

Modeling the economic benefits of temporary octopus fisheries closures

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Abstract

A local fisheries management model employing short-term fisheries closures for rapidly growing species is proliferating across coastal east Africa and Indian Ocean islands. Aiming to improve management and boost incomes, NGOs, international finance institutions, and government agencies are promoting the technique in artisanal fishing communities. In southwest Madagascar alone, over 130 such closures have been implemented since 2004. To-date, no study has analyzed the closures effects on fisher incomes. This paper uses over 250,000 datapoints gathered over 8 years to investigate the economic effects of octopus fishery closures in the Velondriake Locally Managed Marine Area in southwest Madagascar. First, we examine village-scale octopus fishery-generated income before, during, and after closures. The villages saw no significant revenue decline during the closure, but do show significantly higher revenues post-opening. Second, we use a stochastic model, parameterized with landings data, to assess whether each closed site was a profitable investment on its own. Of the 37 closures, 28 were profitable and 9 were unprofitable. In 8 of the 9 unprofitable cases, stealing was recorded, and in 6 cases stealing was rampant. Third, we calculate each closures internal rate of return (IRR), showing that the median monthly IRR in the 28 profitable closures was 67.7% (+/- 29.9% CI95). Examining gender bias in closures costs and benefits, we found that women disproportionately stop fishing octopus during closures and men disproportionately fish during opening-day derbies. The changes are slight and women's proportion remains above 50%.