

Madagascar's first community-run, self-sustaining Marine Protected Area

A unique partnership between the local community, local and international NGOs and institutions aiming to show the economic, conservation and fisheries benefits of Madagascar's first community-run experimental Marine Protected Area (MPA).

The context

Madagascar is the fourth largest island in the world, with 5000km of coastline spanning both tropical and temperate zones. The coastal zone comprises a variety of habitats from mangrove forests to rocky outcrops, sandy beaches and coral reefs and lagoons.

The Grand Recif barrier reef of Toliara and neighbouring reefs in southwest Madagascar constitute one of the West Indian Ocean's largest coral reef systems and thus represent a significant biodiversity 'hotspot' for the region. Much of this biodiversity remains, to date, unknown to science.

Several marine species listed as endangered or vulnerable to extinction are known to exist in Madagascar's waters, including the dugong, sea turtles, the whale shark and the coelacanth. To date, over 130 species of reef-building corals, more than 600 species of sponge and 552 species of reef fishes have been described from the Grand Recif of Toliara alone.

Climate change and the associated El Nino phenomenon have resulted in severe coral

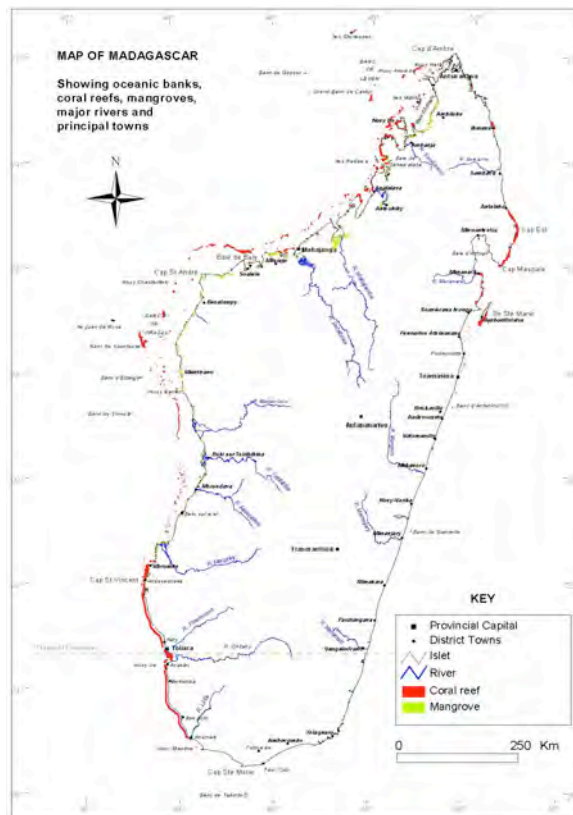


Fig. 1, map of Madagascar showing distribution of coral reefs and related marine habitats (courtesy Cooke, A. 2004)

bleaching events in Madagascar and represent the single greatest natural threat to reef systems. For example, a study on the massive 1998 bleaching event estimated a loss of US\$700-8,200 million in net present value terms for the Indian Ocean.

Current estimates suggest increased frequency of bleaching as a result of climate change and predict bleaching could become an annual event

in the next 25-50 years. It is essential to monitor the impacts of bleaching and the recovery rates of coral reefs, in order to incorporate resilience and resistance factors into the future selection and management of marine protected areas.

In addition to large-scale natural threats, local populations have significant effects on the region's reefs. Sedimentation of rivers and nearshore reefs due to poor land-use practices is one of the primary anthropogenic threats to coastal biodiversity in Madagascar. Large areas of coastal and upland forest have been destroyed by rapid expansion of slash-and-burn agricultural systems. Wide-scale burning has exacerbated soil erosion, which now affects more than 80% of the total land area. Elevated levels of siltation on the coral reefs, in particular in west Madagascar, have already been widely reported.

Other anthropogenic impacts on the coastal environment include coral, sand and rock mining, mangrove destruction, destructive and unregulated fishing, most of which are linked to poverty, inadequate planning and legislation combined with a lack of political will and/or capacity for instituting methods to address these problems.

Over 50% of the artisanal fishing in Madagascar occurs along the reef systems of the southwest and the collection of species such as octopus and sea cucumbers for commercial export rely on methods that destroy the physical structure of the reef. Furthermore, net fishing in nearshore habitats such as mangroves, intertidal pools and seagrass beds may cause serious declines in reef fish species that use the coast as a nursery area.



Fig. 2, artisanal fishermen catch the endangered green sea turtle, Chelonia mydas, Andavadoaka, Madagascar.

Despite these imminent anthropogenic and natural threats, marine and coastal habitats in Madagascar have historically taken a back seat to terrestrial conservation. Recently however, marine and coastal conservation has received an increasing amount of attention as a principal focus of the third phase of Madagascar's environmental plan (EP3), following President Marc Ravalomanana's commitment to create 6 million hectares of protected areas as part of the Durban Initiative.

However, at this stage there are no Malagasy institutions with the technological resources or technical capabilities to undertake research and assessment studies that support site specific or regional level coastal management planning.

Andavadoaka: An opportunity for community based marine resource management

The village of Andavadoaka, population 1200, Andavadoaka sits at the northern end of a reef system that extends from the Grand Recif of Toliara, some 250km to the south. The reefs of Andavadoaka and its nearby offshore islands represent some of the most remote and biodiverse coral habitats in the region. Aside from their enormous biodiversity value, the Andavadoaka reefs are critical to the livelihoods and cultures of the region's artisanal fishing community, the nomadic Vezo, whose economy is entirely marine-based.

Traditionally, the Andavadoaka economy has relied on selling dried fish, sea cucumbers and octopus to collectors from inland Madagascar. Since 2002, however, a number of developments have changed the local economy and how the community interacts with the region's fragile coastal and marine ecosystems.

The recent arrival of Copefrito, a Reunion based fish exportation company, has created an entirely new and lucrative market for fresh octopus and large reef fish (such as emperor, snapper and grouper) as well as for pelagic species like tuna and mackerel.

The octopus *Octopus cynea* is especially of great economic importance in Andavadoaka and the change to an international market for octopus has increased octopus value and the quantity harvested. A collection boat now bases itself at Andavadoaka each spring tide, returning to Toliara twice a month with up to 35 tonnes of seafood.

In addition to this new market force, a recent growth in visitor numbers to the area's two hotels has increased Andavadoaka's reputation for coastal tourism.



Fig. 3, Andavadoaka, Vezo fishing village, southwestern Madagascar.



Fig. 4, satellite image of Andavadoaka and Morombe region, showing the network of offshore islands.

Considering current potential threats to the region's reefs, and as a priority within the framework of the National Strategy for the Conservation of Biodiversity in Madagascar, it was considered critical that data be gathered for use in local environmental management plans. Because of this, Blue Ventures Conservation, a UK-based marine conservation organisation working in collaboration with Madagascar's national marine research institute (the Institut Halieutique et des Sciences Marines - IHSM), recently established a three-year marine research program in Andavadoaka.

As a result of these developments, and in the context of the recent Durban Initiative and

renewed interest in Madagascar's coastal ecosystem, Andavadoaka presents a unique opportunity for the creation of a coastal zone management pilot program incorporating all of the stakeholders currently living and/or working in the region.

The Andavadoaka Partnership

In June 2003 a collaborative venture was launched in Andavadoaka between Blue Ventures Conservation and the IHSM, Madagascar's national marine research institute, in response to the need to develop a better understanding of the area's unique marine and coastal habitats. This collaboration quickly expanded to include a range of additional partners, both within and outside the village. These partners include the following:

'Cooperation Maritime du 22eme Parallele' – Andavadoaka's newly-created fisheries consortium comprising local stakeholders including community leaders and representatives, hoteliers, and the local fisheries collection company Coperfrito.

Wildlife Conservation Society (WCS) - An international NGO that performs site-specific conservation throughout the world and has extensive experience developing conservation programmes in Madagascar.

Institut de Recherche pour Development (IRD) - A French-based research and education institute specialising in multidisciplinary approaches to research throughout the developing world.

The partnership's work in the region aims to identify strategies and targets that the local

community can work towards to develop sustainable local environmental management plans for Andavadoaka's unique marine and coastal environment. These plans focus on improving the quality of life of the local communities who depend on the area's marine resources while maintaining the biological diversity and productivity of the reefs.



Fig. 5, aerial photo of Nosy Hao island, 2km west of Andavadoaka, showing extent of fringing reefs. Certain areas of the island's reefs will form part of the region's marine protected area.

Through the implementation of Madagascar's first experimental community-run Marine Protected Area (MPA), the partnership is working to develop management solutions to help sustain the traditional artisanal fishing economy as well as to minimise the environmental impacts of human activities on the region's marine and coastal environments.

The Andavadoaka project aims to improve the quality of life of the Andavadoaka community by protecting environmental and cultural heritage and increasing local people's income.

Elsewhere, MPAs have been shown to give rise to higher fish biomass, higher fish density, larger carnivorous fish and invertebrates, increased fish larval supplies, and higher biodiversity than fished areas. In addition, well-managed reef-based tourism is a non-extractive industry providing employment for locals, who might otherwise resort to destructive fishing, an activity that yields a much smaller economic gain than tourism.



Fig. 6, Trio of Mobula japonica gliding over transect site on Recruitment Reef, Andavadoaka, within the zone of the proposed MPA.

The project has gained widespread support from the local fishing community, which has shown alarm and concern over the increasing levels of degradation and deterioration of the region's reef habitats and species.

The MPA will have the dual purpose of being a nursery ground and safe haven for marine species from fishing pressures, while at the same time providing a regional ecotourist attraction, generating revenue for the management of the project. Carefully managed ecotourism is seen as an effective means of generating the funding and resources needed for such resource management

planning. The Andavadoaka project was initiated as a means of using this source of revenue to support the conservation, education and research initiatives currently being undertaken in Andavadoaka by partnership.

Income for the project will continue to be generated through Blue Ventures' existing research volunteer programme, as well as through fees charged to tourists visiting the MPA. This revenue is being used to manage the project and train local MPA guides and managers, as well as to further develop the capacity-building and education programmes initiated by the partnership.



Fig. 7, IHS scientist undertaking benthic coral reef survey, Andavadoaka.

Blue Ventures and the IHSM are the principal research partners, involved in carrying out day-to-day research, monitoring and education activities in Andavadoaka. Through its in-country representatives, WCS provides on-hand technical guidance to the project for ecological and fisheries research undertaken on site, and IRD aims to continue its support of the

partnership with ongoing guidance on socio-economic and ecotourism-related research activities.



Fig. 8, IHS student carrying out interview with fisherman survey in Andavadoaka village.

The partnership has enabled the pooling of resources, talents and experiences from a range of national and international organisations, providing a wealth of technical expertise to assist in the successful development of this initiative.

Building the partnership and implementing the project

It is considered vital that all community members have a sound understanding of the objectives and intended benefits of the MPA. To help ensure this aim, regular MPA meetings and workshops are held for Andavadoaka's fishermen, women and children. Meetings are well-attended, sometimes with up to 300 people convening to discuss ideas and proposals.

These exchanges give the community an opportunity to decide the management strategy of the MPA. Following numerous discussions over recent months, the Andavadoaka community is in strong favour of the implementation of the no-take zone. During traditional ecological knowledge meetings fishermen have frequently cited the MPA as an important tool for stopping the alarming decline in the quality of the marine environment of Andavadoaka.



Fig. 9, workshop with local fishermen discussing feasibility of and attitudes towards the proposed marine protected area.

Fisheries data and observations from fishermen indicate a decrease in the average weight of octopus caught in the Andavadoaka region, suggesting the octopus is now over-exploited. This may compromise the regeneration of octopus populations, and smaller individuals are also less valuable on the international market.

In an effort to preserve the local octopus population and to increase the size (and thus

value) of octopus caught in the region, the first zone of the MPA was implemented in November 2004.

The fishermen of Andavadoaka signed a traditional law, called a Dina, on 24th October to close the reef flat around the island of Nosy Fasy, also known as Ankereo, to octopus fishing for 7 months from 1st November 2004.

As *Octopus cyanea* has a high growth rate, conservation scientists hypothesised that a six-month closure would be sufficient to significantly increase the average size of octopus.

As an incentive for the fishermen to support this project, Copefrito has also agreed to increase their price for octopus weighing over 1.5kg.

The MPA's guardians, resident fishermen from the island of Nosy Hao, have undergone training and are now based permanently on the southern point of the island adjacent to the MPA. They are responsible for surveillance and enforcement of the local law (Dina) that has been agreed upon by the local community to prevent fishing within the no take zone.

The fishermen in and around Andavadoaka have respected the first no-take zone around Nosy Fasy, with only one known case of infraction since November 2004, when the MPA guardian caught and fined the poacher.

When the no-take zone reopens on 31st May 2005, the partnership will continue to assess the ecological and economic effects of this octopus MPA in the hope of using it as a tool for the sustainable exploitation of the species.

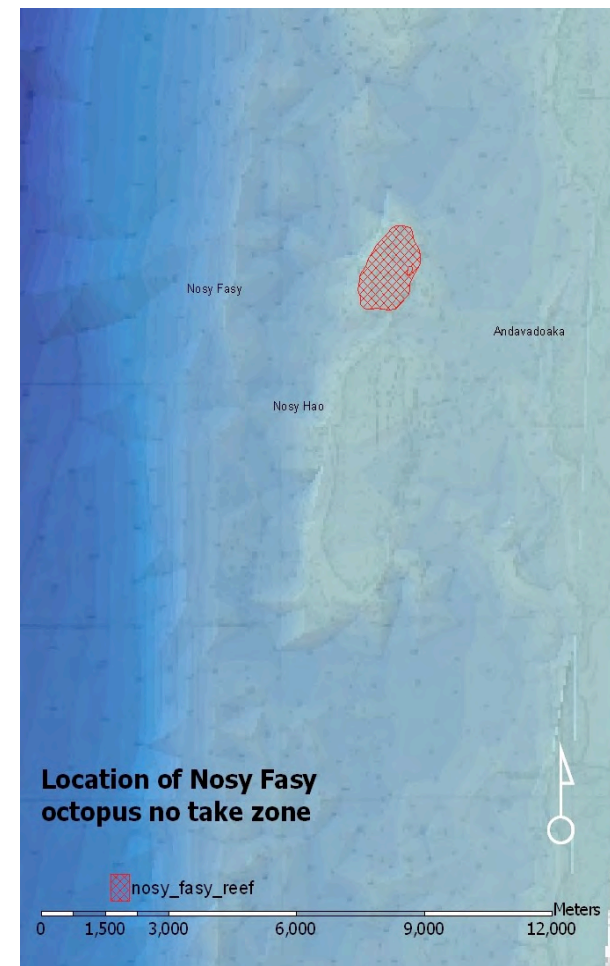


Fig. 10, Admiralty chart of the Nosy Hao region overlaid with depth model illustrating location of Nosy Fasy octopus no take zone.

To continue the octopus fishery management it is planned to rotate the octopus MPA between two reef flat units in the Andavadoaka area. A rotational octopus no-take zone has been proposed in order that fishers can have access to

large (and more valuable in terms of price per gram) octopus from reef flat fishing grounds once a closed area is re-opened. Soon after one closed area is opened to fishing, another is closed to allow the octopus on the second flat to settle, grow, reproduce, and reach larger (and more commercially valuable) sizes.



Fig. 11, A Local fisherwomen with her catch of Octopus cyanea.

Next steps

Many of the anthropogenic impacts affecting Madagascar's coral reef habitats are linked with poverty, inadequate planning and legislation, combined with a lack of political will and/or

capacity for implementing methods to address these problems. Across the full range of responsible institutions and resource users in Madagascar, there is a critical need for better knowledge and understanding of marine and coastal ecosystem processes, and for better access to information and technical capacity to devise management solutions.

The IHSM is Madagascar's primary marine education and research institute with 150 students from undergraduate to PhD level. Despite its national importance, the IHSM does not yet have the technological or human capacity to perform in house analysis to independently inform coastal management decisions.

This partnership presents a significant opportunity for the IHSM to overcome this hurdle by providing access to a valuable data source from the region's reef systems providing experience to assist significantly in future coastal management decisions and MPA site selection.

The project is providing IHSM researchers with experience in local-level coastal management as well as in environmental and social assessment and monitoring activities, in order to develop staff and students' technical capabilities to enable the IHSM to take a lead in integrated coastal management efforts.

In this way the partnership aims to provide the lessons and experiences required for the implementation of community-run marine and coastal conservation initiatives beyond Andavadoaka. However, a major hurdle to overcome will be in capacity building to enable the IHSM to apply the skills and knowledge

acquired and developed in the Andavadoaka project elsewhere in Madagascar.



Fig. 12, presentation on proposed marine protected area by village president, Andavadoaka.

In addition to the technical expertise needed for such training and capacity building, the partnership requires assistance in developing fund raising initiatives for the IHSM and other partners.

Further support is needed in developing the long term business plan for the partnership, to ensure continued effective income generation to support this community-centred conservation initiative.

More information and research updates from the Andavadoaka project can be found online at:

www.blueventures.org/news_research.htm