



Briefing document and frequently asked questions relating to Oliver et al. (2015): *Positive catch & economic benefits of periodic octopus fishery closures: do effective, narrowly targeted actions 'catalyse' broader management?*

Community management of shared resources has proven effective in encouraging conservation around the world. Management efforts are often implemented with help from an external partner, or co-manager, in order to establish a programme at the grassroots with the goal of fostering full community ownership in the future. While community and co-management models are becoming more widespread, quantitative assessments of their effectiveness remain uncommon. This study begins to address this research gap by providing a quantitative assessment of co-management outcomes for a specific periodic fishery closure regime in southwest Madagascar.

Periodic fishery closures are designated intervals where fishers refrain from harvesting in specific areas. This allows for recruitment and growth, optimistically leading to increased catch post-closure. Successful closures are those that generate economic benefits without incurring costs during the closure period. The benefits must outweigh the costs, or else community cooperation is hindered.

In southwest Madagascar, two types of periodic octopus fishery closures are implemented: the national closure, which is legislated by the government and applies to the whole southwest octopus fishery, and local closures, which are organised by communities and only apply to designated fishing sites around participating villages. This study focused on the local periodic octopus fishery closures.

The purpose of this study was to assess whether 8 years of local periodic octopus fishery closures in the Velondriake Locally Managed Marine Area (LMMA) in southwest Madagascar were effective in increasing catch, both per individual and at village level, and more broadly, in fostering community participation and expansion of marine management. Thirty-six closure sites were compared to control sites where no closure was implemented, in order to quantify the benefits of local periodic octopus fishery closures.

Do local periodic octopus fishery closures increase catch?

In the 36 closure sites, there was a significant increase in the weight of octopus landed overall (>700%) and per individual fisher per day (87%) during the 30 days following the closures.

Do local periodic octopus fishery closures pay-off economically?

Villages implementing closures experienced a mean income boost of \$817, more than doubling (+136%) their income from octopus fishing in the 30 days following the closures. They also experienced no significant decline in income during the closures. In sites with high rates of illegal poaching during closures, economic performance was poor, highlighting the importance of local level enforcement to accrue benefits.

How do fishers earn an income during the local periodic octopus fishery closures?

Catch per unit effort (CPUE) at the village level doesn't decrease during the local temporary closure period, as only a small proportion of fishing grounds is closed to octopus fishing. Fishers

can utilise other sites (approximately 80% of their usual fishing grounds) during the local temporary closure period, and do not experience a decline in income.

How long do the local periodic octopus fishery closures last?

The original temporary closure in 2004 lasted 7 months, but the same productivity can be gained from 2-3 month periodic closures.

Are local periodic octopus fishery closures profitable for local communities?

In order to be considered profitable, the expected management benefits of a periodic harvest regime must outweigh the costs of organising. If we model each closure site as an investment without allowing landings from nearby sites to cover costs of foregone catches, the economic results of this study suggest that 75% of closures met such a strict “profitability” criterion, and >60% of those “profitable” closures produced net economic benefits rapidly enough to satisfy the highest desired rates of return (30-47% monthly) reported by local fishing communities. Other studies have documented a lower desired rate of return for these communities (4.1% monthly), and 100% of the “profitable” closures would satisfy this lower rate.

Did local periodic octopus fishery closures catalyse institutions that support broader management?

This case study adds to a growing body of evidence of a pattern whereby experiences with effective periodic fishery closures lead to broader marine management efforts. Following the widespread adoption of this local periodic octopus fishery closure regime, villages in this region of southwest Madagascar established a substantially broader range of community-based, co-management initiatives. Such actions included: the creation of a Locally Managed Marine Area (LMMA) governed by a body of village representatives called the Velondriake Association; the extension of the periodic closure regime into mangrove habitats; the banning of destructive fishing methods; and the formal designation and community enforcement of six permanent no-take marine reserves. This mirrors experiences in Vanuatu and Indonesia, where the benefits of periodic fishery closure regimes facilitated community engagement in broader marine management efforts.

Do community-managed periodic octopus fishery closures improve the health of the fishery?

The primary goal of the periodic octopus fishery closures is to improve the livelihoods of local communities; generating tangible economic benefits in short timeframes, which may in turn catalyse engagement in broader marine management efforts. The impact that they have on the health of the fishery is less certain. Blue Ventures is currently undertaking an extensive stock assessment of the octopus fishery in southwest Madagascar in order to evaluate the impact of the local periodic fishery closure model on octopus populations. The initial stock assessment suggests that current levels of exploitation are not having a detrimental effect on octopus populations. Efforts are also underway to certify the octopus harvested by communities involved in the periodic fishery closure regime. The fishery has undergone a pre-assessment for Marine Stewardship Council (MSC) certification and is currently implementing a fisheries improvement plan in order to meet the requirements to undertake full assessment as an MSC-certified sustainable fishery. This eco-certification would guarantee the optimal management of the fishery.

Is the reef negatively impacted on opening days due to trampling?

A study by Andrisoa (2011)^[1] shows that periodic octopus fishery closures do not detrimentally impact reef habitat. The sites selected for local periodic octopus fishery closures in the Velondriake LMMA have been in a highly degraded state for a significant length of time, and to further reduce any negative effects on the reef, communities run parallel closures at the same

time so that pressure is shared across sites. Habitat monitoring is also being developed in order to evaluate the ongoing impact of the closures on the marine environment.

Do the community-managed periodic fishery closures have a positive impact on the reef?

Coral is a slow-growing organism and it is difficult to evaluate the effect that periodic fishery closures may have after 2-3 months. However, what is clear is that the local periodic octopus fishery closures help to facilitate community engagement in broader marine management efforts; in the study region this has been seen with the creation of the Velondriake LMMA, which includes several permanent no-take marine reserves and the implementation of alternative coastal livelihood schemes. This periodic closure regime has also inspired new national fisheries policy in Madagascar, and has been replicated in the Mauritian island of Rodrigues.

How do communities manage the local periodic octopus fishery closures?

The local periodic octopus fishery closures are managed through the use of *Dina*; customary laws designed and enforced locally by communities, and recognised legally by the government. Communities designate the sites to be closed, and the dates of the closures. They undertake surveillance to ensure compliance with the rules during the closures. To reduce poaching, closures within the Velondriake LMMA permit all villages to fish on opening days, however, catches must be sold to the primary village overseeing with the management of the closure.

How are the local periodic octopus fishery closure sites chosen?

Sites are carefully chosen in order to maximise economic benefits for communities. The ideal site has high octopus productivity, does not encompass more 20% of local fishing grounds, and is near the primary village to enable effective surveillance.

How were the control sites for this study selected?

Blue Ventures has mapped the location, size and local names of hundreds of local octopus fishing sites, through a process of participatory mapping with fishers and village elders. This has allowed us to track octopus catch data back to individual sites. From these hundreds of sites, we selected sites that had never been closed as potential control sites. From that list, we identified the sites that best predicted baseline trends in catch data for each closure site. We used an automated matching procedure to find the set of controls that best paired up with individual closure sites, and were most likely to ensure that our observed results were due to the management intervention.

In summary

Periodic fishery closures targeting rapidly growing species can have positive economic benefits for low-income fishing communities. Analysis of one regime in southwest Madagascar suggests that the returns are substantial, rapid and recurring. The history of management in the region also suggests that short-term interventions that demonstrate tangible economic benefits may help the development of broader co-management efforts. By building enabling conditions for community engagement, the management of an effective periodic fishery closure regime may lower the metaphorical activation energy required for broader marine management efforts, just as a catalyst would in a chemical reaction. Further study of this apparent pattern and the catalyst hypothesis could reveal important lessons for achieving desired ecological, social and governance outcomes in small-scale fisheries contexts across the world.

[1] Andrisoa, A.D. (2011) *Evaluation de la qualité d'habitat appropriée pour les poulpes (Octopus cyanea) d'Andavadoaka dans la région sud-ouest de Madagascar. MSc Thesis. Institut Halieutique et des Sciences Marines, Université de Toliara, Madagascar.*