



Paying the price to solve fisheries conflicts in Brazil's Marine Protected Areas

Priscila F.M. Lopes^{a,*}, Sebastián Villasante^b

^a *Fishing Ecology, Management and Economics (FEME), Department of Ecology, Federal University of Rio Grande do Norte, Natal, Brazil*

^b *Faculty of Political and Social Sciences, University of Santiago de Compostela, A Coruña, Spain*

ARTICLE INFO

Keywords:

Willingness to Pay
Payment for Ecosystem Services
Shark conservation
Shark tourism
Fernando de Noronha

ABSTRACT

Ecosystems services (ES) provide food and recreation to humans, but are fast being degraded. Marine Protected Areas (MPAs) have been proposed as a way to protect some of these ES, but decisions regarding what gets protection and what gets consumed can be a source of conflicts. One such example is the Fernando de Noronha MPA (Brazil), where there is a conflict between shark-directed tourism and fishers who would like to access the no-take part of the MPA during part of the year. A contingent valuation method (Willingness to Pay) was used to ascertain if tourists would accept compensating fishers for not disturbing the sharks during a specific period of the year, by adding a symbolic increase in the taxes they already pay to either visit the island or to visit the no-take part of the MPA. Tourists were open to this alternative (67–71%), regardless of the fee being paid. However, there was a slight tendency to reject the fee when the tourists saw sharks during their stay, suggesting that a closer contact with these animals triggered a less sympathetic attitude towards fishers, probably because they start seeing fishers as wrongdoers, even if this is the worst choice for conservation. Although such a hypothetical payment was easily accepted by the majority of the tourists and could represent an affordable solution to conflicts, convincing those who reject such social compensation, especially if based on an irrational choice, would be an important step for sharks and for the MPA as a whole.

1. Introduction

All over the world, tropical areas are increasingly being used for their ecosystem services (ESs) [1], sometimes to the point of exhaustion or for conflicting and unsustainable uses [2]. One way to protect ESs is through the establishment of protected areas [3]. There are multiple categories of protected areas, some are very restrictive, where only research is allowed, and others are lax enough to allow the sustainable exploitation of their resources [4]. Such variation in the degree of protection can be found in terrestrial and marine environments.

The establishment of Marine Protected Areas (MPAs) is still occurring at a relatively slow pace in relation to its terrestrial counterpart. At the Seventh Conference of the Parties (COP 7) in 2004, governments agreed to protect 10% of the marine habitats by 2012 [5]. In October 2013, IUCN estimated the actual rate only approached three percent and that it was likely the world would reach the initial goal only after postponing the deadline to 2020.¹ Assuring a certain degree of protection is essential to the continuing provisioning of the marine ESs that people depend upon [6].

MPAs protect ecosystems that provide direct and indirect ESs [7], depending on the degree and effectiveness of protection of these areas.

Among the human activities that make use of ecosystem services, two are particularly important and related in the tropics: ecotourism [8] and fisheries [9]. Tropical MPAs, when in a good conservation state, can be a more reliable provider of fish than unprotected neighboring areas, working as a source to the latter through the spillover effect [10]. Resident, migratory and even species with sensitive life history aspects (e.g., long lifespan, late maturity, few offspring), such as sharks, can benefit from such areas [11]. Abundant fish attracts the attention of fishers and recreational divers alike.

Shark diving tourism is a profitable business, annually generating over USD 314 million, an ever-growing figure [12]. Tropical fisheries, on the other hand, are in some places the only source of food and cash for vulnerable poor communities [13]. Both activities have in common that they rely on having access to plenty of fish in the long-term, even if the species are not the same. Shark diving tourism is taken as a non-consumptive ES, where its occurrence is less likely to affect the abundance and diversity of fish. Fishing, on the other hand, consumes the resources it depends upon, and even if not focused on sharks, could disrupt the trophic chain, depending on how it is done and on how much fish biomass is removed from an area [14]. Additionally, there is always the chance of incidental catch, when non-target species are

* Corresponding author.

E-mail addresses: priscila@cb.ufrn.br (P.F.M. Lopes), sebastian.villasante@usc.es (S. Villasante).

¹ <http://www.iucn.org/content/world-nearing-3-ocean-protection>.

caught, sometimes at considerable numbers [15]. Therefore, the sustainable maintenance of livelihoods through fisheries and of shark diving tourism demands the establishment of a middle ground in the use of ecosystems. The lack of an agreement between different uses can lead to conflicts, which ultimately can threaten the already insufficient conservation endeavors [16].

The establishment of protected areas may alter land-use rights, by exclusion, restriction or even by passing these rights to others [17], such as to a local or an external elite [18]. It can also result in the criminalization of natives for their original practices [19]. Conflicts between users and MPAs can jeopardize their effectiveness to the point of making some MPAs less successful than the unprotected areas that surround them [20]. This would be the case when fishers or other users specifically target the MPA to make a political point, for disagreeing with their presence or with the way they were arbitrarily established.

In Brazil, the first protected areas followed the American style of native dispossession to protect an area from any human use, other than contemplation [21]. However, from the late 1980s on, natives and locals saw an opportunity to ally nature protection to land-rights by creating new categories of protection that allowed human presence [22,23]. Whereas some of these areas have been successful, others face difficulties either because of market pressure on their natural resources that encourage people to break the rules or because of difficulties stemming from arrangements made in the past that cannot be supported by current legislation.

In this study, an economic tool was used to propose alternatives to social conflicts regarding the use of ecosystem services by small-scale fisheries and shark diving tourism. The case study was in the MPA of Fernando de Noronha (Brazil), the main shark diving tourism destination on the south Atlantic coast, which also hosts a traditional community of small-scale fishers. According to some stakeholders (some managers at the time of the study, for instance), fisheries threaten shark diving tourism by interfering with the trophic chain or with shark behavior; whereas fishers feel they have lost their traditional rights, and are forced to give way to tourism interests. Although this MPA was first designed to accommodate local fishers' interests, legislation changes, tourism growth, and mismanagement created a conflict that could threaten the current MPA status [20]. Therefore here it was assessed if tourists were willing to compensate fishers for their economic losses due to restrictive access to fishing grounds in order to not disturb sharks. The findings of this study look into alternative economic ways to solve or ameliorate conflicts that arise when certain ES are used by one activity and restricted to others due to a protected area. Solving conflicts is an important step to assure the effectiveness of protected areas [24], through improved compliance [25].

2. Material and methods

2.1. Fernando de Noronha, conflicts from an MPA

Fernando de Noronha is a 26 km² MPA, located 345 km off the South Atlantic coast of Brazil (3°51'13.71" S, 32°25'25.63" W), which is zoned into two management categories: a no-take zone that encompasses 70% of the MPA, where visitation is limited and only allowed under a fee, and a sustainable use zone, where fishing, diving and tourism are allowed (Fig. 1). In 2014 and 2015, the number of people who entered the no-take zone was 63,896 and 76,472, respectively. These figures, together with the monthly number of divers, were provided by ICMBio, the federal agency that manages all federal protected areas in Brazil.

The MPA comprises an archipelago that includes a large inhabited island plus other 19 small islands. The GDP of the island, estimated at about BRL 78 million in 2015 (USD PPP 42.18 millions) [26] or BRL 15,600 per capita (lower than the Brazilian GDP per capita, BRL 28,876), comes mainly from tourism (general nature and diving tourism) [27]. Diving, specifically, attracts about 24,000 people

annually, due to its warm, clear and fish-rich waters [27]. The beaches of the archipelago are a nursery and breeding ground for resident sharks. Among the most common sharks in the area, there are the Caribbean (*Carcharhinus perezii*), nurse (*Ginglymostoma cirratum*) and lemon (*Negaprion brevirostris*) sharks. The archipelago waters are also regularly visited by tiger (*Galeocerdo cuvier*) and silk (*Carcharhinus falciformis*) sharks. Sharks are easily sighted, even from the beaches. This has turned Fernando de Noronha into the main shark-destination of the Atlantic coast of South America [27], especially sought by divers. Wildlife education and conservation are not specifically addressed by dive companies, but the park holds free daily talks on different conservation issues. These talks are the main evening event in the island, with the one concerning sharks being the most popular.

Predating the tourist boom, however, Fernando de Noronha was first and foremost a fishing island. Fishing sustained the local livelihood, culture and food security. Later, shark fishing became important, especially between 1992 and 1997, when a shark-directed fishery operated on the island, targeting multiple species, including *C. perezii* [28]. Tour operators believe that this particular species has been severely depleted during the shark fishing period [28]. Currently sharks are not intentionally fished by local fishers, although some species are still regularly caught outside the MPA limits by fishers coming from the mainland. Local fishers target mainly tuna and other large pelagic species caught outside the park limits, as these are the species demanded by local restaurants [20]. Handline fishing is the main method used and is highly dependent on fresh sardines as bait, caught early morning on the coast. For most of the year, fishers can catch the sardines within the sustainable use zone with castnets on the surf zone. However, for about four months out of the year, the sea is rough in this area, whereas the no-take zone becomes calm. This is when there is a conflict between park managers and fishers, as the latter feel it is their inherited right to fish wherever they need. The period in which the permitted area is unfishable was not factored in the original MPA design established in 1988, because both fishers and managers at the time understood that local fishers would keep fishing in this area when necessary. However, new federal legislation established in 2000 banned any extraction in some categories of protected area, including "parks", and some subsequent managers chose to follow the rule to the letter.

Based on interviews, it was estimated here that fishers remove between 60 and 80 kg of sardines daily from the coast of Fernando de Noronha. For that estimate, fishers were specifically asked how much sardine, on average, they catch before going fishing at sea. Estimates ranged from 3 kg to 12 kg, with most around 6 kg. The average was multiplied by the number of boats fishing at the time of the study. According to the fishers, this is not a significant amount, even if it is done within the no-take zone, an opinion not shared by some of the park managers. In conversations with the latter in 2014, they posited that besides being a no-take zone that should be enforced as such, the use of castnets would disturb lemon sharks that also come to the shore to feed on sardines, and juvenile or mating nurse sharks that use the surf zone. Some managers also claimed, during interviews, that affecting such sharks would have an effect on shark diving tourism happening offshore, as the sharks would be scared away from the archipelago. However, no study has ever been done to support either the fishers or the managers' claims.

The island today hosts 40 active fishers who depend on the pelagic fishery; 35 of those were interviewed. Fishers were asked to estimate their losses due to the interdiction on catching sardines within the park limits, which would impede part of their pelagic fishing due to lack of fresh sardines as bait; with this figure, it is possible to estimate their regular income. According to the fishers, without fresh sardines, their catch drops by half (median of the answers = 50%; average = 59%), meaning a loss of about BRL 2.000/month over the course of that four-month period. Clearly, such losses can vary from year to year, but for the sake of simplicity, it is used as a fixed value. This would imply a general compensation of BRL 256.000 annually for the 40 fishers,

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات