

Status and Management of the Marine Protected Areas (MPAs) in the Eastern African Region

**INTERNATIONAL CORAL REEF ACTION NETWORK (ICRAN) PROJECT
EASTERN AFRICAN COMPONENT
UNEP/FAO
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REGIONAL REPORT

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ACRONYMS AND ABBREVIATIONS

ANGAP	National Association for the Management of Protected Areas
CARE	Cooperative Assistance and Relief Everywhere
CITES	International Convention on the Trade in Endangered Species
COAP	Protected Area Code
CORDIO	Coral Reef Degradation in the Indian Ocean
CRCP	Coral Reef Conservation Project
EIA	Environmental Impact Assessment
EMC	Marine and Coastal Environment
EU	European Union
FAO	Food and Agricultural Organisation of the United Nations
GELOSE	(Gestion Locale Sécurisée) Secure Local Management
GEF	Global Environment Facility
GMP	General Management Plan
GTR	National Representative Working Groups
ICAM	Integrated Coastal Area Management
ICM	Integrated Coastal Management
ICRAN	International Coral Reef Action Network
IUCN	The World Conservation Union
MAB	Man and Biosphere Reserve
MICOA	Ministerio para a Coordenacao da Accao Ambiental
MNP	Marine National Park
MPA	Marine Protected Area
NEAP	National Environmental Action Plan
NEMC	National Environment Management Council
NGO	Non-Governmental Organization
NP	National Park
ONE	Office National de L'Environnement
PCDI	Integrated Conservation and Development Project
PFED	Environment and Development Programme
PNAE	National Environmental Action Plan
PRE/COI	Regional Environment Programme of the Indian Ocean Commission
REAP	Regional Environmental Action Plan
REP	Regional Environment Programme
RSNC	Royal Society for Nature Conservation
RWG	Regional Working Group
SEACAM	Secreatriat for Coastal Area Management
SFA	Seychelles Fishing Authority
SIF	Seychelles Island Foundation
SNR	Strict Nature Reserve
SR	Special Reserve
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Education Science and Cultural Organisation
USAID	United States Agency for International Development
WCS	Wildlife Conservation Society
WIOMSA	Western Indian Ocean Marine Science Association
WWF	World Wide Fund for Nature

EXECUTIVE SUMMARY

Background

This report presents an up-to-date analysis and synthesis of the Marine Protected Areas (MPAs) of the Eastern African Region covering the States of Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, and Tanzania. The report also reviews the successful approaches to the management of MPAs and Integrated Coastal Management (ICM) projects in Eastern Africa. Strategies for effective management of the MPAs to integrate local community concerns are also presented.

Rapid coastal area appraisal techniques were used to determine the status and management of the marine protected areas of the Eastern African Region. Information was derived from structured interviews with stakeholders, existing databases, a literature review and observations at the respective case study sites. The objective was to conduct a critical analysis of the progress, including successes and failures of the management of marine protected areas in Eastern Africa since their establishment. The ability of the managing authorities in maintaining the quality and quantity of biodiversity, the conservation and rational management of marine resources, protection of the ecosystem and improving the livelihood of coastal communities was also assessed.

Biodiversity Values

Eastern Africa's marine ecosystems are rich in biodiversity. Their natural resources are fundamental to the sustainable development of the coastal countries and island states, providing food, mineral, construction materials, and a vast range of other products. The ecosystems constitute an important biological resource, which is the basis for tropical fisheries and ecotourism.

There are three main categories of coral reef in Eastern Africa. These include barrier reefs, fringing reefs, and atolls. The barrier reefs are located adjacent to the continental slope while the fringing reefs are located close to the coastline. Associated ecosystems include seagrass beds on the soft sea bottom, mangroves, estuaries, lagoons and islets with a rich variety of flora and fauna.

Within the region, several protected areas have been established and others are proposed to conserve biodiversity. Coastal marine habitats are underrepresented within the regional network of protected areas. There is already some concerted action to improve the management of existing MPAs. Further, there is much attention being given to the implementation of Integrated Coastal Zone Management (ICZM) approaches. Many of the marine parks are surrounded by marine reserves that act as buffer zones as only regulated activities are permitted.

Threats

The coastal environment is under threat from pollution, damage and destruction of habitats, overexploitation of resources, conflicting use of resources and pressure from growing coastal populations, tourism and urbanization. Virtually all coral reefs outside the marine protected areas are degraded to some extent.

Over the last three decades, Eastern Africa has witnessed a boom in development in both land and marine based activities. These developments have resulted in increased pollution load in the nearshore waters. Undoubtedly these have placed tremendous stress on the coral reef ecosystem through increased siltation and sediment. The activities of the fishermen on foot result in physical damage to live coral on the reef flat as a result of trampling and the use of harpoons to remove the octopus.

ICM Initiatives

The countries of Eastern Africa have realized the importance of coastal and marine resources and the dangers they face. The governments of the region have accepted and are committed to the implementation of the Integrated Coastal Management (ICM) as an effective mechanism for addressing and resolving the multiplicity of issues experienced in coastal areas through sectoral coordination and collaborative approaches. A major achievement of the implementation of the ICM policy in the region has been the establishment of effective partnerships between the different actors involved in coastal zone management.

The development of the integrated coastal area management (ICAM) process has consistently focused on co-ordination, communication and training, resulting in a system that has proved capable of resolving resource use conflicts and meeting set goals. The rationale of the process is based on relieving pressure on over exploited resources and sensitive habitats by facilitating alternative activities that are sustainable. ICAM activities are characteristic of a 'bottom-up' participatory approach with a heavy emphasis on communication, co-ordination and education. The ICAM process, however, needs broad public participation and overriding legal authority to regulate activities that can harm the coastal zone.

An analysis of the case studies suggests that the goals of Integrated Coastal Area Management (ICAM) can be achieved in a time frame of 5 to 10 years after the process is established, depending on the level of activity. The management strategy based on co-operation, education and communication with users is a powerful tool for community development, resource conservation, ecosystem protection and the maintenance of biodiversity. The management of the Nosy Atafana Marine Park in the UNESCO Biosphere Reserve of Mananara-Nord is exemplary of an integrated, participatory process applied successfully to the management of activities and resources associated with marine protected areas. The high degree of success achieved suggests that the approach would be appropriate for adaptation to other coastal areas sharing similar characteristic within the region.

Community Participation

Six years experience of Tanga Coastal Zone Conservation and Development Programme in Tanzania has demonstrated that the management of coastal resources and development activities can effectively be undertaken at the local level. Special Programmes such as Beach Management Programme, Beach Operators Relocation Programme, the Turtle Conservation Programme, Boat Operators Associations and the Coral Reef Conservation Programme (CRCP) are a success and are having a direct impact on the local communities.

Women's involvement is critical if economic gains are targeted. Traditionally the role of women in the management or the use of coastal resources has been minimal. Over the last few years there has been a notable increase in the number of women involved with coastal management, especially in the management of marine parks. In Kenya, women groups are involved in the rehabilitation of a degraded coral reef for ecotourism purposes. However, a profound lack of trained women in the field of coastal management still undermines the role of women in this sector.

A major contribution to the success of the management of the MPAs would be the transfer of property rights to the user groups. For example the success of the management of Nosy Atafana Marine Park in Madagascar was due to the ability of the Mananara Biosphere Project to introduce and implement a usage contract in collaboration with the local communities (see Annex 3). This unique approach to date has resulted in an apparent increase in yields from the resource base with a subsequent improvement in the quality of life of the coastal communities. There has been a regeneration of critical habitats since the creation of the reserve and an increase in the status of biodiversity. Furthermore, there is general compliance with the regulations and resource users have started their own initiatives in the husbandry and conservation of resources.

Participatory management approaches enable conflicts to be resolved. Loss in income due to fishermen caused by restrictions imposed on their activities in protected areas can be resolved through the introduction of a variety of nature-focused activities that substitute fishing.

Coral Reef Health

The health of coral reefs assessment was undertaken to update the MPA managers on the current status of the coral reefs, benthic cover, macro-invertebrates and reef fish populations. The 1997/1998 El Nino event caused extensive coral bleaching within the region. The coral mortality differed between sites, within sites and among the coral species. To a considerable extent, the differential mortality of corals elicited alarming and confusing signals to many MPA managers within the region.

Whilst in some areas there are encouraging signs of recovery, the sheer presence and abundance in algae on corals in other areas suggest poor coral health. The composition and structure of the algae community indicates that the succession process is well underway on many coral reefs. What is clear however, is that the impact of anthropogenic activities may play a crucial role in the recovery of the reef ecosystems.

Lessons Learned

Many lessons in the management of MPAs have been learned from the approaches that have been taken over the last three decades. It has been established that financial and human resources are key elements required to successfully manage MPA. The availability of these resources dictates the level of management successes. Most of the MPA managed by Government agencies are not adequately managed for lack of both financial and human resources. On the other hand, MPAs managed by NGOs enjoys a high level of management successes. This is partly due to financial input from parent organisations that are based overseas, and partly due to an active sourcing of funds from both local and foreign donors.

There is a lack of skilled personnel sufficiently trained in MPA management in the region. A sustained regional programme for MPA capacity building is a prerequisite for an effective system of MPAs. Training courses that were most effective to extension workers included *Coastal Ecology, Participatory techniques, Communication and Facilitation Skills, Analyzing and Planning Skills, and Training as Trainers*.

Stakeholders should participate in all stages of action planning to ensure sense of ownership. The law on “Gestion Locale Sécurisée” (Secure Local Management) in Madagascar provides a model for formal transfer of authority to manage natural renewable resources to local communities. Government support is critical for technical and policy advice as well as for monitoring the programme/project progress.

It is important to build on existing strengths of organizations and personnel and to determine clear roles and responsibilities for each. All too often the institutional framework lags behind after changes have been implemented in the legal framework. A profound lack of integration and interactions between the different agencies hampers the conservation process in the region.

The lack of a central policy need not prevent the implementation of new approaches to MPA management. If successful, the new approaches can form the basis for national policy. In view of the sensitive nature of coastal ecosystems, Environmental Impact Assessments (EIAs) should be undertaken before any development project is implemented..

Recommendations

A key tool for an MPA manager should be equipped with is a management plan. The management plans should be developed with the stakeholders' inputs to facilitate adoption and easy implementation. The preparation of management plans is not an end by itself. The challenge lies in the implementation of the plans. There should be specific time periods for their implementation, and measurable indicators of impact identified. Every effort should be made to ensure that management plans for cross-border protected areas developed in one country are in synergy with those of the neighbouring country.

The current sectoral approach to coastal management needs to be fully addressed and the deficiencies of the legal framework corrected in the light of changing coastal area management approach. Current policies and practices that do not provide secure access of village users to resources need to be reviewed.

A review of the policies to facilitate greater participation of the private sector and NGO in the process of policy formulation with regard to coastal zone management shows that the process is beginning to bear fruit. However, there are certain key issues that need addressing to further improve on current successes. For example, capacity building and sustainable financing are the two key issues that the MPA authorities need to address promptly. Community managed MPAs should be promoted and developed where where possible. Private sector conservation initiatives should also be encouraged.

Most of the Eastern African countries, namely Comoros, Kenya, Madagascar, Mozambique and Tanzania, have proposals for the creation od new MPAs or the expansion of the network of existing ones. Expertise developed within the region can assist these countries in an effort to incorporate the current approaches of integrated coastal managment during the establishment of the new MPAs.

MPA training programmes should be linked to the activities of regional organizations such as REP/IOC, WIOMSA, SEACAM and UNEP's Eastern African Regional Seas Programme to ensure coherence and sustainability.

MPAs located at the borders such as Mnazi Bay -Ruvuma Estuary and Tanga (ICM) - Kisite (MPA) provide opportunities for bilateral cooperation in marine and coastal resources. A networking system to exchange ideas, findings and various management techniques between MPA managers and co-managers within the region is essential.

1. INTRODUCTION

1.1 Regional Setting

The Eastern African coastal region has a wide variety of important ecosystems such as coral reefs, seagrass beds, estuaries, mangroves, lagoons and islands rich in biodiversity. The climate is generally tropical to sub humid. Two monsoon seasons influence the direction and strength of winds, air temperature and rainfall. The monsoons also influence the coastal currents. The shoreline, which extends over a distance of 11,000 km and its associated coastal zone is inhabited by close to 35 million people. Most of the people seek employment around the coast as well as the right to utilize the living resources for their livelihood and sustenance.

The economies of all the Eastern African countries benefit from reef fisheries as well as reef-focused tourism. Artisanal fisheries mostly in the reefs, seagrass and associated platform environments represent more than 95% of the total marine fish catch (UNEP/IMS/FAO/SIDA, 1998).

1.2 Biodiversity Values

Eastern Africa's marine ecosystems and resources are fundamental to the sustainable development of the coastal countries and island states, providing food, mineral, construction materials, and a vast range of other products. However, as in other marine ecosystems throughout the world, they face increasing serious threats from pollution, overexploitation of resources, conflicting use of resources, damage and destruction to habitat, and other harmful consequences of human development. In light of the increasing demand for marine resources, to meet the ever-growing needs of the region's population, biodiversity is especially at risk.

All the Eastern African Countries are heavily dependent on the coral reef ecosystems as sources of food, income and employment. Coral reefs are important for fisheries and tourism. The tourism industry is one of the main markets for fish products. For many communities, mangroves are the primary source of timber, fuelwood, charcoal, medicine, and a variety of other forest products.

1.3 Coral Reefs

The coral reefs Eastern Africa are dominated by *Porites* spp in calm waters and *Acropora* spp in high-energy environments. Stony coral cover averages between 30% and 40%. The coral reefs have a high topographic complexity that creates habitats for numerous other coral reef species.

Seagrasses are found on the soft sea bottom in the shallow waters of back coral reef lagoons, estuaries and inter-tidal areas. They serve as an important habitat for many species and as a sediment trap thus keeping coastal beaches free of pollution. Seagrass beds provide habitats for many species of fish, octopi and holothurians.

1.4 Threats

Rapidly expanding coastal settlements as well as increasing industrial and agricultural activities, are sources of pollution that threaten the sustainability of coastal and marine ecosystems and their associated resources. The increased loads of domestic sewage, agricultural runoff, industrial effluents, overfishing, dynamite fishing and clear cutting of mangroves are significant threats to the coral reefs of the region.

1.5 Protected Areas

The Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (The Nairobi Convention) highlights the importance of a system of MPAs within the region. The Nairobi Convention, with its two protocols, provides a regional framework for cooperation among regional institutions to address environmental issues. The protocol

concerning Protected Areas and Wild Fauna and Flora in the Eastern Africa Region calls for the establishment of a regional programme to coordinate the selection, establishment and management of protected areas with a view to creating a representative network of protected areas in the eastern African region. Further, it calls on the signatory countries to cooperate, directly or with the assistance of competent regional or international organizations, in providing training for managerial personnel in the fields related to the selection, establishment and management of protected areas.

The existing Marine Protected areas (MPAs) in the Eastern African Region fall into three broad categories based on the objectives of their establishment: Category I includes the traditional (first generation) MPAs which were established with a specific purpose of protecting unique habitats or biological communities. They are characterized by their small size. Their management systems have little or no coordination with management of adjacent areas and there is minimal involvement of the local communities. Most of the MPAs in the Eastern Africa Region established initially to conserve coral resources, fall under this category.

Category II includes the large multiple use MPAs that are considered small-scale models of integrated coastal management at a local level. These MPAs have been established on the basis of the principles of ICM with significant community involvement. The Mafia Island Marine Park, in Tanzania and the Nosy Atafana Marine Park, in Madagascar, are key examples of these MPAs.

Category III includes privately managed MPAs in the region with examples in Madagascar and Tanzania. Within the region, several new MPAs, both national and transboundary have recently been proposed. There is already some concerted action to improve the management of existing MPAs. Further, there is much attention being given to the application of the recommendations of the Nairobi Convention and the implementation of Integrated Coastal Zone Management (ICZM) approaches.

2. INTEGRATED COASTAL MANAGEMENT (ICM): A REVIEW

2.1 Overview

Over the past two decades public awareness about the need for environment protection has increased. However, there has been a lack of co-ordination and consultation by the different institutions involved with coastal area management. The involvement of the public or coastal communities in coastal management matters remains relatively low. The inclusion of all stakeholders in integrated coastal management is paramount to the success of any integrated coastal management program.

The strategy of integrated coastal management encourages the integration of sectoral management practice across all levels within the pilot sites. It ensures that there is communication and synergy amongst the sectors and establishes mechanisms to resolve conflicts. The local coastal communities form an integral part of the management of the coastal zone in the Eastern African region.

The awareness creation activities carried out in the region have started galvanizing the local populations to support the conservation of the coastal environment in general. There has been some successes with the strategy in terms of the maintenance of biodiversity, conservation of ecosystems and sustainable use of marine resources. However, with the exception of the Biosphere Reserve of Mananara-Nord in Madagascar these ICM activities are relatively new and have not yet been appraised in terms of their comparative performance.

2.2 Comoros

National Setting

The Comoros archipelago is made up of four islands of volcanic origin. The archipelago is situated north of Mozambique Channel at latitudes 11° 20' and 13° 05' S and longitudes 43° 10' and 45° 20'E. The islands of Great Comoros, Anjouan and Moheli constitute the Islamic Federal Republic of Comoros with an area of 1659 km² and a population of more than 500,000 inhabitants. Presently, there are no legally established MPAs in Comoros. However, there are proposals for the creation of two MPAs, namely, Coelacanth MPA (with assistance of UNDP/GEF/IUCN) and Moheli MPA (with assistance of REP/IOC/EU).

Climatic conditions of the Comoros are tropical with the influence of north-northwest monsoon ("kashkazi") which brings heavy rainfall from November to April, a period corresponding to a hot and humid season. The trade winds from the south-southeast ("kussi") correspond to a dry and cool season. The average temperature range is 23°C to 28°C with variations depending on altitude. The average rainfall varies from 600 to 700 mm.

Coral Reefs

The sub-marine slope of the archipelago is very steep. The average depth of the continental plate is about 200m. The continental plate is very narrow (200 to 1200 m in width). The coral reefs of the Comoros are principally of the fringing type, with various littoral extensions around each island. They cover approximately 60%, 80% and nearly 100% of the littoral area of the Great Comoros, Anjouan, and Moheli respectively. The coral reefs of the Comoros have not been well studied.

The coastal zone of Comoros suffers various types of environmental degradation mostly due to the action of man. Economic problems faced by the country result in unsustainable utilization of the natural resources by the coastal populations. The destructive activities carried along coast are of various types, the main one being destructive fishery. Conscious of this problem, the government is making the national management of the environment and the coastal zone in particular, one of its top priorities.

A plan of action for the management of the reefs and the marine pollution has been elaborated. The national networks for the monitoring of the reefs and the marine pollution been set up. The regional

environmental programme implemented under the Indian Ocean Commission has helped the country in the training of its nationals in the field of environmental conservation and in the setting up of an information system in support of decision-making.

Community Participation

The local Communities form an integral part of the management of the coastal zone. As a result of the sensitization actions carried out by the directorate of the environment, the local populations have started being conscious of the necessity of protecting the environment. Many associations for protection of environment have been set up in different localities, and they are working towards a better management of the natural resources. The actual environment management policy developed in different localities is directly managed by the beneficiaries themselves namely the local community. As an example, the regional environment programme has initiated pilot operations on three sites of the island. The local community, which for a better organization has set up structures of representatives of social cadres of the town or village, manages the projects of the coastal zone.

Partnership with the Private Sector

The private sector is considered as a privileged partner in the integrated management of the coastal zone. The hotel industry is involved in the process of formulation and application of measures for the protection of the coastal zone. At the level of operation, for example the coastal development of Mitsamiouli, the Galawa Beach Hotel participates in the management of coastal fishing by checking and reporting on the destructive fishing practices.

Successful Approaches to ICM

One of the achievements of the implementation of the ICM policy in Comoros is the establishment of effective partnerships between the different actors intervening in the coastal zone. The partners are essentially the community, the association for the protection of the environment, the general directorate of the environment as well the sponsors financing the projects of the coastal zone. The private sector equally plays an important role in the setting up of this policy.

2.3 Kenya

National Setting

The Kenyan coastline, approximately 500 km long, stretches from 1° 42' S to 4° 40' S bordering Somali in the north and Tanzania in the south. The continental shelf covers an estimated area of about 19,120 km². Well-developed fringing reef systems are present all along the coastline except where the major rivers, Tana and Athi-Sabaki Rivers, discharge into the Indian Ocean. Patch reefs occur around Malindi and Kiunga in the north, and Shimoni in the south. Seagrass beds are usually associated with reef systems growing in shallow lagoons creeks and bays. Mangrove forests are well developed in the Lamu archipelago, where 70% of Kenya's mangroves occur.

About 1.64 million people live in the coastal area and the population of the Coast is expected to exceed 2 million by the turn of the century. The population is not evenly distributed. Approximately 400,000 people are concentrated in the Mombasa area where the main East African port of Kilindini is situated. While the population density for the country as a whole is 44 persons/km², the density along the coast varies from 10/km² in Lamu to 280/km² in Mombasa.

The mainstay of the economy in the urban centres is maritime commerce and tourism. The latter depends heavily on the rich biological diversity and the health of the environment. Outside the urban centres, the main economic activities include food production, artisanal activities and small retail and service enterprises.

The Kenyan coast has a tropical climate influenced by the monsoon winds of the Indian Ocean. Two distinct monsoon periods occur, the northeastern monsoon (locally known as "kaskazi"), which blows from September to February and the southeastern monsoon (locally known as "kusi"), which blows from March to August. The north eastern monsoon that usually brings calm weather, is usually hot, and

the wave height drops during this time. The southeastern monsoon is usually windy with cool temperatures and rough seas. Rainy seasons occur between the monsoon periods with the long rains occurring from March to May and the short rains from October to December.

Mean annual rainfall ranges from 508 mm in the drier hinterland in the north to 1,150 mm in the wetter areas south of Malindi. Wind speeds show a pattern whereby wind strength drops during the night and increases during the morning. Highest average wind speeds are recorded between May and September (9.3-9.8 knots). Average maximum temperature in Mombasa ranges from 28-32⁰ C, with highs between January and March and lows in July and August. Average minimum temperature in Mombasa ranges from 21⁰ C in July and August to 24⁰ C between February and April.

Coral Reefs

Coral reefs exist along most of the Kenya coast. The total area of coral reef is estimated at 50,000 ha. Currently a total of 183 species of stony corals belonging to 59 genera have been identified on these reefs. Other important reef building organisms include soft corals, coralline red algae and calcareous algae. However, these species have received less attention. In general the coral reef communities are similar to other parts of the Western Indian Ocean. They are dominated by *Porites* spp in calm waters and *Acropora* spp in high-energy environments. Stony coral cover averages between 30% and 40%.

There are 9 mangrove species along the Kenya coast, none of which are endemic to Kenya. The mangrove swamps cover approximately 53,000 ha with the largest systems occurring in the Lamu area and the Vanga-Funzi coastal system near the Kenyan-Tanzanian border. The mangrove forests in the Lamu district are the second largest on the East African coast and cover an area of 335 km². The most common species are the red mangrove, *Rhizophora mucronata*, and *Avicennia marina*. Both are found along the entire coast. One species, *Heritiera littoralis*, is found only in a small pure stand at the Tana River estuary near Kipini. *Xylocarpus moluccensis* has recently been described in the Kiunga and Shimoni areas.

Seagrass beds occur along the entire coastline usually adjacent to or associated with coral reefs. They serve as an important habitat for many species and as a sediment trap thus keeping coastal beaches pristine. Seagrass beds provide a habitat for many species of fish, octopi and holothurians. Many of these species are of commercial importance. Seagrass beds are also the feeding grounds for endangered species such as the green turtle, the hawksbill turtle and the dugong. Artisanal fishing and commercial trawling activities often concentrate on seagrass beds.

The fisheries resources of the Kenyan coast are estimated from 6000 - 9000 metric tonnes. Approximately 80% of the marine fish catch is demersal, mainly from shallow coastal waters and reefs. An estimated 4000 - 4500 artisanal fishers are involved using different types of gear including trap, hook and line, seining, gill netting spear fishing and gleaning. The catch mainly includes finfish of the families Lethrinidae, Siganidae (rabbit fish) Scaridae (parrot fish) and Lutjanidae (snappers). Crustaceans, including crabs, lobsters and prawns, and octopi are commonly collected during low tides in reefs, seagrass beds or mangrove. Commercial trawling activities take place off the reefs in deeper waters. Fish density within marine parks range from 900 - 1200 kg/ha, much higher than the fish density in reserves (500kg/ha) and unprotected areas of reef (100kg/ha).

Currently, 7 species of dolphins have been recorded in Kenyan waters. Humpback whales have been sighted close to shore on their yearly migration to the south in November. The Dugong population along the coast has declined drastically over the past 25 years. A total of 67 animals were recorded in a 1973 survey, while only 10 dugongs were recorded in an aerial survey conducted in 1994. All of the 1994 sightings were in the waters of Ungwana Bay and off Manda and Pate Islands in the north. (Source: KWS Technical Series Report No. 1). More recent dugong sightings include three animals in the Kisite area. Whale sharks also occur along the Coast. The 1994 aerial survey recorded 37 whale sharks, fairly evenly distributed along the coast, with some aggregations in the Kikambala-Malindi stretch.

The coastal zone provides the habitat for the majority of Kenya's internationally threatened species. Of 159 species of trees and shrubs that are considered threatened, 38% occur on the Coast; of the 71 species of threatened birds, 27% inhabit the Coast; while out of 9 threatened mammal species, 55% are in the Coast environment.

Table 1. Threatened marine and coastal species in Kenya

	Common Name	Scientific Name	Status
Mammals	Dugong	<i>Dugong dugong</i>	Vulnerable
Birds	Sokoke Pipit	<i>Anthus sokokensis</i>	Unknown
	Amani Sunbird	<i>Anthreptes pallidigaster</i>	Rare
	East Coast Akalat	<i>Sheppardia gunningi sokokensis</i>	Rare
	Clarke's Weaver	<i>Ploceus galandi</i>	Unknown
	Spotted Ground-thrush	<i>Turdus fischeri fischeri</i>	Rare
Reptiles	Green Turtle	<i>Chelonia mydas</i>	Endangered
	Hawksbill Turtle	<i>Eretmochelys imbricata</i>	Endangered
	Loggerhead Turtle	<i>Caretta caretta</i>	Vulnerable
Molluscs	Triton's Trumpet	<i>Charonia tritonis</i>	Rare
	Green Snail	<i>Turbo marmoratus</i>	Commercially threatened
	Fluted Giant Clam	<i>Tridacna squamosa</i>	Indeterminate
	Small Giant Clam	<i>Tridacna maxima</i>	Insufficiently known
	Pearl Oyster	<i>Pinctada spp.</i>	Commercially threatened
Crustaceans	Spiny Lobster	<i>Panulirus spp</i>	Commercially threatened

Threats

The tourism industry has also created demand for other reef resources such as corals and shells. Many species are probably being over-exploited and careless collection methods have led to serious habitat damage. Despite controls, large quantities of coral and shells are still exported from Kenya. These pressures, coupled with silt deposition from rivers draining agricultural land and pollution from the cement industry, chemical and textile plants near Mombasa, domestic effluent, mining and oil discharges from tanker traffic, have diminished both the productivity and the species richness and diversity of the entire coast. Virtually all coral reefs outside the marine protected areas are degraded to some extent.

The threats to the coral reefs and associated ecosystems include:

- Physical damage of the coral reefs by trampling, anchoring and collecting of marine life;
- Untreated sewage from hotels and residential population enters the sea directly or indirectly;
- Solid waste from hotels causes visual pollution and affects the ecosystem;
- Deforestation and poor agricultural methods practised upcountry cause erosion;
- Land grabbing and encroachment - some developers grab or encroach on the protected areas;
- Poor fishing methods - some fishers use small size mesh nets while trawling nets have a large by-catch, including turtles; and
- Uncontrolled mangrove harvesting.

Community Participation

In the earlier practice the community and the stakeholders were hardly involved in the management of marine protected areas. They were not represented in the decision-making fora that decided on the policy, location, and sizes of the MPAs. The decisions were made at the government level. The idea of the MPAs reached the community at the implementation stage at which point they had no role to play on their management.

2.4 Madagascar

National Setting

Situated in the Southwest Indian Ocean between latitudes 11° 57' and 25° 30' South and longitudes 43° 14' and 50° 27' East, Madagascar is the fourth largest island in the world with a surface area of 594,000 km². The geomorphology of Madagascar consists of a raised central plateau, which covers two thirds of the island and ranges in altitude from 800 m. to 2,600 m. Abrupt escarpments surround the central plateau and descend to a flat coastal plain. The East and Northeast of Madagascar is characterised by a tropical humid climate whilst that of the West and Southwest, receiving less precipitation is comparatively dry. Climatic conditions are generally highly variable between locations as a result of the wide range of altitude and latitude.

ICAM Initiatives

The first initiative in integrated coastal area management in Madagascar was the development of the management system for the UNESCO Biosphere Reserve of Mananara-Nord in 1989. However, it was not until 1997 that ICAM was formally adopted by the inscription of the 'Marine and Coastal Environments' in the 2nd phase of the National Environmental Action Plan. This was achieved in collaboration with the Environment Programme of the Indian Ocean Commission (PRE/COI) and the National Representative Working Groups (GTR) under the direction of the National Bureau of the Environment (ONE). The strategy adopted encourages the integration of sectoral management practice across all levels within the pilot sites. The objective of this was to ensure communication and synergy amongst the sectors and establish mechanisms to resolve conflicts. With the exception of the Biosphere Reserve of Mananara-Nord these activities are relatively new and have not yet been appraised in terms of their comparative performance. However, they are all characteristic of a 'bottom-up' participatory approach with a heavy emphasis on communication, co-ordination and education. A review of the associated ICAM activities implemented in the pilot sites within this framework is given here.

ICAM in the Tulear Region: The Tulear Region was selected as a pilot site by the Regional Marine and Coastal Environment (EMC) through a regional working group. A system of consultation was established in 14 communes by the formation of committees, which are responsible for monitoring the management of the pilot site through an informal convention between stakeholders. Projects were implemented such as the creation of a fishing provision centre, training in the ICAM process, regeneration of mangroves and algae culture.

ICAM in Nosy Be: The Environment and Development Programme (PFED), which is a partnership between the private sector, the community and other stakeholders has the role of the regional working group (RWG) in Nosy Be. As in Tulear, ICAM training initiatives have been conducted and priority activities have been identified including reforestation, education, control of cholera and the establishment of local conservation organisations. Pollution monitoring programs are well established here as well as in Tulear.

ICAM in Menabe: The Regional Development Committee of Menabe, created in 1996 with the help of the local development committee (CLD) of Morondava and other communes have formulated a 'Sustainable Development Plan of the Coastal Zone for Menabe'. This was achieved through the technical and financial assistance of the PRE/COI. The planning activities involved a diagnostic audit of the management of natural resources followed by the creation of an information system on the coastal zone.

ICAM in the Anosy Region: The Regional Development Committee established in the Anosy Region is in the process of forming the Regional Economic Development Strategy. This is a 5-year investment programme aimed at reducing poverty and improving the integrity of conservation in the region. The Commissariat General of the Integrated Development of the South, with the collaboration of the PRE/COI have developed a Management Plan of the Coastal Zone of the Southern Region. Activities currently in progress include the creation of monitoring units and projects relating to the reduction of deforestation and erosion.

ICAM in Foulpointe: The PRE/COI and the committee of support for the management of the coastal zone of Foulpointe has developed a project associated with the prevention and resolution of problems of degradation of the Foulpointe reef. This activity has the goal of encouraging an ICAM process to achieve these objectives. The following priority activities are planned: training in ICAM, educating the community on sustainable exploitation of the reef resources.

ICAM in Masoala: Integrated coastal area management in Masoala is conducted under the framework of a programme of environmental activities based on community participation in the management of naturally renewable resources (GELOSE). The process is formalised by a contract between the community and the administrative authorities. The objectives are to encourage the sustainable use of marine resources and the conservation of biodiversity. The operation was effected in collaboration with a local community committee composed of representative stakeholder groups. The development of the ICAM process started in 1997, however, the system has not been in place long enough to achieve its goals and was delayed by a change in the management authority two years after initial activities started.

ICAM in Mananara: The UNESCO Biosphere Reserve of Mananara-Nord, established in 1989, was the first attempt at integrated coastal area management in Madagascar. The ICAM project has 3 components: (i) conservation and protection of biodiversity (ii) community development assistance and (iii) Regional Development. The goals of establishing the reserve were to develop the region and improve the quality of life for its communities whilst conserving natural resources and protecting biodiversity. The development of the management process has consistently focused on co-ordination, communication and training, resulting in a system that has proved capable of resolving resource use conflicts and meeting set goals. The rationale of the process is based on relieving pressure on over exploited resources and sensitive habitats by facilitating alternative activities that are sustainable.

A major contribution to the success of the management of the marine park in the reserve was the ability of the Mananara Biosphere Project to transfer property rights to the resource users via a contract (see **Annex 3**). This unique approach to date has resulted in an apparent increase in yields from the resource base with a subsequent improvement in the quality of life of the coastal communities. There has been a regeneration of critical habitats since the creation of the reserve and an increase in the status of biodiversity. Furthermore, there is general compliance with the regulations and resource users have started their own initiatives in the husbandry and conservation of resources.

2.5 Mauritius

National Setting

Marine protected areas appeared for the first time in Mauritius national legislation in 1998. The MPAs in Mauritius are designated as Fishing Reserve (FR), Marine Park (MP) or Marine Reserve (MR). Mauritius has five established fishing reserves and two proclaimed marine parks. Fishing reserves have been in existence for more than fifty years whilst the two marine parks were created in 1997.

Fishing reserves are confined from the high water mark on the shore to the reef crest of the fringing reefs. In case of the marine parks, the seaward boundary extends one kilometer offshore from the fringing reefs. It is prohibited to fish with a large net or a gill net within a fishing reserve. The fishing reserves serve as both brooding and nursery grounds for the various finfish and shellfish species.

The enforcement of relevant laws and regulations is carried out by the staff of the Fisheries Protection Service and the National Coast Guard. These two agencies, among other duties, are also involved in the management of MPAs.

2.6 Mozambique

National Setting

Mozambique has a 2,770km long coastline dominated by estuarine habitats which are defined by numerous rivers that enter into the Indian Ocean. The distribution of the coastal ecosystems including mangroves, seagrass beds, coral reefs, sand dunes, and numerous island archipelagos combine to make the shoreline the most complex along the eastern coast of Africa.

Considering the diversity of ecosystems along the length of the Mozambique coastline and the economic importance of the littoral waters, remarkably few coastal areas are protected. The coastal areas that have conservation status are the Inhaca and Portuguese Islands Reserve, the Maputo Special Reserve and the Bazaruto National Park.

Inhaca archipelago lies in the Indian Ocean 35 km off Maputo City. Inhaca and Portuguese (Guimbani or Bengo) Islands are located between latitudes 25° 57' 49" and 26° 05' 00"S and longitudes 32° 53' 00" and 33° 00' 00"E. Inhaca Island has a form of distorted H or N covering an area of 42.5 km². The island extends up to 12.5 km from Ponta Mazondue (NE) to Ponta Torres (Miculumbela or Chaluacuine) and is 7 km across the widest area. Long dune ridges occur along the east and west coastlines, the hinterland being much lower. The eastern dune ridge has the highest point at Mount Inhaca (115 m). Wind erosion is seriously affecting the eastern ridge while the western ridge (Barreira Verhelma) is being degraded by water erosion causing land slides during the rainy season of October to April.

The smaller Guimbani (Bengo or Portuguese) Island covers an area of about 3.7 km². This island is low lying and is affected by erosion caused by surf or spring waves. The average annual temperature is variable (22°C to 23°C) with a maximum of 37°C and a minimum of 12°C. The rainfall is usually less than 1,000 mm. The relative humidity is about 76%.

Coral Reefs

Much of the coastline of Mozambique adjoins areas of coral reefs. This ecosystem constitutes an important biological resource in terms of its complex biodiversity and is the basis for tropical fisheries and marine ecotourism. The coral reefs represent one of Mozambique's main marine assets and coastal communities and the growing tourism industry rely mainly on reef-based resources. Today, about 6.6 million people live within Mozambique's 48 administrative districts. This represents 42% of the current population of Mozambique (15.7 million) which is expected to grow at 3% per annum (INE, 1998).

Reefs along the Mozambican coast consist of fossilized dune or beach rock colonized by corals to a varying degree. The shoreline has been successively exposed and submerged during the millennia, forming a compound shoreline (Tinley, 1971) in which the coral reefs are distributed in three regions. The northernmost section of the coast extends for 770 km from the Ruvuma River in the north to Pebane in the south (17°20'S). The central section of the coast between Pebane and Bazaruto Island (21° 10'S), a distance of about 950 km is classified as a swamp coast. The southern section stretches for 850 km from Bazaruto Island southward to Ponta do Ouro (26° 50'S).

There are three types of fisheries in Mozambique, comprising industrial, semi-industrial and artisanal fisheries. These three sectors land about 90,000 tons/year from an estimated mean sustainable yield of about 300,000 tons/year (Palha de Sousa, 1996). The industrial and semi-industrial fleets currently earn 40% of Mozambique's foreign revenue, gained largely from prawn fisheries dependent on mangroves and estuaries for their productivity. The artisanal fishery, on the other hand, is responsible for about 70% of the total catch. These fisheries are largely centred on the reefs and are clearly important to coastal communities and the Mozambican economy.

Coral reefs represent the main attraction for the coastal tourist industry in Mozambique. Most tourism occurs where the best infrastructure for tourism is established, especially near the reefs of Pemba, Mozambique Island, Bazaruto Archipelago, Inhambane, Inhaca Island and Ponta do Ouro. In Bazaruto Archipelago, patch reefs occur on the eastern and southeastern shores of the islands and back reefs are characterized by high cover of *Porites* and *Acropora* thickets. Offshore islands and fringing reefs also occur on the northeastern shores of Bazaruto Island where high hard coral and soft coral cover have been recorded.

ICM Initiatives

Mozambique has a national master plan, the National Environmental Management Programme (NEMP) which includes a national coastal zone management programme. The programme, currently under preparation, will comprise a National Coral Reef Management Programme that aims at collecting information on the coral reefs of Mozambique for effective resource management. Currently, Mozambique has the least expertise and capacity to deal with marine resources in the region. Under

the EAF5 project, a coast profile of Xai Xai has been completed and a rapid assessment training exercise, which included both biophysical and socioeconomic parameters, was also conducted in Xai Xai.

ICM training courses for local and regional coastal managers are being conducted at the secretariat for Coastal Area Management (SEACAM) based in Maputo and primarily funded by the Swedish government. Additionally, an integrated development plan that takes into consideration the local community for the Inhaca and Portuguese Islands was completed in 1990 although the Mozambican government has not officially approved it. The Ministry for Coordination of Environmental Affairs (MICOA) is coordinating the development of the management plans for Quirimbas and Bazaruto that will include the involvement of local communities.

2.7 Seychelles

National Setting

Seychelles consists of 115 islands and islets strewn in a vast expanse of the Western Indian Ocean. The total landmass is approximately 455 km². The combined coastline is 600 km long and the oceanic shelf covers about 43,000 km². The Seychelles EEZ is approximately 1.47 million km².

Three categories of MPAs are recognized. These are National Parks, Special Reserves and Shell Reserves. To date there are six Marine National Parks (MNPs) in Seychelles. These MNPs were designated over a period of 25 years, the first being designated in 1973 and the last in 1997. The Marine Parks Authority manages all the six MNPs.

The importance of the coastal zone in Seychelles is predicated on the fact that almost all of the important economic activities are clustered on a narrow belt of coastal lowland and reclaimed land. Shah (1996) estimated that between 85 to 90% of all communities in the Seychelles are found in the 'coastal strip'. The tendency for the people of Seychelles to live in the coastal belt is not one of choice, but rather a lack of choice.

ICM Initiatives

Seychelles has been slow to adopt an integrated approach to coastal management. However, recognising the benefits of this management approach, the new formulation of the EMPS (2000-2010) addresses the issue of integrated coastal management. As a test to the government's commitment to keep abreast with development in the coastal zone, management of these normally narrow strips of land is considered to be an important element of the new EMPS (2000-2010). For a country, as small as the Seychelles, the coast bears the brunt of many unregulated activities taking place well away from the coast. For this reason, a comprehensive, integrated coastal management plan is essential.

Comprehensive coastal management dates back to the 1960s, when the Nature Conservation Board was created. Shah (1996) summarises the transitions that ensured the creation of the Nature Conservation Board. Today, several organisations have been entrusted with powers to regulate activities in the coastal zone. Several inter-ministerial committees have been formed to address cross-sectoral issues in the coastal zone. Although much remains to be done to overcome the sectoral approach to coastal management, developments over the last five years have been encouraging. The creation of the National Environment Advisory Council, under the Environment Protection Act (EPA) 1994, whose membership includes private and NGO representatives was seen as a giant step forward towards the promotion of integrated management.

The involvement of the public or coastal communities in coastal management matters remains relatively low. This is very well illustrated on the extremely low number of people who surveyed the Environment Impact Assessment (EIA) reports for the East Coast Reclamation Project (Phase III). This may have been due to the technical nature of the document; however, public participation in coastal management matters is recognised as being particularly low.

There is no doubt that over the last decade public participation in coastal management has increased tremendously compared to the preceding years. Payet (1999) reports that the private sectors and NGOs

today accounts for between 10 – 20% of all national committees that are involved with environment related matters. However, much remains to be done to ensure that stakeholders take a more active part in the policy formulation process.

In Seychelles because the management of the coastal unit has traditionally been the responsibility of Government, the private sector had been reluctant to get involved with coastal management. However, this attitude is slowly eroding as more and more private organizations and NGOs are getting involved in environment management matters. A rethinking of the government's role in coastal management has encouraged the private sector to take a more leading role in coastal management. However, there is still much that remains to be achieved. Sectoral interests amongst governmental institutions is recognized as being a serious barrier to the process of attracting greater participation of the private sector in coastal management initiatives.

Integrated coastal management is not yet a reality in Seychelles. However, to date Seychelles has registered several major successes in coastal environment management. Shah (1996) lists several factors that are the main impediment to the successful implementation of integrated coastal management. It is, however, recognised that the resolution of these constraints may by themselves not automatically lead to successful ICM. The participation of NGOs, private enterprises and community groups in decision making processes which affects their environment should be considered as being indispensable to the achievement of ICM.

Traditionally the role of women in the management or the use of coastal resources has been minimal in the Seychelles. Over the last few years there has been a notable increase in the number of women involved with coastal management, especially in the management of marine parks. Interests generated in conservation by the numerous wildlife clubs have also been catalytic in encouraging women to become more active in coastal management issues. However, a profound lack of trained women in the field of coastal management still undermines the role of women in this sector.

In conclusion it is noted that ICM in Seychelles is not unachievable. However, several issues need to be addressed before ICM can become a reality. In the last decade several processes have been initiated to help the process forward. However, a general lack of public and private sector understanding of the value of ICM and the implications of certain development and behaviour patterns are impediments to the process.

2.8 Tanzania

National Setting

The United republic of Tanzania is a maritime country located on the east coast of Africa (1° 00' - 11° 48'S and 29° 30' - 40° 30'E). It has an estimated area of 945,200 km², with Tanzania mainland covering an area of 942,800 km². Zanzibar islands cover 2,400 km². The 1,200 km long coastline includes five administrative regions of Tanga, Coast (including the Island of Mafia), Dar es Salaam, Lindi and Mtwara as well as the two large islands of Unguja and Pemba, which make up Zanzibar.

Coral Reefs

About two thirds of the coastline has fringing reefs close to the shoreline, broken by river outlets of Rufiji, Pangani, Ruvuma, Wami and Ruvu Rivers. The estuarine areas of these rivers have rich stands of mangroves. The coastal zone is characterized by a very narrow continental shelf which is 5.8 km wide except the Zanzibar and Mafia Channels, where the continental shelf reaches a width of about 62 km. Most of the continental shelf bed is covered with coral outgrowths and some parts of the coastal margin have extensive mangrove stands. The continental shelf has an estimated area of 17,500 km². The Exclusive Economic Zone (EEZ), which is shared with Zanzibar has an estimated area of 223,000 km².

There are two types of coral reef formations, the fringing and the barrier reef. The coral reefs comprise caves, crevices, cracks, overhangs, and other hideways that provide shelter and nursery grounds for

fish, invertebrates, and other animals. The hard corals are predominately of *Porites* sp. Soft corals are dominated by *Sarcophyton* and *Sinularia* spp. There are about 8,270 species of invertebrates (NEMC, 1995) of which the molluscs account for 73.3%, echinoderms 11%, and arthropods 6.5%. The spectacular beauty of the coral formations and reef communities are principal attractions to many tourists. Mangrove forests are an important part of the tropical coastal ecosystem in Tanzania. There are eight species of mangroves in six families.

Table 2. Species of mangroves occurring in Tanzania

Family	Species
Rhizophoraceae	<i>Ceriops tagal</i> (Perr.) C.B. Rob.
	<i>Bruguiera gymnorhiza</i> (L.) Lam.
	<i>Rhizophora mucronata</i>
Sonneratiaceae	<i>Sonneratia alba</i> Sm.
Avicenniaceae	<i>Avicennia marina</i> (Forsk.) Vierh.
Combrelaceae	<i>Lumnitzera racemosa</i> Willd.
Meliaceae	<i>Xylocarpus granatum</i> Koen.
Sterculaceae	<i>Heritiera littoralis</i>

Seagrasses are found on the soft sea bottom in the shallow waters of back reef lagoons, estuaries and inter-tidal areas. There are twelve species of seagrasses in Tanzania. Seagrass beds, especially in Kilwa and Mafia have been known to be the habitats of the endangered dugong which is feared to have disappeared, as there are no recent sightings. Migratory whales have also been sighted along the coast. A significant population of dolphins is found in the Rufuji Deleta, Saadani, around Latham Island, Mafia Island, Lindi and Mtwara (Chande, et. al., 1994).

Five species of marine turtles are encountered in the marine waters of Tanzania. These are the green turtle (*Chelonia mydas*), the hawksbill turtle (*Eretochelys imbricata*), the leather back turtle (*Dermochelys coriacea*), the olive ridley turtle (*Lepidochelys olivacea*) and the loggerhead turtle (*Caretta caretta*). Marine turtles are among the most threatened marine species and are protected by law. However, they are exploited illegally for their shells, eggs, meat and leather. The present population of turtles has gone down probably due to over hunting, particularly the killing of females before they have a chance to lay eggs as observed at Somanga in Kilwa District.

There are over 1,000 species of fishes found in the coastal waters of Tanzania, seven of these are endemic to Tanzania (Benbow, 1976). Common species of birds found on the coast include the sooty tern, noddy tern, fairy tern and frigate birds. Studies of the coastal water birds in Tanzania are few. Latham Island which is located 65 km southeast of Dar es Salaam is considered to be the most important seabird breeding ground along the entire East African coast and the only known breeding ground of the masked booby and crested tern.

Threats

About 25% of Tanzanians live in the coastal districts not exceeding 60 km from the shoreline. The coastal population is estimated to be increasing at an unprecedented rate and may reach 40% of the national population by the year 2020.

The coastal resources of Tanzania are declining at a fast rate. The coastal environment is also degrading rapidly. The factors that are contributing to environmental degradation and the decline of coastal and marine resources have increased within the last decade due to unplanned urbanisation and industrial development. The rapid population growth exacerbates the worsening conditions of the marine environment. Additionally, unregulated tourism and other development activities along the coastal strip pose considerable environmental and socio-economic threats at both micro- and macro-levels, thus contributing to increased poverty.

ICM Initiatives

Tanzania and other countries of Eastern Africa have realized the importance of coastal and marine resources and the dangers they face. The governments of the region have accepted and are committed to the implementation of the Integrated Coastal Management (ICM) as an effective mechanism for addressing and resolving the multiplicity of issues experienced in coastal areas through sectoral coordination and collaborative approaches. Both the Union Government of Tanzania and the Government of Zanzibar in collaboration with international agencies as well as private individuals (investors) and other stakeholders have already realized the need for the establishment of ICM and MPA programmes in different parts of the coastal zone.

Tanzania Coastal Management Partnership (TCMP): This is a joint initiative between the Vice-President's Office through the National Environment Management Council (NEMC), the United States Agency for International Development (USAID) and the University of Rhode Island Coastal Resource Centre (URITCRC). The purpose of the programme is to support the efforts of Tanzania Government in the development of an effective coastal governance system. TCMP has successfully managed to forge partnerships and linkages among and between government and ongoing coastal management programmes working at regional and district levels, and involving the private sector and the NGO community. TCMP facilitates a participatory and transparent process that will put in place integrated coastal management along the entire coastline of Tanzania.

Kinondoni Integrated Coastal Area Management Programme (KICAMP): This is an initiative by the Kinondoni District Authority and stakeholders to address the environmental problems of degraded coastline, declining coastal and marine resources, beach erosion, environmental pollution and poverty. KICAMP focuses on improved understanding of the environmental and socio-economic issues such as urban expansion; the human impacts to marine and coastal areas and their resources; and integrated management of the marine and coastal area and resources in the district of Kinondoni.

Rural Integrated Project Support (RIPS): The Rural Integrated Project Support programme was launched in 1988 to assist the people of Lindi and Mtwara regions in their efforts to achieve sustainable livelihood. Although RIPS is a broad development cooperation project between Finland and the Lindi and Mtwara regions of Tanzania, with a wider focus than just coastal management, the experience being generated by the project's activities have importance for national ICM. RIPS framework acts as a catalyst by supporting and facilitating local communities and government authorities in entering meaningful dialogue to identify priorities, available resources and opportunities for local action.

Rufiji Environment Management Project (REMP): This project was initiated in 1997 to ensure sustainable environmental management and biodiversity conservation of forests, woodlands, and wetlands. The project aims at promoting the conservation and wise use of the ecosystems such that biodiversity is conserved, critical ecological functions are maintained, renewable resources are used sustainably, and the livelihood of the area's inhabitants are secured and enhanced. The most important outcome of the project is the participatory approach used in planning and implementation of project activities.

Tanga Coastal Zone Conservation Development Programme (TCZCDP): This is the largest pilot project which, through the regional fisheries office, is working at the district and village levels to address critical coastal management issues. TCZCDP was initiated in 1994. Six years experience of TCZCDP has demonstrated that the management of coastal resources and development activities can effectively be undertaken at the local level. A salient feature of the programme is the involvement of communities in finding solutions for the sustainable management of the coastal resources. Communities have been involved directly in management activities.

The Chwaka Bay-Paje Area, Zanzibar: This pilot coastal management initiative was started for the purpose of building the momentum towards national ICAM and to develop the necessary experience in coastal management. This modest experience encompasses the Chwaka Bay and Paje coastline, lying about 50 km southwest of Zanzibar Town. The area includes the villages of Chwaka, Uroa, Michamvi, Bwejuu, Paje, Ukongoroni, Maruhubi and Charawe. There was local demand for the project in that eminent local people recognized that changes were occurring and envisaged problems unless actions, defined in full consultation with the local people were taken.

Table 3: Coastal programmes and their management category in Tanzania

COASTAL PROGRAMME	MANAGEMENT CATEGORY
Tanzania Coastal Management Partnership	ICM
Tanga Coastal Zone Conservation and Development Programme	ICM
Kinondoni Integrated Coastal Area Management Project	ICM
Mafia Island Marine Park	MPA
Rufiji Environmental Management Project	ICM
Rural Integrated Project Support	ICM
Mnazi Bay-Ruvuma Estuary Marine Park	MPA
Kilwa District Community Based Conservation Project	ICM
Kilwa Kisiwani-Songo Mnara World Heritage Site	MPA
Chwaka-Paje Coastal Management Area	ICM
Misali Island Conservation Area	MPA

Lessons Learned

BOX 1: SUCCESSFUL APPROACHES TO ICM. LESSONS LEARNED FROM THE TANGA COASTAL ZONE CONSERVATION AND DEVELOPMENT PROGRAMME (TCZDP, 1998)	
APPROACHES USED	LESSONS LEARNED
Resource Management Activities	<ul style="list-style-type: none"> ➤ Training and on-the-job feedback is essential for staff to learn how to work together. ➤ Further training and refreshers are needed to continue good practice. ➤ Training is a vital component that requires proper assessment and well planned learning activities that are appropriate to the learners and their jobs. ➤ Training workers from different sectors results in better cooperation at regional and district levels. ➤ Study tours were "eye openers" for villagers and government staff, with lessons and experiences incorporated into action plans. ➤ Courses that were most effective to extension workers included <i>Coastal Ecology, Participatory techniques, Communication and Facilitation Skills, Analyzing and Planning Skills, and Training as Trainers.</i> ➤ Awareness raising alone does not solve problems. It needs to be linked with decision-making and actions for people to change. ➤ Initially, a lot of time and support is needed to assist people to analyze their problems and plan solutions. However, these processes do change attitudes, improve relationships and build confidence. ➤ Training villagers as "specialists" in various skills in order to train or advise others can be very effective. Most use their skills and practice what they teach. ➤ Simplicity is essential. Action plans and monitoring indicators should be simple and straight forward. ➤ Children and village youth are the future sustainable users of coastal resources. ➤ Their education and learning to protect the environment is very important. ➤ Financial systems need to be in place so that funds can be directly channelled to village committees. Provision of lump sum grants to village committees for their action plans works well; resources are shared according to priorities.
Village Control of Illegal Practices	<ul style="list-style-type: none"> ➤ Village based patrols are effective in reducing dynamite fishing. Radio communication improves enforcement through coordination with adjacent patrols. ➤ Militia training for villagers will increase their motivation to conduct patrols. ➤ Clear guidelines on arresting procedures for villagers and police, as well as training on how to implement those guidelines, need to be developed. ➤ Cost of patrols can be supported by district revenue collection from fish catches. ➤ Logbooks improve the effectiveness of patrols and can be used in performance evaluations.
Prosecution System	<ul style="list-style-type: none"> ➤ Police and judiciary need to be made aware of coastal ecology issues. ➤ Involve judiciary at the local level wherever possible.

Action Planning and Collaborative Process	<ul style="list-style-type: none"> ➤ Stakeholders should participate in all stages of action planning to ensure sense of ownership. ➤ PRAs done jointly with government and resource users are the start of participatory dialogues that influence relationships and change attitudes. ➤ Resource users have the knowledge and awareness of the state of their resources but often lack alternatives to harmful practices. ➤ Focus on small number of priority issues to concentrate resources and actions to build success and confidence. ➤ Clear action plans are critical for people to understand what they are trying to achieve and how they are going to achieve it. ➤ Women's involvement is critical if economic gains are targeted. ➤ Regular evaluations and monitoring (6 months) are needed to determine if anticipated impacts match reality, to assess the effectiveness of committees and to make modifications as needed. ➤ Government support is critical for technical and policy advice as well as monitoring the programme's success. ➤ Openness, transparency and honesty are important in how decisions are made.
Fora to Promote Key Stakeholders	<ul style="list-style-type: none"> ➤ Conduct participatory appraisals initially with government officers, resource users and other stakeholders which promotes common understanding and consensus. ➤ Annual meetings with stakeholders reaffirm actions to be taken and who will be responsible for which action. ➤ District Steering Committees provide for a forum for stakeholders to interact and plan on a regular basis. ➤ Continue to provide opportunities for stakeholders to participate; do not exclude them even if they have not been interested in the past (e.g. commercial users).
Establishment of Regional and District Coordinating Agencies	<ul style="list-style-type: none"> ➤ Use existing structures and personnel within government and other agencies. Ensure environmental issues are dealt with in these structures for effectiveness and sustainability. ➤ Build on existing strengths of organizations and personnel. Determine clear roles and responsibilities of each. ➤ Obtain written agreements between agencies to ensure clear communications. ➤ Steering Committees are effective in coordinating policies and implementation between villages, district, regions and other programme partners. ➤ Ad hoc task forces are an effective alternative to formal committees that can act on a specific task then disband.
Collaboration with District and Village Governments	<ul style="list-style-type: none"> ➤ Village by-laws are proving to be effective and can rapidly implement ways of district publicizing and reducing destructive practices. District by-laws take a longer approval process through the central government. ➤ Government officers are supportive and interested in actions and processes which will show noticeable outcomes.
National Policies and Legislation	<ul style="list-style-type: none"> ➤ Government policies can be strengthened by what is working in the field. Technical workshops with field days can bring examples to the attention of central government departments. ➤ Regular briefing sessions between regional staff and central government agencies is required. ➤ The lack of a central policy need not prevent people from trying new approaches. If successful, they can form the basis for national policy. ➤ Current policies and practices that do not provide secure access of village users to resources need to be reviewed.

2.9 Regional Implications

Most of the Eastern African countries, namely Comoros, Kenya, Madagascar, Mozambique and Tanzania, have proposals for the creation of new MPAs or the expansion of the network of existing ones. Expertise developed within the region can assist these countries in an effort to incorporate the current approaches of integrated coastal management during the establishment of the new MPAs.

The regional environmental programme implemented under the Indian Ocean Commission has conducted training sessions for nationals from the region in the field of environmental conservation.

This form of training, which includes integrated coastal management techniques needs to be supported and expanded. It is important that experts from the region be involved in implementing the programme in an attempt to strengthen the sharing of experiences and to harmonize the programme activities. ICM training courses for local and regional coastal managers being conducted by the Secretariat for Coastal Area Management (SEACAM) based in Maputo and the Western Indian Ocean Marine Science Association, based in Zanzibar, need to be harmonized to avoid duplication of efforts.

For transboundary ICM and MPA sites, there is need for coordination and consultation by corresponding institutions involved with coastal area management in the neighbouring countries. Finally, the lessons learned from the implementation of the usage contract in Nosy Atafana Marine Park and the Tanga Coastal Zone Conservation and Development Project need to be widely disseminated within the region.

3. MARINE PROTECTED AREAS (MPAs)

3.1 Overview

The overall mission of the MPAs is to conserve and manage the extraordinary variety of the marine and coastal biodiversity for the benefit of the present and future generations. Marine areas are designated as MPAs for conservation, research, maintaining natural and cultural heritage, education and recreation.

One of the key tools that an MPA manager has to have is a management plan. This is a document that leads and guides a coordinated and systematic conservation and management process leading to the achievement of desired goals and objectives. Management Plans are being formulated with the involvement of stakeholders, for the first time, to try and solve the myriad of problems surrounding MPAs. These management plans are expected to be dynamic in order to accommodate changes that are anticipated when dealing with such complex issues. Kenya is currently in the process of completing the management plans for all MPAs.

Capacity building has been identified as a key factor in MPA management.

3.2 Comoros

Types of MPAs

Two marine protected areas have been identified for establishment in the Comoros. These are the Regional Marine Park for the Coelacanth and the Marine Park of Moheli.

The Regional Marine Park for the Coelacanth

The Regional Marine Park for the Coelacanth is located along 25 to 30 km of the coastline in the southwest of the Great Comoro.

The objectives for the establishment of the park are:

- The protection of the population of coelacanth and its marine biotope;
- Integrated management of coast activities (fishing and extraction of materials);
- Tourism development (landscape enhancement, coelacanth myth, information and discovery center); and
- Scientific research on coelacanth and its habitat.

A programme for the setting up of the park for the coelacanth, including a management plan has been proposed in the pre-feasibility report, which is to be reviewed in the year 2000. The organization which seems more appropriate to administrate and manage the park for the coelacanth will be composed of representatives of the park, research centre, directorate of the environment, association for the preservation of the coelacanth, international foundation for the coelacanth, inter-villages committee. The approval of the study proposals could facilitate funding. With the main objective of the park being the protection of the coelacanth and its biotope, the cessation of the capture of coelacanth is considered as an important indicator of success.

Impacts, Conflicts and Threats

The potential anthropogenic impacts and threats on the park are:

- the bottom line fishing, specifically the “maze” fishing whereby the coelacanth is caught accidentally;
- the extraction of materials (sand, corals, pebbles) which leads to coastal erosion;

- dynamite fishing which would cause loss of biodiversity and change the ecological character of the protected area; and
- resource use conflicts.

The narrowness of the continental shelf makes fishing using "galawas" (non-motorized traditional boats) become concentrated in the coastal zone, where the demersals species are becoming over exploited. This leads to the shifting of the fishing effort of the "galawas" near the deep sea where the coelacanth population lives. This constitutes the main cause of the decline of these populations.

The extraction of coastal materials for construction purposes endangers not only the shoreline, but also the biological structure of the reefs. In fact, the anthropogenic erosion and the planetary phenomenon of coral bleaching have disturbing influences which have increasing effects.

The actors of who impact negatively on the environment are in permanent conflicts with the protectors of the environment, who are either from the same village or from the neighbouring village. A representation system to manage these conflicts will be set up through a consensus between the villagers, the prominent citizens and the civil authorities of the region.

The pre-feasibility study of the regional marine park for coelacanth realized in February 2000 advocates 7 helpful approaches for the management of the park:

- a fishing reserve;
- the biosphere reserve;
- a world heritage site;
- a park oriented towards conservation, education and research;
- a park dedicated to conservation and tourism;
- a park linking the conservation of coelacanth to the integrated management of the seaboard; and
- a multi-functional marine park integrating conservation, education, research and tourism.

The Marine Park of Moheli

The Marine Park of Moheli is located on the territory between Miringoni and Itsamia. Its surface area is estimated at 40,360 hectares. The objective of the park is to ensure the conservation and sustainable use of marine and coastal biodiversity, especially fisheries resources and the development of eco-tourism activities.

Impacts, Conflicts and Threats

The coral reefs of the park are faced with threats of anthropogenic origin such as:

- Dynamite fishing: This type of fishing, which is destructive, is practised occasionally in Nioumachouoi;
- Trampling of corals: The fishermen and the women take the opportunity to capture octopus and other fishes when the tide is low;
- The pressure of fishing on the islets: All the Comorian fishermen are aware that the islets of Nioumachouoi are the most productive. The motorized boats, all from Moheli, Anjouan and even Great Comoro fish in the open sea and also in the coral reef;
- The El Nino phenomenon of 1997/1998 has led to coral bleaching;
- Most of the isles of Nioumachouoi are pounded by strong waves which contribute a lot to the destruction of corals of Acroporidae species;
- Poaching: With regard to the marine turtles, the fishermen coming from the other islands carry out poaching activities; and
- Extraction of sand: Degradation of the habitat is caused by the extraction of sand from the beach.

The conflicts are frequent between poachers and the association of the youth for the protection of the environment. Conflicts also exist between tourism operators who want to utilize the marine and coastal zones contiguous to their infrastructures (for example hotels). The preparation of the management plan will be completed by the end of the year 2000. The type of organization proposed for the management of the park is a management committee comprised of a chairman (who is the general secretary of the administration of Moheli Island), a vice-chairman (who is a delegate of the community of the village bordering the park), 10 representatives from the villages bordering the park, a representative from the regional administration for environment and production (for Moheli region), a representative from the regional administration for tourism and transport, a representative from armed police, a representative of the park agents, and a representative of operators in tourism sector.

The main objective of the park being the protection of marine turtles and coralline reefs, the signs of success will be the recovery of turtles population, the reduction of the poaching and conflicts, as well as the regeneration of corals. The village communities are considered as the primary actors in the management of the park. A management agreement has been signed between the community and the project responsible for the setting up of the park. The approach taken for the management of the park is a participative management process resulting in comanagement of natural resources.

3.3 Kenya

Types of MPAs

Kenya led the African countries with the establishment of the continent's first marine protected areas in 1968. These areas were primarily designated to conserve Kenya's coral reefs which run along most of the coastline and which form a biodiversity hotspot second only to the tropical rainforests.

There are four Marine Parks, namely, Malindi, Watamu, Kisite and Mombasa. Their total area is 54 km² and are all managed by the Kenya Wildlife Service. In addition there are five Marine National Reserves, namely, Malindi, Watamu, Mpunguti, Mombasa and Kiunga. Their total area is 706 km² and they are administered by the Kenya wildlife service with traditional fishing allowed within their boundaries.

Three more MPAs have been proposed for establishment. These are Ras Tenawi, Diani-Chale, and the Tana Delta.

Mombasa Marine Park and Reserve

Prior to the gazettelement of this area to a Park/Reserve, the biodiversity and the general environment in Mombasa had faced considerable degradation and over-exploitation, especially from uncontrolled fishing, shell and coral collection, and coastal development. The local community was initially opposed to the gazettelement but the hoteliers and scientists wanted the area gazetted for environmental protection. Finally, Mombasa Marine National Park and Reserve was gazetted under Cap 376 of the Laws of Kenya through legal notices numbers 315 and 316 dated 9th December 1986, and supplement notice No. 88 of 11th December 1986 respectively. The area gazetted as park status measures 10 km² and lies between longitudes 39° 40' and 39° 54' East and latitudes 3° 58' and 4° 04' South.

Kisite/Mpunguti Marine Park and Reserve

Kisite Marine National Park and Mpunguti Marine National reserve were gazetted in 1973 and 1978 respectively. Together, they cover an area of 93 km² situated south of Wasini Island in Kwale District at the border between Kenya and Tanzania. The coral gardens in the park are among the best in the world. Common families include: Pocillaporidae, Acropodae, Agaricidae, Fungidae, Poritidae, Faviidae, Oculinidae, Musidae, Pectinidae, and Milleporidae. The park is famous for the abundance of coral fish and other marine flora and fauna including representative species of no less than nine families of coral fish and ten groups of aquatic birds.

Malindi and Watamu Marine National Parks and Reserves

The Malindi Marine National Park has been designated a Biosphere Reserve under the Man and Biosphere Reserve of UNESCO. It was established in 1968. Siltation brought down by the Athi-Sabaki River during the rainy season has increased due to changing land use practices inland. This impedes visibility in the park and is a threat to the health of the coral reef ecosystem. A further threat is the domestic sewage emanating from the major population centres adjacent to the park and the felling of mangroves in Mida Creek for commercial purposes.

Table 4. Summary of marine parks and reserves in Kenya

Name	Area (ha)	Year Established	Location	Resources
Malindi/Watamu Marine National Park and Biosphere Reserve	20,000	1968	South of Malindi, Close to Gedi ruins and Arabuko Sokoke Forest	Fringing reefs; coral gardens in lagoons; seagrass beds; mangroves; mudflats; shorebirds
Kisite Marine National Park and Mpunguti Marine National Reserve	39,000	1978	Off Shimoni, south of Wasini Island and next to Tanzania border	Coral reefs; islets; nesting birds; fisheries
Kiunga Marine National Reserve and Biosphere Reserve	250,000	1979	South of Somali border and north of Lamu	Coral reefs; islets with large nesting bird colonies; dugong; nesting turtles; pristine mangrove stands
Mombasa Marine National Park and Reserve	200,000	1986	13 km offshore from Nyali to Mtwapa Creek	Coral reefs; high tourist use
Diani-Chale Marine Reserve	250	Being set up	25 km south of Mombasa from Mwachema River to Chale Island	Coral reefs; fishing grounds; mangroves; seabird nesting sites; limestone caves; high tourist use
Tana Delta Wetland Reserve	20,000	Proposed	Southwest of Kipini	Undisturbed wetland (Ramsar Site candidate); birds; turtles; fish

The responsibility of managing Marine Protected Areas (MPAs) falls under the aegis of the Kenya Wildlife Service (KWS). Over time, MPA management strategies have evolved to include other stakeholders in problem identification and decision making. For the first time, Management Plans are being formulated with the involvement of stakeholders to try and solve the myriad of problems surrounding MPAs. This plan must therefore be dynamic to accommodate changes that are anticipated when dealing with such complex issues.

MPA Management Plans

One of the key tools that an MPA manager has to be equipped with to manage an MPA is a management plan. It is important to define the main contents of a management plan, thus a management plan is a document that leads and guides a co-ordinated and systematic conservation and management process in order to achieve the desired goals and objectives. The overall mission of the MPAs is to conserve and manage the extraordinary variety of the marine and coastal biodiversity for the benefit of the present and future generations. KWS is currently in the process of completing the management plans for all MPAs.

Community Participation

The management plans have been developed with the stakeholders' inputs in order to facilitate adoption and easy implementation. The wardens, being key to the planning process, have built a consensus with the stakeholders giving them some ownership of the management plan. This Consensus was sought through workshops and meetings undertaken by the wardens. The key stakeholders consulted included Fisher groups, Boat Operators, Mangrove cutters, Women Groups (Kiunga and Kisite), SCUBA diving

clubs/schools, Tour Operators, Sport Fishing Clubs and Hoteliers. Their contributions were as much as possible included in the management plans. This is especially with regard to new legislation and fishing rights. However, stalemates still exist in some areas, especially in Kiunga Marine Reserve, due to suspicion among local communities and lack of understanding of the difference between park and reserve status with regard to usage. This process is still on-going and final management plans are expected by the end of 2000.

Successful Approaches in MPA Management

Capacity building was identified as a key factor in MPA management. Other successful approaches to MPA management were identified as follows:

- The signing of memoranda of understanding (MoUs) that have made institutions to work together e.g. KWS/FD MoU on several areas in Kenya;
- Institutional linkages through the Beach Management Programme;
- Conflict Resolution: Tourism Licensing Committee has minimised conflicts between Fisheries Department and the Kenya Wildlife Service;
- Consultation in Planning: An example of this is Malindi where all issues concerning the environment are discussed in District Environmental Committees;
- Special Programmes such as Beach Operators Relocation Programme, the Turtle Conservation programme, Boat Operators Association and the Coral Reef Conservation Programme (CRCP) are a success and are having a direct impact on the communities;
- FD and KWS utilizing Community Women Groups in the rehabilitation of a fossilised coral reef for eco-tourism purposes;
- Development and utilization of Management Plans: The guidelines are drawn through consultative process, which is a milestone, however the challenge is implementation and constant review of the plans;
- Opportunity to exploit the Environmental Management and Co-ordination Act through lobbying. The Act has given all people the rights to be watchdogs over their respective environments; and
- Harmonization of conflicting legislation is already in the process.

A network system to exchange ideas, findings, lessons learned and various management techniques between MPA managers and co-managers within Kenya and the region is essential and needs be developed.

MPAs Managed Adequately

Four of the MPAs have been managed adequately, by KWS although availability of adequate management resources has always been an issue. Kiunga Reserve is managed with the assistance of WWF.

3.4 Madagascar

Types of MPAs

In Madagascar, a protected area is defined as a terrestrial, coastal and/or marine area the components of which are of particular importance in terms of their biological, natural, aesthetics, morphology, history, archeological, and cultural value. As such, protected areas require preserving against natural or anthropogenic degradation and any intervention that may jeopardize their composition and evolution (Article 1 of the Code of Protected Areas or COAP, Andrianarivo and Roland, 2000). The protected areas are for conservation, research, maintaining natural and cultural heritage, education and recreation (Article 11 of COAP).

The three types of protected areas are Integral Natural Reserves (INRs), Special Reserves (SRs) and National Parks (NPs). The network of INRs was created in 1927. These reserves were established with the goal of protecting the fauna and flora of defined zones. Hunting, fishing, tree felling, mining, excavation, drilling, agriculture, land prospection and construction are forbidden. The collection of animals and plants is under national regulation.

In view of these threats, protected areas have been established in order to maintain biodiversity and conserve natural heritage. The state assumes the responsibility for the management of the national network of protected areas, which is conferred to the National Association for the Management of Protected Areas (ANGAP). There are three categories of protected area, which have different degrees of protection in relation to the conservation of biodiversity:

National Parks (NP): The goal of National Parks is to protect and conserve natural and cultural heritage whilst maintaining a recreational and educational function. There are a total of 16 national parks in Madagascar (Annex 1) covering a surface area of 1,038,270 ha (ANGAP, 1999).

Strict Nature Reserves (SNR). The network of strict nature reserves was created in 1927. They were established with the goal of protecting the fauna and flora of the defined zones. Hunting, fishing, tree felling, mining, excavation, drilling, agriculture, land prospecting and construction are forbidden. The introduction of species not naturally present into these areas is also prohibited and the collection of animals and vegetation is under national regulation. There are a total of 8 strict nature reserves in Madagascar (Annex 1) with a total surface area of 284,919 ha (ANGAP, 1999).

Special Reserves (SR). Special reserves were established in order to preserve natural ecosystems or sites with distinctive flora and fauna. They have the same degree of protection as strict nature reserves with the exception that there is a greater degree of flexibility with regards to their access. There are a total of 23 special reserves in Madagascar (Figure 2.), covering a total surface area of 375,449 ha (ANGAP, 1999).

There are only two national marine parks in Madagascar, the Nosy Atafana Marine Park located in the Biosphere Reserve of Mananara-Nord and the Masoala Marine Park which consists of a complex of 3 separate marine protected areas. These are all classified as national parks and located in relatively close proximity to each other in the Toamasina and Antsirana regions on the Northeast coast of Madagascar (Annex 1). Covering only 11,000 ha (ANGAP, 1999), which represents 0.6% of the total surface area of protected areas in Madagascar, coastal marine habitats are under represented within the national network of protected areas (Rasolofo and Andrianarivo, 1998).

Management of MPAs

In accordance with the legislation No. 97-012 of June 1997, the administration and management of the national network of protected areas of Madagascar are conferred to the National Association for the Management of Protected Areas (ANGAP) which falls under the Ministry of Environment. ANGAP is a private institution with a public interest. It was created in 1992 following the privatization of the management of protected areas in accordance with the National Environmental Action Plan (PNAE). ANGAP has the authority to delegate the operational management of protected areas to a non-governmental organization, an international agency or a national public institution.

There are 47 protected areas in Madagascar of which 8 are INRs (284,919 ha), 23 SRs (375,449 ha) and 16 NPs (1,038,370 ha). In total, protected areas cover a surface area of 1,698,638 ha. MPAs are classified as NPs and cover 11,000 ha. There are two MPAs one of which is made up of a complex of 3 marine parks.

The Biosphere Reserve of Mananara-Nord

The Biosphere Reserve of Mananara-Nord is situated on the east coast of Madagascar in the Faritany de Toamasina region between latitudes 16° 14' and 16° 32' S and longitudes 49° 38' and 49° 50' E. The Biosphere Reserve has a surface area of 140,000 ha of which 22,649 ha is terrestrial and the home of 47,000 inhabitants.

The Nosy Atafana Marine Park within the Biosphere Reserve was created by the decree No. 216-89 of 25 July 1989. The marine park is situated northeast of Madagascar and has a surface area of 1,000 ha. The park is circular in shape with a diameter of 4 km. Since its establishment, the UNESO-MAB Project was given the responsibility of the park's management with the global objective of maintaining the quality and quantity of biodiversity in the protected area.

The Masoala Marine Park

The Masoala National Park is situated on the Masoala Peninsular in the Northeast of Madagascar. It has a surface area of 230,000 ha and was created following the decree 97-141 on the 7th March 1997. The park encompasses a complex of 3 marine protected areas (Tanjona, Cap Masoala and Tampolo Marine Parks) which have a total surface area of 81 km² (Figure 4). A list of the geographical coordinates and surface areas of the individual marine protected areas within this complex is given in Annex 5.

Proposed MPAs

Table 5. Summary of proposed MPAs in Madagascar

Name	Coastline	Ecosystem/ Habitat	Biodiversity representation	Observations
Bemamba/Manambolomaty complex	Western	Mangroves, Bays, estuaries.	Exceptional	
Kirindy/Mitea coastal zone	Western	Reefs, lagoons, beaches, dunes, rocky coast.	Important	There is already a terrestrial national Park, extension as a marine biosphere reserve is proposed
Mahavavy river estuary	Western	Mangroves, bays, estuaries.	Important:	Exchange zone between sea and river
Nosy Hara - Nosy Mitsio	Northern	Reefs, lagoon, beaches, dunes, rocky coast, small islands.	Exceptional	Nosy Hara's classification as an MPA is in progress
Nosy Manitse	Western		To be evaluated	
Nosy Mavony	Western		To be evaluated	
Nosy Ve	Southwestern	Deep sea, coral reefs, lagoon, beaches, dunes, Mangroves, rivers.	Exceptional	Proposed as a marine biosphere reserve, studies are in progress
Sahamalaza	Western	Coral reefs, small islands.	Important	Proposed as a marine biosphere reserve

3.5 Mauritius

Types of MPAs

Mauritius has five established fishing reserves and two proclaimed marine parks. Fishing reserves have been in existence for more than fifty years whilst the two marine parks were created in 1997.

Fishing Reserves

Port Louis

Port Louis Fishing Reserve is that part of the sea coast from the high water mark and a line drawn from Mortello Tower at Pointe aux Sables to a point due west on the reefs, a point called "Pointe Tortue" along a straight line to the westerly point of Fort George.

Rivier-du-Rempart-Poudre d'Or

That part of the sea between the sea coast from the high water mark and a line drawn from Pointe Grand Courant to the nearest shore of Ile d'Amber and along the shore of that island to Pointe

Dejeuner, thence along a prolonged line to the northern side of Passe St. Geran, along the reef of Pointe Roches Noires.

Flacq

- a) That part of sea between the sea coast at the high water mark and a line drawn from a point in front of Fisheries Post at Poste Lafayette, a place called Pointe La Barise from a stone boundary bearing letters "R.L." to the reefs and along the sinuosities of the reef to the high water mark in front of the old lime kiln at Belle Mare Coast.
- b) Trou d'Eau Douce: That part of sea between the sea coast from the high water mark and a line drawn from the old lime kiln at Le Maho to the extreme western point of the aux rats, thence along the inner shore of the several Isle aux Cerfs to Pointe Petit Vacoas, thence to the extreme point of Ilot Lievre and to Pointe Saint Lain, commonly known as Pointe Cassis.

Grand-Port - Mahebourg

- a) That part of sea coast at high water mark and a straight line drawn from a stone bearing the letters "R.L." behind the Roman catholic Church at Old Grand port to the extreme eastern point of Ile aux Aigrettes to the reefs and along the sinuosities of the reefs to a point at 1019589E, 972579N on the seashore at Point Corps de Garde. The boundary running along an imaginary line bearing an anle of 153° 26' up to the coral reef crest.
- b) Le Bouchon: That part of the sea between the sea coast at the high water mark at a point 1017971E, 971350N on the seashore at Pointe Vacoas, the boundary running along an imaginary line bearing an angle of 135° up to the coral reef crest and along the sinousities of the reef to the extreme pointe of Le Bouchon Barachois inclusive of Le Bouchon Bay.

Black River

That part of the sea between the sea coast at high water mark and:

- a) The sinuosities of the reefs from the place called Petit Vacoas, where the reefs meet the coast to Pointe Lascars on the northern part of Black River Pass,
- b) A straight line from the said Pointe Lascars to Grand Pointe on the southern poin of the pass, both Balck River and Case Noyale being included in the Reserves,
- c) A straight line drawn from the said Grand Pointe to the southern extremity of Pointe des Requins.

Marine Parks

The **Blue Bay Marine Park** covers an area of 353 hectares whilst the **Balaclava Marine Park** has an area of 485 hectares. The objectives of establishing the marine parks are:

- To protect the marine fauna and flora in a particular area of the sea;
- To conserve the marine life in that part of the sea in pristine condition for future generations;
- To allow for controlled uses of the different resources at a sustainable level;
- To allow the different populations of the marine organisms in the ecosystem to interact and reach a dynamic equilibrium;
- To conserve a broodstock of marine biota for seeding of neighbouring waters; and
- To allow for the education, appreciation and enjoyment of the sea and its creatures.

3.6 Mozambique

Types of MPAs

There are two types of protected areas in Mozambique, reserves and national parks. Coral reefs and associated ecosystems are protected within the Inhaca and Portuguese Island reserves and Bazaruto National Park.

Inhaca and Portuguese Islands

The terrestrial and marine protected areas of both Inhaca and Portuguese Islands were officially gazetted in 1965. The total terrestrial protected area of Inhaca Island was then about 1,000 ha but was extended to 1,620 ha in 1976. The terrestrial protected area of Portuguese Island was approximately 310 ha in 1965 but was increased to 370 ha in 1979.

Maputo Special Reserve

The Maputo Reserve was first created in 1932 with the aim of protecting the elephant population existing in the area. In 1969 the name of the reserve was changed to Maputo Special Reserve. Special reserves are areas nominated to protect more than one species of animals or plants and where hunting is not permitted. In 1990, Maputo Special Reserve was expanded to combine coastal and terrestrial components. The reserve has an approximate area of 80,000 ha.

Proposed MPAs

Seven coastal sites are proposed for inscription in the Natural World Heritage List. The proposed areas are Quirimbas Archipelago, Nicala Bay, Ilhas Primeiras and Ilhas Segundas, Mozambique Island, Bazaruto Archipelago, Inhaca and Portuguese Islands, and Machangulo Peninsula-Maputo Special Reserve south to Ponta d'Ouro.

3.7 Seychelles

Types of MPAs

There are at least fourteen areas that can be considered as Marine Protected Areas; the management of which is the responsibility of six agencies. The Marine Parks Authority is responsible for six and the Seychelles Fishing Authority is responsible for four. Birdlife Seychelles and the Royal Society for Nature Conservation (RSNC) both manage one island of which their adjacent waters are afforded protection under the National Parks and Nature Conservancy Act (Cap 141). The Seychelles Island Foundation (SIF) manages the World Heritage Site of Aldabra atoll. The management of the remaining MPA has been prescribed to the Island Development Company (IDC).

Marine National Parks

By 1996, when the Marine Parks Authority was legally instituted, a total of just over 3,285 ha of land and sea area had already been designated as Marine National Parks (MNP). One year later a further 170 ha was added to bring up the total to approximately 3,457 ha. Table 4 gives a breakdown of the surface area of the MNP. The same table indicates when each of these six MNP was designated.

Table 5. Summary of Areas Designated as Marine National Parks.

Name	Designating regulation	Date designated	Land area (ha)	Sea area (ha)	Total area (ha)
Ste. Anne Marine National Park	National Park (Ste. Anne Marine)(Designation) Order. Cap. 141, Sub. Leg. Pg. 1-2	19/03/1973	388.71	996.04	1384.75

Baie Ternay Marine National Park	National Park (Baie Ternay Marine) (Designation) Order. Cap. 141, Sub. Leg. pg. 5-6	11/06/1979	0.99	86.28	87.27
Curieuse Marine National Park	National Park (Curieuse Marine) (Designation) Order. Cap. 141, Sub. Leg. pg. 6-7	11/06/1979	286	1,370	1,656
Port Launay Marine National Park	National Park (Port Launay Marine) (Designation) Order. Cap. 141, Sub. Leg. Pg. 7	11/06/1979	3.59	154.26	157.85
Silhouette Marine National Park	National Park (Silhouette Marine) (Designation) Order. Cap. 141, Sub. Leg. Pg. 9	26/10/1987	?	?	?
Ile Coco, Ile La Fouche, Ilot Platte National Park	S.I. 20 of 1997 (National Parks and Nature Conservancy (Ile Coco, Ile La Fouche, Ilot Platte) Order 1997	19/02/1997	5.05	165.48	170.53
Total			684.34	2,772.06	3,456.40

In terms of land area, the six MNP cover an area of 684.34 ha. Of this total 57% and 42% of the land areas are associated with the Ste. Anne MNP and Curieuse MNP, respectively. The remaining 1-% is associated with the four other MNP. 88% of the total area of the six MNP is associated with the Ste. Anne MNP and Curieuse MNP. Overall, approximately 20% of the total MNP area is made up of land.

The six Marine National Parks are illustrated in Maps 2-7 (see Annex 2).

Ste. Anne Marine National Park

The Ste. Anne MNP lies approximately 5 km east of Victoria harbour, and was designated in March 1973 making it one of the first marine parks in the Western Indian Ocean. The Ste. Anne Marine National Park is made up of a group of six islands. Ste. Anne Island, itself being the largest of the group, hosts the headquarters of the Marine Parks Authority.

Curieuse Marine National Park

The island of Curieuse lies approximately 2 km to the northeast of Praslin, the second largest island in the Seychelles group. Curieuse, a fairly small island, 3 km long by 2 km wide, hosts a large number of endemic plants. In June 1979 the island of Curieuse and its surrounding waters were afforded the Marine National Park status. The Curieuse MNP boundaries envelop the whole of Curieuse and the channel between Curieuse and Praslin.

Baie Ternay Marine National Park

Found in the northwest of Mahé, the main island of the Seychelles group, Baie Ternay MNP lies approximately 5 km to the southwest of the popular tourist area of Beau Vallon. The Marine Park of Baie Ternay affords protection to the area inside the bay, from Pointe Matoupa to the headland of Anse Du Riz. The coastline of the Baie Ternay MNP stretches over a distance of approximately 2.5 km from the above points. Recognising the unique biodiversity of the underwater life that thrives there, the government in 1979 designated Baie Ternay as a Marine National Park.

Port Launay Marine National Park

The Port Launay MNP is a short distance to the south of Baie Ternay MNP. The Cap Matoupa peninsula separates the two marine parks. The seaward boundary of Port Launay MNP runs parallel to the main beach of Port Launay, starting at Anse Des Anglais in the south to Cap Matoupa in the north. Port Launay is sheltered from the influence of the northwest monsoon by the Cap Matoupa headland. Ile Conception, on the westward side of the bay, also provides protection to the bay.

Ile au Coco Marine National Park

The Ile au Coco MNP consists of three islands altogether, cf. *Table 1*. Not very far from La Digue and bordering Felicité island, the Ile au Coco MNP was designated a marine park as recent as 1997. Although it only gained the MNP status in 1997, access to these islands were somewhat restricted to visitors during previous years.

Silhouette

Silhouette, the third largest granitic island in Seychelles lies some 12 km north of Mahé. With a permanent population of around 250 people, Silhouette remains largely unexplored and is reputed to have the least disturbed forests among the granitic island. Silhouette was designated a Marine National Park in October 1987.

Shell Reserves

The Seychelles Fishing Authority, incorporated in 1984, is responsible for the management of the four Shell Reserves in Seychelles (S.I. 35/1987). All four Shell Reserves are located on the inner islands - two on Mahé, one on Praslin and one on La Digue. Both reserves on Mahé are situated on the East Coast of the island. The Anse Aux Pins Shell Reserve runs southwards from S.E Island to Fairyland, a distance of approximately 6.5 km. The second Shell Reserve on Mahé lies between North East Point and the western end of the Carana Beach; thus protecting approximately 2 km of the north-east reef. The Shell Reserve on Praslin stretches for roughly 4 km between Point Zanguilles to Anse Boudin on the North Coast. The La Digue Shell Reserve stretches from La Passe on the north-west Coast to the northern side of the Cap Bagard River covering, a distance of approximately 3.1 km. All Shell Reserves encompass an area lying within 400 metres seaward from the low-water mark. Interestingly the seaward boundary limit of the Praslin Shell Reserve also delimits the south-western boundary of the Curieuse Marine National Park. *Maps 7-10* (Annex 2) show the locations of the four Shell Reserves.

Special Reserves

The waters adjacent to a further four islands are afforded protection as Marine Protected Areas. These are the Aride Island Special Reserve, Cousin Island Special Reserve, the Aldabra Special Reserve, and the African Banks Protected Area. The management of the above MPA falls under the aegis of four agencies: two of which are NGOs, one is a government statutory body and the other is a parastatal company.

Cousin Island Special Reserve

This verdant ornithological sanctuary lies three kilometres to the south-west of Grande Anse - Praslin. It became a nature reserve in 1968, when, with the financial help of the World Wildlife Fund and Christopher Cadbury, it was bought in the name of the International Council for Bird Preservation (ICBP). It was designated a Special Reserve in November 1975. Today the entire island, including the reef around it to a distance of 400m, enjoys the protection of a Special Reserve. The island has since 1998 been managed by Birdlife Seychelles.

Aride Island Special Reserves

Aride Island is the most northerly of the granitic Seychelles, lying sixteen kilometres north of Praslin. The eminent British businessman, Christopher Cadbury, on behalf of the Royal Society for Nature Conservation (RSNC), bought the island in 1973 for Nature Conservation. Six years later, in October

1979, Aride Island was designated a Special Reserve under Seychelles Law. Like on Cousin Island, the adjacent reef of Aride Island is protected as a Special Reserve. The Aride Island Special Reserve is today still being managed by the RSNC.

African Banks

The African Banks is made up of two islands, the North and South Island, sitting at the apex of the Amirantes Plateau. Both islands are uninhabited and are managed by the Island Development Company (IDC), a parastatal organisation. Although the African Banks was designated a protected area in 1987, under the Protected Areas Act (Cap 185), there is no management plan for promoting conservation on these islands. Large numbers of sooty terns (*Sterna fuscata*) visits the African Banks during the southeast monsoon. Poaching of birds' eggs and protected species is common on the African Banks.

Aldabra Atoll

Situated just over one thousand kilometres southwest of Mahé, the Aldabra Atoll is closer to the East African coast and Madagascar (Carpin, 1996) than the main island of the Seychelles archipelago. The Atoll was designated a Special Reserve in 1981 and in 1982 it was listed as a UNESCO World Heritage Site. Conservation effort on Aldabra began in 1971 when the Royal Society established their presence on the Atoll. Today Aldabra is managed by the Seychelles Island Foundation (SIF), a government statutory body established by Presidential Decree in 1979. A comprehensive eight-year management plan (1998 – 2005) exists for Aldabra.

3.8 Tanzania

Types of MPAs

Tanzania Mainland has two marine parks, five marine reserves, and one World heritage Site, while Zanzibar has two conservation areas and one sanctuary (Table 6).

Table 6. Marine protected areas in Tanzania

MARINE PROTECTED AREA	SIZE (km²)
Mafia Island Marine Park	822
Mnazi Bay - Ruvuma Estuary Marine Park	668.5
Menai Bay Marine Conservation Area	467.5
Misali Island Conservation Area	21.6
Fungu Yasini Marine Reserve	7.5
Mbudya Marine Reserve	8.9
Bongoyo Marine Reserve	7.3
Pangavini Marine Reserve	2.0
Chumbe Island Coral Park	?

Mafia Island Marine Park (MIMP)

Mafia Island Marine Park was established in 1995 under the National Legislation Marine Parks and Reserves Act of 1994. MIMP has been managed by the Fisheries Division with assistance of World Wide Fund for Nature (WWF). The initial work of MIMP has been to focus on the problem of dynamite fishing in the park as well as community based activities.

Mnazi Bay - Ruvuma Estuary Marine Park

Mnazi Bay - Ruvuma Estuary Marine Park includes the following villages: Mahurunga, Kitunguri, Kihimika, Kilambo, Tangazo, Litembe, Hyuvi, Mngoji, Msimbati, Nalingu, Mnete, Mkubiru, Sinda, Msanga Mkuu, Ng'wale, Namela, Naponda, and the coastal sea adjoining these villages. The main

objective for establishing the park was to enable local and government stakeholders to effectively protect and manage the marine biodiversity and resources of Mnazi Bay and the Ruvuma Estuary.

Menai Bay Conservation Area (MBCA), Zanzibar

Menai Bay is located in the southwest side of the Unguja Island. It is a traditional fishing ground with extensive areas of coral reefs. The Government of Zanzibar officially gazetted it as a conservation area in August 1997. The area has remained relatively undisturbed until recently, when fishing pressure combined with destructive fishing techniques became a serious environmental concern.

Misali Island Conservation Area, Pemba

The forested coral island of Misali, occupying a land area of 90 ha, is located 10 km off the western coast of Pemba. The total area gazetted is 22 km², with a proposed marine core protection zone of about 2 km². The island is surrounded by 9.4 km ring of coral growth varying from extensive reef formations to areas with patches.

Chumbe Island Coral Park, Zanzibar

The Chumbe Island Coral Park is a private nature reserve developed and managed by the Chumbe Island Coral Park Ltd. (CHICOP). Chumbe Island which occupies an area of 16 ha is situated southwest of Unguja Island. It is a rare example of a still pristine coral island ecosystem in an otherwise heavily overfished and over-exploited area. CHICOP holds a 33 year lease of 2.5 ha of cleared land and a management contract of 10 years for the Chumbe Reef Sanctuary which was gazetted in 1994.

3.9 Regional Implications

The Eastern African marine protected areas are of paramount importance locally, nationally and internationally. The sites are critical for marine biodiversity conservation. Some are habitats for rare and endemic species such as the coelacanth (*Latiimeria chalumnae*) the living fossil of the Comoros. In addition, some sites harbour remnant threatened lowland coastal forests whose survival depends on the conservation measures being taken. MPAs are oases for fisheries and other resources. Such marine resources provide livelihood for most of the coastal people in terms of food and income.

MPAs located at the borders such as Mnazi Bay -Ruvuma Estuary and Tanga (ICM) - Kisite (MPA) provide opportunities for bilateral cooperation in marine and coastal resources. A networking system to exchange ideas, findings and various management techniques between MPA managers and co-managers within the region is essential.

4. KEY MPAs AND ICM SITES: CASE STUDIES

4.1 Overview

MPAs and ICM sites in eastern Africa are established in order to: enhance regeneration and ecological balance of coral reefs, seagrass beds, sand beaches; to promote sustainable development; and to promote scientific research, education, recreation, and any other compatible resource utilisation activities.

One of the most pressing issues in the management of key MPA and ICM sites is the lack of management plans and virtual absence of monitoring programmes to assess the impacts of existing activities and potential developments. The involvement of local residents in the development and management of the park is paramount to ensure that they have priority access to resources and economic opportunities.

The private sector investing in tourism development in and around MPAs has not been engaged sufficiently in MPA management. MPA management authorities should initiate and build a culture of revenue collection from the private sector.

4.2 Comoros

Pilot ICM Site of Itsamia

The pilot site of Itsamia is of particular interest in the sense that it has been the focus of an ICM pilot operation, and is included in the proposed Marine Park of Moheli. The Regional Environmental Programme of the Indian Ocean Commission financed by the European Union has chosen and identified this site for the implementation of integrated coastal zone management.

A workshop on the protection of turtles in Comoros is proposed under the initiative of the association of the Itsamia village. The workshop's objective is to create a forum to identify the constraints, the opportunities, the gaps, and the conflicts, with the aim of launching an operation of marking and protecting the turtle laying sites in Itsamia through a pilot project. UNDP and the association of Itsamia have been able to obtain a financial agreement with the Netherlands government to support the organisation of the workshop (up to 3000 000 CF). The pilot project is being launched as an activity contributing to the establishment of the Marine Park of Moheli.

4.3 Kenya

Role of MPAs

The role of MPAs in Kenya is to protect and conserve the marine and coastal biodiversity and the related ecotones for posterity. MPAs are established in order to: maintain essential ecological processes and life support systems; to ensure the sustainable utilization of species and ecosystems; and to preserve biotic diversity.

Goals of MPAs

The goals of MPAs are:

- Preservation and conservation of the marine biodiversity for posterity;
- Promotion of ecologically sustainable use of the marine resources for cultural and economic benefits; and
- Promotion of applied research for educational awareness programmes, for community participation, and for capacity building.

Role of MPA Managers

The role of an MPA manager is as follows:

- Overall MPA administration and enforcement of current rules and regulations;
- Day-to-day running and management of the MPA ,i.e., revenue collection, patrolling, administration;
- Education and awareness creation;
- Conflict resolution
- Provision of security
- Addressing stakeholder issues and co-ordination

Stakeholders Role

In order to effectively carry out the role described above, an MPA manager needs the support of co-managers from other departments and key stakeholders. In Kenya, the key stakeholders are:

- (a) **Government:** Fisheries Department, Forest Department, National Museums of Kenya, KEMFRI (Kenya Marine and Fisheries Research Institute) , Government Chemist, Location Authorities, Tourism, Water, CDA (Coast Development Authority), Administration, NES (National Environment Secretariat), KPA (Kenya Ports Authority), KEFRI (Kenya Forestry Research Institute), Universities
- (b) **NGOs:** SPEK (Society For the Protection of the Environment, Kenya), Environment Trust of Kenya (ETK), KREP, Tototo Industries, WCK, IUCN, WWF.
- (c) **Private Sector:** Baobab Trust, Mombasa and Coast Tourist Association (MCTA), Kenya Association of Hoteliers and Caterers (KAHC), Kenya Association of Tour Operators (KATO), Kenya Association of Travel Agencies (KATA)
- (d) **Community:** Boat operators, Fisher Folk Association
- (e) **Others:** Coral Reef Conservation Project (CRCP), Coral Reef Degradation in the Indian Ocean (CORDIO).

The Nyali-Bamburi-Shanzu ICM Site

Kenya has begun to experiment with the implementation of site-specific ICAM programmes. The site along the Kenya coast where ICAM is being applied is the Nyali-Bamburi-Shanzu Area. This area encompasses the span from Mtwapa Creek to Tudor Creek, including the mangrove systems of each, extending seaward to the reef crest and inland to include the settlements located immediately to the west of the old Mombasa-Malindi Road. This area is not a legal definition but a general delineation which is being used for planning purposes.

The site was chosen for several reasons:

- Its coastal resources are important for tourism at both the local and national level;
- The area is challenged by one of the most critical coastal issues in Kenya - that of incorporating and sustaining an international tourism industry in a manner that is environmentally sound and benefits the people of the area and the nation as a whole;
- There is local demand for the project. One major impetus in the area selection was that the local residents recognized that issues exist which require immediate attention;
- Most of the key government agencies and organizations maintain offices in Mombasa, thereby facilitating their oarticipation and cooperative effort; and
- Unlike other areas of the Kenya coast, data about the area, though limited exist.

A multi-agency team was created in October 1994. The team developed initial strategies to address critical management issues and worked to build support within government, user groups and the private sector in order to move forward in strategy implementation. This team has operated under the leadership of the Coast Development Authority, whose mandate includes planning, coordination and implementation of development projects in the whole of Coast Province and the Eclusive Economic Zone.

Critical Management Issues

The following critical issues have been identified as requiring urgent attention if tourism, the economy and resources of the Nyali-Bamburi-Shanzu area are to be sustained:

- Inadequate infrastructure and public services;
- Degraded water quality;
- Declines in the reef fishery;
- Degraded marine habitats;
- Coastal erosion; and
- Increasing on-water and land use conflicts;

4.4 Madagascar

The Nosy Atafana Marine Park

Location and Background

The Nosy Atafana Marine Park is situated in the province of Toamasina in the Northeast of Madagascar. The park is circular in shape with a diameter of 4 km. and a surface area of 1,000 ha (Annex 1) The centre of the park is situated at 49° 50' east and 16° 16' south. The marine park was created with the national terrestrial park following the decree no. 216-89 of the 25th July 1989, and is now a component of the UNESCO Biosphere Reserve of Mananara-Nord. The Biosphere Reserve of Mananara-Nord is situated on the east coast of Madagascar between latitudes 16° 14' and 16° 32' south and longitudes 49° 38' and 49° 50' east.

Management of the Nosy Atafana Marine Park

Since its establishment, the UNESCO Mananara Biosphere Project (MAB) was given the responsibility of the parks management with the objectives of (i) maintaining the quality and quantity of biodiversity (ii) the conservation and rational management of marine resources and (iii) protection of the ecosystem of Nosy Atafana. The overall management goal for the biosphere was to develop the region and improve the quality of life of the coastal communities whilst achieving these objectives.

UNESCO conducts the operational management of the reserve under the supervision of ANGAP, which is responsible for the evaluation of programs and activities. In 1991, a usage contract between the Mananara Biosphere Project and the local community was signed (see Annex 3). The short-term goal of this contract addressed the conservation and rational management of marine resources and in the medium-term, the protection of the ecosystem of Nosy Atafana whilst allowing a certain degree of access to resource users. The contract stipulates that the marine park would be open on Tuesday, Thursday and Sunday, and fishing is only authorised for fishermen from 4 villages: Sahaso, Ivontaka, Menatany and Hoalampano. Nosy Atafana Marine Park is zoned into a central core, where no activities are allowed and a buffer zone where fishing is regulated.

In addition to the two wardens permanently based at Nosy Atafana, the Mananara Biosphere Project has a fisheries section which monitors the catches landed at the fishing villages on the coast adjacent to the park. The only building in the park is the accommodation for the park rangers, however there are plans to build a visitor chalet and observation hut this year.

The Netherlands Government funds the management of the marine park and the operational budget for five years is US \$ 58,212 ending in 2001. Some revenue is generated from entrance fees, 50% of which is returned to the coastal communities by the management authority in the form of social development projects once sufficient funds have accumulated (current plans are to sink wells in the coastal villages lacking potable water). The Nosy Atafana Marine Park does not have a management plan, the development of this within the framework of the 'Strategic Plan for the Network of Protected Areas of Madagascar' (ANGAP, 1999) is a priority activity.

Population and Activities

Artisanal fishing is permitted within the park on the days specified in the usage contract. A total of 3.3 tonnes of reef fish was caught inside the park in 1999. Handlines are used and fishermen on foot remove octopus with harpoons. The collection of spiny lobsters (*Panulirus sp.*) is banned in the park, although it does represent an important activity in adjacent areas. The collection of bait (mostly worms) is permitted on the days that the park is closed to fishing. Given the needs of both transients and the local population, the natural resources (holothurians, crustaceans, fish, octopus and mangrove wood) were exploited without regulation prior to the establishment of the park. When fishermen are stranded due to bad weather, they are permitted to stay in the park ranger's accommodation.

Only 29% of fishermen belong to associations that are allowed to enter the marine park. Of these, 34 are solely associated with the extraction of octopus. Women and children collect shells on the reefs along the coast outside the marine park during low tides but do not exploit any of the resources of the park.

Resource Use Impacts

The activities of fishermen on foot result in physical damage to live coral on the reef flat as a result of trampling and the use of harpoons to remove the octopus. This activity was reduced following the establishment of the marine park and usage contract. Furthermore, as a response to the issue, the management authority is in the process of running trials with octopus traps with a view to introducing them to the fishing community as an alternative non-destructive method. It is noteworthy, that quantifying the extent of this impact is difficult as the same type of physical damage occurs from cyclones.

Biodiversity

Despite its relatively small size, all of the habitats characteristic of the coastal zone of Madagascar are represented in the Nosy Atafana Marine Park:

- *Mangrove forests.* Small pockets of mangrove forest are situated on the shoreline and interior of Rangotsy Is.
- *Lagoons.* The three islands in the park are situated in a sandy lagoon. Characteristic benthos includes green algae, seagrass, sponges and sea urchins. Calcareous algae are also present.
- *Coral Reefs.* A fringing coral reef encircles the lagoon and is separated from it by a reef flat. The benthic community is characterised by scleractinian corals.
- *Rocky outcrops.* Hely Is. and the eastern side of Rangotsy Is. are characterised by granitic outcrops and escarpments descending to the sea. The substrate in the littoral zone is colonised by encrusting algae and corals, macro algae and beds of *Crassostrea sp.*
- *Sandy beaches.* Atafana Is. is surrounded by a sandy beach, and small sandy beaches are present on Rangotsy Is.
- *Coastal forests.* Coastal forests grow on sandy soils on the islands within the marine park. The dominant species (*Terminalia catapa*) was heavily degraded but is now regenerating. The forest on Atafana Is. is a breeding site for fruit bats. It is further infested with rats (*Rattus rattus*), in response to which a derattisation programme is currently being investigated.

A preliminary inventory of the biodiversity of Nosy Atafana Marine Park was made in 1997 by the National Centre for Oceanographic Research (Annex 4). In addition to the species list produced, the preliminary survey of the coral reef indicated conditions that were 'ecologically perfect' (Maharavo, 1997).

Achievements

There is a diverse range of examples of how the participatory management approach of the Mananara Biosphere Project has been successful in terms of meeting the goals of the Nosy Atafana Marine Park.

Maintenance of Biodiversity and Protection of the Ecosystem

Improvements in the integrity of the habitats in the marine park have occurred since its creation:

- (i) Regeneration of the coastal vegetation at the camping ground as a result of the prohibition on camping.
- (ii) An improvement in the integrity of the coastal forests through the removal of coconut and breadfruit trees planted by the coastal communities.
- (iii) Conservation of the breeding colony of fruit bats through a ban on hunting.
- (iv) Regeneration of the mangroves at Rangotsy Is. following a ban on the exploitation of wood to make fish drying racks.
- (v) Less physical damage to coral on the reef flat through a reduction in octopus fishing.

Conservation and Rational Management of Marine Resources

The regulation of fishing activity in the Nosy Atafana Marine Park has resulted in:

- (i) An augmentation in the recruitment of reef fish within the park.
- (ii) A 'spill-over' effect in terms of adult fish moving to grounds outside of the park.
- (iii) A subsequent increase in catch rates both inside and adjacent to the park.
- (iv) Diversification of the user groups economic activities.
- (v) Establishment of fish aggregating devices in areas outside the park. Resulting in increased catch rates and a diversion of fishing away from the park.

Conflict Resolution

Fishermen within the region frequently visited Nosy Atafana and a number of encampments were present before the park was established. Subsequently, a conflict of interests arose from the prohibition on camping when the park was created. The participatory management approach enabled the conflict to be resolved and fishermen are now allowed to stay in the park ranger's accommodation when stranded by bad weather. Another conflict developed as a result of the loss in income of fishermen caused by restrictions imposed on their activities in the park. This was resolved through the introduction of a variety of agricultural activities that substituted fishing on the days that the marine park was closed. Furthermore, a credit system was implemented, providing the means for fishermen to purchase primary materials enabling them to fish at other locations outside the park using different techniques.

Current Management Issues

A potential threat to the integrity of the Nosy Atafana Marine Park is the probable impact of tourism. To date, tourism activities within the park have been negligible (19 visitors last year). However, with the planned construction of a chalet and an observation shelter on Atafana Is., tourism is expected to increase soon. There is very little infrastructure for tourism within the region and subsequently the park is not easily accessed. Furthermore, the Mananara Biosphere project is taking a precautionary approach to the development by setting a limit of 10 tourists in the park at any one time. Despite this, it is imperative that any developments within the park take place within the framework of a comprehensive management plan, which encompasses rigorous ecological monitoring.

The most pressing issue is the fact that the Nosy Atafana Marine Park does not have a management plan and there is an absence of a permanent monitoring programme to assess the impacts of existing activities and potential developments. The encouraging achievements of the Mananara Biosphere Project in the management of Nosy Atafana may be jeopardised by the potential adverse impact of tourism development.

The usage contract only applied to the members of the fishing associations in the 4 villages in the coastal area adjacent to the marine park. However, other transient fishing communities also used these marine resources. Their exclusion from accessing the park resulted in the shift of effort further to the north into the Masoala Marine Park, the resources of which were already heavily exploited. Furthermore, the ICAM process was not yet established in the adjacent region to be able to resolve the conflict. Whilst the transient fishing community is relatively small, the principle of the transfer of

resource use into an adjacent region must be recognised as a failure of the management system that created the shift. This might have been resolved if the management system of Masoala Marine Park had evolved in synergy with that of the Nosy Atafana Marine Park.

Lessons Learned

The achievements of the participatory management approach of the Nosy Atafana Marine Park can be attributed a combination of the following factors:

- The process is fully integrated including all stakeholders in the coastal community;
- The decision making process is dynamic, being capable of identifying and responding to critical management issues;
- Issues are resolved by directing the activities of resource user groups to sustainable, non-destructive substitutes. The solutions are simple, viable and directly applicable by the resource users themselves;
- The rationale of the management process is based on communication, co-ordination, co-operation and education;
- The resources of the marine park are accessible through a usage contract that was developed by the management authority in association with the user groups. By allocating property rights, the coastal communities are protective of the marine resources in the Nosy Atafana Marine Park and report violations by unauthorised users from areas outside the region;
- Increased revenues from the benefits of the management regulations (eg. from increased catch rates and substitution activities) are realised by the resource user groups. As a result there is compliance and respect for the management authority;
- The close dialogue between resource users and the management authority enables conflicts to be resolved;
- The quality of life and standard of living of the local community adjacent to the park can be improved by investing the revenues generated from entrance fees into social development projects. This also helps to instil husbandry for the natural resource base and a respect for the participatory ICAM system; and
- The selection of isolated sites for protection that have natural barriers increase the probability of successful management.

4.5 Mozambique

Inhaca and Portuguese Islands

Status

The protected area of Inhaca Archipelago can be broadly divided into terrestrial and marine components with diverse and rich plant and animal species. The terrestrial area under protection is over 1,000 ha in Inhaca Island and about 370 ha in Portuguese Island. Marine protected areas cover an area of about 200ha around Inhaca. The mangrove swamps cover an area of about 480 ha. In the case of Portuguese Island, the MPA is in the northwest lagoon where the coral reefs are found and covers an area of about 6 ha. The mangrove forest in this area covers another 6 ha.

Management

An Integrated Development Plan for Inhaca has been in existence since 1900. Social facilities such as schools, boreholes and a health centre were built as incentives and as a means of involving the local communities in the management of both the terrestrial and marine protected areas, and resolving conflicts in the utilization of the natural resources. The development plan did not work because the local communities did not participate in the decision-making. The conflicts in natural resource use still remain.

There is also an Integrated Development Centre headed by the local administrator. However, the centre does not have sufficient funds and human resources to fulfil its mission. Inhaca Marine Biology Research Station does not have an information centre due to limited human and financial resources. The National Policy for Coastal Zone Management and Marine Protected Areas is not very specific

with regard to Inhaca Archipelago. The "Instituto Nacional de Planeamento Fisico" did submit an Integrated Development Plan for Inhaca to the National commission for Planning regarding zoning and natural resource use. The plan is quite good and clear. However, the plan has not been implemented although it was prepared over three years ago.

4.6 Seychelles

The Ste. Anne Marine Protected Area

Status

Ste. Anne, Ile aux Cerf, Ile Longue, Ile Moyenne, Ile Ronde and Ile Cachee, with surrounding rocks all fall within the Ste. Anne Marine Park, an area covering 1384.75 ha., of which 996.04 ha. are marine ecosystems. The Ste. Anne Marine National Park, located about 5 km from Victoria, Seychelles main urban and commercial centre, was designated in March 1973 making it one of the first marine parks in the western Indian Ocean. The Ste. Anne Marine Park consists of three types of important marine habitats: coral reefs (both sheltered and exposed fringing types), extensive seagrass beds and sand flats. The park also supports a huge variety of fish. The islands in the group are also important turtle nesting sites.

A management plan prepared since 1995 is available. The purpose of the Ste. Anne Marine Park is to conserve the resources and protect coral reefs and other marine habitats from harmful disturbances and to manage the uses of the park. The Marine Park Authority was set up in 1996, under the Environment Protection Act 1994, with a vision to manage in an integrated way the protection, conservation, enhancement and utilisation of Seychelles natural marine resources so as to make a significant contribution to the country's sustainable development. The Authority, with a total of about 29 staff and a budget of 0.5 million US\$ manages six marine parks: The Ste. Anne Marine Park, Baie Ternay Marine Park, Port Launay Marine Park, Curieuse Marine Park, Silhouette Marine Park, and the Ile Coco-Ile La Fouche-Illot Platte National Park, with a total area exceeding 3456 ha.

Human population and activities

Ste. Anne supports the staff of the Ste. Anne Marine Park only, whereas Cerf Island is divided into private plots of land, hosting both a small local population and hotels for tourists, Moyenne Island is privately owned, Round Island is leased for the restaurant trade and Long Island hosts the nation's only prison. Ile Cachee is uninhabited. However the largest population centres based on Mahé lies only 5 km away, and the Marine Park faces a constant threat from direct human activities such as poaching and indirect activities such as reclamation. The population along the East Coast of Mahé is approximately 23,000. There are currently plans for a five star hotel on Ste. Anne island.

Characteristics of Buffer Zones and Corridors

In view of the variety of uses and ownership of the various islands in the marine park, it has been important to define clearly management zones to ensure long-term use and conservation of the marine protected area. The main zones include: Underwater Diving Zones (areas to be used by glass bottom boats and for snorkelling); Bunkering Zone (for bunkering of petroleum products from the storage depot on Ste. Anne – to be relocated very soon); Protected Zones (areas with reefs, sea grasses, turtle nesting beaches); and General Use Zones (for picnics, boating, swimming and other soft leisure activities).

Management Plan

The Ste. Anne Management Plan has no specific time period for implementation, and measurable indicators of progress are not indicated. There is an urgent need for a new management plan. The actions in the plan are defined arising from problem statements.

Management Issues and Constraints

- *Adequacy of legislation and enforcement capacity:* The existing legislation is being updated to improve enforcement effectiveness. However, enforcement capacity is still inadequate and being addressed;
- *Clarity of boundaries:* The boundaries are clearly marked and defined; however the zones are not as clearly marked. However, information on the zoning is communicated to users.
- *The Management Plan and its implementation:* A new management plan is needed. This should encompass wide stakeholder consultation and input.
- *Clarity of management objective and performance indicators:* These are currently not clear, making any assessment of the effectiveness of the park difficult. However, current scientific research indicates that the marine protection area does achieve conservation of many marine species and habitats.
- *Zonation and multiple uses:* Zonation is utilised, but needs to be enforced and the users educated on the role and purpose of the zones. The carrying capacity of each zone may be established.
- *Adequacy of resources:* Both financial and human resources are the current management constraints of the authority.

Impacts, Conflicts and Threats

- *Poaching:* Poaching is not uncommon, but has decreased following successful prosecution of some offenders;
- *Tourism:* Ste. Anne receives at least 40,000 tourist visits a year, and almost 100,000 local resident visits (for picnics) per year, placing enormous pressure on the resource;
- *Impacts of wardens:* The islands in the Marine Park are serviced by utilities, through underwater cables and pipes. However, solid waste disposal, marine debris, beach litter and sewage disposal is a source of impact;
- *Land use planning:* The policies are varied depending on ownership of island. Generally tourism based activities are accepted; and
- *Mainland activities:* Impacts and stressors include coastal reclamation, port activities, oil pollution, sewage discharge (new treatment plant in operation in 2001), garbage, marine debris, and fish wastes.

Benefits/Revenue and Economic value

Number of visitors: 40,000 tourists

Direct income from entry fees: Each foreign tourist pays US\$ 10.00 landing fee.

Indirect income: Minor sales of Coco-de-Mer and other souvenirs.

Other Benefits: Direct and indirect benefits to nearby communities and private sector from tourism, employment and sales of services and goods.

Costs: The operating cost of the Marine Park Authority is about US\$ 600, 000 per year, with revenues for Ste. Anne amounting to about US\$ 250,000. Government still provides a US\$ 140,000 subvention to the Authority.

4.7 Tanzania

Mafia Island Marine Park

The specific objectives for the establishment of Mafia Island Marine Park are:

- Conservation of biodiversity and ecosystem processes;
- Promotion of sustainable use and rehabilitation of damaged ecosystems;
- Involvement of local residents in the development and management of the park, ensuring that they have priority access to resources and economic opportunities;
- Stimulation of rational development of under-utilized natural resources;
- Promotion of environmental education and information dissemination;
- Facilitation of research and monitoring of resource conditions and uses;
- Conservation of historic monuments, ruins and other cultural resources; and
- Facilitation of appropriate ecotourism development.

Experiences

An assessment of Mafia Island Marine Park initiated in 1998 by the Board of Trustees for Marine Parks and Reserves with support from WWF revealed significant successes in the development of the park, the national legislation and institutional framework. At the same time, a number of issues were highlighted as needing attention both in the short and long term. Some of the issues and recommended actions are summarized below.

Local Communities

The local communities are very much aware and supportive of the goals and objectives of the park. This is demonstrated by their willingness to discuss freely and take leading roles in the implementation of the activities of the park. The awareness programmes and the different types of assessments, which have provided greater interaction of different actors have been effective. An example of the positive impact is the women's participation in different activities of the park.

Several projects have been initiated at community level. A major achievement has been the eradication of dynamite fishing. WWF has provided the most modern speedboat to combat dynamite fishing which was until the arrival of the boat rampant in the park. All parties have collaborated effectively through radio communication, which as linked communities, police, fisheries officers, and MIMP management team. The radio communication has been facilitated by WWF.

Private Sector

The private sector investing in tourism development in MIMP has not been engaged sufficiently and MIMP management should initiate and build the culture of revenue collection from the private sector. This can be achieved by holding a series of workshops to discuss the role of the private sector in sustaining the management of the park, including the purchase of local produce for use in the hotels.

4.8 Regional Implications

The selected MPAs are significant in the region as they present good models for MPAs in the region, with Malindi, in Kenya, and St. Anne, in the Seychelles, being the oldest marine parks in the region having been gazetted in 1968 and 1973 respectively.

The Nosy Atafana Marine Park has a particularly important regional significance in that, despite its relatively small size, all of the principal habitats that typify the coastal zone of Eastern Africa occur within its boundaries. The largest of the islands (Atafana) is a habitat and breeding site for flying foxes and marine turtles occasionally use the park as a feeding ground. The migration of Humpback whales (*Megaptera novaeangliae*) occurs just outside of the park. Given the status of this species there is justification to protect this narrow migration corridor. The park is occasionally frequented by Dugongs as a part of their range, running along the Eastern African.

5. ASSESSMENT OF CORAL REEF HEALTH

5.1 Overview

A general assessment of coral reef health in Eastern Africa shows a progressive decline. The severe El Niño event of 1997/98 resulted in unprecedented coral bleaching in the Indian Ocean on record. The extent of bleaching and mortality differed between species and sites. *Acropora*, *Pocillopora*, *Seriatopora* and *Stylophora* were the most affected genera. Despite coral mortality, reef fish species richness and abundance were high compared with other areas that were less affected by the bleaching event.

The decline of the coelacanth population is a matter of urgent concern. If the capture of this organism continues at the current accelerated rate, in addition to the environmental factors that impact on the survival of this living fossil, there is a risk of extinction of this population.

5.2 Comoros

Marine Park of Moheli

The coral reefs of the Marine Park of Moheli have been diagnosed by submarine explorations, sometimes followed by “transects” in 1998 and 1999 by AIDE team.

Table 7. Comparative table living coral during the years 1993,1998 and 1999

Sectors/Sites	G.P.S Coordinates	Tilot 1993	AIDE 1998	AIDE 1999
Ounefou	S12°23'53,6" et E 043°42'34,9"	31%	20 %	5%
Mea		45%	35%	10%
Itsamia	S 12°22'22,2" E 43°55'08,2"	73%	35%	30%
Fomboni	S12°16'18,02" et E 043°44'26,2"	8%	10%	5%
Candzoni	S12°24'21"7 E 043°39'53"7			21.7%
Wallah 1	S12°19'24" E 043°38'57,9"			40%

Source: AIDE, 1999

The comparative analysis of the percentage of recovery of living coral during the years shows a progressive decline in the health of corals reefs in the area investigated. The decline of the living coral from 1993 to 1998 can be explained by the pressures applied on the reefs (dynamite fishing, brutal anchorage of boats, the trampling during low tides, and the dumping of wastes), accelerated by the global coral bleaching phenomenon in 1998/1999.

Moheli Island is considered as the only one to possess the most important laying sites for the turtles (*Chelonia mydas* and *Eretmochelys imbricata*) in the southwest region of Indian Ocean. About 1235 individuals came to lay their eggs on Moheli beaches in 1993. The latest estimates for the year 1999 indicate approximately 6000 egg-laying females per year on the island, of which 3000 are reported in the zone of Itsamia. However, the exploitation of turtles has increased from 13% (1972/73) of the nesting population to 35% in 1994.

Coelacanth Park

The population of the coelacanths in the Great Comoro is actually estimated at 200 to 300 individuals. Since 1938, more than 200 coelacanths have been fished. Actually 1 to 11 coelacanths are caught per year. This is an average of 4.39 specimens per year. If the captures continue at this rate, in addition to the environmental factors that threaten the survival of this living fossil, there is a risk of extinction of this population in the next ten years.

5.3 Madagascar

There are three categories of coral reef in Madagascar namely:

- Barrier reefs, situated adjacent to the continental slope.
- Fringing reefs, located close to the coastline.
- Coral cays.

The permanent monitoring of the coral reefs of Masoala Marine Park was initiated by the signing of a protocol in October 1998, within the framework of the ‘Programme de Conservation et Développement Intégré’ (PCDI). The protocol stipulated that a coral reef monitoring programme should be established to monitor the status of the coral reefs in the three marine protected areas of Masoala Marine Park and

a nearby tourism site. The monitoring programme has since been conducted before and after each cyclone season, which occurs from January to March. The methodology used to determine the status of the coral reefs was established by the 'Regional Environment Programme of the Commission de L'Océan Indien' (PRE/COI), transects and quadrates are used to monitor the benthic community, whilst the reef fish community is monitored using underwater visual census. The monitoring sites have so far been sampled 3 times over a period of 1 year. The trends observed in the status of the coral reefs of the Masoala Marine Park are presented in Randriamanantsoa & Lope (1999). Their key findings are reproduced here.

Tanjona Marine Park

A progressive improvement in the status of the health of the coral reef at Ankaranilaotra was observed between 1998 and 1999. There was a consistent increase in the cover of live coral and a reduction in the cover of soft coral and algae over the sampling period. The improvement is considered to be a result of stable ecological conditions favourable for the settlement and growth of hard corals. Furthermore, a moderation in the level of fishing activity within the park has resulted in a reduction in the damage caused by trampling. An increase in the abundance of reef fish was also observed over the same period.

Cap Masoala Marine Park

The site at Ambodilaitra was characterised by environmental conditions favourable to the proliferation of soft corals, an increase in the cover of dead coral, a high proportion of coral debris and a small proportion of acroporid corals in relation to non-acroporids. Thus, signifying a degeneration in the status of the coral reef system. The high proportion of coral debris at this site is considered to be a result of destructive fishing practices. Despite this, an increase in the abundance of reef fish was observed over the same period. Nonetheless, there is an urgent need to strictly preserve the coral reefs of Ambodilaitra.

Tampolo Marine Park

The results of the survey of the Tampolo Marine Park show an abundance of indicator species of coral and fish that suggest a stable unperturbed reef environment. There was a proliferation of acroporids over the study period notably *A. formosa*, *A. cythera*, *A. platifera*, and *A. chlathrata*. Furthermore, sub-massive corals including representatives of the genus *Galaxea*, *Goneastrea* and *Favia* are well established. There was no change in the cover of dead and soft corals over the study period and the cover of live coral increased from 25% to 60% over the year.

Table 8. Summary of the status of the coral reefs of Masoala Marine Park.

Site	Transect	Quadrat	Fish Counts	Status
Ankaranilaotra	+	+	+++	Ameliorating
Ankarambiavy	-	0	++	Deteriorating
Ambodilaitra	-	-	+	Deteriorating
Ankoalambanona	-	0	++	Deteriorating
Tampolo	N/a	+	+++	Ameliorating

Source: Randriamanantsoa & Lope (1999)

Key: + positive development, - negative development, 0 stationary

The overall analysis shown in Table 7 indicates that the status of 3 of the sites sampled in the Masoala Marine Park (Ankarambiavy, Ambodilaitra and Ankoalambanona) is deteriorating, whilst overall improvements were observed at 2 sites (Ankaranilaotra and Tampolo). The sites sampled in the tourism area (Paradis and Aquarium) were found to be degenerating as a result of hypersedimentation, the proliferation of soft corals and physical damage resulting from destructive fishing practices.

Table 9. Summary of the factors affecting the health of the coral reefs of Masoala.

Site	Development Trend	Factor	Mechanism
Ankaranilaotra	Progressive	Favourable ecological conditions. (With the exception of extended exposure periods).	Normal metabolic functioning of corals, enabling growth, reproduction and settlement.
		Reduction in anthropogenic activities	Reduction in physical damage
Ankarambiavy	Regressive	Proliferation of soft corals	Competition for space with hard corals
		Proliferation of algae	Crowding and asphyxiation of coral colonies
Ambodilaitra	Regressive	Proliferation of soft corals	Competition for space
		Proliferation of algae	Crowding and asphyxiation of coral colonies
		Proliferation of urchins (<i>Diadema setosum</i>)	Ecological disequilibrium caused by overfishing carnivorous and planktivorous fish
		Bleaching	Loss of zooxanthellae due to extended exposure periods
		Physical damage	Fishermen walking on reefs
Ankoalambanona	Regressive	Proliferation of soft corals	Competition for space with hard corals
		Proliferation of algae	Crowding and asphyxiation of coral colonies
		Bleaching	Loss of zooxanthellae due to extended exposure periods
Tampolo	Progressive	Favourable ecological conditions	Normal metabolic functioning of corals, enabling growth, reproduction.
		Presence of suitable settlement substrate	Increased settlement and recruitment
		Reduction in anthropogenic activities	Less physical damage

Source: Randriamanantsoa & Lope (1999)

Given the impacts of fishing on the coral reefs of Masoala Marine Park, in combination with the socio-economic importance of the associated resources, a range of management recommendations have been made in relation to these activities (Randriamanantsoa & Lope, 1999), these include:

- Reinstating fisheries regulations;
- Application of existing laws, ensuring there is adequate surveillance;
- Monitoring commercial exploitation of living marine resources;
- Improvement of the control of access of fishermen to the reefs and lagoons; and
- Sensitising fishermen to the effects of destructive fishing practices.

The management recommendations relating to the status of the coral reefs of the Masoala Marine Park were directly related to the exploitation of marine resources. However, the fact that hypersedimentation is occurring as a result of deforestation, clearly emphasises the presence of a conflict and the need to enforce the capacity of the existing integrated approach to the management of the Masoala Marine Park.

5.4 Seychelles

Reef Types

Three main types of reefs are found throughout the Seychelles. These are mainly the fringing reefs, platform reefs and atolls. Fringing reefs are characteristic of the granitic islands (Stoddart, 1984),

whilst platform reefs are more or less associated with the coralline islands. Numerous examples of atolls are found in Seychelles and perhaps the most well-known and studied of them all is the Aldabra Atoll – a World Heritage Site (Coe and Swingland, 1984).

Over the last two decades, the Seychelles has witnessed a boom in development in both land and marine based activities. Development, especially on and around the three main islands, have resulted in increased pollution load in the near shore waters. Undoubtedly these have placed tremendous stress on the coral reef ecosystem through increased siltation and sediment loads in the nearshore waters (Anon., 1995). The greatest threats to coral reefs are perhaps hazard of a spill of hydrocarbons during transportation or accidental discharges. Discharges of other pollutants from sea going vessels also pose tremendous dangers to coral reefs and other marine organisms. Damage to coral reefs caused by indiscriminate anchorage, irresponsible fishing practices and the re-working of sediment through propeller actions can also result in whole reefs being smothered (Hatzioles *et al.*, 1998).

Assessment

The severe El Niño event of 1997/98 resulted in unprecedented coral bleaching in the Indian Ocean since record began. Seychelles, like many coastal and island states bore the brunt of this pervasive event. Several authors Voght and Callow (1998), Wilkinson *et al* (1999), and Salm *et al* (1998) amongst others have reported that persistent elevated seawater temperatures appear to be the most important cause of coral bleaching in the Seychelles. Wilkinson *et al* (1999) gives a mean mortality rate of 75% for bleached coral. The same authors estimate that between 40-95% of coral reefs have been affected by the phenomenon. Aumeeruddy (2000) reports that coral bleaching was not uniform throughout the Seychelles group; the Southern Island Groups were apparently the least affected with between 40-50% bleaching, whilst in the Baie Ternay Marine Park mortality was around 95%.

This catastrophic event resulted in an unprecedented number of surveys and assessment programs of coral reef during 1998 and 1999. Many of the surveys initiated during these two years are still on-going to assess the responses of coral to changing climatic conditions. The non-uniformity of coral bleaching and mortality in the Seychelles was not restricted to geographical locations, but also amongst the different species of corals. Burnett and Johnson (1999) in a preliminary report on the initial assessment of mortality of Seychelles reef corals following the 1998 bleaching event, gives evidence that members of the genus *Porites* are more resilient to bleaching than the Acroporidae.

Whilst in some areas there are encouraging signs of recovery (Domingue *pers orbs*; Aumeeruddy, 2000) the sheer presence and abundance in algae on corals in other areas suggest poor coral health. The composition and structure of the algae community indicates that the succession process is well underway on many coral reefs (Robinson, 1999). However, the lack of baseline data and long term data series frustrates comparisons of the health of coral reefs after the bleaching events.

As mentioned above, numerous studies on the health of coral reef in Seychelles are presently underway. However, it is far too early to draw any conclusions from any of them. What is clear however, is that the impact of anthropogenic activities may play a crucial role in the recovery of the reef ecosystem. However, the monitoring of coral reefs in Seychelles, initiated through the Programme Régionale de L'Environnement de la Commission de L'Océan Indien (PRE/COI) has already shown the benefit of long term monitoring of coral reefs. Aumeeruddy (2000) reports that although a greater number of sites are desirable for such monitoring purposes, the few sites (3-4) that are being monitored have already shown a definite trend in the evolution of coral reefs: high coral mortality in 1998 and 1999, and slight recovery towards the end of 1999 and beginning of 2000.

5.5 Tanzania

Assessment

The unprecedented coral bleaching and mass mortality, which occurred between March and June 1998 resulted in substantial degradation of many coral reefs in Tanzania. The extent of bleaching and mortality differed between species and sites. *Acropora*, *Pocillopora*, *Seriatopora* and *Stylophora* were the most affected genera. In 1999, through the CORDIO project, coral reef surveys were carried out to determine the extent of coral death and assess the effects of coral death on reef benthos and fish as well as the effects on the socio-economy (tourism and fisheries) of the coastal communities. Results from

this study were analysed and compared with previous similar studies to evaluate the current status of coral reefs in the MPAs of Tanzania.

Misali Conservation Area (MICA), Pemba

The live coral cover on Misali reefs in Pemba declined from 51-74% to 7-17% while the non-living substrate (rubble, rock or sand) increased from an average of 20% in 1994 to 53% in 1999. The relative cover of other benthic organisms such as fleshy algae, coralline algae, sponges and soft corals did not appear to have changed much after the bleaching event. Despite coral mortality, reef fish species richness and abundance were high compared with other areas that were less affected by the bleaching event.

Chumbe Marine Sanctuary (CHICOP), Zanzibar

The bleaching event caused a decrease of live coral cover in Chumbe Marine Sanctuary from 51.9% to 27%. Chumbe reef is one of the sites that experienced high mortality in Zanzibar mainly because it was dominated by *Acropora*, which suffered greatest mortality after the bleaching event. The fleshy algal cover increased from 8.8% to 18.4% on Chumbe reefs whilst outside Chumbe, fleshy algal cover did not change significantly. Despite the high mortality of coral on Chumbe reef compared to other reefs in Zanzibar, reef fish density and diversity was highest.

Mafia Island Marine Park (MIMP)

Following the 1998 bleaching event, the live coral cover at Tutia and Mange reefs decreased from 80% in 1991 to 15.1% in 1999 while on Msumbiji and Utumbi reefs, about 10 km apart (in Chole Bay), the live coral cover was relatively high (30%). The fleshy algae increased substantially on Tutia reef from 1% in 1996 to 15% in 1999. As in other parts of Tanzania, *Acropora* species were badly affected. Despite the higher mortality of corals, an increase in reef fish abundance occurred and a change in species composition in favour of herbivores was observed.

Mnazi Bay Park (MBP), Mtwara

Live coral in Matenga and Kati decreased from 55% and 60% in 1997 to 28% and 42% respectively. After the bleaching event, most of the corals along the Kitelele channel reef died. As in other reef areas, it is likely that the abundance of herbivores increased due to increased space for algal growth.

5.6 Regional Implications

The monitoring of coral reefs initiated through the Programme Régionale de L'Environnement de la Commission de L'Océan Indien (PRE/COI) has already shown the benefit of long term monitoring of coral reefs. Although a greater number of sites are desirable for such monitoring purposes, the few sites that are being monitored have already shown a definite trend in the evolution of coral reefs: high coral mortality in 1998 and 1999, and slight recovery towards the end of 1999 and beginning of 2000.

6. POLICIES, LEGAL INSTRUMENTS AND INSTITUTIONS

6.1 Overview

The countries of the Eastern African region have much extant legislation pertaining to conservation. However, conservation activities are occasionally hampered by ineffective, ambiguous, overlapping and incomplete legislative mandates. The formulation of appropriate legislation is not adequate for proper management of the marine resources of Eastern Africa. Enforcement and compliance are required.

Various legislations relevant to the protection of the aquatic biodiversity do exist, however, the management approach to the conservation of natural resources in the region is sector based. Most of the legal frameworks for the management of MPAs in Eastern Africa are out of date and inadequate. Where appropriate laws exist, these are not applied adequately due to lack of awareness by the local communities and in the government departments.

6.2 Comoros

Political and Institutional Context

The efforts accomplished by the Government to remedy the deterioration of the environment have been enhanced by the diagnosis of the state of environment in 1993, the elaboration of the National Policy for the Environment, (DGE, 1994) and an action Plan for Environment (PAE). The basic principle of this policy is to integrate the ecological considerations in all national sectorial policies and in the social and economical development of the country. The National Policy for Environment (PNE) has addressed many concerns regarding marine and coastal issues in general and the protected marine areas in particular.

These concerns include:

- Safeguarding and protecting the biological diversity and the zones of great ecological and /or natural interest;
- Creating awareness on the environment; and
- Setting up an appropriate marine and integrated coastal management programme.

In the implementation of the PNE, the Comoros Government recognises the need for a participative approach, in which all those interested (users of resources, non-governmental organisations, governmental institutions and private sector) play an active role in the management of resources. Such approach by definition is decentralized and the beneficiaries are the responsible for making decisions. A strategy and a national action plan for conservation have been elaborated in the context of the Convention on the Biological Diversity. The Ministry of Environment assisted by the General Directorate of Environment is the institution responsible for affective management of the environment.

Legal Context

The Comoros has ratified many international conventions calling for the creation of protected marine areas including the following:

- The Convention on Biological Diversity;
- The Protocol Relating to Protected Zones as well as the Wild Fauna and Flora of Eastern African region (Nairobi, 21st June 1985);
- The Convention for the Protection and Management of the Marine and Coastal Zones of Eastern African (Nairobi, 21st June 1985);
- The Ramsar Convention on Wetlands of International Importance; and
- The Convention on the International Trade in Endangered Species (CITES)

The legal measures concerning the environment are included in the text of the law relating to the environment N°94-018/AF. The conditions for the classification of MPAs are found in the articles 47 and 48. MPAs can be created in the form of national park or natural reserve, with the aim of preserving them from all destructive actions, when they represent "an exceptional interest" in aesthetic, scientific, ecological and cultural values.

In Comoros, there is no legally established protected marine area. However there are proposals for the creation of two marine parks:

- The Marine Park of Moheli which is being established by the Government of Comoros with the assistance of the World Conservation Union (IUCN) and funding from GEF/UNDP; and
- The Coelacanth Marine Park in the southwest of Great Comoro whose feasibility study is being carried out by the Regional Programme for Environment of the Indian Ocean Commission.

The appropriateness of the legislation is not adequate for the protection of natural resources in Comoros in general. An inter-ministerial decision N°74-029/PR/MID of the 14th January 1974 relating to the capture, the transfer and the detention of coelacanth prohibits the organism's capture. The coelacanth is also classified in the annex A of the CITES of which Comoros is signatory. However, the application of the law in general causes problems for Comoros. The laws, once made, are not publicized in Comoros language and the public is not aware of the laws. There is inadequate enforcement of the laws.

A presidential decree N°79/0121 of April 1979 prohibits the capture of turtles in the territorial waters of Comoros, and imposes a penalty of 25000 F.C., eight days of imprisonment and immediate seizure of all the turtles in possession. An inter-ministerial decision N°02/015 of March 1992 prohibits the collection of shells, coral exploitation and the capture of turtles and their trade.

6.3 Kenya

Acts of Parliament

There are many legal and administrative instruments relating to the protection and management of marine protected areas. These include:

The Wildlife (Conservation and Management) Act

The Wildlife (Conservation and Management) Act Cap 376 of the Laws of Kenya and the 1989 Amendment is the Principal Act regulating wildlife conservation and management in Kenya. The Act also establishes Kenya Wildlife Service (KWS) as the implementing agency. Under Section 3A, the functions of KWS shall be among others "prepare and implement management plans for National Parks and National Reserves and the display of fauna and flora in their natural state".

The Forests Act

The Forests Act Cap 385 of the Laws of Kenya provides for the establishment, control and regulation of forests on unalienated Government land. The Act therefore, applies not only to state plantations and land controlled and managed by the Forest Department but also to areas which have been set aside for the conservation of fauna and flora, for the management of water catchment area, for the prevention of soil erosion, and for the protection and management of indigenous forests (including mangroves).

The Fisheries Industry Act

The Fisheries Act Cap 378 of 1989 of the Laws of Kenya provides for development, exploitation, utilisation and conservation of fisheries and for connected purposes. The Act is one of the "modern" and comprehensive natural resources laws of Kenya although its implementation has remained largely wanting. The Act provides for the promotion and development of traditional and industrial fisheries, fish culture and related industries through extension service, research and surveys, infrastructure

development, restocking, exploring marketing opportunities as well as enhancing community participation in fisheries management.

The Maritime Zone Act

The Maritime Zone Act Cap 371 of 1989 of the Laws of Kenya consolidates the laws relating to territorial waters and the continental shelf of Kenya to provide for the establishment and delimitation of the Exclusive Economic Zone (EEZ) of Kenya, and to provide for the exploration, exploitation, conservation and management of the resources of the maritime zone. The Act has provisions to put into effect the international agreements that relate to marine environment that Kenya may be a party to.

Coast Development Authority Act

The Coast Development Authority (CDA) is a regional development agency that was created by the Government of Kenya through the Coast Development Authority Act Cap 449 of the Laws of Kenya. Through this Act, CDA has development activities within the jurisdiction area which includes the entire Coast Province, Southern Garissa and EEZ. Most relevant of CDA activities is the Integrated Coastal Management (ICM) process of which Mombasa Marine Park is the pilot area.

The Physical Planning Act

The Physical Planning Act No. 6 of 1996 of the Laws of Kenya which came into force on 28th October 1998 is a legislative framework for systematic national land use planning. The Act provides for proper co-ordination at different levels of Government in the preparation and implementation of the various plans. The Act further provides for an Environmental Impact Assessment (EIA) in connection with a development project that may have an impact on the environment.

The Tourist Industry Licensing Act

The Tourist Industry Licensing Act Cap 381 of 1968 of the Laws of Kenya makes provision for regulating the tourist industry with a view to promoting its well being and development.

The Science and Technology Act

The Science and Technology Act Cap 250 of 1977 of the Laws of Kenya is a legislative framework to establish machinery for making available to the Government advice upon all matters relating to the scientific and technological activities and research necessary for the proper development of the Republic and for the co-ordination of research and experimental development.

Institutions

The key institutions with mandates to manage coastal resources include Kenya Wildlife Service (KWS), Fisheries Department and Forest Department. These institutions are placing more and more emphasis on the participation of communities and other stakeholders in natural resource management.

6.4 Madagascar

Legislation

Marine protected areas do not fall under a specific body of legislation like the terrestrial protected areas. MPAs are established by regulatory legislation derived from and associated with international conventions on the protection and conservation of nature. The international law relating to terrestrial protected areas forms the basis of that for marine protected areas and consists of:

- The International Convention for the Protection of Fauna and Flora in Africa adopted at the London conference in 1933.
- The African Convention for the Conservation of Nature and Natural Resources adopted in Algiers in 1968.

There are at present just two national marine protected areas, the Biosphere Reserve of Mananara-Nord (which includes a marine component), and the three satellite marine parks of Masoala National Park (Tampolo, Cap Masoala and Tanjona). According to decree no 89-216 creating the Biosphere Reserve of Mananara-Nord, biosphere reserves are *'ecologically representative areas associated with research and conservation, monitoring, education, training and traditional land use'*. Decree no. 97-141 of 2 March 1997 (Official Journal of 21 July 1997) provided for the creation of the Masoala National Park, based on both the Algiers and the African conventions. In keeping with the strict approach of the Africa convention, article 3 states: *'all forms of hunting, fishing, exploitation, mining and works that modify the integrity of or results in perturbations to the fauna and flora are strictly prohibited'*. Since 1992, new protected areas have been established in accordance with procedural guidelines issued by ANGAP and the Directorate of Forests in June, 1992.

A new draft Protected Areas Code (COAP) has recently been prepared and is currently before the National Assembly. This piece of consolidating legislation relates to all protected areas including aquatic ecosystems and is based on the following principles:

- Conservation of the natural and cultural heritage for which research and education are essential tools, and for economic development; and
- The establishment of a participatory approach and suitable means to achieve the objectives.

International Conventions

Madagascar has signed, and in some cases ratified, a range of regional and international conventions that apply to the management of the coastal zone and marine biodiversity. These include:

- The Convention on the Law of the Sea (UNCLOS, 1982).
- The Convention on the Protection and Management of the Marine Environment and Coastal Zones of Eastern Africa (Nairobi, 1985).
- The Convention on Biological Diversity (Rio, 1992) (ratified following law no. 95-013)
- The Prevention of Pollution of the Sea by Hydrocarbons (OIL POL, 1954).
- The Convention on the Control of the Movements of Dangerous Wastes and their Disposal (Basel, 1989).
- The International Convention on the Trade in Endangered Species (CITES, 1973).

Of the above, UNCLOS, Nairobi and Rio (through the Jakarta Mandate of 1995) specifically require the establishment of marine protected areas.

Institutions

Following the establishment of the Environment Charter (law 033 of 1990), environmental projects were conducted under the framework of the National Environmental Action Plan (PNAE). This also involved the establishment of the institutions such as the National Environment Office (ONE) and the National Association for the Management of Protected Areas (ANGAP). Other public institutions (research and training) and non-governmental organisations participate in the environmental programs. A policy of integrated coastal area management will be developed by the 'Composante Environment Marin et Côtier' (EMC) under the Environment Programme this year.

In accordance with decree n° 97-012 of June 1997, the administration and management of the national network of protected areas of Madagascar are conferred to the National Association for the Management of Protected Areas (ANGAP) which falls under the Ministry of Environment. It is a private institution with a public interest. ANGAP was created in 1992 following the privatisation of the management of protected areas in accordance with the National Environmental Action Plan. ANGAP has the authority to delegate the operational management of protected areas to another institution, which could either be a non-governmental organisation, international agency or national public institution. ANGAP ensures the co-ordination of activities associated with protected areas and is responsible for their evaluation.

Mechanisms for the Transfer of Authority

GELOSE (law 96-025) – The law on “Gestion Locale Sécurisée” (Secure Local Management) provides a mechanism for formal transfer of authority to manage natural renewable resources to local communities. At Masoala, a marine programme was introduced with the objective of promoting sustainable utilisation of marine resources and exploitation techniques that are compatible with conservation. The operation is implemented in collaboration with local community committees. The goal of the integrated approach to coastal area management adopted is to develop the region whilst promoting sustainable utilisation of marine resources, the conservation of endangered species, protection of ecosystems and maintenance of biodiversity.

6.5 Mauritius

Legislation

Notwithstanding the Wildlife and National Parks Act, 1993, the Minister may by Proclamation, declare:

- a) any area of Mauritius waters including the seabed underlying such waters;
- b) any land associated with Mauritius waters; or
- c) any wetland; a Marine Protected Area.

A Marine Protected Area may be designated:

- a) a Fishing Reserve;
- b) a Marine Park; or
- c) a Marine Reserve.

The Minister may, by regulations prescribe measures for the protection, conservation and management of a Marine Protected Area, including:

- a) the prohibition of certain activities;
- b) the carrying out of certain activities subject to certain conditions.

There is established for the purposes of this Act a Marine Protected Area Fund. The Permanent Secretary is responsible for the management of the Fund. The Fund consists of:

- a) such sums of money as may be appropriated by the National Assembly for any of the purposes of this Act;
- b) any grant or donation made to the fund;
- c) the proceeds of sale of any produce;
- d) any money that is payable under this Act including all fees, rent and other charges arising from the authorised use of the marine parks and reserves; and
- e) any fee payable in respect of the use of marine resources other than fishing.

6.6 Mozambique

Legislation

The legal framework for the management of MPAs in Mozambique is to some extent outdated and inadequate. There has not been any clear legal framework regarding management, law enforcement (e.g. fines), or research on the impacts on or suitability of MPAs since their establishment in the 1960s.

The **marine legislation** stipulates that the government is responsible for the control and administration of activities linked to the use of the sea, including: scientific research, utilization of all marine resources, protection and preservation of the marine environment, protection of the archaeological objects in the sea, marine recreational activities and the general management of territorial water.

The **fishing legislation** recognizes the need for the management and planning of fishery resources, and adoption of measures for resource conservation. According to this legislation, the fishery resources belong to the public and the government is responsible for regulating the use of these resources. The fisheries sector requires strengthening to promote rational use of the fishery resources.

The existing laws are not applied adequately due to lack of awareness by the local communities and in the government departments. In order to correct this problem, it will be necessary to improve collaboration between government departments and to promote awareness creation and dissemination of information to the local communities.

6.7 Seychelles

Policies, Legal Instruments and Institutions

Owing to the importance of protected areas to the Seychelles' future, the government of Seychelles has *inter alia* targeted habitat conservation as an area for which immediate action is crucial (Young, 1993). Seychelles has much extant legislation pertaining to conservation. However, conservation activities are occasionally hampered by ineffective, ambiguous, overlapping and incomplete legislative authority (Young, 1993).

Policies

As mentioned earlier, environmental protection and sustainable use of resources are not just a policy choice and preference. They are imperatives to the health and economic welfare of the Seychelles. However, means by which the government often sets forth to achieve these goals are not conducive with the reality. All too often the institutional framework lags behind after changes have been implemented in the legal framework. A profound lack of integration and interactions between the different agencies hampers the conservation process in Seychelles.

Legal Instruments

The panoply of legislation concerning protected areas fall under four Acts of Parliament. These are mainly the Protected Areas Act, the Environment Protection Act, National Parks and Nature Conservancy Act and the Fisheries Act. Whilst not all areas which are afforded protection under these Acts are concerned with the marine domain, all marine protected areas are, however, covered under the above Acts of Parliament.

Protected Areas Act

Under the above Act 'Protected Area' is defined as: any area, place or premises which appears to the President to be necessary or expedient in the public interest that special precautions should be taken to prevent the entry of unauthorised persons. He may, by order published in the *Gazette*, declare such area, place or premises to be a protected area for the purposes of this Act. The Marine Protected Area covered by the Protected Areas Act is the African Banks and surrounding reefs. Order, 1987 (S.I.41 of 1987)

Environment Protection Act

The Principal objective of this Act is to provide for the protection, improvement and preservation of the environment and for the prevention, control and abatement of environment pollution. The Authority for the purposes of this Act shall be the Ministry or Department of the Government under the Minister having the Portfolio responsibility for Environment. The Minister may, however, by order published in the *Gazette* constitute an authority that shall be a body corporate, for carrying out such of the powers and functions under this Act as may be specified in the order.

Of direct significance of this act to Marine Protected Areas is the power that the Minister may by order published in the *Gazette* to declare areas to be designated as Coastal Zone, hence special consideration for the area to be managed by a Coastal Zone Management Plan. Regulation 15 of this Act requires an Environmental Impact Assessment (EIA) study before any project or activity is undertaken in a protected or ecologically sensitive area. Such an approach is illustrated in the EIA for the East Coast Phase III Reclamation Project.

National Parks and Nature Conservancy Act

Apart from listing the various types of Marine Protected Areas that may exist in Seychelles, this Act also defines the regulations for these areas. Of interest to this report is that this Act recognises three groups under which MPA could be classified:

- (i) *National Parks* – an area set aside for the propagation, protection and preservation for wildlife or the preservation of places or objects of aesthetic, geological, prehistoric, historical, archaeological or other scientific interest for the benefit, advantage and enjoyment of the general public and includes in the case of a Marine National Park an area of shore, sea or seabed together with coral reef and other marine features so set aside;
- (ii) *Special Reserve* – an area set aside in which characteristic wildlife requires protection and in which all other interests and activities are subordinated to this end;
- (iii) *Strict Natural Reserve* – an area set aside to permit the free interaction of natural ecological factors without any outside interference excepting that deemed indispensable for the safeguard of the very existence of the reserve.

Six Marine National Parks and three special Reserves have been designated under this Act. However, there are no areas that have been given the status of Strict Natural Reserve.

Fisheries Act

The Fisheries Act makes provision for the protection of several areas in Seychelles waters, albeit some of these areas are strictly to exclude certain types of fishery. For example industrial fishing for tuna by foreign purse-seiners and longliners are excluded from 9 zones. Others are specifically to prevent damage to the benthos. Basically this amounts to the exclusion of certain gear types in specified areas. There are however four areas, two on Mahé, one on Praslin and one on La Digue that have been designated as Shell Reserves. Originally the Shell Reserves were created to prevent local overexploitation of specified species of molluscs. In order to rationally maximise exploitation of these resources the Shell Reserves were meant to be rotated to new sites every few years. The Shell Reserves are perhaps amongst the protected areas that are most open to abuse, mainly because of a total absence of a management plan, and enforcement of regulations.

Institutions

Marine Parks Authority

The Marine Park Authority was set up in 1996, under the EPA 1994, with a vision to manage in an integrated way the protection, conservation, enhancement and utilisation of Seychelles natural marine resources so as to make a significant contribution to the country's sustainable development. Today the Authority manages six marine parks altogether. With a limited budget of nearly half a million US dollars some of the marine parks are not being adequately managed.

Seychelles Island Foundation (SIF)

The Seychelles Island Foundation is a government statutory body established by decree in 1979 involving the Seychelles government, national academies of science of two developing countries and two NGOs that are active in Seychelles. The SIF manages the World Heritage site of Aldabra, as well as the Vallee de Mai on Praslin. Being a party to the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972), the Government has to commit itself to accomplish the goals of the Convention with regards to the two sites mentioned above.

Birdlife Seychelles

Birdlife Seychelles, founded in 1998, is a local non-profit Association registered under the laws of Seychelles. This local NGO has taken over the management of the Cousin Island Special Reserve from

Birdlife International (formerly the International Council for Bird Preservation – ICBP) which had managed the island since 1968.

Seychelles Fishing Authority (SFA)

The Seychelles Fishing Authority was incorporated in August 1984 by the Seychelles Fishing Authority (Establishment) Act. It was created to develop the fishing industry to its fullest potential and to safeguard the resource base for sustainable development. The SFA is responsible for the management of four Shell (Mollusc) Reserves; two on Mahé, one on Praslin and one La Digue.

The Royal Society for Nature Conservation (RSNC)

The Royal Society for Nature Conservation manages the privately owned Aride Island Special Reserves. Like Cousin, the initial interest in Aride Island had to do with its avian links.

Policies Leading to Success or Failure in MPA Management

As discussed in the previous section, there are several agencies involved in MPA management in the Seychelles. The policies of all these agencies are aimed at attaining similar objectives: environmental protection, maintenance of biodiversity and sustainable use of resources. However, it is clearly recognised that the level of success in MPA management differs between the listed agencies.

Failures

Failures are especially recognised in the government ran agencies, that is the Marine Parks Authority and the Seychelles Fishing Authority. The Marine Parks Authority simply lacks the necessary tools and financial resources to implement its policies in most MPA which fall under its jurisdiction. Whilst some of the marine parks are managed adequately, for example Ste. Anne and Curieuse, others receives almost no attention, for example Baie Ternay and Silhouette.

As mentioned above the Seychelles Fishing Authority has been lax in managing the Shell Reserves. This is as a result of both a lack of human and financial resources, and also as a result of losing sight of the guiding objectives for the setting up of these Shell Reserves.

Successes

Whilst the two agencies mentioned above should not be regarded as having failed in all departments of MPA management, they have also not enjoyed the level of success attained by the two NGOs managing Aride Island Special Reserve, and Cousin Island Special Reserve, respectively. However, one has to recognise that both these islands represent a very small part of all MPA in the Seychelles.

The approaches taken by RSNC and Birdlife Seychelles have been to foster greater public awareness of their work through public campaigns. The fact that both of these Reserves are not easily accessible to many people has also helped tremendously to prevent the deterioration of these two islands. Furthermore, because these islands are managed to a greater extent without the interference of other agencies, this has in part ensured success in the management of these Reserves. A review of the management plans for both reserves also reveals that the goals and targets of the managing agencies are clear and realistic. The Government has also been instrumental in creating a more conducive legal framework for the promotion of conservation in Seychelles. The Government and its agencies have made substantial investment in pollution abatement.

6.8 Tanzania

Existing Policies

There are several sector-based policies, which contain statements relevant to the conservation and protection of marine and coastal biodiversity and environmental management. These policies include: The National Environment Policy of 1997, Land Policy of 1995, Fisheries Policy and Strategy Statement of 1997, Forest Policy of 1998, Mineral Policy of 1997, Wildlife Policy of 1997, gricultura

and Livestock Policy of 1997, Water Policy of 1991, Energy Policy of 1992, and the Industry Policy. Most of these policies have just been formulated and/or revised. All sectoral policies make reference to the protection of the environment or a particular environmental aspect be it land, water or air and also emphasize that natural resources should be used in a sustainable way.

Legislation

Various legislation relevant to the protection of the aquatic biodiversity do exist, however, the management approach to the conservation of natural resources in Tanzania is sector based. The sectors which have the legislation relevant to the conservation of the aquatic environment include: Fisheries, Health, Water, Energy, Urban and Country Planning, Land, Wildlife, Agriculture, Forest, Tourism, Shipping, Petroleum, Environment, Local Government Authority and Mining.

The Fisheries Act No. 6 of 1970; provides for the protection, conservation, development, regulation and control of fish, fish products, aquatic flora, fauna and products thereof, and for matters incidental thereto and connected therewith. The Act provides for making regulations protecting spawning areas as well as the obstruction and pollution of waters.

The Marine Parks and Reserves Act No. 29 of 1994; provides for the establishment of marine protected areas such as marine parks and marine reserves and sets the institutional machinery for effective management of these areas. This legislation provides a legal base for implementing multiple resource use management strategies including integrated management approaches.

The Marine Parks and Reserves Act has consolidated other Acts like the Mining Act 1989, the Wildlife Conservation Act 1974, the Forest Ordinance of 1948, the Fisheries Act 1970, as well as the National Park Ordinance or any written law of the country relating to the protection of wildlife such as the Land Acquisition Act, 1967; Criminal Procedure Act, 1985; the Antiquities Act, 1964 and other Acts or provisions governing the conservation of natural resources.

Lessons Learned

The current natural resources management approach in the country relies on an extensive regulatory, command and control method that is carried out largely under the direction of central government agencies. The allocation of natural resources requires government authorization and permit. This is characterized by extensive bureaucracy that entails high transaction costs for the regulatory agencies as well as private parties seeking approval,

Most of the regulations do not reflect the policies from which they are derived. In many cases, there are new policies cooped up with old legislation. Most regulations are outdated given the new information regarding sustainable resource management.

Enforcement of the existing laws is weak or inadequate. Even where arrests are made, prosecutions in the courts take longer or offenders are given lenient sentences. In addition enforcement bodies lack personnel, equipment, training and finance to enforce the laws. Lack of public education about participation in resource management practices has also resulted in unsustainable development.

6.9 Regional Implications

Whilst some of the marine parks are managed adequately, for example Ste. Anne in Seychelles, Nosy tafana in Madagascar, and Malindi in Kenya, majority of the marine parks in the region receive almost no attention. There is need to create a regional framework for cooperation among the regional institutions to address MPA and coastal zone management issues. Regional and international treaties provide useful mechanisms for collaboration and networking.

7. NEEDS ASSESSMENT

7.1 Overview

The identified needs in MPA management can be categorized as, conservation, financial, human resources, and infrastructural. MPAs in almost all the countries do not fully represent the wide range marine habitats in the region. There is a need to increase the number of marine protected areas. This need has been expressed by all the countries and a number of sites have been identified for future establishment as MPAs.

Financial requirements for the implementation of management plans are a major concern of most of the agencies involved in managing MPAs. Current operational budgets for the MPAs are inadequate. Larger boats for park managers are needed to improve communication and facilitate monitoring programs. Communication facilities such as long-range radios are deemed necessary to assist in the coordination of surveillance patrols.

Gaps have been identified in the capacity requirements for the successful management of many of the MPAs. A majority of MPAs are understaffed. Capacity building in various disciplines is critical. In some countries a trained MPA cadre is not in place. In capacity building, the current focus should be to train managers to be trainers so that they can share their acquired skills with their colleagues and co-managers.

7.2 Comoros

Coelacanth Park

Human Resources

The number of personnel needed for the implementation of the programme of the park is as follows:

- 4 persons for leisure and tourism (audio visual/electronic technician, gardener, shop assistant, accountant); and
- 9 persons for information, education and research (director of coelacanth house, maintenance and sub-marine diving technician, marine biologist, a person responsible for international relations, librarian/public relations person, maintenance technician, cleaner and 2 mechanic drivers)

That is a total of 13 persons.

Financial Resources

The establishment of Coelacanth Park is estimated to cost 100 millions of Comorian Francs. The identified needs for the establishment of the park include: the construction of a workshop for manufacture, maintenance and restoration of fishing boats; tourists guides; scientific and touristic animation; conflict management capacity; and financial management capacity. There is not yet a formal funding for the park, but some sponsors such as UNESCO, the European Development Fund, the French Fund for Environment have expressed interest in the project.

Marine Park of Moheli

Human Resources

The number of personnel needed for the implementation plan for the Marine Park of Moheli includes one conservator, one assistant director and 12 eco-guards. This makes it a total of 14 persons.

Financial Resources

The annual provisional budget of the park is estimated at 277,965,550,880 Comorian Francs (maximum) and 68,081,280 Comorian Francs (minimum). This budget breakdown in US \$ (1US\$ = 480 Comorian Francs) is shown below.

Table 10. Budget for the establishment of the Marine Park of Moheli (US \$)

Designation	Maximum	Minimum
International personnel	103 000	17 500
National personnel	62 326	52 326
Travel	5 750	1 750
Formations	10 522	4 500
Operation Costs	33 780	21 660
Follow up evaluation	2 500	2 500
Transport equipment	72 000	39 000
Computer materials	11 500	4 000
Stationery	8 500	8 500
Education equipment	5 000	2 500
Field equipment	24 500	23 000
Equipment for the Eco-guards	5 000	5 000
Equipment for the park	111 750	52 500
Diving equipment	11 500	8 500
Premises	115 000	115 000
Total	582, 606	358, 236

7.3 Kenya

Conservation Needs

The conservation needs for Kenya's MPAs are:

- Amendment of existing regulations and harmonization of the existing legislation on conservation of the core departments of Forestry, Fisheries, KWS, etc.;
- Memorandum of Understanding (MoUs) to be initiated, institutionalised and implemented;
- More community managed MPAs should be developed where necessary;
- Develop a new legislation which is MPAs specific rather than the current adoption of the terrestrial park legislation to allow for local community participation;
- Enforcement of the new Environmental Management and Coordination Act of 1999;
- Decentralisation of the licensing procedures;
- Promotion of private sector conservation initiatives;

Capacity Needs

In capacity building, all levels of operations and management are considered from the junior, supervisory, and middle level cadres to the senior management. The current focus is to train managers and stakeholders on multidisciplinary approaches utilizing participatory techniques, allowing as much feedback as possible. Of importance also is to train managers to be trainers so that they can share their acquired skills with their colleagues and co-managers.

The identified skills in capacity building were the following;

- General administrative skills;
- Social and public relation skills;
- Financial skills;
- Research skills (ecological background);
- Project Management (planning, implementation, monitoring and evaluation and report writing skills);

- Biodiversity conservation and management skills;
- Capacity building (training) skills;
- Swimming and SCUBA diving;
- Computer skills; and
- Para-military, para-medical and para-legal skills

7.4 Madagascar

Conservation Needs

Marine protected areas in Madagascar are under represented. There is a need to increase the number of marine protected areas (see Annex 8) and develop management plans within the framework of the 'Strategic Plan for the Network of Protected Areas in Madagascar' (ANGAP, 1999). The management plans should address individual needs in terms of the resources and activities of the marine parks and encompass the following aspects:

Financial Needs

The current operational budget for the Nosy Atafana Marine Park is inadequate. The budget required to establish and implement a strategic management plan for 5 years is US \$ 750,000 (determined by the UNESCO Mananara Biosphere Project, 1999). The financial requirement to successfully achieve goals and objectives of the Masoala Marine Park is US \$ 1 million over a 5-year period.

Human Resources

Senior and technical staff require specialized training in the management of protected marine areas. Training is required in education skills and resource/ecological monitoring for park rangers. There is a need for further education programs and increased sensitisation of coastal communities. Additional park rangers are required for effective operational management.

Physical Resources

Larger boats for park rangers are needed to improve communication and facilitate monitoring programs. Improved communication facilities are required (long-range radios). Demarcation buoys at the boundary of the parks need to be installed and mooring buoys for visiting dive boats. Enforcement would be improved if the conservation agents in Masoala were resident in the parks or adjacent coast in the case of those without islands. Each of the Masoala Marine Parks needs a base where the conservation agents can stay. Tourism infrastructure needs to be developed in order to realise the potential revenues from eco-tourism.

Technical Information Needs

Ecological monitoring needs to be consolidated over a longer period and expanded to the Nosy Atafana Marine Park. More detailed resource monitoring and assessment is needed as well as information on the demography of coastal communities and dynamics of migrant fishing communities. Stock assessments and biological studies of exploited resources are required to improve current estimates. The Nosy Atafana Marine Park needs a comprehensive inventory of the biodiversity and a carrying capacity study and sensitivity analysis relating to the impact of eco-tourism.

Programme Activity Needs

The management authority needs to increase the programs and activities associated with the coastal communities adjacent to the Masoala Marine Parks. These should be orientated at developing alternative practices and reversing the deleterious impacts associated with the habitats and resources. This should be accompanied by an increase in the current education and sensitizing efforts in order to provide a catalyst to the ICAM process.

7.5 Mauritius

Conservation Needs

The challenges for effective MPA management lie in the proper enforcement of and compliance with all relevant laws and regulations, monitoring, control and surveillance. Illegal fishing in prohibited fishing zones is a major threat. The different stakeholders who fail to comply with zoning restrictions undermine MPA management.

Human Resources

A marine park cadre is not yet in place.

7.6 Seychelles

Conservation Needs

The number of Marine Protected Areas in Seychelles is quite significant. However, there was a general consensus amongst the participants of a recently held workshop for stakeholder of MPA, that the number of MPAs may be more than that can be managed.

There is a fundamental need to revisit the objectives for establishing some of the MPAs. This is especially relevant for the MPA managed by government agencies, such as the Shell Reserves and the Marine National Parks. Whilst conservation remains the priority of all MPA management agencies, activities outside the MPA often impair the effectiveness of the management objectives. Greater consultation and co-ordination of development activities in the vicinity of MPA should be sought between the different stakeholders.

Capacity Needs

Gaps have been identified in the capacity requirements for the successful management of many of the MPAs. The Marine Parks Authority presently has only one graduate, who also happens to be the Managing Director of this parastatal organisation. However, there is currently a move to boost the level of education for the Marine Parks Authority personnel through short courses and workshops organised locally by visiting and local scientists. Notwithstanding the current trend, there is a need to attract more professionals to this organisation. On the SFA's side, there is a large number of highly educated personnel.

The three MPAs, which are managed by the SIF, Birdlife Seychelles and the RSNC, have adequate human resource with a high level of education. An active program to increase the capacity of existing personnel was recognised by Birdlife Seychelles as an essential part of the management strategy for Cousin Island.

Financial Needs

Financial requirements for the implementation of management plans remain the concerns of most agencies involved in managing MPA. With a budget averaging around US\$ 486, 000 over the last three years, the Marine Parks Authority cannot fully manage the six Marine National Parks under its jurisdiction. At least one of the Marine Parks is not being managed at all, and three are only being partially managed.

Gaps in Information

Gaps in information availability remain a critical area that needs to be addressed for many of the MPAs in Seychelles. The disparity that exists between the availability of information on the terrestrial compared to the marine component of MPA is, primarily, a result of historical events in many of the MPA. Baseline data and long-term data series are, where available, incomplete or unreliable. A fundamental lack of adequately trained personnel and capital remains the most significant stumbling blocks in addressing this quandary making it difficult to assess the quality of protected areas over time. The lack of appropriate and reliable benchmarks makes it difficult for protected area managers to evaluate the level of success or failures that their management objectives may be attaining.

Furthermore, and more importantly, in view of the increasing demand on the limited resources, MPA managers may find themselves in a position that requires them to scientifically show that goals and objectives are being attained in their respective MPA

7.7 Regional Implications

The establishment of the Coelacanth Park in the Comoros is a matter of urgent regional and international concern. International and regional funds should be sought to complete the feasibility study and allow for the implementation of the study's recommendations. Collaborative efforts will be required to establish the Park. Regional institutions, such as the Western Indian Ocean Marine Science Association (WIOMSA) and SEACAM could provide the training already identified in the pre-feasibility study. In establishing the Marine Park of Moheli, cooperation between the pilot project of Itsamia and the regional institutions such as IFRMER of Reunion and Natal Parks Board of South Africa will have to be reinforced by memoranda of understanding.

The fact that several MPA of the region are facing similar threats and challenges this should give rise to opportunities to collaborate and exchange experiences. The benefits of regional collaboration can be clearly seen through several projects undertaken under the auspices of the Indian Ocean Commission (IOC). Such collaboration has facilitated the exchange of experience and expertise, and has been instrumental in capacity building. There is a need to improve the level of education for the MPA personnel through short courses and workshops organised locally, and regionally by local and visiting scientists. There is also a need to attract more professionals to this organisation.

Ecological monitoring needs to be consolidated over a longer period and widely in the region. Monitoring and assessment methodology needs to be standardized and harmonized in order to make the results comparable. Much as the regional collaboration is desirable, it is important to recognize that institutional collaboration has to start at the national level for successful management of the MPAs in the region.

8. CONCLUSIONS

The marine protected areas of the Eastern African region are characterized by high biological diversity and contain representative habitats of endangered and endemic species. Some of the MPAs include important cultural sites. It is clear that the management approaches for the MPAs should be focused on an integrated community based participatory process with a high level of collaboration, coordination, communication and education. The MPA programmes, projects and activities should be driven by the regional and national needs as well as the needs of the coastal communities and other stakeholders.

The rationale of the integrated coastal management approach is based on relieving pressure on over-exploited resources and sensitive habitats by facilitating activities that are environmentally friendly and sustainable. Minimum resources for successful surveillance and law enforcement are required as these responsibilities are shared between the resource users and the managing authorities.

A major contribution to the success of the management of the Nosy Atafana Marine Park, was the ability of the management authority to transfer property rights to the resource users via a 'usage contract'. This unique approach resulted in an increase in yields from the resource base and a 'spill-over' effect into adjacent areas. Furthermore, it resulted in a high degree of compliance with resource users developing their own initiatives in the husbandry, protection and conservation of resources. Variations of this approach could be considered for application in other countries of the region.

The lack of management plans in many MPAs requires urgent attention. MPAs should have management plans to guide their operations in order for the conservation objectives to be achieved. The preparation of the management plans is not enough, the challenge lies in their effective implementation. The preparation and implementation of the plans should be as participatory.

The participatory management process in most of the MPAs has not been in place long enough to be evaluated adequately. However, reports indicate that there has been some success in terms of maintenance of biodiversity, conservation of ecosystems, and sustainable use of the marine resources. The process, however, has not developed sufficiently to be able to resolve conflicts in many MPA sites. An acceleration of this participatory management process through increased activities and the development of a capacity to resolve resource use conflicts are imperative.

A critical analysis has enabled a comparison of the performance of a replicated participatory management system for marine protected areas in the long term (Nosy Atafana at 11 years), and short term (Masoala at 3 years). A general conclusion from the respective management experiences is that the goals and objectives may be achieved as early as 3 years following the implementation of the process. The benefits may be realised in advance if catalysts are applied in the form of programme activities such as public awareness campaigns or training programs. for substitute activities.

A management strategy based on co-operation, education and communication with users is a powerful tool for community development, resource conservation, ecosystem protection and the maintenance of biodiversity. The management of the Nosy Atafana Marine Park in the UNESCO Biosphere Reserve of Mananara-Nord is exemplary of an integrated, participatory process applied successfully to the management of activities and resources associated with marine protected areas. The high degree of success achieved suggests that the approach would be appropriate for adaptation to other coastal areas sharing similar characteristics within the region.

The spatial distribution of the MPAs within the region is such that they encompass a wide variety of habitats, species and ecosystems. Whilst most of the sites were chosen for their outstanding characteristic flora and fauna, some were chosen so as to provide a safe haven for key species, such as marine turtles, molluscs or birds. The relative isolation of the island states and the low level of development around some of the MPAs means that many of these sites are being preserved in their original state. This has far reaching significance since the region is not only preserving these sites for its people, but for humanity as a whole.

Since the cultural heritage of most countries in the region differ, the value of preservation and conservation is often secondary to national needs. Whilst there may be pressure at the international

level to preserve and conserve a species or a habitat, nationally this may not be perceived as a priority given the national needs. For example, marine turtles, a migratory species that does not recognise political boundaries, may be exploited in one country whilst in another, it is protected. A regional network of MPAs covering the range of the species would afford such a species protection and enhance the species chances of survival.

Financial and human resources are key elements required to successfully manage MPAs and the availability of these resources dictates the level of management successes. Most of the MPAs managed by Government agencies are not adequately managed for lack of both financial and human resources. On the other hand, MPA managed by NGOs enjoys a high level of management successes. This is partly due to financial input from parent organisations that are based overseas, and partly due to an active sourcing of funds from both local and foreign donors.

Community based participatory approach to the management of MPAs in most of the countries is still in its infancy. The governments have in the last decade reacted positively to the global trend of giving stakeholders the opportunity to join in the decision making process. This is reflected in the collaborative efforts initiated between government agencies and the joint management committees formed in a number of MPAs.

Cross-sectoral issues are being addressed at all levels, through inter-ministerial committees to technical committees. The benefits of overcoming sectoral approach in the management of protected areas are that resources could be put to use in the most efficient manner. However, to achieve an integrated approach to the management of MPA, the institutional and legal framework needs to be revised accordingly. Although positive steps have been taken to realign the institutional and legal framework towards this end, there are still many barriers to overcome.

Ecological monitoring needs to be consolidated over a longer period and widely in the region. Monitoring and assessment methodology needs to be standardized and harmonized in order to make the results comparable. Much as the regional collaboration is desirable, it is important to recognize that institutional collaboration has to start at the national level for successful management of the MPAs in the region.

Whilst some of the marine parks are managed adequately, for example Ste. Anne in Seychelles, Nosy tafana in Madagascar, and Malindi in Kenya, majority of the marine parks in the region receive almost no attention. There is need to create a regional framework for cooperation among the regional institutions to address MPA and coastal zone management issues. Regional and international treaties provide useful mechanisms for collaboration and networking.

9. RECOMMENDATIONS AND GUIDELINES FOR MPA MANAGEMENT

9.1 Recommendations

The marine protected areas of Eastern Africa do not fully represent all of the important habitats found in the region's coastal zone. It is necessary to establish additional protected areas to improve on the representativeness. It is also important to develop and implement individual management plans for existing MPAs. Where there is a complex of marine protected areas, as in the case of Masoala in Madagascar, each MPA should have an individual management plan that responds to its specific requirements in terms of resources and activities. The management plans should include financial, human and physical resource needs as well as information needs and project activities.

The structure of the management authorities needs to incorporate a specialised section to deal with the indigenous knowledge systems for conservation and conflict resolution. The customary decision-making mechanisms and social agreements such as the "dina" and "usage contracts" of Madagascar or variations of these approaches need to be applied in MPA management programmes.

MPA management authorities need to increase the programme and activities associated with the coastal communities adjacent to the MPAs. These programmes and activities should be aimed at developing alternative and beneficial practices thereby reversing the deleterious impacts on the natural resources. These programmes should be accompanied by education, training and sensitizing efforts in alternative enterprises.

A regional network of marine protected areas should be established in order to facilitate exchanges, expertise sharing and joint capacity building programmes. A regional Western Indian Ocean MPA network or an Eastern African MPA network are suggested.

Several of the MPAs described in this report are being adequately managed. However, much work has to be done in others to bring them to an acceptable level. There is a need to revisit the objectives behind the setting up of some of these protected areas since it is recognised that time and changing circumstances have overtaken the original purpose for the designation of these MPAs

There is a lack of monitoring and evaluation processes in almost all the MPAs. Monitoring and evaluation programmes are essential as a means of assessing progress towards achieving the set goals and objectives. The necessary methodology for monitoring the biophysical parameters should be developed and equipment procured.

A larger proportion of the revenue generated from the utilization of resources in and around MPAs should be channelled back to the MPA authorities to be used in alleviating some of the problems faced by these agencies due to a lack of funds.

Adjustments of the legal framework to keep pace with changing circumstances should be more rapid. While great strides have been made to address this situation, it is critical that the legal system is seen to be working. Information dissemination to the general public on the laws and regulations relating to MPAs should be actively promoted.

There exists a large gap between available information and desired information in most of the MPAs. While there is plentiful of research work that has been carried out in many of the MPAs, the findings of this research work are seldom available locally. There is also an abundance of written material, relating to MPAs, which are available in the country. However, the retrieval process is time consuming and often very frustrating since these documents are often found in "grey literature" or stacked away on an office shelves. Information management should feature highly in the MPA programmes.

9.2 Guidelines for MPA management

The guidelines outlined below are intended to assist the Eastern African countries to manage their national systems of MPAs as vital components of the integrated management of coastal areas in the region. The list is not exhaustive. It is intended to bring out some essential points, which should not be overlooked by management agencies of MPAs in an attempt to enhance their level of management performance.

- Develop or adopt common methodologies for monitoring and evaluating the resources, the ecosystems, policies, and institutional performance.
- Develop or adopt of common indicators for determining sustainability.
- Harmonize existing national standards and agree upon regional standards.
- An integrated management process based on co-operation, education and communication with users and stakeholders, is a powerful tool for conserving resources, maintaining biodiversity and protecting ecosystems.
- Obtain written agreements between agencies to ensure clear communications.
- The signing of memoranda of understanding (MoUs) makes institutions to work together, for example, marine park authorities and fisheries agencies.
- Where the solutions are simple, viable and directly applicable by the resources users themselves, management issues can be resolved by directing the activities of resource user groups to sustainable, non-destructive substitutes.
- By allocating property rights to resources users, surveillance and law enforcement can be improved. This can also instil a high degree of compliance with management regulations and husbandry for the resources.
- Stakeholders should participate in all stages of action planning to ensure sense of ownership.
- The quality of life and standard of living of the local community adjacent to the marine protected area can be improved by investing the revenues generated from entrance fees into social development projects.
- The selection of isolated sites that have natural barriers increases the probability of successful management.
- A close dialogue between resource users, stakeholders and the management authority is imperative if conflicts are to be resolved.
- There is a strong need for synergy in the development of a participatory integrated coastal area management process and close collaboration and communication between regions.
- Stakeholders should be invited to get involved and actively participate at all level of planning and policy formulation before an area is designated as a protected area. This participatory approach will help to identify potential conflict areas at an early stage, thus solutions and/or alternatives may be put forward at this early stage.
- Clear goals and objectives should be set out in the management plan of protected areas; taking into accounts the availability of human and financial resources available. Indicators of successes or failures should be unambiguous and easy to measure.
- Local community involvement in the day to day management of a designated area should be encouraged as far as possible. Experience shows that increased responsibility is demonstrated if economic benefits derived from resource rent is accrued to the local community rather than to an administrative entity.
- Where there are multiple users of resources within a MPA, the introduction of activity zones will greatly help to reduce conflicts between different groups of resource users. Ideally zoning should emanate from traditional use of the different areas within the MPA.
- Education of the general public on the purposes of creating MPA and the differences that may exist between different MPAs is imperative if the managing agencies are to achieve the co-operation of the public.
- Information dissemination is essential to maintain public awareness of what is happening within MPA and to generate the interests of the general public in these areas.
- The public needs to know what are their rights regarding MPA, and they should feel confident to contribute towards the management of these areas through constructive criticisms. All too often, because of a lack of information, stakeholders have taken the back seat whilst decisions which affect the livelihood of their community have been taken.
- Ensure MPA authorities' representation in all licensing committees which license activities that may have an impact on the MPAs.

- Develop a policy for research to support management and establish research priorities. Initiate a monitoring programme to monitor environmental conditions including water quality.
- Advocate legal requirements for independent Environmental Impact Assessments (EIAs) for all development activities that may impact on the MPAs.

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