



Taking an Ecosystem Service Perspective in Velondriake Locally Managed Marine Area

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Short title: Temporary closures in octopus fishing areas increase catch, Madagascar

Key Message: Temporary closures of octopus fishing areas are found to increase catch and economic returns for local communities. By demonstrating such short-term, positive effects and following a gradual, participatory process that fosters trust and cooperation between communities and other interested actors, the resource users are open to implementing long-term management tools for the sustainable use of biodiversity and ecosystem services.

Reviewer: Charlie Gardner, Vola Ramahery

Suggested citation: Oleson, K. (2011) TEEB case: Taking an Ecosystem Service Perspective in Velondriake Locally Managed Marine Area. Available at: TEEBweb.org.

What was the problem?

Marine resources are the sole protein and income source for many poor Vezo people living along the southwest coast of Madagascar. They are also the basis of the Vezo cultural identity. Fishers had observed declining catch for years, but struggled to identify ways to lessen the human drivers of the decline. Acknowledging human impacts on the ocean ran counter to deep cultural beliefs surrounding the abundance and origin of marine resources. Moreover, there is a strong tradition of open access and village leaders felt there were few culturally appropriate, effective management tools available to them (personal comment – R. Samba to K. Oleson 2009).

What was done to solve it? How were ecosystems considered?

Recognising the need to combat a persistent decline in fisheries catch, the community formed one of the first locally managed marine areas in the Western Indian Ocean region. The Velondriake Locally Managed Marine Area (LMMA) encompasses around one thousand square kilometers of the southwest coast of Madagascar (located some 200 km north of Toliara). The LMMA includes activities that are meant to identify, quantify, and communicate ecosystem services flowing from the ocean, and to demonstrate the human impact on ecosystems.

Fisheries are the most immediate and demonstrable ecosystem service derived from the LMMA, and because of the Vezo's reliance on fishery products for income and protein, LMMA management activities have centred on managing key species (octopus) and demonstrating management effects to local communities. For example, increased catch due to temporary closures of octopus fishing areas has demonstrated the benefit of this fishery management technique. A survey conducted in 2009 found near unanimous consent on closures' benefits to communities. This management technique has thus been replicated hundreds of times along the coast north of Toliara, South West Madagascar.

Other ecosystem services supported by the LMMA include those derived from various protected ecosystems (mangroves, coral reefs, beaches, coastal forests) and increased community cohesion and interaction. Local livelihoods and well-being rely on the provisioning, regulating, and supporting services of these systems. Increased tourism, recreation, and research (cultural services) support the local economy in a very tangible manner. Coastal protection and biodiversity maintenance (important for resilience) are more abstract regulating and supporting services. Local and global “cultural” services (as defined by the Millennium Ecosystem Assessment 2005) are actively supported by existing management actions, including protection of threatened and charismatic species (option and existence values), the cultural identity of the Vezo as those who “live with the sea”, maintenance of cultural traditions, and increased social cohesion. The LMMA further supports a family planning initiative (Mohan 2009) and alternative livelihoods activities, for example sea cucumber farming and a sewing co-operative within the women’s association.

Community awareness of the ecosystem services flowing from the LMMA has increased through the participatory management process over the past 7 years. Aside from the obvious community meetings surrounding resource management, the LMMA integrates community members in extensive environmental educational campaigns, scientific research, and community-based monitoring. Further, the process to develop the 5-year LMMA management plan (Peabody and Benbow 2010) was amongst the first in Madagascar to be based on a fully participatory approach where a series of village meetings were used to identify threats to ecosystem services and come to consensus on conservation priorities and objectives for the LMMA (personal comment – C. Gardner to K. Oleson, 2009).

What was needed to solve the problem in terms of data, resource and capacity?

The LMMA is co-managed by NGO Blue Ventures Conservation (www.blueventures.org) and the community. The NGO contributes scientific knowledge, analytical skills, management leadership, and funds while the community contributes local knowledge, labor, and community managers. Regular management meetings are held in each region of the LMMA and all decisions are ultimately made by the community with the NGO providing the framework for meetings and timely decision-making (Harris 2007).

For 6 years, landing data have been collected in the LMMA, providing the necessary biological data to analyse closure effects and compare management regimes. A full analysis of the dataset is currently underway, but preliminary results indicate that the octopus closures have a significant fisheries and economic effect: an 80% increase in catch per unit effort and 68% of closures have positive net present values (Oliver et al. in prep, Oleson et al. in prep. a and b). Data collection has involved upwards of 20 local villagers each year, trained to collect data, and a dozen local “scholars” trained to enter and verify data. Socio-economic baseline data are also collected, and an analysis is underway to track the socio-economic impacts of the LMMA over time. This effort involved local teams trained in surveying a sample of LMMA villages. Community-based monitoring efforts inform villagers of the impacts of the LMMA. A coordinator trained local monitoring teams and oversaw the effort and communication strategies.

Management effects are monitored using the Socioeconomic Monitoring Guidelines for Coastal Managers in the Western Indian Ocean (Malleret-King et al. 2006) and community-based monitoring (Ramahery 2007). Analyses and academic studies resulting from the monitoring efforts are reported back to the managers and community leaders (Oliver et al. in prep.; Oleson et al. in prep. a and b; Andriamalala 2008; Epps 2006; Humber et al. 2006), who in turn report it to communities via regular meetings.

Did the approach influence public management or result in policy uptake?

A local Malagasy law governing resource use, called a *dina*, is now in effect in the LMMA. The *dina* outlines permitted activities and penalties for infractions. *Dinas* are a method of law enforcement used in remote areas in Madagascar that seek to codify traditional rules and integrate them into the national legal system. The Velondriake *dina*'s spirit is remarkable because it is contrary to the long-held, deep Vezo tradition of open access and its objective is to preserve marine ecosystem services. The LMMA has been awarded temporary protected area status valid for two years, under the national law governing protected areas, and definitive status will follow upon conclusion of the participatory process to develop the full management plan. The ecosystem service model has taken hold nationally. There is a national closure of the octopus fishery based on the scientific evidence gathered in this LMMA, and the closures are being propagated throughout the southwest of Madagascar. As mentioned above, Blue Ventures Conservation is currently analyzing the benefits to Vezo incomes of the octopus closures. Preliminary results indicate that the closures increase individual weight per unit effort (Oliver et al. in prep) and increase income (Oleson et al. in prep. a). Thus the perception amongst villagers is nearly uniformly positive regarding the closures (Oleson et al. in prep. a). Furthermore, the community perception and understanding of the ocean as a system and the impacts humans have on the marine resources are monitored.

What else was necessary for it be influential?

According to the LMMA manager (personal comment – S. Peabody to K. Oleson, 2010), strong relationships between fishers, fisheries collectors, and the NGO - essentially public private partnerships – have been key to the LMMA's successes so far. A second lesson is the need to follow a bottom-up, gradual process of beginning with demonstrable biological effects (octopus are fast growing so a short closure quickly demonstrated effects) and moving towards other management regimes once trust has been built.

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