary income generating activities including mariculture, agriculture, tourism–related enterprises, bee–keeping and handicrafts to broaden income base and lessen involvement in unsustainable resource–use activities.
- ◆ Ensure where possible new income generation is targeted at resident groups currently involved in unattainable resource–use.

- ◆ Develop a strategy for sustainable use of fishing resources that includes; promoting environmentally friendly fishing gears, through community-based trials of innovative gears, gears exchanges schemes, and small-loan schemes; regulating potentially unsustainable gears through a permit system.
- ◆ Develop a strategy for sustainable use of natural forest and mangrove products that permit limited subsistence level use whilst strongly promoting silviculture and agro-forestry alternatives.
- ◆ Develop a strategy for sustainable use of dead corals in intertidal areas that permits limited subsistence level use whilst strongly promoting alternative building materials.
- ◆ Rehabilitate degraded environments, where appropriate through planting and transplantation activities, and possibly temporary closures.
- ◆ Include in Village Natural Resources Development Plans a strong emphasis on developing sustainable alternatives to existing unsustainable activities.
- ◆ Train fishers on enforcement tactics.

5.2.3 Action and Strategies to ensure community participation in management and community access to resources

Action: Conduct detailed study to identify and analyse different user groups based on their common interest for development of effective proportional representation in participatory resource management.

Strategies:

- ◆ Establish Village Liaison Committees to promote dialogue, understanding and active co-operation between communities and the marine park.
- ◆ Develop an appropriate formal agreement with Mafia District authorities to guide productive co-operative relationship that addresses the interests and concerns of both parties.
- ◆ Ensure gender issues are placed in the mainstream of all plans.
- ◆ Give marine park residents priority access to resources in zoning scheme regulations.
- ◆ Encourage and facilitate local residents' involvement in sustainable tourism enterprises and other emerging economic opportunities, as a means to broaden residents' revenue base and relieve pressure from over-exploited stocks.
- ◆ Assess and promote options by which local communities can gain greater control over the marketing of fin-fish and other marine resources.
- ◆ Ensure that there is an integration of indigenous knowledge with scientific knowledge in the planning of sustainable resource use strategies.
- ◆ Document traditional fishing grounds and incorporate them into fisheries management plans where it is harmonious with the objectives of sustainability and biodiversity conservation.
- ◆ Develop community-based collaborative enforcement mechanisms to enhance compliance with park regulations.

5.2.4 Action and Strategies to develop eco-tourism

Action: Empower park residents to become active participants and beneficiaries of the growing eco-tourism industry.

Strategies:

- ◆ Support tourism operators in the promotion and marketing of a diversity of tourism attractions, such as dive-sites, ruins, wildlife and local culture etc.
- ◆ Collaborate with tourism operators, where appropriate, to develop public tourism facilities, such as nature trails, jetties and mooring sites.
- ◆ Train park staff and local tour operators to interact with visitors in a professional, courteous and constructive manner.
- ◆ Actively assist investors in following correct procedures for new developments and ensure that they comply with EIA guidelines and requirements.
- ◆ Facilitate dialogue between communities and tour operators to ensure that resident communities share in the economic benefits of tourism.
- ◆ Develop a system to record and monitor visitors' use of the park.
- ◆ Develop regulations, for notification under the Marine Parks and Reserves Act. No. 29 of 1994 covering; the design of tourism facilities, utilities and amenities, including freshwater supply; disposal of solid waste, wastewater and sewage; visual appearance of buildings; water-sports; installation of jetties and mooring sites etc. Also covering broader issues relating to the application of EIA Guidelines for Marine Parks and Reserves, and the approval and enforcement of EIA recommendations;
- ◆ Develop a Visitor Management Plan that captures the above issues, and also covers; safety regulations, especially for watersports and procedures in the event of an emergency; carrying capacity and limits of acceptable use; codes of conduct for tourists and tourism operators;
- ◆ Develop a Land Utilisation Plan for MIMP that identifies areas for potential tourism use.
- ◆ Develop a strategy with District authorities, tourism operators and communities to manage and where necessary regulate settlement into villages in the vicinity of tourism development.

5.2.5 Action and Strategies to promote community education and information sharing

Action: Conduct Situation analysis, Training Needs Assessment and develop outreach training programme on environmental education for communities.

Strategies:

- ◆ Conduct a needs assessment to understand the current status of environmental awareness and education.
- ◆ Develop an integrated programme of environmental education that; Identifies and targets priority groups within the community, such as schools, women groups, village elders, judiciary and resource-users and disseminate the information generated through newsletters, brochures, schools materials, teacher training and visual media etc.;

- ◆ Promote a culture of information-sharing and transparency in decision-making through regular dialogue with all stakeholders.
- ◆ Develop incentives or small-scale award schemes for best environmental practice.
- ◆ Develop a MIMP information centre that provides display and take-way information material to visitors.

5.2.6 Action and Strategies to develop under-utilised resources.

Action: Promote sustainable livelihood in communities.

Strategies:

- ◆ Identify and assess under-utilised resources including their distribution, abundance and potential for sustainable exploitation.
- ◆ Focus the development of under-utilised resources on relieving pressure on existing over-exploited resources, and direct benefits to resident groups most affected by zoning and other restrictions.
- ◆ Develop Village Natural Resource Development Plans in conjunction with communities in order to co-ordinate the development of sustainable resource-use and to guide provision to villages of funds from the Conservation and Development Trust Fund.
- ◆ Develop a Land Utilisation Plan within the marine park boundary, with District Authorities and communities, to provide guidance as to the type of development permitted in given areas including all tourism, commercial and local development.
- ◆ Encourage and facilitate private sector involvement in developing under-utilised resources where it is in the interest of resident communities. Where appropriate identify investors and provide guidance for establishing operations.
- ◆ Facilitate the investigation and development of markets for under-utilised resources.
- ◆ Develop regulations to control potentially harmful aspects of resource utilisation including wastewater, solid waste and sewage disposal, freshwater supply, physical appearance of buildings etc.
- ◆ In collaboration with District authority control and regulate the immigration into the Marine Park.

5.2.7 Action and Strategies to conserve the cultural heritage

Action: Develop cultural heritage development plan.

Strategies:

- ◆ Identify and collate, in association with local communities, existing information on sites of cultural significance within the marine park.
- ◆ Collaborate with communities and mandated institutions to formulate appropriate management measures to preserve and restore historical and sacred sites.
- ◆ Facilitate implementation of appropriate management measures in collaboration with communities, tourism operators and where appropriate, institutions and donors.

- ◆ Encourage scientific investigations on historical and cultural resources.
- ◆ Train staff on the importance and management requirements of sites and relics.

5.2.8 Action and Strategies to develop research and monitoring

Action: Establish partnership with other institutions to build institutional capacity especially in research and monitoring.

Strategies:

- ◆ Identify the prioritize monitoring and research that will provide critical management information for the marine park, including; the status of natural habitats and biodiversity; sustainable levels of use of important resources; community demographics and livelihoods.
- ◆ Establish an internal monitoring system that is integrated into routine park operations and reporting through the permit and user fee system, patrol reports, and participatory resource-use monitoring to allow periodic evaluations of management performance and resource sustainability.
- ◆ Collaborate with local and foreign scientific institutions to fill outstanding data requirements not covered by the internal monitoring capacity.
- ◆ Maintain an up-to-date document outlining monitoring and research priorities and circulate it to all potential collaborating research institutions in Tanzania and overseas.
- ◆ Provide incentives to attract available research capacity to Mafia and to encourage it to focus on the marine park's research priorities.
- ◆ Establish a database of all relevant research data collected in the marine park.

CHAPTER 6

MANAGEMENT AND OPERATIONAL FRAMEWORK

This chapter sets out the management and operational framework by which the management plan will be implemented at field level. In accordance with the Marine Parks and Reserves Act No. 29 of 1994 the Board of Trustees, through the Marine Parks and Reserves Unit, is responsible for the management of MIMP. Day to day operations of the marine park is the responsibility of the Warden-in-Charge, supported by a team of professional and support staff in the field. The chapter is divided into sections as follows:

- ◆ Legislation and policy planning (6.1)
- ◆ Organizational structure, roles and responsibilities (6.2)
- ◆ Park operations and enforcement (6.3)
- ◆ Communication and information sharing (6.4)

6.1 LEGISLATION AND POLICY PLANNING

6.1.1 Supporting Regulations

The enforcement of this revised general management plan will be in line with *General Regulations* for the Mafia Island Marine Park covering a variety of issues including:

- ◆ The zoning scheme and resource-use restrictions (outlined in Chapters 7 and 8)
- ◆ Qualifications for residency and user certificates (section 6.3.5)
- ◆ EIA requirements and procedures

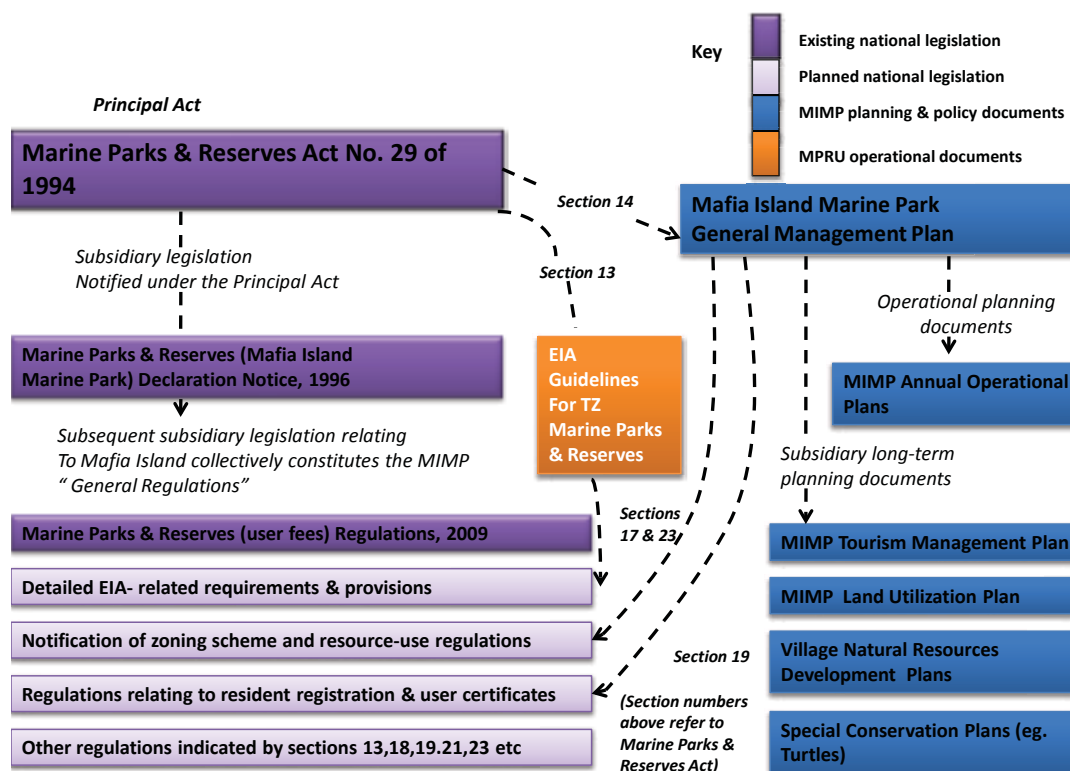
Different revised regulations may be developed at different times, but collectively, they will be referred to as the *General Regulations* for the Mafia Island Marine Park. The revision will be guided by sections 13, 18, 19, 20, 21 and 23 of the Marine Parks and Reserves Act, No. 29 of 1994. The Warden-in-Charge and MIMP field staff will initiate the process of revising regulations under the guidance of the Unit Manager, and such revisions will be submitted to the Advisory Committee. Following modification and approval, the proposals would then be submitted to the Marine Parks and Reserves Unit for professional legal re-drafting and subsequent submission to the Board of Trustees for further modification or approval. The Board will then recommend proposed revised regulations to the Minister for approval and gazetting.

6.1.2 Planning Documents

This management plan is the principal planning document of the Mafia Island Marine Park. Other subsidiary long-term policy plans and time limited operational plans are referred to in this document, particularly Chapter 5 on implementation strategy and include:

- ◆ Land Utilisation Plan
- ◆ Tourism Management Plan
- ◆ Village Natural Resources Development Plans
- ◆ Species Conservation Plans (eg. Turtles) as appropriate
- ◆ Research and Monitoring Plan

The relationship between the legislation and Marine Park planning documents is summarised and presented in next page



6.2 ORGANIZATIONAL STRUCTURE, ROLES AND RESPONSIBILITIES

6.2.1 The Board of Trustees and the Marine Parks and Reserves Unit

The Board of Trustees formulates policies on all Marine Parks and Reserves in the country and directs the Marine Parks and Reserves Unit (MPRU) on all matters regarding to the designation and management of the marine park system. Part II of the Marine Parks and Reserves Act No. 29 of 1994 establishes the Marine Parks and Reserves Unit whose functions include:

- ◆ to seek funds for the establishment and development of marine parks and reserves
- ◆ to implement and enforce the provision of the Act and subsidiary legislation pursuant to Section 18 to 38 of this Act.

6.2.2 The Advisory Committee

The purpose and composition of the MIMP Advisory Committee is provided in the *Second Schedule* of the Marine Parks and Reserves Act No. 29 of 1994. As such, the Advisory committee is established to advise the Board of Trustees; consult with the Marine Park Warden on technical, scientific and operational matters and to propose names to the Board of Trustees for the purpose of appointing a Warden. The Advisory Committee constitutes a representative forum of MIMP stakeholders including local communities, regional and district government, a non-government agency, a research institution and representatives of the tourism and fish processing investors within the marine park area. The Committee meets quarterly and submits its recommendations directly to the Board of Trustees. The Warden-in-Charge serves as Secretary to the Committee.

6.2.3 The Warden-in-Charge

The Warden-in-charge is responsible for all matters concerning the park administration and is subject to the control of the Board of Trustees and the Advisory Committee. The Warden-in-charge has a responsibility to local communities, District authorities and other stakeholders, including notifying them of planning efforts and ensuring that they have a proper opportunity to participate.

6.2.4 Village Liaison Committees

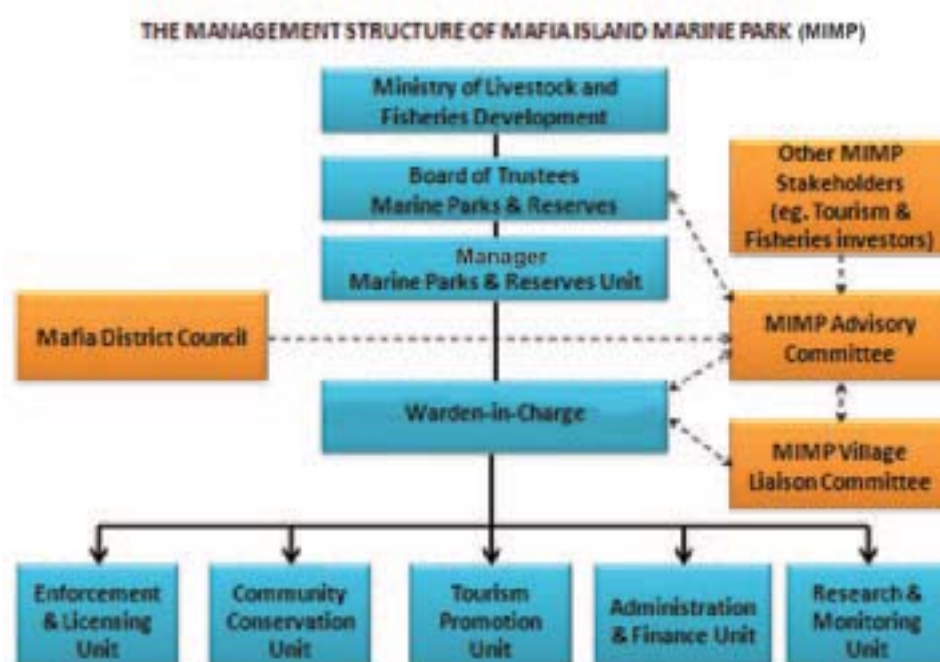
The Marine Parks and Reserves Act No. 29 of 1994 also provides that each Village Council *which affects or is affected by the marine park ... either directly or through a designated committee shall participate fully in all aspects of the development of the regulations, zoning and general management plan*'. Accordingly the villages within MIMP have established Village Liaison Committees, which report to the Village Councils and which shall continue to serve as the primary interface between the communities and the marine park.

6.2.5 Mafia District Council

There are a number of important issues in the management of the marine park that require collaboration and agreement with the Mafia district authorities. These include:

- ◆ EIA requirements for developments outside the boundary of the marine park;
- ◆ complementarities over the management of Mlola Forest between the marine park and the impending District Forest Reserve;
- ◆ the issuance of fishing licenses and collaborative patrolling;
- ◆ the collection of user fees within the marine park and disbursement of revenue; and
- ◆ Issues relating to land title and concession fees within the park boundary;

Agreement over these issues has particular operational relevance in the context of local government reform. The marine park will seek to develop an appropriate, formal and mutually acceptable agreement with the District Council to guide effective resolution of these issues.



6.3 PARK OPERATIONS AND ENFORCEMENT

6.3.1 Infrastructure

The park has its own office buildings, community education centre, field research centre, information centre, suitable staff accommodation, vessels, communication systems and other basic equipment to facilitate management of the park. The main operation is based at Utende, but in order for the park authorities to manage and supervise operations in the park, and maintain personal dialogue with relevant groups, there are strategically located outposts in other areas. In particular the park has maintained a representative office at Kilindoni to enhance communications with District offices and to support enforcement operations on the western side of the park. Temporary camps, particularly on the islands, may also be established if need arises. Additionally, the marine park has supported the establishment of an office in each village for the Village Liaison Committee. The provision of such facilities and sensitive behaviour especially by enforcement staff is essential for convincing user groups that the park is part of the local establishment and willing to work with them in addressing some of their concerns.

6.3.2 Human resource

The operational staff structure for the marine park is provided in the Revised Scheme of Service for Marine Parks and Reserves of 2006. Basically, the overall staffing for the Mafia Island Marine Park evolve on a need basis depending on available financial resources. Staff job descriptions and responsibilities are defined and ongoing training undertaken as relevant.

A 5-year Strategic Plan and Annual Operational Plans will be prepared in accordance with this management plan. These will detail major activities to achieve the park's long-term goals and objectives set out herein, and the activities of all park staff will be guided by these plans.

6.3.3 Law Enforcement and Community Involvement

Law enforcement is a co-operative venture between MIMP staff, fisheries MCS personnel and local communities. Villagers are encouraged to act as the “eyes and ears” of the enforcing authorities. An important component of the enforcement regime will be the VHF radio network/ mobile phones connecting the villages to the marine park head-quarters and District police. MIMP staff will react solely or jointly with the other District enforcing agencies (Fisheries, MCS and Police) to any such call as well as mounting patrols within the Park area.

The Marine Park will work with Village Liaison Committees in ensuring compliance with park and fishing regulations. However, it will be the responsibility of each Village Liaison Committee to encourage residents of MIMP to adhere to regulations. That said, villagers alone are not able to control all illegal activities within the marine park and there will always be a need for supportive law enforcement working in collaboration with villagers to enhance self-regulation.

A co-operative programme ensures an easy flow of intelligence, efficient use of equipment and prompt attention to call of duty. Falling within the scope of the programme will be:

- ◆ consistent training of enforcement personnel;
- ◆ agreement on priority sites for patrols;
- ◆ enforcement strategies;
- ◆ interpretation of regulations;
- ◆ consistent and prompt reporting requirements;
- ◆ formal patrol procedures and schedules; and
- ◆ mode of patrols, by foot or by boat.

This enforcement policy will require boats capable of mounting a fast response. In addition, an observation tower with appropriate scanning equipment may be constructed at the Park Headquarters for surveillance purposes, subject to practical considerations and costs.

Law enforcement within the park boundary is the primary function of the Licensing and Enforcement Warden and of Park Rangers. Law enforcement outside the park boundary is carried out in collaboration with Police, MCS, District Fisheries, Game and Forest Officers. MIMP staff do not have jurisdiction outside the boundaries of MIMP except where an offence was committed inside the park boundary.

Any contravention of the rules and regulations in MIMP shall be liable to prosecution in the Mafia District Magistrate Court. Arrested persons will be charged by the Park Warden and thereafter be taken to the police who will in turn produce the accused in court. The Warden will prosecute the accused according to agreed legal procedure. This procedure will require the Warden and Park Rangers to undergo some legal training.

6.3.4 Demarcation of boundary and zones

The geographical description of the park boundary is given in Appendix 1 and is according to Government Notice No. 200 published on 6th September, 1996. The boundaries of user zones within the park boundary are described in Chapter 7 of this plan.

Emphasis on demarcation will be given, in practice, to facilitation of patrolling and guidance of visitors, fishers and other resource-users. On this basis, the demarcation of road and sea access points and user zones within the park boundary will be treated as a priority.

With regard to the outer boundary, the marine boundary on the northern, western and southern sides from Ras Kisimani anticlock-wise round Bwejuu Island to Kitutia will be marked with buoys. The eastern marine boundary from Kitutia north to Kifinge is the 200m depth contour and it is impractical to demarcate. It is also largely unnecessary since artisanal fishers rarely operate at such depths. The northern landward boundary from Jimbo village back to Ras Kisimani will be marked with strategically located signposts at access points to give information and awareness to the exact location of the boundary.

THE PERMIT SYSTEM

There will be two kinds of permission document;

- **Local Resident User Certificates:**

Issued to all local resident resource-users without fee, having medium-term validity, initially 3 years. These will provide blanket permission for certain activities and effectively serve as identify cards for *bona fide* local residents to confirm their status to MIMP and village patrollers.

- **MIMP Permits**

Grant permission for a specified limited period for a given individual to undertake a specified type of resource-use, in some case in a specified area.

- ◆ **Issuing authority**

The issuing authority for MIMP permits and Local Resident User Certificates shall be the Warden-in-Charge or his/her designated representative(s)

- ◆ **MIMP Residents**

Any MIMP resident wishing to undertake any activity itemised in Tables 8.1–8.3 of Chapter 8 should hold a *Local Resident User Certificate*, obtainable through their Village Liaison Committee. Approval will not be denied provided the person is a *bona fide* resident.

Village Councils within the marine park will establish and maintain a registry of all *bona fide* marine park residents. Verifiable criteria as to who qualifies as a marine park resident shall be determined by each Village Council in collaboration with the marine park.

Any MIMP resident wishing to undertake an activity indicated in Table 8.1-8.3 of Chapter 8 as requiring a MIMP Permit will be required to apply for such, through their Liaison Committee.

MIMP residents will pay no fees neither for *Local Resident User Certificates* nor for *MIMP Permits*.

Village Councils will be responsible for ensuring that applicants are aware of and understand all regulations associated with restricted resource-use. Nevertheless, all individuals will have an equal responsibility to make sure that they are informed about regulations.

Non-residents

Any non-resident wishing to enter the marine park or to undertake any activity requiring a user permit, as indicated in Tables 8.1-8.4 of Chapter 8, will be required to obtain an Entry Permit and / or a User Permit from the Warden-in-charge. The marine park will publicise procedures for permit applications by non-residents following implementation of this Management Plan.

A fee will be charged to non-residents for entry into the marine park, and for permission to undertake any form of resource-use within the park as indicated in Table 8.1- 8.4 of Chapter 8.

All Users

Approval for all MIMP Permits will be subject to the conditions outlined in Chapter 8 and to ensuing legislation. The Warden-in-Charge will not be obliged to issue and permit if he/she feels considerations of resource-use sustainability outweigh the interests of the individual concerned.

All resource-users, whether residents or not, will be required to carry relevant certificates and permits with them during resource-use activity in case required to produce them by patrollers.

6.3.5 Financial management

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

◆ Collection of user fees

Fees will be efficiently collected to ensure that the efforts of Park Rangers are not unduly weighted towards the collection of fees, but rather the enforcement of zoning provision that will govern unsustainable resource use.

Visitor entry fees will be directly collected by the Park staff within the park boundary, and remit funds received to the accountant of the park daily.

User tariffs will be charged in accordance with Government Notice No. 92 published on 17th April, 2009. The park management will not be involved in issuing licenses or collecting revenues from fishing licenses.

◆ Accounts system

All revenues accruing from the park will be held in the park's account within the Marine Parks and Reserves Conservation and Development Trust Fund for all marine parks as provided in the Marine Parks and Reserves Act No.29 of 1994 (section 7). The terms and conditions for operation of the Conservation and Development Funds will be in accordance with the guidelines for revolving funds laid down in the Government's financial Orders. The net revenue, after operating costs will not be subjected to Government taxation. Likewise contribution from outside and agencies or organizations will not be taxed.

Effective management and control over the use and accounting of funds entrusted to the park is critical. The most important elements in achieving the required controls are detailed budgeting, clear accounting procedures and transparency of reporting. Budgeting will be undertaken on an annual basis phased in expected quarterly expenditure. The Warden-in-change will be responsible for preparing a forecast of revenue for the park, based on discussions with the hoteliers and commercial marine resources users. The budget will then be submitted to the Advisory Committee for comment and referred to the Board of Trustees for approval.

Disbursement of funds from the Conservation and Development Fund will be the responsibility of the Unit Manager with the approval of the Board, and subject to adequate control procedures.

◆ Distribution of Net Revenues

The Conservation and Development Trust Fund within the Marine Parks and Reserves Unit established as detailed in the legislation, shall have separate sub-funds; one for the development and establishment of Marine Parks and Reserves, and separate sub-funds for the operation of established Marine Parks. The first of these Marine Parks is the MIMP.

As provided by Section 7 of the Marine Parks and Reserves Act No. 29 of 1994, the District authority receives a share of the net revenue from the MIMP sub-fund for the development and effective administration of Mafia Island. This annual funding should be sufficient to compensate the District for the loss of revenue from the operations of the Park, such as for the collection of concession fees from tourist hotels within MIMP boundary. Nonetheless, the level of this contribution has been finally negotiated, to be 10% of the net revenue.

Another share of the MIMP sub-fund is used for the benefit of the villagers in the vicinity of the MIMP, also in accordance with Section 7 of the Act No. 29 of 1994. This share is 20% of the MIMP net revenue. The Act stipulates that funds disbursed in this way must be used to implement the objectives of the Act, as stated in Section 10. This is interpreted to mean, in particular, the development of under-utilised resources and of resource sustainability. Accordingly, the marine park will facilitate the development of Villages Natural Resources Development Plans, setting out a framework for expenditure. The park may allocate funds disproportionately to villages whose livelihoods are most affected by the park, or whose residents are most engaged in unsustainable resource-use.

6.4 COMMUNICATION AND INFORMATION SHARING

Appropriate information dissemination techniques and consultation mechanisms will be adopted to sensitise 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 objectives 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 the MIMP Community Conservation Unit in conjunction with Village Liaison Committees. An environmental education and awareness-raising programme will be developed in association with schools and other community groups.

Other stakeholder groups will be engaged through regular consultative meetings. A priority will be to establish a mutually agreed policy framework with tourism and other commercial investors through participatory development of relevant policy planning documents including EIA Guidelines, Tourism Development Plan and Land Utilisation Plan. Appropriate MIMP staff (Tourism warden) will be assigned to liaise with investors to ensure that issues of mutual concern are debated and appropriate activity proposed to the Warden-in-Charge.

The development of an information centre at the marine park office will be one component of a broader communication strategy developed under the guidance of the head of department of information and communication based at the Marine Parks and Reserves Unit headquarters. The aim of the programme will be to provide both official and informal visitors with reader-friendly information about the marine park and to inform them about MIMP policies, regulations and ongoing activities. Use of newsletters, public signs, audio-visual materials and other appropriate media will be considered as appropriate.

CHAPTER 7

ZONING SCHEME

The practice of zoning in marine protected areas has been in existence for more than two decades in other countries, notably Australia, the USA and the Caribbean. The general concepts behind zoning are outlined in various literature including Salm *et al.* (2000) and Kelleher (1999).

Zoning is the primary management tool of multiple-use marine protected areas. Its aim is to harmonise otherwise conflicting conservation and livelihood objectives by spatially separating extractive resource-use areas from sensitive habitats. Beyond this, the regulations in zones permitting resource-use ensure that resource-use activities are productive and sustainable.

Zoning schemes divide the multiple-use area into *use-zones* that have different levels of protection depending on their respective conservation and economic importance. The detailed guidelines to the type of activities permitted in each zone in MIMP are provided in Chapter 8.

This chapter outlines the zoning scheme for the Mafia Island Marine Park (Fig.3) and the principles underlying its development. It includes:

- ◆ the aim of the MIMP zoning scheme (7.1);
- ◆ the types of zones including the criteria by which areas are designated under each and the resource use strategy in each zone type (7.2);
- ◆ the boundaries of areas designated under each zone type, and the rationale behind each (7.3);and
- ◆ future changes to the zoning scheme (7.4).

7.1. AIM OF THE MIMP ZONING SCHEME

The zoning scheme:

- ◆ protects critical and species-rich habitats including sub-tidal areas, mangroves, forests, bird-nesting, fish-spawning and turtle-breeding grounds;
- ◆ protects the diversity and quality experiences available to visitors to Mafia;
- ◆ recognises traditional/local community fishing grounds and provides a means for continued but controlled use;
- ◆ notwithstanding the above, inevitably conforms to certain natural features of the seascape, land formations and important ecological features;
- ◆ provides a geographical basis against which resource-use is evaluated, monitored and reviewed and the effectiveness of the management plan is measured.
- ◆ provides a framework for surveillance and patrolling activities by focusing enforcement in zones with higher levels of protection.

Fig. 3



7.2 DEFINITION OF ZONE TYPES

There are three types of zones within the Mafia Island Marine Park;

- ◆ *Core Zone*
- ◆ *Specified-use Zone*
- ◆ *General-use Zone.*

In addition the Marine Parks and Reserves Act, No. 29 of 1994 provides for a *Buffer Zone*, outside the boundary of the park. The character of each zone type and criteria by which areas are designated under each type are as follows:

7.2.1 Core zone	
Provision	Core zone status provides the highest level of protection within the park. It is intended to include all areas of the marine park that both warrant primary conservation status and those local resource-users can afford wholly to relinquish.
Criteria for selection	Areas are selected for designation as Core Zones if they qualify for one or more of the following criteria. ◆ areas that are in relatively pristine or intact condition, that are also representative of the main types of natural habitats found within the marine park; ◆ areas containing relatively high levels of locally representative biodiversity; ◆ areas considered to be important breeding or spawning grounds, or otherwise important to the productivity and regeneration of the park's natural resource base; ◆ areas whose protection is considered important for the survival of locally rare or threatened species; and ◆ areas of special cultural significance. Within MIMP, both marine and terrestrial forest habitats are represented within Core Zones.
Resource-use strategy	Within Core Zones all biological resources, non-biological resources and ecosystem processes are, as far as practicable, protected from the direct adverse effects of human activity. Accordingly, extractive resource use is prohibited entirely. Controlled tourism and scientific research are permitted.

7.2.2 Specified-use zone

Provision:	Specified-use Zone status provides intermediate level protection with the park. It is intended to include areas of the marine park that warrant primary conservation status but which are also important to local resource-users.
Criteria for selection	An area may be designated as a Specified-use Zone where it qualifies broadly to the same criteria as those given in 7.2.1. for Core Zone status, but either: ◆ its greater importance in sustaining the livelihoods of local human communities makes it impractical to prohibit extractive resource-use entirely; ◆ or it qualifies to one or more of the criteria for Core Zone status, but to a lesser degree of importance than other core zone status.
Resource-use strategy:	The strategy in Specified-use zone is to prohibit activities likely to cause significant alterations to the environment. This may be defined as: ◆ significant change or damage to benthic or terrestrial habitats not likely to self-regenerate from year to year, ◆ significant depletion of the abundance or biodiversity of representative species assemblages; and ◆ significant depletion over time of species that are considered locally rare or threatened. In acknowledgement of section 10 of the Marine Parks and Reserves Act, No. 29 of 1994, extractive resource-use in Specified-use Zones is restricted to residents of the marine park.

7.2.3 General-use zone

Provision:	General-use Zone status is intended to provide for sustainable resource-use for MIMP residents, thereby relieving resource-use pressure from zones with higher level protection. Despite their lower protection status, some General-use Zones also play an important role in maintaining ecosystem processes and the overall productivity of the marine park area.
Criteria for selection:	General-use Zone status is accorded to areas that do not fulfil the criteria set for Core Zone status or Specified-use Zone status.

Resource-use strategy: Extractive resource-use is permitted in General-use Zones. The objective of regulations in *General-Use Zones* is to ensure that fish catches and other resource exploitation are sustainable from year to year, notwithstanding natural variations in breeding and recruitment. A certain level of permanent habitat alteration is acceptable only provided that the overall productivity of the environment is not significantly undermined and that adjacent areas with a higher protection status do not deteriorate in ways defined previously.

This entails excluding from General-Use Zones methods of resource-use likely to damage benthic habitats or otherwise adversely affect the breeding and recruitment of commercial species, as well as methods that remove an unsustainable number of juvenile or adult organisms. It also entails restricting the number of resource-users of each type to a sustainable level.

MIMP residents will have priority access to resources in General-Use Zones. Nonetheless, other Mafia residents and resource-users from outside Mafia may undertake certain resource-use activities under permission from the marine park management and where relevant from local village councils.

7.2.4. Buffer Zone

The buffer zone is an area outside and adjacent to the marine park boundary that serves as a cushion against impacts from activities outside the park. All new developments and land allocations within the buffer zone are obliged to undergo the same EIA scrutiny as developments within the marine park boundary, following the official EIA Guideline of the Marine Parks and Reserves. This is provided in the Marine Parks and Reserves Act, No. 29 of 1994 [section 16] which further provides that the marine park must be informed in writing 30 days in advance of preparation of an EIA. The marine park has no other direct jurisdiction over activities in the buffer zone.

It is emphasised that such EIA scrutiny is in no way intended to discourage sustainable development or investment in Mafia District. Sustainable development in the District is generally in the interests of the marine park and is welcomed. EIA procedures are intended only to mitigate unnecessary environmental degradations by improving the design and operations of such developments.

The buffer zone boundary has initially been set, by agreement with the Mafia District authorities, at 800m in all directions outwards from the MIMP outer boundary. However, it is recognised that the marine park environment could be affected by developments in a considerably wider area, within Mafia District or even beyond. It is intended therefore, that following implementation of this plan, negotiations will be held with the Mafia District authorities to extend the requirement for EIA scrutiny to a considerably wider area within the District, probably by one of the following means:

- ◆ extending the MIMP buffer zone;
- ◆ instituting appropriate District by-laws relating to EIA requirements; or
- ◆ the institution of national legislation on EIA requirement.

7.3 SCHEME OF DESIGNATED AREAS

This section describes the location of all areas designated under the 3 zone types within the Mafia Island Marine Park and the rationale behind each of the areas.

A detailed Zoning Plan has been produced and gazetted as a subsidiary document to the General Management Plan. The detailed Zoning Plan has included:

- ◆ Detailed technical descriptions of the zone boundaries (which have been notified in subsidiary regulations under the Marine Parks and Reserves Act. No. 29 of 1994)
- ◆ Detailed management strategies for individual zones. These follow the resource-use strategies outlined in this document and contain greater specific detail on issues such as the location of demarcation and mooring buoys, patrol activity, and particular resource-use allocations (eg. mariculture).

7.3.1 AREAS DESIGNATED AS CORE ZONES

1. Outer Kinasi Pass/ Mchangani Core Zone	
Boundary	The northern terrestrial boundary is the mean high high-water mark. Bounded in the west by a line running from the west side of the Mchangani mangroves to the north end of Miewe Kubwa, from the southern tip of Miewe Kubwa to the northern tip of Juani Island. Bounded in the east by a line running 1 km parallel to the mouth of Kinasi Pass/ the line of the outer reef.
Justification	Contains Dindini-Mchangani and Kinasi walls that constitute unique reef habitat within MIMP with significant biodiversity value, and also popular SCUBA diving sites. Fish eagles and other sea birds nest on the islets around Kinasi Pass. The creek at Mchangani is one of the two most extensive Mangrove stands within the park, but the mangroves are under threat from local cutting. The outer Kinasi Pass area is thought to provide a refuge for commercially important pelagic fish migrating in and out of the Chole Bay tidal.

2. Kitutia Core Zone	
Boundary	This zone encloses a sand cay surrounded by a circular reef; the boundary is a line 1km outward from the mean low low-water mark.
Justification	Notwithstanding considerable coral bleaching damage in 1998, it is a prime example of <i>Acropora spp.</i> dominated shallow fringing reef habitat. Considered locally to be a fish spawning area. In view of its southerly location in relation to the main northerly current, it is possibly an important source of coral and reef-fish larvae for other reefs on Mafia. The reef has hitherto been an important fishing ground for Jibondo fishers, for fin-fish and octopus, but was coming under significant pressure from seine nets. Prior to the 1998 coral bleaching, the reef was a valued snorkelling site and subject to recovery, may be again in the future.

3. Kijiwenyara Core Zone	
Boundary	Kijiwenyara is a small rocky islet situated off the western end of Bwejuu Island. The zone covers the islet itself bounded by the mean low low-water mark, and marine area described by a semi-circle of radius 200 meters with the centre of the circle at the westernmost end of the islet.
Justification	The marine area described is traditionally recognised as a fish spawning ground and refuge, though in recent years local fishermen have started to fish the site. The islet is a nesting site for fish eagles.

4. Mlola Forest Core Zone	
Boundary	The main part of Mlola Forest lying within the marine park, running from the northern boundary of the park in Jimbo village, south along the eastern seaboard to Mchangani. Bounded in the east by the mean low low-water mark and in the west by the Mlola Forest Specified-use Zone and the official forest boundary.
Justification	A large portion of the intact part of the extant lowland coastal forest on Mafia. The forest has relatively high biodiversity, contains several species confined to a few sites in Tanzania, and provides a refuge for duiker and elephant shrews. The forest provides protection for agricultural land, from hot, saline easterly winds. The forest has come under severe threat over the course of several decades, from clearance for shifting cultivation and from the extraction of trees for timber and poles.

5. Kua Ruins Core Zone	
Boundary	A continuous area surrounding all the Kua ruins on Juani Island extending 100m in all directions from the outer ruins.
Justification	Kua is the site of a 16 th century town thought at one time to have been the headquarters of the Sultanate of Kilwa. The ruins remain of high cultural significance.

5. Kizani Channel Core Zone	
Boundary	The water channel at the south-western corner of Juani Island known locally as <i>Mto wa Kizani</i> , extending up to the high high-water mark in the channel itself, plus the beach areas and shallow waters on either side of the east end of the channel.
Justification	A site of scenic beauty used for tourism. The channel is lined with mature mangroves which have begun to suffer from uncontrolled cutting. Large flocks of waders and small seabirds utilise the inter-tidal area.

6. Ras Kisimani Ruins Core Zone	
Boundary	Small enclaves containing the ruins themselves and their immediate vicinity.
Justification	Although little of the ruins remain aside from foundations, they are the site of the earliest settlement of Mafia dating back at least to the 13 th century and possibly earlier and are therefore of cultural significance.

7.3.2. AREAS DESIGNATED AS SPECIFIED-USE ZONES

1. Chole Bay Specified-use Zone	
Boundary	An extensive section of the north eastern and central part of Chole Bay encompassing Kulawe reef to the west and Msumbiji reef to the south. Bounded from a point on the northern shore of Chole Bay east of Mchangani, running south west towards Chole Island to a point south-west of Kulawe reef, running east to the northern tip of Juani. On the east side the boundary is adjacent to the boundary of the Outer Kinasi Pass Core Zone.
Justification	Contains all the significant reef habitats within the park. Chole Bay including those around Miewe Ndogo islet, the reefs along Kinasi Pass known as Utumbi reef and Chole and Kinai Walls, and the relatively shallow reefs between Kinasi Pass and Juani Island including Milimani and Mlime reefs. Collectively these are the most species-rich coral reef habitats in the marine park. Highly important fishing grounds especially for fishing communities on Juani and Chole Islands, but also other communities around Chole Bay. These reefs have come under increasing pressure over the past three decades, first from dynamite fishing and more recently from the use of bottom-dragging seine nets.

2. Kifinge Bay Specified-use Zone	
Boundary	A coastal/marine strip running the full length of Kifinge Bay. Bounded in the west by the mean low low-water mark, adjacent to the Mlola Forest Core Zone, in the east by a line 1km from, and parallel to, the low low-tide mark.
Justification	Kifinge Bay is an important turtle-nesting site. Turtles are vulnerable to capture by shark nets in the waters off the bay especially during the nesting seasons. The area is also an important fishing ground during the north-east monsoon and is reputedly popular for sharks.

3. Juani Outer Reef Specified-use Zone

Boundary	A coastal/marine strip running the full length of the eastern seaboard of Juani Island including the islet known as <i>la Kasa</i> at the southern end of Juani. Bounded inland by a line 50 metres above the mean high high-water mark and in the east by a line 1km from, and parallel to, the mean low low-water mark.
Justification	Beach areas on the outer side of Juani provide important turtle-nesting sites. Turtles are vulnerable to capture by shark nets in the waters off the outer reef especially during the nesting seasons. The area is also a significant fishing ground during the north-east monsoon.

4. Jibondo Outer Reef Specified-use Zone

Boundary	A coastal/marine strip running the full length of the eastern seaboard of Jibondo Island. Bounded inland by a line 50 metres above the mean high water mark and in the east by a line 1km from, and parallel to, the mean low water mark.
Justification	Beach areas on the outer side of Jibondo provide important turtle-nesting sites. Turtles are vulnerable to capture by shark nets in the waters off the outer reef especially during the nesting seasons. The area is also a significant fishing ground during the north-east monsoon.

5. Mange Reef Specified-use Zone

Boundary	A circular reef exposed at low spring tides. The zone boundary extends 1km out from the mean low low – water mark.
Justification	A well developed reef structure proving one of the main fishing grounds for Jibondo fishers. The reef has come under increasing threat in recent years, mainly from over – fishing and also from the use of bottom – dragging seine nets.

6. Mlola Forest Specified-use Zone

Boundary	The narrow strips running 250m along the inside of official forest boundary of the Mlola Forest Reserve. One runs from Beacon 90 south to Kitotoni River (Beacon 54). The other runs from the Mlola Forest Post (Beacon 43) in Kungwi south to Chole Bay (Beacon 1).
Justification	These zones provide for controlled extraction of building poles for a limited period of five years specifically until the maturation of trees planted from 1998. Also provides controlled extraction of medicinal plants, firewood and raffia fibre. The ue zone is divided so as to avoid the most intact areas of forest between the Mlola Forest Post and Kitotoni River and at Kirongwe north of Beacon 90.

7. Ras Kisimani Specified-use Zone	
Boundary	All of the land area on Ras Kisimani above the low – spring tide mark plus the two channels that partially separate it from the main Mafia island; <i>Mto wa Arusha</i> and <i>Mto wa Saliboko</i> , up to the high tide mark on the east side of the channels. This includes the extensive, mangrove stretch in the inter – tidal area north of Ras Kisimani up to a latitudinal line above the northern mouth of <i>Mto wa Arusha</i> such that all of the mangroves around the mouth of the channel and to the south are included.
Justification	The two channels, <i>Mto wa Arusha</i> and <i>Mto wa Saliboko</i> , contain some of the best areas of mangrove habitat within MIMP. Together with Ras Kisimani itself they constitute a site of notable scenic beauty that can be utilised by visitors from lodges in Utende, and may itself be suitable for tourism development. The beaches of Ras Kisimani also host a small number of turtle nests.

7.3.3 AREAS DESIGNATED AS GENERAL-USE ZONES

All areas within the marine park boundary not designated above as either Core Zones or Specified – use Zones are designated as General - use Zones.

7.4 FUTURE CHANGES TO THE ZONING SCHEME

Like any zoning plan, the MIMP zoning scheme needs to be flexible to respond to major changes in the socio – economic or physical environment.

For example, the existing high level of dependency on marine resources by local residents is currently a major factor determining the protection status given to certain areas, especially *Specified – use Zones*. However, successful development of alternative income sources could relieve the dependency on marine resources and allow certain areas to be given higher protection in the future. Equally, adverse trends in demographics or economic circumstances could necessitate lowering the protection status of certain areas; though in general this would be a course of last resort. New scientific information on reproduction cycles or current patterns might highlight the importance of new scientific information on reproduction cycles or current patterns might highlight the importance of new zones over existing ones and so invite modifications. Natural damage from storms or coral bleaching might require temporary zoning to allow stocks or ecosystems to recover.

In short it is recognised that revisions to the zoning scheme over time are not only possible, they are part of a long – term strategy of adaptive management.

The procedure governing changes to this Management Plan, including the zoning scheme, is outlined in Chapter 9.

CHAPTER 8

PROHIBITED AND PERMITTED ACTIVITIES

This chapter provides a guide to activities prohibited within the marine park as a whole or that are restricted within particular zone types. It follows the resource–use strategies for zone types outlined in section 7.2 of the previous chapter. Following implementation of this management plan, regulations will be drawn up in line with these guidelines and notified under the Marine Parks and Reserves Act, No. 29 of 1994.

8.1. ACTIVITIES PROHIBITED IN ALL ZONES

All existing national legislation prohibiting activities of whatever kind applies throughout the marine park. In addition the following activities will be prohibited from all zones within the park boundary:

8.1.1 Prohibited extraction of Living Resources

- ◆ Use of beach–seine nets including nets known locally as *Juya*, *Juya la Kojani* and *Kavogo*
- ◆ Any activity involving mechanical damage to, or breakage of corals and other benthic habitats or organisms, whether by hand or by use of poles or other implements.
- ◆ Killing of turtles and dugong whether accidental or deliberate, including removal of turtle eggs
- ◆ All pull nets with stretched–mesh size less than 3 inches, including *Tandio/Mtando* nets
- ◆ Trawling
- ◆ Use of propelled spear–guns and harpoons
- ◆ Use of chemicals and poisons for fishing
- ◆ Use of SCUBA to collect any marine organism other than for research purposes
- ◆ Mangrove cutting for commercial sale

8.1.2 Prohibited Extraction of Non–living Resources

- ◆ Coral mining from inter–tidal and sub–tidal areas for commercial sale
- ◆ Sand mining from beaches and sub–tidal areas
- ◆ Hydrocarbon exploration and drilling
- ◆ Sea–bed mining

8.1.3 Prohibited Construction and Development

- ◆ Port development and/or dredging
- ◆ Industrial development
- ◆ Use of explosives for any purpose
- ◆ Dumping into marine waters of solid waste, untreated wastewater, sewage or chemically polluted water or liquid.
- ◆ Artificial drainage of any land area

8.1.4 Prohibited Tourism Activities

- ◆ Jet – skiing
- ◆ Sea – planes

8.2. GUIDE TO REGULATED ACTIVITIES

The following guidelines indicate the conditions under which certain activities may be permitted within the marine park and should form the basis of legislated regulations:

FISHING:

8.2.1 Net fishing

See also Table 8.1

- ◆ All pull-nets and bottom-dragging set-nets, including *Nyavu za kuzungusha*; *Nyavu za kuvuta*, 'Mtando' and *Tambo*, will be prohibited in all zones. The accompanying use of poles and other implements to scare fish out of the substratum will be prohibited.
- ◆ Following successful development of alternative sustainable fishing gears, Park regulations and national regulations; the above nets are prohibited entirely from the marine park.

8.2.2 Sport – fishing

See also Table 8.1

- ◆ Sport-fishing will be prohibited from Core Zones and Specified-use Zones but permitted in Regulated-use Zones.
- ◆ Sport-fishers will be required to obtain a sport-fishing licence from the Division of Fisheries Development or the District Fisheries Office.
- ◆ Sport-fishers will be required to release all fish exceeding specified weights, since large adult fish are important for reproduction. Maximum weights will be established for all relevant groups of target species.
- ◆ Sports-fishing using spear-guns or harpoons will be prohibited entirely.
- ◆ The Warden will have the authority, if he/she feels it is necessary, to require sport-fishers to accommodate on board their fishing vessel a marine park observer during fishing activities, and to cover the cost of such a person at official staff field allowance rates.

8.2.3 Octopus fishing

See also Table 8.1.

- ◆ Octopus fishing will be prohibited from Core Zones but permitted in Specified-use Zones and *Regulated – use Zones*.
- ◆ Fishing for octopus, by *skin-diving*, will not be permitted during neap tides.
- ◆ A minimum, and possibly a maximum, catches weight for individual octopus will be legislated.

MINING:

8.2.4 Sea Coral Mining

See also Table 8.2.

Mining of coral whether live or dead, from inter-tidal and sub-tidal areas will be strictly regulated under the marine park's resource-use permit system, but will not be prohibited entirely.

- ◆ Sea coral mining will be restricted to MIMP residents for purposes of domestic construction within the marine park villages only, and will be permitted in *Regulated-use Zones*.

- ◆ Coral mining for commercial sale will not be permitted, neither will coral mining by non – MIMP residents for any purpose.
- ◆ The conditions under which a coral mining permit may be issued to a MIMP resident will explicitly include the amount of coral a single person may remove under a single permit and the frequency with which a single person may apply for a subsequent permit.
- ◆ Permit applications in which the applicant proposes to make use of alternative building materials alongside coral blocks and / or lime will be viewed more favourably.
- ◆ It will be required that mining sites be specifically approved by the Warden-in-Charge or a designated representative, and such sites should be selected so as to maximise the likelihood of regeneration of the substrate. Areas in the vicinity of important fishing grounds, beaches or other sensitive coastlines will be avoided.

8.2.5 Land-based fossil coral mining

- ◆ Land-based fossil coral mining, whether for building blocks, aggregate, chippings or lime will be restricted to MIMP residents in *Regulated-use Zones* and will require a permit from the marine park.
- ◆ It will be required that mining sites be specifically approved by the Warden-in-Charge, or a designated representative, in collaboration with the relevant Village Council.
- ◆ Fossil-coral mining may be cautiously encouraged around the marine park to provide an alternative to sea coral. However, it should be subject to monitoring by Village Councils and the marine park, and may become subject to stricter controls at a later date if concerns arise over its sustainability or environmental impact.

8.2.6 Mud-brick making

- ◆ Mining of mud within the marine park for production of mud-bricks will be restricted to MIMP residents in *Regulated-use Zones* but will not require a permit.
- ◆ Mud-brick production may be cautiously encouraged around the marine park to provide an alternative to sea coral. However, it will be subject to monitoring by Village Councils and the marine park, and may become subject to stricter controls at a later date if concerns arise over its sustainability or environmental impact.

TREE CUTTING:

8.2.7 Mangrove harvesting

See also Table 8.2.

Harvesting of mangrove products, especially tree-cutting, will be strictly regulated under the marine park's resource-use permit system.

- ◆ Mangrove cutting will be restricted to MIMP residents for purposes of boat – building and repair and domestic construction within marine park villages, in *Regulated-use Zones* only. Collection of dead mangrove branches, fruits, leaves and seeds will be allowed outside of *Core Zones* without the need for a permit.
- ◆ Mangrove cutting for commercial sale will not be permitted; neither will mangrove harvesting by non-MIMP residents for any purpose.
- ◆ Cutting of mangrove for small-scale clearance of beach or inter-tidal areas for whatever purpose requires a permit. Significant clearance will not be permitted.

- ◆ The frequency with which a single person may apply for a subsequent permit will be regulated.
- ◆ A mangrove-cutting permit issued to a MIMP resident will explicitly state the number of mangrove that the person may remove.
- ◆ Permit applications in which the applicant commits himself/herself to planting seedlings of agro-forestry alternatives will be viewed more favourably, and may even be made a condition of approving the permit.
- ◆ It will be required that cutting sites be specifically approved by the Warden-in-Charge or a designated representative. Sites should be selected so as to maximise the likelihood of regeneration. Cutting in the vicinity of important fishing grounds and tourism areas should be avoided.

8.2.8 Forest products (non-mangrove)

See also Table 8.3.

Harvesting, especially of poles, but also of non-timber forest products will be regulated under the marine park's resource-use permit system.

- ◆ Pole-cutting will be restricted to MIMP residents for purpose of domestic construction within marine park villages only. Pole-cutting will be prohibited from Core Zones. It may be permitted in specified-use Zones under permit, but issuance of such permits to be strictly limited.
- ◆ The frequency with which a person may apply for a pole-cutting permit will be regulated.
- ◆ A permitted individual may be required to plant agro-forestry alternatives as conditions of cutting natural trees.
- ◆ Cutting of trees listed as "*Reserved Trees*" by the Forest and Beekeeping Division of the Ministry of Natural Resources and Tourism of Tanzania should only be permitted in *Regulated-use Zones* and then only under permit from the Warden-in-Charge.
- ◆ Collection of firewood, raffia fibre (*ukindu*) and medicinal plant material should be permitted in *Specified-use Zones* under permits issued locally by Village Liaison Committees and freely in *Regulated-use Zones*.

8.2.9 Salt making

- ◆ Salt production involving heating sea-water with firewood or other fuel will be prohibited within the marine park.
- ◆ Salt production using solar energy may be undertaken in *Regulated-use Zones* under permit from the marine park. The location must be approved by the relevant Village Council and the Warden-in-Charge.

8.2.10 Construction

- ◆ Large-scale processing plants and installations, whether floating or land-based, may not be located within the marine park boundary.
- ◆ Development of any small-scale processing plant or installation, including desalination plants and processing plants for marine products whether floating or otherwise, must undergo EIA scrutiny in accordance with the Marine Parks and Reserves Act. No. 29 of 1994.
- ◆ All new and existing constructions including tourism lodges other commercial outlets, jetties and mooring installations, but exempting local residents' houses, civic buildings and public amenities,

will be subject to scrutiny under the EIA guidelines for Marine Parks and Reserves.

Any construction not approved under these guidelines, even retrospectively, will be required to adjust accordingly.

- ◆ The EIA Guidelines for Marine Parks and Reserves will include guidance on issues relating to freshwater supply; disposal of solid waste, waste-water, sewage and any other chemically polluted waters; physical appearance and construction materials, and any other significant alterations to the natural environment.

8.2.11 Scientific research

- ◆ All scientific research within the marine park will be subject to permit issued at the discretion of the Warden-in-charge.
- ◆ A fee will be charged for all researchers to conduct research within the marine park.

Differential charges will be imposed for Tanzania nationals and non-Tanzania nationals. The Warden-in-charge will have discretion to waive the research fee if it is considered that the research is sufficiently to the benefit of the marine park.

TABLE 8.1 SUMMARY OF PERMITTED ACTIVITIES BY ZONE

Activity	Core Zone	Specified – use zone	Specified – use zone	General – use zone	
	All users	Residents	Others	Residents	Others
Hand-lines, box-traps, fence-traps	X	LRUC	X	LRUC	P
Long – lines	X	X	X	LRUC	P
¹ Pull nets (of any size entirely prohibited)	X	X	X	X	X
² Set-nets / shark nets between 3” – 7” mesh	X	LRUC	X	LRUC	P
Shark nets more than 7” mesh	X	X	X	LRUC	P
Sport-fishing	X	X	X	LRUC	P
³ Octopus collection	X	LRUC	X	LRUC	P
Lobster, crab, shells (food)	X	LRUC	X	LRUC	P
Collection of shells for the curio trade	X	X	X	P	X
Aquarium collection (all organisms inc. coral)	X	X	X	P	X

(See section 6.35 for permit system)

KEY

X = Not permitted

LRUC = Local Resident User Certificate required

P= MIMP Permit required

Note:

¹ Pull nets: includes nets known locally as ‘Mtando’ Nyavu za kuzungusha’ Nyavu za kuvuta and Mtambo are entirely prohibited

² Set nets >3” >7”: include nets known locally as ‘Jarife’ and Nyavu za kupweleza’

³ Also see detailed restrictions on Octopus fishing in para 8.2.3.

TABLE 8.2 SUMMARY OF PERMITTED MARINE RESOURCE–USE (NON–FISHING) BY ZONE

Activity	Core Zone	Specified – use zone		General–use zones	
	All users	Residents	Others	Residents	Others
Mangrove cutting (subsistence)	X	X	X	P	P
Other mangrove resources (leaves, fruits, bark etc)	X	X	X	LRUC	X
Coral or limestone’s mining from inter– tidal or sub – tidal areas	X	X	X	P	X
Seaweed/ sea grass collection (wild)	X	X	X	LRUC	P
⁴ Mariculture	X	P	X	LRUC	P
⁵ Other marine bio-prospecting	X	X	X	P	P

(See section 6.35 for permit system)

KEY

X = Not permitted

LRUC = Local resident user certificate required

P = MIMP Permit required

Note:

⁴Mariculture: includes seaweed farming oyster farming, crab farming, fish farming, fish cage – culture, lobster ranching, sea – cucumber ranching etc.

⁵Other marine bio-prospecting: includes collection of limited of samples of biological or inorganic material for development of medicinal, pharmaceutical or other commercial products

TABLE 8.3: SUMMARY OF PERMITTED FOREST AND TERRESTRIAL RESOURCE–USE BY ZONE

Activity	Core Zone	Specified – use zone		General – use zone ⁶	
	All users	Residents	Others	Residents	Others
Pole – cutting	X	P	X	LRUC	X
Cutting of Reserved Trees for Timber	X	X	X	P	X
Medicinal plants, firewood & raffia fibre collection	X	P	X	LRUC	X
Agriculture & Agro – forestry	X	X	X	LRUC	X
Bee – keeping	X	X	X	LRUC	X
Hunting	X	X	X	LRUC	X
Land – based fossil coral mining	X	X	X	LRUC	X
⁷ Construction (non–tourism)	X	X	X	LRUC	P
Camping (fishermen)	P	P	P	LRUC	p

(See section 6.35 for permit system)

KEY

X = Not permitted

LRUC = Local Resident User Certificate required

P = MIMP Permit required

Note:

⁶General-use zone: include all land areas of the Marine Park including all of the islands of Jibondo, Juani, Chole and Bwejuu.

⁷Construction (non-tourism): includes any structure, except those providing services to tourism, whether temporary or permanent and whether for domestic or commercial purposes.

TABLE 8.4. SUMMARY OF TOURISM REGULATIONS BY ZONE

Activity	Core Zone	Specified – use zone	General – use zone
SCUBA diving	P	P	P
Snorkelling, Swimming	Freely allowed	Freely allowed	Freely allowed
Windsurfing, Sailing	Freely allowed	Freely allowed	Freely allowed
⁸ Construction	X	P	P
⁹ Sport-fishing	X	X	P
Overnight boat mooring	X	X	P
Camping	P	P	P

(See section 6.35 for permit system)

KEY

X = Not permitted

P = Permit required from MIMP / villages

Note:

⁸Construction: Specifically tourism – related construction of all kinds whether by MIMP residents or tourism operators, including accommodation buildings, shops, restaurants, shelters, water – sports related structures providing utility functions such as waste disposal, water and electricity.

⁹Sport-fishing: Note that sport – fishing is subject to various conditions detailed in the main text (para 9.2.2)

CHAPTER 9

EVALUATION AND REVIEW

9.1 PROCEDURE FOR REVIEW OF THIS MANAGEMENT PLAN

The general management plan is not a static document and will be changed from time to time to reflect resource use trends and new resource information acquired through research, and possible changes in local attitudes and perceptions during implementation. Just as the planning effort involved open, inter – disciplinary and interactive workshops and consultative meetings the review process will also require a similar transparent process.

The review process will aim to abide by the following schedule:

i) 5th year Interim Review

Before the end of the 5th year following approval of this Revised Plan, the Marine Parks and Reserves Unit, together with the Park Management, will ensure that an interim review is conducted. The purpose will be to assess progress on implementation of the Plan and the continuing appropriateness of the Zoning scheme and associated policies. The review will be conducted internally but will involve consultation with major stakeholder groups, District authorities and the Advisory Committee. The conclusions will be brought to the attention of the Board of Trustees and if there are any salient points, especially any requiring legislation or revision of significant points in this document, they will be brought to the attention of the Minister of Livestock and Fisheries Development.

ii) 10th year Major review

Before the end of the 10th year following approval of this Revised Plan, the Board of Trustees, through the Marine Parks and Reserves Unit and the Park Management, will ensure that major review is conducted. The purpose would be similar to the above interim review, but would be conducted in greater detail and will preferably involve an independent assessor, subject to available resources. The results of the review will be brought to the attention of the Minister of Livestock and Fisheries Development.

iii) Validity of this plan

If the timing of the above reviews is delayed for any reason, it will not affect the validity of this current Plan.

iv) Modifications in the meantime

Outside of the above reviews, the Board of Trustees may, from time to time, give approval for modifications to the policies contained in this Plan, pending full consideration through the above or any future review process. This would apply in particular to the introduction of new policies or regulations that have not yet been legislated, such as the introduction of a new *Core Zone* or *Specified-use Zone*. Such introduction would, as always, be subject to stakeholders' agreement. On the other hand, where policies contained in this plan are already in subsidiary legislations, the Board will not have the authority to do anything on them without the approval of the Minister responsible for Fisheries Development.

BIBLIOGRAPHY

Anderson JEC (1995) Resource Use in the proposed Mafia Island Marine Park. Studies in Environmental Economics and Development Unit for Environmental economics, department of Economics, Gothenburg University. PP 53

Anderson JEC Ngazi Z (1995) Marine Resources Use and the Establishment of a Marine Park, Mafia Island, Tanzania *Ambio* Vol. 24. No. 7 – 8, pp 475 – 481

Anderson JEC, Ngazi Z (1998) Coastal Communities' Production Choices, Risk Diversification and Subsistence behaviour Responses in Periods of Transition. A case Study from Tanzania. *Ambio* Vol. 27. No. 8. pp. 686 – 693

Burgess NB, Clarke GP, Rodgers WA (1999) The biodiversity importance of East African lowland coastal forests. *Biological Conservation*.

Darwall WD (1995) Sun-dried mud bricks; a trial alternative construction material. Unpublished report to Frontier – Tanzania/ the Society for Environmental Exploration, London, UK

Dulvy NK, Stanwell-smith D, Darwall WRT, Horrill CJ (1995) Coral mining at Mafia Island, Tanzania. A management dilemma. *Ambio* 24, 358 – 365.

Gaudian G, Richmond M (1990) Mafia Island Marine Park Project. The People's Trust for Endangered Species, Imperial College London, U.K. 90 pp.

Greenway and Rodgers WA (1988) The flora of Mafia Island.

Horrill JC (1991) Mafia Island Project. Report No.1, July 1990 to March 1991. Frontier-Tanzania/The Society for Environmental Exploration, London, U.K. 24pp.

Horrill JC, Ngoile, MAK (1991) Mafia Island Project. Report No.2, September 1991. Frontier-Tanzania/ The Society for Environmental Exploration, London. U.K. 46pp.

Horrill JC, Mayers, C.J. (1992) Preliminary Baseline Survey of Coastal Resource Users in the Proposed Mafia Island Marine park.

IUCN (1994) Guidelines for Protected Area Management Categories. Gland, Switzerland

Kennington, R.A (1990) Managing Marine Environments. Taylor & Francis New York Inc. 221 pp.

Kelleher G (1999) *reference to be added*

Lockwood M (1993). Lecture Notes. *Protected Area Planning*. Charles Sturt University. Faculty of Science and Agriculture

Mambosho, H. Mgeni A (1996) Village Holistic Study. Report to the Mafia Island Marine Park.

Ngoile MAK (1989) The Development of a Marine National Park, Mafia Island, Tanzania: The Current State of the Marine Environment of the South Mafia Channel Report. University of Dar es Salaam, Institute of Marine Sciences. 44pp

Ngoile MAK, Melamari L, and Makoloweka, S (1998) Assessment of Mafia Island Park (MIMP), Tanzania. Report to WWF-Tanzania Programme Office.

Norton J (1995). Identification of Alternate Building Options on the Islands of Mafia, Tanzania. Consultant report to WWF.

IUCN (1996). 1996 IUCN Red List of Threatened Animals. IUCN, Gland, Switzerland.

IUCN (1990) Biodiversity in sub-Saharan Africa and its Islands: Conservation, Management and Sustainable Use. IUCN Species Survival Commission Occasional Paper No.6. IUCN, Gland, Switzerland. 242pp.

Ray GC (1968) Marine Parks for Tanzania. Conservation Foundation, Washington DC. 47pp.

Rosen BR (1971) The distribution of reef coral genera in the Indian Ocean. Symp. Zool. Soc. London. 28:263–299.

Salm RV, Clark JR (1984). Marine and coastal protected areas: A guide for planners and managers, 2nd ed. IUCN, Geneva. ISBN 2–88032805–5.

Scherl, LM (1995). Participatory Planning Process for Mafia Island Marine Park Management. Consultant report to the Mafia Island Marine Park.

Talbot R (1995) Distribution and abundance of coral reef fish fauna on Tutia Reef, East Africa. Coral Reefs 12:36-45.

UNEP (1989) Coastal and marine environmental problems of the United Republic of Tanzania UNEP regional Seas Reports and Studies No. 106, UNEP. 1989.

UNESCO (1987) Coral Reef Management Handbook: Eds. Kenchington, R. A. and Hudson, B.E.T., UNESCO.

WWF (1991a) A rationale and strategy for the proposed Mafia Island Marine Park. WWF Tanzanian Country Office.

WWF (1991b) Proceedings of the proposed Mafia Island Marine Park Planning Workshop, WWF Tanzanian Country Office.

APPENDIX 1:

BOUNDARY DESCRIPTION FOR MAFIA ISLAND MARINE PARK

The Marine Parks and Reserves (Mafia Island Marine Park) Declaration Notice, 1996

Government Notice No. 200 published on 6/9/96

Made under Section 9 of the Marine Parks and Reserves Act. No. 29 of 1994

- i. This notice may be cited as the Marine Parks and Reserves (Mafia Island Marine Park) (Declaration) Notice, 1996
- ii. This notice shall be deemed to have come into operation on the 1st July 1995.
- iii. The area described in the Schedule to the Notice is hereby declared to be the Mafia Island Marine Park
- iv. The Government Notice 455 printed and published on the 25th August 1995, is hereby revoked.

SCHEDULE

Boundaries

All that area of land in the District the boundaries whereof are more particularly defined as follows:

Commencing at a point on the Mafia–Rufiji District boundary, Latitude 07° 54' 30" S Longitude 39° 30' 00"E, thence due east to a point at the north of Maduvi Reef (07° 54' 30"S, 39° 30' 09"E) and thence on an easterly bearing to a point on Mafia Island (07° 55' 12", 39° 38' 18"E).

Thence following a line 1km inland from and parallel to the highest high water tide mark of Mafia Island south easterly, easterly, and north – easterly to a point at the north of Chole Bay (07° 53' 36" S, 39° 47' 00"E).

Thence in a north-easterly direction (54.5°) to a point representing the northernmost extent of Chole Bay (07° 52' 41"S, 39° 48' 22"E), thence due east to a point to the south of Mlola (07° 51' 43"S, 39° 49' 35"E) and thence on a north-easterly bearing to a point north of Forbes Bay (07° 48' 16"S, 39° 52' 23"E)

Thence in an easterly direction to point on the highest high water tide mark (07° 48' 07"S, 39° 52' 04"E), thence due east to a point over the 200m marine isobaths (07° 48' 07"S, 39° 54' 01"E) and thence following the 200m isobaths south and parallel to the eastern seaboard of Mafia, Juani and Jibondo Islands to a point south of Tutia Reef (08° 09' 32"S, 39° 39' 50"E) thence due west to a point on the Mafia – Rufiji District boundary (08° 09' 40"S, 39° 30' 00"E) thence due north along the Mafia – Rufiji boundary to the point of commencement.







Board Of Trustees
Marine Parks And Reserves Unit

September 2011