



VILLAGE OF ANDAVADOAKA

Madagascar



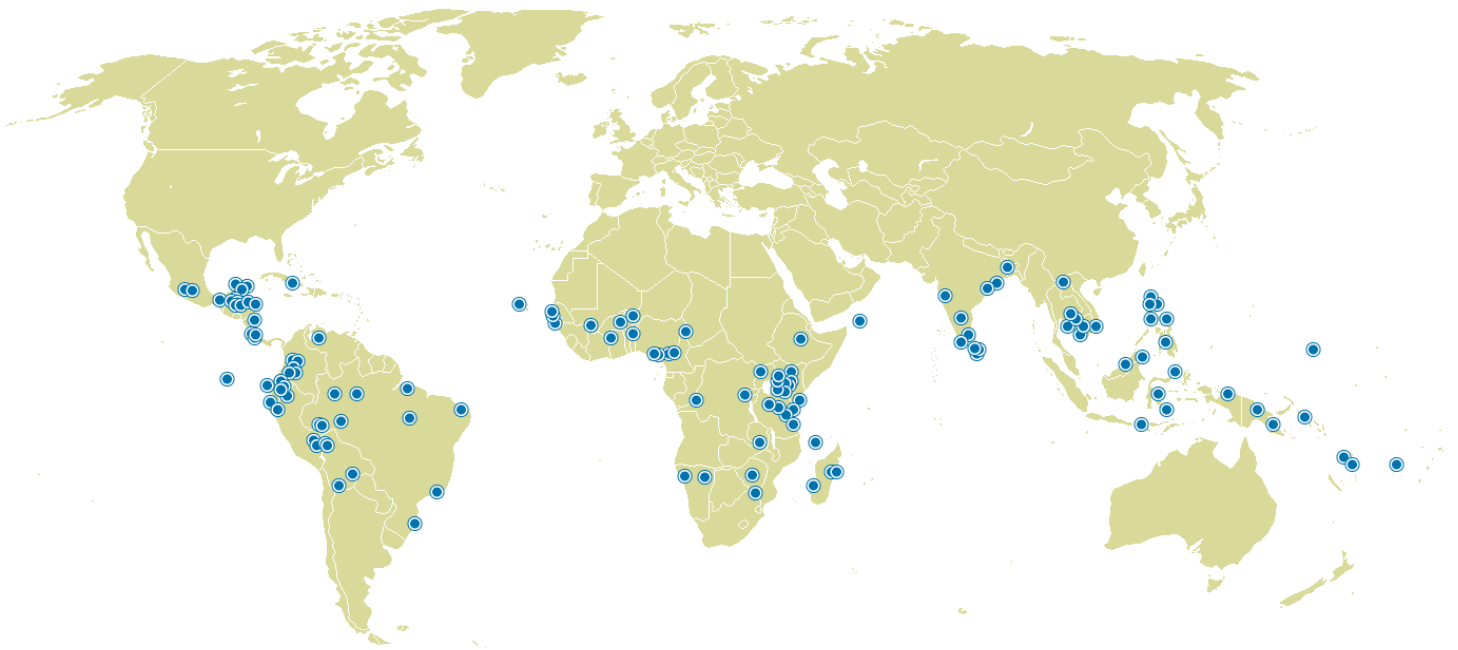
Equator Initiative Case Studies

Local sustainable development solutions for people, nature, and resilient communities

UNDP EQUATOR INITIATIVE CASE STUDY SERIES

Local and indigenous communities across the world are advancing innovative sustainable development solutions that work for people and for nature. Few publications or case studies tell the full story of how such initiatives evolve, the breadth of their impacts, or how they change over time. Fewer still have undertaken to tell these stories with community practitioners themselves guiding the narrative.

To mark its 10-year anniversary, the Equator Initiative aims to fill this gap. The following case study is one in a growing series that details the work of Equator Prize winners – vetted and peer-reviewed best practices in community-based environmental conservation and sustainable livelihoods. These cases are intended to inspire the policy dialogue needed to take local success to scale, to improve the global knowledge base on local environment and development solutions, and to serve as models for replication. Case studies are best viewed and understood with reference to *'The Power of Local Action: Lessons from 10 Years of the Equator Prize'*, a compendium of lessons learned and policy guidance that draws from the case material.



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PROJECT SUMMARY

In response to declining local octopus populations, community leaders in the coastal village of Andavadoaka sought to regulate harvesting practices. With guidance from Blue Ventures, a UK-based NGO, the village authorities created a trial 'no-take zone' in 2004 where octopus hunting was banned for a period of seven months. Enforcement was rooted in the tradition of Dina, or local codes of conduct, which are common throughout Madagascar.

The results were increases in the mean weight of octopus caught by around 50%, prompting many neighbouring villages to ask Andavadoaka for support in creating no-take zones in their own near-shore waters. An inter-village organization was created to assist these villages, and ultimately 23 villages came together in 2006 to form the Velondriake Locally Managed Marine Area, containing both temporary and permanent no-take zones in which fish, mangroves, and other marine organisms are conserved.

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KEY FACTS

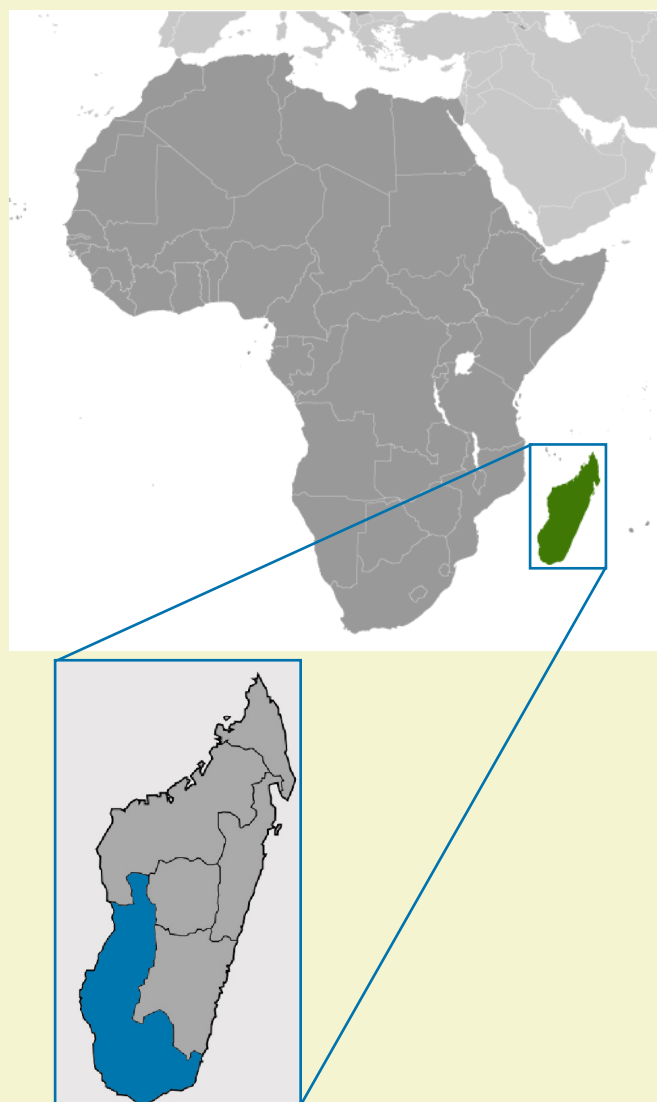
EQUATOR PRIZE WINNER: 2006

FOUNDED: 2004

LOCATION: Toliara Province

BENEFICIARIES: 9,200 villagers

BIODIVERSITY: Velondriake locally-managed marine area

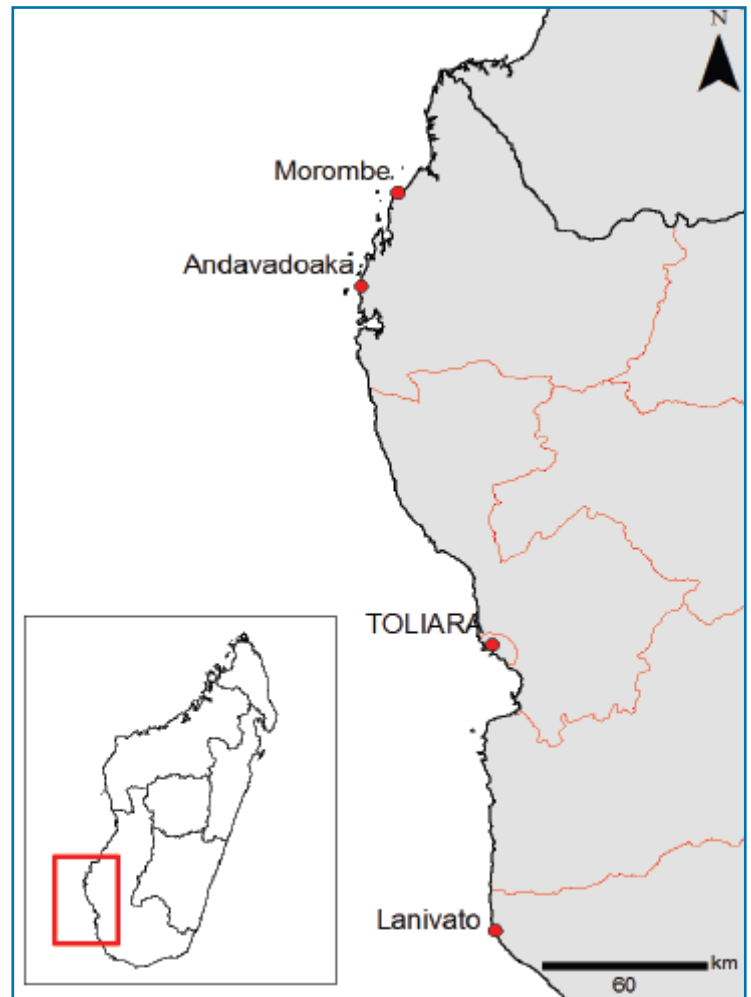


Background and Context



Andavadoaka is a small fishing village located on the southwest coast of Madagascar, in the Morombe division of Toliara Province. The village lies on the edge of a shallow lagoon protected from the open ocean by a series of reefs that support substantial coral growth, providing a vital resource base for local traditional and artisanal fisheries. These reefs form the northernmost section of the Grand Recif barrier reef system, the third largest continuous reef system in the world, an area containing some of the most extensive and biologically diverse marine and coastal ecosystems of the western Indian Ocean. The 1,200 villagers of Andavadoaka are primarily Vezo, a semi-nomadic sea-faring people who rely on healthy ocean waters and coral reefs to provide the octopus, fish and other marine species they depend on for food and income. A sustainable octopus fisheries initiative implemented in Andavadoaka in 2004 has been replicated along the coastline, leading to the formation of a locally-managed marine area.

Andavadoaka's coastline is characterized by two large reef systems – fringing reefs and barrier reefs – and important octopus fishing sites are located on both. In southwest Madagascar, fishers can immediately sell their catches to villagers who serve as local collectors, known as 'sous-collectors', for fisheries companies. Since 2003, two principal commercial collectors, Copefrito and Murex, have purchased fish, octopus, squid, crab and lobster from sous-collectors in the Andavadoaka region. Copefrito alone doubled the volume of marine products purchased in the region between 2003 and 2005, totaling one billion Malagasy Ariary (MGA), or approximately USD 500,000. Of this amount, approximately 90 per cent was paid to fishers, with octopus representing 60-70 per cent of the total products purchased. As the fishing population has grown, however, along with commercial interest, the fishery has become increasingly susceptible to overexploitation. Decreasing average octopus catches in recent years have compounded the effects of rapid population growth and increasing immigration to the coastline, putting pressure on traditional Vezo livelihoods.



Map of the southwest coast of Madagascar showing the area from Lanivato to Morombe. Source: Village of Andavadoaka/Blue Ventures

Octopuses are harvested by the Vezo fishing community through reef gleaning using traditional methods. The reef flats in the region of Andavadoaka are exposed and accessible by foot for only three to seven successive days during spring tides, which occur approximately every nine to 13 days. At low spring tides, women and children scour the exposed reef flats with long, sharp sticks. Men take part in reef gleaning but will also free dive with spears over shallow reef edges, in search of octopus. The reef flat is searched for octopus dens, recognizable by the coral rubble placed over the entrance, which are explored with the sharpened stick. If an octopus is occupying the den they are immediately pulled out by the fisher and killed. This process is unselective, as smaller octopuses are likely to be injured in the hunting process and will not be returned by the fisher once they have been pulled out.

Addressing unsustainable practices

In 2004, declining catches led village leaders to seek a more sustainable method of fishing. With guidance from the UK-based conservation group Blue Ventures, the Wildlife Conservation Society (WCS), and Madagascar's National Marine Institute (*Institut Halieutique et des Sciences Marines* - IHSM), and in partnership with Copefrito, these community leaders established the world's first community-run temporary octopus reserve. A trial 'no-take zone' was implemented at a collection site between 2004 and 2005, resulting in an increase in the mean weight of octopuses caught.

The success of temporary octopus reserves inspired other villages in the region to conduct similar closures, with dozens of octopus reserves currently closing each year. These reserves also served as the basis for the first locally-managed marine area (LMMA) in Madagascar. Twenty-four surrounding villages as well as Andavadoaka now comprise the Velondriake LMMA, which has the broader purpose of marine management for the long-term sustainability of the Vezo lifestyle. The LMMA is managed by a committee formed of representatives from each of the twenty-five villages. The committee is responsible for the drafting of local village laws (*dina* in Malagasy) which are established and enforced by the committee to protect the reserves. The LMMA has established temporary octopus reserves, permanent fish reserves, and mangrove reserves, and has banned destructive fishing practices.

Blue Ventures has supported the LMMA by providing ongoing technical advice and funding for its community development program

areas. Additional initiatives include the promotion of aquaculture as an alternative income source, and the provision of family planning and reproductive health services to local communities. Blue Ventures has also promoted ecotourism and provided a fund for education scholarships for local youth, employing 41 staff in Madagascar, including 29 in the Velondriake LMMA.



“Biodiversity is key not just to the functioning of ecosystems, but also the functioning of societies. In my area, few people know the word biodiversity and there is no equivalent word in the Malagasy language. Instead, I use the phrase, “our natural heritage from the creator” which not only expresses biodiversity, but also implies the value of this to our people and culture.”

Mr. Roger Samba, President of Velondriake

Key Activities and Innovations



The overall goal of the work being done in Andavadoaka, and in the wider Velondriake area, is the sustainable management of marine areas for the protection of unique biodiversity, the wellbeing of local communities, and the preservation of the Vezo lifestyle. Target beneficiaries include the 1,200 villagers of Andavadoaka itself and the 8,000 people across the Velondriake LMMA villages.

Marine management involves a number of strategies - the establishment of temporary octopus reserves, permanent fish and reef reserves, and mangrove reserves, as well as the prevention of destructive fishing practices such as poison fishing and beach seining. The active promotion of alternative livelihood activities, delivery of health and education services, and raising awareness of the importance of conservation among local communities have all helped to incentivize the sustainable management of the area's natural capital. All of these approaches have been rooted in active community participation and support, while utilizing the technical expertise of partner organizations.

The first temporary octopus no-take zone was a 200-hectare reef flat at Nosy Fasy, a barrier island located five kilometers offshore of the village of Andavadoaka. Both the idea of a temporary octopus reserve and its means of implementation are innovative. To date, literature relating directly to temporary closures as a fisheries management tool for octopus remains limited; Andavadoaka and Velondriake serve as models for this strategy. In the case of the Nosy Fasy reef, local communities identified the site and determined for how long the reserve should remain closed. A *dina*, or local law, was established to officially protect the site from octopus fishing during the planned closure period, although fishing for other species was allowed to continue. As a barrier island located in view of the village, the Nosy Fasy no-take zone could be clearly delimited. A guardian was also employed to prevent poaching. The first closure was for a seven month period from 1st November 2004 until the beginning of the first spring tide in June 2005, while a second closure was enacted between 15th December 2005 and 28th April 2006. This second

closure incorporated new national legislation banning octopus fishing in December and January that came about as a result of a national octopus fishery workshop held to discuss the results of the first closure. The lengths of these closures represented compromises reached by local fishing communities.

The use of a *dina* meant that the regulations that governed the use of the no-take zone were rooted in local custom. Traditionally, *dina* are social norms or codes of conduct that govern relations within and between communities. They are voluntary rules, developed and applied by communities themselves, and normally take the form of oral tradition. These *dina* are not recognized by the state as laws, but are locally legitimate and therefore generally respected. Their use is widespread, with an estimated 75 per cent of Madagascar's population living in rural areas governed by *dina*. In an attempt to integrate such customary rules with laws governing the use of natural resources ('reconciling the legal and the legitimate'), the Malagasy state adopted *dina* as a legally recognized governance tool in 1996 through the GELOSE legislation (*Gestion Locale Securise* – Secured Local Management): the transfer of limited management rights over natural resources from the state to community associations according to a renewable contract between the state, the community association and communal authorities. In the case of GELOSE, a *dina* is developed and agreed upon by the local community, with the support of external promoters, and becomes applicable once approved by local authorities. The rules that it contains must conform to existing national laws as well as recognized and uncontested norms at the local level. Although such *dina* may be enforced locally and conflicts may be resolved within the community, community associations may strengthen the power of the *dina* through ratification by a magistrate's court. This gives the *dina* legal recognition, and allows communities to appeal to legal procedures if required. There are precedents of *dina* being used in the case of community-managed or co-managed protected areas within Madagascar, but relatively little literature exists beyond the context of management transfers.

Andavadoaka to Velondriake

The Andavadoaka experiment led to the rapid replication and scaling-up of its model among other coastline villages. Careful monitoring of the octopus catches purchased by local sous-collectors showed that the reserve closures had helped to increase octopus catch by allowing for reproduction and growth of the octopuses. The mean weight of octopuses caught increased by an average of 48 per cent after each closure period; this was coupled with an increasing shift in weight distribution, so that there was a 32 per cent increase in the number of octopuses over 500g caught between September 2004 and June 2006. This translated into an increase in the catch per unit of effort per fisher and increased financial returns from the fishery.

These results from the initial trial were presented to Andavadoaka and neighboring villages, leading to the replication of the no-take zone along the coastline. Reserve closures are currently implemented along the southwest coast of Madagascar from Morombe in the north to Ambola in the south, a distance of approximately 400 km.



Catch data spanning a six-year period from 2005-2010 suggests that there has been no decline in the octopus catch in the Velondriake region in that time.

Replication from Andavadoaka to the surrounding villages happened organically, out of necessity rather than through outside intervention. On the opening day of the first temporary octopus reserve in 2005, after a seven-month closure period, more than a thousand fishermen came from as far as 60 km away to take part in the hunt. This was a more than fifteen-fold increase in the normal fishing pressure. Although the catch on the opening day was remarkable, fetching more than a ton of octopus (versus less than 50 kg on an average low-tide day), the catch was divided among so many that the Andavadoaka fishers felt cheated of their catch. As a result, the Andavadoaka village elders decided that, at the next opening, outsiders would not be allowed to participate.

In December 2005, therefore, two additional villages set aside reserves for closure periods of five months. On the first day of fishing in these reserves in April 2006, pressure from outsiders had decreased, but was still high. The temporary reserve idea had caught on by this time, however, and Blue Ventures and the village of Andavadoaka were receiving multiple requests from other villages for support in instituting no-take zones. An inter-village organization was created to assist these villages.

Individual village meetings led to the establishment of new reserves along the coast. These can be categorized into octopus reserves (temporary no-take zones on known octopus gleaning sites); fish reserves (permanent no-take zones on recognized fin fishing sites, typically lagoonal patch reefs); and mangrove reserves (permanent and temporary no-take zones in mangrove sites where villages collect crab, shrimp, and fish).

The success of the reserve closure system led to the formation of the Velondriake Locally-Managed Marine Area. In July 2006, nearly 100 leaders of 23 villages presented the *dinas* and no-take zone maps they had developed, and proposed a unified Marine Protected Area. In total, they laid out six permanent coral reef area no-take zones, 16 reef flats for temporary octopus reserve no-take zones, three mangrove no-take zones (one permanent and two temporary), and three terrestrial areas for the protection of baobab forest habitat. The Velondriake *dina* also outlawed destructive fishing practices and the fishing of turtles and other endangered species. This was finalized in October 2006, along with a management plan and structure for the Velondriake Association.

This community-based organization has the mandate of conserving the region's natural resources through the LMMA. All permanent residents of villages in Velondriake are *de jure* members, with rights to participate in the association and benefit from its actions. It is made up of a general assembly, which elects the members of the management committees, reviews the financial accounts, and defines the overall management plan and budget; the central committee (or Foibe), which sets work plans, oversees the regional committees, and maintains relationships with outside partners; and three regional sub-committees, responsible for carrying out work

in their respective areas. These sub-divisions are Vezo Milagnoriake (North), Milasoa (Centre) and Fanemotra (South). Finally, there is also an executive committee, the Farita Arovana Velondriake (Velondriake Protected Area) Committee, which includes two representatives from Blue Ventures and WCS, three from the Foibe, and three from the local government.

In December 2010, Inter-Ministerial Decree 50025 granted Velondriake and 71 other new protected areas provisional protections within the Madagascan System of Protected Areas (*Le Système d'Aires Protégées de Madagascar* - SAPM). The new law increased fines for poaching, banned industrial fishing, and began the process by which the Velondriake Association will be delegated official rule-making and limited policing powers.

The Velondriake Association works closely with its partner organizations to deliver livelihood alternatives and public services to its 25 communities. Blue Ventures plays a central role in this. Mariculture activities such as sea cucumber rearing and seaweed farming have been promoted as ecologically-sound, income-generating livelihood alternatives to octopus fishing. Ecotourism in the region is being developed, with local people trained as eco-guides and an eco-lodge currently under construction. Two women's associations in the Velondriake area have received training in handicrafts, providing women with independent sources of income. Blue Ventures has also established a family planning centre in Andavadoaka, and awards scholarships for primary, secondary, and university-level students. Finally, partner organizations conduct extensive monitoring and research within the protected area, publishing results that form a unique body of work on the effectiveness and sustainability of locally managed fisheries reserves.

Raising awareness

The Velondriake Association has engaged in efforts to raise awareness of the importance of conservation among local people. Much of this work has focused on young people. 'Club Alo Alo' was formed in Andavadoaka with the aim of attuning the younger generation to the efforts being made in the Velondriake network. At least once a month, Club Alo Alo participates in an organized environmental activity along with Blue Ventures volunteers. Activities in 2010 included a beach clean-up and environmental songs and games.

Awareness-raising has also taken place through a social marketing campaign in partnership with Rare Conservation. Celebrating the traditional Vezo way of life, the campaign's slogan 'Vezo Aho' (literally 'I am Vezo') honors the fishing-dependent lifestyle of the region's Vezo people, while raising awareness of how fundamental sustainable marine resource management is to the continuation of this lifestyle among future generations. Since the campaign's launch in March 2010, social marketing materials have been distributed across Velondriake, including over 500 posters and 800 t-shirts. More than 162 local sailing canoes (*pirogues*) have had their sails painted with slogans from the campaign, providing moving billboards to ensure regional visibility of the campaign's important conservation message. Outreach efforts also included radio commentary and songs, and community theatre productions that integrated the campaign's messages focusing on halting destructive fishing methods and promoting marine conservation. In September 2010, the campaign culminated in a series of festivals held in three large villages across Velondriake, attended by over 3,000 community members. These featured presentations from village leaders about the importance of responsible marine management, as well as *pirogue* races and entertainment.



Impacts



BIODIVERSITY IMPACTS

The southwest Madagascan coastline surrounding Andavadoaka is rich in biological diversity. During a recent survey, scientists recorded more than 380 species of fish along the reefs of the Velondriake area, of which 20 species had never before been recorded in Madagascar. More than 160 species of coral and 238 species of mollusk have also been recorded.

A wealth of marine biodiversity

This area contains a number of endemic species including the large-toothed cardinal fish, the black-blotched porcupine fish, the white-spotted guitar fish and the yellow-spotted puffer. Other species found in the Velondriake region include sharks, dolphins, sea turtles and migrating whales. Both sea turtle and shark populations are in rapid decline due to unsustainable fishing practices and increasing fishing pressure. Many species found in Velondriake are listed as vulnerable, endangered or critically endangered by the IUCN's Red List of threatened species. These include the Napoleon wrasse, the giant grouper, the white tip reef shark, the black tip reef shark, the gray reef shark, the leopard/zebra shark, the green turtle, the loggerhead turtle, the humpback whale and the spinner dolphin.

The main focus of conservation efforts within the Velondriake LMMA has been on octopus populations along the coastline, with secondary focuses on fish, crab and shrimp populations. The system of reserve closures helps to prevent overexploitation of fished species, while the prevention of indiscriminate fishing practices has conserved rarer species. Monitoring of terrestrial species, such as spider tortoises, has also been initiated within Velondriake's land reserves.

The temporary and permanent reserve system has multiple benefits for marine biodiversity. Since the establishment of the Velondriake LMMA, the area of permanent marine reserves has grown to 108 ha, or 1.8 km², with a fourth reserve officially opened at the mouth of a

mangrove embayment in the south of Velondriake. Two further sites in northern Velondriake have also been identified by local fishers and approved by Blue Ventures scientists, and are awaiting official recognition as reserves in 2011. The permanent reserves protect some of the most developed coral reefs on the southwest coast, with up to 60 per cent hard coral cover in some areas, providing a healthy benthic habitat for fish and other marine species.

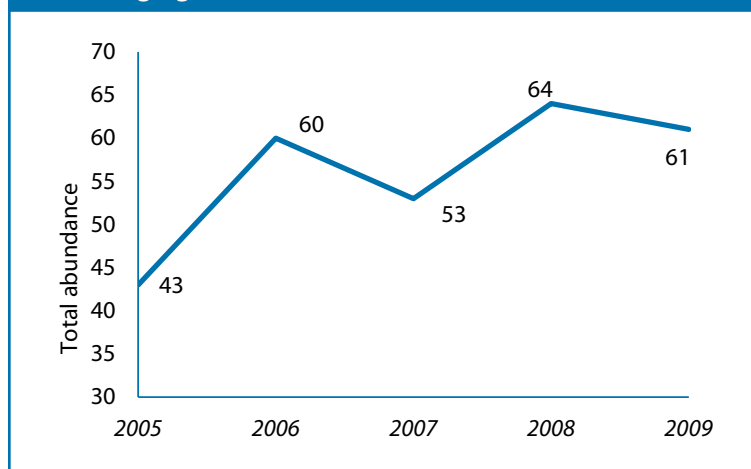
The temporary octopus reserve no-take zones are designed to allow octopuses, a species with a short life span but fast growth rate, to regenerate. Typically lasting three to four months, the temporary closures are timed to coincide with peaks in growth and reproduction. Octopus egg production is related to body size (larger specimens lay more eggs) so targeted reserve closures aim to sustain stocks through increased reproductive activity.

Monitoring success

Evidence of fish population numbers along the Andavadoaka shoreline since 2005 is indicative of the positive effects of temporary and permanent reserve closures and a sustained increase in population size. Underwater surveys have been used to monitor fish populations, recording biomass, diversity, and variations in fish assemblage composition, and to study benthic health, measuring algae and coral cover, coral bleaching, and coral recruitment. Blue Ventures employs data collectors in the villages within Velondriake to record samples of octopus catches, enabling them to build a six-year dataset from which they can calculate daily, monthly and annual variations in catch per unit of effort.

There is also a community-based monitoring program in place, through which community members are trained in simple monitoring methods. As well as aiding in the collection of data, this serves to demonstrate the value of conservation to local fishers. While fishing for octopus, they count the number of holes within the reef flat reserve compared to the number outside. Likewise, community

Fig. 1: Total abundance of four target fish families on near-shore fringing reefs at Andavadoaka



Source: Blue Ventures (2010)

members survey permanent reserves, comparing the number of a particular target fish species present within and outside the reserve.

Further monitoring efforts have focused on terrestrial species within the Velondriake LMMA, building on the success of marine monitoring in Andavadoaka and Velondriake. In 2009, ecologists and volunteers from Blue Ventures completed the first round of terrestrial surveys to monitor the population of the critically endangered spider tortoise (*pyxis arachnoides brygooi*) within the coastal forests east of the Island of Lamboara. Results revealed some of the healthiest populations of this critically endangered species (endemic to Madagascar), with mean densities of 9.5 tortoises per hectare. These surveys formed part of a wider conservation project aimed at conserving both the threatened Mikea Forest in southwest Madagascar and its endemic tortoise population. In collaboration with the Wildlife Conservation Society (WCS), Madagascar National Parks (MNP) and the University of Antananarivo, these surveys aimed to establish the current extent of the highly fragmented population range of this tortoise species. Despite protection under CITES (The Convention on the International Trade in Endangered Species) which outlaws international trade in the species, *P. arachnoides* specimens are still captured and sold on international pet markets for high prices, creating a high economic incentive for poachers. This monitoring is continuing every six weeks and it is hoped that the project will expand to include more community-based monitoring and protection, and potentially act as a site for the reintroduction for confiscated tortoises in the future.

Addressing deforestation

Velondriake's partnership with Blue Ventures has also seen the introduction of a carbon offsetting project that delivers fuel efficient stoves to community members. Blue Ventures Carbon Offset (BVCO) is a not-for-profit social enterprise founded in 2007 to reduce the environmental impact of international volunteers visiting Madagascar through the Blue Ventures Expeditions programme. Working with the established solar stove producer, ADES (*Association pour le Développement de l'Energie Solaire*), based in Toliara, BVCO has funded this project using donations from

travellers and organizations wishing to offset their greenhouse gas emissions. The project provides subsidized solar and fuel-efficient stoves to Velondriake communities, allowing families to move away from open-fire cooking which requires enormous amounts of wood fuel and often leads to smoke-related illnesses and burns, especially for women and children. The stoves simultaneously reduce family fuel costs, decrease pressure on scarce forest resources, and free up time previously spent collecting firewood. It is particularly well supported by the island communities, who previously depended on cutting trees on their islands for fuel. This has caused significant deforestation on islands such as Andranombala.

Challenging norms

Destructive fishing practices and the unsustainable use of other local marine and terrestrial resources, which caused species loss and habitat degradation, were outlawed by the Velondriake *dina*. These include turning over corals to find octopus and sea cucumbers; the use of *laro*, a toxic vegetable poison, for fishing; fishing with beach seine nets; cutting mangroves for construction and lime fabrication; and the cutting of baobab branches for cattle fodder and the removal of bark for hut walls and rope. Prior to the introduction of the *dina* in 2006, many of these practices were commonplace in Velondriake villages. In 2008, a study found that *laro* poison was only used in isolated cases in two villages, compared to all 25 in 2006, while only four villages continued to use beach seine nets, compared to 21 before the *dina*.

The general adherence to the *dina* and subsequent biodiversity impacts can be attributed to the power of cultural norms, and their institutional integration within village authority structures. Village meetings have been held to raise awareness of the regulations and to explain their purpose. Laminated copies of the *dina* have been distributed, and regulations have been enforced with the help of local groups. Morombe radio station has been used to explain the Velondriake LMMA on three occasions. Negotiations have taken place where fines for non-compliance were thought to be too high; all infractions are noted by village presidents and regional committee members. Blue Ventures has also held participatory workshops to periodically review *dina* compliance. In general, compliance is high as a result of fishers voluntarily requesting the establishment of no-take zones, and thereby initially becoming members of the Velondriake LMMA, rather than these reserve closures being imposed by higher authorities. In 2009, however, it was agreed that representatives of the local police force and fisheries department could accompany a tour of Velondriake villages to reinforce the potential involvement of local authorities in enforcing the *dina*.

SOCIOECONOMIC IMPACTS

The socioeconomic considerations of organizing for conservation in Andavadoaka and Velondriake have been vital in underpinning the sustainable use of the region's natural resources. In cases where the *dina* was found to have been broken in 2008, the Velondriake Association central committee (Foibe) held meetings with all of the culprits identified by the study to determine why they persisted in using destructive practices. The responses pointed to a lack of



alternatives; community members typically break coral when looking for wild sea cucumbers, a lack of good fishing nets leads to the use of poison and beach seine nets, and mangroves are cut because families lack other income sources. This highlighted the importance of providing socioeconomic incentives to facilitate conservation.

Introducing aquaculture livelihood projects, providing educational scholarships, supporting women's associations, distributing solar and fuel-efficient stoves, and providing access to family planning and reproductive health services have all had substantial positive impacts on the Vezo and other communities of the Velondriake region.

In terms of direct income generation, Blue Ventures has employed octopus data collectors in ten villages, aquaculture farmers in two villages, and family planning counselors in all 25 villages within the region. Income gains have also resulted from the improved catches now available to local fishers. The revenue from the increased number and weight of octopuses accrues directly to fishers. As stipulated by their partnership with Blue Ventures, Copefrito pays a set price per kilogram depending on whether the octopus is greater or less than 1,500g. As well as increasing the number of octopuses caught, the weight of individual specimens has increased, yielding higher returns per catch. The original octopus reserve no-take zones implemented in Andavadoaka led to a nine per cent rise in octopuses caught over 1,500g between September 2004 and June 2006.

Developing alternatives

Further income generating activities will be encouraged with the development of the area as an ecotourism destination. Tourism in Velondriake is still limited, but has provided some locals with a means of escaping their heavy dependence on threatened marine resources. Several members of the Velondriake community have been trained as eco-tour guides, preparing them to lead snorkeling expeditions, boating trips and bird-watching treks, while also educating visitors about the area's unique natural resources and the need to protect them. Training includes two months of lessons, fieldwork and role-playing sessions. Guides-in-training are taken to tourist destinations such as mangrove forests, reef flats and baobab forests and are taught how to conduct canoe tours to islands off the coast of Velondriake.

The evolution of ecotourism as a sustainable source of income for more community members relies on increasing both the number of tourists and the lengths of their stays in the region. The remoteness of the region is seen as both a potential barrier to tourism and as an attraction for many tourists seeking less known destinations. Velondriake, in partnership with Blue Ventures, is in the process of building an eco-lodge north of the village of Andavadoaka. This will include hotel accommodation and a restaurant, and will offer a variety of recreational activities and educational workshops, allowing visitors to learn about the region's unique culture and environment

from local tour guides. The eco-lodge is owned and operated by the Ecolodge Committee, a group comprised of the Velondriake Association, the Andavadoaka Women's Association, and select community members from the commune of Befandefa. Proceeds from the eco-lodge will be used to support the management of the Velondriake LMMA. In early 2011, Velondriake was awarded a grant from the UNDP-GEF Small Grants Programme for its eco-lodge.

Since 2008, sustainable aquaculture has been adopted as a viable alternative livelihood activity, allowing local people to provide for their families without contributing to rising fishing pressures on the region's fragile coral reefs. The Velondriake aquaculture program utilizes the local Vezo population's intimate knowledge of the sea, along with access to a strong international export market, to promote sea cucumber (*holothuria scabra*) and seaweed (*kappaphycus alvarezii*) production. Sea cucumbers are grown within enclosed net pens situated in mud flats and reach maturity after nine months. The reef flats surrounding many villages in the Velondriake network offer an ideally placid habitat for sea cucumbers, which are prized in Asia for their aphrodisiac qualities. Prices can reach approximately USD 220 per kilogram for the majority of the year and rise higher with increased demand around the Chinese New Year. Rearing sea cucumbers requires minimal labour and low capital investment, and has no adverse impact on the environment. In fact, the pens may even help to regenerate severely depleted natural populations of sea cucumbers. Once established, sea cucumber pens can be harvested once every three months, providing a family with revenue of approximately USD 60 per month.

Seaweed, meanwhile, is grown on lines in open water and is harvestable after six weeks. It is currently being grown by community members in four villages within Velondriake, and is exported for use as an organic thickening agent in numerous food and household products, including toothpaste. Within Velondriake, there are ten family groups currently involved in farming sea cucumbers and over 30 individual seaweed farmers. Both products are sold to a regional buyer and exported to international markets. With support from Norwegian NGO, Norges Vel, the project is in the process of being scaled up to benefit 400-500 community members.

In 2007, BVCO held a stove workshop for community members, and

put in place structures to develop production and distribution of solar and fuel-efficient stoves. In 2009, BVCO turned much of the day-to-day management of the project back to ADES, although they continue to purchase carbon credits to offset emissions from volunteers' flights. In 2009, the project earned Gold Standard verification and validation status in the voluntary carbon market, a best practice methodology and high quality carbon credit. The project employs three villagers on a full-time basis and ten local stove sellers, who earn income in the form of commission on sales. As well as providing employment and income to community members, this project has health benefits in terms of reducing smoke inhalation, and benefits conservation efforts by reducing the amount of firewood required by households.

Wider social benefits

There are currently two women's associations within Velondriake, situated in Andavadoaka and Lamboara, whose primary goal is to provide local women with financial alternatives to octopus harvesting. The Andavadoaka women's association has received training in embroidery and tailoring in order to increase the quality and marketability of their handicrafts. In addition, the women have recently begun construction of a house where they can showcase their crafts and hold meetings. In July 2008, the Women's Association had 46 full members, who each pay a monthly membership fee of MGA 100 (approximately USD 0.05) which goes into the communal account of the Women's Association. For each handicraft item sold, the Women's Association takes a percentage, with between MGA 1,000 and 3,000 (USD 0.50-1.50) going to the woman who made the item. The organization has a formal structure, with a President and a Treasurer. Blue Ventures provides a full-time support staff member and ongoing handicrafts training, as well as issuing interest-free small loans and purchasing essential materials and equipment, such as sewing machines, from the town of Toliara, 150 km south of Andavadoaka, on the women's behalf.

The provision of education and healthcare services has also brought tangible socioeconomic gains to the Velondriake village populations. Since 2006, funding from Blue Ventures has provided scholarships for academically-gifted students to attend Catholic Mission primary and secondary schools in Andavadoaka, Morombe, and To-





liara. Without this source of funding, many of the chosen primary school students would be forced to attend the local public schools, which are free, but in comparison are overcrowded and very limited in resources.

In the 2009-2010 school year, a total of 101 children from across Velondriake received scholarship assistance to attend school and to purchase supplies necessary for their education. Of these, 76 were from Andavadoaka and 25 from remote neighboring villages, including the remote island communities of Nosy Ve, Nosy Andragombala and Nosy Be. In the past, Blue Ventures funding has also given scholarships to marine scientists to gain experience at their research station at Andavadoaka, while ten undergraduate and postgraduate scholarships are currently offered annually to promising Malagasy students of marine sciences thanks to an endowment by the President of the Velondriake Association, Roger Samba.

Madagascar has one of the world's fastest growing populations, with over half of the country's population under fifteen years of age. On average, only one in five women has access to contraception. Rapid population growth in the Velondriake region has increased pressure on its natural resources. In response to this, Blue Ventures established a family planning clinic in Andavadoaka in August 2007 to provide access to reproductive health services for women in the community, in particular, addressing the local demand for family planning. This initiative expanded into a broader Population, Health and Environment (PHE) program, aiming to integrate sexual and reproductive health and maternal and child health initiatives into existing conservation efforts. By 2010, this program involved four clinic sites, with a fifth being established, and 18 community-based distributors work-

ing throughout Velondriake, who have provided male condoms and birth control pills to 1,687 patients. Family planning projects have sought the approval of village leaders and elders before beginning educational or clinic work.

The success of the PHE programme has resulted in new grants from the United Nations Population Fund (UNFPA) and the MacArthur Foundation, while technical support has been given by Population Services International (PSI) and Marie Stopes International (MSI). This clinical service is supported by a program of community education, which draws upon social marketing techniques to raise awareness. In October 2010, three regional football tournaments were held across the Velondriake LMMA, with health messages communicated via peer educators, theatre productions and short films during the evenings. These educational messages reached 900 spectators at the tournaments, with 600 and 500 people viewing the theatre productions and films respectively.

POLICY IMPACTS

The Velondriake LMMA has involved local and regional government representatives in its work since its inception, and has also been able to influence government approaches to community resource management through its demonstrable successes.

The Andavadoaka experiment had an instant impact on government policy. Within a year of the first reserve opening, the Madagascar Government instituted a national closed season on octopus harvesting as a direct result of a national conference organized by Blue Ventures and WCS. More recently, following the success of

the Velondriake LMMA, the government has embraced the idea of community-based marine resource management. Since 2008, with a USD 20 million grant from the African Development Bank, the government has supported the creation of fifty locally managed marine areas along the south-western coast of Madagascar based on the Andavadoaka model as part of their Toliara Fishers Community Support Project (*Projet d'Appui aux Communautés des Pêcheurs de Toliara* - PACP).

In December 2010, Velondriake, along with 71 other protected areas was granted provisional protected status by the Madagascar Government. This protection affords Velondriake two years to submit the necessary management planning documents required to receive a contract of delegated authority and definitive protection status. When this process is finalized, Velondriake will become the first locally managed marine area in Madagascar to acquire this protection.

The incorporation of *dina* by the Velondriake Association into the classification of its temporary and permanent reserves reflects a national process of institutionalizing these customary laws, and has rooted conservation regulations in both local traditions and decentralized government authority. The Farita Arovana Velondriake has three local government representatives, and government and law enforcement representatives were also engaged in reinforcing *dina* regulations in Velondriake villages in 2009. Technicians from the government fisheries department participated in a workshop attended by all members of the Velondriake regional management committees, village presidents and leaders, and communal government authorities. The fisheries department explained Madagascar fishing regulations as they pertained to Velondriake fishers, the biological reasoning behind these laws, and how the Velondriake *dina* complemented the national regulations. Committee members discussed how the fisheries department could

help them enforce the *dina* and national law.

The first regional stock assessment of the commercially valuable reef octopus (*octopus cyanea*) in southwest Madagascar was initiated in September 2010, implemented in part by IHSM. Despite the availability of robust fisheries data from Andavadoaka and surrounding villages, no data had previously been collected in villages further south where the temporary reserve model had been replicated. This assessment was launched to address this data shortfall, and will allow stakeholders to understand the seasonal fluctuations in octopus catch along the southwest coast, surveying landings for twelve months in 27 villages over 400 km of coastline, from Lanivato in the south to Morombe in the north. A detailed octopus fishery management plan will be prepared to conclude the first year of the research in conjunction with local project partners, including commercial export companies and village leaders. It is hoped that this five-year plan will provide fisheries stakeholders with an effective strategy to ensure the long term sustainability of the fishery through continued adaptive management and the implementation of accepted fisheries thresholds. This research is supported by ReCoMaP, a regional program of the Indian Ocean Commission, funded by the European Union, for the sustainable management of the coastal zones of the countries of the Indian Ocean.

The Velondriake Association president and Blue Ventures Malagasy staff have attended a number of meetings that have informed decision-making, regional planning processes, learning exchanges, and built the capacity of the staff members themselves. These include an exchange forum on co-managed areas, a workshop on marine turtles and a range of seminars and symposiums on a range of topics from the development of management plans to the monitoring of coral reefs.



Sustainability and Replication



SUSTAINABILITY

The sustainability of temporary and permanent reserves as systems for the local management of fisheries, both in Andavadoaka and in the Velondriake LMMA as a whole, is contingent on the continued support of its partner organizations, notably Blue Ventures. Challenges for the initiative involve the scaling-up of income generating activities that can sustain the environmental, social and economic impacts achieved thus far, without seeing a diminution of their scope. This will rely heavily on the development of ecotourism and alternative livelihood options, and on the continued capacity building of Malagasy staff within the Velondriake Association.

The completion of the eco-lodge, currently under construction, will substantially benefit the tourist trade within the region. Its construction, and the training of local community members as eco-guides, has laid the groundwork for a successful ecotourism initiative that could generate a sustainable source of revenue that would finance the activities of the Velondriake Association. Blue Ventures assisted in the development of an ecotourism action plan based on the recommendations of an independent specialist. These recommendations included seven key objectives, including establishing a standardized fee system to capture tourism revenue, improving transport infrastructure to make the region more accessible, establishing a tourism impact measurement system, and ultimately increasing the number of tourist nights to 15,000 per year (from 9,000 in 2008).

Government policy will also affect this process, as until the Madagascar government awards the Velondriake LMMA protected area status, the Velondriake Association cannot legally demand entrance fees from tourists. To date, Blue Ventures volunteers have been paying a voluntary entrance fee, while local hotel owners have agreed to begin asking for entrance fees from their guests.

From an ecological and social perspective, the system of sustainable fisheries management appears to be inherently sustainable. The impetus for the conservation of fishery stocks through the establishment of no-take zones came from fishers in the village of Andavadoaka, which were enthusiastically replicated in other villages. Their continued use reflects the positive economic results achieved, while the resilience of high octopus and fish populations in turn suggests positive ecological impacts. Destructive fishing habits have been all but eradicated.

A key factor in the social sustainability of the initiative is community buy-in to the project's activities, a result of recognition that conservation efforts are bringing clear benefits to community members. Results from a survey to investigate perceptions of the reserves by local communities indicate that the overall perception of the reserves is strongly positive, with 96 per cent of interviewees feeling that they have value for their community. Of the gleaners and fishers who were interviewed, 90 per cent agreed that the reserves had increased their ability to sell octopus, and 83 per cent agreed that their family had more diversified sources of income after the establishment of the reserves.

Educational scholarships are less sustainable, as they rely directly on funding from Blue Ventures. Similarly, the Population, Health and Environment program relies on funding, supplies and training from external partners; however, the community-based distributor system has ensured that local capacities have been significantly strengthened in this regard.

The organizational sustainability of the Velondriake Association itself rests upon the substantial capacity building that has been undertaken within local communities. Currently, the majority of Blue Ventures staff works in Madagascar and is Malagasy; ultimately, the Velondriake project in Madagascar will be managed entirely by Malagasy staff. To this end, a local staff member from Andavadoaka recently became the first Malagasy to be certified as a dive instructor.

More than 150 community leaders from around Velondriake have been trained in marine protected area management. Four local students were given SCUBA training and more than 30 IHSM students have been trained in SCUBA and marine science. Sixteen university scholarships have been dispersed as part of the Getty Scholarship program and over 100 students annually receive financial support to attend the Catholic Mission school.

Two examples of the strength of local capacity stand out. In 2008, the president of the Velondriake Association, Roger Samba, was awarded the J. Paul Getty Award for Conservation Leadership by the Worldwide Fund for Nature (WWF), in recognition of his role in the establishment of the world's first community-managed no-take zone for octopus. In 2010, meanwhile, Gildas Andriamala graduated with a Master's degree from Georgetown University, USA, with sponsorship from Rare Conservation, having coordinated the 'Vezo Aho' social marketing campaign in the Velondriake LMMA. These examples serve as evidence of the substantial management capacity within Velondriake's local population, and the benefits of their close association with Blue Ventures and other partner organizations.

REPLICATION

The initial use of temporary octopus fishery no-take zones in Andavadoaka in 2004 has inspired extensive and rapid replication. The conservation and socioeconomic successes of these initial experiments in temporary no-take zones led directly to temporary and permanent reserve closures in 24 neighboring villages along the southwest Madagascar coastline, and ultimately the establishment of the Velondriake LMMA in 2006. This model has now been replicated in turn in other locations, most notably along the Madagascar coastline. Velondriake's success in making the argument for conservation, sustainable use and community-based natural resource management has made it a regional centre for peer-to-peer learning exchange, with Velondriake often playing host to groups from across Madagascar.



Blue Ventures and WCS are helping to create fifty new no-take zones based on the Velondriake model as part of the government's PACP project. The PACP's objective is the sustainable development of traditional marine fisheries in southwest Madagascar. The project covers 310 km of coastline between Morombe and Soalaly, and is financed by the African Development Bank. The first step towards this was to arrange learning exchange visits for the new villages to Velondriake. The groups consisted of a cross section from each village: fishermen and women, young and old, and village leaders. To date, 122 people from 14 villages have taken part in knowledge exchange visits to Velondriake, each for three days.

In November 2010, 16 community representatives from the coastal villages of the Kirindy-Mite National Park travelled down the coastline to visit Velondriake. Over the course of three days, participants visited both mangrove and coral reef reserves, and a community-managed aquaculture project, and participated in evening question-and-answer sessions with members of Velondriake's management committee. Since October 2009, Blue Ventures has partnered with the national parks service, Madagascar National Parks (MNP) to begin the process of engaging local coastal communities in the establishment of a marine extension to the existing Kirindy-Mite

“People need to think more long-term. Often governments and funders become obsessed with quick, magic solutions to problems. Anyone who does not propose a solution like this is ignored. As a result, local communities and partner organizations are stuck asking, not for what we need, but for what they believe they can get funding for. The truth is, conservation is more expensive than anyone would like it to be. Local communities struggling to make a living among diminishing resources do not have the ability to donate large amounts of time to community organizations without being compensated. Additionally, while permanent reserves and alternative livelihoods projects are excellent, they often bring benefits in medium and long-term while bringing additional costs in the short term. To overcome this, communities groups and partners need modest but sustained funding sources that meet their needs, not the fancies of the funders.”

Mr. Roger Samba, President of Velondriake



National Park based on the Velondriake LMMA model. This visit was preceded by a visit by 22 representatives from the northern tip of Madagascar, who had travelled over 2,000 km to take part in a similar community exchange. Andavadoaka, and by extension Velondriake as a whole, is solidifying its reputation as a regional center of excellence in the Western Indian Ocean for the development and promotion of effective community-based management of marine and coastal resources. By sharing experiences and success stories, the pioneering work of the Velondriake communities can have a greater reach. These exchange visits are not only valuable for visitors, they also demonstrate to the Velondriake Association how important their work has been, and provide encouragement for future activities. Examples of the Andavadoaka model currently being implemented elsewhere include Bevohitse, Ambatomilo, Salary, Tsiandamba, Fiherenemasay and Ambola, all from Madagascar, as well as a group of octopus fishermen from the Mauritian island of Rodrigues.

Blue Ventures' research station and observation team have attracted students and practitioners. In September 2010, Blue Ventures hosted 20 University of Toliara ecotourism students, including four from the neighboring Comoros Islands, to study ongoing marine research and conservation programs in Velondriake. Ongoing monitoring of Velondriake's marine and terrestrial species and habitats has served as model for community-based conservation approaches. A research team is in the process of publishing the results of a five-year bioeconomic analysis of the effects of Velondriake's marine reserves on sustainability of local fisheries, which would represent a landmark study in local marine resource management.

Besides no-take zones, Velondriake's aquaculture program is also in the process of being scaled up with support from The Royal Norwegian Society for Development (Norges Vel), a non-profit NGO. The goal of this new program phase is to increase the volume of production and the numbers of people involved in these activities. This project aims to increase the number of farmers five-fold, to a total of 50 families engaging in sea cucumber farming, and 180 farmers of seaweed. Total projected direct beneficiaries of the program will number between 400 and 500 people, over 15 per cent of Velondriake's population.

Velondriake's success has also encouraged the expansion of fisheries monitoring within the region. In 2010, southwest Madagascar's octopus fishery underwent pre-assessment for Marine Stewardship Council (MSC) certification, initiated by Blue Ventures and financed by the Sustainable Fisheries Fund (SFF). This is one of the first traditional fisheries in east Africa to be considered for certification by the MSC. In order to attain MSC certification, the sustainability of the region's fisheries beyond Velondriake also needs to be evaluated.

PARTNERS

UK-based conservation NGO, Blue Ventures, has been central to the successes of the Andavadoaka and Velondriake marine management initiatives. The NGO was involved in an advisory role in the initial creation of temporary no-take zones on the Nosy Fasy reef, and has provided funding, training and technical advice for the expansion of these reserves since 2004. The NGO currently provides educational scholarships for community members, runs the Population, Health and Environment program, organizes environmental education projects, conducts monitoring and research within the LMMA, and co-manages the LMMA. The Blue Ventures research station at Andavadoaka houses volunteer and permanent staff, and they are involved in establishing ecotourism within the region. They have also engaged in the many replication attempts outside the Velondriake LMMA since 2004.

Copefrito, a commercial marine fisheries collector, initially guaranteed a price for octopus sales from Andavadoaka and have since remained a principal partner in the work of Velondriake LMMA. Located in Toliara, Copefrito regularly sends a camion and boat to Andavadoaka to purchase octopuses, which are processed and exported to southern European and Asian markets. The company has helped to reinforce the strength of the dina by not collecting octopus when the reserve is closed. Without a buyer, locals have less incentive to trespass on the reserve during periods of closure.

Wildlife Conservation Society (WCS) was initially involved in the successful implementation of no-take zones in Andavadoaka village, and are currently engaged in the implementation of the 'Projet d'Appui aux Communautés des Pêcheurs de Toliara' (PACP), and with ongoing terrestrial surveys of the endemic spider tortoise (pyxis arachnoides). WCS has also assisted the Velondriake Association in developing a UNDP-GEF Small Grants Programme application for funding for a biogas enterprise.

Institut Halieutique et des Sciences Marines (IHSM), Madagascar's national marine institute, based at the University of Toliara, was a partner in the initial implementation of no-take zones in Andavadoaka, and has remained involved with the Velondriake LMMA as a research partner in various monitoring projects.

The United Nations Population Fund (UNFPA), the MacArthur Foundation, Population Services International and Marie Stopes International have all provided financial or technical support for the Population, Health and Environment Programme.

The Sustainable Fisheries Fund and the David and Lucile Packard Foundation funded the initial assessment for Marine Stewardship Council certification.

The African Development Bank funded the 'Projet d'Appui aux Communautés des Pecheurs de Toliara' (PACP), establishing 50 no-take zones along the coastline south of Velondriake.

The Royal Norwegian Society for Development (Norges Vel), a non-profit NGO, is funding the scaling-up of the Velondriake aquaculture program.

The University of Toliara and ReCoMaP (Regional Coastal Management Programme for the Indian Ocean countries) have funded the region's first octopus stock assessment.

Madagascar National Parks and the University of Antananarivo, with funding from the Turtle Conservation Fund, are implementing terrestrial surveys to monitor the population of the endemic spider tortoise (*pyxis arachnoides*) within the Velondriake LMMA.

Rare Conservation funded the 'Vezo Aho' social marketing campaign in 2010, and sponsored its leader Gildas Andriamala to gain a Master's degree from Georgetown University in the United States.

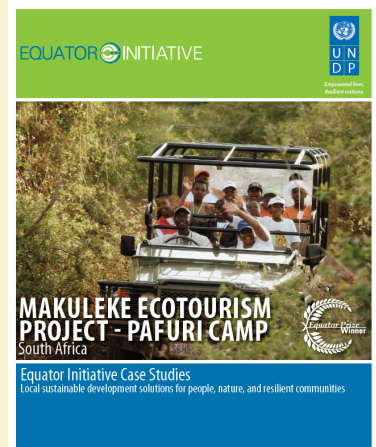
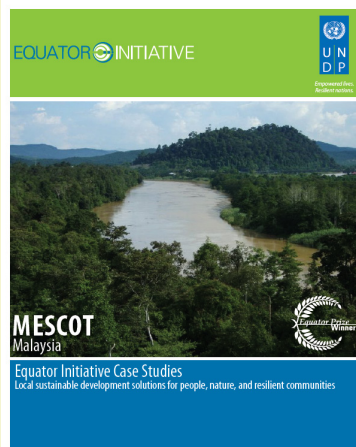
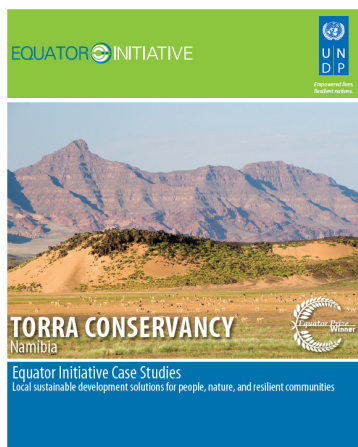
Applications relating to the initiative have been made to the UNDP-implemented GEF Small Grants Programme. In 2009, an application was made for a grant to support village-based ecotourism in Velondriake. This was turned down by SGP in favor of a biogas/renewable energy project in the community of Befandefa submitted by WCS. SGP approved a grant of US\$35,000 for this, which was turned down by Velondriake after a feasibility study brought up a number of technical issues. Instead, Velondriake resubmitted a proposal for the construction of an eco-lodge, which was approved in 2011.



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