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Participatory artisanal fisheries management in islands: Application to the Canary Islands (Spain)

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ABSTRACT

Socio-economic development of small-island fishing communities is greatly dependent on local coastal and marine resources. However, illegal fishing and aggressive practices in insular ecosystems lead to over-exploitation and environmental deterioration. Moreover, a lack of scientific data increases uncertainty and prevents the adequate monitoring of marine resources. This paper focuses on the integration of local fishing communities into decision-making processes with the aim of promoting artisanal fishing on the Island of Tenerife (the Canary Islands), as a way to preserve the marine ecosystem and socio-economic development of traditional cofradias (fishers' organisations). A qualitative methodological framework, based on participatory problem-solution trees and focus groups, was used to identify the main factors impeding the sustainable development of the artisanal fishing sector on the island and to elaborate collective proposals with policy implications. The fishing community involved identified four main issues that are maintaining an unsustainable island fishery: 1) Over-exploitation; 2) Poor self-management of cofradias and commercialisation problems; 3) Fisher individualism and low co-management strategies, and 4) Illegal fishing increase vs. artisanal fishing decline. Results show the required policy enhancements to tackle them and the need to adapt regulations to the local situation.

1. Introduction

There is a strong scientific debate about the status of global marine fisheries. A series of studies at the beginning of the 2000s concluded that fish populations had declined in the late 1980s [1] and had reduced by 90% since the 1950s [2].

Thus, across regions, average recruitment capacity has declined at a rate approximately equal to 3% of the historical maximum per decade [3] due to environmental changes and chronic overfishing. According to [4], there are three main related causes maintaining this negative trend: a) the collapse of fish stocks caused by the degradation of aquatic ecosystems; b) fishing overcapacity, and c) a deficient fisheries management. Thus, some authors suggest a need for improved monitoring of all fisheries, including, often neglected, small-scale fisheries, as well as illegal and other problematic fisheries, such as discarded catches [5,6].

These findings have been severely criticised by several scientists [7–9], arguing that while a fish population's collapse could certainly lead to a decline in overall catch, there are other factors unrelated to population size that could also cause the catch to decline (e.g. strong regulation might produce a decline, but it could also lead to an increase in population). In fact, several authors [8,9] criticise the highly selective use of data, and specific conclusions about the extent and timing of depletion of stocks presented in [2] analysis.

Climate change is also an important issue due to its impacts on biodiversity and local socio-economic systems. The precise impacts and direction of climate-driven change for particular fish stocks and fisheries are uncertain [10], but some regions are more vulnerable than others due to their low capacity to develop adaptation strategies [11], the fragility of ecosystems [12,13] and the complex dynamics of climate change [14–18].

Moreover, impacts on island fisheries might be more severe due to the social, economic and environmental vulnerability of these types of territories [19]. In these regions, factors such as aggressive fishing practices and inadequate fisheries management can increase impacts and contribute to the decline of both marine biodiversity and socio-economic activity [20–23].

In the Canary Islands region, there is a lack of systematic scientific data on fish distribution, fish mortality and recruitment, thus, there are no official reference indicators about the status of stocks apart from a 2015 research study, in which a catch reconstruction was carried out for the period 1950–2010 [24]. Lack of information and data leads to the elaboration of a partial diagnosis and, therefore, to the development

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of inadequate policies, which: a) do not solve the problems, and b) create social disagreement and conflicts among stakeholders. According to [25], the information available is not enough to support the design of a sustainable strategy for the Canary Islands' artisanal fishery.

Given this condition of high vulnerability and lack of data, the implementation of actions focused on the integration of different types and sources of knowledge into policy-making processes would be an asset [26–28]. One source could be local community knowledge, which might provide valuable qualitative information related to planning and management alternatives [29–34]. In fact, local fisher communities have been handling marine resources for centuries without quantitative data and, instead, using inherited traditional knowledge [35,36]. Several scientists have highlighted the usefulness of integrating local knowledge into fisheries planning and management practices or strategies during the last decades [37–41].

Traditional fishing knowledge in the Canary Islands, as in the rest of Spain, is characterised by traditional groups called *cofradias*. These relevant social actors maintain artisanal fishing practices, but their numbers have been declining for several years.

The main objective of this paper is to contribute to the development of a more efficient fishing policies focused on the preservation of artisanal fishing on the island of Tenerife. This paper presents a community-based process designed to generate socially robust knowledge [42] with policy implications. Several participatory workshops were carried out in order to a) identify obstacles and factors that hinder the preservation of artisanal fishing as well as proposing alternative solutions for the island's fishery; b) develop a set of communally committed proposals to promote artisanal practices and preserve the marine ecosystem.

2. Site description and methods

2.1. Study area

The Canary Islands archipelago is located in the northeast Atlantic Ocean, approximately 110 km from the northwest coast of Africa. The archipelago is located in the path of the Canary Current, where deep waters are cold and nutrient-rich and have a key role in stimulating primary productivity. Inhabited by a large number of endemic and migrant species, the Canary Current is a unique ecosystem of global significance, and rich in fisheries resources [43]. Concretely, Tenerife is the island with the highest number of native flora species of the Canary Islands (476 spp. = 68% of total) [44], and the waters around Tenerife constitute an important habitat for cetaceans [45].

Fishing activity in Tenerife is coastal artisanal (for small pelagic species, crustaceans, demersals and molluscs), several methods of fishing are used, ranging from artisanal inshore fishing to recreational marine fishing, which includes spear fishing and angling.

The fishing fleet in Tenerife shows a high social and economic dependency on small-scale fishing, but these practices are in decline according to analysis by public administrations, as a consequence of four major factors [46]:

- Lack of adequate seaport infrastructures.
- Poor capacity of *cofradias* to commercialise catches.
- Progressive loss of employment through the migration of workers to the tourism sector.
- Reduction in European financial aid.

The Canarian artisanal fishing fleet (vessels less than 12 m long) has declined since 1990 (Fig. 1). The number of vessels, the total gross tonnage, and vessels' engine power have been reduced by ca. 60%, with a severe fall since 1990 [47].

Recreational and illegal fishing activities also increase pressure on stocks though no official statistics are available. Nevertheless, the number of marine guard fines and reports have increased in recent years.[1] Reconstructed catch was estimated at 38,600 t in 1950, increasing to 81,200 t in 1985 and decreasing to about 65,300 t per year by the late 2000s. These catches coincide with a severe depletion of fish stocks, due in part to fishing overcapacity in the artisanal sector, despite attempts to limit fishing effort by the government. Moreover, some authors consider that around 70% of this catch was from the recreational fishing sector [24].

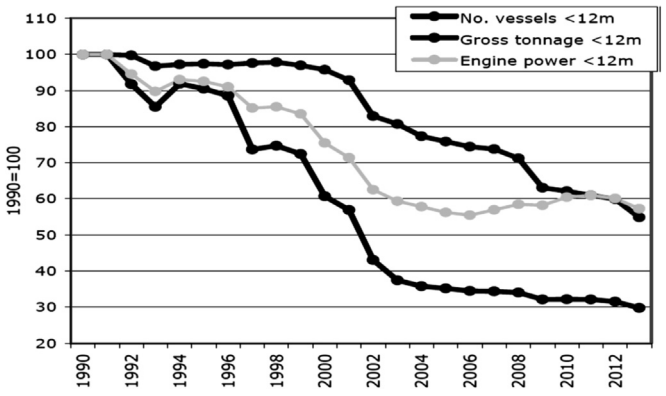

Fig. 1. Evolution of the Canarian fishing fleet in terms of percentage (%) of vessels, gross tonnage and engine power. Vessels less than 12 m long.
Source: [47].

2.2. Local communities involved

When defining the boundaries of a study area, small island territories can provide one advantage due to their restricted geo-spatial limits. Nevertheless, this assumption is not that simple when defining an island fishing community, according to [47], geographical limits are not the main basis of the definition of local coastal communities. Therefore, social, economic, cultural and political criteria should be taken into account. The Magnuson-Stevens Fishery Conservation and Management Act (organisation monitoring fishery policy in the United States) provides a valid definition: a "fishing community" is *a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs* [48].

Artisanal fishing communities in Tenerife are organised into 10 *cofradias* (see Fig. 2). These are traditional and historical fishers' organisations in Spain [49,50]. *Cofradias* are local non-profit corporations with public rights, which represent the interests of the whole fishing sector by acting as consultative and cooperative bodies for the administration, undertaking economic, administrative and commercial management tasks and with the ability to cooperate in matters of regulating access to resources and informing about wrongdoing occurring in their territory [51]. Thus, *cofradias* play a key role within the fishing activity, maintaining social cohesion and representing local economic interests.

Cofradias represent the primary fishing organisations on the island. There are several differences between them related to revenues, workforce and fleet capacity. Fig. 2 shows the number of fishers and boats that each *Cofradía* currently has and their respective fishing areas. These differences impact on their capacity to access fish stocks.

2.3. Methodology

A qualitative methodological approach based on a progressive learning process was used (see Fig. 3). Prior to workshops, a stakeholder analysis and a round of semi-structured interviews were carried

[1] In press: Canarian Fish Inspection Service registered more than 660 fines for illegal fishing in 2011. In Spanish: <http://www.20minutos.es/noticia/1657068/0/>.