

**CABO DELGADO  
BIODIVERSITY AND TOURISM PROJECT**

**Management Plan  
(2003-2006)**

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## SUMMARY

The Cabo Delgado Province in northern Mozambique is one of the few places along the East African coastal belt where coastal and marine habitats remain largely unexplored and undisturbed. The Cabo Delgado Biodiversity and Tourism Project (CDBTP) has been developed in order to ensure the sustainable conservation of such a diverse and pristine wilderness area.

The project was founded on the premise that the key to the success of such a conservation project lies in its sustainability, both ecologically through scientifically-based management and socio-economically through a real partnership with local communities, as well as financially through revenues derived from up-market tourism. In order to ensure the financial viability of the project, the initiators of the CDBTP acknowledged that both a marine and a terrestrial component were necessary to attract specialised up-market tourism in such a remote and unknown destination.

The project area has two components:

1. A coastal area of 32,931 ha located in the District of Macomia in the *Posto* of Quiterajo. It is delimited by the Messalo River in the north, the Diquide river in the south and the coastline in the east.
2. Three islands: Macaloe (387 ha) in the District of Macomia, and Vamizi (1,181 ha) and Rongui (969 ha) in the District of Palma.

The Project Area lies within the northern section of the Indian Ocean coastal belt, which is a region of exceptional biodiversity. The area around the islands of Vamizi and Rongui harbours an exceptional marine biodiversity (coral reefs, seagrass beds) and has remained intact from any anthropogenic or natural impact. It is also a site of very high significance for endangered species, including five turtle species, dugongs, humpback whales. The Coastal Area is probably a hotspot, due to the presence of large tracts of intact coastal forests and thickets which are renowned for their levels of diversity and endemism. It harbours a diversity of large mammals as well as endangered species (elephants, wild dogs) and represents a key site for wildlife during the dry season, due to the availability of permanent water. The Coastal Area also includes the southern part of the Messalo river estuary, which is ecologically vital to the coastal ecosystem health as the Messalo river is the second largest rivers of the Cabo Delgado province. Both the Coastal Area and the area around Vamizi and Rongui fit the criteria the social, economic, ecological and regional criteria to become Protected Areas.

The purposes of the *Fazenda do Bravio* of the Cabo Delgado Biodiversity and Tourism Project are:

- To protect and maintain the biological diversity and natural resources of national and international significance, as well as ecosystem processes;
- To develop up-market tourism activities that will ensure the financial viability of the Project;
- To ensure community participation in management decisions and activities;
- To promote sound management practices for sustainable production purposes;
- To contribute to the socio-economic development of local communities;

- To provide opportunities for research and education.

The management of the Project Area will be based on a collaborative approach, involving all stakeholders (tourism operation, local communities, government, conservation organisations) during all management steps and processes. It will also have to be adaptive as the baseline data collection will be ongoing and management activities will need to be adjusted.



## CHAPTER 1. INTRODUCTION

This management plan has been prepared to guide the management and development of the *Fazenda do Bravio* for the Cabo Delgado Biodiversity and Tourism Project, which has been approved by the *Resolução Interna de Conselho de Ministros* N<sup>o</sup> 10/2000 of 27<sup>th</sup> December 2000, supplemented by the *Resolução Interna de Conselho de Ministros* N<sup>o</sup> 13/2001 of 21<sup>th</sup> December 2001. The *Fazenda do Bravio* includes two components:

1. A Coastal Area of 32,931 ha located in the District of Macomia in the *Posto* of Quiterajo. It is delimited by the Messalo River in the north, the Diquide river in the south and the coastline in the east.
2. Three Project Islands: Macaloe (387 ha) in the District of Macomia, and Vamizi (1,181 ha) and Rongui (969 ha) in the District of Palma.

Information in this document was obtained by doing various surveys in the project area over the last 4 years, including an aerial and participatory survey of the Coastal Area, as well as a marine survey around the Project Islands. However, it must be emphasized that the available information on the natural resources and their uses will need to be completed by other studies and that the management of the area will have to follow an **adaptive** approach, by which solutions to both ecological and social problems will be updated and reviewed. In addition, such management will be implemented as a **collaborative** initiative between private sector, local communities, government authorities and conservation organisations.

The main objective of the Management Plan of the *Fazenda do Bravio* of the CDBTP is to conserve habitats and ecological processes in order to preserve the value of the area for global biodiversity conservation and for sustainable activities that will ensure the socio-economic development of the area and the financial viability of the project. Although the current legal framework for natural resources management indicates the main activities for *Fazendas do Bravio* is hunting, the main activities that will be developed by the Cabo Delgado Biodiversity and Tourism Project are conservation, up-market and selective tourism, and community development.

This management plan aims to provide a strategic framework for the:

- Identification of key features of the area which are significant for global biodiversity conservation, for tourism development and for local economic development.
- Assessment of threats to natural resources and other issues pertaining to resource management and tourism development
- Outlining of strategies to minimize these threats.
- Development of strategies for a collaborative programme between the tourism initiative, local communities, government authorities and conservation organisations that will ensure the ecological, social and economical viability of the project.
- Development of a buffer zone and subsidiary legislation for acquiring an official protected status and linking up with other international and national conservation initiatives.

## CHAPTER 2. RESOURCE DESCRIPTION

### 2.1 AREA AND LOCATION

The *Fazenda do Bravio* is located in the Cabo Delgado Province in two Districts, Palma and Macomia. It includes two components:

- A coastal area, which will be referred to as the Coastal Area, which is located in the Macomia District in the administrative post of Quiterajo. It covers 32,931 ha and is delimited by the Messalo River in the north, the Diquide river in the south and the coastline in the east.
- An island component, represented by three islands, which will be referred to as the Project Islands. The Project Islands are part of the Querimbas archipelago and include:
  - Vamizi (1,181 ha) and Rongui (969 ha), in the Palma District.
  - Macaloe (387 ha) in the Macomia District.

### 2.2 CLIMATE AND PHYSICAL ENVIRONMENT

#### 2.2.1 Climate

The climate throughout the area is described as humid tropical. Annual rainfall averages 950-1000 mm on the coast. The coefficient of variation is 18-19 %. Precipitation is strongly influenced by the southern end of the East African Monsoonal System and most rain (85-91 % of the annual total) falls during the months of December to April inclusive, but it appears that no months are completely dry. Mean annual air temperature lies between 24°C and 26°C. At Mocimboa da Praia, temperature varies from a mean minimum temperature of 18.0°C during July and August, to a mean maximum temperature of 32.1°C during March. Relative humidity is high throughout the year, varying from a mean of 67.6 % during September to 82.2 % during February on the coast.

#### 2.2.2 Tides and currents

Tides have maximum ranges of about 4 m. As it approaches the coast of northern Mozambique, the west-flowing South Equatorial Current branches into the north-flowing East African Coastal Current and the warm south-flowing Mozambique Current.

#### 2.2.3 Geology

Sedimentary rocks of Tertiary age, mostly sandstones, conglomerates and marls underlie the Coastal Area. The soils are freely draining, infertile deep, red sands, sandy loams and sandy clay loams and pale, often greyish, sandy loams, interspersed with fertile black alluvial clays deposited along the main rivers, such as the Messalo. There are infertile white sands derived from recent dunes and heavy greyish saline soils in a narrow strip along the coast. The islands consist of low-profile Pleistocene coral limestone formations.



## 2.2.4 Hydrology

The main permanent water sources available in the Coastal Area include the Messalo river, the Muenha river, places on the Chafi river, Lake Macungue, as well as swampy areas, especially east of the coastal road.

In the village on the island of Vamizi, there is an old well built during colonial times from which brackish water is extracted.

## 2.3 VEGETATION AND WILDLIFE

### 2.3.1 Coastal Area

#### 2.3.1.1 Habitats

The Coastal Area lies within the northern section of the Indian Ocean coastal belt, which is a region of exceptional botanical diversity. Much of the vegetation within the Coastal Area is still largely undisturbed, mainly because people and their fields are concentrated along the main road going from Mucojo to Quiterajo. Vegetation types which have already been identified include: coastal and lowland forests and coastal thickets, *Acacia* and floodplain savanna, coastal shrubland, alluvial and coastal grassland, mangroves.

Coastal forests and thickets and are both of great conservation importance as they are recognised globally for their high diversity and level of endemism. Both the dry deciduous (lowland) forest and the lowland semi-evergreen (coastal) forest of the east coast of Africa have been identified as international priorities requiring urgent protection. Although Mozambique contains 68 % of Africa's dry lowland forest and 60% of Africa's coastal forest, both types are ill-represented within the existing protected areas of Mozambique. Five plant species that are endemic to Mozambique have been found previously within the area (*Hexalobus mossambicensis*, *Maerua andradae*, *Dichapetalum zambesianum*, *Cassipourea obovat*, *Vepris allennii*). Other endemic plant species (*Monodora junodii*, *Rhodognaphalon stoltzii*, *Combretum stocksii*, *Dichapetalum barbosa*, *Homalium mossambicense*, *Nesea pedroi*, *Thespesiopsis mossambicensis*, *Polygala limae*, *Grewia limae*) are likely to be discovered when more intensive collecting efforts are made. Deciduous thickets (including *Guibortia schliebenii*) that were originally distributed behind the coastal dunes in a sublittoral strip 5-10 km wide, are also present north of Quiterajo and have not been converted to fields or cashew savanna, as has been the case south of the Project Area.

In addition, the Coastal Area also includes the southern part of Messalo river estuary, which is the second largest river of the Province. Estuaries are ecologically vital, providing habitat and breeding grounds for numerous fish and crustacean species and filtering down silt brought down rivers. Mangroves around the Messalo estuary cover more than 5,000 ha and are undisturbed, which is a rare exception in Mozambique where most areas of mangroves have been heavily utilised by man. The estuary system also includes wetlands which are important sites for bird populations.

#### 2.3.1.2 Wildlife

Due to the habitat diversity, the present wildlife community in the Coastal Area is varied and species that have already been identified include elephant, buffalo, various antelopes

(waterbuck, eland, greater kudu, sable, suni, oribi, duiker), pigs and primates, elephant shrew, and several large predators, including spotted hyaena, leopard, wild dog, lion. The area is still largely unexplored zoologically and endemic species are likely to be found. The presence of several large mammals, such as black rhinoceros, impala, zebra, Lichtenstein's hartebeest, wildebeest, and maybe cheetah and reedbuck that used to occur in the area has not been confirmed yet. The area around Quiterajo has often been reported by local villagers as being the area where there are the greatest concentrations of wildlife. The African elephant and the wild dog are two species that have been identified in the survey area and that are listed as 'endangered' in the current *IUCN Red List of Threatened Animals*.

Elephants are currently protected in Mozambique where their populations have been seriously depleted during the war. In Cabo Delgado Province, heavy poaching by Tanzanians occurred along the Rovuma and Lugenda Valleys, and, in Palma District, many elephants have been shot "on control" by the District authorities. The most recent survey (1997) estimated the elephant population in the Cabo Delgado Province at 3000-4000 animals but it is likely that numbers have increased in recent years, as illustrated by the increasing number of reports of human/elephant conflicts in the Province. The Coastal Area has been reported by all communities as a key site where most elephants concentrate during the dry season. In fact, it represents a key area for all wildlife species due to the wide availability of water throughout the year, as well as of cover where game can hide during the day.

The presence of wild dogs in the Project Area is also of particular significance, especially as they have been sighted in large numbers (packs of more than 20 animals have been reported). Because of their enormous ranges and very low densities, wild dogs are particularly vulnerable to habitat fragmentation. The availability of areas of sufficient size is particularly important for their long-term survival.

No attempt has been made yet to estimate densities of animals, but the surveys enabled to establish that there were breeding herds of elephants and breeding populations of lions and wild dogs in the Coastal Area. This suggests that there is a sufficient density of prey animals (usually ungulates and suids) to support a resident lion population during all months of the year. However, the impression gained during the surveys was that the density of large ungulates was not high.

The establishment of the *Fazenda do Bravio* provides a great asset and complement to the Querimbas National Park, situated south of the Mucojo road. Because wildlife species which require large home ranges and have seasonal movements (elephants, buffalos, elands, large predators, etc) utilise both areas, it will be important to establish a wildlife corridor between these two areas.

The Coastal Area also supports critical marine habitats (extensive and pristine sea grass meadows, Paqueve reef) and includes abundant marine wildlife, including turtles which nest on beaches of Paqueve and Milamba, and dugongs which have been reported in great numbers around the Messalo estuary (see below).

## **2.3.2 Project Islands**

### **2.3.2.1 Habitats**

The islands are covered by dense vegetation, including coastal thicket *Sideroxylon inerme* and other evergreen trees and shrubs. The marine environment around the islands consists of large fringing reefs and seagrass meadows. Due to the narrow continental shelf, the seaward coast is very deep just east of these islands

Coral reefs around Vamizi and Rongui islands have been identified to be exceptional by their pristine condition, diversity, and abundance in endangered species such as turtles and dugongs. A preliminary coral survey has enabled to establish the unspoilt condition of the reefs on both sides of Vamizi island, with live coral representing a coverage of up to 50% of some of the transects surveyed. There were extremely few signs of anthropogenic impact, and most of the area was also found to have survived the global coral-bleaching event of 1998, emphasizing the importance of these coral reefs for global biodiversity conservation. Coral reefs are amongst the most endangered ecosystems in the world, as well as being some of the most productive and diverse of all natural ecosystems. They have been identified as “essential life-support system” for food production, health and other aspects of human survival, as their high productivity allows most coastal and island communities to rely on them for providing proteins in the form of fish, molluscs and crustaceans.

Reefs around Vamizi and Rongui are also characterised by a great diversity of fish species. More than 100 fish species have been identified to date but this represents an underestimate due to the time and nature of the surveys methods. A previous survey conducted in the southern part of the Querimba islands identified more than 375 fish species, and it can be expected that even more will be recorded in the project area, as the northern Querimba’s are considered to hold more diversity than in the south. The abundance of fish was confirmed by fishermen on both Vamizi and Rongui, who are now coming from very far to be able to fish in these exceptionally productive waters. The great size of individuals (snappers, groupers, emperors, barracudas) and of schools of fish that were observed, both during transects and during the examination of the fishermen’s catches, suggested that levels of exploitation are still low in the area.

It is also likely that the coral reefs around Vamizi and Rongui islands act as an important source of replenishment for marine habitats along the east African coastline, due to the presence of the west-flowing South Equatorial Current which branches into north and south flowing currents as it approaches Vamizi island

### **2.3.2.2 Wildlife**

The *Fazenda do Bravio* (both Project Islands and Coastal Area) represent significant sites for marine endangered species. Green and hawksbill turtles have already been confirmed to nest on the Project Islands and on Milamba/Paqueve beaches, while three other species (olive ridley, loggerhead, leatherback) occur in the waters around the area. Turtle numbers have been greatly reduced over the years and these turtle species are listed as Endangered by IUCN, with the Hawksbill being Critically Endangered. Less than 2,000 Hawksbill are known to nest in the Central western Indian Ocean, while the green turtle is the most common with may be around 6,000 animals nesting yearly. Very little is known regarding

the situation of sea turtles in Mozambique and the protection of breeding sites is vital to the survival of all species.

Dugongs have also been reported to occur in all Project Areas, and seem to be abundant near the Messalo estuary. Considering that this species is the most endangered marine mammalian species in the Western Indian Ocean, with the only known viable population being in Bazaruto archipelago, the Project Area could represent a key site for the survival of this species.

Humpback whales are also known to come to give birth in the area between Vamizi and Rongui. Humpback whales are distributed in both hemispheres but their populations have been much reduced from earlier exploitation. It is estimated that the population size is around 3,000 in southern oceans, with strong migratory movements between feeding grounds in Antarctic and breeding grounds to Eastern South Africa and the South coast of Madagascar as well as to Australia. The protection of their breeding grounds is an essential conservation strategy to ensure their survival.

Whale sharks, dolphins and seahorses are also occurring in the Project Area. Seahorses are threatened worldwide by over-exploitation for traditional medicine, aquarium fishes and curiosities. At least five species of seahorses occur in the western Indian Ocean but very little is known about which ones exist in Mozambique. The presence of at least four species in the northern Querimba archipelago illustrates the biodiversity of the area as well as its pristine condition.

### **2.3.3 Criteria for Protection**

The Project Area represents a site of unique biodiversity, combining pristine marine and terrestrial ecosystems, which is rare in eastern Africa where many coastal areas have shown lower biological diversity and intense human impact. It also unites all the ecological criteria that are used for establishing a Protected Area.

Biodiversity: Richness in both marine and terrestrial habitats and in endangered species

Naturalness: lack of disturbance and degradation

Dependency: Importance for ecosystem processes (coral reefs, estuary)

Uniqueness: Presence of endemic species

## **2.4 LOCAL COMMUNITIES**

### **2.4.1 Distribution**

All communities in the Project Area have been consulted extensively by the Project and have given their support and approval. Communities living along the coast of Cabo Delgado are Kimwanis, who are of Muslim culture, but Swahilis are also present in the northern part of the coast north of Mocimboa da Praia.

Human settlement in the Coastal Area is mainly concentrated in villages along the main road connecting Mucojo to Quiterajo. Of these villages, 3 are located along the road (Quiterajo, Nuamaneco, Natugo and Ilala), and another 2 are between the road and the

coast (Milamba, Metoni). There is also a small marginal settlement further inland, north-west of Lake Macungue (see Annexe 1).

Despite its status of administrative post, Quiterajo is comparatively less populated than other surrounding areas. The last demographic census gave a total population of 7,185 people in 1999. On its western side, the Coastal Area does not have any immediate inhabited sites but there are villages situated along the main road going to Mocimboa de Praia, around 10 km from the western boundary of the *Fazenda do Bravio*.

On the Project Islands, only Vamizi has a resident population of 533 people, sited at the western end of the island. In the past, both Vamizi and Macaloe were permanently inhabited. Vamizi has had a long and turbulent history over the last 500 years, being a key trading post for both the Arabs and Portuguese settlements in Mozambique. There are still remnants of this agitated past, in the form of ruins of an old Portuguese fort and of a chapel near the village. There are also ruins of an old fort on Macaloe.

However, the three Project Islands are often used by local populations living on the coast, as well as by transient fishermen coming from other areas (Tanzania, Nacala) setting up camps during a few months every year. Permanent populations along the coast facing the Project Islands include Pangane (8,627 people) for Macaloe, Olumbe (5,704 people) for Vamizi and Manganje for Rongui.

#### **2.4.2 Socio-economics**

The last population census of 1999 in the country gave the following socio-economic indicators for the Cabo Delgado Province:

Recruitment rate: 2.8%

Illiteracy rate: 75% (60% men – 88.5% women)

Infant mortality rate (per thousands): 174.4

Life expectancy: 37.9 years

The Cabo Delgado province has a high proportion of low birth weights in the country: 13.9% of children born weigh less than 2.5 kg at birth.

Health facilities in the Project Area include a *Posto de Saude* in Quiterajo, which is in dire need of being rehabilitated and equipped (only two beds and two nurses for 7,185 people). There are no health facilities on Vamizi island and people need to go to Olumbe *Posto de saude* in case of a problem.

## **2.5 RESOURCE USE**

### **2.5.1 Subsistence hunting**

In the Coastal Area, local communities are mainly fishermen but every village seems to have people who hunt with bows and arrows, nets, in order to hunt antelopes, small mammals and birds for meat. Species which are not targeted are bushpigs and warthogs, due to religious constraints. It is not known yet whether local people also sell bushmeat, whether they use snares or firearms, and if communities living on the main Macomia-Mocimboa road also hunt in the Coastal Area. People also use fires in the open areas during the dry season to improve visibility and attract animals for hunting

### **2.5.2 Subsistence fishing**

Traditional fishing is the main economic activity for populations living along the coast and on islands. Fishing methods employed by the communities are traditional and include seine nets, handlines, boxtraps and spear guns, with traditional dugouts and dhows. However, boats and nets are a rare commodity and fishers in some villages (Olumbe for example) cannot provide enough fish for ensuring the subsistence of the whole community. The absence of more sophisticated techniques is linked to the lack of a cash income in communities (most people cannot even afford hooks) as well as to the absence of a local market for fish products.

By contrast, transient fishermen coming from other areas (Nacala, Tanzania), fish for commercial purposes and use more sophisticated equipment that include dhows and large seine nets, thus resulting in a different catch (access to different fishing grounds, to larger fishes and to different species). Resident fisher communities have complained about the presence of these itinerant fishers and have tried many times to prevent them from setting up their camps on the islands every year around Feb/march. However, transient fishers did not respect these demands and the lack of backing by any official authority has resulted in the regular return of the transient fishers every year.

Molluscs and crustaceans are also caught by women in the intertidal zone, principally for their own consumption, while sea cucumbers are harvested and dried to be sold to commercial operators, mainly from Tanzania. Some gasteropods (*Chicoreus ramosus*, *Fasciolaria trapezium*) are used locally to produce white lime or building material.

### **2.5.3 Subsistence agriculture**

Apart from fishing, subsistence agriculture is the main activity for communities living on the coast. Crops in the Coastal Area include: rice, cassava, millet, maize, sweet potatoes, beans, and coconuts. When possible, two cycles of crops are planted. Rice is planted in Nov/Dec and harvested around May/June. Cultivated areas are situated near villages and near water sources such as rivers, swamps and lakes. There is also a very large cultivated zone outside the Coastal Area in the lowland area north-east of Chai up to the Messalo River. All villages in the Coastal Area have extensively complained about problem animals (elephants, antelopes, suids, baboons) raiding and destroying their crops.

On the Project Islands, crops are much more limited due to the poor soil fertility. There are some fields cultivated by residents around the village of Vamizi, as well as some old cultivated areas near the transient fisher camps on the north-eastern and south-eastern sides of the island. On Rongui and Macaloe, a few areas have also been cleared for crops by transient fishers.

### **2.5.4 Use of wild plants**

Communities living in and around the Project Area survive on the crops that they grow, and by fishing and hunting. There are no surplus crops to sell or barter, very few people are formally employed and the rest must obtain almost everything that they require from the natural resources that surround them.

Uses of wild plants in the Coastal Area are very varied and include:

- wood for firewood, construction, carpentry, tool making;

- coconut palm leaves for thatching roofs;
- string and rope made from bark (especially *Brachystegia* and *Julbernardia* spp);
- medicinal plants;
- beehives made from bark stripped from a tree (often *Brachystegia* sp.);
- incense made from the gum exuded by *Hymenaea verrucosa*;
- a white cosmetic face mask, made from the pounded roots of *Olox dissitiflora*;
- the sap of *Hyphaene* palms to make palm wine;
- edible wild fruits (*Sclerocarya caffra*, *Parinari curatellifolia*, *Vangueria infausta*).

### 2.5.5 Statements

- The area around the islands of Vamizi and Rongui harbours an exceptional marine biodiversity (coral reefs, seagrass beds) and has remained intact from any anthropogenic or natural impact. It is also a site of very high significance for endangered species, including five turtle species, dugongs, humpback whales.
- The Coastal Area is probably a hotspot, due to the presence of large tracts of intact coastal forests and thickets which are renowned for their levels of diversity and endemism. Because it is also an area where wildlife concentrates during the dry season, due to the availability of dense cover and permanent water, it represents one of the last areas along the East African coast where large mammals can still be seen on the beach.
- The Coastal Area includes the southern part of the Messalo river estuary, which is ecologically vital to the coastal ecosystem health as the Messalo river is the second largest rivers of the Cabo Delgado province.
- Both areas contain marine habitats of very high economic value for local communities, whose subsistence is based on fishing.
- Both the Coastal Area and the area around Vamizi and Rongui fit the social, economic, ecological and regional criteria to become Protected Areas.

## Plate 1. Terrestrial natural resources



## Plate 2. Marine natural resources

## CHAPTER 3. MANAGEMENT ISSUES

### 3.1 NATURAL RESOURCES ISSUES

#### 3.1.1 Coastal Area

##### 3.1.1.1 *Human / Wildlife Conflict*

All communities of the Coastal Area have reported that wildlife was a permanent threat to them and their crops. During all visits to the villages, people have complained that their crops were raided regularly by elephants, antelopes, hippos, wild suids and primates. To protect their crops, people spend their nights in small shelters in fields and attempt to frighten away elephants, using fires and noises. However, they become also vulnerable to large carnivores and a number of accidents with hyaenas and lions have also been reported. In fact, a very serious lion problem occurred in the project area in 2000, when 35 people were reported to have been killed by lions in the area. We were told in Quiterajo that this problem had been solved by authorities who tracked down and eliminated the lion responsible. This lion problem nevertheless seems to be resurging regularly. In addition, there have been reports of people being killed by crocodiles by the Messalo river.

##### 3.1.1.2 *Hunting pressure*

Characteristics of the wildlife populations in the Coastal Area tend to indicate that there is a constant hunting pressure:

- Elephants have developed nocturnal habits and are very difficult to see on the ground, while they immediately seek cover when approached from the air.
- Large antelope species, and buffalo, are present, but probably at low densities, as is reflected by the low tick density in the area. It is likely that species which are primarily savanna dwellers and are easier to hunt have been affected by unregulated hunting.
- Smaller mammals are very shy and difficult to approach on the ground.
- Some species which were known to have occurred in the area have not been identified yet as still occurring (black rhinoceros).

The extent of hunting (legal and illegal) activities and of traditional hunting vs. commercial hunting has not been evaluated yet in the Project Area. However, the observation that each village has a few hunters going out regularly, and reports (as far as in Maputo) that professional hunters are taking clients in the Quiterajo area, confirms that hunting has been on-going.

The diversity of terrestrial wildlife in the survey area, and the presence of large mammals, is an essential component of the development of up-market tourism activities there. Such activity will be essential in ensuring the financial viability of the conservation of the area, and will contribute significantly to the socio-economic development of local populations in this part of the Province. In order to be able to develop tourism activities in the *Fazenda do Bravio*, it will be essential that wildlife populations be allowed to settle down and not be hunted at all, which will also allow wildlife populations to recover demographically. The protection of the Project Area will also trigger immigration of wildlife, as the creation of a safe environment has been known to attract animals (elephants, wild dogs, antelopes, lions, etc) from the surrounding areas. In order to satisfy both the project tourism needs and the

communities' needs, it is proposed to establish a zoning programme in the Project Area and create a buffer zone around the *Fazenda do Bravio*.

### **3.1.1.3 Protection of endangered species**

Elephants and wild dogs are the two endangered species protected by law, but it is also possible that black rhinoceros are still occurring in the area. Considering the commercial value of both elephants and rhinoceros, and the report of incursions by Tanzanians poachers through the Rovuma river, it will be essential to ensure the protection of the *Fazenda do Bravio* against such potential threats. This threat will obviously increase in time as populations densities increase, and as the road network in the northern part of the Province develops.

### **3.1.1.4 Habitat loss and denial of access to water**

Although most fields are concentrated around villages, there are a few remote and isolated places within the Coastal Area where people are growing crops, usually in areas of higher soil fertility or near water sources. Such cultivated areas occur:

- in the periphery of the dry lowland forest, as cutting and burning the forest adds nutrients to soils that would otherwise be infertile.
- in alluvial grassland along the Messalo river, where fertile soils retain moisture in the dry season are favoured for the cultivation of rice and other crops

The clearance of natural vegetation in such places represents not only a loss of habitat to large mammals, but it also increases the number of opportunities for human/wildlife conflict. In addition, crops which are grown near water points or the river are also going to be easily targeted for crop raiding while they will also prevent wildlife to access water and may disrupt seasonal movement patterns. Since the Messalo river floodplains represent an important dry season concentration area, especially for grazing animals, it will be important that access to the river be not disrupted by human activities. Similarly, it will be essential to provide a corridor between the Querimbas National Park and the *Fazenda do Bravio* for allowing seasonal movements of wildlife.

Endangered and ecologically vital habitats, such as coastal forests and thickets, mangroves and the Messalo estuary, also need to be preserved in order to conserve biodiversity. More importantly, it will be required to protect critical habitats (river banks, wetlands, catchment areas) on both sides of the river in order to conserve the estuary system.

### **3.1.1.5 Transmission of zoonotic diseases**

In 1999, we were informed that about fifteen people died in the Coastal Area after being bitten by rabid jackals and this seems to occur at regular intervals, indicating that the disease is probably endemic in the area. Jackals are known to be extremely susceptible to rabies and are the wild vectors of the disease in many parts of Southern Africa. However, it is not known whether rabies outbreaks amongst jackals are preceded by outbreaks amongst domestic dogs in the same or adjacent areas. Kimwanis, who are muslims, regard dogs as unclean but it is possible that Makonde, who are known to be very good hunters, come to hunt near the Coastal Area with their dogs.

### **3.1.2 Project Islands**

#### ***3.1.2.1 Habitat destruction***

Transient fishermen represent the main immediate threat to marine resources, since they have come in increasing numbers in recent years, they have no sense of responsibility towards fishing grounds, no authorities regulating their activities, while they take indiscriminately any marine resource, including endangered species. They are known to have used destructive fishing methods, including explosives, although this does not appear to be a frequent occurrence. Such methods have been disapproved by all resident communities. However, a full study of the impact of fishing practices on marine habitats and sustainability has not been undertaken yet for communities living along the coast between Vamizi and Rongui.

The anchoring of boats on reefs is another cause of coral reefs damage and breakage and probably affects areas which are close to the fisher landing places. However, only small boats or dhows are used by local fishermen and this would become a threat with motorised or modern boat that will come in the future.

Deforestation, developments in a watershed and poor farming practices could represent a potential future threat to reefs situated offshore the inland surveyed area, by accelerating erosion and contributing damaging quantities of freshwater or silt or both to reefs.

#### ***3.1.2.2 Overfishing***

Communities on the islands and along the coast mainly use traditional fishing such as seine nets, handlines, box traps and spear guns. Such methods can be damaging to marine resources by:

- catching non target species such as dugongs, turtles, sharks and fish species
- catching juveniles when nets have a mesh size that is too small
- catching specifically large breeding individuals with spear guns
- breaking reefs through anchor damage or by walking on reefs

Ultimately, overfishing results in shifts in fish size, abundance and species composition within reef communities and has grave consequences for fisheries yields, for livelihoods and for conservation. When fishing pressure surpasses maximum sustainable levels, catches decline very quickly and people livelihoods rapidly deteriorates, leading them to resort to more destructive techniques.

Local fishers mainly use their catch for subsistence and their daily catch probably has limited impact on marine resources, as marine resources around Vamizi and Rongui are in pristine condition. However, the recent development of commercial fishing in certain areas along the Cabo Delgado coastline and the increasing number of transient fisher coming to the Querimbas islands could rapidly lead to overfishing. The sustainability of fishing practices by resident fishers along the coast between Vamizi and Rongui also needs to be fully evaluated.

### **3.1.2.3 Protection of endangered species**

The main threat to turtles and dugongs in this area is predation by man for meat consumption, either by the accidental or the intentional capture of specimens. Some local resident fisher interviewed reported that the capture of dugongs and turtles was mainly accidental, but that they would consume these animals when they found them in their nets. Others reported that they caught turtles intentionally in large nets used for sharks and rays. People are fully aware of the legislation pertaining to the protection of these species but in villages where food deprivation is a priority, any possible food item represents a way of subsistence.

Transient fishers represent the main threat for turtles and dugongs as they do not respect any authority and have commercial fishing activities which allow them to have more sophisticated fishing gears than resident fishers, as well as dhows. In addition, they established their camps on nesting beaches, giving them unlimited access for digging out eggs from the turtle nests.

A supplementary threat to the sea turtles is represented by the trade in tortoiseshell, especially hawksbill. The patterned carapace of the hawksbill is used to make ornaments of all sorts, including jewellery and crafts, which are sold illegally in Pemba or in Tanzania. There could also be an international trade by Tanzanians as Tanzanian dhows have been seen near the islands, full of racks containing live turtles. These turtles were apparently watered regularly in order to be kept alive and they might have been destined to be stuffed, as young stuffed specimen are valuable ornaments.

Both transient and resident fishers also catch indiscriminately dugongs, as dugong meat is considered very valuable for its taste and quantities.

## **3.2 SOCIO-ECONOMIC ISSUES**

Resident communities in and around the Project Area are amongst the poorest in the Province and have a subsistence livelihood based on the exploitation of natural resources and subsistence agriculture. The lack of infrastructures, transport and of a demand also means that commercial opportunities are nearly non-existent. In addition, the sandy soils that dominate the coastal strip and those on the islands mean that agricultural productivity is very poor. Because access to education services is also very limited, there is a very poor standard of general education (most people on Vamizi island are illiterate).

The socio-economic situation in the Project Area represents a major challenge for the prospect of ecological sustainability. There is such a day-to-day struggle for survival that resource users do not envisage the concept of future and will adopt any technique to provide their family with food. It will therefore be essential to provide communities, through both conservation and tourism activities, with new, sustainable sources of revenue and to broaden their income base.

In addition, the fact that the Project starts to create opportunities for socio-economic development will provide an incentive for people living outside the Project Area to come and establish their home within the Project area. This will obviously increase all the threats of resource overuse in the Project Area.

### **3.3 TOURISM ISSUES**

The Project will develop tourism lodges that will target very up-market and exclusive eco-tourism, in order to generate enough revenues to make the operation financially viable, and to have a minimum impact on the environment. The main attraction of the Project Area is that it combines a number of different and complementary activities in two distinct areas. The islands of Vamizi and Rongui will offer island / adventure / diving / fly-fishing type vacations, while the island of Macaloe and the Coastal Area will allow for the beach / wildlife photo safaris/ fishing combination. Long-haul tourists coming from Europe and the USA will be attracted by this unique combination, providing that it remains exclusive. The exclusiveness will also be a pre-requisite for the financial viability of the operation, and the subsequent socio-economic development of communities in the Project Area.

Because it can be anticipated that other tourism operations will want to start operating in the immediate surroundings of the Project Area, it will be necessary to ensure some protection, in the form of a buffer zone, around the Project Area. Such developments need to be limited as they will constitute an obstacle to the financial and sociological viability of the Project, while also preventing the success of the conservation initiative of the project.

Similarly, the development of tourism activities such as game viewing, fly-fishing, scuba-diving, walking, resting on the beaches, will be developed in the context of exclusivity and privacy, thus requiring that communities activities are not practiced in the same areas as tourism ones. Such cohabitation will be feasible through the development of a zoning programme in both the Islands and the Coastal Areas.

### **3.4 RESEARCH AND MONITORING ISSUES**

There has been virtually no studies carried out in this part of Mozambique and the few studies that were undertaken in Cabo Delgado have not focused on the Project Area. The only information available in the Project Area has been collected by the project, through various participatory and scientific surveys. However, there is still a great lack of information about many aspects of natural resources, their uses and threats in the area. Management strategies and activities can already be developed on the basis of existing knowledge, but will need to become adaptive as more information is made available for the area.

In addition, there is a need to develop an on-going monitoring programme that will assess regularly the impact of management activities and success of conservation strategies. It is important that such monitoring activities be developed in collaboration with local resource users, and implemented as much as possible by them.

Because it will also be necessary to develop specific research programmes, the collaboration of various international conservation organisations with national research institutions will be essential in ensuring long-term capacity building.

### **Plate 3. Management Issues**

## CHAPTER 4. MANAGEMENT OBJECTIVES

The main objectives of the CDBTP are to ensure the community-based conservation of natural resource in the Project Area and to develop up-market tourism activities that will both contribute to the socio-economic development of communities and to the sustainability of the Project. Unlike other private areas in Mozambique, the purpose of the *Fazenda do Bravio* of the CDBTP therefore includes three components: conservation of natural resources, tourism development, and community socio-economic development. The objectives of the Cabo Delgado Biodiversity and Tourism Project are therefore more compatible with those of a Protected Area.

In particular, the management objectives in the Project Area are:

- To protect and maintain the biological diversity and natural resources of national and international significance, as well as ecosystem processes;
- To develop up-market tourism activities that will ensure the financial viability of the Project;
- To ensure community participation in management decisions and activities;
- To promote sound management practices for sustainable production purposes;
- To contribute to the socio-economic development of local communities;
- To provide opportunities for research and education.

## CHAPTER 5. MANAGEMENT STRATEGIES

### 5.1 PRINCIPLES AND BENEFITS TO COMMUNITIES

In order to fulfill the objectives of developing tourism and ensuring sustainable conservation of natural resources, the Project will ensure that there is full involvement and co-operation of local communities who are on a daily basis interacting and managing natural resources. The project will consult communities throughout all stages of management planning and implementation, through a Community Liaison Officer that will be employed by the Project and liaise with Village Committees that will be elected by communities. All Protection, Management and Conservation activities will be community-based and employ and train local people.

The CDBTP will also work on the principle that the use of positive incentives and the creation of benefits for communities living in the Project Area is the best method for achieving sustainable conservation and tourism. More particularly, the benefits that communities will derive from the project will be:

- Creation of individual cash income through the recruitment and employment of local staff for all activities.
- Direct financial benefit through a bed levy that allocates some of the revenues generated from tourism to local communities. Community projects will be funded through this



income, but the decision and implementation of the nature of the project (e.g. construction of schools, health clinics and wells, distribution of cash, etc) will be undertaken by the communities and government.

- Acquiring of skills in the areas of conservation (reef monitors, research assistants and students, etc) and tourism (guiding, management, building, maintenance , etc) through the training of local communities.
- Creation of incentives for the development of small businesses (guest activities in local dhows, supplying the lodges with fish, vegetables, traditional curios and crafts, etc).
- Better agricultural practices.
- Better fishing practices and improvement of catch.
- Securing of sustainable sources of protein;
- Education in basic ecological principles necessary for understanding the value of protecting natural resources;
- Preservation of traditional and cultural values that relate to natural resources;
- Creation of a flagship project for conservation in Mozambique, enhancing national pride and heritage symbolic

## **5.2 BENEFITS TO GOVERNMENT AND MOZAMBIQUE**

The CDBTP will assist government in fulfilling its role for socio-economic development by helping to develop projects in the areas of:

- Health: Contacts have already been made with the Provincial Department of Health to establish a small *Posto de saude* on Vamizi island, to rehabilitate and supply adequately the *Posto de saude* in Quiterajo, and to help with transport when a medical evacuation is needed.
- Water supplies: The Project will develop a system for providing water to the community on Vamizi island. It will also help to develop a borehole in Quiterajo, as part of a restructuring of agricultural development that will help in reducing the human/wildlife conflict and in improving food supplies.
- Agriculture: The project will develop a small pilot farm in the Specified-use zone of the Coastal Area that will supply technical expertise and seeds to community agricultural schemes. The Project will ensure the sustainability of such initiatives by buying vegetable supplies for the tourism lodges.
- Fiscalisation: Discussions with the Palma District administrator have already resulted in an agreement to ensure the development of a fiscalisation programme for the area around Vamizi and Rongui. The CDBTP will assist District authorities with radio communications (a base set radio will be installed in April in Palma) to link up Palma and the islands. It will also provide boat transport for patrolling the area and conducting law enforcement procedures. A similar scheme will be developed in the Coastal Area.

At a national level, the CDBTP will ensure a transfer of expertise in conservation, research, and tourism to Mozambican nationals, including recent graduates from University Eduardo Mondlane (Maputo) for who opportunities for further academic training will be made available.

The CDBTP also represents a unique model of collaboration between private sector, communities, government that has already attracted international attention and will become a model for sustainability in Mozambique.

### **5.3 STRATEGIES**

#### **Strategies to protect biodiversity and ecosystem processes**

- Identify critical areas and habitats by extending existing knowledge on:
  - Distribution of terrestrial and marine habitats
  - Identification, status and distribution of species and habitats which are endangered, threatened and critical, within and around the Project Area
  - Ecological processes responsible for the productivity and diversity of marine and terrestrial habitats
- Identify threats to key habitats, species and ecosystem processes
- Develop community-based mechanisms for protection against these threats
- Reduce the impact of the human/wildlife conflict in the Coastal Area through a community-based problem animal control programme
- Eliminate unsustainable resource use practices through community-based enforcement mechanisms and create incentives to adopt sustainable resource use practices
- Regulate resource uses through a zoning scheme within and around the Project Area
- Develop community-based monitoring programme of indicators of biodiversity

#### **Strategies to develop up-market eco-tourism activities**

- Identify key sites of tourism value within Project Area
- Build lodges in each project sites, with architectural and technical designs integrated in the environment
- Develop tourism activities focusing on natural resources (game viewing, diving, snorkelling, fly-fishing, walking trails, etc)
- Employ and train local people for all tourism activities
- Develop a zoning programme for ensuring the sustainability (minimum impact on environment, high yield, low volume, exclusivity) of the tourism operation and compatibility with local resource use activities
- Educate international tourists in conservation and community development issues
- Apply a bed levy to tourists for the creation of a fund that will guarantee the financial viability of the community/conservation programme

### **Strategies to ensure community participation in management decisions and activities**

- Employ Community Liaison Officer that is from the Project Area
- Assess decision-making institutions and structure of communities in the Project Area
- Establish Village Committees to promote active co-operation between communities and the Project
- Develop formal agreement with communities and District Authorities to guide relationship and cooperation of local communities with the Project
- Undertake all management and research activities following a participatory approach
- Integrate local and traditional knowledge with scientific knowledge for the planning of management activities
- Give resident community priority access to resources following the zoning scheme
- Provide enough incentives for communities to protect their resources

### **Strategies to promote sound management practices for sustainable production purposes**

- Develop community-based mechanisms for enforcing legislation pertaining to resource use
- Assist government logistically for backing up communities in law enforcement
- Assess all forms of resource use by local communities
- Eliminate resource use practices in core areas responsible for the productivity and diversity of resources
- Regulate traditional fishing and hunting activities through a zoning scheme
- Promote the use of sustainable fishing gears through small loan schemes
- Promote alternative sources of income including all tourism-related enterprises
- Encourage the development of under-utilised resources
- Ensure that new income generation is targeted at resident groups involved in unsustainable resource use

### **Strategies to contribute to the socio-economic development of local communities**

- Reduce the conflict between wildlife and local communities in the Coastal Area
- Reduce the risk of transmission of zoonotic diseases to local people
- Create employment in the areas of tourism and conservation
- Train local people in activities related to tourism, conservation and management
- Develop a community fund financed by a bed levy
- Give responsibilities to communities for decision and implementation of community projects financed by this fund
- Provide loan schemes through this community fund for the development of small businesses
- Assist government for priority needs of communities (health, education)
- Create a scholarship scheme for children showing interest in conservation and/or tourism

### **Strategies to provide opportunities for research and education**

- Establish priority research needs that will provide critical management information
- Develop a community-based monitoring system for evaluating resource sustainability and the success of management strategies
- Collaborate with international and national scientific organisations
- Develop a local education programme that will target priority groups within the communities and disseminate information on environmental issues
- Maintain an active dialogue with decision-making institutions and resource users through formal and informal mechanisms
- Develop scholarship scheme for children showing an interest in environmental issues
- Create a conservation/research education centre on the Project Islands and the Coastal Area

## CHAPTER 6. MANAGEMENT ACTIVITIES

Objective	Activities	Time frame
Protect natural resources	<ul style="list-style-type: none"> <li>- Employment of community guards</li> <li>- Training of guards in law enforcement by government</li> <li>- Logistical assistance (communications, transport) to government for law enforcement</li> <li>- Community-based control of further settlement and illegal activities</li> </ul>	Started in 2002
Reduce impact of human / wildlife conflict	<ul style="list-style-type: none"> <li>- Data recording of human/.wildlife incidents by local enumerators</li> <li>- Instigation of low-cost preventive measures into some communities</li> <li>- Ranking of species, areas and timing of human/wildlife incidents</li> <li>- Land-use evaluation of agricultural practices</li> <li>- Spatial reorganisation of crops</li> <li>- Epidemiological study of rabies</li> </ul>	Started 2002 / 2006
Survey of resource base and of resource use	<p><u>Project Islands:</u></p> <ul style="list-style-type: none"> <li>- Survey of coral reefs, seagrass beds, mangroves and marine species using participatory and dive surveys</li> <li>- Habitat mapping of the areas (GIS, satellite map, dive survey).</li> <li>- PRA on fishing grounds, seasonal and historical trends</li> <li>- Collection of landing data and boat rides with local fishers</li> <li>- Ranking of areas around the islands considering conservation, tourism and local commercial values</li> </ul> <p>Coastal Area: marine environment (same as above)</p> <p><u>Coastal Area:</u> terrestrial habitats</p> <ul style="list-style-type: none"> <li>- Survey of coastal forests, thickets and other habitats using participatory surveys</li> <li>- Habitat mapping of the areas (GIS, satellite map, survey).</li> <li>- Wildlife surveys using participatory methods</li> <li>- Survey of bushmeat trade and occurrence of illegal hunting</li> <li>- Land-use evaluation of agricultural practices</li> </ul>	<p>Started in 2002</p> <p>2004</p> <p>mid 2003/ mid 2004</p>
Assess status of endangered species and other key species	<p><u>Project Islands:</u> Turtle, dugong, dolphins, whales</p> <ul style="list-style-type: none"> <li>- Monitoring of turtle nesting beaches by local monitors.</li> <li>- Survey of habitat suitability and use as feeding grounds for these species</li> <li>- Tagging of specimen</li> <li>- Participatory rural appraisal (PRA) on distribution, population trends, local values</li> <li>- Aerial census of populations</li> </ul> <p><u>Coastal Area:</u> marine environment (same as above)</p> <p><u>Coastal Area:</u> elephant, wild dog, lion, buffalo, sable, suni</p> <ul style="list-style-type: none"> <li>- Population census and distribution through participatory</li> </ul>	<p>Started in 2002/ 2005</p> <p>2004</p> <p>mid 2003 / mid 2004</p>

	<p>methods</p> <ul style="list-style-type: none"> <li>- Radio-collaring of individuals</li> <li>- Participatory rural appraisal (PRA) on distribution, population trends, local uses and values</li> </ul>	
Zonation of Project Areas into different use areas and linkage with other Protected Areas	<ul style="list-style-type: none"> <li>- Ranking of areas considering conservation, tourism values and local subsistence needs</li> <li>- Creation of a core zone within Project Area with exclusive tourism access in collaboration with communities</li> <li>- Creation of community use zones</li> <li>- Creation of a buffer zone around Project Areas with limited use and potential linkage to other Protected Areas</li> </ul>	2003
Research on critical habitats and species	<ul style="list-style-type: none"> <li>- Survey of endemic species</li> <li>- Ecology of endangered species</li> <li>- Population dynamics and genetic diversity of endangered species populations</li> <li>- Pharmaceutical and cosmetic properties of plants used for traditional uses</li> </ul>	2004/2006
Promote sustainable use practices and improve livelihood	<ul style="list-style-type: none"> <li>- Survey of history, decision-making institutions, sources of income and subsistence, social services, priority needs</li> <li>- Assistance to government for improving social services (health, education, water)</li> <li>- Creation of pilot commercial agricultural schemes</li> <li>- Creation of incentives to develop other small businesses related to tourism</li> <li>- Development of a programme for monitoring indicators for assessing impact of project</li> </ul>	2003 / 2006
Increase environmental awareness and transfer skills to Mozambican	<ul style="list-style-type: none"> <li>- Training and employment of local people on project.</li> <li>- Use of endangered species as flagship to initiate awareness campaign</li> <li>- Train and employ local people in wildlife surveys, fisheries surveys and endangered species monitoring</li> <li>- Creation of research/education centre</li> <li>- Academic training of Mozambican graduates</li> </ul>	2003/2006

## CHAPTER 7. ZONATION

### 7.1 PRINCIPLES

The sustainable conservation of these marine ecosystems will be based on an integrated coastal planning and management approach, allowing multiple uses in the area. An important aspect of management is the division of the area into zones for different uses so that the multiple-use goals of conservation, tourism and utilisation by communities can be achieved. This is particularly important for reefs ecosystems where protection of a core area has proved to increase significantly the abundance of fishes both inside and outside the area of protection, as well as for estuaries which need to be able to maintain exceptionally high levels of productivity.

Although the concept of zoning is usually applied in Protected Area, it will be essential in the *Fazenda do Bravio* of the CDBTP in order to ensure that:

- sensitive and critical habitats are protected from damaging activities
- tourism activities are separated from other areas to avoid conflicts
- intensive use (fishing, agriculture) is confined to areas that can sustain it

The zoning programme includes the definition of:

- Core areas, which cover habitats that have high conservation values, are vulnerable to disturbance, and can only tolerate a minimum of human use. These core areas need to be large enough to sustain breeding populations of key species and their support systems and to be in relatively pristine condition. They will only support very limited tourism activities (diving, walking, etc) developed exclusively by the CDBTP, as well as communities activities providing that they are sustainable and very limited. These will include:

For the Project Islands:           Coral reefs surrounding the islands  
  Nesting beaches on the islands  
  Turtles and dugongs foraging grounds

For the Coastal Area:           Floodplains along the Messalo river  
  Main water points along the river  
  Mangroves  
  Dry forest and coastal thicket

- Specified-use areas, which cover areas of conservation value but which are important and suitable for local human use, including fishing and agriculture. They will include:

For the Project Islands:           Traditional fishing grounds between Vamizi and Rongui.  
  Tecomagi reef, which is an essential component of the  
  Rongui-Tecomagi reef systems (See Annexe 2)

For the Coastal Area:           Fields around settlements and in areas outside the core areas  
  Will include a recreational area along the beach where  
  tourism lodges will be built

- Buffer zone, which surround the *Fazenda do Bravio*. It will enable to include continuation of the important habitats that are inside the *Fazenda do Bravio* and to safeguard it from encroachment and to manage activities that may affect ecosystems within the *Fazenda do Bravio*.
- Corridor, which should ultimately be established for linking the Project Area with other Protected Areas and create Transfrontier Protected Area. They will include:

For the Project Islands:           Area to link up with Mtwara Protected Area in Tanzania

For the Coastal Area:           Area south to link up with Querimbas National Park

## 7.2 ZONING PLAN

The zonation is based on the current knowledge of distribution of critical habitats and areas of uses around Vamizi and Rongui islands, as well as in the Coastal Area, as identified from the aerial, ground and marine surveys and examination of satellite images. It will require refinement once further surveys have revealed the extent and conservation value of the habitats within each area.

The habitats shown on maps correspond to habitats considered to be of particular conservation value, as listed below.

### 7.2.1 Coastal Area (Figure 2)

#### Core zone

*Boundary*   The northern, eastern and southern boundaries follow the contour of the *Fazenda do Bravio*. The eastern boundary follows a line running parallel to the Mucojo/Quiterajo road, but situated 2kms west of this road. It goes around Quiterajo following a 2kms perimeter until it joins the coastline.

*Justification* Lowland forest and dry deciduous thicket which is part of the largest, most undisturbed and thus most valuable area of dry forest and thicket recorded in the coast of Cabo Delgado, and which provide wildlife with dense cover.

Floodplains with numerous water points which allow access of game to the river

Wetlands with abundant birdlife

Very large tracts of mangroves

#### Specified-use zone

*Boundary*   Area situated east of the core area, i.e. following a line running parallel to the Mucojo/Quiterajo road and situated 2kms west of it, but excluding the recreational area on the coast



*Justification* Contains coastal grassland and wetlands

### **Recreational zone**

*Boundary* A coastal strip 1km wide between Ingoane and Milamba mangrove inlet.

*Justification* Prime site of aesthetical and tourism value

### **Buffer zone**

*Boundary* The northern boundary runs 2 kms north and parallel to the Messalo river, until it meets the Muera river. It follows the Muera river west and the Mualonadiuma river south, crosses Lake Nguri and Lake Chipinge, goes in a straight line east to meet River Livualede, follows this river until River Diquide, and then joins the old Rucia footpath until Ingoane. The eastern boundary runs parallel to the coastline, 3.5 kms out at sea.

*Justification* Essential components of the Messalo river estuary system (floodplain, wetlands, mangroves).

Wildlife corridor between Lake Macungue and Lake Nguri essential during the dry season

Continuation of the Quiterajo dry lowland forest and coastal thickets, as well as another patch of dry forest east of Chai which forms a wildlife refuge.

Reef system of Cabo Paqueve.

Nesting and foraging grounds for turtles.

Sea grass meadows supporting what could be one of the most important dugong populations of the Province.

## **7.2.2 Vamizi and Rongui Islands (Figure 3)**

### **Vamizi core zone**

*Boundary* The boundary follows the 30m contour around the northern, eastern and southern sides of Vamizi island, leaving the island area west of E 40°38', but including Kisanga bank.

*Justification* Pristine fringing reef habitat, unaffected by bleaching and any other impacts. Considering its position in relation to the main current, it probably plays a key role for coral and reef larvae replenishment.

Turtle nesting beaches and juvenile development grounds

Mangrove habitats

Pristine coastal thicket on the island, roosting grounds for seabirds, samango monkey colony

### **Rongui core zone**

*Boundary* The boundary follows the 30m contour north, east and south of Rongui island, including Queramimbi islet, passing midway through the shallow water channel between Rongui and the mainland and rejoining the 30m contour.

*Justification* Pristine fringing reef habitat, unaffected by bleaching and any other impacts. Considering its position in relation to the main current, it probably plays a key role for coral and reef larvae replenishment.

One of the more extensive continuous coral system of the archipelago (around 20 km long).

Turtle nesting beaches and juvenile development grounds

Mangrove habitats

Pristine coastal thicket on the island, roosting grounds for seabirds

### **Specified-use zone**

*Boundary* The eastern boundary follows the 100m contour off Vamizi and Rongui islands, bridged by a straight line between the eastern-most points of the contours. The northern and southern boundaries are the latitudes of S10°45' and S11°05', and the high water line along the coast

*Justification* Tecomagi reef, which is an essential component of the Rongui-Tecomagi reef system

Extensive areas of seagrass meadows with dugongs

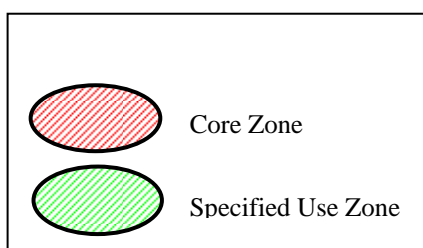
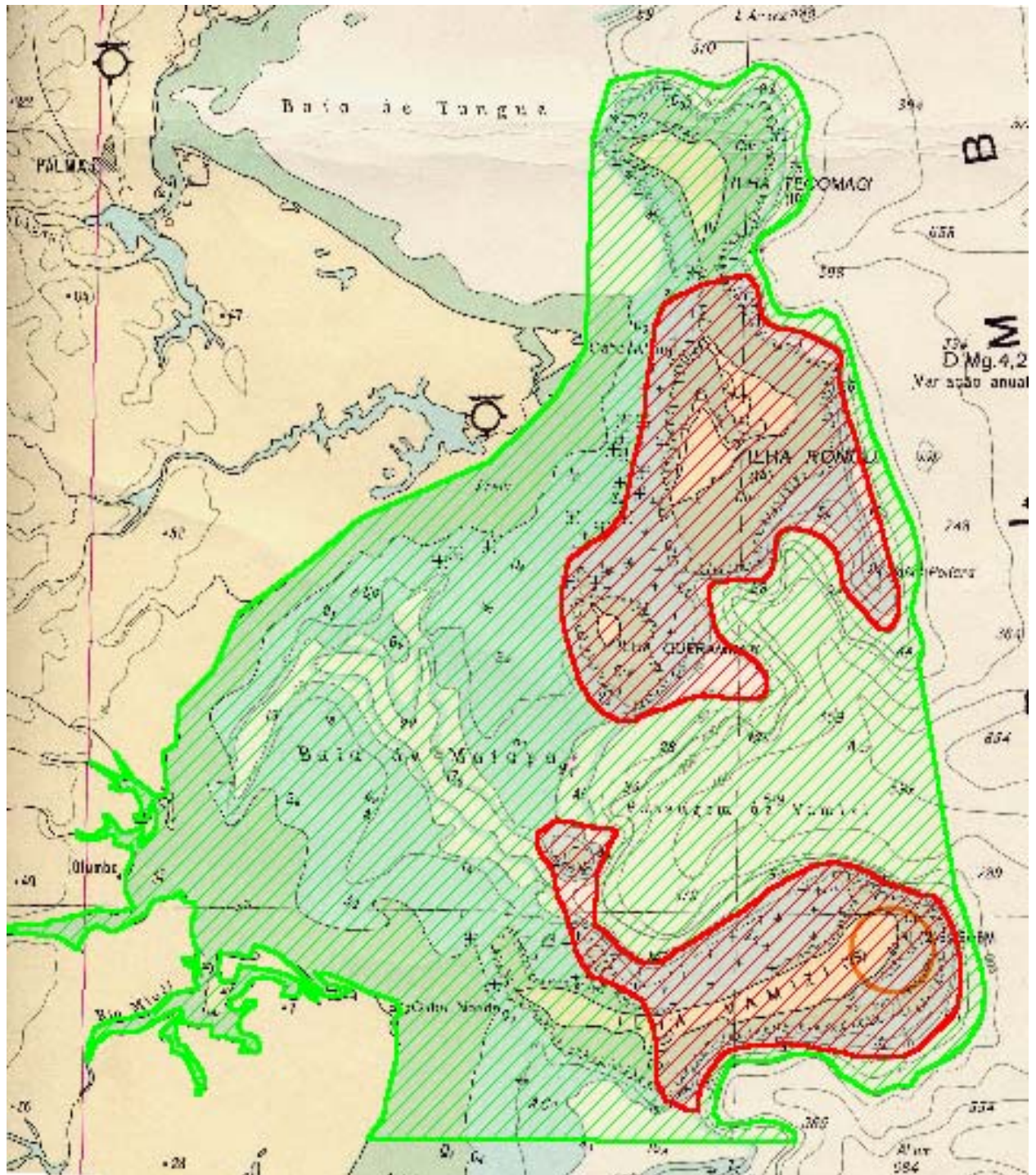
Intertidal zone along the coast with turtle nesting beaches

Extensive mangrove system around Olumbe

Pelagic habitat important for dolphins, whales, sharks and large pelagic fish species



Figure 3. Zoning plan of Vamizi/Rongui



## 7.3 SUMMARY OF ACTIVITIES BY ZONE

### 7.3.1 Coastal Area

ACTIVITY	CORE ZONE		SPECIFIED-USE ZONE		RECREATIONAL ZONE		BUFFER ZONE	
	CDBTP	Others	CDBTP/Resident	Others	CDBTP/Resident	Others	CDBTP/Resident	Others
Tourism lodge	Yes	X	CDBTP	X	CDBTP	X	CDBTP	X
Permanent settlement	X	X	Resident	Resident	X	X	X	X
Crops	X	X	Resident	X	X	X	X	X
Use of traditional footpaths	X	X	Resident	X	X	X	Resident	X
Hunting	X	X	CDBTP	X	X	X	X	X
Timber cutting	X	X	X	X	X	X	X	X
Firewood collection	X	X	Resident <sup>1</sup>	X	X	X	Resident	X
Problem Animal Control	X	X	CDBTP	X	CDBTP	X	CDBTP	X
Collection of traditional plants,honey	X	X	Resident	X	X	X	X	X

<sup>1</sup> Only deadwood

### 7.3.2 Project Islands

ACTIVITY	CORE ZONE		SPECIFIED-USE ZONE	
	CDBTP	Others	CDBTP/Resident	Others
Tourism lodge	CDBTP	X	CDBTP	X
Permanent settlement	X	X	X	X
Subsistence crops	X	X	X	X
Cash crops and plantations	X	X	X	X
Fishing (only sustainable practices, as determined by further fisherie surveys)	Resident CDBTP	X	Resident CDBTP	X

## CHAPTER 8. FRAMEWORK

The financial viability of the conservation and community programme will be ensured through the redistribution of some tourism-generated revenues towards a fund that will be managed by a Board. Before tourism revenues can be generated, such funds will be raised through international conservation organisations such as the Zoological Society of London, and then managed by a Mozambican non-profit Association. As the programme develops and tourism generates money, this Association will become a Trust.

### 8.1 ASSOCIATION

Representatives from the CDBTP, local government, international and national scientific organisations will be Associates. They will formulate general policies on the management of the *Fazenda do Bravio*. The Association will also employ a resident marine biologist and ecologist, and a Community Liaison Officer (Figure 3).

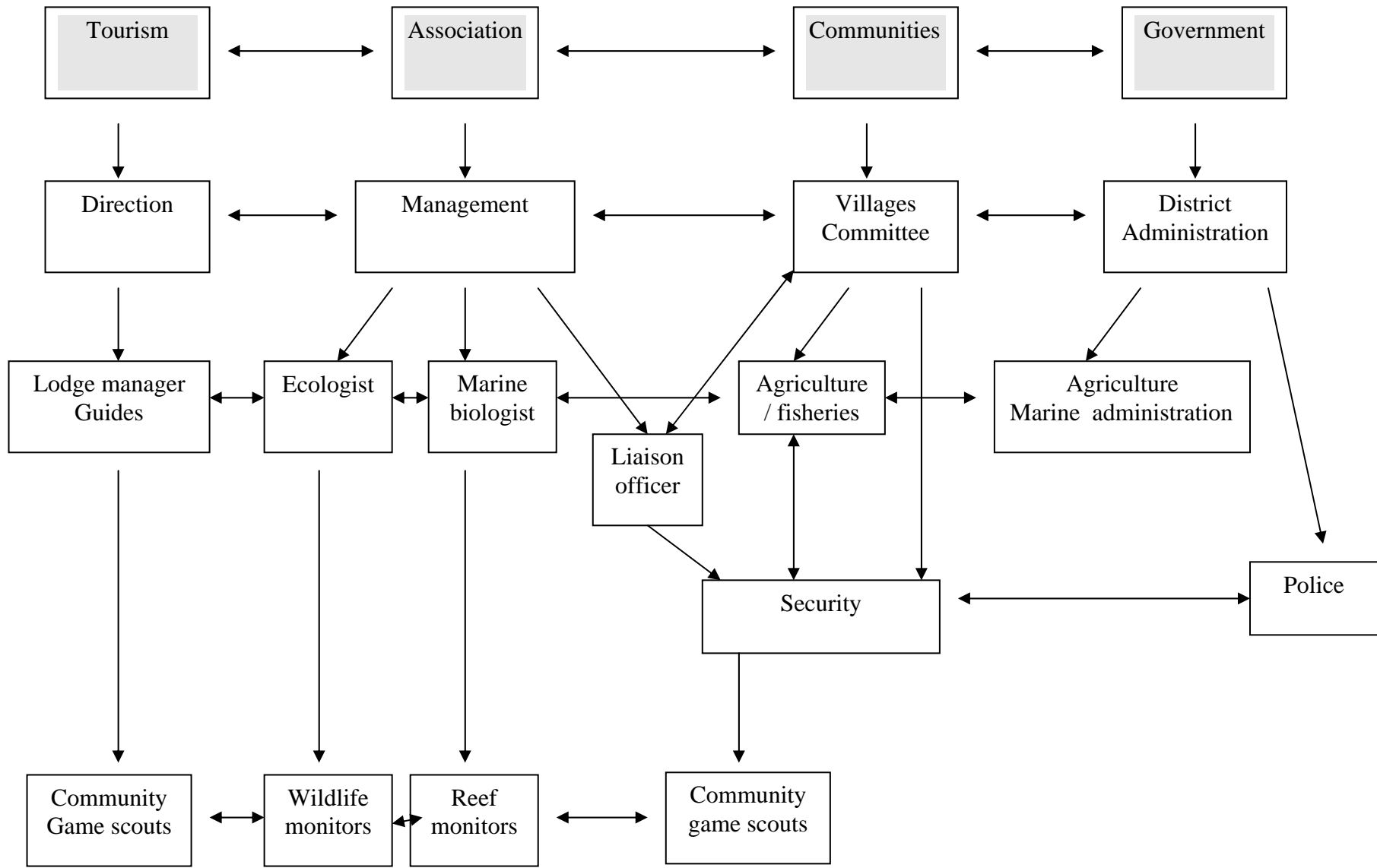
### 8.2 COMMUNITIES

Each community present in the Project Area will elect representative on a Village Committee, which will become the interface between the communities and the CDBTP. Communication between these two entities will be facilitated by a Community Liaison Officer that will be employed by the CDBTP.

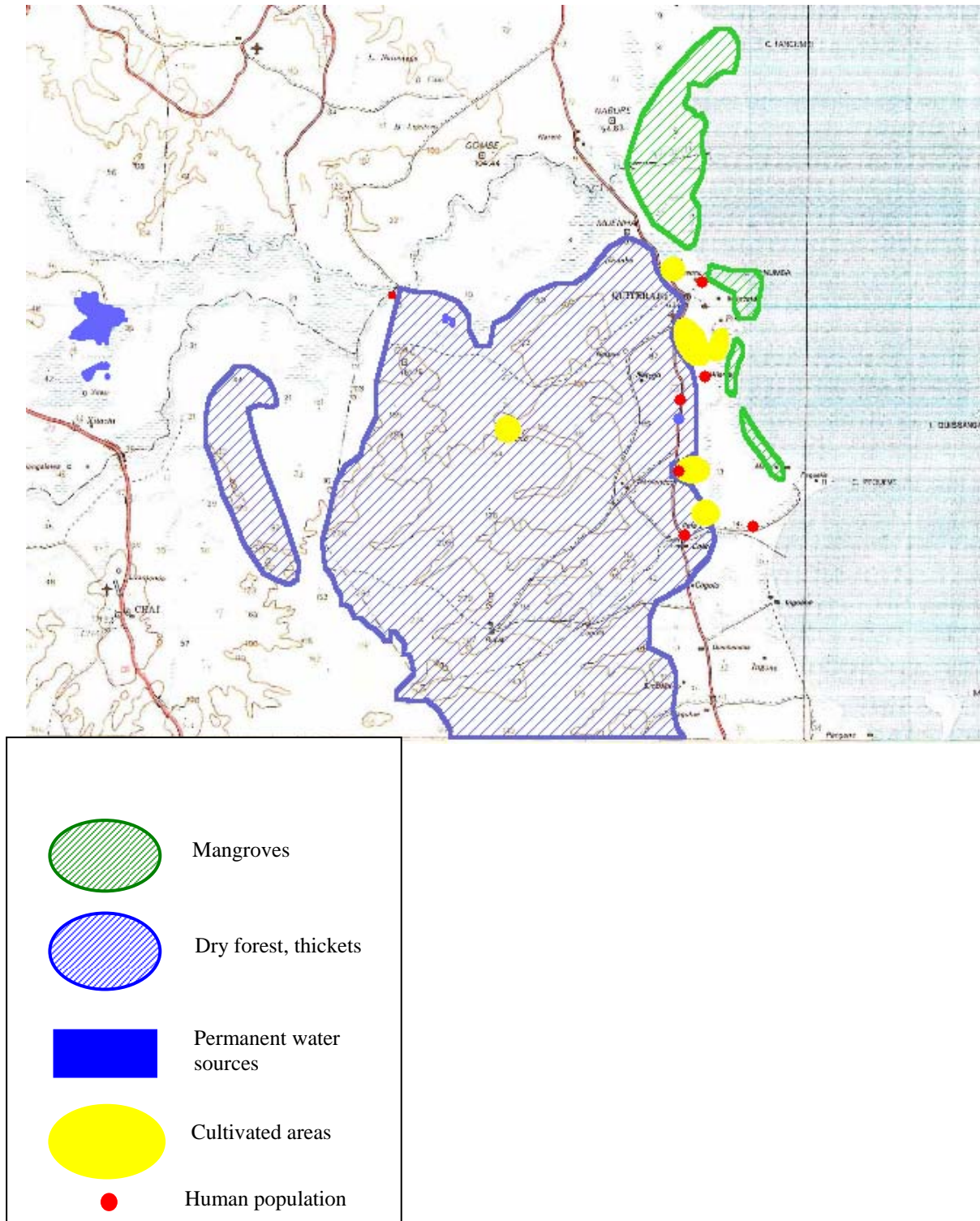
### 8.3 GOVERNMENT

District authorities will assist Communities and the CDBTP in law enforcement, while the CDBTP will assist logistically government in his role. A cooperative programme will have to ensure easy flows of intelligence, efficient use of equipment and prompt reaction when needed.

**Figure 4. Management structure of the Fazenda do Bravio**

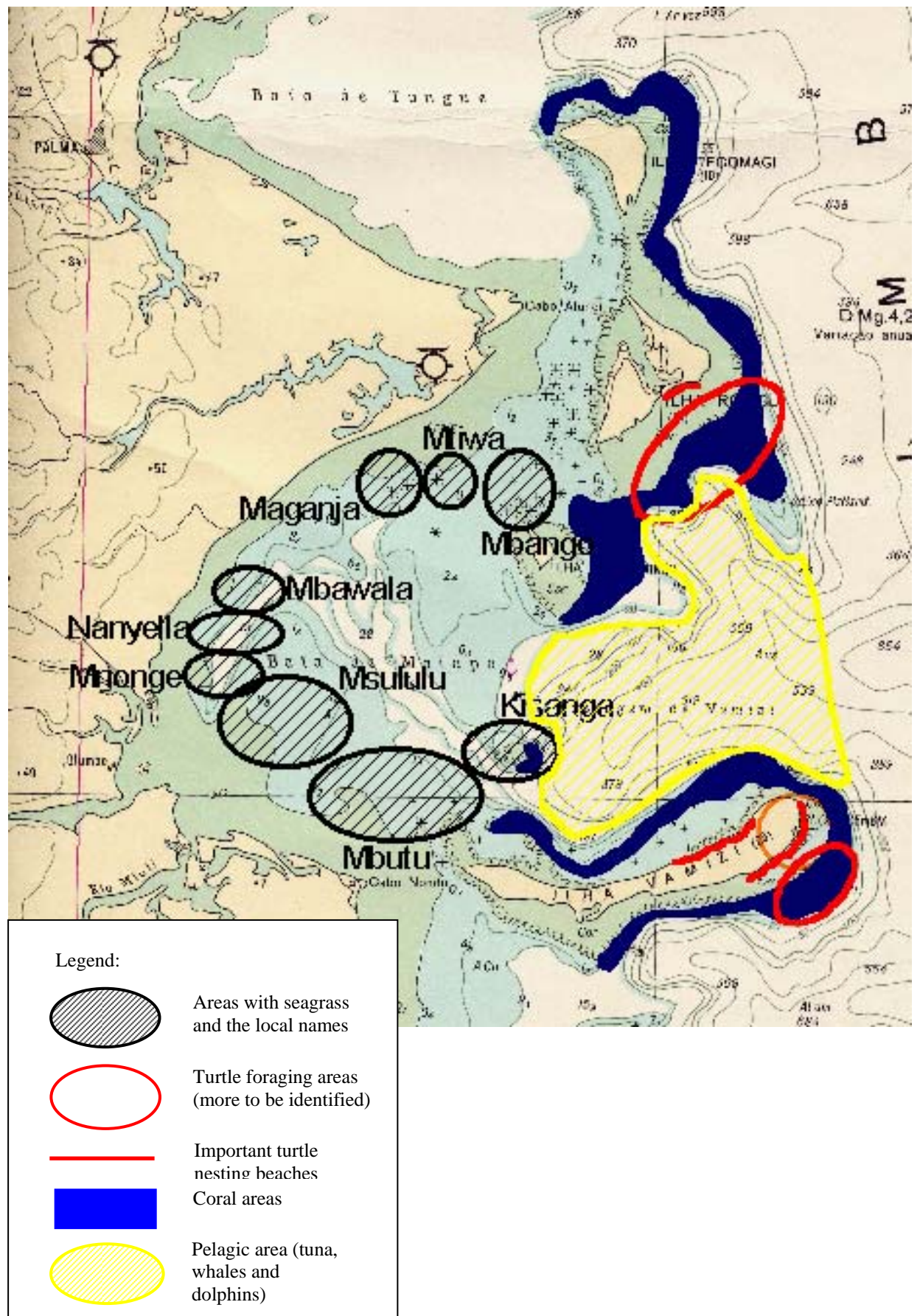


## Annexe 1. Critical habitats and human settlements in the Coastal Area





## Annexe 2. Critical habitats around Vamizi/Rongui islands



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