



Assessing economic effects of a marine protected area on fishing households. A Thai case study

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ABSTRACT

Some recommendations made by the World Parks Congress in Durban (2003) underscore the need to consider the impacts of multi-purpose marine protected areas (MPAs) on resident or adjacent populations, and lead social and fisheries scientists to reconsider their approaches and methods regarding the assessment of economic effects of an MPA. This paper contributes to this reconsideration by proposing an assessment method of microeconomic effects. The approach is the comparison of fishing households' economic situation in Chumphon Province (Thailand) at a given time based on their location in relation to a marine protected area: within or adjacent to Chumphon Archipelago Marine National Park vs. remote from it. We address three economic dimensions: the profitability of household activities, the income-distributional effects among households and the household vulnerability. This assessment requires the calculation of five indicators: the net income, the net profit margin, the Gini coefficient and the Herfindahl index, and Bene's vulnerability index. From a dataset made up of 123 fishing households surveyed twice a year, the main results show higher incomes and less economic vulnerability for households located within or adjacent to the MPA, and a more inegalitarian income distribution among households located remote from the MPA. So, the households located within or adjacent to the MPA have more security, can stay focused on the most profitable fishing activities and not have to diversify outside of the fishing sector. In an environment where commercial small-scale fishing was already highly developed, setting up an MPA could have the effect of sustaining an efficient, specialised professional set-up for fishing households in the area concerned. With respect to a policy to establish MPAs in keeping with the Durban recommendations, this study shows that a thorough analysis of profitability, income distribution and economic vulnerability should help to identify who the winners and losers might be, which could improve the targeting of mitigation and compensation measures.

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1. Introduction

The 1990s saw a boom in studies on MPAs. Yet social sciences and, more specifically, economics made up just a small proportion of this literature, which concentrated on giving grounds for setting up and maintaining MPAs. Since the 2000s, this share has slowly grown in response to international recommendations to consider MPA-generated societal impacts on resident populations (Pomeroy

et al., 2004; Mascia et al., 2010). Most of these studies focus on the particular purpose of the MPA in question: ecosystem protection, fisheries management, advancement of recreational non-extractive activities, and the sustainable development of a marine coastal zone in the case of a multifunctional MPA (Noel and Weigel, 2007).

With respect to the acceptance and the success of MPAs, Charles and Wilson (2009) are pointing out ten human dimensions, including the economic dimension (costs, benefits and distributional effects). The total economic surplus or net benefits such as spillovers to commercial fisheries, the fishery buffer benefits, the ecotourism and biodiscovery benefits as well as the environmental non-market values generated by an MPA are identified and measured by authors such as Angulo-Valdes and Hatcher (2010). It

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is also at the MPA scale that measured costs are identified such as the displacement of commercial and recreational fisheries, the displacement of charter fishing, and reduced demand for fishery support services (The Allen Consulting Group, 2009). The methodologies applied are generally cost–benefit analysis, bio-economic modelling and valuation techniques for non-market values (Alban et al., 2006).

Other studies that seek to justify MPAs address the notion of equity with an assessment of the distributional effects of an MPA. These impacts are estimated to assess compensatory measures such as money transfers, harbour facilities, the development of alternative fishing activities and other income-generating activities (Boncoeur et al., 2002); buyback programmes (Sanichirico et al., 2002); and the allocation of exclusive and territorial use rights (Andaloro and Tunesi, 2000). Distributional effects are studied at vessel group scale (Sumaila and Armstrong, 2003), or at MPA scale, first by exploring the links between MPAs efficiency and equity and the ability of a MPA to provide a suite of benefits, secondly by undertaking a distributional analysis which quantifies transfers of wealth between stakeholders (Hargreaves-Allen, 2010). Equity considerations have also led some authors to address the MPAs' contribution to poverty reduction (Leisher et al., 2007).

The recommendations made by the World Parks Congress held in Durban in 2003 have driven forward studies on MPA socio-economics. The wording of some of these recommendations underscores the need to consider the impacts on resident populations, especially when anything other than a strict reserve is being considered. The majority of MPAs today are no longer strict no-take areas under IUCN Category 1 (UBC, Undated). Most of them now come under IUCN categories II–VI, recognising the need for subsistence resource use or low-level non-industrial use, which does not rule out zoning including a no-take area. As reiterated by recommendations of the Convention on Biological Diversity (CBD, 2010) and more recently at the Third International Marine Protected Areas Congress (Westlund, 2014), it is all the more important to consider the socio-economic effects in view of the sharp rise in marine protected areas worldwide over the last two decades. Especially, most of least-developed countries tolerate the exploitation of natural resources in MPAs, considering the strong dependence of resident and adjacent populations on the use of these resources and the frequent lack of alternative activities (Weigel et al., 2011).

This new environment therefore calls for scientists and managers to rework their approaches and methodology. For instance, both MPA and household level need to be considered to assess the economic effects of MPAs on populations. Estimated MPA-generated profitability should be calculated at both MPA level, in terms of economic surplus or net benefits, and at microeconomic level in terms of the profitability of all household activities, including market-oriented activities. Similarly, the distributional effects generated by an MPA should be explored at both MPA or vessel group level and household level, for instance when considering income distribution.

The focus on fishing households also raises another economic dimension: household vulnerability. This concept, which can be defined as a household's probability of falling below a poverty line in the future, is one of the most remarkable recent achievements of development economics (Dercon, 2001). Bene, 2009 states a good case for this focus by confirming the feasibility and value of its application to fishing households.

In this paper, we test the hypothesis that the economic situation of fishing households located within or adjacent to an MPA is better than that of fishing households located remote from an MPA when ecosystems, communities and fishing activities are similar. In a first part, a relevant case study meeting the criterion of similarity is presented: the Chumphon Province coastal area in Thailand which includes a marine protected area (Chumphon Archipelago

Marine National Park). A second part is devoted to the description of a field survey and a method for comparing the economic situation of fishing households at a given time based on their location in relation to the marine protected area: within or adjacent to the MPA vs. remote from the MPA. In a third part, a set of results are presented and discussed in order to assess the economic effects of the MPA on fishing households, especially regarding the profitability, income distribution and microeconomic vulnerability.

2. Case study presentation

The effective implementation of the management plan (Sutipanwihan, 2003; Plathong et al., 2006), the involvement of fishing communities adjacent to the MPA through the performance of two collaborative projects focused on locally-based coastal resources management (and on coastal fisheries co-management Suanrattanachai et al., 2003, 2008), contributed to the success of Chumphon Archipelago Marine National Park with regard to resource management and conservation. This relative success was a good reason for choosing this MPA in the Gulf of Thailand as a case study.

Regarding the MPAs in Thailand, the picture is mixed. Authors such as Bennett and Dearden (2014) are fairly critical in the light of negative perceptions of DPN governance from communities of the Andaman Coast. Some years before, Lunn and Dearden, 2006a,b) stressed on the failure to take into account the needs and usage patterns of small-scale fishers; Arunotai, 2006 noted the lack of awareness of traditional knowledge of local or indigenous communities.

Others studies concluded with a more positive assessment. The Thai Environment Monitor 2006 underlined that Thai MPAs were managed reasonably well, but that only a small part of the remarkable sites were protected (World Bank, 2007). More recently, Christie et al. (2011) outline the notable progress with the inclusion of stakeholders, but also the few mechanisms available to promote the involvement of communities and civil society in the MPA management. These authors report the relatively little information about the overall effectiveness of marine parks, as already mentioned by Cheung et al. (2002) who advocated for the carrying out of research on economic gains, as a priority action. Prasertcharoensuk et al. (2010) focus on the range of different issues that remain to be addressed while there have been a lot of positive progress. Hockings et al. (2013) highlight the accomplishments and propose ten key recommendations including a greater commitment from stakeholders and communities, and an enhancement of MPA resilience. More generally, the recent literature stresses the need for taking into account the human dimensions of Thai MPAs and more specifically for incorporating socio-economic data into marine protected area management (UNESCO, 2007).

2.1. Ecosystem, geographic and socio-economic features

The Chumphon Archipelago Marine National Park (or Mu Ko Chumphon National Park) is an integral part of Chumphon Province, located in the upper part of the Southern Region in the Isthmus of Kra (Fig. 1). The park comprises half of Chumphon Province's 222-km coastline and covers a total area of 317 km², 80% of which is marine (Sethapun, 2000). Chumphon's marine and coastal ecosystem encompasses more than 40 islands, 17 major coral reef sites (in particular around Kula Island and Ngam Islands group) and sea-grass beds, sandy beaches (especially the Sai Ri Sawee and Arunothai beaches), 3000 hectares of mangrove forests (in particular the Ao Tungka-Sawee mangrove forest), three river mouths and several canals including Thung Tako River (Plathong et al., 2006). All these habitats support rich marine life,

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