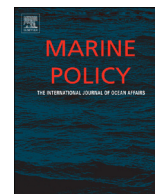




ELSEVIER

Contents lists available at ScienceDirect

## Marine Policy

journal homepage: [www.elsevier.com/locate/marpol](http://www.elsevier.com/locate/marpol)

## Shark-diving tourism as a financing mechanism for shark conservation strategies in Malaysia

Gabriel M.S. Vianna<sup>a,b,\*</sup>, Mark G. Meekan<sup>a</sup>, Abbie A. Rogers<sup>c,d</sup>, Marit E. Kragt<sup>d</sup>, James M. Alin<sup>e</sup>, Johanna S. Zimmerhackel<sup>a,c,d</sup>

<sup>a</sup> Australian Institute of Marine Science, M096/35 Stirling Hwy, Crawley, WA 6009, Australia

<sup>b</sup> School of Animal Biology, University of Western Australia, M090/35 Stirling Hwy, Crawley, WA 6009, Australia

<sup>c</sup> UWA Oceans Institute, The University of Western Australia, M470/35 Stirling Hwy, Crawley, WA, 6009, Australia

<sup>d</sup> Centre for Environmental Economics and Policy, School of Agriculture and Environment, The University of Western Australia, M089/35 Stirling Hwy, Crawley, WA 6009, Australia

<sup>e</sup> Faculty of Business, Economics and Accountancy, University Malaysia Sabah, 88999 Kota Kinabalu, Sabah, Malaysia

## ARTICLE INFO

## Keywords:

Marine protected area  
Socio-economic valuation  
Sustainable financing  
Enforcement  
Semporna  
Willingness-to-pay

## ABSTRACT

This study estimated the economic value of the shark-diving industry in Semporna, the most popular diving destination of Malaysia, by surveying the expenditures of diving tourists and dive operators through the region. A willingness-to-pay survey was also used to estimate the potential of the industry as a financing mechanism for enforcement and management of a hypothetical Marine Protected Area (MPA) to conserve shark populations. The study showed that in 2012, shark-diving tourism provided direct revenues in excess of USD 9.8 million to the Semporna region. These economic benefits had a flow-on effect, generating more than USD 2 million in direct taxes to the government and USD 1.4 million in salaries to the community. A contingent valuation analysis indicated that implementation of a fee paid by divers could generate over USD 2 million for management and enforcement of the MPA each year. These findings suggest that shark diving is an important contributor to the economy of the Semporna region that could be used as a mechanism to assist financial resourcing for management and conservation strategies.

### 1. Introduction

Shark-diving is a fast-growing tourism industry that at a global scale has been estimated to engage around 500,000 participants every year [1]. In 2013, established shark-diving operations could be found in approximately 45 countries spread throughout tropical and temperate waters around the world and many generated significant economic benefits to local economies. For example, in Fiji shark diving inputs over USD 42 million annually to the country's economy, whereas in Palau, Micronesia, the industry generates around USD 18 million per year, accounting for approximately 8% of the Gross Domestic Product [2,3]. In Australia and French Polynesia, shark diving generates annual revenues of USD 25.5 and 5.4 million per year, respectively, while at the small archipelago of Fernando de Noronha, Brazil, this activity generates USD 2.6 million annually [4–6]. Worldwide, the most valuable shark-diving industry occurs in the Bahamas, where it generates annual revenues of over USD 109 million [7]. The financial benefits of shark-diving are distributed across several sectors of the local economy, because tourists spend money on both diving and also on a variety of

other goods and services such as accommodation, food and transport. Shark-diving tourism also generates income through tax revenues, enabling governments to provide services and infrastructure to communities [2,3].

Many of the sharks on which this tourism industry is based are, however, exposed to an extensive global fishery with an estimated catch of at least 100 million individuals per year [8]. Sharks are very susceptible to overexploitation, because they have long generation times and low growth and reproductive rates, which has led to declines of many populations worldwide [9]. Reductions in the abundances of sharks pose a threat to the shark-diving industry and have major implications for local economies of nations involved in the activity [10,11]. Moreover, the depletion of shark populations may also have a negative impact on the ecological integrity of marine systems, where sharks have an important regulating role [12,13].

The economic value of shark-diving tourism provides a strong incentive for the implementation of management strategies that seek to maintain healthy populations of sharks. Between 2009 and 2017, at least 13 nations and territories around the world banned shark fisheries

\* Corresponding author at: Australian Institute of Marine Science, M096/35 Stirling Hwy, Crawley, WA 6009, Australia.  
E-mail address: [gvianna@rare.org](mailto:gvianna@rare.org) (G.M.S. Vianna).

and/or the trade of shark products within their waters by implementing shark sanctuaries. These sanctuaries are multiple-use marine protected areas (MPAs) that typically impose prohibitions on fisheries that capture sharks as target species or bycatch, while still permitting the operation of other fisheries in the same area [14]. The effectiveness of shark sanctuaries as a management option to conserve populations depends on managers having access to sufficient funds to implement surveillance and control activities to enforce sanctuary status and the engagement and compliance of local communities in the cessation of targeted fishing [15,16]. Despite the importance of enforcement, many of the small island countries that have implemented sanctuaries lack the economic and logistic means to effectively police regulations, a situation exacerbated by the large areas of open sea encompassed by many sanctuaries.

Given that shark-diving tourism offers a significant income stream to local economies in many countries, one option to fund the establishment and management of MPAs or other conservation strategies, such as bans on targeted shark fishing, might be to explore options for levies on this type of tourism. This requires, firstly, detailed information about the socio-economic importance of the local shark-diving industry and secondly, information on the willingness of tourist participants to fund such levies. Some of the revenues from shark diving-tourism, such as tax revenues, are relatively simple to identify. However, many economic benefits are not measurable in market transactions and must be assessed using non-market valuations. For example, travel cost surveys [17] can be used to estimate to what extent local tourism expenditure relies on the abundance of shark populations and/or the presence of a MPA at a tourist destination. Other non-market valuation methods such as contingent valuation [18] can be used to estimate visitors' (and non-visitors') willingness-to-pay (WTP) for the ability to see high abundances of sharks, the presence of a MPA or the imposition of bans on shark fishing. Non-market valuation surveys can also be employed to estimate how much shark divers would potentially be willing to pay to enter MPAs, and can thus reveal what additional financial resources could be generated by the introduction of entrance fees [6]. This is particularly important in developing countries that lack the resources to police and enforce management strategies [16,19].

This study investigates these matters for the marine environments of the Semporna region in Malaysia, where conflicts between shark fishing and diving tourism have generated initiatives for management strategies including the proposition of a MPA and a moratorium on shark fishing across the region. The study estimated the market value of shark-diving tourism, including direct revenues and taxes generated for both the local communities and government. Using a WTP survey, the study also estimated the potential revenues that could be generated through user fees from dive tourists to administer conservation strategies.

## 2. Methods

### 2.1. Study site

Semporna is a district in the southeast of the Malaysian state of Sabah, on the island of Borneo (Fig. 1). The district is located on the border of the Coral Triangle and is the most biodiverse area of marine fauna in the world [20,21]. The Semporna region maintains Malaysia's largest dive tourism industry, with its islands (e.g. Mabul, Pom-Pom, Kapalai, Matakang and Ligitan) and the Tun Sakaran Marine Park as popular diving destinations. According to the local diving industry, the main drawcard for divers to visit the area is the island of Sipadan, which received about 43,900 divers in 2012 (Sabah Parks - Personal comm.). Around Sipadan, divers have the opportunity to interact with large predatory fishes such as sharks. Common reef shark species such as the white-tip reef (*Triaenodon obesus*), grey reef (*Carcharhinus amblyrhynchos*) and scalloped hammerhead (*Sphyrna lewini*) sharks are regularly sighted around the island. Although less frequent, other

species such as the Borneo shark (*Carcharhinus borneensis*) and the whale shark (*Rhincodon typus*) can also be observed. The Sipadan Island Park (168 km<sup>2</sup>) and the Tun Sakaran Marine Park (350 km<sup>2</sup>) are both largely no-take zones; however, hook and line fishing is allowed in specific zones of the latter park.

In Sabah, it has been estimated that approximately 22,000 people rely on fishing activities [22]. Local fisheries target mainly reef-associated fish species, but pelagic species of carangids and scombrids are also commonly caught. There are also reports of fishers targeting sharks in the region. Malaysia was ranked as the world's ninth-largest fishery for shark and ray products between 2000 and 2011 but decreasing shark landings indicate a decline in shark populations in the region [23]. This suggests that both legal and illegal fishing activities still put pressure on shark numbers [8]. Concerns about the impact of fishing on shark populations in the region have resulted in a proposal to implement a moratorium on shark fishing and a MPA to protect sharks in the district.

### 2.2. Surveys

Three self-administered questionnaires were administered with three samples of respondents in the Semporna district: dive tourist, guides, and operators. These questionnaires were designed to elicit the market and non-market values generated by shark-diving tourism in the region. The survey was conducted between September and October 2012. The questionnaires followed the protocols established by other shark-diving industry valuations conducted in Palau and Fiji [2,3]. Questionnaires and a printed explanation of the purpose of the research were handed to tourists and dive guides at the end of their dive trip.

The dive tourist survey collected information about divers' demographic characteristics, their motivations to visit the destination, their satisfaction with the diving experience, and expenditures while in the region. These expenditures included costs of accommodation, living costs, diving and shark diving (when applicable), domestic transfers, and money spent on other activities (e.g. land tours) while in the region. The questionnaire also included a contingent valuation component, in which divers were asked their maximum WTP for a daily fee to provide funds for enforcement of a hypothetical MPA to protect sharks in the Semporna region (Section 2.4).

The dive guide survey was conducted to collect socio-demographic information, as well as characteristics of the shark-diving industry, such as dive sites visited, shark sightings, divers' motivations to visit the region, average number of divers and sharks at sites, and employment information (salaries, length of employment etc.).

The dive operator survey involved interviews with managers of dive businesses based in the town of Semporna, and islands of Mabul, Pom-Pom, and Matakang. These surveys included companies that currently held licenses to dive at Sipadan (12 companies with a daily quota of 120 divers) and dive companies that operated exclusively in other sites of the Semporna region. The questionnaire for dive operators obtained information about the characteristics of the businesses, including number of tourists taking dive trips, main dive attractions and activities, information about employees and operators' expectations regarding the dive industry. Detailed information regarding expenditures related to the diving operation and salaries were also collected.

### 2.3. Economic revenues from shark diving

The direct economic benefits from shark-diving tourism were estimated based on tourists' expenditure on diving, accommodation, living costs, and local transport. These benefits capture the business revenues brought to the region by the shark-diving industry. It is recognised that business revenues do not equate to the total economic benefits from the shark-diving industry: shark-diving services contribute to a range of market and non-market (consumptive and non-consumptive) values [24]. Nevertheless, revenue provides a useful indicator of the economic

Download English Version:

<https://daneshyari.com/en/article/7487721>

Download Persian Version:

<https://daneshyari.com/article/7487721>

[Daneshyari.com](https://daneshyari.com)