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Finding the balance between tourism and conservation: The pathway to safe and sustainable whale shark tourism in South-Ari Atoll.

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ABSTRACT OF

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Abstract

Tourism and marine conservation are two things that, even though they can be mutually beneficial, are increasingly found to conflict. The marine wildlife tourism industry has been growing exponentially over the past years, raising concerns regarding its sustainability. Whale shark excursions are a very popular activity in the Maldives and provide a substantial income to tourism operators in South-Ari Atoll as well as to the national government. Although the whale shark is a nationally protected species and their aggregation grounds have been designated as a Marine Protected Area in 2009, an official code of conduct or any other form of legal regulations that manage the number and conduct of tourists and boats in the area is still absent. This lack of control combined with a lack of education and awareness amongst guests and operators results in chaotic situations that endanger the safety of guests and pose a threat to the whale sharks. This research has found that overcrowding and poor behaviour by guests and guides are the main threats to whale sharks. The underlying issues of poor education and communication, and absent legal regulations and enforcement are problems that urgently need to be addressed in order to ensure safe and sustainable whale shark tourism in the future. Although the current political situation in the Maldives poses a barrier for conservation, a larger effort for cross-stakeholder communication, collaboration and education does have the potential to make whale shark tours a more enjoyable experience for both tourists and whale sharks.

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List of abbreviations

CMS	Convention of Migratory Species
CPR	Common Pool Resource
EPA	Environmental Protection Agency
LAC	Limits of Acceptable Change
MPA	Marine Protected Area
MWSRP	Maldives Whale Shark Research Programme
MWT	Marine Wildlife Tourism
SAMPA	South-Ari Marine Protected Area

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1. Introduction

In the past few decades the global wildlife tourism industry has been rapidly expanding worldwide (Higham and Lück, 2008; Newsome, Moore and Dowling, 2002). Also the non-consumptive viewing of pelagic marine wildlife has seen a sharp increase in demand (Higham and Lück, 2008; Newsome, Moore and Dowling, 2002). Especially remote and isolated places have received a high influx of tourists due to what Butler (1993) refers to as the "Robinson Crusoe factor" of tropical islands, which embodies the "holiday aspirations of western consumers" (Bentz, Dearden and Calado, 2013, p. 879). This expansion can be partially attributed to an increase in knowledge of the marine environment promoted by nature documentaries and featured stories in magazines like National Geographic, as well as the increased accessibility and affordability of scuba diving (Higham and Lück, 2008; Rodger *et al*., 2011). In 2008, 13 million people worldwide participated in whale watching (e.g. viewing or swimming with cetaceans), resulting in an estimated direct expenditure of USD 2.1 billions (O'Connor *et al*., 2009). Similar "explosive growth" of natural area tourism as first described by Newsome, Moore and Dowling (2002, p. 2) can be seen in the viewing of other marine mega fauna like sharks, rays, and turtles (Gallagher and Hammerschlag, 2011; O'Malley, Lee-Brooks and Medd, 2013)

One animal that has received significant media attention is the whale shark (*Rhincodon typus*), which has grown to become an iconic species honoured as the 'gentle giant' (see figure 1). Whale sharks, the largest sharks in the world and completely harmless to people, are now a prime tourist attraction in many parts of the world. With lengths of up to 12 meters it seems hard to believe that they can live off just plankton. They travel vast distance across oceans: the largest whale shark commute recorded was 8,000 miles across the Pacific. They can dive up to 350 meters deep but spend most of their time at the surface, most likely to warm up their body temperature as well as to feed on plankton (Thums *et al*., 2013). Their slow pace, impressive appearance, and innocuousness make them a suitable and popular shark to snorkel or dive with. Popular spots for snorkelling or diving with whale sharks around the world can be found in Australia, Mozambique, Mexico, Belize, Japan, Thailand, Malaysia, Seychelles, India, the Philippines, and the Maldives (Richards *et al*., 2015).

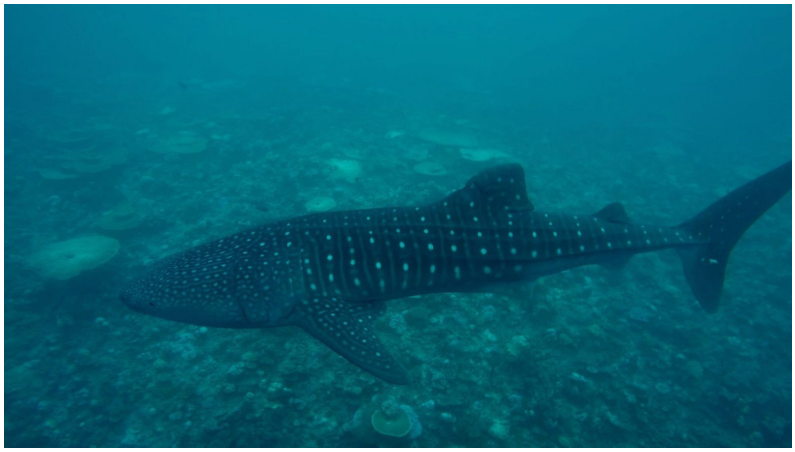

Figure 1 Whale shark 'Lucky' in SAMPA (Felipe Lei, 2016)

Although there is a significant lack of data on the global economic value of whale/shark watching/diving, regional data suggests that the income of such activities contributes millions of dollars to national economies every year (Burgin and Hardiman, 2015; Vianna *et al*., 2012). The direct expenditures related to whale shark excursions have generate between USD 1 and 2.3 million in 1994 and 2006 respectively in Ningaloo Marine Park (Australia) (Catlin *et al*., 2010; Davis *et al*., 1997), USD 1.2 million in 2003 in the Seychelles (Cesar *et al*., 2004), and USD 7.6 to 9.4 million in 2012 and 2013 in the Maldives (Cagua *et al*., 2014). These large revenues of the whale shark tourism industry in the Maldives, and others around the world, forebode the pressure that tourism enterprises put on whale sharks and the consequent need for international protection of this species.

Despite the popularity of whale shark tourism, there is very limited consensus about its management on an international or even on a regional scale (Burgin and Hardiman, 2015). There is no binding international law that specifically addresses the conservation and management of shark tourism or marine wildlife tourism (MWT) in general (Techera and Klein, 2012). However, the whale shark has recently been pushed from threatened to endangered on the IUCN Red List of Threatened Animals, indicating the concerns about the health of its populations. Furthermore, the whale shark is included in Appedix II of both the Convention of Migratory Species (CMS) and the Convention of Trade in Endangered Species (CITES), although neither listing provides for direct conservation or management. In 2010 whale sharks gained further protection under the CMS through the Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MoU). Currently the MoU has 40 signatory states, the Maldives not being one of them as they are not a party to the CMS. Recently however, the Maldives became the 31st country to publish a National Plans of Action for the Conservation and Management of Sharks (NPOA-SHARKS) following the adoption of the Food and Agriculture Organization of the United Nations (FAO) International Plan of Action for the 1999 Conservation and Management of Sharks (IPOA–SHARKS). Nationally, the whale shark was declared as a protected species in June 1995, simultaneously with a ban on whale shark hunting. So far the variety of national and international protection measures for the whale shark has failed to create an overarching and legally binding protection framework. Both in the Maldives and other countries around the world, whale sharks are still lacking effective conservation and management strategies.

1.1 Whale shark tourism in the Maldives

The most important area for whale sharks in the Maldives is South Ari Atoll. The area's rich natural heritage and abundance of marine mega fauna including rays, sharks, turtles, and dolphins makes it a popular destination for scuba diving and snorkelling. More importantly, the area is an internationally significant aggregation site for whale sharks, providing a reliable opportunity for

visitors to see a whale shark all year round (Davies, 2014; Rowat, 2007). The wide and shallow reef in South Ari atoll makes it relatively easy to spot a whale shark at the surface and tourism operators from as far as North-Malé Atoll (more than 150km away) take advantage of this natural attraction by organising whale shark excursions for their guests (Richard Rees, personal communication, May 2016). South Ari's strong reputation has allowed it to develop and support one of the worlds largest whale shark tourism industries in the world, which shows in the high density of resort islands. Out of the 49 islands in South Ari Atoll, 14 are resort-island whereas only 10 are inhabited. On most of the inhabited islands there are also one or more guesthouses and dive centres and the area is frequently visited by large numbers of liveaboards[1] as well. This has made South-Ari atoll a national tourism hotspot as well as an important source of income for the government. In 2013 alone around 78,000 visitors engaged in whale shark excursions for which they paid anywhere up to $600 (trips range from being included in the resort's all-inclusive package to private speedboat trips) (Cagua *et al*., 2014). This adds up to a total estimate of USD 9.4 million of direct expenditures in the whale shark tourism industry in 2013 (Cagua *et al*., 2014). Such a substantial number of visitors and large amount of income in a relatively small area highlights the need to implement proper management and regulations that will safeguard the sustainability of the whale shark tourism industry by ensuring whale shark conservation together with guest safety and satisfaction (Cagua *et al*., 2014).

In 2009 the most southern reef, which is globally unique as it is the only place where whale sharks have been spotted all year round, was declared a protected area. South-Ari Marine Protected Area (SAMPA) stretches out along a 42 km long reef crest and extends 1 km seawards making it the largest Marine Protected Area (MPA) in the Maldives (see Appendix I for a map of the MPA). The objectives as defined by the national Environmental Protection Agency are (EPA, 2009):

- To protect and preserve an important Maldivian aggregation area for the whale shark, *Rhincodon typus*.
- To provide a means to promote and ensure the long-term conservation and protection of the South Ari ecosystem.
- To generate income for local islands through sustainable tourism, facilitating scientific research projects and fostering community focused education and conservation initiatives.

Unfortunately, more than seven years after its designation, the MPA still fails to meet its founding objectives. Despite the protected status of the area there is currently no management plan in place and the MPA regulations (Appendix II) or the voluntary code of conduct (Appendix III) are in no way monitored or enforced. Consequently, unregulated tourism provides an imminent threat to the whale sharks and their habitat. This unfortunate example of a *paper park* has resulted in an ever-growing number of vessels and tourists motor-boating, snorkelling or scuba diving on the reef.

[1] Liveaboards include private yachts and scuba dive safari boats that frequently visit South-Ari atoll to let their guests swim with whale sharks as part of their weeklong tours through the Maldives.

Overcrowding and poor practices have resulted in more than 90% of all the whale sharks in the area showing boat strike related injuries (Richard Rees, personal communication, May 2016). Moreover, the unregulated and unsafe activities on the reef do not only threaten the whale sharks but also compromise the safety of tourists engaging in whale shark related activities.

The objective of this thesis is to identify the barriers to safe and sustainable whale shark tourism in SAMPA and pinpoint potential solutions to these problems. The rationale behind this is to find a better balance between tourism and conservation in SAMPA. Collating the opinions of tourism stakeholders on the current situation in SAMPA will help to identify the drivers of non-compliance with voluntary guidelines and provide prospects for enhancing the involvement of the tourism industry in whale shark conservation. Based on this information, suggestions can be made for future management and policies towards safe and sustainable whale shark tourism and recommendations can be made to assist with the implementation of more sustainable tourism practices.

The overarching research question is: *how to sustainably manage whale shark tourism and ensure satisfying interactions for visitors with a minimal impact for the whale sharks, specifically in the case of SAMPA*. In order to have a comprehensive understanding of the current situation and to facilitate the research goal, the following sub-questions are addressed:

1. How and why is the current whale shark tourism industry in South Ari Atoll is unsustainable?
2. How can the current situation and practice in the whale shark tourism industry be changed in order to ensure safe and sustainable whale shark tourism in the future?

The thesis is structured around these research questions as follows. Chapter 2 provides a literature review discussing the sustainable development of marine wildlife tourism. The impact of tourism on marine wildlife and the related guest experience will be reviewed using the Limits of Acceptable Change framework (Stankey, McCool and Stokes, 1984) and the Wildlife Tourism Model (Duffus and Dearden, 1990). Finally an overview of management approaches to sustainable whale shark tourism will be given using Ningaloo Reef Park in Australia as a best practice example. Chapter 3 describes the rationale and theory of the methodology used to answer the research questions. Chapter 4 sets out the results from the fieldwork, starting with the most imminent threats to whale sharks in SAMPA and their causes, from which higher-level issues will be derived and finally potential solutions for these issues will be discussed. The final section discusses the findings in light of the academic literature set out in the literature review followed a concluding analysis of a future scenario.

2. Literature review

2.1 Defining sustainable tourism

There is evidence from academic literature, which suggests that wildlife tourism can be a sustainable form of tourism development provided it is well managed before major expansion occurs (Gallagher and Hammerschlag, 2011; MacLellan, 1999; Richards *et al*., 2015; Vianna *et al*., 2011). Inskeep (1991) defines sustainable tourism development to meet the needs of present tourists and host regions while protecting and enhancing opportunity for the future. Herein it is the goal to find a balance between optimum satisfaction and enjoyment of the environment by visitors without exposing it to the degradation associated with tourism (Inskeep, 1991). Sustainability within MWT can be defined as:

> Tourism which is developed and maintained in an area (community/environment) in such a manner and at such a scale that it remains viable over an infinite period and does not degrade or alter the environment (human and physical) in which it exists to such a degree that it prohibits the successful development and well being of other activities and processes (Butler, 1993, p. 29).

The sustainable level of tourism should be derived from the sustainable capacity of the natural area, which depends on the conservation goals and management objectives for the resources in that area (Ryan, 1991). All forms of nature-based tourism, including eco-tourism and wildlife tourism are directly dependent on the un-impacted natural environment, and its resources such as marine wildlife and the mere existence of nature-based tourism hinges on the maintenance of local ecological integrity (Boo, 1990; Hassanali, 2013; Rodger *et al*., 2011). The ecological impacts that wildlife tourism may have on the target species can potentially affect the economic and social sustainability of the industry through a decline in or disappearance of the target species (Rodger *et al*., 2011). Moreover, unrestricted or poorly managed wildlife tourism can lead to ecological damage, congestion, and cultural disruption (Lindberg and Lindberg, 1991).

2.2 Impacts of marine wildlife tourism

Although the specific impacts of swimming with marine mega fauna in the wild vary greatly among species and locations, this form of MWT has generally been found to be highly invasive (Birtles, Arnold and Dunstan, 2002; Valentine *et al*., 2004). Specific concerns related to these practices are the risk of harassment and stress to the animal, disruption of normal behaviour, displacement from their habitat, and the risk of injury to the animal or to humans (Birtles, Arnold and Dunstan, 2002; Mau, 2008). Research has shown that the number of people in the water and their behaviour has a direct and substantial effect on the behaviour of sharks (Quiros, 2007; Richards *et al*., 2015). Especially if snorkelers or swimmers are placed directly amongst the

animal, it is often forced to choose between staying or avoiding the swimmers (Constantine, 2001). If the animal shows increased swim speed, rapid diving or other avoidance behaviour this often affects their normal feeding, resting, or for whale sharks specifically, thermoregulatory activities (Rowat and Brooks, 2012). Due to the slow pace at which whale sharks move, boat strikes or collisions are major concerns. The injuries that may result from these accidents can potentially have fatal effects (Rowat, 2007; Rowat and Brooks, 2012). Furthermore, divers and snorkelers can disturb or cause stress to the animals by approaching, touching or riding them (Thurstan *et al*., 2012; Valentine *et al*., 2004). Potential problems can be particularly severe in highly popular areas and sensitive marine reserves. In such areas poorly managed activities can cause significant damage and especially "marine reserves that protect particularly sensitive conservation features, such as aggregations of whale sharks or manta rays are at heightened risk of harm" (Thurstan *et al*., 2012, p. 1098).

2.3 Assessing and managing the sustainability of marine wildlife tourism

The increasing demand for watching or diving with marine wildlife has resulted in continuous expansion of the industry, which has lead to concerns regarding its sustainability (Higham and Lück, 2008). The sustainability of MWT has been commonly assessed using the Wildlife Tourism Model designed by Duffus and Dearden (1990). Using the Butler curve of resort development, this framework shows that a wildlife attraction passes through several stages as the amount of visitors grows. When the carrying capacity of an area or a population is reached, the impact of tourists can consequently lead to the collapse of that specific attraction. This curve is paralleled by Bryan's specialisation theory which argues that the initial, small group of visitors is mainly composed of specialised participants, which over time will be gradually displaced by a more generalist clientele (Bentz *et al*., 2016b). As generalist participants often occur in higher numbers, have a higher impact, and are generally willing to pay less for the activity, this development often negatively affects conservation (Bentz *et al*., 2016a). Duffus and Dearden (1990) suggest that the relationship between the development stage of a wildlife tourism industry and level of specialization is an inevitable outcome unless effective management is applied before major expansion occurs (Bentz *et al*., 2016b). This threat is especially imminent for marine wildlife activities that naturally attract more generalist participants. These activities, like snorkelling with whale sharks, often have a narrow range of specialization and facilitated access for generalist users without special courses or equipment (Bentz *et al*., 2016a). Due to their greater numbers, larger needs for facilitation and interpretation, generalists will place a greater pressure on both the social and natural environment. Specialists on the other hand often have a minimum impact on the environment and the target species because of their heightened environmental awareness, pro-environmental behaviour, and support for management interventions (Bentz *et al*., 2016a; Bentz *et al*., 2015).

In principle most forms of tourism and species conservation can be compatible if appropriate management measures are in place to limit and control damaging activities (Dietz, Ostrom and Stern, 2003; Ostrom *et al*., 1999). People need management to prevent for example the urge "to disturb animals in order to get that perfect picture" (Salm, 1985, p. 236). In practice it is difficult to exclude tourists from marine wildlife attractions but it should be possible to achieve sustainable use if rules and regulations for proper resource management are established (Dietz, Ostrom and Stern, 2003; Ostrom *et al*., 1999). The difficulty of excluding tourists in MWT together with their negative impact on the wildlife and the effects their activities have on the experience of others, make MWT a potential common pool resource (CPR) (Moore and Rodger, 2010). The characteristics of CPRs –difficulty of exclusion and subtractability– make them susceptible to Hardin's (1968) infamous tragedy of the commons. Hardin's theory, which is supported by many scholars over the years, argues that resources held in common, such as oceans or the animals that live therein, are subject to massive degradation. Namely, individual freedom in the common use of goods and services most likely leads to overexploitation when every individual strives for the optimization of their personal use (Feeny *et al*., 1990; Hardin, 1968). It would be easy to assume that a tragedy of the commons is unlikely for MWT if these activities take place in MPAs, and thus are inherently protected from Hardin's *overgrazing*. However, many MWT activities occur outside of MPAs or in parks that exist only on paper, and thus have insufficient resources to be properly managed and protected (Moore and Rodger, 2010). In order to prevent a tragedy of the commons situation rules must be devised, monitored, and enforced to limit who can use the CPR, for how long and when (Ostrom *et al*., 1999). Formal monitoring systems must be created and financed and sanctions must be established for non-conformance (Ostrom *et al*., 1999). With appropriate regulations such as limitations on vessel speed and number of visitors, recreational activities like diving and snorkelling can be compatible with marine reserves and species conservation (Thurstan *et al*., 2012).

Effective management interventions for MWT can be based on Stankey *et al*. (1985) *Limits of Acceptable Change* (LAC) framework, which helps to set targets for the amount of change allowed in a specific setting as well as to monitor and assess these changes (Bentz *et al*., 2016b; Thurstan *et al*., 2012). This post-carrying capacity visitor management framework was coined by the U.S. forest service in the 1980s and is based on constant monitoring of site conditions against the objectives established for it. The LAC framework is recommended by the *Convention on Biological Diversity* as a method to plan and manage tourism in natural and protected areas (Secretariat of the Convention on Biological Diversity, 2004). Through the use of biophysical and social indicators the conditions and resources related to a specific activity can be monitored and managed. To ensure realism and clarify the nature and extent of management activities it is important to establish baselines and specific standards for indicators representing resource and social conditions (Stankey *et al*., 1985). Biological indicators for wildlife habitat and biodiversity

are often based on species count and population abundance as well as the degree of disturbance (Jenkins, 2007). However, due to a lack of knowledge about the biology and natural behaviour of whale sharks it is very difficult to identify baseline conditions and management standards for such biophysical indicators (Mau, 2008). Indicators that can help to assess the social LAC include the visitors' level of specialization, perceived crowding, satisfaction, social benefits and economic stability of the activity (Bentz *et al*., 2015). To improve management responses regarding wildlife attractions in light of the growing demand for MWT, it is essential to understand the human dimensions of wildlife tourism, i.e. the needs and expectations of visitors (Bentz *et al*., 2015; Catlin and Jones, 2010; Newsome, Dowling and Moore, 2005; Ziegler, Dearden and Rollins, 2012).

2.4 Guest satisfaction in marine wildlife tourism

Most of the research on guest satisfaction in MWT focuses on whale watching but the principle findings are generally transferable to swimming with whale sharks because guest satisfaction in both industries is influenced by similar factors. Guest satisfaction in MWT, as in whale watching, can be influenced by many factors, including the demographic profile of the visitor, the environmental conditions during the excursion, the level of crowding at the site, the absence or presence of the focal species and the number of encounters, the costs of the trip, etc. (Bentz *et al*., 2016c; Orams, 2000). However, empirical research presented in the literature provides conflicting findings regarding the importance of the actual sighting of the focal species for guest satisfaction in MWT. Orams (2000) found that the proximity to the animal is not an influencing factor of tourist satisfaction and that a high degree of customer satisfaction can be achieved despite the absence of whales. Whereas Bentz *et al*. (2016c) found that seeing one or more whales was the most important factor influencing guest satisfaction and Valentine *et al*. (2004) found a significant link between proximity and satisfaction when swimming with minke whales. These conflicting findings stress the importance for management to be species and operation specific. Moreover, they make clear that many important factors contributing to satisfaction in MWT such as the presence of whale sharks or the number of encounters cannot be controlled by the operator (Bentz *et al*., 2016c; Orams, 2000). Factors influencing guest satisfaction that can be managed by the operator are the boat type, guest expectations, and costs of the trip. Studies on tourism generally suggest that the higher the price of a service, the higher the expectations will be, which will make it harder to satisfy the guests (Bentz *et al*., 2016c). However, expectations can largely be managed through briefings, educational programs and interpretation before and during the trip (Bentz *et al*., 2016c; Bentz *et al*., 2015; Orams, 2000; Zeppel, 2008; Zeppel and Muloin, 2008). For operators it is beneficial if their guests' expectations are realistic as this makes them easier to satisfy and will consequently lead to higher levels of guest satisfaction.

2.5 Educational management strategies in marine wildlife tourism

Environmental education and interpretation are important tools in creating an enjoyable and meaningful tourism experience (Newsome, Dowling and Moore, 2005). Education-based management strategies are often seen as a win-win situation for both wildlife and tourists (Orams, 1996). As education has proven to promote long-term sustainability of wildlife tourism activities by influencing tourist, community and industry behavior, it is a useful management tool for nature-based tourism (Newsome, Dowling and Moore, 2005; Orams, 1996). Ecotourism is a specific form of nature-based tourism that distinguishes itself from other forms by its emphasis on ecological sustainability and its educative characteristics (Newsome, Dowling and Moore, 2005; Rodger *et al*., 2011). Ecotourism is defined by The International Ecotourism Society (TIES, 2015) as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education" and is generally viewed as being more sustainable than other forms of nature-based tourism (Hassanali, 2013). According to Dowling (2001) ecotourism needs to fulfil five fundamental principles: it being nature-based, ecologically sustainable, environmentally educative, locally beneficial and satisfying for tourists. MWT and ecotourism are often used as synonymous terms and although MWT can be a form of ecotourism if managed well, many MWT operators fail to adopt the fundamental principles of ecotourism (Bentz, Dearden and Calado, 2013; Gallagher *et al*., 2015). This is unfortunate as wildlife ecotourism can be beneficial in enhancing public awareness about the need for marine conservation and consequently lead to positive environmental action (Thurstan et al., 2012; Wilson and Tisdell, 2003).

Interpretation is the term used for informal educational management strategies in natural settings (Lück, 2003), which is known to lead to conservation benefits. The difference with formal education is that interpretation is designed to stimulate interest and enthusiasm while educating visitors. Aside from educating visitors about the biology, ecology, and behavior of the focal species; best practice guidelines; and threats to marine wildlife, interpretation can help to make the visit a richer and more enjoyable experience (Lück, 2003; Weiler and Davis, 1993; Zeppel, 2008; Zeppel and Muloin, 2008). Thus interpretation does not only have a pedagogic role but also an entertainment aspect (Lück, 2003). The ecological benefits of interpretation are for example minimizing the disturbance to the focal species and the general marine environment and generating more widespread support for species conservation and research (Newsome, Moore and Dowling, 2002; Zeppel, 2008; Zeppel and Muloin, 2008). The social benefits of interpretative activities are the reduction of inappropriate visitor behavior by fostering a voluntary change in tourists' attitudes and behavior and increasing tourists enjoyment and understanding of the experience (Orams, 1996). Moreover, interpretation programs for MWT can enhance guest satisfaction and minimize

their impact on the focal species and the marine environment by managing their expectations and desire for close interaction with marine wildlife (Zeppel and Muloin, 2008).

Interpretational techniques may include many different forms of media, from leaflets or signs to video animations, but personal interpretation by a trained guide leading to a "direct guided experience" in a real-life situation is proven to be the most effective method (Lück, 2003, p. 946). Following a well-designed interpretation program on-site benefits of increased understanding may lead to off-site benefit such as long-term support for wildlife conservation and protection (Wilson and Tisdell, 2003; Zeppel, 2008; Zeppel and Muloin, 2008; Ziegler, Dearden and Rollins, 2012). Orams (1994; 1996; 1997) argues that it is important to give participants concrete opportunities to contribute to conservation during or right after the experience because tourists will be highly motivated and more likely to act then than they would be once they are back home. Generally during this post-experience stage, participants are more receptive to global environmental threats and ecosystem degradation, which increases the chance of them participating in follow-up activities such as signing petitions, becoming a member of an environmental organization, or purchasing products that support environmental research (Higham and Lück, 2008; Lück, 2003; Orams, 1994; 1996; 1997). More specifically Jacobs and Harms (2014) found that interpretive activities increase the conservation intentions of whale watchers. Especially emotion interpretation (e.g. interpretation that aims to provoke empathy toward whales by anthropomorphizing them), more so than interpretation that emphasized knowledge or responsibility, increased participants' conservation intentions (Ballantyne, Packer and Sutherland, 2011; Jacobs and Harms, 2014). It enhanced for example participants' intentions to encourage friends and family to help save the whales, the intention to donate money to the protection of whales, and the intention to volunteer to help protect the whales (Ballantyne, Packer and Sutherland, 2011; Jacobs and Harms, 2014).

Lück (2003; 2015) and others have found that tourists actually expect interpretation and education on marine wildlife tours and that in some cases they would even have liked to receive more information about the focal species and the marine environment in general (Lück, 2003; 2015; Zeppel and Muloin, 2008). Ballantyne, Packer and Hughes (2009, p. 663) add to this that "tourists were particularly interested in practical information about what they could do to help protect the wildlife, rather than general information about conservation issues" and that they "expected that restriction would be placed on their activities in order to protect wildlife". Framing tourists as conservation partners rather than enforcing rules and regulations on them might improve this sense of good-will (Ballantyne, Packer and Hughes, 2009). The desire of tourists for greater proximity to wildlife is often driven by "the thirst for a close-up photograph" (Salm, 1985, p. 236; Valentine and Birtles, 2004, p. 31). However, Ballantyne, Packer and Hughes (2009, p. 663) found that "most tourists are willing to forego both proximity and photography in favor of protection". Moreover, they argue that:

> If wildlife tourism operators make the effort to better understand their visitors' needs, motives and expectations, they may find that, in many cases, the needs of tourists and the needs of wildlife are not necessarily in conflict (Ballantyne, Packer and Hughes, 2009, p. 664).

2.6 Regulatory and economic management strategies in marine wildlife tourism

Although education can make a significant contribution to the ecological and social sustainability of MWT activities, in order to tackle the dual dilemma of CPR, restricting access and creating incentives for users to invest in the resource, an integrative management approach is needed (Moore and Rodger, 2010). Regulatory and economic management strategies are a necessary means to fully ensure the sustainability of swim-with whale shark excursions. Regulatory management in the form of an efficient and effective law-enforcement scheme needs to be established in order to protect the safety of the tourist and to protect the animal from disturbance or inappropriate tourist behavior (Bentz *et al*., 2016c; Orams, 1996). In this regard a precautionary approach needs to be taken in order to prevent transgressions of the biological LACs of whale shark tourism. Examples or regulatory management strategies are zoning plans, restrictions on the number of visitors, speed limitations for vessels, permits or licenses, a schedule to limit the number of vessels, and an actively enforced code of conduct. However, due to the limited availability of management related information on whale shark ecology and biology, the establishment of social en ecological LACs for whale shark experiences remains a challenge (Mau, 2008). Therefore, long-term data needs to be collected on the exact impacts of the activity on whale sharks and until that time the precautionary principle needs to be applied with regard to safe and sustainable LACs of whale shark tourism (Gallagher *et al*., 2015; Rowat, 2007). Moreover, in order to implement the necessary regulatory management strategies, funding needs to be raised through additional economic management strategies. Examples of ways to raise funding for conservation, monitoring, and enforcement are an entry fee to park visitors, a permit auction for operators, or fines for incompliance and misbehavior. (Bhat, Bhatta and Shumais, 2014; Lindberg and Lindberg, 1991).

2.7 An integrative management approach to whale shark tourism: the example of Ningaloo Marine Park, Australia

An example of a comprehensive best-practice management approach using longitudinal data is the whale shark tourism industry in Ningaloo Marine Park. Whale shark tourism at Ningaloo Marine Park in Western Australia began in the late 1980s and is one of the oldest and most researched shark tourism sites in the world (Catlin, Jones and Jones, 2012; Techera and Klein, 2012) Catlin and Jones (2010) have used the Wildlife Tourism Framework as described earlier to demonstrate the changes that occurred following the maturation of the whale shark tourism industry at Ningaloo Marine Park. Their research suggests that between 1995 and 2005 whale shark tourism at Ningaloo Marine Park has shifted towards a more generalist or mainstream industry. They found that the

tourist population in 2005 had a greater distribution of age groups, less skilled individuals (e.g. qualified scuba divers) with lower levels of perceived crowding and less focus on the wildlife component of the experience. Between 1995 and 2005 there was a significant increase in the number of people per vessel and an increase in the *sharing* of whale sharks between vessels (Catlin and Jones, 2010; Catlin, Jones and Jones, 2012). Despite these changes that could alter tourists' perceptions of their experiences, it appears that the social LAC have not yet been exceeded, perhaps due to the different values that generalist wildlife tourists attach to their experience (Catlin and Jones, 2010). However, the biophysical LACs for interaction with whale sharks are not as easily determined and adverse impacts are not always immediate or obvious (Catlin and Jones, 2010). Therefore, it is hard to tell whether the biological LACs are exceeded or when this is likely to happen.

Davis *et al*. (1997) identified four factors that need to be taken into consideration when sustainably managing shark-based ecotourism. These are the impacts on sharks, the participant experience, the operational administration of the industry, and the financial and economic aspects. In Ningaloo Marine Park several management measures have been implemented to prevent or limit disturbance to whale sharks and degradation of the marine environment. In 1993 the number of licensed tour operators was limited to 15 and a licensing fee was charged to the licensed operators based on their total number of participants (Catlin, Jones and Jones, 2012). In 2009 the criteria for the award of licenses were last revised, making the application process more stringent and competitive based on nine sustainability related performance indicators (Catlin, Jones and Jones, 2012). Furthermore, an auditing process was added to the regulatory framework in order to monitor the progress of the operators in meeting their sustainability goals (Catlin, Jones and Jones, 2012). The limited number of licenses in combination with a voluntary code of conduct facilitates tour operators to monitor each other and contributes to a culture of compliance (Techera and Klein, 2012). The Code of Conduct for Whale Shark Interaction contains both guidelines for swimmers and vessels and aims to provide a safe and low impact experience (Mau, 2008). The codes for example include guidelines regarding the maximum number of swimmers per whale sharks (10:1), the minimum distance to the whale shark for swimmers and vessels, speed limitations and guidelines for participant behavior in the water (Department of Parks and Wildlife, 2013). Surveillance of the operators' on-water activities is conducted by trained staff from the Department of Parks and Wildlife in order to ensure compliance with their license conditions and help operators to meet their obligations (Department of Parks and Wildlife, 2013). The costs of these vessel patrols as well as the training provided to whale shark guides are covered by the park fee paid by the operators (Mau, 2008). So far lack of enforceability of non-binding codes of conduct has been mitigated relatively well by self-enforcement based on the shared interest in maintaining economically viable businesses and respecting the animals concerned (Techera and Klein, 2012). The limitations on the number of tour operators and participants interacting with one whale shark as well as the industry-

based code of conduct benefit the participant experience as it reduces crowding and enhances the safety of people and sharks involved in the activity (Techera and Klein, 2012). In addition to these rules and regulations, the management plan for Ningaloo Marine Park has a strong focus on guest education, the benefits of which both to the visitor experience and the sustainability of the wildlife activity have been discussed above (Techera and Klein, 2012). This integrated management approach includes regulatory, educational, and economic management strategies, and has so far been successful in integrating "environmental protection, social advancement and economic prosperity" (Mau, 2008, p. 219). The application of the precautionary principle has achieved an ecologically sustainable whale shark tourism industry in which visitor safety and a quality experience are realized with minimal harm or disturbance to the whale sharks (Mau, 2008).

3. Methodology

In order to answer the overarching research question of how to sustainably manage whale shark tourism and ensure satisfying interactions for visitors with minimal impact for the whale sharks in the case of SAMPA, a single, embedded case study approach was adopted, using four different methods of data-collection. The case study is in addition to and building upon the literature reviewed in the previous section. Because of the specific geographic context of the research question and the focus on contemporary events it made sense to adopt a case study approach. This approach has been defined by Yin (1994) as "a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence." Furthermore, an advantage of using a case study approach is that it allows for a full variety of source and methods to be used. This case study will answer the following sub-questions:

1. How and why is whale shark tourism in the Maldives not sustainable for the future?
2. How can the whale shark tourism industry in South Ari Atoll be changed in order to encourage safe and sustainable whale shark tourism and find a balance with conservation in the area?

This section will start with setting out the case study used throughout this dissertation. Thereafter it will expand upon the methods that were used for data collection and data analysis, while also addressing the limitations and ethical considerations thereof.

3.1 Case study

The specific case study of SAMPA was chosen for three reasons. First of all, it is an unusual case due to the distinct and unique geophysical nature of the Maldives. The remoteness of the islands and the lack of infrastructure as well as the distinct political climate make it unique. These distinct qualities provide for a particularly interesting comparison to other countries where MWT plays an important role. Secondly, because it is a unique case study it can both challenge and extend the current academic literature on how to manage MWT sustainably. Lastly, although a few studies have been published on various topics related to whale sharks and whale shark tourism in the Maldives (Cagua *et al*., 2014; Davies, 2014; Riley, Harman and Rees, 2009), this dissertation will be the first to explicitly address the overall sustainability of the whale shark tourism industry in the Maldives.

For the purpose of answering the sub-questions set out above, the case study will be limited to activities related to whale shark tourism in SAMPA. The activities include excursions led by the various operators in and around SAMPA, on which tourists get the chance to snorkel or dive with a whale shark provided that a whale shark is spotted during the excursion. There are four resorts

located within the boundaries of the MPA but other resorts from within and outside of South-Ari atoll as well as liveaboards frequently visit the MPA with their guests.

3.2 Data collection

The data for this case study was collected during a period of 37 days between the 24th of April and the 29th of May 2016. During this period four local island of the Maldives were visit for the collection of data: Malé and Hulhumalé in South-Malé Atoll, and Maamigili and Dhigurah in South-Ari Atoll. In addition to this, three resort islands and a liveaboard were visited.

The data for this case study was collected using four different sources of evidence, namely:

1. In-depth interviews
2. Reports, government documents and (social) media
3. Survey
4. Direct observations

The use of multiple methods of data collection makes it possible to verify the data through triangulation within the case study. Furthermore, by seeing if the multiple sources of evidence converge, the construct validity of the case study can be enhanced, i.e. the correct operational measures for the concepts being studied can be confirmed (Yin, 1994). The combination of these sources of evidence provides an up-close and in-depth coverage of the case study. The unstructured interviews provide an in-depth view of the current orthodoxy of whale shark tourism in SAMPA following the individual perceptions and personal sense of reality of the interviewees. Direct observations and content analysis of news articles and (government) documents add to the representation of the current state of affairs in SAMPA. The survey supplements the interviews as it allows for the corroboration of certain findings that were established from the in-depth interviews amongst a larger group of informants. It needs to be considered however that this methodological approach brings with it a certain level of researcher bias through reflexivity. Namely,

> a researcher's background and position will affect what they choose to investigate, the angle of investigation, the methods judged most adequate for this purpose, the findings considered most appropriate, and the framing and communication of conclusions (Malterud, 2001, p. 483).

In this case the impartiality of the researcher was slightly compromised by the researcher's proposition that the whale shark tourism industry in the Maldives is currently unsustainable and that the balance between tourism and conservation needs to be restored in favour of whale shark conservation. Furthermore, the results of the interviews and survey are the subject of an inclusive selection bias as the participants and interviewees were selected on the basis of geographical proximity and availability.

3.2.1 In-depth interviews

A total of 22 in-depth interviews were conducted with a range of stakeholders at various locations (see Annex IV). The interviews ranged in length from 45 to 7 minutes in length. There was no structured set of questions that guided these interviews; rather a list of themes was used in order to guide the conversation. This allowed the interviewees to focus on their personal perceptions of the current situation and receive as many different commentaries as possible. Unfortunately I was not able to conduct as many in-depth interviews as I would have liked due to logistical limitations and time and resource restraints. Because of the distance between the different (resort) islands and the lack of transportation it proved to be harder than expected to visit many different resorts. To make up for this limitation a survey was conducted in addition to the interviews.

3.2.2 Document analysis

During the fieldwork period, a number of documents has been critically analysed including the South-Ari Atoll MPA Regulations, the Maldivian Whale Shark Encounter Guidelines, and an unpublished report on the consultation workshops with the local community and tourism stakeholders on SAMPA. These documents include the current guidelines that are applicable, although not enforced, in SAMPA as well as suggestions for potential improvements of these guidelines from the previous stakeholder meeting.

3.2.3 Surveys

A survey was designed following the information gathered from the in-depth interviews and the document analysis in collaboration with Richard Rees. As mentioned before, this survey serves the purpose of corroborating the findings that had been established from the interviews and the document analysis. Therefore, no statistical analysis will be conducted on this data; rather will it be used as a qualitative source that can contribute to the triangulation of the other data collected. In total 25 responses were received from different stakeholders in the tourism industry.

3.2.4 Informal, direct observations

During the time spent on Maamigili and Dhigurah, the two largest local islands within SAMPA, the author participated in several whale shark excursions, both snorkelling and diving. From these activities, observational field notes were taken that are used to support and add detail to the narratives that have been collected from the interviews.

3.3 Ethical considerations

In preparation of this research The University of Edinburgh's ethical and risk assessment requirements for fieldwork abroad were addressed. Following the assessment, measures were taken

to reduce risks. The interviews were arranged in public spaces where both the researcher and interviewee felt at ease. Moreover, the location of the researcher was shared with a third person at all times. Prior to the start of the interviews the purpose and context of the research was explained to the interviewees and they were asked to provide informed consent to take part in the research and for the interviews to be recorded.

Many of the people that were interviewed for the purpose of this thesis currently work in the whale shark tourism industry, either in resorts, dive centres or on liveaboards. Some of them expressed opinions that were explicitly 'off the record' or 'between you and me' as they did not wish for these statements to be heard by their employer or the government. Naturally, these viewpoints are not attributed to this person and are only included in this study if they were verified by another source. Moreover, these reservations stress the sensitivity of discussions about tourism and conservation in the current political climate. For the purpose of this dissertation the interviewees have not been made anonymous. However, since the goal of this research is to provide an overall analysis of the situation in South-Ari atoll rather than to point out the shortcomings of specific tourism stakeholders or operators, all interviewees will be made anonymous if parts or all of this research becomes publically available.

3.4 Analysis method and limitations

Because this dissertation follows a linear-analytic structure, an inductive analysis strategy was chosen, working the data from the "ground up" (Yin, 1994). In order to analyse all the data collected, the interviews first had to be transcribed. Thereafter, the verbatim transcripts, together with comments from the surveys, the author's observational field notes, and some documents and news articles were coded. During the process of coding, memo'ing and diagramming were used to keep track of emerging themes, codes, and new ideas. The memos and diagrams were consequently used to make connections between the different themes and codes. These findings were visually represented in the form of matrixes and flowcharts, some of which can be found in the findings section of this dissertation. For the analysis a technique called pattern matching was used, comparing the empirically found patterns from this case study with predicted patterns (Trochim, 1989), in this case the established theories and guidelines found in the literature. The significance of pattern matching in this study is that it helped to address the management gaps and shortcomings found in the case study from multiple perspectives and in comparison to the existing theoretical framework (Almutairi, Gardner and McCarthy, 2014). Moreover, this case study has the potential to modify and enrich the concepts embedded in *the assessment framework to guide the sustainability of the marine wildlife tourism industry* (Rodger *et al*., 2011), *the sustainable tourism development and marine conservation regimes* (Stewart, 1993), and *the strategies for marine*

wildlife tourism in small islands (Bentz, Dearden and Calado, 2013) in a way that is more inclusive of imperfect situations such as this case study example.

However, an important limitation of this study is that its findings are not necessarily generalizable or representative of other case studies. Firstly, the interview and survey sample are not random and therefore not necessarily representative of the wider groups of stakeholders, e.g. industry, NGOs, and government. Secondly, the coding and pattern matching as described above are subject to researcher bias as the themes chosen and highlighted throughout this study are the result of a personal and individual choice process. Consequently, the findings presented in this study are not fully representative of the opinions of different stakeholder parties on whale shark tourism and conservation in the Maldives, let alone in other places around the world. For the outcomes of this research to be better founded and more generalizable, additional long-term field research would need to be conducted in the Maldives and potentially in other countries with a significant whale shark tourism industry. Nonetheless, reoccurring themes and opinions may be indicative of wider viewpoints regarding whale shark tourism and conservation in South-Ari atoll.

4. Findings

The field research that has been conducted consisted of interviews with stakeholders, direct observation and a supplementary survey, which has resulted in a collection of current issues and potential solutions regarding safe and sustainable whale shark tourism. This section will give an overview of the findings that were obtained from the field research in South-Ari atoll and the Maldives. Firstly, it will give a short account of a whale shark encounter in South-Ari atoll, based on the author's own experience. Secondly, it will set out the direct threats to whale sharks and it will link these threats to the main issues related to tourism in SAMPA. Lastly, it will tie back the issues found on a practical level in the MPA to higher-level issues that play a role in marine and environmental conservation throughout the Maldives. Based on an analysis of these issues and the outcomes of the interviews, potential solutions will be discussed.

4.1 The encounter

During my time in the Maldives I was lucky enough to encounter six whale sharks. The following section will provide a short account of my personal experience of these whale shark encounters and is thus deeply biased and purely premised. Consequently, this personal account is not necessarily representative of how others might experience snorkeling or diving with a whale shark.

The busiest encounter personally experienced was with Lucky: a beautiful whale shark who unfortunately had some clearly visible and quite severe propeller strikes on his right side and a folded dorsal fin due to a large cut (see figure 2). Although the encounter was not nearly as busy as some of the ones described by the interviewees, it gave an impression of what such a mass encounters would be like. Even with just our group, there were only 15 of us, it felt quite crowded at times. Everyone wanted to get as close to the whale shark as we were allowed to, and in the rush of excitement most people forgot to look where they or their fins were going. Shortly after our group entered the water a resort dhoni[2] arrived and these guests jumped from their boat right in the middle of our group of snorkelers, without looking where they were jumping. One person from our group, reported that he was duck diving down and just about to come back up to the surface when another guest jumped into the water right above him and almost crashed into him, creating a really frightening moment. Moreover, there was quite a lot of fin kicking and elbowing going on in general. Even though there were still only about 30 people in the water, it felt like a battlefield at times. The encounter ended after a mere 5 minutes with evasive behaviour from Lucky as he suddenly turned away from the reef and swam down into the deep ocean, indicating that he probably had had enough of us. Although it is hard to say with certainty, this was probably a result of the group of resort guests that were dumped right on top of him (and us). The next morning

[2] Dhonis are the traditional fishing boats in the Maldives, which are nowadays also used for snorkel and dive excursions.

however, we saw Lucky again and we were fortunate enough to have him to ourselves. This time he seemed completely at ease and he did not mind us being there at all, allowing us to swim with him for over 20 minutes and take some beautiful photos and videos. This second encounter was truly one of the most enchanting experiences I have ever had as everyone behaved very well and gave each other enough space to move around. Nonetheless, considering our previous experience with Lucky I can only imagine what it would be like to be at a whale shark encounter with up to 200 people in the water and over 20 boats circling around it, especially for the whale shark itself. This is definitely something I would rather avoid, even if that means missing out on the chance to see another whale shark.

4.2 Threats to the whale sharks

Richard Rees and James Hancock, director and operations manager of the Maldives Whale Shark Research Programme, identified two major concerns regarding the direct impact of tourism on the whale sharks in South-Ari atoll. First of all, over 90% of all whale sharks identified in the area have some form of injury, mostly consistent with boat strikes (Richard Rees, personal communication, May 2016). Indeed, all the whale sharks that I have seen during my time in South-Ari had some form of injury, ranging from a sliced up dorsal fin to cut up flanks on both sides (see figure 2). These types of injuries are the result of collisions with boats and can be contributed to the high number of boats that are looking for whale sharks in the MPA and the speed at which they are travelling through the protected area. The injuries that are seen on the whale sharks generally tend to heal well but Alexandra Childs, one of the infield staff members of the Maldives Whale Shark Research Programme (MWSRP), points out that it is unclear whether the injuries have any effect on the whale sharks' growth rate, breathing ability, or overall health later on in life.

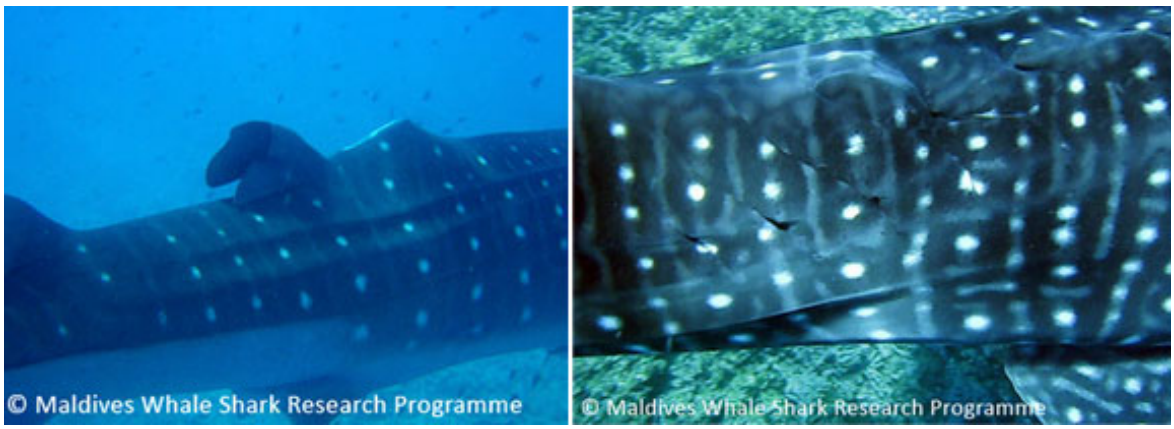

Figure 2 Whale shark injuries from boat strikes: Lucky's folded dorsal fin on the left and an example of propeller strikes on the right (MWSRP)

The other direct threat to whale sharks in the area is the disturbance of their habitat and the disruption of their natural behaviour. Rees and Hancock say this is caused by the large amount of people and boats that often surround a whale shark at an encounter and their potentially poor

behaviour in the water. Many interviewees have affirmed that some of the people in the water, whether it is divers or snorkelers, get too close to the whale shark, get into its pathway by swimming in front of it, or sometimes even touch it. Alexandra and other staff from the MWSRP have noticed that this may change their tolerance of people in the water, showing evasive behaviour as soon as tourists enter the water. These disturbances interrupt the whale shark's natural movements, more often than not causing it to cut short the period that it is swimming at the surface. Although very little is known about the natural behaviour of whale sharks, the latest guess from the international research community is that in South-Ari whale sharks mainly come to the surface for so called behavioural thermoregulation, i.e. to warm up (Thums *et al.*, 2013). Assuming this recuperation hypothesis is valid, the time that whale sharks spend at the surface must be important for their overall health. But again, the exact implications of disturbance of this type of natural behaviour are still unclear.

4.3 Issues with the whale shark tourism industry in SAMPA

These main threats to whale sharks in SAMPA, boat strikes, habitat disturbance, and the disruption of their natural behaviour are caused by various issues that occur in the MPA, both during encounters and during the time boats are looking for whale sharks. The three main issues that came forward during the interviews are poor boat practice, poor guest behaviour and overcrowding (see figure 2). These issues will be analysed in detail below.

Figure 3 The threats to the whale sharks in SAMPA and their underlying issues

4.3.1 Poor boat practice

Poor boat practice is the main problem during the vessel operation, i.e. before the guests enter the water at an encounter. According to Alexandra Childs and the marine biologists at Maafushivaru and Thudufushi, the most prominent issues are incompliance with the advised maximum speed within SAMPA but also getting too close to the whale shark when dropping the guests in the water. Officially the speed limit in SAMPA is 10 nautical miles with no vessel coming closer than 10 meters to the whale shark (see Appendix II). These guidelines are further specified in the voluntary code of conduct but they are not always followed correctly. Moreover, it has been argued by some of the interviewees and discussed amongst tourism stakeholders during the previous stakeholder meeting that these regulations are not strict enough. Speeding is the number one danger to whale sharks, which also causes most of the propeller strikes. Rees and Hancock explain that the main reason for boats to exceed the recommended maximum speed in the MPA is the fact that it is often easier to spot an ongoing encounter than it is to spot a whale shark. This results in boats racing over to an ongoing encounter in order to give their guests a glance at this one whale shark, without paying attention to potential whale sharks they cross on their way. Haleem and Ismail, who both organise whale shark excursions, argue that if boats drive faster than the recommended speed they will not be able to see any potential whale sharks on their way, thus increasing the likelihood of a collision. Because even if they do spot a shark at that speed, the captain will not be able to manoeuvre out of its way and the whale shark will not have enough time to away either. The MWSRP staff explains that although whale sharks can be quite agile if they want to, they generally move very sluggishly, meaning that they cannot get away quickly.

Many of the interviewees have related the issue of racing over the reef to the presence of speedboats in the area, which often come from high-class resorts further away or are used for private whale shark trips. To Agnes van Linden, manager of the Carpe Diem liveaboards, it appears that guests are allowed to do anything if they have the money to do so. This results in what Romney, CEO of Island Divers calls “big bucks going across the top of the reef”. It is hard to say who should be held responsible for these bad boat practices in the MPA. Alexandra Childs explains that although it is the captain who is the one behind the wheel, it is often unclear whether he has been informed of the dangers of speeding or whether he is under too much pressure of either his management or his guests to find a whale shark and get them back in time. Richard Rees adds to this that the crew working on excursion boats may or may not be aware of the guidelines, but in many cases “[rules] go out with the wind as soon as that sort of guest pressure comes into play”. Bernie, operations manager of the Emperor Fleet’s liveaboards, argues that this pressure is partly due to the fact that guests arrive at their resort or liveaboard expecting to see whale sharks everywhere. It is unrealistic expectations like these, implied by social media and pretty brochures, that are hard to manage for the operators and that drive up the pressure for the guides when they go

out on a whale shark excursion. According to Richard and James, this guest pressure resulting from mismanaged expectations contributes further to boats joining an existing encounter rather than looking for their own shark, which in its turn contributes to overcrowding at the encounters (see figure 4).

4.3.2 Poor (guest) behaviour

An issue that contributes to habitat disturbance and disruption of the whale sharks' natural behaviour is poor behaviour by guests (and sometimes also guides) while they are in the water. Many interviewees confirm that despite the guidelines that are currently in place there are still people who get very close to the whale shark, swim in front of its head, use flash photography or even touch the shark, often just to get a great picture. Generally the staff who work at the resorts within South-Ari atoll and on some of the long-running liveaboards seem to be fairly well informed about the dangers of such behaviour and the guidelines that are currently in place as most of them have either received information from the MWSRP or are from one of the local islands. However, Marco and Midhoo, dive centre managers at Maafushivaru and Sun Island contend that every year there are more and more new liveaboards and speedboats from resorts outside of South-Ari atoll (North-Ari, South-Malé and even North-Malé atoll) that come to visit SAMPA to show their guests the whale sharks. Their staff do not seem to know much about the area, the whale sharks or appropriate practices and they are really just doing "whatever they want" according to Amanda, the marine biologist at Maafushivaru. Part of the issue lies in the fact that there is a very high turnover of staff at most resorts. Often dive guides, marine biologists, and even general managers stay for maximum a couple of years before they move on to a different island in the Maldives or a different country. 60% of the survey respondents indicated they have worked in South-Ari atoll for 3 years or less. Some of the liveaboards even use freelancers who can change employers every few weeks and are thus not at all informed about the practices in South-Ari atoll. Richard explains that when there is a change of staff it is unlikely that rules and regulations are passed on because they are not actually enforced, meaning that knowledge disappears and any efforts to educate or inform the operators and their staff are being abolished. Naturally a lack of knowledge and awareness amongst the staff on whale shark excursions will result in their guests being unaware of the dangers of their behavior (see figure 4). However, even if the guides and marine biologists who lead the excursions are fully up to speed, they might have issues educating their guests due to language barriers. According to Agnes it is especially the Asian guests, who account for a large portion of the Maldivian tourism industry, that often have difficulties understanding English. Consequently, a lack of wide spread knowledge and awareness amongst operators together with language barriers in the education of their guests result in poor behavior during encounters.

4.3.3 Overcrowding

Lastly, there is the issue of too many boats in the area and too many people in the water at the same time, which has a large impact on the whale sharks' habitat and natural behaviour. As mentioned before, people come from very far to see a whale shark. South-Ari atoll is the most famous and most central place in the Maldives to see whale sharks and therefore tourists from all over the country want to visit this specific area. There are dhonis and speedboats that are day-tripping from the resorts, there are dive boats, and there are liveaboards. Especially mid-week, from Tuesday to Thursday it can be extremely busy out on the reef. Bernie and Agnes explain that almost all liveaboards have the same 7-day itinerary from Saturday to Saturday called 'classic' or 'best of Maldives', which is basically from Malé down to South-Ari and back up to Malé. Consequently, in the middle of the week all liveaboards converge around SAMPA while the dhonis and speedboats from the resorts are there as well. On those days, even with the best intentions and a good briefing, the whale sharks turn into what Mark Stevens, dive center manager at Centara carefully calls "a bit of a free-for-all". In such a situation, guidelines are likely to be disregarded as people only care about their own experience (see figure 4). Bernie argues that amongst all the different operators there are ones who try to do things the right way but there are also operators who really do not care and just want to satisfy their guests. Richard Rees expects that as long as this is the case and everyone seems to be doing whatever they want then many operators will not recognize, let alone follow the guidelines that are in place and there will be "a sort of tragedy of the commons situation". The perceptions on how many people are generally at an encounter vary quite a bit but the interviewees mentioned numbers between 25 and 250 snorkelers and divers. These amounts of people around one shark result in encounters being described as "chaos", "mayhem", "hell", or "disaster" by the interviewees (see figure 2 for an impression of a mass-encounter). During many of the interviews, stories were brought up of people being kicked in the face by a pair of fins, people pulling each other under, and people swimming over each other with their cameras. Moreover, Agnes indicated that many of the returning liveaboard guests are no longer satisfied with the experience and would rather avoid any whale shark encounters due to the extremely high density of boats and people.

Figure 4 Impression of a mass-encounter (MWSRP)

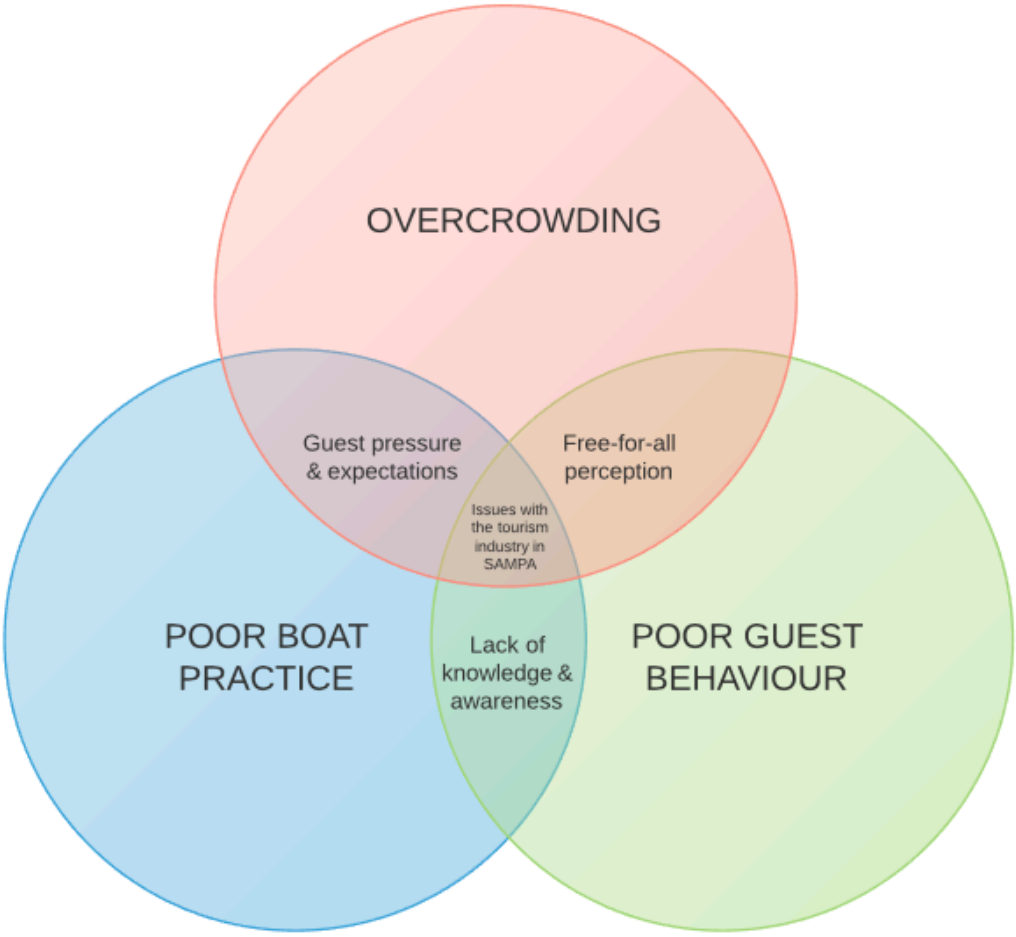

Figure 5 Issues with the tourism industry in SAMPA and the underlying causes

4.4 Higher-level issues and potential solutions

The issues of overcrowding and poor practices by both staff and guests before and during an encounter can be related back to some more profound issues related to (marine) conservation that occur throughout the Maldives. Arguably the poor behaviour amongst both guests and staff can be contributed to a lack of knowledge and/or awareness. The absence of knowledge and awareness can be put down to a lack of education but also to the fact that legal rules and regulations or even a management plan are still non-existent in SAMPA. Furthermore the issues of overcrowding and bad boat practices such as speeding are likely to persist until there are legally enforceable rules as well as some form of monitoring and enforcement in place. Figure 4 gives an overview of the causal relationships between the issues found in SAMPA that are related to the unregulated tourism industry and the underlying drivers of these issues as discussed in the previous section. This section will discuss the higher-level issues of a lack of education and communication, and the absence of clear regulatory laws and enforcement measures (see figure 5). Based on these issues some solutions will be discussed that have the potential to improve the current situation.

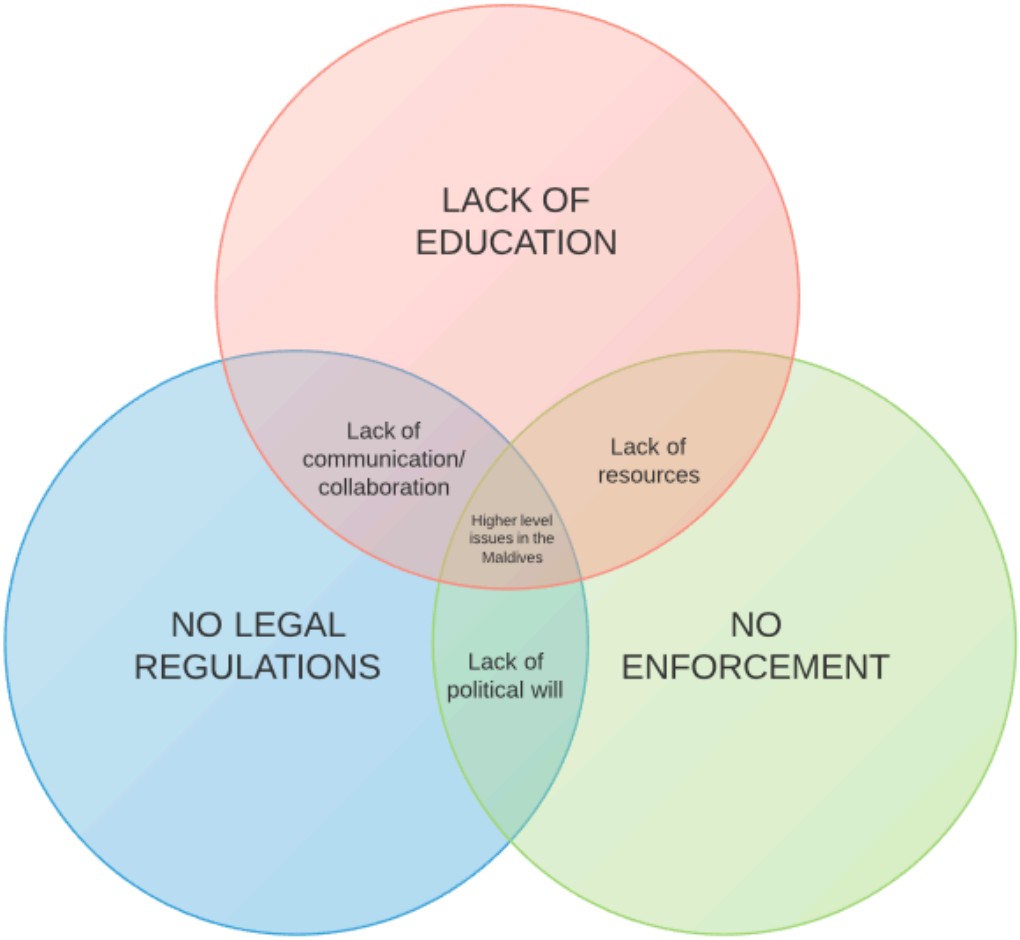

Figure 6 Higher-level issues regarding marine conservation in SAMPA and the Maldives

4.4.1 Educational management strategies: Knowledge & awareness

The lack of education is something that the MWSRP has been trying to tackle for years now. They have designed a training programme for guides and marine biologists as well as informative materials for guests in 12 different languages and an illustrative video that explains the encounter guidelines. The survey indicated that almost 30% of the participants found that they receive insufficient information on best practices for whale shark conservation. Consequently, only 36% of the guest briefings include information about whale shark conservation and 56% includes information about the biology and ecology of whale sharks. Even though many of the guides are looking for materials to show their guests, Richard complains that the operators will not easily approach them. Instead it seems that MWSRP has to visit the resorts and literally put it on their desk in order for them to pick it up. This is confirmed by some of the dive centre managers who argue that they do not have time to come to Dhigurah for training days or stakeholder meetings. So even though most of the operators are not content with the current situation on the reef and would like things to change, they are not the ones that can be expected to take an initiative for change.

An official training scheme would be something that could substantively increase the level of knowledge and awareness amongst both guides and guests. If the guides are knowledgeable about whale shark conservation and related best practices they can provide an example for their guests who are then more likely to follow the best practices, according to Sam, the dive instructor on ScubaSpa. Furthermore, if the guides would follow a training it would also ensure that they all have access to the guest materials that are available including the animation for the sake of language barriers. Moreover, MWSRP would have the chance to increase the number of guides that contribute to their research by participating in the citizen-science project they have set up. Both guides and guests can identify the whale sharks they see using the MWSRP app, which uses I3S identification software developed by NASA, to easily identify whale sharks based on their spot-pattern[3]. This will greatly benefit whale shark research and conservation objectives in the long run. The survey found that 75% of the respondents agreed that a training and certification scheme, including the provision of standardized guest-materials and training in photo-identification, would be a good idea. However, it will be extremely hard to reach all operators, especially those situated outside of South-Ari Atoll and the liveaboards. Also, the training would have to be repeated at least every year, either internally by the operators themselves or by MWSRP, due to the high turnover of staff.

Realistically it will only be possible to execute such an extensive educational programme with the accreditation and ideally also with funding from the government, as the operators need a strong incentive to participate in such training. Ali, the manager at the water sports centre at Sun Island argues that a "firm hand" is needed. Many of the interviewees working in the tourism industry confirm that the government needs to actively intervene by creating legal regulations and spreading information about the MPA. Ideally the certificate for guides and boat crew would be compensatory in order for the operators to get a license that allows them to enter SAMPA. Amanda, marine biologist at Maafushivaru, suggests that the resorts or liveaboards who do not hold a license because their employees are not certified could in such a case still organise whale shark excursions for their guests by bringing them to an excursion operator on a local island. This will not only prevent uncertified guides from entering the MPA and posing a risk to the whale sharks, it will also involve the local community in the conservation efforts in SAMPA and provide additional income for them. However, it is clear that such an extensive certification and licensing system is unlikely to progress without backing from the government in the form of legal regulations and consequent monitoring and enforcement.

[3] For more information on this technology see Brooks, K., Rowat, D., Pierce, S. J., Jouannet, D. and Vely, M. (2010) 'Seeing spots: Photo-identication as a regional tool for whale shark identication', *Western Indian Ocean Journal of Marine Science,* 9(2), pp. 185-194. Available at: http://www.ajol.info/index.php/wiojms/article/view/73980/64649. For more information on the specific app see the MWSRP website (http://maldiveswhalesharkresearch.org/our-app/).

An alternative idea that came up during one of the interviews was to involve TripAdvisor or Booking.com. Amanda again, suggested that the descriptions of the resorts on these websites could indicate whether or not it is 'whale shark certified'. This way the guests are made aware of the difference between operators that are certified and those that are not, and the operators will be able to use their certificate as a promotional marketing feature. Furthermore, this feature could involve a link to a website with more information for tourists about whale shark conservation in the Maldives. A special website for tourists, which also pops-up if one searches for 'whale sharks Maldives' on Google, would help to ensure that the tourists have a general sense of awareness and that their expectations are realistic, which will also make it easier for operators to manage their guests' expectations and help to reduce the pressure of guests on the guide and the boat crew during the excursions. This website could potentially be made by MWSRP with sponsorship of the certified resorts. It will contribute to the reverence that Richard and James want to create for the area, namely that when guests arrive they will feel that it is a special site and that they are very lucky to be there and that they have the opportunity to see a whale shark.

4.4.2 Regulatory management strategies: Law, monitoring, and enforcement

Although education can largely reduce the lack of awareness amongst guests, guides and boat crew, and thereby prevent most of the consequences of poor guest behaviour and poor boat practices, it will not solve the problem of overcrowding. The problem of overcrowding at the encounters can be linked back to the fact that many boats rather join an on-going encounter than find a whale shark themselves, which also results in speeding. This is because it is easier to spot a gathering of boats on the horizon than it is to spot a whale shark, especially if they are under a lot of pressure from their guests to produce an encounter. The number of boats and people within the MPA at the same time and the speed limit for all vessels in the MPA are the two most important issues that need to be addressed. In order to address these issues of overcrowding and speeding, and to strengthen compliance with the other guidelines in the MPA, the government needs to transpose the current guidelines into legal regulations with related punishments and fines in case of non-compliance. Laws need to be communicated with the different stakeholders and be monitored and enforced by an authorized power present in the MPA. Of course these things are much easier said than done. The lack of political will amongst the current government to address any environmental or conservation issues, limits the amount of resources available to the governmental bodies charged with these tasks (Scheyvens, 2011). The lack of communication between the government, NGOs and stakeholders further limits the successes in addressing conservation needs.

Richard and James argue that officially limiting the maximum vessel speed will reduce the risk of collision and boat strikes for whale sharks, but it will also reduce the inefficiency with which boats look for whale sharks. Although a limit of 10 knots is already stated in the current MPA guidelines not all operators generally confirm with this. Previous stakeholder consultation has indicated that

many operators from within SAMPA would like the maximum speed to be 5 knots but the lack of compliance seems to indicate that there are still too many operators that are either unaware or ignorant of such speed limitations. Therefore it is essential that enforcement and education measures are implemented before existing regulations or guidelines are strengthened. Limiting the number of boats and people entering the MPA during the same timeframe will obviously reduce overcrowding and thereby increase the safety of both tourists and whale sharks. Most interviewees thought that limiting the number of boats could best be done by having a license based schedule, something that had also been found in earlier stakeholder consultation meetings. A schedule in which all operators get assigned certain time-slots throughout the week would spread the excursions of resorts and liveaboards more evenly. Furthermore, by using the schedule in combination with a licensing system it can also restrict access to the MPA for uncertified guides and boat crews. However, from this research is has not become clear how to best reach an agreement between so many parties and how to effectively monitor the compliance of such a schedule. This is something that future research could greatly contribute to.

As argued before, the success of legal regulations is highly dependent on their monitoring and enforcement. The dive centre managers of Vilamendhoo and Sun Island say that monitoring and enforcement would ideally be conducted by local rangers: people who live on one of the local islands and are always present, especially during high season; people who know the area very well and are knowledgeable about the whale sharks; and potentially people who have their own boat, which would make them more mobile. Involving the local community in monitoring and enforcement of the MPA will empower them, give them a feeling of ownership and can offer them financial support. The local rangers could also receive their training from MWSRP, who can then collaborate with the local rangers in monitoring and research. Together with EPA they could provide the rangers with technical support. In the future, there might even be the possibility to deploy a spotter plane, perhaps funded by a group of interested resorts, which can be used to monitor the vessel traffic in the area but that can also increase their chances of finding a whale shark. From this overview of possible regulatory management strategies in SAMPA it becomes clear that there is still a long way to go for the implementation of laws, monitoring, and enforcement. Moreover, such measures will only be effective in combination with extensive education, and communication of the laws and regulations in question.

4.4.3 Economic management strategies: Funding

In order to provide training across tourism stakeholders and implement monitoring and enforcement of the legal regulations, funding is needed. A common way to raise funding for this kind of MPA management is to charge an entry fee to all visitors or alternatively to charge a weekly, monthly or yearly payment per operator. However, in the case of SAMPA there are several issues with this method. Firstly, the water sport mangers from Sun Island raised the issue that

resorts and other operators are very hesitant to ask their guests for more money. Whale shark excursion can be relatively expensive and they argue that guests are already complaining about the current price. Furthermore, the dive centre manager from Holiday Island states that he would not want to give the money to the government as he is afraid he will not see the financial contribution go anywhere but "their pockets". Potentially an independent body could be set up to manage the MPA's funding but even those are thought to be susceptible to corruption in the Maldives. Lastly, because the MPA is an open area without a clear entry or exit point it will be very hard to oversee who is coming inside the MPA. This is an issue that does not merely affect the collection of fees but will also hinder the monitoring of a schedule and licensing system. Therefore, the success of any funding mechanism is partially dependent on the collaboration of the operators with the enforcing authorities.

5. Discussion and conclusion

Based on these findings, the proposition that the whale shark tourism industry in South-Ari atoll is currently not sustainable for the future can be confirmed. Both the social and ecological aspects of the tourism industry as well as its economics are currently unsustainable. This discussion will tie back these findings to the original research questions. To do so it will one by one address the ecological, social and economic sustainability of whale shark tourism in South-Ari atoll, offering suggestions for future research as well.

5.1 The (un)sustainability of the whale shark tourism industry in South-Ari atoll

5.1.1 Ecological sustainability

The most imminent threat to whale sharks at the moment is vessels speeding in the MPA. The risk of injury to the whale sharks highly compromises the ecological sustainability of whale shark tourism. Furthermore, the speeding of boats joining existing encounters adds to the second major threat to whale sharks, which is overcrowding. To improve these two aspects of whale shark tourism an educational programme and clear laws need to be implemented. However, regarding the implementation of rules and regulations it is an issue that there are currently no clear ecological LACs for whale shark tourism. Although MWSRP and other researchers around the world are putting much effort in the monitoring and research of whale sharks, little is still known about their natural behaviour and the impact of tourism hereupon. Consequently, no universal guidelines exist for the maximum number of people or boats per whale shark or their minimum distance to a whale shark (Hueter and Tyminski, 2014). Despite the lack of clear indicators and baselines for ecological LACs it is clear that the situation in South-Ari atoll is not ecologically sustainable. The percentage of whale sharks with injuries from boat strikes is much higher in SAMPA than in other areas with a whale shark tourism industry. In SAMPA over 90% of the whale sharks now has some form of injuries compared to for example 53% in Mozambique (Haskell *et al*., 2014) or 65% in Djibouti (Rowat *et al*., 2007).

In the existing literature, the length of the encounter has been adopted as an indicator for a lower impact on whale sharks and thus a more sustainable practice (Haskell *et al*., 2014; Pierce *et al*., 2010). Pierce *et al*. (2010) found a significant link between the expression of avoidance behavior by sharks and the proximity at which swimmers entered the water from the vessel. Moreover, in order to reduce the risk of collision a minimum distance between boats and whale sharks should be implemented. No obvious correlation between the number of people in the water and the encounter time was found by Pierce *et al*. (2010). However, limiting the number of swimmers can help to reduce the likelihood that people get too close or touch the whale shark as it is easier for guides to keep their guests in sight and it will be easier for the swimmers to see the whale shark without any

pushing or kicking. Moreover, other restrictions such as speed limitations and a higher shark-boat distance can help to extend the length of whale shark encounters. The absence of any limitations on number of swimmers or boats in SAMPA is cause for concern and something that urgently needs to be addressed.

Currently, management practices around the world vary greatly. For example, in Donsol, Philippines the maximum number of swimmers per shark is six (Quiros, 2007), in Mexico it is three people (Remolina Suárez *et al*., 2005) and in Australia ten people (Catlin and Jones, 2010). Similar differences can be found in the minimum distance between whale sharks and vessels, which is 30m in Australia (Department of Parks and Wildlife, 2013), 20m in Mozambique (Pierce *et al*., 2010), and 10m in Mexico and SAMPA (Remolina Suárez *et al*., 2005). Clearly, there is no empirical consensus regarding the maximum number of people per whale shark or the minimum distance to a whale shark. The lack of empirically found LACs is something that needs to be addressed in future research. Future research should furthermore address the impact of the behavior of swimmers and their proximity to whale sharks on the whale shark behavior and the length of the encounter (Pierce *et al*., 2010).

5.1.2 Social sustainability

The Wildlife Tourism Model by Duffus and Dearden (1990) can be used to assess the social sustainability of a MWT industry. When applying this model to the tourism industry in SAMPA it has clearly reached a more generalist or mainstream stage. Going on a whale shark trip requires no previous training or investment and the large numbers of participants often have little previous knowledge about marine wildlife or whale sharks in specific. Based on the accounts of interviewees and the author's personal experience with whale shark excursions it can be concluded that some social indicators such as perceived crowding and guest satisfaction seem to have crossed their LAC for some participants. Especially the more expensive, private trips impose high guest-expectations, which are in turn harder to satisfy by the operators. However, operators can increase levels of guest satisfaction by embracing an official code of conduct in and on the water, training for their guides, and an extensive interpretation program for their guests. Direct interpretation has proven to make marine wildlife excursions more educative and more enjoyable for guests. By managing guest expectations, interpretation can also increase the satisfaction and appreciation of guests during and after an encounter. Moreover, stricter guidelines will lead to less crowded and longer whale shark encounters, which do not only protect the animals against collision and other negative effects, they also enhance guest satisfaction (Davis *et al*., 1997). Advanced divers and snorkelers will have a better chance of getting a clear picture of the whale shark without other people in it, and tourists who are less experienced with snorkeling have a higher chance of catching a good glimpse of the whale shark before he ends the encounter. Therefore, a well-designed interpretation program together with a strict code of conduct in and on the water enforced by

repercussions for non-compliance would increase guest satisfaction and thus the social sustainability of the whale shark trips in SAMPA.

The social sustainability of the industry does not only concern the participants on the whale shark excursions but just as much involves, or rather should involve, the local communities. The tourism industry in South-Ari atoll generates a very large amount of money every year. However, except for the employment opportunities provided by the resorts and guesthouses in the area, none of the income generated through whale shark tourism reaches the local islanders. In order to improve the social sustainability of the whale shark tourism industry for local communities its revenues need to be distributed more equally amongst the different stakeholders. The potential solutions set out in the findings, e.g. the employment of local islanders in monitoring the MPA and possibly in guiding excursions for the guests of unlicensed operators can ensure that part of the profits from the industry goes to the local communities. Involvement of local communities in monitoring, enforcement and business will generate new employment opportunities and enhance their sense of responsibility and ownership (Eagles, McCool and Haynes, 2002; Newsome, Dowling and Moore, 2005). With good management of these social management strategies, the local support for whale shark tourism and the livelihoods of the Maldivians can be enhanced.

5.1.3 Economic sustainability

In 2013, the total direct expenditure on whale shark excursions in SAMPA (USD 9.4 million) made up ~2,3% of the total contribution of tourism to the Maldivian GDP (Cagua *et al*., 2014; Ministry of Tourism, 2015). This is quite significant considering that this concerns merely the direct expenditure and does not include the indirect effects in the economy. Consequently, the direct spend method "provides a minimal and very conservative estimate of the economic value of tourism in [natural] areas" (Wood and Glasson, 2005, p. 396). Nonetheless, the Maldivian whale shark industry approaches 3% of the global shark ecotourism expenditure (Cagua *et al*., 2014). Moreover, in 2013 the national tourism industry contributed 26% to the total Maldivian GDP and it contributed 35% to the total government revenue (40% in 2014) (Ministry of Tourism, 2015). The direct expenditures in the whale shark tourism industry in South-Ari atoll specifically contributed approximately $750,000 to the total government revenue, that is 0,3% of the government revenue from tourism (Cagua *et al*., 2014; Ministry of Tourism, 2015).

In order to maintain these high tourism revenues, the resources on which the industry is dependent need to be conserved and protected. Namely, the future income stability of the industry depends on the ecological and biological health of the whale shark population. By exceeding the ecological carrying capacity of the marine ecosystem and the whale shark population in South-Ari atoll, the tourism industry and the Maldivian government are shooting themselves in the foot. Currently none of the income from the tourism industry goes to conservation or research. If the industry and the

government want to secure their income from whale shark tourism in the future, they need to invest in more sustainable practices and conservation measures for the whale shark. In order to ensure the future economic sustainability of the industry and marine tourism in general, ecological and biological sustainability of its resources need to be safeguarded first.

5.2 A look into the future

To ensure safe and sustainable whale shark tourism and to find a balance between tourism and conservation in SAMPA, an integral management plan is needed. This plan should include regulatory, educational, and economic management strategies in order to address the overall sustainability of this MWT industry. It is unclear however, where the responsibility for change lies. Neither operators nor the government can be expected to take the initiative. Currently, many of the operators still point their fingers at the national government when they are asked about whale shark conservation. However, due to a lack of political interest in conservation the ministry of environment and EPA lack resources, funding and sufficient staff members, which was confirmed during the interview with EPA. They are trying to install management plans for all the MPAs but they have a very long list of big tasks. The national government, meanwhile, does not seem to care about marine conservation but all the more about tourism revenues and the tax incomes generated from it. It is time that the government realises that the income of the whale shark tourism industry is a reflection of the economic value of whale sharks, which is highly dependent on their population's health and the resilience of the marine environment. Investment in marine conservation is therefore a requirement for the future sustainability of the tourism industry.

Although it would be great if legal rules and regulations were implemented towards safer and more sustainable whale shark tourism, the current barriers to do so both on a local and on a national scale force us to look at alternative, voluntary approaches to balance tourism and conservation. A few potential solutions have been set out in the sections above. However, many of these solutions might be difficult to realise due to the geographical nature of the MPA, the wide spread distribution and ignorance of many operators and guests, and the lack of political engagement and funding. These factors make it difficult to implement formal enforcement measures or extensive educational programmes. Therefore, the success of any regulation or enforcement largely depends on the engagement and involvement of the operators and a swing towards a majority who embraces self-regulation. Although many resorts initially seem open to the idea of self-regulation, there are currently two main barriers. Firstly, as long as the operators keep pointing their fingers at the government, they will not put the responsibility at themselves. To change this, they need to be presented with economic incentives for safer and more sustainable whale shark trips, and they need to realise that it is possible to make a change without government interference. Ironically enough, some operators who demand regulatory measures from the government do not trust them with

funding for monitoring and enforcement or financial contributions to whale shark conservation. Being afraid that money will end up in the pockets of authorities, operators might be better of initiating their own regulations and enforcement measures. However, there is the second looming threat of a tragedy of the commons situation. Namely, as long as nobody complies, there will be no incentive for anyone to do so. However, when those who do not oblige by the rules become a minority, they would hopefully feel the pressure to confirm too. Many of the operators located within SAMPA seem to know about and comply with existing guidelines and they also seem keen on stricter regulations and more enforcement. If they would unite their powers, this may have a very positive effect on whale shark conservation in the area. There is definite potential for the creation of a voluntary alliance between South-Ari operators and MWSRP in order to steer towards a majority that complies with the current voluntary regulations. Furthermore, this will set an example for other operators and create leverage based on which the government can more easily push for legal regulations.

To get the operators on board there must be a strong focus on guest satisfaction and safety as these are the factors that provide an incentive for them to act. With regards to guest satisfaction, interpretation is something that should be strongly promoted and encouraged amongst operators because it can be used to manage guest expectations through which levels of satisfaction can be increased. A website designed specifically for guests, as suggested before, can contribute to managing these expectations. This website can also be used as a platform to promote sustainable and certified operators, i.e. the operators included in the alliance who have followed the MWSRP training programme. Furthermore, the website and interpretation programs can give practical tips on how tourists can actively engage with and contribute to conservation, something that many wish for according to Ballantyne, Packer and Hughes (2009). Lastly, they can increase the reverence of the MPA and the exclusivity of the allied operators. This exclusivity could ultimately be enhanced by a for example a TripAdvisor certificate. Such measure would result in a clearer distinction of sustainable operators and create an attractive alliance that will hopefully expand with more and more certified operators as time goes by. The funding of the alliance, the training program for operators, and potential enforcement measures such as local rangers or a spotter plane could be raised by the operators asking their guests for a financial contribution in the post-experience phase. During or right after the experience tourists are generally most likely to act or contribute to a good cause (Higham and Lück, 2008; Lück, 2003; Orams, 1994; 1996; 1997). In order to enhance the generosity of tourists, guides should in their training be encouraged to focus on emotion interpretation, as this form of interpretation increases participants' conservation intentions (Jacobs and Harms, 2014).

5.3 Conclusion

There is no straightforward answer to the question of how to sustainably manage whale shark tourism and ensure satisfying interactions for visitors with minimal impact for the whale sharks, especially not in the case of SAMPA. The voluntary, industry-based approaches suggested in the sections above are not fool proof and lack the strict guidelines and enforcement measures that could completely solve the issues of overcrowding and speeding, and create a level playing field amongst all operators. However, the creation of an alliance that promotes sustainability amongst operators poses an opportunity to improve the current situation in SAMPA. Hopefully such an industry initiative will attract the attention of official authorities and stress the need of government backing. If current practices are changed now there is still a good chance of restoring the balance between tourism and conservation, so that generations to come will have the chance to enjoy the natural beauty of the whale sharks and rely on the income that can be generated from them. Nonetheless, this voluntary approach does remain dependent on the effort and engagement of MWSRP and the different operators. Communication and collaboration between stakeholders is essential in order to create a strong association for safer and more sustainable whale shark tourism in the Maldives.

The Maldivian government can learn a lot from other countries with a MWT industry or a whale shark tourism industry in specific. Countries with more experience such as Australia, who has implemented precautionary measures to keep its whale shark tourism industry safe and sustainable, can be used as an example for potential management strategies in the Maldives. The implementation of clear and legal regulations, a license based schedule, and monitoring and enforcement measures would make a large difference in the conservation of whale sharks in South-Ari atoll. Not only will it prevent harm to the whale sharks and bring guests a safer and more enjoyable experience, it will also ensure that both the industry and the national government can rely on the income generated from whale shark tourism in the future. These measures and effects do not only apply to whale shark tourism in South-Ari atoll, but can also be consulted for MWT all around the Maldives. Therefore, the success of a safe and sustainable whale shark industry in South-Ari atoll can set a precedent for the national tourism industry, which depends not only on whale sharks but also on rays, turtles, other sharks, coral reefs, and healthy marine ecosystems in general. Conservation measures and additional research are needed to ensure the future sustainability of this tourism industry, and changing the practices in SAMPA can be the first step towards a sustainable and exemplary Maldivian marine tourism industry.

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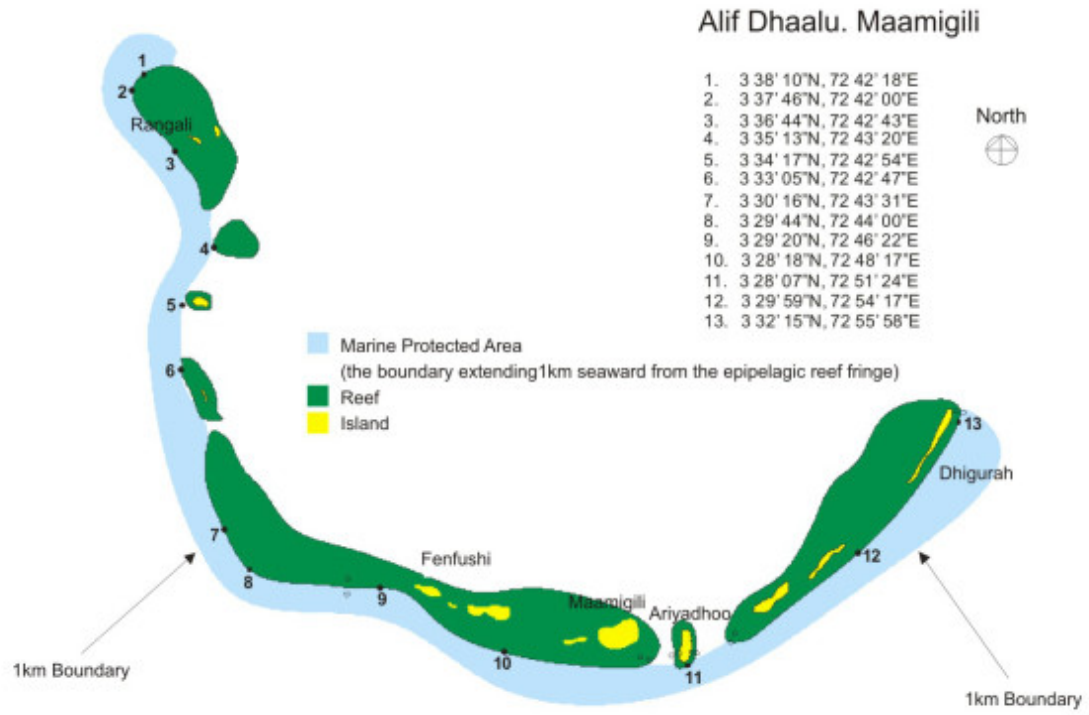
Appendices

Appendix I. Map of South-Ari Marine Protected Area (SAMPA) as declared in 2009



Appendix II. South Ari Atoll MPA Regulations

Commencing from 5th June 2009, the following activities are prohibited within this South Ari Atoll MPA.

1. To carry out any activity which could lead to destruction or alter the site/habitat or the living and non-living things within that environment.
2. Coral and sand mining.
3. Disposal or dumping of any materials.
4. Anchoring except in an emergency situation which is life threatening or leading to destruction of the vessel.
5. No person entering the protected area is allowed to disturb or tamper whale shark or any other fauna. A person entering the sea to watch whale sharks must at all times maintain a distance of at least 4 meters from the whale shark.
6. The speed limit within this protected area should not exceed 10 nautical miles.
7. No vessel should come closer than 10 meters to the whale shark
8. No vessels larger than 20 meters overall length should be engaged in any activity within the MPA
9. Safari vessels, vessels with overall length greater than 20meters and using of jets skis are prohibited.
10. Catching, collecting or killing of any fauna especially birds

Appendix III. Maldivian Whale Shark Tourist Encounter Guidelines (5th June 2009)

1) Restriction on vessels in or near contact zone:

a) An exclusive contact zone of a 250 meters (820.2 feet) radius applies around any whale shark.

b) A vessel establishing a contact zone should identify itself by raising the designated flag.

c) Any other vessel engaging in whale shark related activities must not enter a contact zone to observe a whale shark.

d) The operators of a vessel establishing a contact zone shall record the details of the contact on the form provided and return this to the appropriate authority within the time specified.

2) Restrictions on period in contact zone:

a) A contact vessel must not remain in the same contact zone for longer than 40 minutes if there are other vessels queuing to view the shark.

b) Notwithstanding clause 2 (1) above, the contact period is deemed as having ended once the contact vessel has lost contact with the shark and should lower the contact flag indicating that the contact zone and contact period have lapsed.

3) Restrictions on vessel speed in contact zone:

a) Subject to clause (2 & 3) below, a contact vessel must not exceed 5 knots (9.3km/hr.) in a contact zone.

b) A contact vessel must not exceed 2 knots (3.7 km/hr.) within 50 meters (164 feet) of the contact whale shark.

c) If, for reasons of safety, a contact vessel must exceed 5 knots (9.3km/hr.) in a contact zone, that vessel must leave the contact zone as soon as is practicable.

4) Proximity of contact vessel to the whale shark:

a) A contact vessel must maintain a distance of at least 10 m (32.8feet) from the nearest whale shark.

b) Should a whale shark swim towards the vessel to within 10 m (32.8 feet), all engines should be in neutral or switched off until the shark has moved more than 10 m away from it.

5) Direction of approach:

a) Subject to clause 3 (1 & 2) if swimmers or divers are to enter the sea from a contact vessel to view a whale shark, the contact vessel should wherever possible approach a whale shark from in front or from the side without the vessel forcing the shark to change direction.

6) Number of swimmers or divers:

a) The number of swimmers or divers entering the sea from a contact vessel to view a shark is limited to a maximum of 12 persons in total.

7) Physical contact with whale shark prohibited:

a) A person must not touch or ride on, or attempt to touch or ride on, a whale shark under any circumstance.

8) Proximity of swimmers or divers to the whale shark:

a) A person in the sea must at all times maintain a distance of at least:

- 3 meters (9.84 feet) from the head or body of the whale shark, when approaching a whale shark from any direction; and
- 4 meters (13.1 feet) from the tail of the whale shark, when approaching the tail from any direction.

b) Must not deliberately cross in front of the whale shark's direction of travel or impede its movement.

9) Motorized swimming and other activities prohibited:

A person in the sea must not:

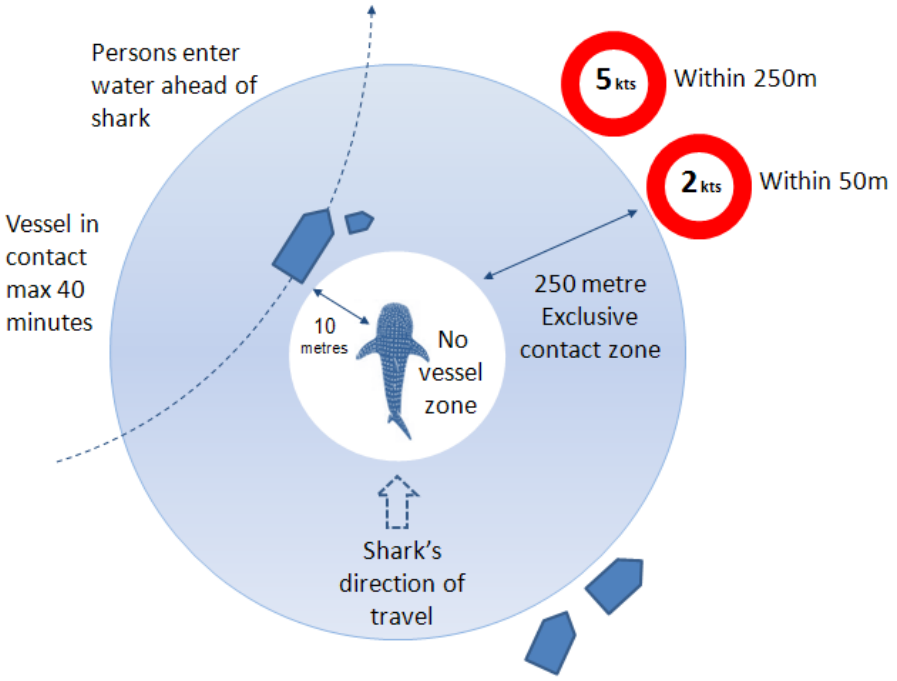
a) Use a motorized or otherwise powered swimming or diving aid in a contact zone.

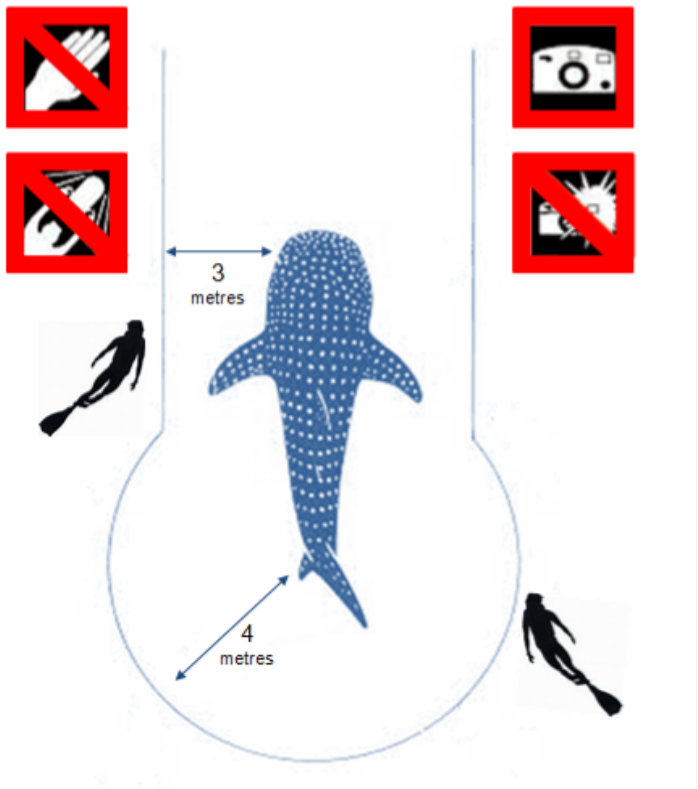
b) Use any device capable of towing or carrying a person that is towed behind a vessel, in a contact zone.

c) Use flash photography.

10) Exceptions when authorized by the authorized Government Agencies:

a) Clauses 5, 7, 8 and 9 do not apply to a person who is undertaking authorized scientific research. Authorized scientific teams should also adhere to their allocated timings provided in the permits and should collect their deployed equipment prior to leaving the MPA.





Appendix IV. List of interviewees

Name interviewee	Position	Date interview
Richard Rees & James Hancock	Director & Operations Manager of MWSRP	27 April 2016
Agnes van Linden	Owner and manager of Carpe Diem liveaboards	28 April 2016
Bernie	Operations manager of Emperor Fleet liveaboards	4 May 2016
Dr. Ameer Abdulla	Director of IUCN Maldives	5 May 2016
Ahmed Shan	EPA Maldives	5 May 2016
Rafil Mohamed	Former board member of Dive Association Maldives	6 May 2016
Alexandra Childs, Irthisham Zareer & Lisa Murphey	In-field staff member of MWSRP	7 May 2016
Romney	CEO of Boutique Beach (Dhigurah)	7 May 2016
Ismail Ahmed	Dive base leader at Boutique Beach (Dhigurah)	7 May 2016
Shamoon Abdullah	Manager and owner of Shamar guesthouse (Maamigili)	9 May 2016
Midhoo	Dive center manager at Diveoceanus Holiday Island	9 May 2016
Sam	Dive instructor at Scubaspa liveaboard	12 May 2016
Hussein	Dive center manager at Vilamendhoo	12 May 2016
Leila	Dive instructor at Vilamendhoo	12 May 2016
Kylie Merritt	Dive instructor at One & Only	13 May 2016
Hamid Haleem	Excursion leader at the LUX Marine Biology Center	13 May 2016
Matthieu Franchi	Dive instructor at Eurodivers LUX*	13 May 2016
Amanda Battle Morera & Marco Steiner	Marine biologist & dive center manager at Vilamendhoo	14 May 2016
Mohamed Zakariya	Dive center manager at Diveoceanus Sun Island	15 May 2016
Hashim & Ali	Excursion leader & manager at the water sport center at Sun Island	15 May 2016
Dr. Mausoom	General manager at Sun Island	15 May 2016
Mark Stevens	Dive center manager at Centara Grand	23 May 2016
Mario Passoni	Former dive instructor at Thudufushi	24 May 2016
Luca Saponari & Gabriele Scarinzi	Marine biologists at Thudufushi	25 May 2016