

# **Discussion Document**

## **National Coral Reef Management Program (NCRMP): Mozambique**

### **Preamble:**

This document is intended as a seed for discussion and the subsequent development of a national coral reef management program for Mozambique. It is in no way intended to be the definitive plan but rather a starting point for the process of developing an integrated and encompassing program.

To this end, all constructive comments and opinions are welcome, and these can be submitted to the coastal zone management unit at MICOA.

Thank you in advance for your contribution.

# Discussion Document

## National Coral Reef Management Program<sup>1</sup> (NCRMP): Mozambique

### Background and Current Situation

Whilst a more thorough summary has recently been compiled on the coral reefs of Mozambique (Rodrigues *et al.*, *manuscript in prep.*), the following points can be made.

The Mozambique coastline extends over approximately 2,700km and is bordered by a typically narrow continental shelf of less than 5km. Despite this narrow shelf, however, there are large areas, particularly in northern Mozambique, which have extensive coral growth and can be said to have true coral reefs.

Traditionally, the Mozambique coast is considered in three regions: the northern, central, and southern regions. Of these regions the central region has perhaps the poorest coverage of Scleractinian corals due to significant inputs of sediment and freshwater from the Zambeze and Save Rivers which discharge here.

Similarly, the southern region is characterised by generally sparse Scleractinian growth but contains some areas such as Inhaca Island where growth is extensive. Most often, however, coral coverage is restricted to patch reefs or coral growth on pre-existing sedimentary rock platforms.

By comparison, the northern region contains extensive areas of Scleractinian coral growth which form reefs around the numerous islands, and also form shallow lagoons with barrier reefs along significant sections of the northern coastline.

At the same time, approximately 23% of the country's total land area falls within 42 coastal districts and an estimated 40% of the country's population live on the coastal strip (Lopes, 1996). Population densities range from 28 persons/km<sup>2</sup> in rural areas to between 625 and 1525 persons/km<sup>2</sup> in urban areas such as Beira and Maputo, the capital.

Economically there is a strong national dependence on marine resources with approximately 40% of Mozambique's revenue coming from the industrial and semi-industrial fisheries sectors (Palha de Sousa, 1996). Notably, 70% of the total national catch comes from the artisanal fishery which is largely restricted to within 5km of the shoreline.

Also, there is currently a rapid increase in tourism along much of the coast and the target areas for this are primarily those with coral reefs. Whilst the current situation of poor infrastructure does not favour the Mozambique economy, the recent trend toward tourist development seems likely to continue.

In addition to these sources of income, there are also a number of other resource extraction activities practised in many parts of the coast which impinge directly on coral reefs. Among these the most noteworthy are perhaps coral mining, for the production of lime, ornamental fish collection for export, and the collection of shells and curios for export. Again, since there is little to no available information on the magnitude and distribution of these activities, it is impossible to fully assess their impact on the coral reefs involved.

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<sup>1</sup> This document is intended as an initial step in the formulation and implementation of a viable management strategy and program for coral reefs in Mozambique.

In summary, the coastal waters and coral reefs of Mozambique represent a significant component of the coastal and national income. The full significance of this and the extent to which coral reefs play a role in the economy can only be inferred from the information currently available. However, it is clear that coral reefs play a major role in the welfare of coastal communities and therefore warrant an effective and sustainable management system.

In the light of this, there have been growing efforts within Mozambique to develop a management scheme for coral reef resources, however this has been hindered by a number of concomitant factors.

In the first instance, there currently exists little capacity in many of the sectors necessary for the development and implementation of an effective management program. Whilst there are a number of individuals and smaller groups who have experience in some aspects of management, government, and marine resources, these are presently too few to provide a solid base for management. Similarly, there are only a few younger Mozambique scientists or ecologists who have any knowledge and background in coral reef research. Clearly, there is a great need to build up the national capacity in a wide range of areas that are necessary and appropriate for coral reef management. Some of these areas of expertise are already identified within the larger national coastal zone management program, but this list could be refined to specifically support coral reefs during the initial process of developing a national management program.

The other main limit to the development of a coral reef management program is a lack of financial support. In the present economic situation in Mozambique there is still a national need to give high priority to improving social welfare and the alleviation of poverty. In this context there is little government funding available for the development and implementation of resource management programs, and so there is a great dependence on donor support for such activities. Coral reef management clearly falls within this category.

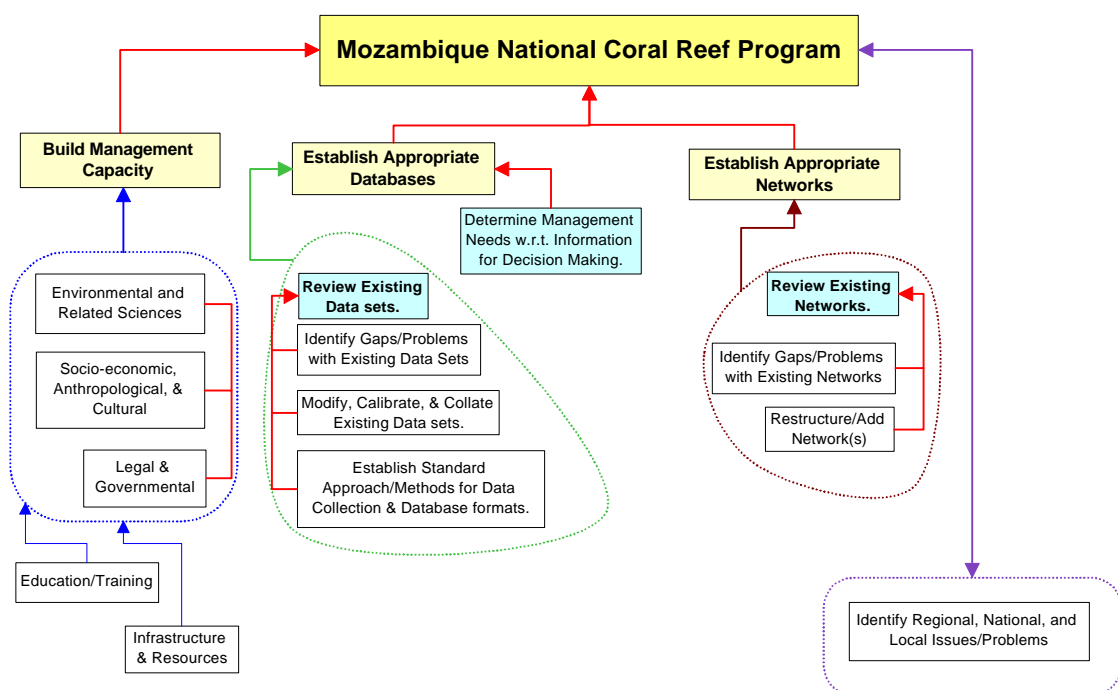
Also, it should be highlighted that, for similar reasons, Mozambique has a very limited historical background in coral reef research and/or monitoring, so that there is only limited potential for ecological and socio-economic comparisons to be made with the current situation. Further, this means that those sectors ultimately responsible for management, and the supply of information to management, are likely to also be more unaware of the needs and characteristics required by an effective coral reef management program. In short, these compounded problems have, in some sectors, lead to a situation where there is a total lack of understanding as to the relevance and value of a sound policy for natural resource management. By corollary, an integrated and multi-disciplinary approach is required in order to adequately address the issues involved. This is definitely true with regard to coral reef management.

Notably, MICOA, in conjunction with DANIDA and in close cooperation with a number of other donors, have recently initiated a project for the development of a National Coastal Zone Management Program (NCZMP). This program encompasses the entire coastal zone and is multi-disciplinary in its approach. It is further envisaged that one of the components of this NCZMP will address the critical ecosystems which comprise the coastal environment; such as coral reefs. Consequently, the present management plan for coral reefs is being formulated concurrently with the National Coastal Zone Management Plan (NCZMP). Specifically, the coral reef management plan aims to address the component within the NZCMP entitled "National Programs for Specific Ecosystems".

In the light of the above discussion, and background discussions with a variety of individuals and groups that are in some way involved in coral reefs, four larger areas of activity stand out as being vital for the attainment of the main goal of sustainable management of coral reef resources.

These areas are:

- capacity building within the relevant fields required for effective sustainable management;
- the collection and synthesis of relevant information and scientific data in support of sound management;
- the development of an appropriate and effective network for the coordination and sustenance of coral reef management related activities;
- and the process of identifying, characterising and addressing current and eventual problems with coral reefs and their management.



**Figure 1** Summary diagram of the proposed areas of activity required for the development and establishment of an effective National Coral Reef Management Program.

It should also be noted here that, whilst the components listed above are vital within management, they are not presented here as the total model for coral reef management in Mozambique. Clearly these aspects will have to be built into a functional management process and this, in itself, is seen as part of the development of the national program. Unfortunately, however, the present lack of expertise and background knowledge in Mozambique means that the rate at which the process of program development can be undertaken is severely hindered. Consequently, the initial phase of management and management strategy development will require that certain areas of activity be given a higher priority than might otherwise be warranted.

Further, it is envisaged that all activities, and the development of the management program, be subject to an ongoing process of review and upgrading in order to make them appropriate over time and amidst changing circumstances.

### Aims & Objectives:

In broad terms the core aim of the coral reef management program is to ensure the long-term sustainable utilisation of the coral reef resources<sup>2</sup> of Mozambique. Within this context, and in accordance with the perceived shortcomings and problems currently existing in Mozambique, a number of more specific aims have been derived.

The central aims are:

1. To integrate coral reefs into the mainstream of decision making as part of an overall national integrated coastal zone management plan.
2. To build an effective management capacity for coral reefs in Mozambique. This includes the capacity required within the environmental sciences, socio-economics, anthropological and cultural sciences, as well within the legal and government organisations that set the guidelines and regulations for the management of coral reefs and the activities that might impinge on their integrity.
3. To provide a sound platform of information and technical support for the relevant decision making bodies and organisations who are responsible for coral reef management.
4. To help generate, and increase, awareness about the role of coral reefs and their significance for the welfare of coastal communities and the national economy as a whole.
5. To ensure that coral reef management is made dynamic so that it can accommodate future socio-economic and ecological changes as they occur, with the aim to mitigate any negative impacts that such changes may have on the integrity of coral reefs.

### Current Coral Reef Activities within Mozambique:

As presented in figure 1, there are presently four major areas of activities that are considered to be critical for establishing a National Coral Reef Management Plan (NCRMP). Notably, at present there are a number of ongoing activities that clearly fall within these target areas. These are briefly described below.

#### ***Capacity Building:***

Currently there are at least three ongoing projects within Mozambique, which involve the training of local people in different aspects of coral reefs.

The Sida-SAREC Regional Coral Reef Program is presently supporting a number of different activities. Initially, it is assisting in the development of a coral reef research/survey group that draws personnel from a number of different organisations as their expertise dictates. These include the Institute for Fisheries Research (IIP), University Eduardo Mondlane (UEM), Promarte, and MICOA itself. Accordingly, the people involved have varying levels of skill in the following fields of expertise; coral taxonomy, coral reef ecology, coral reef fish ecology, underwater photography, coral reef surveying, and research coordination. Consequently, the idea with the group is to further train the members in their respective fields and to ultimately

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<sup>2</sup> In this context, coral reef resources are meant to include all resources directly obtained or derived from coral reefs. This encompasses all coral reef related fisheries, shells, corals, plant life, and ecosystem components inherent in coral reefs.

form a nucleus of experts who can then go on to train other local scientists. At present, this project is in its initial stages but it is expected that the group will be in a coherent and functional form by mid 1998. At this time the group should be able to conduct survey work for status assessments of coral reefs, and also be able to conduct more intensive inventories of coral reefs toward the establishment of monitoring sites and/or the more accurate assessment of the integrity of coral reefs areas.

This project is also providing assistance in training personnel in monitoring techniques and is establishing monitoring sites that will form part of a national monitoring network as the required expertise is developed. A number of broad areas where monitoring sites might be established are presented later in this document.

Finally, the Sida-SAREC project is assisting with the formation of a national Coral Reef Management Plan for Mozambique. The present Sida-SAREC project is expected to continue until 1999.

The second main project currently concerned with coral reefs in Mozambique is that being conducted by Frontiers Mozambique. This project is surveying the coral reefs in the Kuirimbasa area of Northern Mozambique and is also training some local personnel in survey methods. To date, a significant but largely coarse level data set has been obtained for the reefs using RAPID assessment techniques. It should be noted also that coral reefs are only one component of a larger resource assessment project and so available resources necessarily limit their investigation. In line with this, however, a number of local non-academic personnel have been trained in the necessary methods and so represent another nucleus for the further development of Mozambique expertise. This project will end in the beginning of 1998 and there are currently plans by Frontiers to apply for funding to conduct similar surveys at other locations in northern Mozambique.

The third project currently underway is being conducted on Bazaruto Island. This project is being financed by the European Union, and implemented by WWF, DNFFB and the Endangered Wildlife Trust of Mozambique. As with the Frontiers project, this endeavour has trained local personnel in diving and survey techniques, and it has also collected a significant data set. In addition, the project has established a number of monitoring sites, which it hopes will be monitored in the future by any coral reef program that might be developed.

In difference to the other two projects listed above, the Bazaruto project has also attempted to develop a management plan for the reefs of Bazaruto and it has oriented its investigations accordingly. The project is expected to end in mid 1998 although further funding is being sort.

In addition to the above projects there have also been some "snap-shot" style projects which have attempted to provide training in some aspect of coral reef ecology, surveying techniques, or management. The most recent example of this is the survey conducted on the reefs at Inhampura near Xai Xai. This project was conducted under the auspices of UNEP, IUCN, and MICOA, and aimed to both survey the Inhampura reefs as well teach local personnel a number of RAPID assessment methods. Unfortunately, as is often the case with such singular activities, a number of factors greatly limited the potential gains made from the project and its contribution to the long-term management of coral reefs is questionable.

### ***Established Databases***

As summarised by Rodrigues *et al.*, (*manuscript in prep*) there has historically been comparatively little research conducted on coral reefs in Mozambique. This has lead to the situation where the existing information is patchy and sometimes inconsistent, so that accurate comparisons over time are not possible. This, in turn, poses problems, as it is therefore not possible to provide management with prognoses and/or possible cause-effect diagnoses with regard to any degradation that has occurred so far.

With this as a background, all of the projects mentioned above have provided much needed

input for the assessment and characterisation of Mozambique's coral reefs. As a result, there are now substantial data sets for the respective study areas.

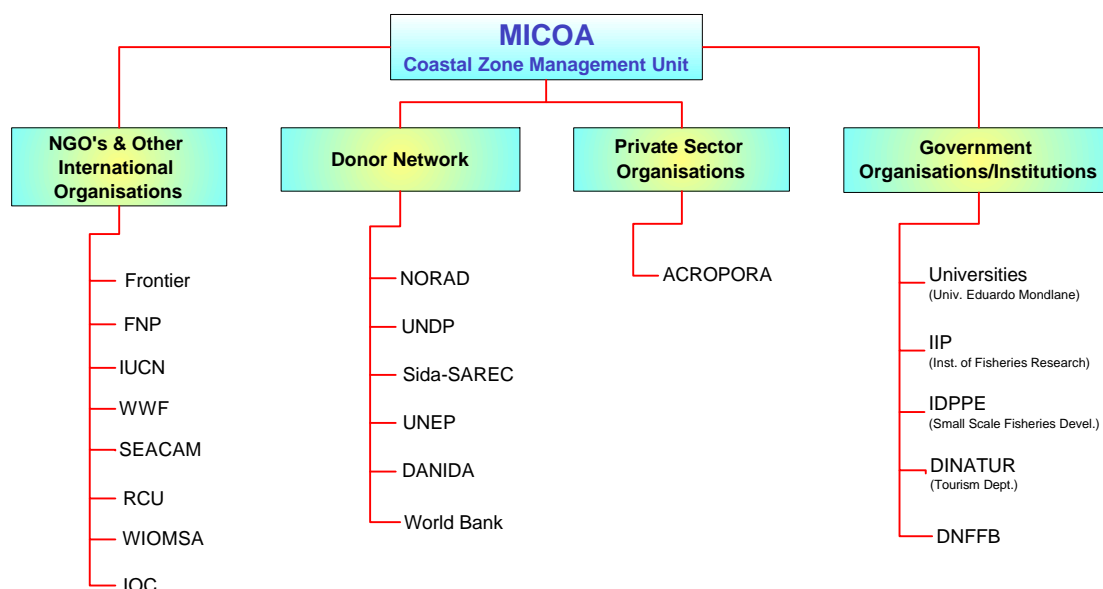
Unfortunately, however, there is also the potential for management problems related to some of the recent data collected and this is a matter that needs to be dealt with in the immediate future. Regrettably, it is only recently that these projects have had any significant dialogue with each other and so there has been little to no standardisation of methods, data entry formats, or post-collection data handling. This potentially places doubts on some of the data in terms of its appropriateness and applicability to management. The true usefulness of existing monitoring sites, and the data collected by all of the above projects will need to be assessed.

### ***Existing Networks:***

As shown in Figure 2 there currently exist a considerable number of organisations and institutions that are in some way involved in coral reef related activities and who may potentially play a role in their long-term management. All of these bodies presently have contact with MICOA and thus form part of an existing network of communication.

Unfortunately, given the relatively recent global and local realisation as to the importance of coral reefs, few if any of these bodies have a specific mandate or code of activity which is specifically aimed at coral reefs in Mozambique. In addition, a range of historic and administrative factors has hindered the effective networking between some of these bodies.

Consequently, it seems necessary that effort be put into developing a more effective network for the support and implementation of any coral reef management program that is developed.



**Figure 2** Current organisations and institutions with some involvement or interest in coral reef management and who have a direct link with MICOA.

### ***Identification of existing Problems and Shortcomings in Coral Reef Management:***

A brief survey among the different stakeholders associated with coral reefs and coral reef resources indicates that there are many tangible problems presently facing coral reefs and their

management in Mozambique. Clearly there are many easily identified issues that warrant attention and these include the following:

- the use of destructive fishing methods;
- over exploitation of resources including certain fish species and, potentially, certain invertebrates;
- inappropriate and degradative building practises in the coastal zone that may impact coral reefs;
- inadequately managed tourism related activities;
- the uncontrolled or poorly managed collection of curios and other coral reef resources;

Unfortunately, however, the problems discussed above concerning inadequate management capacity and the lack of available information, make it difficult at present to construct a clear and soundly based picture of the extent and nature of the major problems facing coral reefs in Mozambique. In some areas there are visible signs of impact on corals and one or more of the associated resources (*insert example*). However, the lack of hard information generally makes it hazardous to prescribe a sound management approach, and the lack of infrastructure makes it equally difficult to implement any appropriate actions.

In line with this, it is also unclear as to what the best strategy for different aspects of coral reef management would be. In the case of possible zonation for coral reefs, for example, it might be that one or more combinations of zonation are appropriate depending on current and future use patterns for the resources in the area.. It might be necessary, for example, that some zones have a highly limited access because of their role as in maintaining local biodiversity or uniqueness, whilst other zones would be designated open use or multiple use. Such guidelines and planning strategies will be derived as the relevant information and synthesis occurs over the ensuing period of development.

### *Possible Activities Encompassed by the envisaged National Management Program:*

In the light of the above discussion a number of possible activities and approaches are proposed below in order to raise what are considered as key issues for the development and maintenance of an effective NCRMP. As mentioned above, this is not intended as an exhaustive or definitive list and it is hoped that this list can be made as applicable and appropriate as possible by the contribution of ideas by the different interested parties and stakeholders.

#### *General:*

- the formation of a working group to prepare a coral reef management strategy and program for Mozambique. This group would contain representatives from the major stakeholder groups and should conduct its activities in dialogue and consultation with the coastal communities.
- the establishment of a reference group to collate and assess the currently available information on coral reefs in terms of its appropriateness and applicability to management needs. This should include the establishment of standards for data collection and post collection data handling.
- the formulation, development, instigation, implementation, and enforcement of a national coral reef management plan and strategy with the involvement of coastal communities (including the private sector).



- the building of awareness within the community and across the various governmental and non-governmental sectors as to the significance and value of coral reefs for the welfare of the larger community as a whole.
- the thorough examination of the economic and social significance of coral reefs for the coastal communities and nation with the aim to identify and apply locally appropriate socio-economic tools to assist in the sustainable management of coral reefs. This should include an assessment of the sharing of benefits from resource utilization.
- research on the ecology of coral reefs with the aim of developing and implementing effective measures for sustainable management of the coral reefs as well the possible restoration and/or remediation of damaged reefs.
- the development of an effective network aimed at enhancing the cooperation between government, scientists, the tourist and business sectors, and coastal communities.
- the development of an effective coordination system between protected area, conservation, and research projects being conducted on coral reefs with the aim to maximize the effectiveness and the gains made from such efforts.

*Socio-economic:*

- the examination of the role of coral reefs within the larger tourist industry and business sector on with attention to the socio-economic and ecological pro's and con's for the long-term welfare of the community.
- the assessment of the coral reef fishery in terms of its significance for coastal communities and for the welfare of the community at large.
- the examination of, and, where suitable, the development of mechanisms and strategies for the alleviation of the resource pressure currently being placed on coral reefs in Mozambique. This could include alternative income earning activities, as well as incentives for alternate methods of resource use, and economic deterrents for resources obtained illegally or by destructive means.
- the examination of possible alternative methods for financing the maintenance of coral reefs in Mozambique.
- the development of more effective systems and methods for the collaboration of local and foreign businesses in the long-term sustainable management of coral reef and coastal zone resources.

*Legal and/or Regulatory:*

- the examination, and assessment of current regulations, legislation and enforcement systems related to coral reef resources and their management.
- the development of appropriate regulations, legislation, and enforcement systems for the sustainable management of coral reefs
- the development and implementation of a standard and systematic approach to the introduction of new coastal developments and activities.
- the development and establishment of environmental/ecological guidelines for environmental impact assessment and the standards of operation for coral reef related developments and constructions.

*Environmental/Ecological:*

- the collation and synthesis of existing information for application in management.
- the establishment of national standards for methods to be used in coral reef surveys and management related data collection. This should include data collection, post collection data handling (statistical analysis etc), and entry of the data into a national GIS.
- the making of an inventory of the coral reef resources and their current status in Mozambique
- the identification, characterisation, and establishment of critical zones or areas for immediate inclusion in an active coral reef management plan/strategy.
- the establishment of a network of monitoring sites to assess the impact of human activities on coral reefs around Mozambique.
- the elimination of destructive fishing techniques.
- the assessment of the integrity and status of the coral reef fishery.

*Community Oriented:*

- the development of systems and methods for the consultation and collaboration of local communities in coral reef management.
- the development and implementation of a program for the introduction, inclusion, and strengthening of marine resource and coastal zone issues in school curricula with a highlight on the significance of coral reefs.
- the development of an ongoing public awareness program including publicity of existing conservation zones or resource managed areas with clear delineation of their borders.
- the examination and documentation of local traditional knowledge, customs and usage of the coral reefs and associated resources.

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