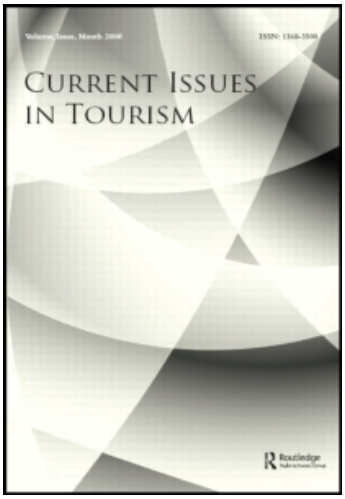

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Preparing for climate change: recognising its early impacts through the perceptions of dive tourists and dive operators in the Egyptian Red Sea

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Preparing for climate change: recognising its early impacts through the perceptions of dive tourists and dive operators in the Egyptian Red Sea

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Climate change has the potential to permanently alter the attraction of many destinations and substantially impact the benefits derived from tourism. These impacts can be reduced if vulnerability to climate change is understood and operators take steps to adapt. Some of the more immediate and manageable impacts are likely to result from changes in tourist perceptions and attitudes towards climate change. We test for early impacts in the Red Sea region and for the awareness of tourism operators. We interviewed 150 tourists and 35 operators. Our data suggest that changes in tourist awareness are already apparent; yet, operators ascribe only a moderate level of environmental and climate awareness to them. This 'perception gap' increases the vulnerability of dive operators.

Keywords: climate change; adaptive capacity; climate vulnerability; climate risk; attitudinal change; climate adaptation planning

Introduction

Tourism generates important economic activity globally and is a major source of foreign exchange income in many countries (Simpson, Gössling, Scott, Hall, & Gladin, 2008). In Egypt, tourism generates an estimated US$7.8 billion annually (equivalent to approximately 6% of the national gross domestic product), as well as providing employment for 12% of the national work force (AFP, 2009). Although the Great Pyramids of Giza and the Nile River are some of the world's most iconic tourist attractions, much of the revenue from tourism in Egypt is derived from the Red Sea region. Some 540,000 people annually arrive from all over the world to dive on the coral reefs of the Egyptian Red Sea, providing growing demand for tourism infrastructure and delivering important foreign revenue to the regional and national economy (USAID, 2007).

Coral reefs, however, are particularly sensitive to changes in climate (Baker, 2001; Hoegh-Guldberg, 2004; Hughes et al., 2003). As a result of increasing sea water temperatures,

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mass coral bleaching has occurred worldwide, devastating reefs in some regions including the Maldives, Seychelles and Palau and leading some experts to claim that coral reefs are 'in crisis' (Bellwood, Hughes, Folke, & Nystrom, 2004; Hoegh-Guldberg et al., 2007). Further, as a result of the uptake of carbon dioxide from the atmosphere, ocean acidification exacerbates the threat to marine animals and plants that produce calcium carbonate skeletons (Marshall & Johnson, 2007). While the north-west region of the Red Sea has so far escaped a major mass bleaching event, ecologists working in the region suggest that it is only a matter of time before the effects of climate change manifest here (IUCN, 2007; NCS, 2006). As such, climate change has the potential to permanently alter the attraction and value of many tourism destinations and substantially impact the income streams and social benefits derived from tourism (Scott, McBoyle, & Minogue, 2007).

As our awareness of climate change has increased, so has our need to understand the changes it will bring and our vulnerability to it (Hein, Metzger, & Moreno, 2009; Marshall, Stokes, Nelson, & Howden, 2010b; Stokes & Howden, 2010). Climate change cannot be fully averted as past emissions will increase global temperatures by up to 0.6% over the next four decades (IPCC, 2007) and we must understand, prepare for and adapt to its inevitable effects (Marshall, 2010; Marshall et al., 2010a). Adaptation is essential if the tourism sector in the Egyptian Red Sea is to reduce its vulnerability to climate change and limit negative changes in tourism visitation to the region (Armitage, Marschke, & Plummer, 2008; Nicholls, 2004; Strickland-Munro, Allison, & Moore, 2009; Williams & Ponsford, 2009).

Adaptive capacity is defined as the ability to respond to challenges through learning, managing risk and impacts, developing new knowledge and devising effective approaches (Marshall, Marshall, & Abdulla, 2009; Nelson, Kokic, Crimp, Meinke, & Howden, 2010). It requires the flexibility to experiment with novel solutions (Gunderson, 2000; Levin et al., 1998). Adapting to climate change requires adequately anticipating and preparing for change. Some individuals and some industries will be better able to plan and reorganise than others (Doria, Boyd, Tompkins, & Adger, 2009; Marshall, 2008; Paavola & Adger, 2006).

Enhancing adaptive capacity can significantly reduce risks of adverse impacts from future and unpredictable events. Characteristics that contribute to adaptive capacity include possessing creativity and innovation (for identifying solutions or adaptation options) (Folke, Hahn, Olsson, & Norberg, 2005; Hiedanpaa, 2005), testing and experimenting options (Armitage et al., 2008; Walters, 1997), using effective feedback mechanisms (Young et al., 2006), using adaptive management approaches (Holling, 2004), emotional and financial flexibility for absorbing the costs of change (Gunderson, 1999; Marshall, 2008) and being able to reorganise given novel information (Abel, Cumming, & Anderies, 2006). These characteristics can be actively targeted for development and enhancement as part of strategic efforts to build capacity to adapt to climate change.

Adaptive capacity can be enhanced by accessing projections of the future to better understand the threats facing climate-sensitive enterprises. In turn, this may help identify opportunities and reduce risks associated with climate change (Grothmann & Patt, 2005; Scott et al., 2007). The extent to which enterprises are able to cope and adapt to changes in the natural resource depends, in part, on the nature and extent of the dependency on natural resources; those enterprises that are more dependent on the marine resource may be less able to adapt because they are less flexible (Marshall, Fenton, Marshall, & Sutton, 2007; Marshall et al., 2009).

A recent review by the United Nations Environment Program (Simpson et al., 2008) recognised four broad categories of climate change impacts that are likely to affect

tourism destinations, sector competitiveness and business sustainability. We use additional reports (Ehmer & Heymann, 2008; Forsyth, Dwyer, & Spurr, 2007; Hein et al., 2009) and our own experience to expand this conceptual model to five categories: direct climatic impacts, indirect environmental change impacts, impacts of mitigation policies on tourist mobility, indirect societal change impacts and attitudinal and behavioural change impacts.

Direct climatic impacts

Climate will have direct impacts on tourism by altering destination appeal and by affecting input costs (Simpson et al., 2008). Destination appeal will be affected where climate itself is a significant tourism resource (i.e. probability of 'sunny days') and where the weather determines the suitability of important tourism activities (Hein et al., 2009). Input costs are often dependent on environmental conditions, such as temperature (for heating/cooling), rainfall (availability of water) and frequency of extreme weather events (cancellations, infrastructure repair and insurance costs). Changes to climate could result in both negative and positive impacts, depending on the location and nature of activities undertaken at a tourism destination.

Indirect environmental change impacts

Many tourism activities are dependent on environmental assets, such as beaches or coral reefs. Climate change is expected to alter many aspects of the natural and built environment, creating a range of indirect impacts for tourism, many of which are likely to be negative. Examples of indirect environmental impacts from climate change include biodiversity losses, loss of coral cover, reduced reef aesthetic, decreased fisheries production as well as a decline in ecosystem services such as coastal protection and beach replenishment. Positive impacts may also occur; for example, warmer weather may encourage tourists to visit some Arctic or Antarctic regions, although there may be other negative effects associated with such opportunities (Lemelin & Johnston, 2008; Lemelin, Dawson, Stewart, Maher, & Lueck, 2010).

Impacts of mitigation policies on tourist mobility

National or international mitigation policies that seek to reduce carbon emissions or the impact of tourism on natural resources may have an impact on tourist flows (Gossling, Hansson, Horstmeier, & Saggel, 2002; Simpson et al., 2008). For example, coral reef management agencies such as the GBRMPA are establishing strategies that will ensure reef use, such as tourism is conducted in a way that is sensitive to climate change considerations (Marshall & Johnson, 2007). In this case, the numbers of tourists to a tourist site, for example, might be more tightly managed given that the site may especially be prone to climate change damage. Additionally, mitigation policies may foster tourist attitudes that result in lower propensity for long-haul travel or encourage carbon offsetting across a range of settings.

Indirect societal change impacts

Climate change has the potential to cause significant social upheaval as a result of impacts on future economic growth and political stability (IPCC, 2007). As a result, climate change is commonly regarded as a national and international security risk that will intensify with

warming especially in regions where tourism is highly important (Barnett, 2003). Developing countries in particular are likely to experience indirect societal change impacts (Simpson et al., 2008). Worsening situations of social unrest may make some regions less attractive for tourism.

Awareness and attitudinal impacts

As consensus grows about the imperative to take action on climate change, individuals are adopting new attitudes and behaviours in response to new laws and community expectations ('social norms'). These changes are likely to influence the decisions tourists make about destinations, modes of travel, activities and the businesses they patronise (Forsyth et al., 2007). Changes in awareness and attitudes may be expressed earlier, and perhaps even more dramatically, than the impacts included in the above four categories. For example, a destination with a poor image for sustainability and climate friendliness could rapidly decline as a preferred destination with tourists with a strong environmental conscience (e.g. see corporate responsibility assessments at www.kuoni-group.com). In contrast, by changing operating practices and with the support of appropriate communication activities, particular tourism businesses, destinations or sectors can actually position themselves to benefit from changes in tourist' attitudes rather than suffering negative impacts (Becken & Hay, 2009; UNWTO, 2008).

The early impacts of climate change in the Red Sea

We focus here on understanding the potential for (climate) attitudinal change to be a significant impact on tourism industry and use the Red Sea tourism industry in Egypt as our case study. We anticipate that knowledge of emerging impacts may assist the industry to more effectively respond to the emerging challenge of climate change. Based on surveys within other resource-dependent industries, we assess the climate awareness and attitudes of dive tourists so as to assist dive operators to better plan for the effects of climate change. We also examine the perceptions of dive operators to gauge the extent to which they are aware of changes in attitudes and awareness of tourists in their business operations and planning. Specific aims of the study were to: (i) test for evidence of awareness and attitudes of tourists that could affect choice of destination, activity or business, (ii) assess the perceptions of the dive tourism industry about the awareness and attitudes of tourism clients and (iii) evaluate the implications of these results for adaptation strategies in the Red Sea dive tourism industry.

Study methods

Surveys were developed to assess the awareness and attitudes of dive tourists to environmental conditions and climate change issues. They were also developed to assess the perceptions of dive operators about the awareness and attitudes of dive tourists. Statements were created to reflect various perceptions and respondents were asked to rate how strongly they agreed with each statement using a four-point Likert scale (1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree). This survey structure is most efficient for obtaining large amounts of data in a relatively short time (Likert, 1932). A five-point scale was not used so as to discourage use of an 'unsure' or 'neutral' option, which can be difficult to interpret. It was observed that given the option, respondents are likely to use a neutral option; yet, if not present, they do not seem to request one. Respondents

were instructed to leave a response blank if they wanted to do so. Some open-ended questions were also included. Survey questions were based on similar surveys in other industries (see Marshall & Marshall, 2007). Initial versions of the surveys were pre-tested with 10 colleagues (social scientists) and industry representatives in Egypt. Each survey was pilot-tested with 10 tourists and 10 tourism operators, respectively, to ensure that the questions were unambiguous.

The tourist statements were designed so that the following information could be elicited: (i) demographic characteristics, (ii) general dive experience, (iii) dive experience in the Red Sea, (iv) sensitivity to coral degradation, (v) awareness of climate change impacts, (vi) environmental awareness, (vii) dive holiday preferences and (viii) attractive features of the region. Tourist results are presented so as to address each objective.

The dive operator survey statements were designed so that the following information could be gained of the dive operators themselves: (i) demographic characteristics, (ii) dive experience, (iii) perceptions of coral condition in the Red Sea, (iv) perceptions of dive tourists' sensitivity to coral degradation, (vi) general environmental awareness, (vii) awareness of climate impacts in general, (viii) awareness of tourist preferences and

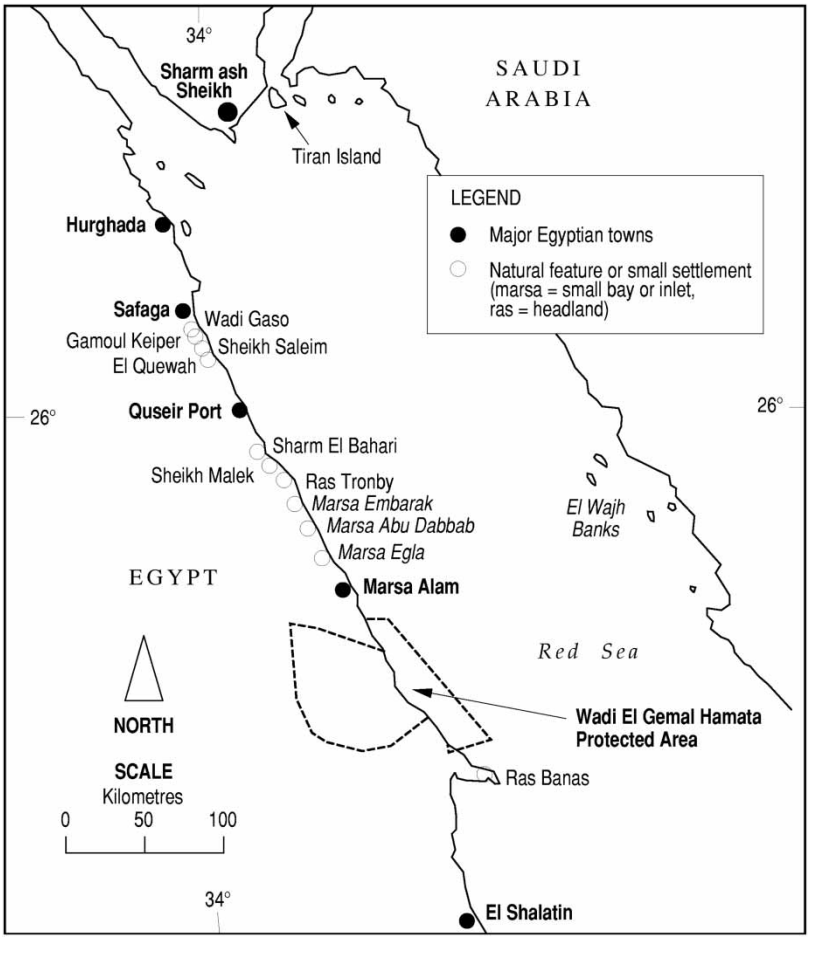

Figure 1. Map of the Red Sea.

(ix) interest in preparing for climate changes. Dive operator results are presented so as to address each objective.

A team of trained interviewers was established through a non-government organisation called the Hurghada Environmental Protection and Conservation Society (HEPCA, see www.hepca.com.eg), based in Hurghada, Egypt. Interviewers randomly identified and approached day operators and live-aboard dive operators from five destinations along the Egyptian Red Sea Coastline (Figure 1). There were two main destinations and three minor destinations. Over the course of one month (May 2009), surveys were administered to tourists and dive tourist operators. Some 188 tourists and 58 dive operators were approached, with a response rate of 80% and 60%, respectively. Refusals were often due to language barriers and the workload of tourist operators. Overall, 150 dive tourists and 35 dive operators were sampled.

Study findings

Most (72%) of the 150 dive tourists surveyed were aboard a day-trip operation and the remaining 28% were on a live-aboard operation. Most dive tourists were basing themselves in Hurghada or El Gouna (60%). Of the 35 dive operators surveyed, 50% conducted a day-trip style operation only, and 25% conducted a live-aboard style operation while 25% operated as both. Half of the respondents owned the dive business, while the remainder were employees. One business was very small with only one employee, while another was very large with around 300 employees. The mean number of employees per business was 38 (s.e. = 11), and the mode was 15. Three businesses (10.7%) did not own any dive vessels, whereas one owned 11 vessels. The mean number of dive vessels held by businesses was 2 (s.e. = 0.5), with a mode of 1. Most operators (93%) were based out of Hurghada or El Gouna.

Dive operators (96%) were interested in learning more about the impacts of climate change on coral reefs. About 25% of dive operators indicated that they would close their business if there was major damage to their main dive sites from climate change within the next 5 years. The remaining operators suggested that they would either continue their operation as is (21%) or look for new reefs (25%). About 35% of operators indicated that they would close their business in response to major climate-induced damage of their reefs within the next 5–10 years.

Differences between tourists and tourist operators in their nationality, demography, dive experience, experience of the Red Sea, awareness of environmental issues and climate change and bases for dive holiday preferences are presented in Table 1.

Discussion of study findings

Our results suggest that changes in dive tourist' awareness and attitudes are already being realised in the Red Sea region and that the industry appears to be unaware of current tourist perceptions surrounding climate change and coral reef condition. That is, while other climate change impacts may already be occurring in the Red Sea region, the fifth type of climate change impact, 'awareness and attitudinal impacts' (see Introduction), is already occurring. We suggest that this makes the industry in the Red Sea region particularly vulnerable to climate changes. Dive tourists in the region are generally well educated and are mostly very aware of environmental conditions and climate change issues. Nearly half of the dive tourists indicated that they would be able to detect changes in coral condition of around 25%. This sensitivity to coral condition is consistent with a broader trend in environmental awareness of

Table 1. Differences between dive tourists and dive tourist operators.

	Tourists	Tourist operators
Nationality		
Germany	34%	14%
Britain	30%	25%
Holland	5%	NA
Belgium	4%	NA
Poland	3%	NA
Norway	1%	NA
Egypt	0%	32%
Demography		
Most frequent age group	36–46 years	36–46 years
Have finished schooling	65%	NA
Completed further education	50%	NA
Dive experience		
'Advanced'	46%	Mean dives = 1996, SE = 321
Recently qualified	13%	Mean experience = 10 years
Have dived elsewhere	89%	75%
Have dived in at least 10 other locations	7%	11%
Have dived in Red Sea before (return tourist)	79%	7% new to local region
Dive experience of the Red Sea		
Rating of Red Sea dive experience (1–10 scale, where 10 is the best dive imaginable)	Mode = 8, mean = 7.7, SE = 0.1	NA
Ranking of most important factors for diving	Big fish, pretty coral forms, lots of healthy coral, visibility, many pretty fish	NA
Expected more coral	47%	NA
Were disappointed with coral colour	41%	57% thought that tourists had unrealistic expectations about coral colour
Were disappointed with the numbers of fish	38%	NA
Noticed change in coral condition	30%[a]	80%
Would recommend region to others	84%	NA
Thought the coral reef was beautiful	66%	29%
Awareness of environmental issues		
Noticed 'dead looking' coral	50%	78% thought tourists noticed dead looking coral
Would notice if <10% coral died	45%	71% thought <10% loss would not be noticed
Would notice if <25% coral died	73%	40% thought <25% loss would not be noticed
Would notice if <50% coral died	78%	64% thought <50% loss would not be noticed
Would notice if most coral died	77%	79% thought that loss of most coral would not be noticed by tourists

(*Continued*)

Table 1. Continued.

	Tourists	Tourist operators
Most important perceived threat to coral	Dive tourists	Pollution
Ranking of climate change as a threat	Third	Third
Awareness of climate change		
Were concerned about local climate change impacts	80%	93%
Read a lot about climate change impacts	73%	92%
Have heard about coral bleaching	75%	68% have seen coral bleaching in region
Dive holiday preferences		
More likely to choose 'environmentally friendly' operation	90%	57%
Plan holiday according to dive experience expected	79%	86%
Importance of climate change issues in choosing an operation	59%	31%
Importance of management of climate change in selecting holiday destination	59%	15%
Often talk about coral reef health and fish numbers with other dive tourists	76%	57%
Importance of dive experience in choosing holiday destination	43%	89% thought that if coral declined, then tourist numbers would be affected
Importance of proximity to home in choosing holiday destination	34%	NA
Importance of good weather in choosing holiday destination	22%	NA

[a]Of return tourists only.

tourists worldwide (DRET, 2008; Simpson et al., 2008). Furthermore, the majority of dive tourists in our sample were interested in dive operators that were promoting energy efficiency, environmental friendliness and climate awareness. While climate change may not have had a discernible impact on Egyptian coral reefs, our results suggest that it is already having an impact on the perceptions and choices of dive tourists. Interestingly, 78% of tourists thought that reefs were already declining.

The dive industry in the Egyptian Red Sea appears largely unaware of the changes in tourist' awareness and attitude towards climate change. They have not yet incorporated information about the climate and environmental interests of their clients into their business thinking. For example, dive operators perceive that dive tourists have unrealistic expectations about coral condition, are unlikely to notice coral degradation, do not consider climate issues when choosing a dive operation and do not consider their own climate footprint when travelling. Hence, dive operators are potentially catering for less than half of their clients and risk losing market share to more responsive competitors elsewhere in the region or internationally (Berrittella, Bigano, Roson, & Tol, 2006; Yang & Wall, 2009).

Research conducted in the UK has found that although tourists are climate aware, their behaviour has not yet changed in line with their knowledge (DRET, 2008). Long-haul travel to tourist destinations, for example, has not declined, even though tourists are aware of its climate impact. This is encouraging for dive tourism operators in the Red Sea region; there may be likely to be a lag period before tourist behavioural change in the region is expressed (Hunter, 1997). This should give dive operators more time to prepare.

To enhance adaptive capacity, the tourism industry may benefit from facilitated networking activities, both within the local industry and beyond (e.g. with other local businesses and government), as well as developing links with the tourism industry internationally. Tourism operations with the flexibility to offer a range of tourism experiences will be better equipped to deal with ongoing changes such as the effects of a shift in climate. For example, one dive operator we visited during this study was offering bird-watching excursions and night time astronomy lessons. Another operator had established a desert camp to introduce his 'dive' guests to Indigenous music, food and culture. Developing a range of strategic business skills can also buffer against overly dependent resource sectors (Dessai, Lu, & Risbey, 2005; Marshall, 2008, 2010). There is strong evidence from other sectors that good networks and leadership will also be important in helping individuals and sectors adapt to future conditions (Adger, Arnell, & Tompkins, 2005; Gunderson, Carpenter, Folke, Olsson, & Peterson, 2006; Howden et al., 2007; Strickland-Munro et al., 2009; Nelson, Adger, & Brown, 2007).

Partnerships are fundamental to the success of the adaptation process. Industry associations, for example, foster collaboration by providing venues and opportunities to enhance networking both within the industry (internally) and with local government, community and other locally based industries (externally). Industry associations can also support their constituents through providing assistance with business planning, assessments of adaptation options and with reorganising. Partnerships that collaboratively learn and encourage creativity while sharing the purpose of climate adaptation are critical for identifying, implementing and reviewing adaptation options. Developing adaptation plans and identifying actions in partnerships will also help in identifying and achieving broader industry goals (Howden et al., 2007; Vogel, Moser, Kasperson, & Dabelko, 2007).

Adapting to climate change will not always mean preparing for the worst; in some cases, it may also mean preparing to take advantage of new conditions (Patt & Dessai, 2005; Vincent, 2007). For example, alpine-based tour operators previously dependent only on good snow falls are now taking advantage of extended summers by promoting lucrative non-winter-dependent activities such as hiking and health-related activities (Greenwood & Yeoman, 2007). Exploring the potential for positive as well as negative outcomes from climate change is important in the development of climate adaptation plans.

Conclusions

The results of this study provide a foundation for the development of adaptation strategies by the Red Sea tourism industry and elsewhere. We have elucidated potential impacts on dive tourism in the Red Sea as a result of a mismatch between the awareness and attitudes of dive tourists visiting the Red Sea and in the perceptions of the dive industry. This initial analysis of the early manifestation of climate change issues may assist the Red Sea tourism industry to understand aspects of the consequences of climate change for them and their region, and use this as the foundation for adaptation planning. Through early awareness and pro-active adaptation, industry sectors such as the Red Sea tourism industry can

hope to reduce impacts and capitalise on any opportunities presented by this newest of challenges: climate change.

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