A short report for the Ministry of Environment, Maldives; EPA and AEC Project

Developing Tourism at Hanifaru Bay Marine Protected Area (MPA)

Executive Summary

Baa Atoll's Hanifaru Bay has gained an international reputation as one of the best places in the world to experience swimming with manta rays (*Manta alfredi*) and whale sharks (*Rhincodon typus*) with both species aggregating at this site during the Southwest Monsoon in order to feed. As well as being a site of great ecological interest, tourism generated as a result of this site provides important revenue for the Maldivian economy. The importance of Hanifaru Bay has been recognised by the Maldivian government with the site designated as a Marine Protected Area (MPA) in June 2009 with legislation in place to govern the manner in which it should be used. Furthermore the site is proposed as a 'Core Zone' when Baa Atoll achieves designation as a UNESCO World Biosphere Reserve in 2011. However, despite its legal status, as yet there has been no onsite government presence to monitor the intensity of site use or to enforce regulations in place.

Snorkelers enjoy watching feeding manta rays at Hanifaru MPA

A mass manta ray feeding event at Hanifaru Bay MPA

This report presents data collected by the Maldivian Manta Ray Project (MMRP), a non-profit and independent conservation and research focused organization, as part of an ongoing study which considers not only the animals observed in the bay, but also tourism occurring at the bay, as well as the interactions between the two. Specifically, results are presented from an extensive five month study of

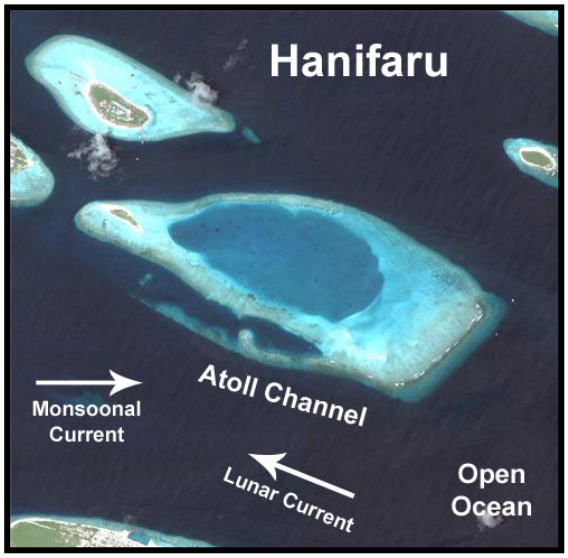
tourism at Hanifaru between July and November 2010. These results were compared with historical data collected between 2007 and 2009 to look at the changes in tourism over time.

Results of this study show worrying trends in growth of tourism at the site. A total of 853 boats and 7,416 tourists were observed over the full study period, representing an 82% increase in the number of boats, and a 158% increase in the average number of tourists per day from 2009. Compliance to legislation governing site capacity was regularly observed to be ignored leading to instances of severe overcrowding both by boats and in the water leading to significant levels of harassment to the animals. Moreover, a number of the regulations in place were found to be ill-suited to the unique nature of the site and, if complied with, might risk the safety of all users of the site, both wildlife and humans.

Trips to Hanifaru in 2010 generated on average over $5,000 per day. However at present this revenue is retained by the operators using the site with nothing reinvested in management of the site or the local communities. Whilst the MPA designation of Hanifaru shows recognition of it importance and provides an excellent foundation for ongoing management, this study emphasises the urgent need for relevant modifications to the current regulations and onsite enforcement to be implemented in order to ensure the sustainable future of the site. It is intended this study will help to inform decisions about the future management of Hanifaru with regard to both the conservation of the site and its ability to continue to generate revenue for the country and local communities in a sustainable way.

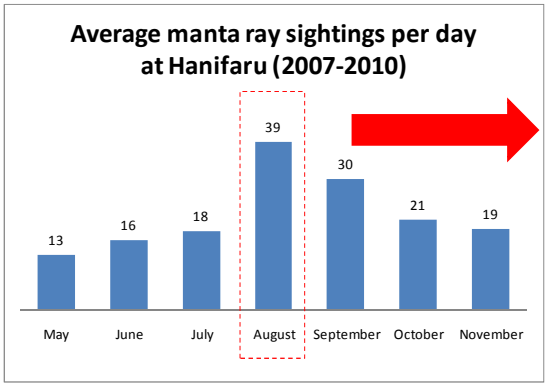
Understanding Hanifaru Bay

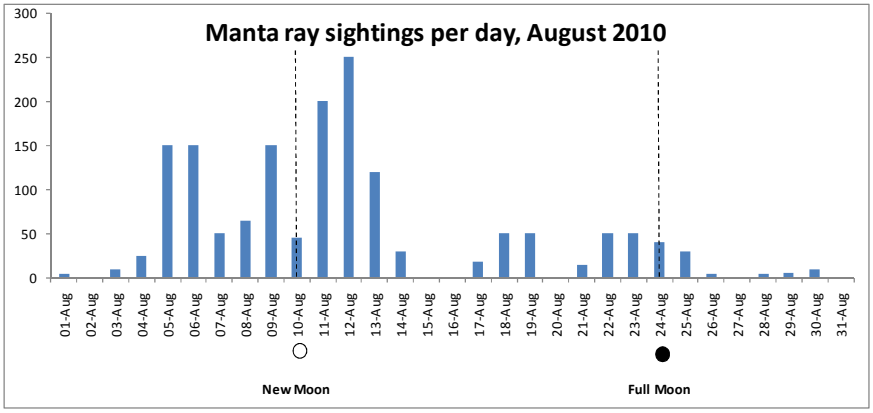
Long-term studies at the site by the MMRP have highlighted the unique nature of the bay and its capacity to attract large numbers of manta rays and numerous whale sharks to feed. Understanding the mechanisms that cause these feeding events are vital to understanding the daily and seasonal changes in abundance of manta rays and whale sharks at Hanifaru and are therefore crucial to managing tourism at the site.



Hanifaru Bay lies at the end of a 1600m long channel. The channel and bay are positioned such that during the Southwest Monsoon a unique phenomenon occurs, with the incoming lunar tide and prevailing monsoonal current opposed to one another. This creates a back-eddy at the channel mouth forcing the plankton rich water brought into the atoll by the tide down into the bay area. Any

water flowing out of the bay is picked up again by the incoming tide and so a cycle begins concentrating plankton into the bay. These concentrations of plankton attract large numbers of manta rays and whale sharks to feed, with over 200 manta rays having been observed in the bay during a single feeding event. Continuing research by the MMRP is helping to refine the prediction of manta and whale shark feeding events. Numerous factors have been observed to have an influence on the scale and duration of feeding events, however, trends are appearing and strong tidal exchanges, such as those experienced during the full and new moon, appear to intensify feeding events. Peak sightings of both manta rays and whale sharks occur in August each year, with the full and new moon of each month. Such predictability needs to be considered in the planning management strategies for Hanifaru since demand from users of the bay will be higher at these times; however, this predictability will allow a number of management strategies to be employed in order to control tourism at Hanifaru.



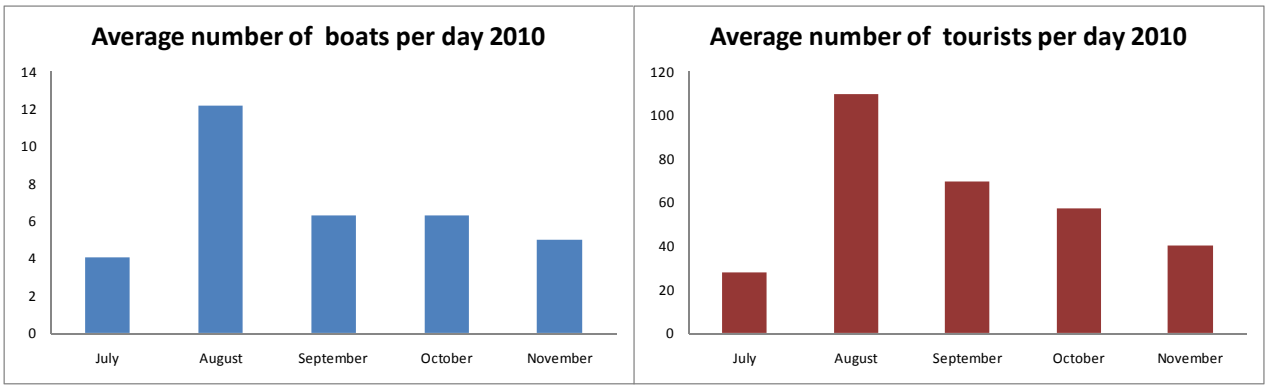


Main Findings

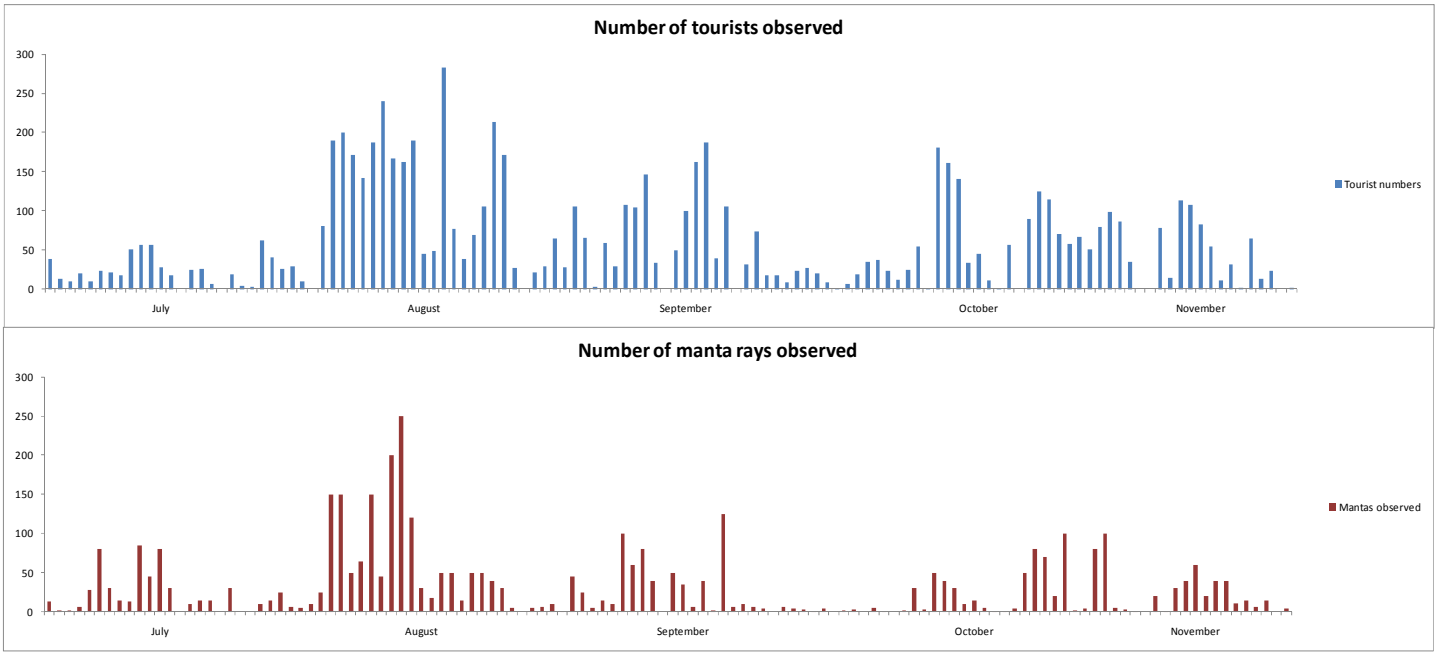
Surveys were carried out between the 1st July 2010 and 30th November 2010 on as many days as possible where conditions allowed. A total of 540 hours were spent surveying Hanifaru over 120 days in this period. Each vessel using the bay was logged and the operator identified; time of arrival and departure were noted alongside the numbers of guests and guides on board and the activities in which they participated. Notes were also taken on the conduct of each vessel and its guests including speed of entry and exit, behaviour of the guests in water and the manner in which the boat used the bay. Guests were monitored in the water and interactions between manta rays or whale sharks and tourists were noted along with the reactions of the animals to such behaviour. These observations were compared to legislation in place for management of the bay (Unless otherwise stated all figures relate to the full survey period).

Site Use- Overview:

- During the 5 months of surveys 853 boats were seen to be using the bay (including the vessel carrying out the research).
- A further 384 boats were seen cruising the bay to check for the presence of manta rays & whale sharks.
- In total 7,416 tourists were observed using the bay.
- August was the busiest month surveyed with 328 boats (38% of all boats recorded) and 2,962 tourists (40% of all tourists recorded) using the site in this month, with an average of 12.1 boats and 109.7 tourists using the site each day.



- The maximum number of boats observed using the site in a single day was 29, on the 18th August 2010; this day also saw the maximum number of people, 335, observed in a single day.
- Site use strongly reflected the abundance of manta rays and/or whale sharks at the site, days with higher sightings of wildlife resulting in days where greater numbers of tourists and boats were seen.



Site Use- Current Government Legislation:

Legislation in place for the management of Hanifaru denotes that a maximum of 5 vessels can use the bay at any one time with a maximum of 80 tourists.

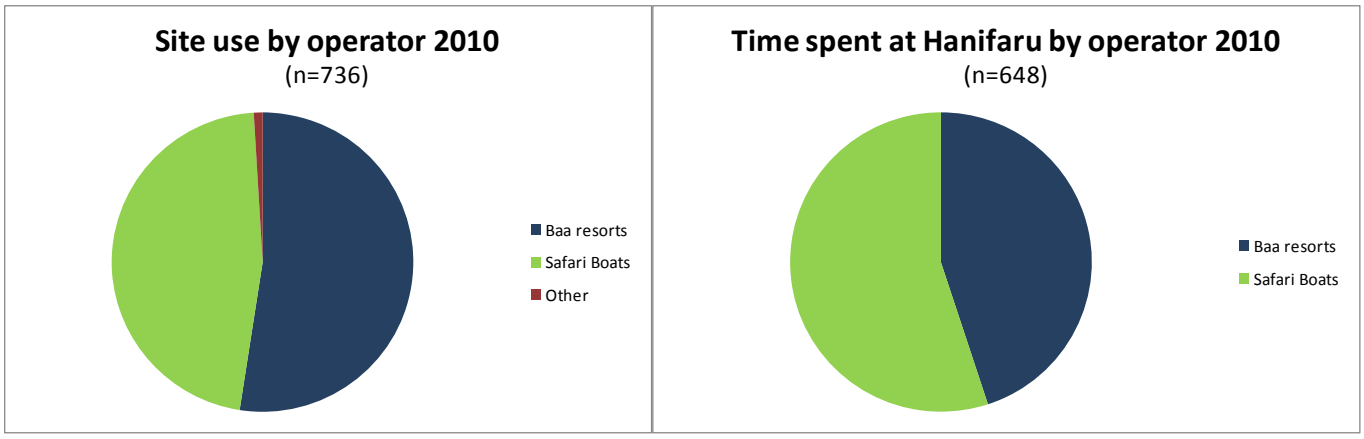
At times as many as 12 vessels, twice the regulated allowance, were recorded inside the bay at Hanifaru during the 2010 manta season (June-Dec). Oversized vessels were also recorded inside the bay area.

- Regulations regarding number of boats using the site were observed to be broken on 36 of the 121 survey days.
- Of these 36 days 17 occurred in August with the period of time spent over capacity lasting, on average, longer than 3 hours. On the 10th August the site was observed to be over the legal capacity for 6 hours and 45 minutes.
- The maximum number of boats observed using the bay at any one time was 12.
- Regulations regarding numbers of people using the site were broken on 21 occasions during the 121 survey days with 12 of these occurring in August.
- The maximum number of people observed using Hanifaru simultaneously was 187.
- On days where these regulations were breached issues arose with safety and such issues as boats colliding on anchor, manoeuvres too close to animals and people and overcrowding of animals were all observed.
- In addition to safety implications a number of studies[1,2,3] have shown that over-crowding decreases visitor satisfaction, such effects are likely to also occur at Hanifaru.

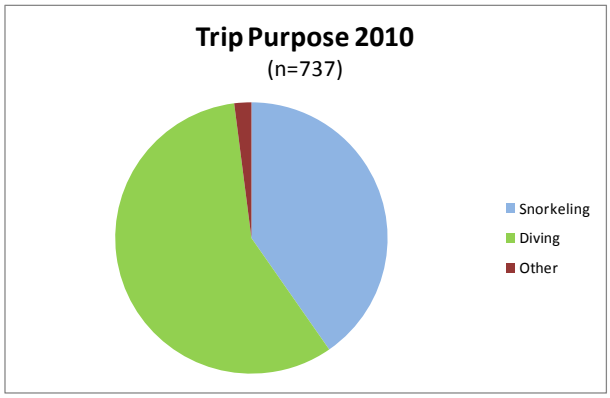
Site Use- Operators and Activities: (All figures quoted exclude the research vessel)

- All of the resorts in Baa Atoll were observed using the site during the survey period.
- 52.5% of the boats observed using the site belonged to the resorts in Baa Atoll.

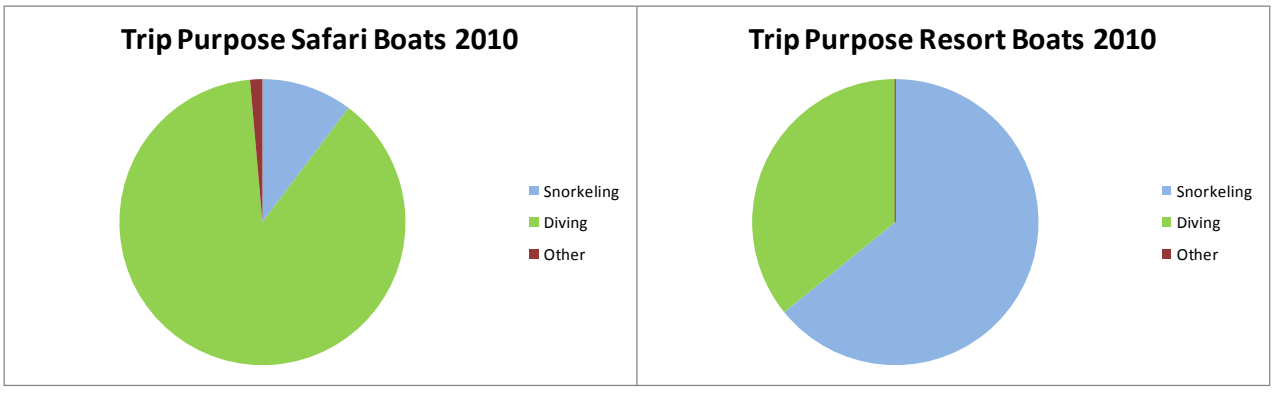
- 46.6% of the boats observed using the site were safari boats from outside Baa Atoll.
- Safari boats were observed to spend significantly longer in Hanifaru Bay than resort boats (1 hour 45 minutes compared to 1 hour 3 minutes on average) and therefore accounted for a much greater proportion of time spent at the site.



- A total of 53 different safari boats were observed using the site, this represents a 308% increase on 2009 where only 13 different safari boats were observed using the site.
- Diving was more common than snorkelling, accounting for 57.7% of boats using the site and 60.8% of all tourists visiting the site.

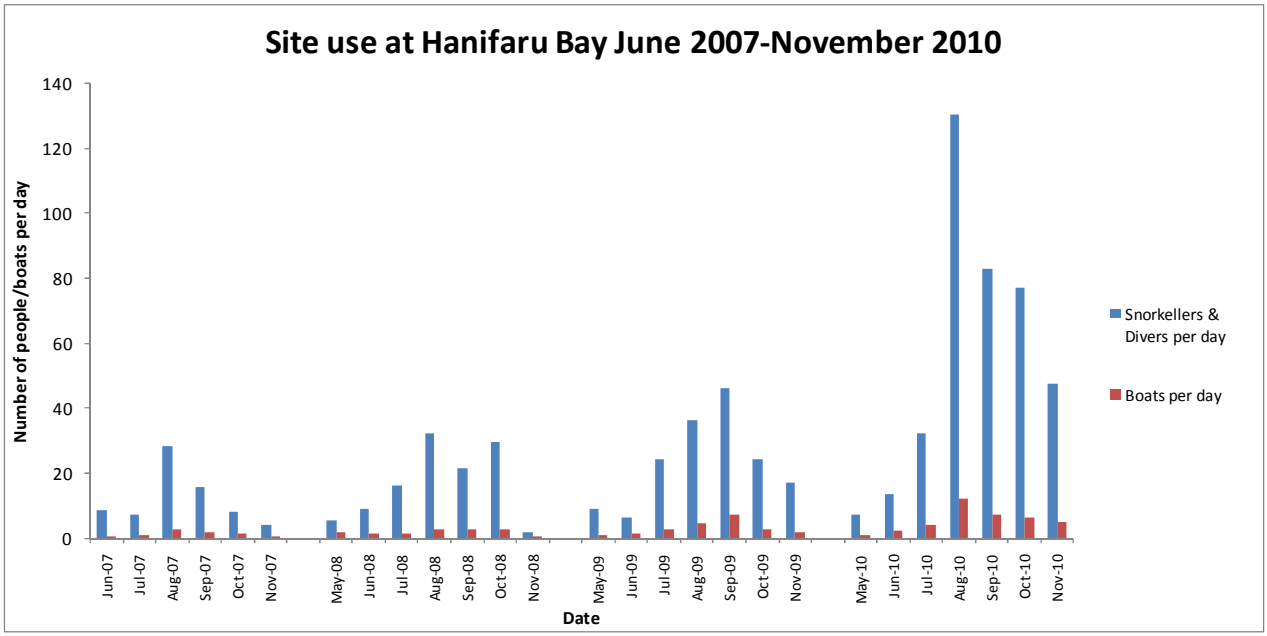


- As well as differing in the amount of time spent at the site there were obvious differences in the way resort boats and safari boats used the site; with resort boats conducting mainly snorkelling trips to the bay whilst safari boats mostly dived.



Site Use- Changes Over Time:

- With increasing publicity and awareness, site use at Hanifaru has increased dramatically over the last 4 years with substantial increases seen in 2010.
- Between the 2009 and 2010 seasons the average number of boats using the site daily increased 82%, with the number of tourists using the site per day increasing 158%.
- August saw the greatest growth with an 165% increase in boats and a 260% increase in tourists per day.
- **Such growth and increase in demand is not sustainable at Hanifaru without onsite management by the government.**



Boat Conduct:

Legislation in place for the management of Hanifaru denotes vessel speeds should be less than 10 nautical miles.

- Given the numbers of people and animals using Hanifaru the MMRP believes this legislation to be unsuitable, even at this speed there is a high level of risk of boats colliding with people or animals.

Legislation in place for the management of Hanifaru denotes vessels should come no closer than 10m to megafauna.

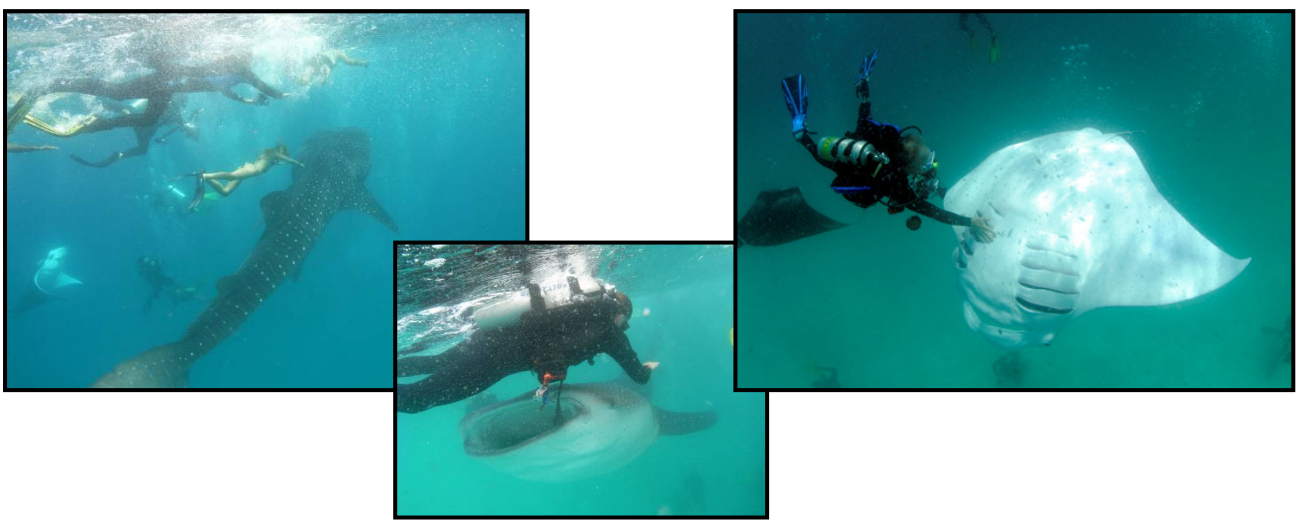
- In July and August 8.2% of boats were observed to be in breach of this regulation, either waiting over the bay or dropping of tourists or picking them up. Boats were also observed following animals to show guests from the surface or to allow guests to jump into their paths.
- Several near misses were observed between boats and tourists in the water in August alone:
    - Boats drifted over snorkelers while dropping off guests on 7 occasions.
    - Free divers and divers had boats driven directly overhead on 7 occasions.
    - On 4 occasions unanchored boats drifted into stationary boats while collecting guests causing guests to be crushed between 2 boats.
    - On 2 occasions boats collided when the bay was over capacity.

Legislation in place for the management of Hanifaru denotes that boats should not anchor in the MPA.

- This legislation presents issues at Hanifaru; the small size of the bay, almost constant current bringing in plankton and high levels of site use means that if boats do no anchor at the site they will be constantly manoeuvring over the bay, animals and tourists.
- The MMRP suggest there is sufficient space for 5 tourist boats to anchor on the sand bank at the eastern side of the bay.
- During this study it was observed that as numbers of boats exceeded regulations anchoring became more difficult with some boats not anchoring and therefore posing a danger to bay users, occasionally also resulting in collisions between vessels.

Tourist Conduct:

Legislation and guidelines in place for the management of Hanifaru denotes that no person entering the water is allowed to disturb or tamper with manta rays or whale sharks and that divers and snorkelers should keep a recommended 3-4m distance away from the whale sharks.



- A number of instances of disturbance to the animals were recorded during this study; touching, chasing and accidental collisions, which often resulted in the animals flinching, swimming away or stopping feeding.
- On many occasions during the study manta rays were observed to stop feeding as a reaction to exhaust bubbles from diver's regulators; a worrying issue in the face of increasing diving at the site.
- A number of major instances of disturbance were also observed. With the behaviour of tourists dramatically deteriorating during times when the bay was overcrowded, often with the worst behaviour occurring when whale sharks were present.
- Touching, obstructing the movement of, and over-crowding animals were all observed.
- People were also observed chasing and holding onto, or riding the animals.
- A number of studies looking at reactions of animals to human behaviour suggest short term measures of avoidance taken by the animals could have implications for long term survival. [4,5,6]
- Longer term studies are needed to confirm if these behaviours are having a lasting effect on feeding behaviour and site fidelity of the manta rays and whale sharks at Hanifaru.

Finance and Revenue:

- A scientific paper published in 2010 showed that manta ray tourism in the Maldives was worth $8.1million each year from direct revenue sources.[7]
- Following the methodologies employed in this above mentioned study the revenue generated at Hanifaru in 2010 were calculated based on the numbers of visitors observed during the five months.

Month	Total revenue generated (US$)	Average revenue per day (US$)
July	47,177	1,887
August	243, 262	9,010
September	128,245	5,829
October	133,385	4,764
November	51,215	2,845
Totals	**603,284**	**5,027**

The total figures presented here are a conservative estimate of the true value of Hanifaru since not all days were surveyed each month. In addition they do not account for boats which only cruised the bay and did not use the bay when megafauna' numbers were lower.

- At present all of the revenue generated by the site is retained by operators.
- The large number of tourists using Hanifaru Bay represents an unexploited funding resource for its ongoing management.
- A 2009 study of willingness to pay in MPA's that attracted divers and snorkelers suggests an overwhelming approval to pay for entry to such sites.[8]
- A willingness to pay survey conducted in Baa Atoll found that 85% of overseas visitors are willing to pay US$35 per visit towards marine and coastal conservation.[9]
- At other similar sites around the world a proportion of the fee to use the site is dedicated directly towards the ongoing conservation and management there.[10]

Conclusions and Recommendations

Despite designation as a MPA with legislation in place to govern site use, at present Hanifaru is little more than a paper park. Regulations have been poorly communicated to users, and potential users, of the site and the site lacks any official government presence. Therefore there is no enforcement or penalties to ensure compliance. Certain aspects of the regulations currently in place do not take into account the unique nature of the site; especially those regulations pertaining to boat conduct, speed and anchoring at the site, which if obeyed to the letter of the law would actually make the bay more dangerous for both people and megafauna.

The following measures should be considered in the ongoing management of the bay:

- **Permit System:** Using the existing knowledge on the known variations in manta ray and whale shark abundance at the site over tides and seasons, a permitting system is recommended with operators purchasing a time slot in which they can use the bay. Premium prices could be charged for slots where expected abundance is greater. In other countries limited entrance is used as a management tool[1,10], this too could be considered for Hanifaru.
- **Warden's Patrol Vessel:** A patrol vessel is needed to police the MPA and ensure an official government presence at the site to enforce the regulations.

- **Entrance Fee:** Hanifaru Bay experiences sufficient demand and generates sufficient revenue for a part of this revenue to be used for the management of the bay. Self funding opportunities need urgent consideration.
- **Certification Scheme:** A compulsory certification system needs to be implemented for boat captains and guides using Hanifaru. One certified guide should accompany every 10 paying guest.
- **Tourist Education Programmes:** All tourists must be briefed before entering the water, studies have demonstrated tourist behaviours can be positively modified with effective briefings.[11]
- **Fines & Penalties:** Defined and appropriate penalties need to be set and enforced for those who deliberately disobey regulations in place to protect Hanifaru. These fines should be implemented for boat owners, guides and tourists.
- **Improved Legislation:**
    - Legislation should be changed to require boats to anchor in the sandy shallow area of the bay when using the site to limit boats manoeuvring over the bay's main feeding area.
    - The speed limit of boats should be reduced to 5 nautical miles.
    - Vessels longer than 15 meters should be prohibited.
    - **Ban Diving:** Strong consideration should be given to limiting the site use to snorkelers only; this will speed up the turnover of tourists through the bay and improve safety and management of the tourists. It will also allow an important refuge for the manta rays and whale sharks who can dive deeper if they want to move away from tourists. At other key locations around the world diving is banned with these animals. Hanifaru Bay is primarily a feeding site for manta rays and whale sharks which mostly feed close to the water's surface. There is therefore no need to dive this site in order to enjoy close encounters with these animals. The vast majority of tourists can snorkel, while only a limited number of tourists can dive.
    - Research at this site needs to be continued both to further the understanding of these species and to ensure that tourism is not having any lasting negative effects on the manta rays and whale sharks over time.
    - All fishing, including traditional bait fishing, should be banned within the MPA boundaries; this includes the outer reef edges as well as inside the Bay area.

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