



## Socioeconomic impacts of marine protected areas in the Mediterranean and Black Seas



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### ABSTRACT

The socioeconomic implications of Marine Protected Areas (MPAs) and perceptions of stakeholders on MPA impacts are important to consider when designing, implementing, and managing MPAs. However, the currently available knowledge about these areas and especially of stakeholder perceptions is scarce and limited to restricted geographic areas. The present study aims to address this gap by examining these factors in the Mediterranean and Black Seas using an extensive literature review and an online survey approach. We collated and examined a total of 208 published studies on socioeconomic impacts of MPAs and marine uses. We found that for fishing, the socioeconomic impacts of MPAs were generally perceived as negative for industrial fishing and positive for artisanal fishing. In the online survey, we collected ca. 100 responses and found that stakeholder perceptions on the impacts of MPAs differ across sectors and regions. Industrial fishing was perceived as being negatively impacted in the Black Sea, while most respondents from the Mediterranean Sea were neutral in their responses relating industrial fishing and MPAs. The impact of MPAs on artisanal and recreational fishing was generally viewed as neutral by respondents from the Black Sea, whereas most Mediterranean respondents indicated a positive impact of MPAs. We also found that perceptions of the major threats to MPAs differed across the Mediterranean and the Black Sea. Responses from the Black Sea were systematically shifted towards a more negative perception of threats to MPAs compared to those from the Mediterranean Sea. Illegal fishing and other illegal activities were considered to be the most relevant threats to MPAs by stakeholders in both regions. The mismatch found between evidence of MPA effectiveness and impacts from the scientific literature and the results of our survey suggests that within the framework of maritime spatial planning and ecosystem-based management, effective MPA planning should be informed by multiple sources across regions.

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### 1. Introduction

Marine Protected Areas (MPAs) are commonly used for coastal and marine management with the principal purpose of biodiversity conservation and conserving marine living resources (Fabinyi, 2008; NRC, 2001; Pita et al., 2011). MPAs vary widely in the type

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and level of protection applied, ranging from areas that allow multiple uses to areas that entirely exclude human access (Pita et al., 2011). As such, their implementation under a wide range of economic and social conditions (Angulo-Valdés and Hatcher, 2010) can have profound impacts on local livelihoods (Halpern et al., 2010). Therefore, the designation, implementation, and management of MPAs should consider conservation outcomes as well as socioeconomic impacts, and financial and institutional sustainability (Gurney et al., 2014; Niesten et al., 2010; Richardson et al., 2006). Such considerations can reinforce the likelihood of an MPA to achieve its goals in the long run (Christie et al., 2003; Cornu et al., 2014; Hattam et al., 2014; Mascia, 2004; Voyer et al., 2012).

Earlier research efforts have largely focused on pinpointing the positive ecological impacts of MPAs and advocating in favor of their broad set of benefits in the long-term (Lester et al., 2009). For example, Angulo-Valdés and Hatcher (2010) listed a total of 99 benefits deriving from MPAs, ranging from the protection of spawning stocks and/or critical habitats to the enhancement of aesthetic experiences and non-consumptive opportunities such as recreation. If well designed, and effectively managed, an MPA can generate benefits with a direct, immediate or delayed economic and social value in addition to those related to its conservation value. Several studies have reported that the establishment of MPAs and the consequent protection of naturally important areas (such as breeding, nursery, and recruitment habitats) have had a considerable positive impact on local and regional economies (Ami et al., 2005; Badalamenti et al., 2000; Boncoeur et al., 2002; Farrow, 1996; Harmelin et al., 1995; Higgins et al., 2008; Hoskin et al., 2011; Lausche, 2011; Lloret et al., 2008; Russ and Alcalá, 2004; Sanchirico et al., 2002). Positive impacts include provisioning of goods and services, support to economically valuable activities, creation of new jobs and diversification of livelihoods, increase in revenues due to tourist taxes and expenditures from non-consumptive recreation and tourism. This wider view of protected areas as an important tool to foster sustainability and their vital role in biodiversity conservation was acknowledged over ten years ago at the 5th IUCN World Parks Congress entitled 'Benefits beyond Boundaries' (IUCN, 2003).

In contrast, some authors have argued that the ecological benefits of MPAs are necessary, but are insufficient in order to ensure the MPAs' positive socioeconomic benefits (Christie, 2004; Grafton et al., 2005). MPA design is usually focused on getting scientific advice on the biological dimension, while less attention is placed on the socioeconomic consequences (Beare et al., 2013). The implementation of marine reserves (the strictest form of marine protection) often creates conflicts among stakeholders, as access to valued ecosystems, localities, and stocks is prohibited or heavily curtailed (Coleman et al., 2004; Cox et al., 2003; Granek et al., 2008; Salz and Loomis, 2005). These conflicts, in return, may affect the social, economic, and institutional dimensions, which are critical to the success of MPAs (Charles and Wilson, 2009; Jennings, 2009; Mascia and Claus, 2009).

Recently, an upsurge of interest in the socioeconomic impacts (both positive and negative) that are expected from MPAs has been observed (Rees et al., 2013; Weigel et al., 2015). Globally, studies assessing the impacts of MPAs on individual activities such as fishing (Scholz et al., 2011), tourism (Agardy, 1993; Davis and Tisdell, 1996; Hargreaves-Allen et al., 2011), and recreation (Lynch et al., 2004) are increasing. The same trend is seen in studies that incorporate socioeconomic variables into the designation of MPAs (e.g. Giakoumi et al., 2011; Klein et al., 2008; Scholz et al., 2011). However, most studies indicate that the assessment of social impacts is still uncommon (Voyer et al., 2012). More information is needed to address the level of uncertainty regarding the magnitude of the social and economic impacts of MPAs. Most importantly, it is

important to understand how these impacts vary over time, across spatial scales and levels of social organization, across social domains and within and among social groups (Fox et al., 2012; Pita et al., 2011; Richardson et al., 2006). Acknowledging the existence of diverging social perceptions and ideological clashes around MPA impacts and taking them appropriately into account is crucial to incorporate the social value of MPAs into decision making (Agardy et al., 2003; Ami et al., 2005; Gall and Rodwell, 2016; Leleu et al., 2012). Adequately accounting for the viewpoints of different stakeholders (Verweij and van Densen, 2010) is also key to the design of policies aiming to enhance social acceptance of MPAs, and to reduce enforcement costs by improving the social compliance to these policies (Hattam et al., 2014).

The Mediterranean and Black Seas are semi-enclosed systems surrounded by a large number of European (some of which belong to the European Union – EU), Asian and/or African countries, each with its diverse social, environmental, and economic characteristics. These environmental and geopolitical complexities usually drive differences in stakeholder's perceptions on the role and impacts of MPAs depending on the stakeholder's activity or location. Such factors should be accounted for when designing new MPAs or managing existing ones (Pipitone et al., 2014). However, the last comprehensive study on socioeconomic aspects of MPAs in the Mediterranean was carried out 15 years ago by Badalamenti et al. (2000), and it did not consider the social perceptions on the impacts of MPAs. In the last fifteen years, several studies have investigated stakeholders' perceptions in individual MPAs, such as in the National Marine Park of Alonissos (Oikonomou and Dikou, 2008). However, there has been no attempt to conduct a large-scale study to update Badalamenti et al.'s (2000) work. Furthermore, no study has, to date, explored the socioeconomic aspects of MPAs in the Black Sea.

The objectives of the present study are to: (i) review the socioeconomic impacts of MPAs in both the Mediterranean and Black seas; (ii) examine the social perceptions of Mediterranean and Black Sea MPA stakeholders on the socioeconomic impacts of MPAs; and (iii) suggest how this information could be used to advance future MPA design and management.

## 2. Methods

We created a list of current MPAs in the Mediterranean and Black Seas on the basis of the MAPAMED database ([www.mapamed.org](http://www.mapamed.org)) and the World Database on Protected Areas ([www.protectedplanet.net](http://www.protectedplanet.net)). Further information on Black Sea MPAs was gathered from Milchakova (2011) and Begun et al. (2012). A total 232 MPAs were listed for the Mediterranean and Black Seas (Table A1).

In order to analyze which uses could potentially be impacted by the establishment of MPAs, a total of 22 marine uses were identified: 1) industrial fishing (including trawlers, seiners, and purse seiners); 2) artisanal fishing (including hooks, lines, traps, fixed nets, trammel nets, fish barriers, gill nets, and multi-purpose vessels); 3) recreational fishing (land- or boat-based angling); 4) underwater recreational fishing (spearfishing); 5) aquaculture/mariculture (open ocean); 6) shellfishing; 7) biological resources extraction (including species not considered in fishing, aquaculture or mariculture activities, such as sea cucumbers, algae or corals); 8) tourism (including sunbathing); 9) hiking, walking, access to beaches; 10) swimming, snorkeling, canoeing, surfing, paddle surfing, wind surfing, etc.; 11) diving; 12) underwater archaeology; 13) recreational boating (sailing and marine cruising); 14) scientific research; 15) educational activities; 16) sand/gravel extraction; 17) oil/gas extraction; 18) offshore wind farming; 19) wave farming; 20) industrial maritime transport; 21) building along the coastline;

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