



# Artisanal fishers' perceptions regarding coastal co-management policies in Chile and their potentials to scale-up marine biodiversity conservation

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## ABSTRACT

No-take Marine Protected Areas (Nt-MPAs) constitute an indispensable tool for biodiversity conservation. Nevertheless, there are other instruments such as marine coastal co-management policy frameworks which may be also considered as tools for conservation or as ancillary conservation instruments. Using focus groups, semi-structured interviews and survey questionnaires we analysed small-scale artisanal fishers' perceptions towards a coastal co-management regime in Chile and the potential to generate capacities and a social setting to scale-up marine conservation. Empirical evidence from the study shows artisanal fishers have indeed been empowered through the coastal co-management experience; however, there exist heterogeneity in their willingness to participate in the creation of Nt-MPAs, mainly determined by occupational mobility. Chilean artisanal fishers strongly support a bottom-up process in the conservation of marine biodiversity, though the need for top-down steering and guidance is also stressed, especially regarding enforcement.

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## 1. Introduction

Marine coastal management approaches based on top-down and centralized government interventions have proven to be inadequate [1–3]. As a consequence, during the last decade, researchers and development agencies have promoted a shift towards bottom-up governance of local (communal) resources and the sharing of responsibility between governments and fishers through the use of co-management policy frameworks [1,4–7]. Concomitantly, many international *fora* have advocated for a significant scaling-up of site based conservation interventions in the form of No-Take Marine Protected Areas (Nt-MPAs) to achieve on the order of 20–30% coverage of the world's major coastal and marine habitats by 2012 [8]. Such targets are overly ambitious, given that most Nt-MPAs are not considered to be managed effectively (“paper” Nt-MPAs) and foremost, that there is resistance from fisher communities to the implementation of this conservation tool [9,10]. As a consequence, if marine conservation is going to scale-up there is a pressing need for efforts to enhance the complementarities between Nt-MPAs and other conservation/management tools (e.g. Territorial user rights fishery policies; TURFs, marine extractive reserves, indigenous landscape management areas), in what instruments of the Convention of Biological diversity have termed “ancillary” marine

conservation initiatives [11]. Accordingly, it becomes important to understand the potential of co-management policies to generate social settings which could support joint sustainable use of coastal resources and biodiversity conservation objectives.

In inshore coastal Chile, co-management takes the form of the Management and Exploitation areas for Benthic Resources (MEABR) policy. Through the MEABR regime the Chilean Under-secretary of Fisheries assigns temporary TURFs to artisanal fisher associations (mostly unions in Chile) in defined geographical coastal areas [12]. The MEABR policy was implemented in Chile as a reaction to the widespread overexploitation of benthic species which occurred during the 1980s (reviewed in [3,13]). The first actual MEABR was formally established in 1997 [12]. As of 2005, 301 MEABR have management plans in place, and 547 have approved decrees issued [14]. To date 1032 km<sup>2</sup> are assigned as MEABRs in Chile, however, policy uptake has been highly dependant upon the commitment of the Government to promote, popularize and co-finance the implementation of these management areas [15]. In order to have an MEABR fisher unions must contract biological consultants to undertake a baseline study and yearly follow-up direct assessments of managed benthic stock inside the management area; hence, determining yearly Total Allowable Catches (TAC). Unions must also pay an annual fee to government for the right to maintain the management area. They are also required to maintain the MEABR stocks through ‘natural seeding’ recruitment processes (*sensu* [16]); therefore, no human

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induced restocking is allowed.<sup>1</sup> Additionally, only resources included in management plans can be extracted from the MEABR.

The biological-fishery success of the MEABR policy has been publicised through scientific and government documents which showed a significant increase in abundance and individual size of targeted resources within MEABR in comparison with open-access sites [16–18]. Recently, Gelcich et al. [19] also showed how MEABRs, showing efficient enforcement programmes, sustained greater marine biodiversity than open-access areas. In addition the Fisheries Undersecretary sees MEABR implementation as a positive change in which fisher communities have self-organised, creating partnership with the government, universities and consultants [20]. In this way, artisanal fishing coves are being consolidated responding to government incentives. Studies have identified that livelihood characteristics could influence fishers' attitudes towards the policy [21,7]. In the same vein, research has shown positive shifts in some environmental perceptions of fishers who have engaged with the policy [20,22]. Despite the effort which has been devoted to the generation and implementation of this policy model in Chile, to date there are few empirical studies assessing fishers' perceptions of the policy process and about the possible generation of the social settings (social support), in the artisanal fisher communities, for marine biodiversity conservation.

The plans to scale-up marine conservation in Chile were institutionalized by the government in 2003 via the approval of a National Strategy for Biodiversity (Estrategia Nacional de Biodiversidad). In the process (2001–2003) the National Commission on the Environment (CONAMA) identified 305 key sites in Chile for the conservation of ecosystems (biodiversity conservation). Of these only 28 corresponded to marine sites. The targets of this national plan are set for 2006, 2010 and 2015. For 2006 the marine conservation target consisted on the implementation of three Marine Protected Areas for Multiple Uses (MU-MPA) which should include a core Nt-MPA zone. To date these areas have been implemented, nevertheless, the NT-MPA zones have still not been defined [23]. For 2015 the target is that all MU-MPA should be fully implemented and institutionalised as a network. However a understanding of fishers' perceptions of this process has been largely absent.

The broad thrust of our research aims to analyse Chilean artisanal fishers' perceptions regarding a well established fishery co-management regime (i.e., TURFs and MEABRs) and its potential to generate a social setting which may help to support the scaling-up of marine conservation practices. In doing this our objectives are: (1) to understand fishers' perceptions of the TURFs/MEABR policy processes with respect to (a) compliance, (b) enforcement, (c) empowerment, (d) main problems/conflicts and future challenges. (2) To evaluate fishers' perceptions regarding biodiversity conservation associated to MEABRs and fishers view of the MU-MPA plan, specifically the Nt-MPA component, to be implemented in Chile. (3) To assess fishers' determinants of their willingness to participate in the administration and management of an MU-MPA network in Chile. Hopefully these analyses will inform related policy developments aimed at integrating the sustainable use of coastal resources and biodiversity conservation.

## 2. Methods

### 2.1. Research sites and settings

Artisanal fisheries in Chile supply a significant fraction of high-valued finfish, benthic invertebrates and algal resources, for local

consumption, although a large fraction is also exported. This activity is important from a social and employment perspective as there are around 50,000 artisanal fishers registered in Chile. Out of these, 22,600 are registered as divers or coastal intertidal food gatherers, which mainly exploit benthic shellfish and algae as part of their livelihood. At least 60 coastal benthic species are exploited in Chile [3, 12], however the gastropod *Concholepas concholepas*, known locally as 'loco' is the most economically important. Hence 90% of existing MEABRs have loco as their main target species. The importance of loco, as a managed flagship-species, means that management practices specific to this species have become the driver for policy developments towards MEABR approaches. Furthermore, it has been decreed (2000) that all the loco gathered in Chile must be extracted through diving exclusively from established MEABRs. During the last five years, around 3000 tonnes (MT) of loco  $y^{-1}$  have been landed in Chile worth around US\$ 5–7 million in export values, this amount rising as new unions apply for MEABRs and market demands increase (see [3,21]).

Within Chile, certain areas of coastline are officially designated as 'coves' ('caleta' in Spanish). These are strips of land above the high tide mark that provide certain rights to users such as the right of access to the sea, land a boat, land natural resources and construct certain buildings. Currently there are 425 caletas in Chile [21]. Some caletas are well equipped as artisanal landing ports for finfish and/or shellfish, in urban areas or holiday destination towns, others are rural and relatively isolated. For administrative purposes Chile is divided into 15 regions, and our research considered eight unions in four of these regions (IV, V, VI and X; Fig. 1), representing a range of urban-rural types associated to a variety of livelihood characteristics: (1) Union Cooperativa (urban) and (2) Chigualoco (rural) are located in Region IV (31°55'S; 71°00'W; Fig. 1). The MEABR policy process has been established in Region IV for 7 years; hence, these unions have been managing MEABRs for most of this time and in 2006 were extracting resources for their sixth year. (3) Unions El Quisco (urban) and (4) Algarrobo (urban) are located in region V (Fig. 1), El Quisco was one of the first unions in Chile to engage with MEABR policy. (5) Union La Boca (rural; 33°55'S; 71°50'W), (6) Puertecillo (rural; 33°55'S; 71°50'W) and (7) Matanzas (rural; 33°57'S; 71°52'W), are in region VI (Fig. 1). They applied for an MEABR in 2001, and got their management plan approved in 2003. The situation of these unions is typical of the general situation in region VI, as it was one of the last in Chile to incorporate the MEABR policy. (8) Union Carelmapu (rural; 41°51'S; 73°35'W) is in Region X (Fig. 1) and had its first MEABR management plans approved in 2001.

The studied unions represent fishers with a range of livelihood portfolios as well as dependency on benthic resources and MEABRs incomes (Fig. 1). Fig. 1 shows the percentage of landings of benthic resources and the income of an individual fisher derived from loco harvests within MEABRs for the studied unions. Main sources of income vary between fisher unions and individual fishers and range from exclusive dependence on diving, to dependence on fishing for finfish, gathering algae or other off-sector activities. It is important to highlight that there has been ongoing biological and fishery research activity (which ranges from 4 to 20 years) by the authors of this study in the selected unions. Therefore, a good level of rapport already existed between researchers and these artisanal small-scale fisher communities.<sup>2</sup>

<sup>1</sup> Re-stocking of the MEABR can be done once at the beginning of the process before the MEABR is officially harvested.

<sup>2</sup> It could be argued that rapport could lead to assess perceptions that are product of the opportunistic sampling design in which fishers might be trying to please the interviewer with pro-environmental attitudes or positive attitudes towards MEABRs. However, as shown in the results, fishers are extremely critical of MEABRs and of their role in discussions regarding Nt-MPAs in Chile. Thus this is not likely to be the case.

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