



## Assessment of recreational fishery in the Galapagos Marine Reserve: Failures and opportunities

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### ABSTRACT

The Galapagos Marine Reserve (GMR) is one of largest marine protected areas in the world. After its establishment in 1998 fishing rights in the GMR were given exclusively to local fishers and only small-scale fishing is permitted. As tourism is exponentially increasing in Galapagos and the two most important fisheries resources have almost collapsed, fishers are seeking alternatives in the more profitable tourism sector. A recreational fishery called "Pesca Artesanal Vivencial" (PAV) was established in 2005, where tourists are taken out by local fishers on their boats to experience an authentic day at sea. Our research focused on the problems which occurred during the implementation of PAV and the suggestions of possible solutions for a future sustainable management. To assess the current situation of PAV in Galapagos information was gathered from captain's logbooks, port authorities, questionnaires, interviews and participatory workshops. Results show that the implementation of PAV has not been successful. Instead, regular catch and release sport fishing is becoming increasingly prevalent in the Galapagos Islands, organized by tourism agencies, without benefiting the local fishing sector. Stakeholders have very divergent interests, impeding the development of a sustainable management of PAV. Regulations need to be stricter with improved enforcement so that fishers are not only figureheads, but are the real owners who run the business. To allow PAV to develop into a sustainable income alternative for the local fishing sector in Galapagos, a long-term management plan needs to be established, taking into account the current problems described in this analysis.

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### 1. Introduction

Since overexploitation of marine resources became evident around the world, fishers have been offered alternative job opportunities to reduce fishing pressure and sustain the fishers' livelihoods. However when these job opportunities are not related to fishing, they can easily alienate the fishers from their roots and culture (Cinner et al., 2009). This study will give an example presenting a case study from the Galapagos Islands, of how fishers could find an income alternative that preserves their culture by showing tourists how to fish.

Overfishing has become a severe ecological and economic problem in the past decades, mostly due to overcapacity of fishing fleets, the increase in global demand for fisheries products due to population growth and insufficient or nonexistent fisheries management (FAO, 2008; Worm et al., 2009; Srinivasan et al., 2010). Fishing communities in developing countries are suffering most from the

depletion of marine resources, on which they have depended for their livelihood for many generations (Allison and Ellis, 2001). Measurements to reduce fishing pressure, introduction of management regulations and the protection of vulnerable marine areas are urgently needed. However, these necessary regulations cannot be implemented and enforced, without risking the livelihood of millions of people in small fishing communities worldwide (Castilla and Defeo, 2005). The idea of finding alternative income sources for local fishers to reduce fishing pressure and secure their livelihoods has been a great challenge for many decades and has only succeeded in a few instances (Smith and Pestaño-Smith, 1980; Cinner et al., 2009). Fishing in many places is known as a profession that is passed on from generation to generation and represents a way of living that most fishers are reluctant to give up (Cinner et al., 2009). Offering fishers job opportunities in the tourism sector or in other industries is often not a feasible solution, and alternative occupation prospects for fishers are likely to fail if they cannot provide the non-economic aspects of job satisfaction that fishing does (Pollnac and Bavinck, 2008). However, as fishing guides for tourists in marine recreational fisheries, commercial fishers could be facing a more attractive economic alternative. Marine recreational fisheries are increasing and gaining more importance

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around the world (Borch, 2010; Cooke and Cowx, 2004; Magnin and Hartmann, 2004), and they have a much lower inherent ecological impact than commercial fisheries do (Cooke and Cowx, 2004).

In the Galapagos Islands in Ecuador, the majority of fishers immigrated to the islands as late as the 1990s, and most fishers do not represent typical traditional fishers having followed their fathers' and grandfathers' trade, but have arrived from mainland Ecuador only to join the gold rush of sea cucumber fisheries and decided to stay (Toral-Granda and Martinez, 2004). Industrial fisheries have existed before in Galapagos, started by Norwegian settlers fishing for groupers in the 1940s. This fishery was later taken over by Ecuadorians and turned into an important fishing destination for the Ecuadorian fishing fleet in the 1960s (Reck, 1983). As the Galapagos fishing sector started to grow in the 1990s, sea cucumber *Isostichopus fuscus*, spiny lobster *Panulirus spp.* and the sailfin grouper *Mycteroperca olfax* became the main fisheries resources. The Galapagos Marine Reserve (GMR) was created in 1998 and covers 133,000 km<sup>2</sup>. It is one of the largest multi-use marine protected areas in the world and includes fishing, conservation and tourism zones. With the creation of the GMR and the implementation of the Galapagos Special Law in 1998, fishing rights in the GMR were given exclusively to local fishers and all industrial fisheries were banned. Puerto Baquerizo Moreno, the capital of the Galapagos Islands on San Cristobal, is traditionally the most important fishing port of the archipelago (Reck, 1983). From about 25,000 people in Galapagos, 7330 live on San Cristobal (census INEC, 2010). Overfishing of the coastal resources in the early 2000s, created an economic downturn in the local fishing sector (Toral and Martinez, 2004; Hearn, 2008; Wolff et al., 2012). Today, many fishers have left the islands, changed their jobs or shifted toward pelagic species such as wahoo *Acanthocybium solandri* and yellowfin tuna *Thunnus albacares* (Castrejon, 2011). Therefore, many fishers in Galapagos are not attached traditionally to fishing and have left the islands or changed their occupation to work in tourism, retail or others. This can be seen as an advantage in comparison with other places, as fishers can be motivated to change away from commercial fishing. Tourism in Galapagos is flourishing and number of tourists has increased from approx. 40,000 in the 1990s to 185,000 in 2011 (GNP Database, 2011), being the archipelagos' main source of income and most important industry by far (Epler, 2007). The first sport fishing vessels from the Ecuadorian mainland arrived in the late 1990s in San Cristobal and operated without any legal framework (personal communication with local fishers). However, sport fisheries were shunned by GNP and conservation NGO's as an unsustainable activity that would not contribute to the conservation of the Marine Reserve (personal communication with conservation sector). Instead, a plan for a marine recreational fishery, called "Pesca Artesanal Vivencial" (PAV) was brought forward by Galapagos fishers in 2005, to provide a viable economic alternative to commercial fishing (Zapata, 2006). The objectives proposed by the participatory management board of introducing PAV are the following: (1) Reduce fishing pressure of already overexploited resources such as lobster and sea cucumber, (2) Improve the socioeconomic situation of local fishers, (3) Conserve the Galapagos marine ecosystem (Castrejon, 2008). A successful implementation would reduce fishing pressure and its ecological impact on the GMR, while ensuring the livelihood of local fishers through their participation in the expanding tourism industry. The Participatory Management Board approved the plan and sport fishery was banned from the GMR at the same time (Zapata, 2006). After seven years and many problems with the implementation, the main questions are: What is the current situation of PAV in Galapagos? What were the main problems during its implementation? Has the implementation of PAV achieved to reduce fishing pressure on already overexploited resources? What are possible solutions for a marine recreational

fishery to make it a viable economic alternative for Galapagos fishers?

## 2. Methods

### 2.1. Galapagos fishing licenses and "Pesca Artesanal Vivencial"

Licensing local fishers started in 1998 with the creation of the Galapagos Marine Reserve (GMR) and was open for registration for every fisher, who possessed a Galapagos residence card, until 2002. A fishing license allows the holder to fish in all fishing zones stipulated in the Galapagos fishing chapter, they are free of charge and valid for life (Castrejon, 2011). If a fisherman gives his license back, because he is not commercially fishing anymore, he cannot apply for a new one. Today there are about 400 commercially active fishers from a total of 1005 who still own a valid fishing license in the archipelago (GNP Database, 2011). Many of the fishers who came specifically for the boom of the sea cucumber fishery in the 1990s left the Galapagos fishing sector once this fishery started to collapse in the early 2000s. Most still keep their official fishing license although they have not been commercially fishing in Galapagos since.

Pesca Artesanal Vivencial (PAV) includes a bag limit of 50 lb so the fishers can prepare a traditional Ecuadorian dish using the catch for the tourists on return to shore. The permit also includes snorkeling and diving activities at specific sites. PAV is an activity reserved exclusively for Galapagos fishers who have a valid fishing license. The concept is different to regular catch and release sport fishing as it includes the cultural aspects of fishing in Galapagos. This study focuses on San Cristobal as it is the island where marine recreational fishing was first established and where most recreational fishing activity still occurs (Fig. 1).

### 2.2. Research approach

Data collection was based on a semi-quantitative approach using questionnaires, logbooks, port authority registers and onboard observations and a qualitative approach using workshops and interviews with all major stakeholders.

#### 2.2.1. Semi-quantitative approach

*Log books.* The Galapagos National Park (GNP) handed out log books to all PAV captains from 2009 onwards. Information requested for each trip included date, hour, fishing site (and GPS position), fishing gear, name of boat and captain, nationality of tourist, number of tourists, fish species caught and general observations. Unfortunately logbooks often were not filled out at all or only partly. Here, we analyzed the available information to understand trends of catch composition, number of active boats, seasonality of fishing trips, fishers active in PAV activity and nationality of tourists arriving to carry out recreational fishing, assuming that the sample was representative of the activities of all fishers.

*Port register.* Port authorities of San Cristobal provided a dataset on boats registered to PAV between 2008 and 2011 containing the following information: date and time of departure and arrival, name of the boat and number of people on board (crew and tourists).

*Semi-structured Interviews.* Altogether 20 tourists filled out the questionnaire after they came back from a fishing trip in San Cristobal. The questionnaire included questions about their motivation to travel to Galapagos, if they were traveling with an agency, previous fishing experience, satisfaction about service and fishing and recreational activities carried out during their fishing trip other than fishing itself (e.g. snorkeling).

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