

Tourism, Reef Condition and Visitor Satisfaction in Watamu Marine National Park, Kenya

Benjamin Cowburn¹, Robert Sluka², Joy Smith¹ and Mohamed Omar Said Mohamed³

¹A Rocha Kenya, PO Box 25924, Nairobi, 00100, Kenya; ²A Rocha International, 3 Hooper Street, Cambridge, CB1 2NZ, UK; ³Conservation Programmes, Wildlife Conservation Division, Kenya Wildlife Service, PO Box 40241- 00100, Nairobi, Kenya.

Keywords: coral reefs, tourism, conservation, reef condition

Abstract—Reef-based tourism is known to put environmental pressure on reefs but its consequences on the ecological and economic sustainability of Marine Protected Areas is unknown. Previous research suggests that, if reef conditions decline, then tourism on a reef will also suffer, but is this always the case? This study investigated the interaction between tourism impact, reef condition and visitor satisfaction in Watamu Marine National Park, Kenya. A wide range of data were collected, including benthic ecological variables, visitor counts, visitor behaviour while visiting Watamu's main reef and questionnaire responses regarding visitor satisfaction. It was found that the reef visited by tourists manifested observable damage and differences in ecological character, which potentially compromise its ecological sustainability. Despite these observations, most tourists did not notice the changes or were happy with their experience and hence the economic sustainability of the park appears secure. However, the future trajectory of reef condition and tourism on the reef is complex and difficult to predict, which could lead to a trade-off between conservation and income-generating goals. A potential solution is presented whereby a synergy between both goals is maintained.

INTRODUCTION

Tourism is a key source of income in Watamu Marine National Park (WMNP), Kenya, as in many Marine Protected Areas (MPAs) around the world (Davis & Tisdell, 1995). Tourism in protected areas is encouraged because of the perceived synergy between wildlife

conservation and income generation, whereby a park and its wildlife draw tourists who help to cover the costs of maintaining and managing the park through entrance fees, as well as economic gain to local communities (Dixon *et al.*, 1993). Indeed, the income

from tourism in WMNP is by far the largest economic gain from the local ecosystem, as recreational activities generate an income two orders of magnitude greater than that gained from fishing in nearby waters (Alati, 2011).

However, the very people paying to enjoy a park may cause damage to its habitat, particularly in parks which incorporate coral reefs. Tourist-induced damage to this fragile ecosystem has been noted in popular tropical MPAs around the world (e.g. Hawkins & Roberts, 1992; Muthiga & McClanahan, 1997; Medio *et al.*, 1997; Schleyer & Tomalin, 2000). Damage may originate from several sources (Hawkins & Roberts, 1992; Hemery & McClanahan, 2005) including the re-suspension of sediment through finning, the collection of organisms and benthic components, fish feeding, and interference with benthic communities by scraping, trampling or holding. These behaviours most commonly result in damage to the corals (Kay & Liddle, 1989) and alter the community composition on the impacted reefs (Allison, 1996).

There is thus a trade-off between tourism and conservation (Dixon *et al.* 1993), and possibly negative feedback whereby damage to a reef reduces its aesthetic appeal (e.g. Schuhmann *et al.*, 2013) which threatens the economic sustainability of its reef-based tourism. The damage may also reduce a reef's conservation value, so it is crucial to elucidate the consequences of these two parameters to maintain an ecologically and economically sustainable park.

Several studies have examined various aspects of reef tourism in MPAs but very few have linked ecological factors and tourist satisfaction (see Barker & Roberts, 2004, Medio *et al.*, 1997). There is also unbalanced attention on certain issues; for example, many papers have focused solely on tourist-induced ecological damage to reefs (e.g. Hawkins & Roberts, 1993), but far fewer on how this damage influences diver satisfaction and willingness to pay (e.g. Dixon *et al.*, 1993). Despite the importance of tourism to WMNP, its effects have never been assessed. The aim of this study was to quantify the impact of visitors on its main coral reef and how this affects the ecological and economic sustainability of the park.

MATERIALS and METHODS

The study sites

This study was conducted in WMNP from September 2011 until March 2012. Surveys were carried out on the main visited patch reef, Coral Gardens, and ecologically similar areas of reef immediately to the north and south. All patch reefs were dominated by large (2-4m) *Porites* heads, growing in a shallow (4m deep) lagoonal environment. Coral Gardens will be referred to as the 'snorkelled site' and the other areas as the 'un-snorkelled sites'. The latter are visited by tourists but at a much lower frequency than Coral Gardens, considered negligible.

The impact of tourists was assessed from tourist numbers from Kenya Wildlife Service (KWS) records of daily tickets sold from October 2011 to March 2012 and observations on tourist activities at Coral Gardens during peak visitor periods. An observer on KWS patrol boats recorded tourist boat arrival and departure times, the number of tourists on each boat and the number that entered the water. The time spent in the water was recorded for randomly chosen tourists. Some were followed in the water at Coral Gardens for ten minutes without their knowledge to assess their behaviour while snorkelling. The number of times they were observed finning and re-suspending sediment, finning and scraping or trampling the reef, holding onto corals or the reef, and removing organisms and benthic material were recorded.

Ecological assessment

Benthic cover

The benthic community was characterised using 38 line intercept transects, each 10 m long, placed parallel to one another along the reef at 5 m intervals. The following categories were recorded along each transect: hard coral, soft coral, fleshy algae, turf algae, coralline algae, sand and rubble. The length of each patch/colony of the different benthic types was measured to determine their percentage cover.

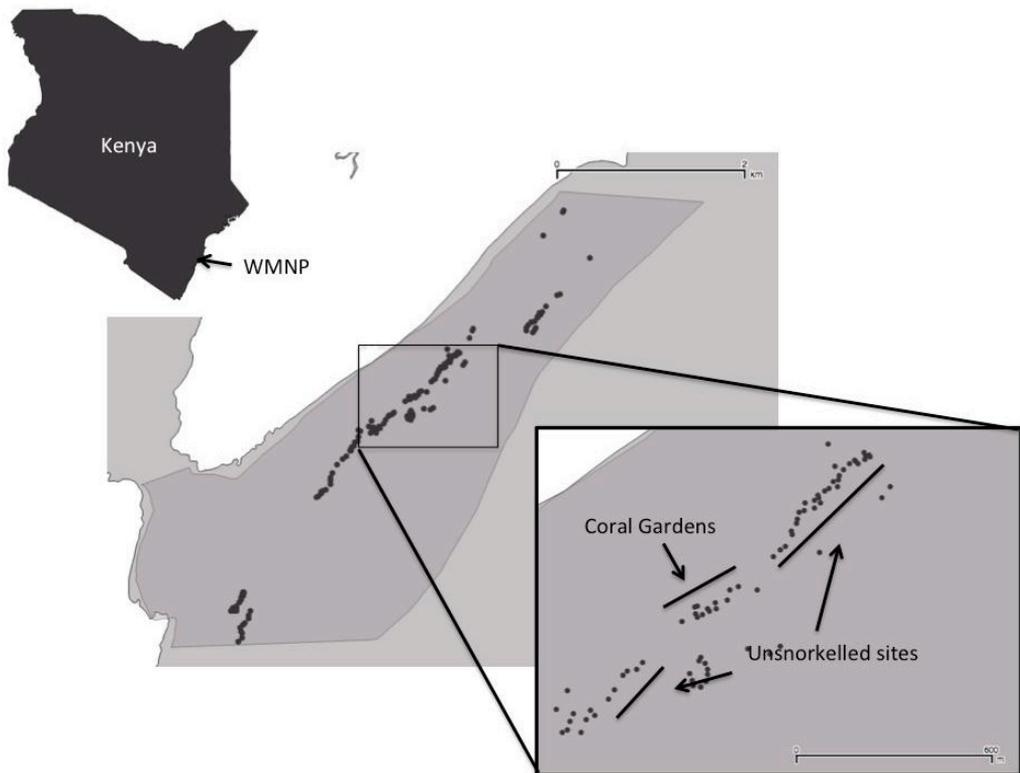


Figure 1. Map of Watamu Marine National Park (WMNP) on the Kenyan Coast with the patch reefs within the park boundaries. The inset shows the study sites.

Coral damage

A total of 24 belt transects, 20 x 1 m (20 m²) were laid across the reef at 5 m intervals and all hard coral colonies were recorded. The genus of the coral and whether or not it was broken was noted.

Tourist Satisfaction

Questionnaire interviews were conducted with visitors in the WMNP on tourist boats en route to Coral Gardens and on the way back. Questions sought to understand a range of information relevant to reef-based tourism including visitor awareness of conservation issues, previous snorkelling experience and satisfaction with the reef and the excursion. The interviews were conducted in English and Italian.

Questions en route included “How did you find out about the snorkelling trip?” and “How do you rate yourself as a snorkeller?”

Specific questions relating to their experience were asked on the return journey; e.g. “Did you notice any human impacts on the reef.” Open questions like “What human impacts do you know which can damage coral reefs?” were asked without any suggestions and assigned to categories post-hoc. Questions were designed to be indirect, non-leading and non-confrontational in order to get honest responses.

A simple regression analysis was conducted on responses to test whether there was a relationship between a visitor’s prior experience of coral reefs and their satisfaction of Coral Gardens. Questions relating to experience included the number of coral reefs in other countries they had visited, how they would rate themselves as a snorkeller, and how many conservation threats to coral reefs they could name. These

factors were condensed into an 'experience score' by scoring responses for each question numerically and then summing the results. The questions relating to tourist satisfaction were descriptive words mentioned about the reef, whether they felt the excursion was worth the cost and whether they thought WMNP's reefs were better than other reefs they had seen. These questions were then condensed into a 'satisfaction score'. For example, each positive word mentioned when describing the reef was awarded 1 point and each negative word -1, hence three positive words increased their satisfaction score by 3 (see appendix for full scoring method). While these scores were somewhat arbitrary, careful consideration was given to the weighting and nature of responses contributing to a score and these scores can provide a tentative idea of any visitor's overall previous experience and excursion satisfaction.

RESULTS

Impact of tourists

Data on ticket sales showed that visitor numbers to WMNP fluctuate markedly throughout the year, with the highest visitation by 5733 tourists in January of 2012 and the lowest in May 2012 at just 31 visitors. The average number of park entrance tickets sold daily was 153.95 (SE±15.66) during the high season. Approximately 35 of these were sold daily to SCUBA divers (Aqua Ventures pers. comm.) who did not visit Coral Gardens. Thus, there were approximately 118.95 (SE±15.66) visitors daily to Coral Gardens. Kenya Wildlife Service (KWS) keep daily records for boats visiting the park, which showed that the average daily number of boats was 11.02 (SE±2.11).

A total of 58 boats were observed on 12 days at Coral Gardens during which a total of 93 people were timed getting in and out



Figure 2. Tourist trampling on coral head in Coral Gardens.

of the water. The average time in the water was 19.1 minutes ($SE \pm 1.18$), the maximum being 66 minutes. Counts of people in boats at Coral Gardens yielded an average of 13.4 ($SE \pm 1.2$) people per boat, but there was a large amount of variation with some boats having over 30 visitors, while others had just one or two tourists on board. Interestingly, it was observed that not everyone visiting the reef got in the water; 36% of tourists remained on the boat, inferring that on any day an estimated 76 people swam at Coral Gardens.

A total of 47 people were followed in the water to record their behaviour. As some people left the water before 10 minutes elapsed, a total 396 minutes were recorded, yielding 64 records of tourist contact with the reef. The most common contact was trampling, which was observed 21 (32%) times (Fig.2). Over half of the observed contacts (59%) were intentional.

Ecological assessment

The transects conducted to establish benthic cover and coral damage revealed that there were higher levels of broken coral at the snorkelled site compared to the un-snorkelled sites (Fig. 3). The proportion of damaged relative to total coral colony abundance was 0.15 or 15% ($SE \pm 0.3$) at Coral Gardens and just 0.03 or 3% ($SE \pm 0.1$) elsewhere, a difference that was statistically significant ($p < 0.001$)

Coral cover ('hard coral') was higher at the un-snorkelled sites (33.3%, $SE \pm 3.59$), while Coral Gardens had the lowest cover (14.5%, $SE \pm 2.93$) (one-way ANOVA $p = 0.005$). *Acropora*, the most common branching coral, was less abundant at Coral Gardens. *Acropora* at un-snorkelled sites covered, on average, 2.38% ($SE \pm 5.02$) of

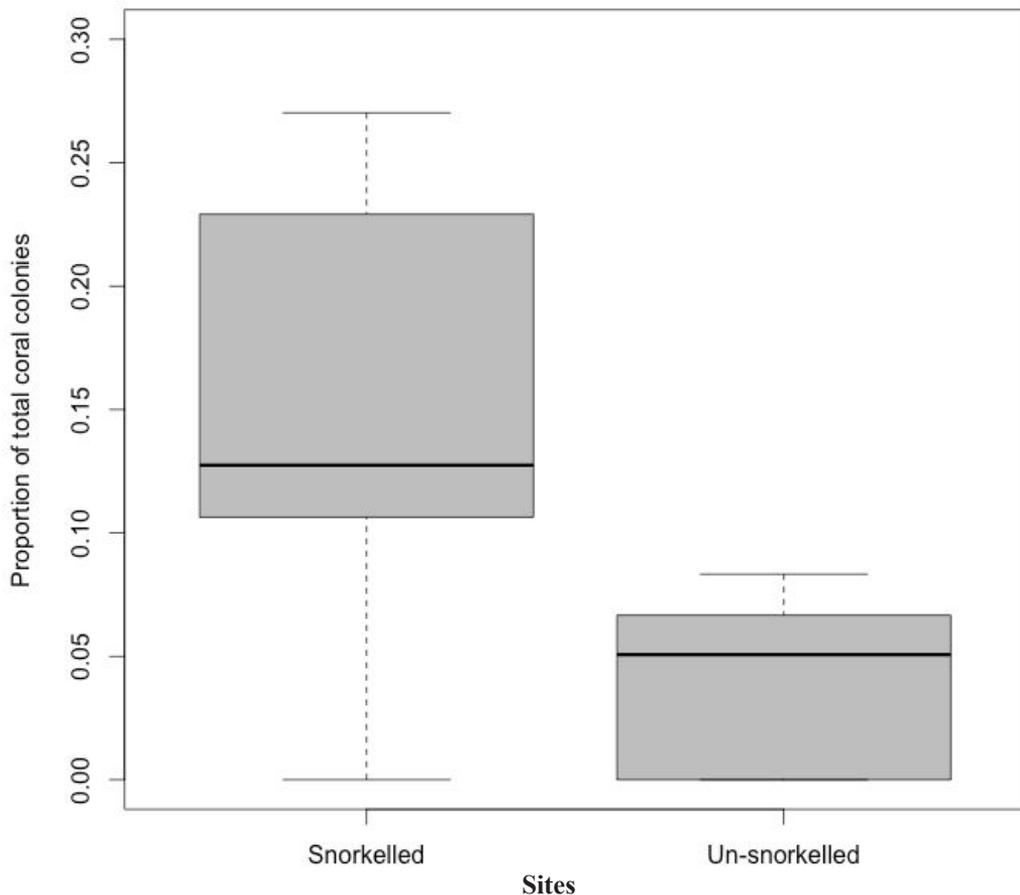


Figure 3. Boxplots of broken coral as a proportion of total coral cover at snorkelled and un-snorkelled sites.

the benthic surface compared to just 1.11% (SE±6.92) at the snorkelled site; however, this difference was not significant (one-way ANOVA $p=0.233$).

Tourist satisfaction

A total of 50 questionnaire interviews were conducted on 11 boats visiting Coral Gardens, interviewing tourists of six nationalities (American, English, French, German, Kenyan and Italian). When asked to describe the reef using descriptive words, 82% of the words given were positive, the most common being ‘beautiful’, ‘colourful’, and ‘diverse’. The most common negative description was ‘not colourful’ (18%). Other negative words included ‘degraded’, ‘patchy’ and ‘dissappointing’. Five people used only negative words, nine gave both positive and negative feedback, while the majority of people (30) used only positive words to describe the

reef. Despite the positive responses, a high proportion (41%) also said that they had seen better reefs elsewhere or that Coral Gardens did not meet their expectations. Figure 4 shows the responses of people to the question, “Did the reef meet your expectations?”

In general visitors did not notice human impacts on the reef as 31 divers responded that they saw no human influence. Of the 14 who did notice human impacts, five mentioned fish feeding and four mentioned litter, only one mentioning reef degradation. Interestingly, none of the visitors mentioned they had seen broken or damaged coral.

Visitors were also asked about their perceptions of and satisfaction with the excursion in terms of willingness to pay. Some 37 interviewees (80%) thought the excursion was worth the money they paid while eight (17%) said it was not. When reminded that the park entrance had cost \$15, half of the

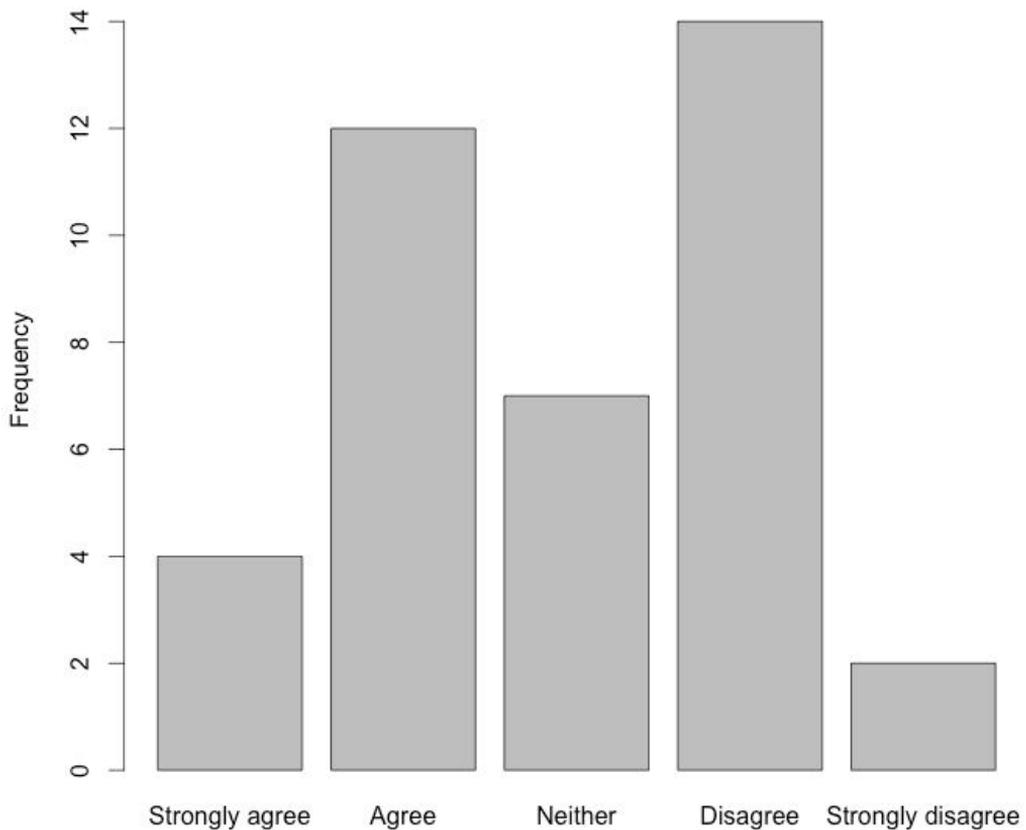


Figure 4. Responses of interviewees to the question: “Did the reef meet your expectations?”

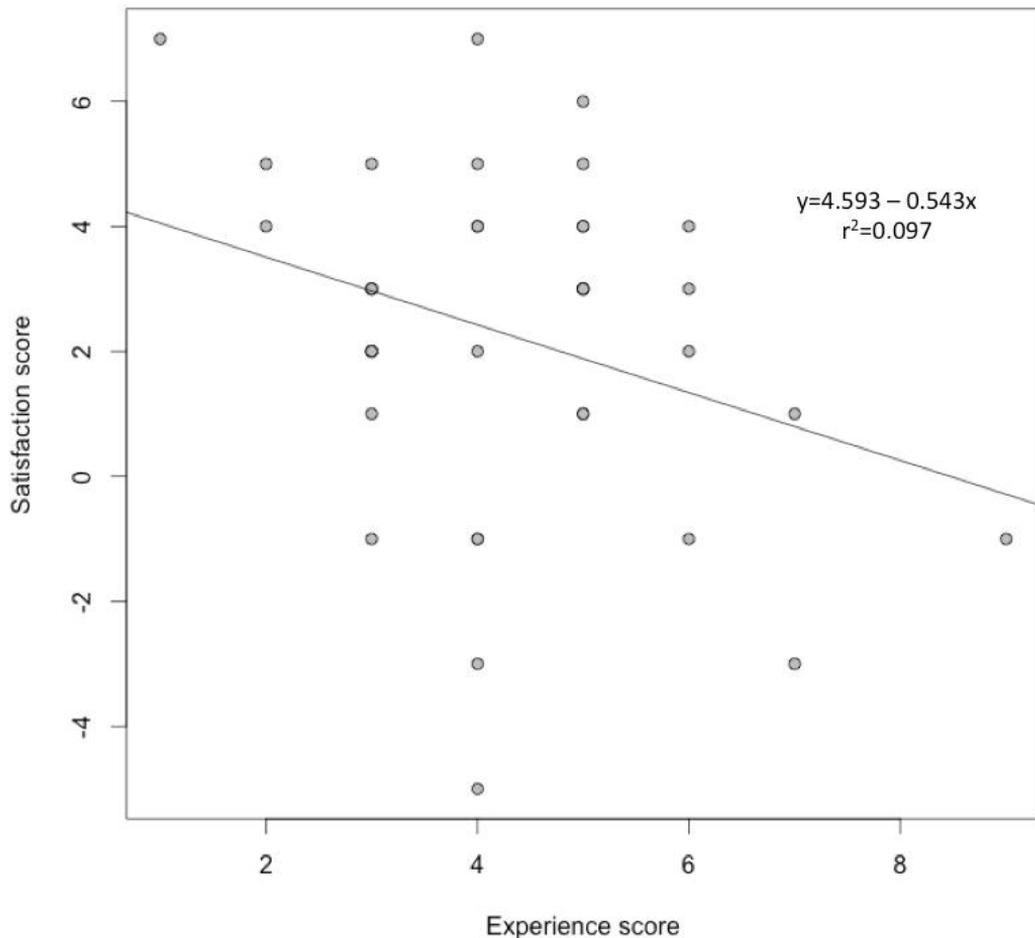


Figure 5. Regression of experience and satisfaction score.

respondents thought this was a reasonable price and twelve (30%) suggested the entry fee could be higher. Only eight (23%) thought the entrance fee should be reduced.

The regression analysis of satisfaction versus experience yielded a near significant ($p=0.053$), negative relationship (Fig. 5). This implies that more experienced tourists failed to enjoy Watamu Marine National Park as much as those with less coral diving experience.

DISCUSSION

Impact of tourists

Tourism to WMNP fluctuates throughout the year, with a peak during more pleasant weather

with low rainfall and wind speeds which occur in January. The number of tourists has also fluctuated in recent years, in accordance with the socio-economic and political conditions of the time. For example, over 35,000 tickets were sold between September 2011 and August 2012, but this figure diminished to 20,000 a year from 2008-2010 (Alati 2011), probably in response to political and civil unrest following the 2008 elections and the global economic recession which depressed tourism. This study is concerned with snorkel tourism, whereas most other published studies only investigated SCUBA divers e.g. 6,000-17,000 divers p.a. to Grand Cayman (Tratalos & Austin, 2001), 20,000 divers p.a. in Sharm el Sheik, Egypt (Medio *et al.*, 1997), 10,000-26,000 divers

p.a. in St Lucia (Barker & Roberts, 2004) and >100,000 p.a. at Sodwana Bay in South Africa (Schleyer & Tomalin, 2000). One study recorded the number of snorkellers for a site on the Great Barrier Reef, where just 15 snorkellers visited the area per week (Plathong *et al.*, 2000). WMNP therefore receives an average or above average number of visitors when compared to studies of SCUBA diving tourism, but it is not clear how this relates to snorkel tourism for which the only other study reports much lower number of visitors (Plathong *et al.*, 2000).

The average number of reef contacts by tourists in Coral Gardens was 0.191 contacts per person per minute, which equates to 3.65 contacts per person per trip. When multiplied by the estimated 76 snorkellers per day, this yields a daily total of 277 contacts on the reef during the high season. People were most commonly observed standing on the reef to adjust snorkelling gear and sometimes simply to talk to friends. During one extreme low tide, tourists were observed lying on the top of coral heads sunbathing in shallow water, which exemplifies the intentional nature of much of the contact with the reef. Medio *et al.* (1997) observed a similar level of contact at Sharm el Sheik at 0.2 min⁻¹, but Barker and Roberts (2004) observed a lower level of 0.09 min⁻¹ in St Lucia. Both of these levels were recorded in situations where no briefing or instruction was given to tourists, which is similar to what occurs in WMNP. However, these studies involved SCUBA diving and the reef contact rates may be different from that caused by snorkellers. Barker and Roberts (2004) estimated that only 4.1% of SCUBA contacts result in serious damage such as breakage. While this rate is highly dependent on the benthic composition, i.e. branching corals are more vulnerable to breakage (Kay & Liddle, 1989), it would project to 11 cases of damage a day at Watamu. However, only one tourist contact with the reef was observed to result in breakage during this study when someone snapped off a piece of coral to show friends. If other breakages occurred, they went unnoticed.

Ecological assessment

Damage was significantly higher in Coral Gardens, 15% of all corals manifesting damage and 23% of the branching corals, compared to just 3% and 2%, respectively, on un-snorkelled reefs immediately adjacent to Coral Gardens. These levels of breakage are higher than reported in Maldives where 5.3% of the colonies were broken and 11% of the branching corals (Allison, 1996). Less tourist damage was found at a diving site in the Red Sea where 9.1% of the corals were broken (Hawkins & Roberts, 1993). A study on the Great Barrier Reef in Australia reported 35-70% breakage, but this figure seems high, probably due to a difference in classification of 'damage' or the nature of the sampling area as it concentrated on a snorkel trail where visitors follow a predetermined route (Plathong *et al.*, 2000). Ideally, a standardized method of measuring coral damage should be developed and applied to studies worldwide for the accurate comparison of results.

The benthic cover at Coral Gardens was different from the un-snorkelled areas, having lower coral cover and more turf and coralline algae. The incidence of branching *Acropora* colonies was lower, but this was not statistically significant. Lower coral cover and lower branching coral abundance was also noted in the surveys by Allison (1996), Kay and Liddle (1989), Hawkins and Roberts (1993), Tratalos and Austin (2001) and Juhasz *et al.* (2010). However, Hawkins and Roberts (1992), Muthiga and McClanahan (1997) and Plathong *et al.* (2000) encountered no differences in reef community structure in their studies.

Tourist satisfaction

Satisfaction with the reef was negatively correlated with diver experience, inferring that more experienced divers noticed degradation of the reef or found their boat and dive operators unsatisfactory. Studies by Dixon *et al.* (1993) and Lucrezi *et al.* (2013) yielded similar results, with more experienced divers noticing damage to the reefs as opposed to less experienced divers, who hence enjoyed

their dive experience more. Despite this trend, positive feedback concerning Coral Gardens and the excursion far outweighed negative comments, with about 80% or more of all responses being positive. Another interesting observation was that 41% of the visitors said that they had seen better reefs elsewhere, even though most feedback about Coral Gardens was positive. This suggests that the quality of a reef is not necessarily the only, or even the main driver, of visitor satisfaction.

Williams and Polunin (2000) investigated factors which caused people to enjoy reefs and found that most visitors appreciated seeing fish rather than coral cover and diversity. Schuhmann *et al.* (2013) found that high coral cover, large fish and low numbers of divers were important in this regard, but they also commented that the majority of the divers interviewed were experienced and educated, which greatly affected their experience. Davis and Tisdell (1995) noted that, although wilderness, beauty and diversity

were important drivers for people to go on an excursion, ease of access to a reef was more important. Coral Gardens is located less than 2 km from several large package holiday hotel complexes and fish feeding ensures there are always active shoals of fish when visitors are present. Most tourists on boat trips in the area generally stay in these hotel complexes and it is unlikely that reef-based tourism is a major driver to visit Watamu. Many boat excursions in Watamu also go dolphin watching and to a sandy island for a picnic, and several visitors said that these activities were the best part of their excursion. In addition, it was evident from tourist observations that some people were not interested in snorkelling and only spent a short time in the water, often swimming without a mask or snorkel. Some people just wanted to sunbathe, which is advantageous to conservation if they pay park entrance fees and sunbathe on the boat, but not if they sunbathe on coral heads as occasionally observed during low tides.

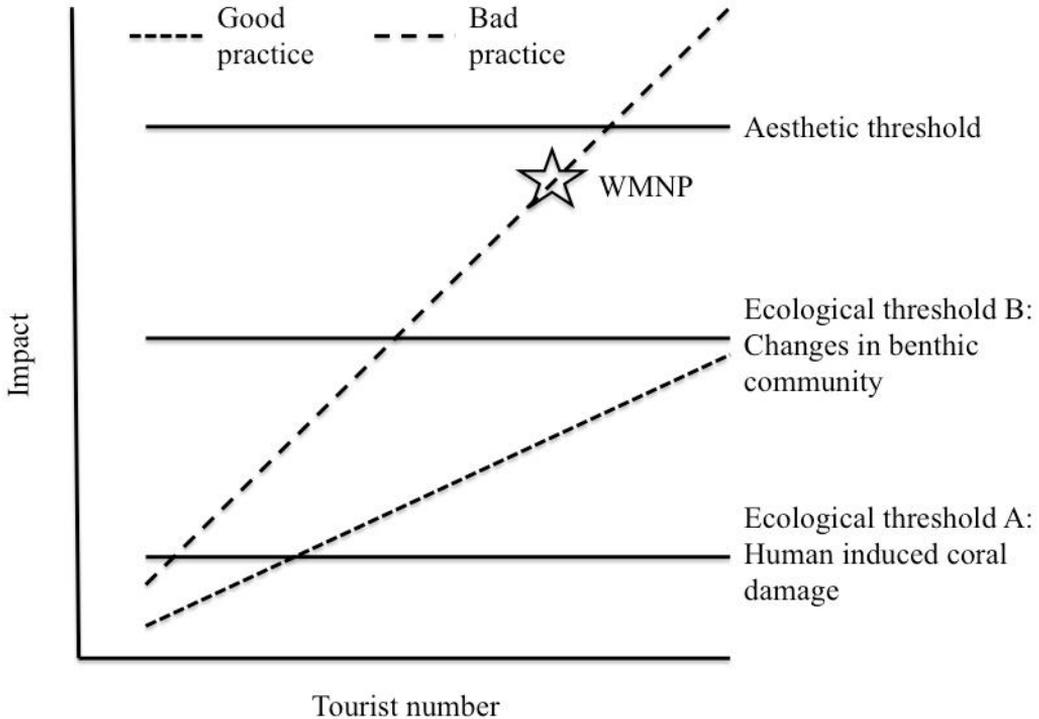


Figure 6. Conceptual relationship of the threshold between tourism in Watamu and its apparent effect on the condition of Coral Gardens.

Management implications and a “Tourism Threshold Model”

Dixon *et al.* (2003) introduced the concept of thresholds in reef-tourism interactions, which in this study has been expressed as a graph in Figure 6. In such a model, the amount of damage that would constitute a threshold would be based on management decisions on what is acceptable. A relationship between visitor number and reef damage whereby managers can decide upon limits for the latter was indeed determined by Schleyer and Tomalin (2000) but was beyond the scope of this study. Rather, the thresholds depicted in Figure 6 are relative and intended to demonstrate how conservation and tourist income may interact and influence the decision-making process.

This study demonstrated that areas visited by tourists in Watamu Marine National Park (WMNP) were more impacted than other areas. From the data collected and comparisons with findings in the literature, it is asserted here that WMNP appears to have crossed two ecological thresholds; one of human-induced coral damage and of a change in community composition.

There is also an aesthetic threshold beyond which visitor satisfaction will diminish with reef damage. The nature of tourism and the profile of tourists visiting a park are important when setting the aesthetic threshold in such a model (Fig. 6); not everyone engages in reef tourism for the same reasons and not everyone will view the reef in the same way. The satisfaction of many people interviewed during this study was not diminished by the bad snorkelling practice of others or degraded reef. As Hawkins and Roberts (1994) claimed, some people want “warm clear water, regardless of what there is to see”. Therefore, it can be concluded that the aesthetic threshold for Coral Gardens has not been reached.

In Watamu, it is possible that a synergy between conservation and income generation has been broken. Under current conditions, managers and community stakeholders may

be tempted to exploit Coral Gardens in spite of damage because of its income generation. This may be justifiable from a conservation point of view, as Coral Gardens represents a small patch reef in the park with the adjacent coral areas being relatively well protected; it may thus be thought of as a sacrificial site for the protection of the other patch reefs. On the other hand it is not known how Coral Gardens will change in the future and perhaps the reef will continue to decline, leading to local extinctions of species and even loss of the shoals of fish which attract the tourists.

Hence there may be a trade-off between economic gain and ecological protection. Should a manager limit ticket sales or should tourists be dispersed to other reef areas, to spread the tourist damage and prevent any one area becoming too degraded? In fact, neither of these solutions needs to be implemented. The high levels of intentional contact with the reef, which are technically illegal under park rules, constitute bad snorkelling practice, which results in more impact per tourist (Fig. 6). Good snorkelling practice could be implemented through better control of tourist behaviour and increased diver briefings and education, which would not only reduce the reef contact rate, but also increase visitor satisfaction (den Haring, 2012). Indeed, some of the experienced snorkellers who were unhappy with their visit to the reef commented on the fact that seeing people sitting and standing on the reef had upset them.

Thus, while tourist impact on coral reefs is a well-documented phenomenon, it should not be assumed that this will affect visitor satisfaction or economic gains. The nature of tourism to an area and visitor education can greatly influence the associated interactions with a reef and visitor enjoyment of the habitat and wildlife. Interactions between conservation and tourism are not always synergistic and can present trade-off decisions for managers, which may be difficult to solve. However, in the WMNP, it is recommended that management of tourist behaviour through enforcement of regulations and education could resolve this conflict in interest.

Acknowledgements—This project was undertaken in partnership with Kenya Wildlife Service (KWS) in Watamu and the Coast Province Research Unit. We are grateful for the support they gave us throughout the study. We are also thankful to the various boat operators

who allowed us to collect data on regular trips to the Coral Gardens, and for all the assistance they gave us during data collection. Finally thanks are due to volunteers from A Rocha Kenya who helped collect and analyse the data for this study.

Appendix

Section 1: About the Interviewee

- 1.1 Nationality
- 1.2 Name of hotel/residence and length of stay
- 1.3 How many times have you visited Kenya?
- 1.4 How many times have you visited Watamu?
- 1.5 How many other coral reefs have you visited?
- 1.6 Where?
- 1.7 Why did you choose to go on a snorkelling trip today?

<input type="checkbox"/> Wildlife General	<input type="checkbox"/> Scenery
<input type="checkbox"/> Birds	<input type="checkbox"/> Spending time with family and friends
<input type="checkbox"/> Marine Ecology	<input type="checkbox"/> New Experience
- 1.8 How did you find out about visiting the reef?

<input type="checkbox"/> Hotel	<input type="checkbox"/> Beach Operator
<input type="checkbox"/> Word of Mouth	<input type="checkbox"/> Guide Book
	<input type="checkbox"/> Internet

Section 2: Awareness and information transfer

- 2.1 How would you rate yourself as snorkeller?
 First time today Beginner Intermediate Experienced

2.2 How would you describe the reef’s legal protected status?
If known that it is a MPA (b) What rules and regulations does this status entail?

2.3 Do you know of any human impacts that damage coral reefs?

- 2.4 How much information were you given by boat operators on;
- | | None | Little/Some | Lots |
|---|--------------------------|--------------------------|--------------------------|
| (a) Rules and regulations of the park..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) Tides and safety..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) Wildlife..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) Use of snorkelling equipment..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (e) Can you tell me some of the information you were given? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- 2.5 How much information were you given by hotels on;
- | | None | Little/Some | Lots |
|---|--------------------------|--------------------------|--------------------------|
| (a) Rules and regulations of the park..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) Tides and safety..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) Wildlife..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) Use of snorkelling equipment..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (e) Can you tell me some of the information you were given? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

2.6 Did you see the KWS boat during the trip? *Y/N/Not sure*

2.7 KWS offered assistance, advice or information?

None	Little/some	Lots
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.8 From what other sources did you receive relevant information?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

Section 3: Their perception of the reef

3.1 Can you give me three words to describe the reef?

3.2 What type of human impacts did you notice on the reef?

3.3 This reef is better than (others you've seen)/(your expectations).

Strongly agree Agree Neither Disagree Strongly disagree

3.4 The boat operators:

	Strongly agree	Agree	Neither	Disagree	Strongly disagree	N/a
(a) were friendly	<input type="checkbox"/>					
(b) were helpful	<input type="checkbox"/>					
(c) were knowledgeable	<input type="checkbox"/>					
(d) provided appropriate gear	<input type="checkbox"/>					
(e) Comments					
					
					
					

3.5 The trip was value for money:

Strongly agree Agree Neither Disagree Strongly disagree

3.6 Does any of the trip fee go to marine conservation? How much?

3.7 What is an appropriate park entrance fee?

\$5	\$10	\$15	\$20	\$25	\$30	>\$35
<input type="checkbox"/>						

3.8 What was your favourite part of the trip?

3.9. Could anything have made the trip better?

3.10 Any other comments

Scoring method for experience and satisfaction score

Experience Score	0 Points	+1 Point	+2 Points	+3 Points	+4 Points
1.5 How many other coral reefs have you visited?	None	1-2 countries	3-5 countries	6-10 countries	11+ countries
2.1 How would you rate yourself as a snorkeller?	First time today	Beginner	Intermediate	Expert	
2.3 Do you know any human impacts which damage coral reefs?	No impacts mentioned	1-2 impacts mentioned	3+ impacts mentioned		

Satisfaction Score	-3 Points	-2 Points	-1 Point	0 Points	1 Point	2 Points	3 Points
3.1 Can you give me three words to describe the reef?	3 negative words	2 negative words	1 negative word		1 positive word	2 positive words	3 positive words
3.3 This reef is better than others you've seen/your expectations		Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	
3.5 The trip was value for money?		Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	

References

- Allison WR (1996) Snorkeller damage to reef corals in the Maldiv Islands. *Coral Reefs* 15: 215-218
- Barker NHL, Roberts CM. (2004) Scuba diver behaviour and the management of diving impacts on coral reefs. *Biological Conservation* 120:481-489
- Den Haring SD (2011) Interpretation as a tool to influence snorkeler behaviour, a case study in Mombasa Marine Park and Reserve, Kenya. *CORDIO Status Report* 2011
- Davis D, Tisdell C (1995) Recreational scuba-diving and carrying-capacity in marine protected areas. *Ocean & Coastal Management* 26: 19-40
- Dixon JA, Scura LF, Vanthof T (1993) Meeting ecological and economic goals: Marine parks in the Caribbean. *Ambio* 22: 117-125
- Hawkins JP, Roberts CM. (1992). Effects of recreational scuba diving on fore-reef slope communities of coral reefs. *Biological Conservation* 62: 171-178
- Hawkins JP, Roberts CM (1993) Effects of recreational scuba diving on coral reefs - trampling on reef-flat communities. *Journal of Applied Ecology* 30: 25-30
- Hawkins JP, Roberts CM (1994) The growth of coastal tourism in the red-sea - present and future-effects on coral-reefs. *Ambio* 23: 503-508
- Jameson SC, Ammar MSA, Saadalla E, Mostafa HM, Riegl B (1999) A coral damage index and its application to diving sites in the Egyptian Red Sea. *Coral Reefs* 18: 333-339
- Juhasz A, Ho E, Bender E, Fong P (2010) Does use of tropical beaches by tourists and island residents result in damage to fringing coral reefs? A case study in Moorea French Polynesia. *Marine Pollution Bulletin* 60: 2251-2256

- Kay AM, Liddle MJ (1989) Impact of human trampling in different zones of a coral-reef flat. *Environmental Management* 13: 509-520
- Lucrezi S, Saayman M, van der Merwe P (2013) Perceived diving impacts and management implications at a popular South African reef. *Coastal Management* 41: 381-400
- Medio D, Ormond RFG, Pearson M (1997) Effect of briefings on rates of damage to corals by scuba divers. *Biological Conservation* 79: 91-95
- Ong TF, Musa G (2012) Examining the influences of experience, personality and attitude on SCUBA divers' underwater behaviour: A structural equation model. *Tourism Management* 33: 1521-1534
- Plathong S, Inglis GJ, Huber ME (2000) Effects of self-guided snorkeling trails on corals in a tropical marine park. *Conservation Biology* 14: 1821-1830
- Shaanan IM (2005) Sustainable tourism development in the Red Sea of Egypt threats and opportunities. *Journal of Cleaner Production* 13: 83-87
- Schuhmann PW, Casey JF, Horrocks JA, Oxenford HA (2013) Recreational SCUBA divers' willingness to pay for marine biodiversity in Barbados. *Journal of Environmental Management* 121: 29-36
- Tratalos JA, Austin TJ (2001) Impacts of recreational SCUBA diving on coral communities of the Caribbean island of Grand Cayman. *Biological Conservation* 102: 67-75
- Williams ID, Polunin NVC (2000) Differences between protected and unprotected reefs of the western Caribbean in attributes preferred by dive tourists. *Environmental Conservation* 27: 382