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The interplay between fish farming and nature based recreation-tourism in Southern Chile: A perception approach

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ABSTRACT

Nature based tourism, ecotourism and other types of recreation are an intangible cultural marine ecosystem services. Due to its geographical conditions, Southern Chile has been worldwide-recognised site by its nature based tourism attraction. Fish farming has had since 1980's a consistent development in the region with jumps and bumps, but still occupying a dominant role in the region's economy. Previous reports about perceptions from entrepreneurs of the tourism sector claim that they are living a confrontational reality against aquaculture. The WTP modelling results suggest a general disposition of the tourists to pay some money to avoid further negative environmental impacts on the ecosystem services they enjoy and positively correlated with income. The wealthier is the tourist, the higher is the disposition to pay to avoid. Results from our survey indicate that the majority (67%) of tourists has a negative environmental perception of fish farming activities, while almost half (47%) of the tourists recognise the importance of aquaculture for the economy of coastal communities. Public policies and particularly spatial regional planning should consider the high level of negative interaction showed from this results in order to allow both activities to develop in equity of opportunities.

1. Introduction

Marine ecosystem services (thereafter, ES) are the benefits that humans obtain from ecosystems that support, directly or indirectly, their survival and quality of life in the planet, which also contribute to the development of the global economy (Daily, 1997). Global oceans provide a wealth of core ecosystem processes, beneficial ecosystem processes and beneficial ecosystem services, that span all categories of ES ranging from food, raw materials, physical wellbeing, social wellbeing and knowledge (TEEB, 2010).

Human always have benefited from marine ecosystems, either obviously in the form of food resources, or more subtly in the form of cultural and recreational opportunities. Cultural practices reflect physical and cognitive interactions between humans and nature, enabling benefits provided by ecosystems and their services through the development of identities, capabilities, and experiences (Norgaard, 1994).

Despite international commitments, through among others the Convention on Biological Diversity, the vast majority of the world's nations declared that human actions were dismantling the Earth's ecosystems at an alarming rate, crossing safe planetary boundaries (Steffen et al., 2015). Ecosystem degradation and the loss of marine biodiversity are expected to degrade at a higher rate in the context of climate change and ever increasing human consumption of resources (de Groot et al., 2012). Faced with one of the world's greatest challenges – how to feed more than 9 billion people by 2050 in a context of climate change, economic and financial uncertainty, and growing competition for natural resources jointly with inequalities (Scheffer et al., 2017).

The scientific understanding of the heterogeneous distribution over the demand of marine ES is largely unaddressed in the international research agenda (Nieto-Romero et al., 2014). Most of the empirical research tend to aggregate the humans who are beneficiaries within human wellbeing, which limits the applicability of these studies and approaches to questions related to synergies and trade-offs between ES,

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stakeholders and institutions (Perrings et al., 2011). The interactions of marine ES over space and time may be linear or non-linear, and may contain unexpected thresholds and tipping points (Hughes et al., 2013). Extensive work has been done about the production of marine ES worldwide, highlighting that is a result of the interplay between biophysical and sociocultural systems (Bennett et al., 2015). However, the knowledge about benefit distribution of ES and the mechanisms behind them can help us to disentangle synergies and trade-offs in order to understand the long-term consequences of choosing one management plan for ES at the expense of other(s) remain unclear. In other words, trade-offs and synergies between the beneficiaries of different ES help determine winners and losers at different spatial scales (Bennett et al., 2015). As marine aquaculture continue to expand spatially (FAO, 2016), unknown trade-offs and interactions with other ES still remain unclear.

Marine and coastal nature based tourism, recreational tourism, opportunities for recreation and tourism[1] are the possible ways to define the non-extractive cultural ecosystem service focused on this study. On the other hand, fish farming or fish aquaculture[2] are the possible ways to define the technologies under which aquatic enterprises use a given area of the coastal or marine ecosystem to develop their activities with the finalgoal of harvesting a given fish cohort under captivity. Primarily fish farming is a type of tangible, provisioning and extractive ES whereas ecotourism is a non-tangible, cultural and non-extractive ES. Since ES are not independent from each other (Pereira et al., 2005) and the management attempts to optimize a single service often lead to reductions or losses of other services (Rodríguez et al., 2006). In our case study, two opposing ES are potentially competing for the same spaces and ecosystems and both are under the direct influences, impacts or feedbacks of any action made by fish farming to recreation tourism or viceversa. In other words, the interplay of both ecosystem service is controlled by a direct or indirect synergy or trade-off relationship (Holling and Meffe 1996).

Perceptions are define here as individual and subjective interpretations of reality which are socially constructed, the product of one's history and surroundings (Bennett, 2016). Perceptions depend on contextual factors (e.g., culture, politics, socioeconomics, livelihoods), past experiences of similar events (e.g., imposition of a different environmental policy), and individual and collective attributes (e.g., gender, race), values, norms, beliefs, preferences, knowledge, and motivations mediate and influence perceptions (Bennett, 2016).

Perception research has been used for diverse purposes and thematic areas, as a way of legitimacy and effectiveness of natural resource management strategies (Mabardy 2013), also to determine the current context of socio-ecological system to aid in its planning and monitoring (Bennett, 2016). Moreover it can be used at a broad scale to provide insight on national or international policies (Bennett and Dearden, 2014) or even to assess dynamics of environmental changes (Rodriguez-Carreras et al., 2014) or trace landscape dynamics (Vila-Subirós et al., 2016). Previous research identified aquaculture industry negatively affecting the natural ecosystem and native species, which had a negative impact on the tourism sector (Salgado et al., 2015). Here we use perception research to investigate whether negative perceptions from marine and coastal nature based tourists exist regarding fish farming as a proxy of evaluating trade-offs between these two activities. Within the particular context of Chile our methodological scope is not novel, and previous research in Araucania region has attempted to study empirically the direct impacts on tourism using perception research (Castillo and Cortés, 2012). More recently perception research has focused on researching about gaps and opportunities within aquaculture stakeholders (Rivera et al., 2017), and even efforts within the aquaculture industry to evaluate stakeholder perception regarding environment impact of their activities (Salgado et al., 2015). Stakeholder perception about locating aquaculture in offshore areas are related to financial and regulatory constraints (Fairbanks, 2016). However a recent global analysis found a general positive trend of perception, yet differences between developed and developing countries were detected (Froehlich et al., 2017).

Despite this remarkable research effort on perception methodologies, the theoretical background of our study is novel since little research has focused on tourists' willingness to pay (WTP) attitude and perceptions on fish farming in Chile, which is considered –after Norway- the most important aquaculture producer in the world, while at the same time attracts a high number of tourists per year.

Under this context, the Southern Chilean region of Los Lagos has been subjected to extraordinary development of aquaculture. The two main species harvested –atlantic salmon (*Salmo salar*) and blue mussels (*Mytilus chilensis*)- have reached top positions in the world ranking of aquaculture production. Chilean salmon reached in 2012 the second position only overpassed by Norway (Outeiro and Villasante, 2013) and the mussel production also reached the second position in the world ranking behind China. The Chilean industry employed around 28,000 people in 2008 (INE, 2008). According to FAO (2016), the aquaculture sector generated globally US$5,584 million in exports in 2014, corresponding to 1,214.5 tonnes, mainly salmon (92.3%), Chilean and European mussels (2.5%), seaweed (2.3%) and scallops (1.7%). Almost all of the aquaculture production is exported, mainly to the United States, Japan, and the European Union. Such a development is not free of charge in forms of ES tradeoffs where costal landscape and seascapes are highly impacted (Outeiro and Villasante, 2013).

Currently, tourism represents 3.2% of the Gross Domestic Product (GDP) in Chile (Outeiro et al., 2015a), representing US$2040 million (INE, 2010) in which 25,000 micro, small and large companies (SERNATUR, 1998) are involved. Ecotourism plays a key role in this sector and holds a great potential for growth over the next decade (Nahuelhual et al., 2013) due to the appeal of wildlife watching and extraordinary scenery (SERNATUR, 2011). In 2016 the employment in the Chilean tourism sector was 375.900 direct jobs overpassing 200,000 counting with indirect jobs, while in Los Lagos region reached 19,280 direct jobs (SERNATUR, 2016).

According to a recent survey made by the National Board of Tourism in Chile, 65% of long distance tourists (mainly from European Union, United States and Canada) are looking for nature experiences, and this is the main reason to visit the Andean country. Other reasons stated by the tourists are visiting lakes and fjords (15%), rivers (12%) as well as beaches and coasts (10%), and specific locations in Chile. The respondents showed that Patagonia (Southern Chile) represents 49% and it's the main geographical motivation to visit the country (SERNATUR, 2011). In Chile, entrepreneurs of the tourism sector claim that they are living a confrontational reality against aquaculture (OCDE/CEPAL, 2005).

As a consequence of the current empirical scientific evidence and policy needs, the objective of this paper covers a research gap in the literature by focusing on studying these interactions by eliciting perceptions from nature based tourists visiting the main villages of Chiloé, Southern Chile. Our objectives are: a) to find out the general profile of tourists visiting Chiloe who had any contact with the cultural ecosystem services (marine and coastal nature based recreation), b) to investigate what are the most relevant socio-economic attributes for practising recreation and ecotourism activities, c) to find out what are the main socio-economic drivers of perceptions and WTP attitude about fish farming and other coastal and marine activities. Our final aim, it is to generate a local scale study of perception from tourists visiting Chiloé about fish farming activities.

[1] Marine and coastal nature based tourism, recreational tourism, opportunities for recreation and tourism might be used interchangedly throughout the paper to signify the same activity.

[2] Finfish farming and fish aquaculture might be used interchangedly throughout the paper to signify the same activity.