We´re Going to Make a Marine Reserve, but Who is Going to Pay for It?

Vamos a Hacer una Reserva Marina y ¿Quién Pagará?

Nous Allons Créer une Réserve Marine, Mais qui va la Payer?

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EXTENDED ABSTRACT

Fully protected marine reserves are tools proposed by the environmental, fisheries, and social sectors to promote the recovery of fisheries through an ecosystem-based approach and have positive impacts on the conservation of marine biodiversity (PISCO 2008, Aburto-Oropeza et al. 2011). Despite successes, many marine reserves only exist on paper ("paper parks"); there is a legal decree, but no continuous biological monitoring or enforcement, in many cases due to a lack of financial resources (Rife et al. 2013). International conservation and sustainability targets recommend increasing the marine area under protection and effective management to protect biodiversity and promote sustainable fisheries. Recently, national governments have gone big, creating very large marine protected areas, and questions have been raised about the effectiveness of management at such scale, the top-down approach and the low percentage closed to fishing (Singleton and Roberts 2014). A bottom-up approach can result in socially-acceptable marine reserves, but scaling problems are common.

Whilst most of the international literature on this subject focuses on the cost of establishing or operating large marine protected areas (MPAs) (e.g. Balmford et al. 2004, Ban et al. 2011), there is little information about the costs associated with monitoring marine reserves established through bottom-up community processes in which the inhabitants of the fishing communities carry out the monitoring actions through citizen science programs (Karr et al. 2017, Fulton et al. 2019a), using scientifically robust methodologies (Fulton et al. 2019b).

As a case study, we use 25 fully protected marine reserves (total: 186 km2) of nine partner communities of Comunidad y Biodiversidad (COBI), our 20 years of experience, and a new open-source marine reserve costing tool to calculate the cost of monitoring these marine reserves (https://turfeffect.shinyapps.io/AppCosteo/). In our study, the average annual monitoring campaign costs $13,200 USD (including NGO participation). The average cost per day is $1,600 USD, with salaries/ stipends (44%), boats (12%), fuel (10%), travel costs (16%), equipment (13%) and insurance (5%) being the main categories. At present, fishers only cover on average 16% of the annual monitoring budget, with the majority covered by philanthropy. The cooperatives of the Baja California Peninsula invest the most in monitoring, covering 23 - 45% of the costs, whilst those in the Mexican Caribbean and Gulf of California invest little (3 - 4%), or nothing. It is worth mentioning that if the communities were able to conduct the monitoring independently the average monitoring campaign would only cost $8,000USD on average. Commonly used indicators such as monitoring cost per km2, or cost per reserve are not effective as they do not capture distances, required monitoring effort or efficiencies achieved by monitoring several reserves during one monitoring campaign. The most important factor in defining the cost is the number of work days to complete the site specific monitoring programme.

Since 2012, Mexico´s National Fisheries Commission (CONAPESCA) has permitted the creation of *fish refuges*, a type of spatial management tool that can be no take or species specific, permanent or temporary. In the seven years since, 45 fish refuges have been created, the all expect one through bottom-up, participatory processes. To effectively monitor the current network of fish refuges using a similar methodology to COBI´s partners, would require an estimated $330,000USD annually. To measure the effectivity of the current network of 45 fish refuges, and the 31 new fish refuges that Mexico committed to on the High Level Panel for a Sustainable Ocean Economy in 2019, requires sustainable financing solutions to covering biophysical monitoring costs (http://oceanpanel.org/ocean-based-climate-action-could-deliver-fifth-emissions-cuts-needed-limit-temperature-rise-15degc).

Options to finance the network will likely be varied, but need to reduce dependence on philanthropy. For immediate implementation three options were identified:

i) *The community begins to cover the cost* — At present on the Baja California cooperatives invest significant amounts in monitoring their marine reserves. The cooperatives cover fuel, boat time and complement a stipend paid to the surveyors (to compensate the lost days fishing). Mechanisms must be explored to increase community contributions, and promote appropriation of the reserve, whilst balancing livelihoods and wellbeing.

ii) *Innovative financing* — Schemes such as carbon credits, REDD+, ecotourism, and sustainable fishing incentives have promised opportunities for financing marine conservation for decades, but despite some local successes (e.g. Cabo Pulmo for ecotourism), implementation at scale in the marine realm still appears to be distant.

iii) "*Good" subsidies* — In Mexico, the two main sources for subsidies of this type are the National Fisheries Commission (CONAPESCA - part of the Ministry of Agriculture and Rural Development) and the National Commission for Protected Areas (CONANP - part of the Ministry of Environment). CONANP can only subsidize monitor-

ing in or near protected areas (which are zoned for multiple uses) and, since 2013, the National Fisheries Commission has assigned subsidy budget to fish refuges at the national level.

Further exploring the CONAPESCA subsidy program, through Freedom of Information requests allowed us to contrast the total amounts required to effectively maintain the marine reserves versus the distribution of financial resources in the subsidy program (www.piscoweb.org). For example, CONAPESCA subsidizes fisheries to the tune of $123 USD million per year, but only 1.43% of the total amount between 2013 - 2018 ($9.6 USD million) has been assigned to the fish refuges under the agency´s jurisdiction. Of this, 74% goes to only one of said areas, the Golfo de Ulloa, which is not no take, nor bottom-up. Twenty-six of the 45 fish refuges, concentrated in the Gulf of California and Mexican Caribbean, received no subsidy at all, despite these areas concentrating 42% of the fish refuges, and 80% of the no take area.

Combining bottom-up costing exercises with transparency, freedom of information and data visualization creates powerful tools for change. With a more equitable and just distribution of a single, small, subsidy programme, Mexico´s National Fisheries Commission could cover citizen science monitoring costs (assuming a similar monitoring program) for a fish refuge network more than four times bigger than the current network.

KEYWORDS: MPA, marine reserve, budget, philanthropy, subsidies

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