Co-Management of the Reef at Vamizi Island, Northern Mozambique

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INTRODUCTION

The province of Cabo Delgado in northern Mozambique still represents one of the most inaccessible coastal regions of East Africa, having been isolated by more than 30 years of war and by its remoteness from the strategic centres of economic activity located south in the country. No longer than 10 years ago, the Querimbas archipelago - called "Maluane islands" before Portuguese times - remained one of the only coastal areas in the region in which biodiversity had never been really documented, although its potential conservation value had previously been suspected (Tinley, 1976). When marine surveys started to be undertaken in the southern Querimbas (Whittington *et al.*, 1998) results indicated that the diversity of corals found there was comparable with the best found along the East African coastline. As a result, the Querimbas National Park was gazetted, encompassing most of the southern section of the Querimbas where coral reefs are monitored regularly (Motta *et al.*, 2003, Costa *et al.*, 2004).

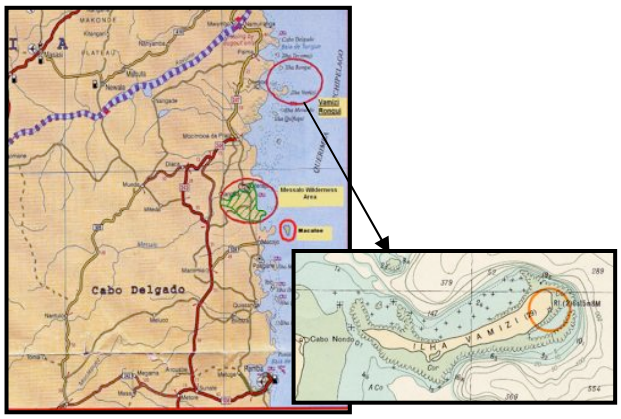

Figure 1. Map of northern Mozambique showing Maluane project areas with Vamizi Island map showing depth contours in metres.

Vamizi island lies in the far north section of the Querimbas archipelago just below the Tanzanian border (Fig. 1), in the area where the South Equatorial Current splits into the Mozambican Current and East African Coastal Current. It appears to be an ancient uplifted patch reef of Pleistocene origin, surrounded by a submerged reef flat with broad terraced slopes

Obura, D.O., Tamelander, J., & Linden, O. (Eds) (2008). Ten years after bleaching - facing the consequences of climate change in the Indian Ocean.CORDIO Status Report 2008. Coastal Oceans Research and Development in the Indian Ocean/Sida-SAREC. Mombasa. http//:www.cordioea.org

(Davidson *et al.*, 2006). It is bound eastwards by bathymetric intrusions providing proximity to deep water of the Mozambique channel.

Vamizi is one of the largest islands (12 kms long and 0.5-2 kms wide) of the Querimbas and one of the four islands which always had a resident community since Arabic times, settled in the western section of the island for its easier access to the mainland. The resident population was estimated at 533 people in 1999, the majority being of kimwani and swahili origin with a livelihood based on subsistence fishing (Garnier, 2003). Since the end of the war, an increasing number of itinerant fishermen from Tanzania and other provinces in Mozambique have established a presence on Vamizi, making the total population highly fluctuant on the island depending on the monsoon. Regular movements of fishers between the island and coastal villages on the continent, only situated 4 kms from the island, also contribute to this high flux of people.

After conducting the first socio-ecological surveys in the northern Querimbas (Garnier *et al*, 1999), the Maluane initiative was created in order to ensure the sustainable conservation of the exceptional coastal biodiversity of the northern Querimbas and to support the socio-economic development of local communities, using up-market tourism as the economic engine. As stated in its management plan (Garnier, 2003), the objectives of Maluane are:

- To protect and maintain the biological diversity and natural resources of national and international significance, as well as ecosystem processes;
- 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;
- To develop up-market tourism activities that will ensure the financial viability of the Project.

Table 1. Scleractinian families contributing species to the coral reef communities of Vamizi Island (from Davidson *et al.*, 2006).

Family	Species count	% total (183)	Present in sites
Acroporidae	59	32.24	36
Faviidae	51	27.87	36
Mussidae	11	6.01	36
Poritidae	14	7.65	36
Oculinidae	2	1.09	35
Pocilloporidae	7	3.83	35
Agariciidae	8	4.37	34
Fungidae	9	4.92	34
Merulinidae	3	1.64	33
Siderastreidae	6	3.28	33
Dendrophylliidae	4	2.19	25
Euphyllidae	2	1.09	23
Pectinidae	6	3.28	22
Astrocoeniidae	1	0.55	5

In order to achieve the objective of a three-fold sustainability (ecological, social and financial), Maluane was developed as a partnership between a conservation organisation (the Zoological Society of London (ZSL)), local communities and the private sector, represented by a group of individual European investors with a strong commitment to conservation. Since 2001, Maluane has developed a number of marine conservation programmes on Vamizi Island that will be succinctly presented below.

Assessment of the Status of Vamizi Reef

Detailed assessments of Vamizi reef were conducted in 2003 and 2006 by Maluane and ZSL and the results presented below are extracted from Davidson *et al.* (2003, 2006) and Hill *et al.* (2003). In order to undertake a full benthic survey of coral communities around Vamizi Island, three methods were used: manta tow surveys, rapid ecological assessment (REA) and SCUBA search. Underwater visual census of reef fish was conducted to obtain abundances of all species

Plate 1. Diversity of coral species at Vamizi reef and extensive habitats.

Plate 2. Grey reef sharks, snappers and reef fishes at a deep fringing reef location.

excluding cryptic and small species. Both surveys were undertaken in collaboration with the Natural History Museum of Maputo and the University E. Mondlane at Maputo, with whom Maluane has developed strong links and which always send Mozambican students for training in conservation management techniques with Maluane. Coral reefs around Vamizi were identified as being very healthy and productive (Plate 1). The average coral cover was 37% (range 22-63%), with low levels of injury (<15%) and death (<10%) of corals. REA of 36 sites within 12 locations identified the presence of 183 coral species in 46 genera from 14 families (Table 1). Each location surveyed has a broad suite of coral species with over 75% locations having over 45% of the total species observed. Locations on the northern slopes of the island scored a higher species richness than other sites, reflecting their semi-sheltered environment

In addition, it had been observed in 2001 that the northern and eastern slopes of Vamizi had not been affected by the 1998 bleaching event, contrasting with the findings of Motta *et al.* (2002) in the southern Querimbas. The resilience of coral communities on these slopes is likely to be associated with the proximity of the reef to cool deep waters and the fast water flow created by currents, both being recognised as factors mitigating thermal stress (Grimsditch & Salm, 2005).

Fish surveys since 2003 around Vamizi identified 401 species of fish – over half the number of reef

Table 2. Comparison of number of reef associated species between national surveys (Pereira, 2000) and Vamizi survey (Davidson *et al.*, 2006).

Family	Number of known reef associated species	
	National	Vamizi
Acanthuridae	31	31
Balistidae	16	12
Chaetodontidae	23	21
Haemulidae	15	10
Labridae	67	52
Lethrinidae	19	16
Lutjanidae	22	10
Mullidae	14	12
Pomacanthidae	12	11
Pomacentridae	45	35
Scaridae	24	20
Serranidae (groupers)	56	31

Plate 3. Bumphead parrotfish.

associated species recorded for the whole country (Table 2, Plates 2 & 3), with large numbers and densities of carnivores normally regarded as vulnerable to fishing. A fisheries survey conducted in local communities using fishing grounds around Vamizi Island showed that the main threat to fisheries was represented by over-fishing and unsustainable fishing practices used mainly by transient fishers (Guissamulo *et al.,* 2003).

Community-Based Management of Marine

Resources at Vamizi

It is well known that the sustainability of resource use and management of natural resources is affected by the degree of involvement and empowerment of local communities in all the processes that contribute to the sound conservation management of an area – from data collection to decision-making, management and monitoring activities (Salm *et al.*, 2000). This strong community involvement, combined with an adaptive and sound, scientifically-based management approach that also builds on local knowledge, represents the foundation upon which Maluane's conservation programme was developed on Vamizi.

One of the first steps undertaken by Maluane was to assess the perception of resource users on Vamizi of the threats to ecosystem productivity. It was clear that a divide existed between itinerant fishers, who did not consider this issue as being relevant to their livelihood, and resident fishers. The latter had a clear awareness and understanding of the concept of sustainability when they explained that traditionally, fisheries could sustain them since they only extracted what they needed for subsistence. They pointed out that increased immigration on the island, combined with the introduction of unsustainable fishing methods had resulted in a significant decline in fish catch and therefore represented the main threat to their livelihood. In addition, the resident community as a whole resented deeply the presence of most itinerant fishers on their island, who they claimed had only brought social disruption, instability and more problems to the island, such as cholera outbreaks. This was reflected by the geographic isolation of the itinerant fishers' camps on the island and the lack of social organisation, leadership and hygiene in these camps (Guissamulo *et al.*, 2003).

Although the divide between resident and itinerant fishers was not as clear as it appeared to be since a number of transient fishers had now settled on the island and integrated the community by marrying locally (Hill, 2005), the resident community asked Maluane to support them in regaining control over access to their marine resources. The fact that they turned to Maluane rather than government can be explained by the solid relationship that Maluane had developed over the years with the Vamizi community and by the tangible benefits that the project had brought to the island (see Socio-economic development and alternative livelihoods), whereas the limited resources of government meant that no socio-economic development had occurred on the island previous to Maluane.

In an attempt to decentralise authority and empower local communities to manage their marine resources, Fishing Community Councils or CCP (*Concelho Comunitario de Pesca*) were legalised in Mozambique in 2006 and given the rights to control access and manage their resources within 3 nautical miles of their coastline. Two CCPs have now been legalised on Vamizi island and in Olumbe, the main village on the coast which also uses fishing grounds

Plate 4. Local monitor being trained to assess reef fish populations.

Plate 5. Turtle monitors tagging and measuring a green turtle.

around Vamizi. In partnership with government and IDPPE (*Instituto das Pescas de Pequena Escala* or Small-Scale Fisheries Institute), Maluane has supported the creation and capacity building of the CCPs, which is still on-going.

In order to develop the CCP capacity to make sound management decisions, training of some CCP members in basic reef monitoring has been initiated in 2006 (Davidson *et al.*, 2006) and their capacity in monitoring fish catch and undertaking fish stock assessment will soon be developed (Plate 4). This will also allow for community-based monitoring of the effectiveness of management decisions, such as the newly formed marine sanctuary that both the CCP and Vamizi community have decided to create around the north-eastern section of the island. The unanimous decision to set aside a no-fishing area for one year was taken once the community had identified the critical issues and priorities and agreed on the solutions to solve these issues. The feed-back sessions on all survey results that were conducted with all stakeholders, combined with the on-going awareness programme on sustainable resource use that is conducted on the island, also contributed to this process.

In addition, a community-based turtle monitoring programme has been developed on Vamizi and Rongui islands since 2002, also raising awareness of local communities on marine conservation issues. This programme has been very successful with a local team of 10 monitors, all originating from local villages, is now conducting this conservation project, from the marking and protection of all nests to the tagging of turtles (internal and external tags, satellite tags) and education and awareness programs (Plate 5).

As a result, more than 700 nests of both hawksbill and green turtles have been protected on Vamizi and Rongui islands and poaching of nests and eggs has now been reduced to nil on these islands. Nesting success on Vamizi and Rongui (>80% hatching and emergence success) was found to be very high, emphasizing the regional importance of these islands as turtle nesting grounds, especially since coastal habitats around the islands also provide developmental grounds for both turtle species.

In order to help develop regional turtle conservation strategies, Maluane has fitted the first satellite tag on a green turtle in Mozambique, which has now migrated to her feeding ground in Malindi, Kenya.

Socio-economic development and alternative livelihoods

Socio-economic and fisheries surveys undertaken in Vamizi show that the livelihood of local communities in the project area is totally dependent on reef-based fisheries, with most local fishermen being unable to

Plate 6. Cultural group of the women's Association performing traditional dances at Vamizi lodge.

Plate 7. Vegetable farm providing farmers with an alternative livelihood.

access adequate fishing gear and being restricted by trade opportunities (Guissamulo *et al.*, 2003). In addition, the increased pressure on marine resources associated with the presence of itinerant fishers often forced resident fishers to become partners with itinerant fishers, thus obliging them to use destructive fishing techniques, such as small-mesh seine nets, mosquito nets and spear guns. A majority of these fishers is just too poor to afford alternative gear and this is their only means of providing food for their families.

In partnership with the Ministry of Environment (MICOA) and GEF, Maluane is supporting the development of small businesses in Vamizi and Olumbe communities for which it is providing both ensured through the needs of the tourism product already developed on Vamizi. They include an association of twenty-nine women that has started to generate revenue by performing cultural activities (crafts making, traditional dances) for the lodge (Plate 6) and a vegetable farm with twenty-two farmers at Olumbe that is producing fresh vegetables for the lodge (Plate 7).

An association of twenty-one fishermen has also just been formed, which will be supported to use sustainable fishing methods.

Although still in the very early stages, some of these small businesses have started to generate revenues and have created alternative livelihood schemes for the two communities that use fishing grounds around Vamizi island. In addition, the project has created significant employment and provided local capacity building in the areas of tourism and conservation, while stimulating the local economy through the purchase of local products (building material, fresh marine products etc).

The introduction of income diversification and alternative livelihood schemes that are environmentally sustainable and economically viable is a well-recognised method to improve the quality of life of coastal communities and to reduce the pressure on coastal ecosystems. Capacity building of the associations has proved to be quite challenging since these communities have been isolated from any form of socio-economic development for decades. One of the major obstacles, especially for women, is their very high level of illiteracy which has started to be addressed by developing literacy programmes on the island. While the capacity building process is still on-going, a monitoring programme of the alternative livelihood programme is being developed to assess carefully its impact.

Another contributing factor to the determination of local communities to self-regulate fishing pressure has been the support of Maluane in improving directly the community's well-being by providing access to social services that were desperately lacking on the island. A health post has been built on Vamizi by the

project, while access to education and drinking water will also be addressed by the project.

Financial Sustainability

The socio-economic programmes described above, together with the conservation initiative developed by Maluane have largely been funded by the group of private individuals who have also financed the development of the tourism operation. Charitable organisations and institutional donors are also supporting specific conservation programmes within Maluane, on the basis that the conservation and community programmes will ultimately become financially viable through tourism-generated revenues. A bed levy is already charged to all clients staying at the lodge, who are given the opportunity to participate in most of Maluane conservation activities and to understand better the needs and challenges of the socio-economic programme developed by the project. It has been found that awareness raising on conservation and community issues at the lodge was not only very well received by most clients, but had actually become a necessity for the niche market willing to travel to remote destinations in order to learn and contribute more towards environmental and social issues.

CONCLUSIONS AND RECOMMENDATIONS

The diversity, richness and exceptionally pristine status of Vamizi reef, which is now such a rare occurrence in East Africa, suggests that it deserves a priority status. Placed in a regional context, Vamizi reef also needs special consideration as it is likely to play a vital role as a source in replenishment for other reefs in the region, due to its specific oceanographic environment and resilience to thermal stress. Further research on such resilience is needed while a community-based monitoring programme of the reef is being developed.

The creation of fishing committees on Vamizi and Olumbe illustrates the determination and ability of resident fishers to organise themselves in regaining control over the management of their natural resources. The creation of a marine sanctuary over one section of Vamizi reef represents the first step towards the sustainable conservation of one of the most pristine reefs in Eastern Africa. The on-going monitoring and capacity building of the CCPs will ensure that the pivotal role played by this new community institution is fulfilled.

The creation of alternative livelihoods in Vamizi and Olumbe communities, combined with stimulation of local economy through tourism, has undoubtedly contributed to the determination of local communities to actively protect and manage marine resources and to organise themselves to do so. The real impact of this programme needs to be carefully assessed.

A community-based turtle monitoring programme has been developed on Vamizi island, resulting in the successful protection of nesting grounds and in raising local awareness on marine conservation issues. This programme is also contributing to the development of regional turtle conservation strategies.

The Maluane project still has a way to go, but will be an important case study of whether high end tourism, building on a foundation of thorough scientific research and planning, and explicitly aiming to work in partnership with local communities, can succeed in conservation in the face of growing pressure on the ecosystem (Milner-Gulland, E.J. and Rowcliffe, M. (in press).

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