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TOURISM

PERCEPTIONS OF THE ECONOMIC VALUE OF SHARKS FOR SINGLE-DAY DIVE TOURISM AND COMMERCE IN SANTA CRUZ ISLAND

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*The **Galapagos National Park Service** has its headquarters in Puerto Ayora, Santa Cruz Island, Galapagos and is the Ecuadorian governmental institution responsible for the administration and management of the protected areas of Galapagos.*

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*The **Charles Darwin Foundation**, an international non-profit organization registered in Belgium, operates the Charles Darwin Research Station in Puerto Ayora, Santa Cruz Island, Galapagos.*

***Galapagos Conservancy**, based in Fairfax, Virginia USA, is the only US non-profit organization focused exclusively on the long-term protection of the Galapagos Archipelago.*



Photograph: Inti Keith

Perceptions of the economic value of sharks for single-day dive tourism and commerce in Santa Cruz Island

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Introduction

Sharks play a critical role in marine ecosystems as most are top predators in the food web (Compagno *et al.*, 2005). When feeding, sharks not only feed themselves, they also control the population size of their prey and balance the marine ecosystem (Stevens *et al.*, 2000). There is thus a broad consensus regarding the benefits of preserving top predators such as sharks (Holmlund & Hammer, 1999), and the potential threat of their demise on marine ecosystems (Stevens *et al.*, 2000; Sergio *et al.*, 2006; Ward & Myers, 2005).

Unfortunately sharks face intense overfishing worldwide. This has caused drastic declines in populations of most large shark species in recent decades (Baum *et al.*, 2003; Myers *et al.*, 2007). More than 17% of shark species worldwide are threatened or endangered (Stevens *et al.*, 2000; IUCN, 2010). The principle cause for these declines is the high demand for shark fins by Asian markets. Studies have determined that 26 to 76 million sharks are sold in Asia each year (Clarke *et al.*, 2006), with annual revenue ranging from US\$400-550 million (Clarke *et al.*, 2007).

However non-extractive activities can generate much higher economic returns, especially because the resource can be used multiple times in comparison with fishing. Well-managed tourism based on observing wildlife can provide an alternative that is ecologically and economically sustainable (Norman & Catlin, 2007; O'Connor *et al.*, 2009).

The Galapagos Marine Reserve (GMR) is considered by many as one of the best places for underwater tourism in the world (Sammon, 1992; Scuba Diving, 2000). Thirty species of sharks live in the GMR, with hammerhead sharks (*Sphyrna lewini*), Galapagos sharks (*Carcharhinus galapagensis*), white-tipped sharks (*Triaenodon obesus*), and whale sharks (*Rhincodon typus*) the most common (Hearn *et al.*, 2008). The tourism potential of the islands and the sharks is exploited by various tourism companies whose activities are regulated by the Galapagos National Park Service (GNPS). The ability to observe sharks throughout the archipelago is one of the reasons the islands are such an important tourist destination and has been reported as significantly increasing the levels of entertainment and enjoyment of tourists (Espinoza & Figueroa, 2001; Figure 1).

Although shark fishing has been banned in the GMR since 1989, the high demand and subsequent economic pressure for shark fins in Asian markets have generated an illegal trade within the waters of the GMR that is difficult to measure and quantify (Reyes & Murillo, 2007). The size and dynamics of the fishing fleet involved in these illegal activities is not fully known, but unofficially it is known

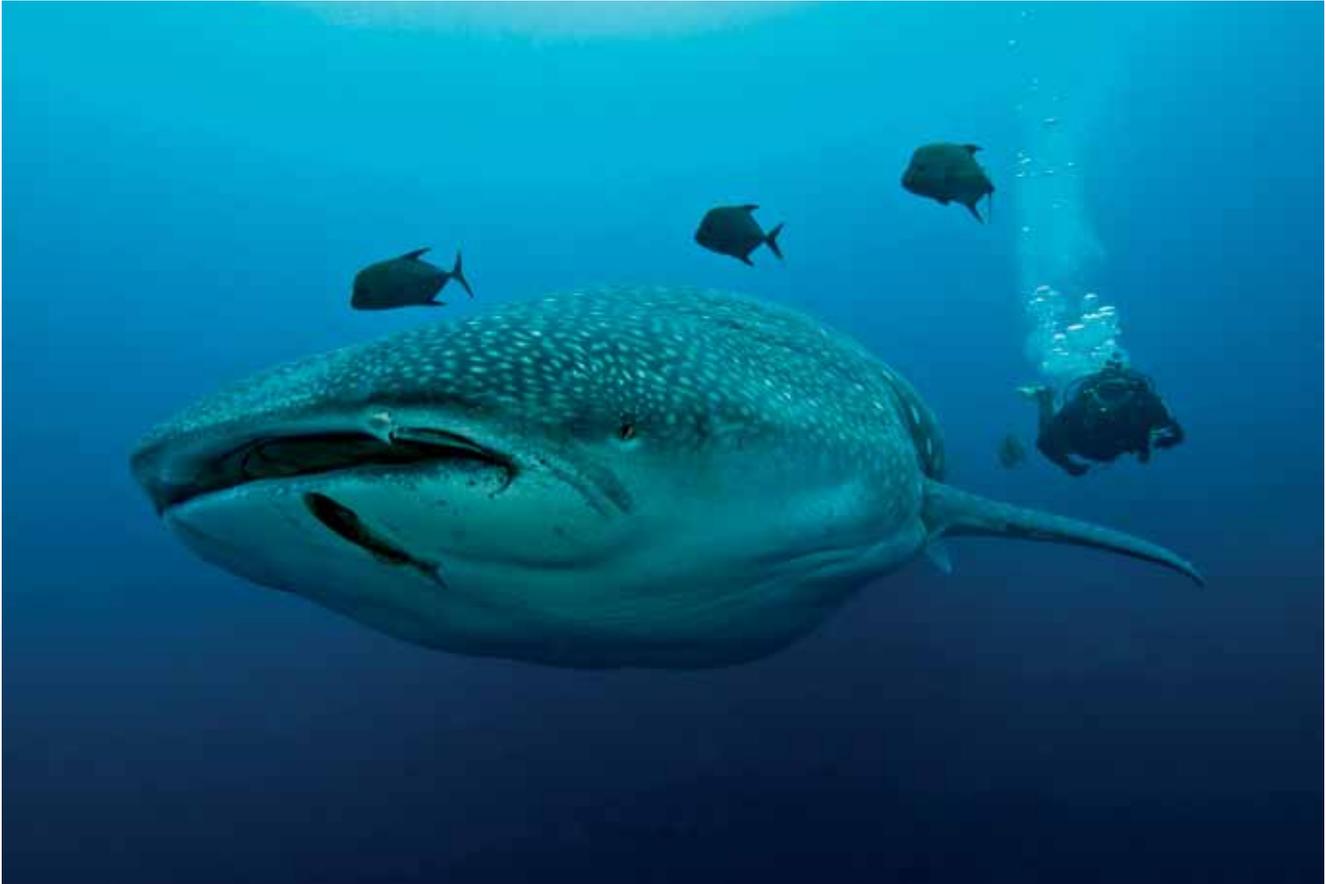


Figure 1. Tourist swimming alongside a whale shark. Photo: Jonathan Green

that the main incentive for many local and national fishers to become involved in this fishery is the significant economic revenue it generates.

Determining the non-extractive economic value of a species is a crucial step to gain legitimacy for their protection, as it reinforces the value of nature conservation and its importance in the local economy and wellbeing of the community. For this reason, the Charles Darwin Foundation, along with the GNPS and the University of California-Davis, initiated a series of studies to measure the importance of sharks in the Galapagos economy. The objective of the first study, reported here, was to establish the basis for calculating the economic impact of sharks on tourism operations (single-day dive tours) on Santa Cruz and for the local handicrafts and souvenir sector.

Methodology

Santa Cruz was chosen as the study site because of the high concentration of tour operators, hotels, and shops, in comparison with the other islands (Grenier, 2010). Annually 75-80% of Galapagos tourists visiting the islands enter through the airport in Baltra Island, north of Santa Cruz (DPNG, 2011a). In Puerto Ayora there are about 45 tour operators, nine of which provide single-day dive tours (Villareal & Grenier, 2010). This number increased recently after new regulations for dive tourism

and patent allocation were implemented by the GNPS. Similarly, Villareal and Grenier reported a total of 50 local handicrafts and souvenir shops located mostly along or near Charles Darwin Avenue.

During March 2010, surveys were carried out with the nine dive tour agencies that offer day tours and 31 local handicrafts and souvenir shops. Surveys were directed specifically to guides and administrators working for their respective companies, and focused on perceptions regarding the dynamics of the business in which they worked.

The analysis of the importance of sharks in the dive tourism sector was performed following the model proposed by Clua *et al.* (2011) and then adjusted for data collected in this research. First the Annual Gross Income (AGI) of each dive agency was calculated, based on the average number of tourists per trip, the frequency of trips per week, and the cost of each dive package. Second, the percentage of the AGI that corresponds to the passengers who travel looking to observe sharks (AGI-SO) was modeled. This value was estimated based on the perception of the guides regarding the percentage of passengers traveling with them that demonstrated that their primary interest was to observe sharks. Finally, the AGI that each shark would produce for the dive operators (AGI-Shark) was estimated. The AGI-Shark calculation took

into account the frequency of shark observations per week and the average number of sharks observed per trip as reported by the dive guides, since the population size of the various shark species found in the GMR is unknown.

In the case of local handicrafts and souvenirs, the estimated AGI or total sales was based on the number of tourists registered by GNPS who entered Puerto Ayora

and Baltra during 2009 and 2010 (DPNG, 2011a), and the amount spent per tourist as reported by Epler (2007) and Ordoñez (2007). These values were then related to the reported percentage of importance of products related to sharks in the AGI of the local shops. The study defined products related to sharks as all handicrafts, clothing or accessory items that use a shark image and/or use sharks as a marketing medium (Figure 2).



Figure 2. Left: Figure of a commonly sold shark in a handicrafts and souvenir shop. Right: Exhibition and sale of t-shirts with figures of representative animals such as hammerhead sharks (center). Photos: Inti Keith.

Results

Dive agencies

The dive agencies provided trip information including cost, number of passengers, and frequency of trips and shark observations. The average cost for a single-day dive trip was US\$146, with a range from US\$115 to US\$190. Most dive companies reported making five trips per week, with an average of six passengers per trip. The dive guides indicated that they believe that approximately

92% of their passengers arrive in Galapagos to observe sharks. However, sharks are not observed during all dive trips. According to the surveys, sharks are observed on average 3.5 out of every seven days of diving. The main shark species observed on dive trips were hammerheads, Galapagos sharks, white-tipped sharks or reef sharks, and recently the black-tipped shark (*Carcharhinus limbatus*). It was not possible to obtain information on abundance by species, rather abundance estimates per trip relate to all shark species as a functional group.

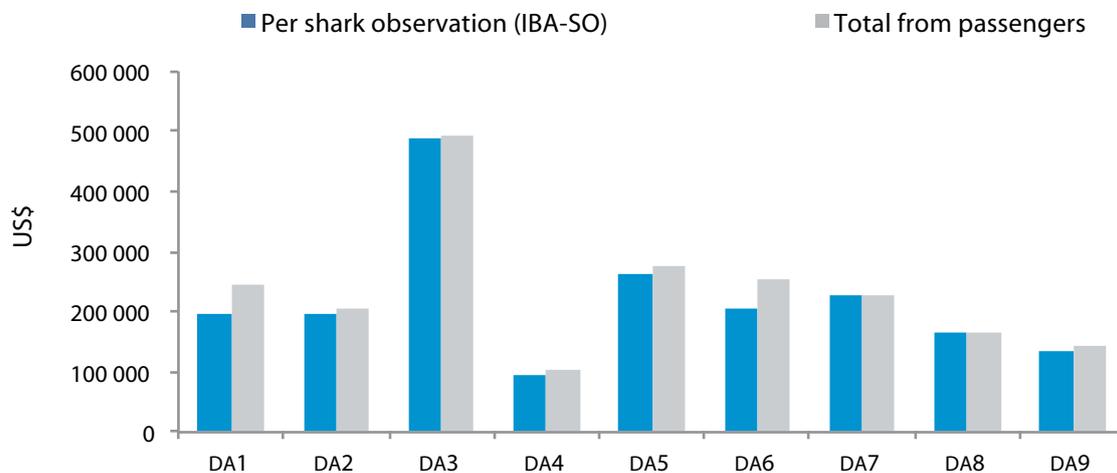


Figure 3. Estimates of the total annual gross income (AGI) and the AGI for shark observations (AGI-SO) for each dive agency (DA) surveyed.

Based on the information provided in the surveys, the AGI of all dive agencies was estimated to be approximately US\$2,115,000, with an average AGI per operator of US\$235,000 (maximum ~US\$495,000; minimum ~US\$105,000; Figure 3). Starting with a baseline of 92% of dive tourists arriving in Galapagos to see sharks, the total AGI-SO was estimated at US\$1.97 million. The average AGI-SO per operator was US\$220,000 (maximum about ~US\$490,000; minimum ~US\$95,000).

Local handicrafts and souvenir shops

According to data on tourist arrivals to Santa Cruz, an estimated 140,221 tourists arrived in 2008, 128,493 in

2009, and 136,318 in 2010 (DPNG, 2011a). Based on these totals and the published amount spent per tourist, the AGI for all of the souvenir shops was estimated to be ~US\$3,890,000 for 2008, ~US\$3,565,000 for 2009, and ~US\$3,780,000 for 2010.

The percentage contribution of handicrafts and souvenirs related to sharks in the AGI of each shop was highly variable. Establishments reported percent contributions from 2-70%, with the most frequent income estimates between 0-10% and an average of 25%. Using 25% as the baseline, it is estimated that the AGI for items related to sharks could reach ~US\$970,000 for 2008, ~US\$890,000 for 2009, and ~US\$945,000 for 2010 (Figure 4).

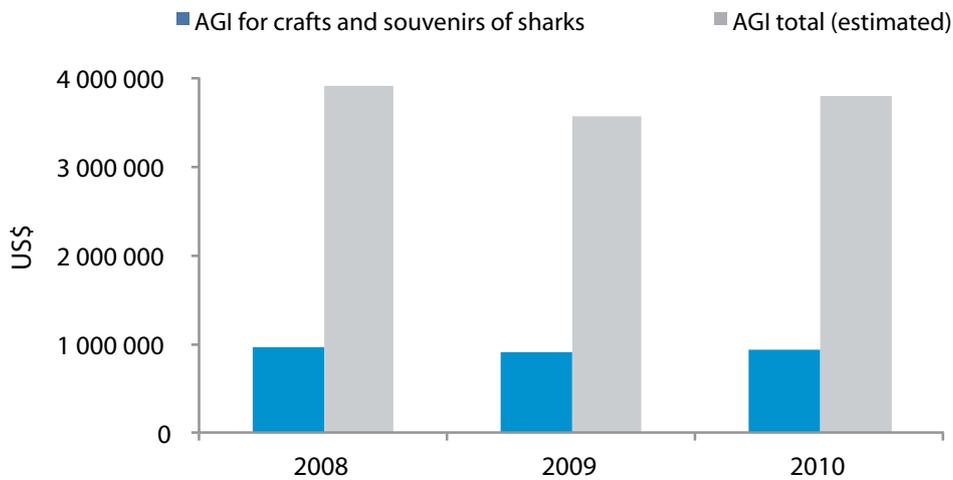


Figure 4. Total annual gross income of handicraft and souvenir shops (AGI) and the annual gross income estimated for the sale of crafts and souvenirs of sharks.

Discussion

This study represents a survey of the perception of dive agencies and local handicrafts and souvenir shops that operated during 2010. It is important to note that the level of uncertainty in this type of study can be high, especially due to the high degree of reticence among respondents to provide financial information about their business operations.

Direct use value: dive agencies

Currently it is estimated that shark-related dive trips contribute between US\$1.2 and US\$7.4 million annually to many local and regional economies (Rowat & Engelhardt, 2007; Norman & Catlin, 2007; Catlin *et al.*, 2010; Martin & Hakeem, 2006). The calculation of the economic value of sharks increasingly plays a critical role as a tool to demonstrate that the impact of removing these organisms not only affects the ecosystem but also the services that humans derive from them (Clua *et al.*, 2011). Year by year, observation tourism is becoming a non-extractive activity that generates high economic returns to society, which can greatly exceed those obtained through fishing (Norman & Catlin, 2007).

In the case of Puerto Ayora, the AGI-SO has been estimated at ~US\$1.9 million, within the range of values reported for other regions. However, the value reported in this study only covers tourist expenditures for single-day dive packages. To better measure the economic value of non-consumptive use we must also evaluate dive tourism within the cruise modality and estimate trip costs of tourists in both types of dive trips. Taking into account the frequency of observation and the number of sharks observed in each trip, it is estimated that each shark (independent of species) may directly generate ~US\$34,000 per year from single-day dive tours. However, this estimate requires that there is always the same potential for observing sharks and that shark population size is constant. To achieve a more accurate estimate requires an intensive population study to determine the number of sharks present at each site as well as a survey of the other modality of dive cruises.

Indirect use value: handicrafts and souvenir shops

The estimates show the economic importance of the image of sharks as an iconic species of marine tourism in the handicrafts and souvenir business sector, with



Photo: César Peñaherrera

at least a quarter of the annual income of these shops (~US\$930,000) resulting from sales of t-shirts, key chains, figures and other souvenir items that show an image of sharks. Revenue projections in this study covered only the past three years, due to changes in the dynamics of dive tourism that resulted from new regulations imposed by the GNPS.

This calculation requires that at least two assumptions are met in order to reduce the level of uncertainty associated with the results: 1) high level of experience in the handicrafts and souvenir business of the respondents, and 2) information on the time tourists spend in Galapagos. Respondents had at least five years of experience, with the average increasing to 5-15 years, as the age of the respondent increased. These data provide a reasonable degree of confidence in the information provided. In terms of the amount of time that visitors spend in Puerto Ayora and the time they have to shop for souvenirs, the Visitor Management System of the GNPS (DPNG, 2011b) indicates that tour vessel itineraries continue to allow tourists to visit port areas at least once.

Conclusions and recommendations

Although this study is based in part on perceptions, this is the first analysis of its kind for the GMR. As in other parts of the world, tourism based on wildlife observation generates substantial revenues within the

local community through non-extractive uses such as dive tourism and the production of handicrafts and souvenirs. This study provides key information for future economic studies in Galapagos. However, the results should be refined and supplemented with more detailed information on tourist behavior and spatial and seasonal abundance of the shark species that are important to the tourism industry. To better understand the amount of revenue dive trips generate each year, similar studies focused on multi-day dive cruises will also have to be completed as well as surveys of tourists involved in dive trips. Well-managed tourism can produce high economic returns both directly and indirectly through onsite expenditures by each tourist. Furthermore, it is necessary to expand this research to the different inhabited islands of the archipelago to better determine the actual annual revenue generated in Galapagos by sharks.

This information should be disseminated by the authorities in order to build awareness and educate the populations of the different islands regarding the economic importance of conserving the sharks of the GMR. This information should also be used to help tourism operators understand their role as key players in the conservation of vulnerable and endangered species. Diving with sharks is becoming an important, high-income business that provides not only a direct economic benefit related to the cost of the dive package but also includes expenditures by each tourist during their stay.

Finally it is recommended that this type of study be expanded to different key species in the GMR and the Galapagos National Park. This will help to improve the understanding of the value of resources and will foster a sense of ownership for the care of native species among the residents of Galapagos.

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