RESILIENCE SOURCEBOOK

Inspired by the 2013 Milstein Science Symposium
Understanding Social and Ecological Resilience in Island Systems
Informing Policy and Sharing Lessons for Management

CASE STUDIES OF SOCIAL-ECOLOGICAL RESILIENCE IN ISLAND SYSTEMS

American Museum of Natural History
Center for Biodiversity and Conservation

USING TEMPORARY CLOSURES TO ENHANCE SOCIAL-ECOLOGICAL RESILIENCE IN A DEGRADED CORAL REEF SYSTEM

Velondriake, Madagascar

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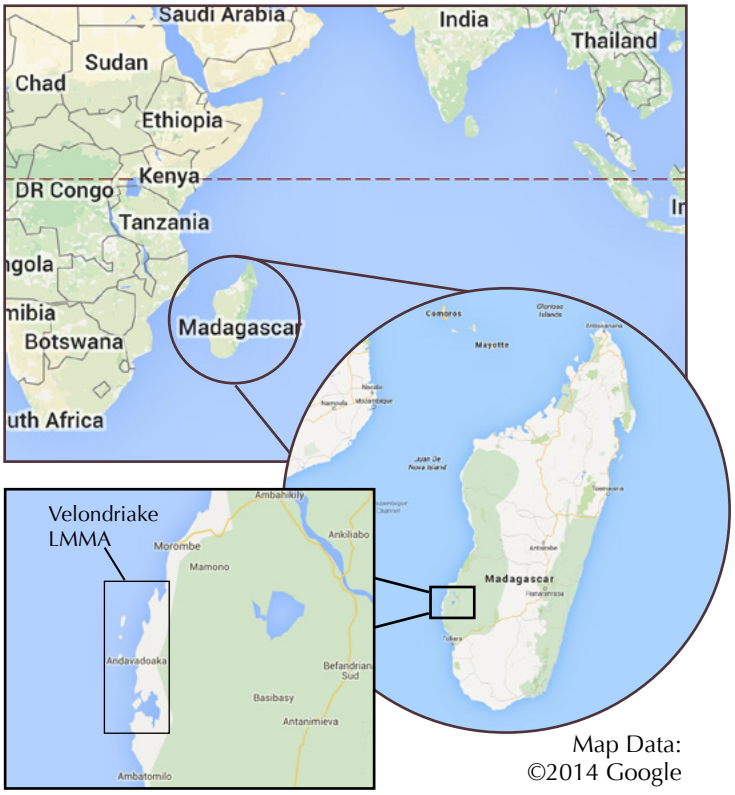
The Setting

Velondriake is a Locally Managed Marine Area (LMMA) on the arid southwest coast of Madagascar in the commune of Befandefa. It is home to about 7500 people, most of whom are Vezo, an ethnic group whose members pride themselves on their connection to the sea and their fishing prowess. Madagascar's southwest coast is home to some of the largest coral reef systems in the western Indian Ocean. In 2012, Madagascar was ranked 151 out of the 187 countries in the Human Development Index. The southwest region of Madagascar adjacent to Velondriake LMMA is experiencing a population boom – both from high birthrates (6.2 births per woman, in comparison with the national average of 4.8) and migration from other areas of Madagascar. Reports of average income levels of the Vezo communities adjacent to the Velondriake LMMA range from PPP $1.72 – $2.13 per person per day, which straddles the international poverty line of PPP $2.00 per person per day. Small-scale fisheries support over 82% of all household income in the region, a substantial portion of which is generated from gleaning.

The Disturbance

By the late 1990s, the reefs of southwest Madagascar were experiencing long-term degradation due to various causes, including overfishing and changing fishing practices. While traditional fishing had always been a major source of both food and trade in the region, in recent years, many traditional fisheries – including octopus, lobster and shrimp – have become commercialized and landings are primarily exported. Human population growth paired with



the arid region's low agricultural potential put increasing pressure on marine resources, leading to overfishing on reefs – affecting reef organisms such as fish and octopus. Overfishing damages reefs over time because of the loss of ecosystem function. For example, herbivorous fish maintain algae at levels that minimize their competition with corals – if herbivores are overfished then they cannot perform this function. Destructive fishing techniques, such as cyanide fishing and seine-net fishing, also damage reef habitat structure and quality. Community members were concerned about diminishing catches from their reefs.

In 1998, an El Niño caused elevated sea surface temperatures, resulting in mass coral bleaching across the Indian Ocean. The bleaching and subsequent coral mortality in the southwestern region brought attention from conservation groups and researchers already working in Madagascar. The bleaching event exacerbated the longer-term decline in the region's reefs.

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A Velondriake LMMA committee meeting. Photo credit: Garth Cripps, Blue Ventures

The Response

Blue Ventures, in collaboration with L'Institut Halieutique et des Sciences Marines (IHSM – Institute of Fisheries and Marine Sciences, University of Toliara), the international conservation non-governmental organization Wildlife Conservation Society (WCS), and Copefrito started working with communities in the area in 2003. Established in 1995, Copefrito is a Toliara-based fish collection company and the largest purchaser of octopus in the region. Originally the organizations approached the communities with the intention of creating a marine protected area. The communities were not won over to the idea of a permanent no-take area, however, so the partners came up with an alternative proposal.

Starting in one village, Andavadoaka, the group worked with the community to set up a seven-month periodic closure of one octopus fishing site. Blue Ventures hoped that this short-term closure would demonstrate that closures could have economic and social benefits as well as ecological effects. In addition, a seven-month closure of just one site was a restriction that the community could accept. Octopus ecology makes them an ideal candidate for a targeted closure. The four species of shallow-water octopuses targeted in the region grow very quickly and within a seven-month period, the average catch size of an individual can increase from 100-300 grams to 1 kg. Octopuses are also habitat-specific (they generally live in one part of a reef), so the closure in one area enforced by the community in Andavadoaka would generate benefits that they could more readily expect to reap themselves. This is in contrast to more mobile species that might spawn in one area and feed in another, or that might traverse many different communities' reef areas, meaning that creating a closure in one area might improve catches elsewhere. Through multiple meetings between community members and Blue Ventures staff, the community identified a part of their reef that they would designate as a no-take area for the octopus fishery. The no-take area was closed from November 2004 to June 2005.

On opening day, hundreds of fishers from other villages came to fish on Andavadoaka's reef. This had the unfortunate result of lowering yields for the fishers from Andavadoaka, however, the silver lining was that the news of the closure's success in generating bigger catches spread quickly and led to the creation of dozens of closures in neighboring villages' reefs. Over time, with scientific and logistical support from Blue Ventures, WCS, and IHSM, villages added permanent no-take areas in reefs and mangroves in addition to the species-specific temporary closures for octopuses. With strong local leadership, the villages worked together with Blue Ventures to create a government recognized community organization, the Velondriake Association, to manage the protected area. This culminated in the establishment of the Velondriake LMMA in October 2006, encompassing 25 villages. In addition to

A woman fishing for octopus on the reef flat. Photo credit: Garth Cripps, Blue Ventures

spatial and temporal management of fishing, the Velondriake LMMA has outlawed destructive fishing practices.

In order to support the compliance with LMMA rules, Blue Ventures with the support of the international conservation NGO RARE, established a social marketing campaign called "Vezo Aho" ("I am Vezo") which reinforced traditional Vezo fishing practices such as line fishing that were less environmentally destructive than poison fishing and beach seine-net fishing. Research revealed that it was believed to be migrants to the area – and not resident Vezo – that were responsible for the destructive fishing techniques and that local people did not feel empowered to enforce the rules of the LMMA. The "Vezo Aho" campaign encouraged locals to enforce the LMMA rules as part of maintaining their Vezo identity and to take pride in the knowledge and skill that Vezo need to have in order to successfully fish with their traditional and more sustainable methods. Blue Ventures supported the social marketing campaign by demonstrating with fisheries data that line fishing was more sustainable because it targets fish at the optimal demographic stage (while seine net fishing was indiscriminate in what is caught).

The Recovery

Velondriake communities are reaping the benefits from the LMMA with strong evidence that the temporary octopus closures have economic benefits. The impacts of the permanent no-take closures are less clear. It is thought that these may not all have been as effectively enforced as the temporary closures and so the ecological and economic impacts have not been as clear. While improvements to community led monitoring and enforcement are still being developed, the LMMA's creation of an institutional framework that can serve to manage a large geographic area is a big step toward realizing the Velondriake Assocation's vision of effectively managing its coastal and marine resources for economic development, nature conservation, and community solidarity.

Vezo fisherman on pirogues. Photo credit: Garth Cripps, Blue Ventures

Participants at a Blue Ventures training in Velondriake. Photo credit: Olivia Kemp, Blue Ventures

Lessons Learned

- *Tie monitoring to appropriate communication*. Monitoring results should be shared with community members as soon as possible. Blue Ventures was aided in that communication through community partners to translate the data into a format that was locally comprehensible – both in terms of the language and the visuals. For example, Blue Ventures and their partners worked with local people to create videos with "junior reporters" (local schoolchildren) collecting footage then editing it to convey messages in a locally appropriate way. Using video also enabled the messages to reach a wider audience.
- *Demonstrate the effectiveness of a concept before asking for widespread adoption*. The octopus closures worked in favor of the establishment of the LMMA because of the tight feedback between the species' ecology and the management. Communities were able to understand right away that the closures were

effective at increasing catches. The momentum from these successful closures enabled further conservation.

- *Social marketing and outreach can support enforcement*. The "Vezo Aho" campaign inspired and motivated community members to better enforce LMMA rules by tying Vezo cultural identity with the success of the LMMA. Also the hallmark of social marketing – reinforcing what people do, rather than telling them what not to do – was well received.
- *Local leadership is key.* In Velondriake, elders played a big role to getting the people to get on board with the idea of trying the no-take zones. The quick expansion of the LMMA can be attributed to the extraordinary leadership of Velondriake Association's President Roger Samba. Importantly Blue Ventures and its partners didn't only rely on the community presidents to provide local leadership. By spending enough time in the community to understand whom people liked, trusted, and respected, Blue Ventures and its partners were able to identify effective and visionary local leaders. The communities were willing to try the initial no-take zones because of these local leaders.

As told to Georgina Cullman

Partner Organizations

- Blue Ventures
  http://blueventures.org
- Institut Halieutique et des Sciences Marines (IHSM), Université de Toliara
  http://www.ihsm.mg
- The Wildlife Conservation Society, Madagascar
  http://programs.wcs.org/madagascar/Home.aspx
- Rare Conservation
  http://www.rare.org
- Copefrito, SA
  http://www.copefrito.com

Funding Summary

- US National Science Foundation Grant No. OISE-0853086
  http://nsf.gov
- The MacArthur Foundation
  http://www.macfound.org
- The Helmsley Charitable Trust
  http://helmsleytrust.org
- Network for Social Change
  http://www.thenetworkforsocialchange.org.uk

Resources

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The Milstein Science Symposium

The collection of this case study and others like it results from the April 2013 Milstein Science Symposium, Understanding Ecological and Social Resilience in Island Systems: Informing Policy and Sharing Lessons for Management. Held at the American Museum of Natural History, the Milstein Science Symposium convened local resource managers, researchers, educators, island leaders, policy makers, and other leading conservation practitioners to examine characteristics, qualities, and processes that may foster resilience for coastal and marine systems as well as explore interactions, linkages, and feedback loops in complex social-ecological systems and what this means for management. The Milstein Science Symposium was organized in collaboration with The Nature Conservancy, the Gordon and Betty Moore Foundation, the National Science Foundation, The Christensen Fund, the Coral Reef Alliance (CORAL), the Scripps Institution of Oceanography at the University of California San Diego, the University of California Santa Barbara, the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries, and Small Island Developing States (UN-OHRLLS), and the Wildlife Conservation Society.

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