Routledge
Taylor & Francis Group

Asia Pacific Journal of Tourism Research

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rapt20

Snorkellers' environmentally conscious behaviour after visiting the Great Barrier Reef

Anja Pabel, Leonie J. Cassidy & Bruce R. Prideaux

To cite this article: Anja Pabel, Leonie J. Cassidy & Bruce R. Prideaux (2023) Snorkellers' environmentally conscious behaviour after visiting the Great Barrier Reef, Asia Pacific Journal of Tourism Research, 28:7, 713-728, DOI: 10.1080/10941665.2023.2264974

To link to this article: https://doi.org/10.1080/10941665.2023.2264974

Published online: 02 Nov 2023.

ASIA PACIFIC JOURNAL OF TOURISM RESEARCH
2023, VOL. 28, NO. 7, 713–728
https://doi.org/10.1080/10941665.2023.2264974

Routledge
Taylor & Francis Group

Snorkellers' environmentally conscious behaviour after visiting the Great Barrier Reef

Anja Pabel [a], Leonie J. Cassidy [b] and Bruce R. Prideaux [c]

[a]Central Queensland University, Cairns, Australia; [b]College of Business, Law and Governance, James Cook University, Smithfield, Australia; [c]Central Queensland University

ABSTRACT

The majority of tourists who visit Australia's Great Barrier Reef (GBR) engage in snorkelling. Yet little is known about how snorkellers perceive this experience. The aim of this study was to investigate snorkeller behaviour by exploring their environmental opinions and to provide insights on the association between climate concerns and environmentally conscious behaviours of snorkellers. A self-administered questionnaire ($n = 273$) was distributed onboard reef tourism vessels visiting the study area. Approximately one-third of respondents believe that climate change and global warming are major threats to the GBR. Regression results indicate the environmentally conscious behaviour model (ECBM), a modified version of the norm activation model, is effective in understanding how a snorkeller's level of climate concern (LCC) both directly and indirectly activates and influences a snorkeller's environmentally conscious behaviour (ECB). LCC has a positive direct effect on ECB, and a positive indirect effect via environmental identity (EI), and personal environmental norms (PEN).

ARTICLE HISTORY
Received 5 April 2023
Accepted 25 September 2023

KEYWORDS
Snorkelling; environmentally conscious behaviour; Great Barrier Reef; climate change; pro-environmental behaviours; interpretation

Introduction

Snorkelling is a popular tourism activity on coral reefs, particularly where shallow reefs are conveniently accessible by tour boats. Unlike scuba diving, snorkelling does not require extensive training or expensive equipment (Coghlan et al., 2011) and is accessible to a larger market, providing participants are reasonably fit. However, accessibility can lead to concentration of snorkellers into relatively small areas. As Danovaro et al. (2008) noted, about 90% of reef tourism is concentrated in about 10% of the global reef areas leading to concerns that these high-use areas may suffer significant damage because of crowding (Renfro & Chadwick, 2017). Concerns have also been raised that increasing damage caused by climate change may degrade the quality of snorkelling experiences leading to a long-term decline in visitor numbers (Prideaux et al., 2019). Taken together, crowding and climate change present a significant challenge for coral reef managers and the tour operators whose livelihood depends on the sustainable use of this biologically important resource.

In Australia, the World Heritage listed Great Barrier Reef (GBR) is an important tourism attraction with approximately 2 million total visitor days in 2022 (GBRMPA, 2023). According to Esparon et al. (2015) and Le et al. (2019) aesthetic and environmental values are key pull factors in generating demand for visiting the GBR. However, coral bleaching and damage from crowding have the potential to significantly reduce the GBRs aesthetic and environmental values which can be expected to lead to reduced demand. Although there have been several coral bleaching events in recent years (AIMS, 2023), coral has regenerated relatively quickly but remains susceptible to further damage including from snorkellers who may be unaware of how their actions can damage the GBR. Understanding snorkellers'

CONTACT Anja Pabel a.pabel@cqu.edu.au Central Queensland University, 42-52 Abbott Street & Shields Street, Cairns, QLD 4870, Australia

environmental concerns offers one avenue for developing strategies for reducing the environmental impact of snorkelling but requires a deeper understanding of the Environmentally Conscious Behaviour (ECB) of snorkelling tourists and concerns they may have about the long-term sustainability of the GBR.

Previous research in both marine (Lück, 2015) and terrestrial (Kim & Stepchenkova, 2020) environments identified environmental education as an effective pathway for alerting visitors to how their actions may unintentionally harm the environment. Powell and Ham (2008) in an investigation of how education delivered via targeted interpretation could achieve better environmental outcomes in the Galapagos Islands found that well-designed and delivered interpretation can increase knowledge of protected areas, increase visitor satisfaction, lead to positive environmental behaviours and enhance support for conservation. Conversely, a lack of environmental knowledge may inhibit tourist participation in pro-environmental behaviours even when they have a favourable attitude to nature (Ünal et al., 2018).

It is estimated that approx. 75% of visitors to the GBR participate in snorkelling (Coghlan, 2012), hence knowledge on snorkeller behaviour is essential to managing the impact of human activity on coral reefs. Although snorkellers account for most visitors to coral reefs, previous research into managing the impact of human activity on coral reefs has focused predominantly on scuba divers (Giglio et al., 2018; Toyoshima & Nadaoka, 2015). The aim of this study was to address a significant literature gap in our understanding of snorkeller behaviour. The study investigated their environmental opinions to provide insights that can assist reef managers and the tourism industry develop strategies to enhance the visitor experience while minimising unintended damage to the reef. Three research objectives were developed to identify snorkellers concerns about the environment, identify strategies for improving environmental education about the GBR and to develop a theoretical framework that may be employed to investigate snorkeller's ECB. The research objectives were:

(1) Identify the level of concern snorkellers have towards environmental issues.
(2) Identify strategies that can be used to educate snorkellers about environmental challenges facing the GBR.
(3) Develop a theoretical framework to predict how to increase a snorkeller's ECB.

Understanding the concerns of snorkellers will assist in developing new management strategies, enhance the visitor experience, and deal with concerns about climate change including coral bleaching. The main focus of this research centres on an examination of the association between environmental norms, climate concerns, and environmentally conscious behaviours of snorkellers. This paper contributes to the literature that has investigated environmentally conscious behaviour by suggesting a framework that can be employed to understand how a snorkeller's level of climate concern (LCC) both directly and indirectly activates and influences a snorkeller's environmentally conscious behaviour (ECB).

Literature review

Snorkellers' impacts on coral reefs

The impacts of snorkellers on the marine ecosystem may include coral breakage via contact with fins, trampling or standing on coral, disturbance of fauna and sedimentation via fin-kicking which stirs up the surrounding soft substrate (Hannak et al., 2011; Webler & Jakubowski, 2016). Damage to coral reef communities is increased in areas of less controlled tourism activities with high visitor numbers that potentially exceed their carrying capacity (Zhang et al., 2016).

The severity of snorkelling impacts can vary between locations. In Thailand, intensive use of snorkelling sites has been linked to increased coral disease (Lamb et al., 2014). In Mexico, intensive snorkelling on the Mesoamerican Barrier Reef has led to reduced coral cover (Renfro & Chadwick, 2017). There are also concerns that the concentration of snorkelling activity may increase the potential harm from introduced chemicals such as sunscreen and perfumes. In response to these concerns Hawaii's legislature banned the use of sunscreens containing oxybenzone and octinoxate to prevent damage to coral reefs (Levine, 2020). Other ways to mitigate the impact of harmful chemicals include promoting reef-safe sunscreens or using protective clothing like rashies and wetsuits (Miller et al., 2021; Porter, 2018).

In the northern Red Sea (Sinai, Egypt), Hannak et al. (2011) suggest installing artificial structures to create underwater snorkelling trails that direct snorkellers to less sensitive areas, limit impacts to defined zones, and provide opportunities to explore deeper parts of the reef. In Hawaii, Porter (2018) offered practical recommendations for managing vessel-based snorkelling day tours to coral reefs including implementing education and outreach programmes, enforcing reef-safe sunscreen policies, refraining from dumping effluents at sea and reducing general waste aboard vessels. Other strategies include careful site selection, providing floating stations for snorkellers to hold on to and rest, life vests, and rotating trails (Plathong et al., 2000).

While tour operators often remind snorkellers to avoid contact with the reef, unintentional contact can still occur (Den Haring & Sutton, 2019). Collecting data on in-water snorkelling behaviour can be valuable for managing impacts, however, it can be time-consuming and labour-intensive for operators.

Threats to the GBR and coral reef quality

The 348,000 km^2 GBR was World Heritage listed in 1981 and is administered by the Great Barrier Reef Marine Park Authority (GBRMPA). This large expanse of coral reefs enables researchers to focus on specific regions of the GBR and to compare multiple areas. Coral reef degradation occurs for various reasons, and although the GBR "is claimed to be the most well managed coral reef system in the world" (Prideaux & Pabel, 2018, p. 57), it still suffers from the effects of climate change, poor water quality, and the crown-of-thorns starfish (*Acanthaster planci*) (Vercelloni et al., 2017). If greenhouse gas emissions are not rapidly reduced, the GBR will continue to suffer coral decline limiting the chance of recovery (Hughes et al., 2018). Other threats include altered weather patterns, anthropogenic ocean acidification, increased nutrient and sediment runoff from river catchments, marine debris, damage to reef structure, dredging, exotic species, and vessel strike (GBRMPA, 2019).

Perceptions of reduced coral quality affects the demand for recreational diving and snorkelling trips, the number of tourists visiting the reef, and, consequently, the economic sectors that rely on healthy reefs for income generation (Kragt et al., 2009). If reef quality declines, the number of reef trips by divers and snorkellers is estimated to decline by as much as 80% (Kragt et al., 2009). Though tourists are concerned with coral bleaching, coral disease, and climate change affecting the GBR (Prideaux & Pabel, 2018), they often fail to connect their travel emissions with climate change (Buchs, 2017) and increased pressure on the GBR, and thus their impact as tourists (Piggott-McKellar & McNamara, 2017). Tourism infrastructure (e.g. pontoons and mooring points) encourages concentration of tourists in localised areas and can affect the health of corals in that area (Ding, 2021).

Snorkellers' needs for education and interpretation

Interpretive information is useful for making tourists aware of the reef's diversity, and how they can contribute to its protection. When tourists immerse themselves in novel environments, such as coral reefs, they are naturally curious and wish to learn more about these ecosystems (Lück, 2015). Vessel-based experiences offer temporary captivity of tourists providing reef operators with an opportunity to educate their passengers about threats to coral reefs, discourage inappropriate behaviours (i.e. coral trampling), make individual visitors realise the strength of their purchasing power as consumers (e.g. rashies, reef-safe sunscreen) and encourage environmentally conscious behaviours (e.g. recycling) (Porter, 2018). Since knowledge has been found to be a predictor of pro-environmental behaviour (Kollmuss & Agyeman, 2002), a lack of environmental awareness by snorkellers could pose threats as they may not know how their actions help to minimise negative environmental effects. Hence providing environmental awareness education to reef visitors about the importance of caring for the coral reef ecosystem is important as it helps to reduce negative impacts (Toyoshima & Nadaoka, 2015).

Coral reef and marine wildlife interpretation can be presented by tourism vessel crew during guided snorkel tours, marine biology talks, fish feeding presentations, and tours using glass bottom boats and semi-submersible boats (Coghlan, 2012). Guides provide narratives, answer questions, provide social interaction, and tailor information to match the spatial and temporal elements of the experience (Apps et al., 2017). Non-personal forms of interpretation include onboard signage, brochures, guidebooks, videos, and online apps (Apps et al., 2017). Experimenting with a video message, Webler and

Jakubowski (2016) asked snorkellers to sign a pledge to promote proper snorkelling etiquette and commit to specific pro-reef behaviours. After watching the video and signing the pledge, in-water observation of 79 snorkellers found a five-fold reduction in the rate of potentially damaging behaviour. Increasing use of digital technology and gamification offers further avenues to extend the experience temporally and spatially (Coghlan & Carter, 2020).

Certain marine tourism segments expect interpretation to be part of the experience as is often the case with whale watching (Andersen & Miller, 2006), and shark-based tourism (Apps et al., 2017). However, it can be difficult to maintain the interest of a diverse tourism audience when confirmation biases come into play. Tourists' confirmation biases influence their tendency to pay attention to information confirming their worldview or avoid information that contradicts it (Martin et al., 2017). Climate change also contributes to confirmation biases, particularly as many people remain confused or unsure about the severity of the threats (Leviston et al., 2013), or do not consider climate change to be an immediate, personally relevant threat (Scannell & Gifford, 2013).

Pro-environmental behaviours of tourists

Empirical research has explored how individuals' awareness of environmental issues and concerns about climate change influence their engagement in pro-environmental behaviours including aspects such as their attitudes, personal environmental norms and identity (Ates, 2020; Han, 2015). The extent to which individuals identify themselves as environmentalists or consider environmental issues as integral to their self-concept can influence their environmentally sustainable behaviour (Whitmarsh & O'Neill, 2010). This influences their decision-making processes, leading them to engage in pro-environmental behaviours during their holidays, i.e. reducing waste, carbon-offsetting, and choosing green lodging options (Whitmarsh & O'Neill, 2010; Han, 2015). Yet, drivers of pro-environmental tourist behaviours are not universal (Juvan & Dolnicar, 2017).

Snorkellers who are concerned about climate change may be more conscious of their actions, including their choices and behaviours while snorkelling. Any knowledge about the importance and fragility of coral reef ecosystems helps them act as stewards of the reef by making more sustainable choices during their travels, such as avoiding physical contact with corals, using reef-safe sunscreens, and following guidelines for minimising environmental impact (cf. Webler & Jakubowski, 2016). Beyond contributing to visitor satisfaction, environmental interpretation increases awareness and understanding, influencing tourists' pro-environmental attitudes and behaviours (Apps et al., 2017). People's positive attitudes towards the GBR are related to their pro-environmental behaviours, however, there are several challenges in building the link between attitudes and behaviours. Firstly, educational strategies required for influencing attitudes are different from those required for influencing behaviour (Eilam & Trop, 2012). Educational approaches such as behaviour modification (i.e. "don't touch the coral") are more likely to influence behaviour than attitudes (Eilam & Trop, 2012). However, environmental attitudes are commonly perceived as a precondition for achieving environmental behaviour (Eilam & Trop, 2012).

Secondly, cognitive as well as affective engagement is required to change attitudes and beliefs (Curnock et al., 2019). However, eliciting an effective response to the threat of climate change is often unsuccessful in behavioural change campaigns (Ockwell et al., 2009), due to assumptions that environmental issues arising from climate change are more likely to affect others in far-off places in the future (Singh et al., 2017). Finally, there are several perceived barriers impacting on people's tendency to engage in pro-environmental behaviours. External constraints include lack of time, knowledge, and financial resources. Apart from external constraints, perceived internal constraints and cultural factors that influence people's beliefs and attitudes include value orientation, social identity, and group norms (Curnock et al., 2019).

Marine tourism operators play an important role in encouraging pro-environmental behaviours as a key function of their organisations since marine ecosystem health is linked to its sustainable use (Martin et al., 2017). Tourism operators are often regarded as stewards of Australia's GBR and play a vital role in climate change mitigation through their business practices (e.g. eco-tourism certification), and by educating their customers with interpretation and targeted messages to ensure visitor impacts are minimised (Goldberg et al., 2018). It is apparent that a knowledge gap remains in understanding how snorkellers' environmental concerns affect their behaviour in sensitive environmental settings such as coral reefs.

Understanding the drivers of ECB may assist management authorities and marine tour operators develop education activities that will enhance snorkellers' coral reef experience as well as protecting the reef from unintentional damage from this cohort of tourists.

Assessing snorkellers' environmentally conscious behaviour

To develop a theoretical framework able to predict a snorkeller's ECB, the Environmentally Conscious Behaviour Model (ECBM) is proposed. The ECBM is based on the Norm Activation Model (NAM) which states that a person's altruistic behaviour is causally affected by a morality to act on their personal norms (Schwartz, 1977). Several researchers have proposed extending the model (Buchs, 2017; Ritchie et al., 2022), while others combined the NAM with alternative theories, such as the value-belief norm (Ozekici, 2022). Ritchie et al.'s (2022) application of the NAM to investigate visitor attitudes to GBR recovery strategies highlighted the appropriateness of using NAM and provides a useful review of the past use of NAM which is not repeated here.

This study proposes the ECBM as an extension of the NAM to include environmental and climate concerns of GBR snorkellers. This model replaces personal norms of the NAM with personal environmental norms (PEN) and proposes that they are activated by a snorkeller's level of climate concern (LCC). A snorkeller's environmental identity (EI) refers to their understanding of how they affect the natural environment (Perera et al., 2022) and is activated by their LCC. A snorkeller's environmentally conscious behaviour (ECB) reflects their willingness to minimise or change adverse behaviours that impact the environment (Perera et al., 2022) and is activated by their LCC. Two newer areas considered for activation by a snorkeller's LCC are energy conservation (EC) which is the conservation of power and water, and carbon footprint (CF) described as their propensity to attempt to reduce carbon emissions associated with travel. These activation proposals lead to the following hypotheses (see Figure 1):

H1: Level of climate concern (LCC) has a positive effect on environmentally conscious behaviour (ECB).

H2: LCC has a positive effect on environmental identity (EI).

H3: LCC has a positive effect on personal environmental norms (PEN).

H4: LCC has a positive effect on energy conservation (EC).

H5: LCC has a positive effect on carbon footprint (CF).

Once activated by their LCC, a snorkeller's personal environmental norms (PEN) activate their environmentally conscious behaviour (ECB), and their environmental identity (EI). This provides the following hypotheses:

H6: PEN has a positive influence on ECB.

H7: PEN has a positive influence on EI.

Once a snorkeller's environmental identity (EI) is activated, it influences their environmentally conscious behaviour (ECB).

H8: EI has a positive influence on ECB.

Both a snorkeller's energy conservation (EC) and carbon footprint (CF) influence their environmental identity.

H9: EC has a positive influence on EI.

H10: CF has a positive influence on EI.

Methods

Procedure

This study aligns with positivism, which generally focuses on identifying explanatory associations and causal relationships (Jennings, 2010). Using convenience sampling, a self-administered questionnaire was distributed to collect the views of both domestic and international snorkelling tourists to the northern section of the GBR (departing from Cairns; Figure 2). This method was chosen due to its suitability for this study in capturing as many snorkellers as possible immediately after the snorkelling experience. Data collection took place in January, February, June, and August 2018 resulting in the sample including both summer and winter visitors. Permission was gained from reef tourism operators for a research assistant to travel on their vessel. Initial contact was made with potential participants on their homeward journey. Tourists who agreed to complete the questionnaire were provided with an information sheet, and questionnaire which took approximately ten minutes to complete. Prior to conducting the questionnaire, ethics approval was received from the

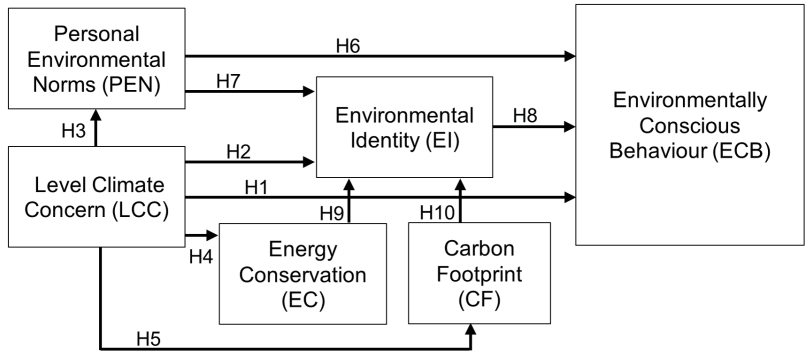

Figure 1. Proposed environmentally conscious behaviour model (ECBM).

lead researcher's home university (Approval no. H1609-252).

Research instrument and measures

Questions contained a mix of open-ended and closed questions using Likert scales to enquire about respondents' views on environmental issues, and their environmental attitudes and behaviours (consciousness). Demographic questions included gender, age (recoded to age groups), education, and country of origin. The questionnaire included: nine items relating to environmental issues which were measured on a 4-point scale ranging from "not concerned" to "totally concerned"; seven items relating to personal belief about environmental matters were measured on a 5-point scale ranging from "strongly disagree" to "strongly agree"; fourteen behavioural items which were measured on a 5-point scale, ranging from "always" to "never"; five items on respondents' willingness to change personal habits after spending a day on the GBR which were measured on a 4-point scale ranging from "never" to "always." These measures were adapted from DEFRA (2008), Minton and Rose (1997) and Fraj and Martinez (2007) to address the various research objectives. The questionnaire was pretested with five snorkellers who had visited the GBR, and appropriate adjustments made to reduce any ambiguities.

Data analysis

Data were analysed using SPSS version 28. Descriptive analysis was undertaken to identify respondent profiles and opinions relating to the GBR. A thematic analysis was then conducted to identify themes across the open-ended questions, such as "What is the single most important environmental issue facing the GBR?" and "How do snorkellers cause damage to the GBR?" Next, four principal component analyses (PCA) were conducted on nine questions relating to environmental issues, fourteen questions relating to ECB, seven questions relating to personal belief, and five questions relating to the influence of spending a day on the GBR. Using varimax rotation, small coefficients with an absolute value below .40 were suppressed, and coefficients, significance levels, determinants, and KMO and Bartlett's test of sphericity investigated. Reliability was checked using Cronbach's alpha, and regression analysis was conducted.

Sample and demographics

A total of 340 questionnaires were distributed, and after cleaning, 273 usable surveys were retained for analysis. The data consist of 46.1% males, and 53.9% females. Table 1 shows age range, education, and country/area of origin, with most respondents from Australia and New Zealand, the U.S.A. and Canada.

Results

Satisfaction with GBR experience

The majority of respondents (85.6% of Australians and 92.6% of internationals) were "satisfied" or "very satisfied" with the coral cover (see Table 2).

Figure 2. The GBR with Cairns indicated (adapted from GBRMPA, 2019).

Table 1. Demographic details of respondents.

Variable	Description	Percentage
Country origin/area	Australia & New Zealand	30.8
	U.S.A. & Canada	31.1
	UK & Ireland	10.3
	Mainland Europe	13.2
	Asia	11.0
	Other	2.6
	Missing	1.1
Gender	Male	46.1
	Female	53.9
Age range	18–29	18.3
	30–39	20.9
	40–49	11.4
	50–59	17.9
	60–69	20.9
	70+	10.6
Education	Postgraduate	11.2
	Undergraduate	51.3
	Diploma	16.4
	TAFE	8.2
	Secondary	11.9
	Other	1.1
First visit Australian	Yes	73.1
	No	26.9
First visit International	Yes	92.7
	No	7.3

Note: TAFE = Technical and Further Education.

Identifying the level of snorkellers' concern towards environmental issues

Using an opened-ended question, respondents were asked to outline the single most important environmental issue facing the GBR in their opinion. A thematic analysis was conducted employing the following definition of global warming and climate change:

> Global warming refers only to the Earth's rising surface temperature, while climate change includes warming and the "side effects" of warming—like melting glaciers, heavier rainstorms, or more frequent drought. Said another way, global warming is one symptom of the much larger problem of human-caused climate change. (Kennedy & Lindsey, 2015)

Table 2. Satisfaction with coral cover.

Level of satisfaction	Australia % ($n = 76$)	International % ($n = 190$)	All respondents % ($n = 266$)
Not at all satisfied	0.0	0.5	0.4
Dissatisfied	1.3	2.1	1.9
Neither dissatisfied nor satisfied	13.2	4.7	7.1
Satisfied	46.1	34.7	38.0
Very satisfied	39.5	57.9	52.6

This question was answered by 69 Australian and 173 international respondents. As shown in Figure 3, the greatest environmental concerns for the GBR identified by Australian respondents were climate change (37.6%), followed closely by global warming (30.4%) and pollution (15.9%). For international respondents, the greatest environmental concerns for the GBR were global warming (33.5%) followed by climate change (30.6%), pollution (24.2%), and tourism/tourists (24.2%). Pollution included keywords such as trash, rubbish, garbage, plastics, and litter. The mention of tourism/tourists was grouped separately from humans as the context of the answers was specific. Items that had a low level of concern included mining, farming, shipping, and industry, and were grouped together.

While tourism/tourists were identified as an environmental issue, respondents were not concerned with overcrowding. The majority of respondents (79.2%) indicated they were not concerned with the number of other snorkellers on the day of their visit. Respondents were also asked if they believed the number of snorkellers in the water was likely to cause any changes to the reef. There was a considerable difference in opinion with 38.4% of Australian respondents indicating they thought the number of snorkellers would cause damage compared to 64.8% of international respondents.

Respondents who considered the number of snorkellers in the water could cause damage to the GBR were asked in an open-ended question why they thought this was the case. Figure 4 outlines the main reasons for concern (Australia $n = 29$; International $n = 117$). Snorkellers standing on or touching the reef was the main concern for both Australians (58.6%) and Internationals (52.9%). A quarter of international respondents (24.7%) were also concerned about the potential for accidently "bumping" or "kicking" the reef. Too many tourists being in one place was a concern for 20.6% of Australian and 17.1% of international respondents. A further 17.2% of Australian respondents were concerned with rubbish being left behind in the ocean, and sunscreen polluting the reef.

Preferred approaches to education about environmental challenges facing the GBR

Respondents were asked about the best way to educate snorkellers about environmental challenges for the GBR (Australia $n = 57$, International $n = 145$).

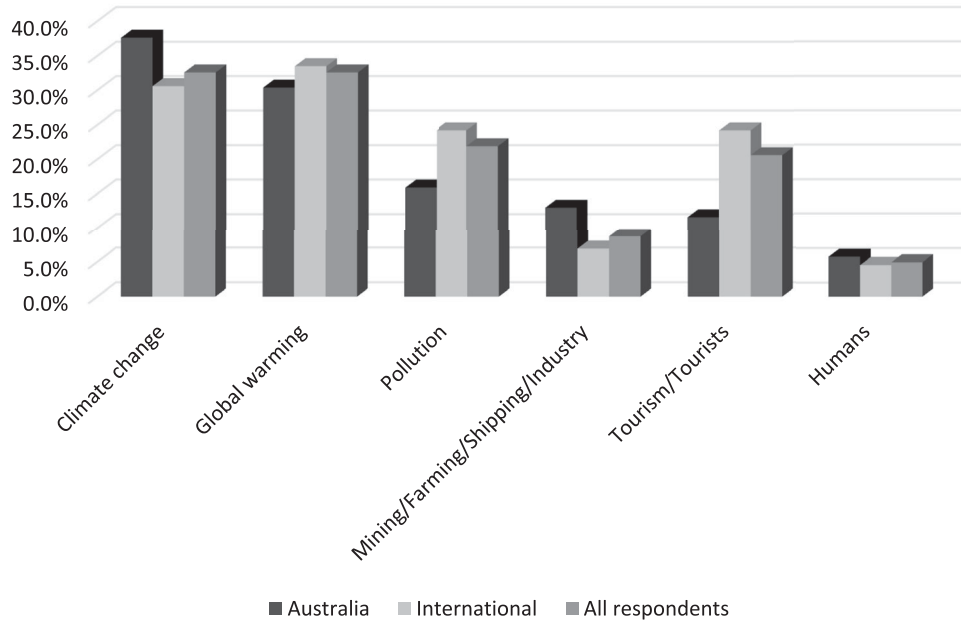

Figure 3. Environmental issues facing the GBR (n = 242).

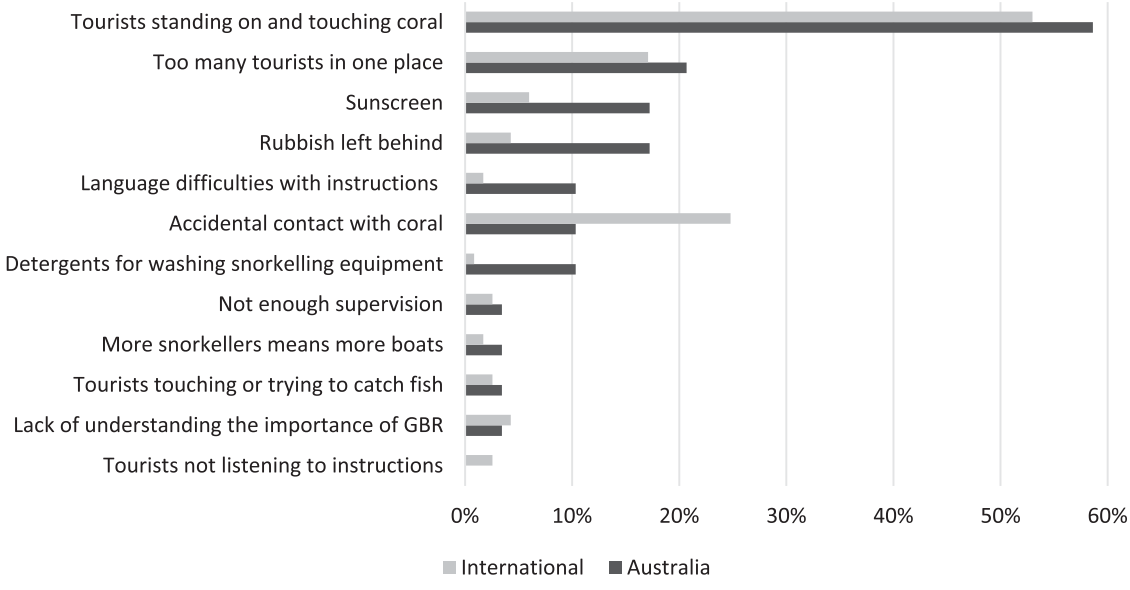

Figure 4. Reasons why snorkellers may cause changes to the GBR (n = 146).

Providing visual aids such as photos, videos, and tours of damaged areas of the GBR were suggested by respondents as effective ways to educate snorkellers about the environmental challenges facing the reef (see Figure 5). Another approach identified by 43.8% of Australian respondents is to ensure all information to tourists is provided in multiple languages. Other approaches suggested by participants are shown in Figure 5 and include compulsory attendance talks on the way to the GBR, instructional snorkelling courses and cheaper guided snorkelling tours.

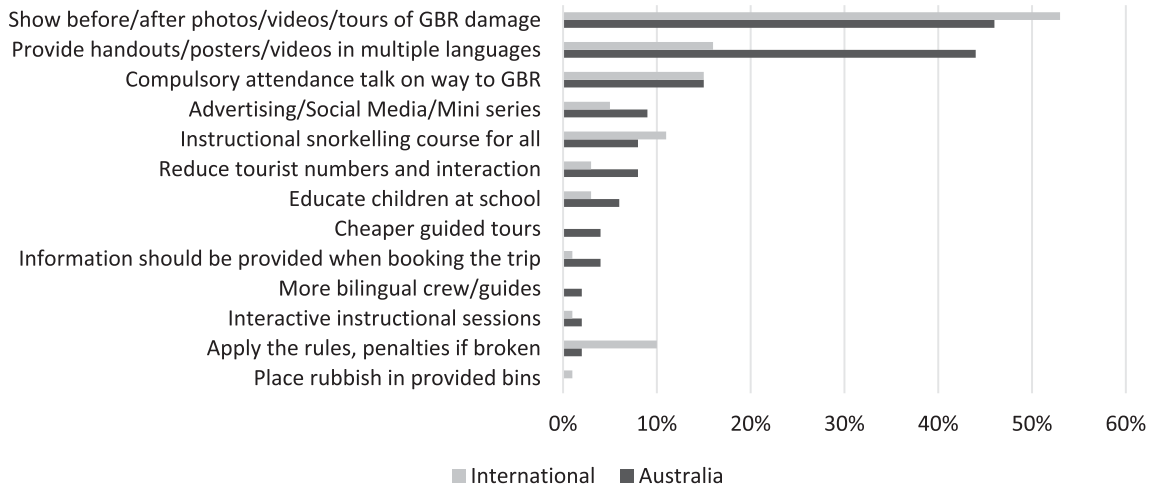

Figure 5. The best way to educate snorkellers about environmental challenges to the GBR (n = 202).

Snorkellers' environmental activities at home (EAH)

The first PCA conducted on the EAH items identified one item ("share environmental awareness links with social media friends") for removal as it failed to load on any of the three factors identified. The three factors are named according to EAH actions: (1) Personal environmental norms (PEN) (2) Energy conservation (EC); and (3) Carbon footprint (CF). These three factors all had eigenvalues greater than 1 and accounted for a total of 50.48% of the total variance (Table 3). To test internal consistency, Cronbach's alpha was calculated for items retained in each factor, and all items indicated acceptable levels of internal consistency (see Tables 3–6).

The first factor, personal environmental norms, demonstrates the value and attention snorkellers give to recycling, food kilometres, and product packaging. The second factor, energy conservation, demonstrates the importance placed on activities within the home; and the third factor, carbon footprint, demonstrates the importance placed on mobility and carbon emissions.

Snorkellers' concerns with environmental issues

The second PCA was conducted on items relating to concern for environmental issues (Table 4). All items loaded on one factor, meaning the scale of items

Table 3. Principal component analysis (n = 273) – Environmental activities at home (EAH).

Factor and items	Item loadings	Eigenvalue	Variance explained %	Cronbach's alpha
Factor 1: PEN		3.45	26.55	.72
Take your own bag when shopping	.691			
Don't buy something that is over-packaged	.646			
Buy recycled paper	.634			
Buy locally grown food	.608			
Recycle at home as much as possible	.557			
Dispose of batteries in special collection boxes	.534			
Factor 2: EC		1.76	13.55	.71
Switch off lights not being used	.763			
Turn off electrical appliances not in use	.756			
Try to conserve water	.739			
Factor 3: CF		1.35	10.39	.64
Walk or cycle if journey less than 3kms	.778			
Use public transport, not own car	.762			
Car share for similar journey	.584			
Take fewer flights when possible	.525			

KMO = .747; Bartlett's test of sphericity = $\chi^2(78, n = 273) = 752.398$, $p < .001$.

Table 4. Principal component analysis ($n = 273$) – Level of climate concern (LCC).

Factor and items	Item loadings	Eigenvalue	Variance explained %	Cronbach's alpha
Factor: LCC		4.60	51.11	.88
Concern with industrial pollution	.789			
Concern with marine pollution	.765			
Concern with motor vehicle pollution	.756			
Concern with the extinction of plants & animals	.739			
Concern with air quality	.718			
Concern with deforestation	.672			
Concern with landfill/rubbish	.671			
Concern with climate change	.667			
Concern with food contamination by pesticides	.641			

KMO = .909; Bartlett's test of sphericity = $\chi^2(36, n = 273) = 968.041$, $p < .001$.

Table 5. Principal component analysis ($n = 273$) – Environmental identity (EI).

Factor and items	Item loadings	Eigenvalue	Variance explained %	Cronbach's alpha
Factor: EI		2.37	47.31	.71
The environmental crisis facing humanity has been exaggerated	.778			
I am not willing to go out of my way to improve the environment, it's the government's job	.677			
I would not sacrifice my home comforts to save energy	.656			
I don't believe my behaviour & everyday lifestyle contributes to climate change	.605			
Economic growth is more important than the environment	.554			

KMO = .767; Bartlett's test of sphericity = $\chi^2(10, n = 273) = 241.439$, $p < .001$.

Table 6. Principal component analysis (n = 273) – Environmentally conscious behaviour (ECB).

Factor and items	Item loadings	Eigenvalue	Variance explained %	Cronbach's alpha
Factor: ECB		2.88	57.56	.81
I would pay more for products whose production & packaging does less damage to the environment	.845			
I am prepared to suffer some apparent inconveniences for the sake of a better today & tomorrow	.775			
I am willing to contribute to charities that focus on conservation and preservation	.744			
I would be willing to stop buying products from companies that I believe are polluting the environment	.742			
I would be willing to buy only organic food to help the environment if there is not too much of a premium over regular food	.678			

KMO = .820; Bartlett's test of sphericity = $\chi^2(10, n = 273) = 432.581$, $p < .001$.

was unidimensional (Vaske et al., 2017). The factor, named level of climate concern (LCC), loaded with an eigenvalue greater than 1, and accounted for 51.11% of variance. Cronbach's alpha indicated good internal consistency of the items within the factor at .88.

Snorkellers' personal beliefs

The first PCA conducted on the personal belief questions identified two items ("we need stricter laws to protect the environment" and "taxes on pollution should be increased to pay for damage to the environment") for removal as they failed to load. After the two items were removed, another PCA was conducted on the personal belief questions and Table 5 shows the loadings of all items for the factor of environmental identity (EI). All remaining items in this factor address the importance snorkellers place on the environment over themselves. This factor loaded with an eigenvalue greater than 1 and accounted for 47.31% of variance. Cronbach's alpha indicated an acceptable level of internal consistency of the items within the factor at .71.

The influence of spending a day on the GBR

The final PCA conducted on questions relating to the influence of spending a day on the GBR revealed that items loaded on one factor (unidimensional). The factor was named environmentally conscious behaviour (ECB) and loaded with an eigenvalue greater than 1 and accounted for 57.56% of variance (Table 6). Cronbach's alpha reliability test indicated good internal consistency at .81.

Regression results

Results in Table 7 show that a snorkeller's LCC had a significant positive effect, and thus activates their ECB, their EI, and their PEN. However, LCC has no effect on their EC or CF. The snorkellers' PENs have a significant positive effect on their ECB, and their EI. The snorkellers' EI has a positive significant effect on their ECB. A snorkeller's EC has a significant positive effect on their EI. However, their CF has no effect on their EI.

Discussion

In addressing the first research objective (level of concern about environmental issues), one-third of respondents (32.6%) agreed that climate change and global warming were the largest threats to the GBR (see Figure 3). Other threats were pollution (21.9%), and tourism/tourists (20.6%). The number of snorkellers in the water appeared to be of greater concern to international respondents (64.8%) than Australian respondents (38.4%).

Although GBRMPA (2022) reports snorkellers on the GBR cause minimal impact to coral, 57.4% of respondents believe snorkellers can damage the reef. The majority of these respondents felt standing on or touching the coral reef caused the greatest damage. Other perceived impacts include accidently bumping or kicking the reef, pollution (by snorkellers), and sunscreen (see Figure 4). Increases in tourism in an area have the potential to ruin specific areas through uncontrolled tourism, misuse, or overuse of the resource (Gil et al., 2015; Porter, 2018), particularly if the coral is part of a shallow water reef (Harahab et al., 2020).

Table 7. Regression results for hypothesis.

	R^2	*F*	β	*t*	*p*	Results
H1	.212	74.01	.463	8.60	<.001	supported
H2	.225	79.77	.477	8.93	<.001	supported
H3	.073	22.30	.276	4.72	<.001	supported
H4	.005	2.32	.092	1.52	.129	not supported
H5	.000	1.08	.063	1.04	.300	not supported
H6	.098	30.69	.319	5.54	<.001	supported
H7	.048	14.74	.227	3.84	<.001	supported
H8	.145	46.96	.384	6.85	<.001	supported
H9	.028	8.94	.179	2.99	<.010	supported
H10	-.003	.07	.02	.27	.791	not supported

While respondents demonstrated a high level of concern for the GBR, they were very positive about their experience. For example, 79.2% of respondents were not concerned with the number of other snorkellers in the water on the day of their visit, and 90.6% indicated they were "satisfied" or "very satisfied" with the coral cover (see Table 2). The respondents' satisfaction with their experience may be due, in part to the GBR being one of the best managed coral reef systems in the world (Prideaux & Pabel, 2018).

The second research objective was to ascertain respondents' perspectives on the best approach to educate snorkellers about environmental challenges facing the GBR. Interpretation is a valuable tool for generating public support for conservation, however, its implementation depends on individual tour operators. The literature suggests tourists to the GBR require more education on their impacts (Goldberg et al., 2018). The results of this study agree, however answers from respondents go further, suggesting snorkellers (tourists) require more direct examples of the damage that occurs to the GBR when rules and instructions are ignored, in contrast to where visitors are careful to obey rules and instructions given prior to entering the water. Respondents suggest this could be achieved using photos and/or videos, or tours of areas that have been damaged by snorkellers to compare with pristine areas of the GBR (see Figure 5). This finding is significant since it shows that respondents consider it important for tourism operators to show visual aids such as photos and videos or conduct tours to educate snorkellers about the damage caused by their activities on the GBR. By showing the areas that have been damaged by snorkellers and comparing them to pristine areas of the reef, snorkellers may gain a better understanding of the impact their activities can have on the ecosystem. This approach may help to encourage snorkellers to modify their behaviour and reduce their impact on the reef.

Other suggestions include the availability of all instructional resources in multiple languages, provision of handouts, posters, compulsory educational talks on the way to the reef, instructional snorkelling

courses for all, cheaper guided snorkelling tours, and application of rules and penalties if rules are broken. Suggestions for education of the general population included using advertising, social media, and a series of TV short documentaries to demonstrate the reality of threats to the GBR.

Compulsory educational talks on the way to the reef suggested by respondents may be complemented by educational debrief talks on the homeward voyage. This approach could lead tourists to emotionally connect with what they have encountered, for example, particular coral types or marine species such as sharks. The profundity (or greatness) of the experience may generate motivation for participants to learn more about what they have seen and a greater desire to protect it (Apps et al., 2017). This was seen in a study by Clark et al. (2019) using the theory of planned behaviour (TPB) where after experiencing whales, tourists behaved in a more pro-environmental way. Previous research has also indicated the importance of the role of interpreters/naturalists in influencing the overall audience perception of a tour (de Lima, 2016). This aligns with respondents' suggestions (see Figure 5) about using guides to deliver interactive instructional sessions and offering instructional snorkelling courses to educate snorkellers about environmental challenges. Likewise, respondents considered it helpful for tour crews to be multilingual. However, Eilam and Trop (2012) acknowledge influencing adults' attitudes via educational strategies alone is more complex than influencing their behaviour.

The final research objective was to develop a theoretical framework to predict how to increase a snorkeller's ECB. The initial PCA revealed three factors according to environmental activities at home (EAH): personal environmental norms (PEN), energy conservation (EC), and carbon footprint (CF). The next three PCA results provided three unidimensional factors (Vaske et al., 2017), level of climate concern (LCC), environmental identity (EI), and environmentally conscious behaviour (ECB). The resulting factors formed the Environmentally Conscious Behaviour Model (ECBM) which is based on the NAM. In the model, initial activation occurs via the level of climate concern (LCC) of snorkellers. LCC has a significant and positive effect on a snorkeller's ECB, PENs, and EI. In turn, PENs have a significant positive effect on a snorkeller's ECB, and EI. EC also has a positive effect on a snorkeller's EI. CF does not influence a snorkeller's EI, but this may not be unusual. CF relates to travel reduction activities undertaken by snorkellers, however some tourists/travellers do not seem to link their movement by aircraft or other means as contributing to climate change (Buchs, 2017).

By developing a new theoretical framework on snorkeller's ECB, the study adds to the theoretical conversation with the literature particularly in regard to environmental awareness, personal environmental norms and identity theory (Ates, 2020; Han, 2015). Our findings indicate that the level of climate concern a respondent has predicts their personal environmental norms (undertaking sustainable actions at home), their environmental identity (putting the environment first), and an increase in the level of their environmentally conscious behaviour. Eilam and Trop (2012, p. 2213) noted the influence of an individual's action in achieving great outcomes by stating that "changes in environmental behaviour on a personal level can lead to changes in sustainability on a societal level." One outcome of environmental education is to improve environmental literacy, defined as "the capacity to perceive and interpret the relative health of environmental systems and to take appropriate action to maintain, restore, or improve the health of those systems" (Karimzadegan & Meiboudi, 2012, p. 405). The results of this study indicate that a trip to the GBR leaves an impression on tourists which is demonstrated through their new, and thoughtful suggestions in relation to educating snorkellers about threats to the GBR. Any environmental awareness education is important in making snorkellers understand their role in engaging in pro-environmental behaviour (Kollmuss & Agyeman, 2002).

Conclusion

This study contributes to the understanding of environmental awareness and behaviour of snorkellers, a topic which has been largely ignored although this group represent a much larger market than scuba divers. The results provide new insights into GBR snorkellers and contribute to theory via the development of a new framework, the ECBM, that uncovers the importance of a person's level of climate concern in influencing their personal environmental norms, environmental identity, and ultimately their environmentally conscious behaviour. These findings add to the theoretical discussions on snorkellers' ECB and contribute to the extant literature on environmental awareness, personal environmental norms and

identity theory of this particular tourist segment (Ates, 2020; Han, 2015).

The results can assist environmental agencies by providing data that may be used in the development of visitor management and education strategies. Snorkellers were more likely to be concerned about the environment and engage in sustainability activities at home. This study further contributes to the literature (Apps et al., 2017; Coghlan et al., 2011) by outlining the preferred strategies identified by respondents to educate snorkellers, and to influence conservation activities. This study also found that spending just day on the GBR can positively influence snorkellers' ECB.

This study has practical implications for tour operators by showing that visitor expectations can be better managed through more specific education strategies including marine briefings, leading to increased visitor education, and satisfaction. The visitors themselves need to be better informed about how they can protect the GBR through their actions by becoming more environmentally aware, which may encourage them to improve their ECB, leading to an overall healthier environment. While the conservation-recreational use nexus poses constant challenges to managers of marine protected areas as well as reef tourism operators (Martin et al., 2017), environmental education or interpretation should be used to reinforce or enhance visitors' environmental awareness. Respondents indicated that one of the most effective ways to educate visitors in relation to damage to the GBR is "seeing is believing," by taking snorkellers on a tour of reef sites damaged by tourist activities, and then take them to areas where rules and regulations are strictly adhered to. This approach provides the visitors with first-hand knowledge which may improve their ECB and be passed on (by word-of-mouth) to other potential visitors to the GBR.

Several limitations should be noted including convenience sampling as a potential source of sampling bias. Research on tourists' attitudes and behaviours may contain social desirability biases due to reporting answers based on societal acceptance, which also affects the reliability and validity of results. Moreover, data collection took place prior to the COVID-19 pandemic, however visitation to the GBR in 2022 is close to pre-COVID visitation levels at just over 2 million total visitor days, indicating that understanding snorkellers' environmental concerns is still critical for protecting the reef from unintentional damage from this cohort of tourists. The education level of respondents was not considered a usable variable as it skewed towards higher degrees with over 60% of respondents reported a university education. Further research could consider a follow-up survey with visitors to ascertain any changes to their environmentally conscious behaviour once they arrive back in their home environments.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Anja Pabel http://orcid.org/0000-0003-1409-5496
Leonie J. Cassidy http://orcid.org/0000-0003-2409-0971
Bruce R. Prideaux http://orcid.org/0000-0002-3577-1951

References

Andersen, M. S., & Miller, M. L. (2006). Onboard marine environmental education: Whale watching in the San Juan Islands, Washington. *Tourism in Marine Environments*, *2*(2), 111–118. http://www.cognizantcommunication.com/

Apps, K., Dimmock, K., Lloyd, D. J., & Huveneers, C. (2017). Is there a place for education and interpretation in shark-based tourism? *Tourism Recreation Research*, *42*(3), 327–343. https://doi.org/10.1080/02508281.2017.1293208

Ates, H. (2020). Merging theory of planned behaviour and value identity personal norm model to explain pro-environmental behaviours. *Sustainable Production and Consumption*, *24*, 169–180. https://doi.org/10.1016/j.spc.2020.07.006

Australian Institute of Marine Science (AIMS). (2023). Coral bleaching events. https://www.aims.gov.au/research-topics/environmental-issues/coral-bleaching/coral-bleaching-events

Buchs, M. (2017). The role of values for voluntary reductions of holiday air travel. *Journal of Sustainable Tourism*, *25*(2), 234–250. https://doi.org/10.1080/09669582.2016.1195838

Clark, E., Mulgrew, K., Kannis-Dymand, L., Schaffer, V., & Hoberg, R. (2019). Theory of planned behaviour: Predicting tourists' pro-environmental intentions after a humpback whale encounter. *Journal of Sustainable Tourism*, *27*(5), 649–667. https://doi.org/10.1080/09669582.2019.1603237

Coghlan, A. (2012). Linking resource management to tourist satisfaction: A study of Australia's GBR. *Journal of Sustainable Tourism*, *20*(1), 41–58. https://doi.org/10.1080/09669582.2011.614351

Coghlan, A., & Carter, L. (2020). Serious games as interpretive tools in complex natural tourist attractions. *Journal of Hospitality and Tourism Management*, *42*, 258–265. https://doi.org/10.1016/j.jhtm.2020.01.010

Coghlan, A., Fox, K. R., Prideaux, B., & Lück, M. (2011). Successful interpretation in Great Barrier Reef tourism: Dive in or keep out of it? *Tourism in Marine Environments*, *7*(3-4), 167–178. https://doi.org/10.3727/154427311X13195453162813

Curnock, M. I., Marshall, N. A., Thiault, L., Heron, S. F., Hoey, J., Williams, G., Taylor, B., Pert, P. L., & Goldberg, J. (2019). Shifts in tourists' sentiments and climate risk perceptions following mass coral bleaching of the Great Barrier Reef. *Nature Climate Change*, *9*(7), 535–541. https://doi.org/10.1038/s41558-019-0504-y

Danovaro, R., Bongiorni, L., Corinaldesi, C., Giovannelli, D., Damiani, E., Astolfi, P., Greci, L., & Pusceddu, A. (2008). Sunscreens cause coral bleaching by promoting viral infections. *Environmental Health Perspectives*, *116*(4), 441–447. https://doi.org/10.1289/ehp.10966

DEFRA. (2008). *A framework for pro-environmental behaviours*. Department for Environment, Food and Rural Affairs. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69278/pb13574-behaviours-annexes-080110.pdf

de Lima, I. B. (2016). Pivotal role of tour guides for visitors' connection with nature: Conceptual and practical issues. *International Journal of Humanities and Applied Science*, *5*(1), 18–22.

Den Haring, S. D., & Sutton, S. G. (2019). Comparing intended, self-reported, and observed behaviour of snorkellers in the Mombasa Marine Park and Reserve, Kenya. *Tourism in Marine Environments*, *14*(1–2), 1–17. https://doi.org/10.3727/154427318X15369841121725

Ding, R. (2021). Analysis of environmental sustainability by causal loop diagram and system dynamic model – a case of the Great Barrier Reef. *IOP Conference Series: Earth and Environmental Science*, *651*(4), 1–9. https://doi.org/10.1088/1755-1315/651/4/042002

Eilam, E., & Trop, T. (2012). Environmental attitudes and environmental behaviour – which is the horse and which is the cart? *Sustainability*, *4*(9), 2210–2246. https://doi.org/10.3390/su4092210

Esparon, M., Stoeckl, N., Farr, M., & Larson, S. (2015). The significance of environmental values for destination competitiveness and sustainable tourism strategy making: Insights from Australia's Great Barrier Reef world heritage area. *Journal of Sustainable Tourism*, *23*(5), 706–725. https://doi.org/10.1080/09669582.2014.998678

Fraj, E., & Martinez, E. (2007). Ecological consumer behaviour: An empirical analysis. *International Journal of Consumer Studies*, *31*(1), 26–33. https://doi.org/10.1111/j.1470-6431.2006.00565.x

Giglio, V. J., Luiz, O. J., Chadwick, N. E., & Ferreira, C. E. (2018). Using an educational video- briefing to mitigate the ecological impacts of scuba diving. *Journal of Sustainable Tourism*, *26*(5), 782–797. https://doi.org/10.1080/09669582.2017.1408636

Gil, M. A., Renfro, B., Figueroa-Zavala, B., Penie, I., & Dunton, K. H. (2015). Rapid tourism growth and declining coral reefs in Akumal, Mexico. *Marine Biology*, *162*(11), 2225–2233. https://doi.org/10.1007/s00227-015-2748-z

Goldberg, J., Birtles, A., Marshall, N., Curnock, M., Case, P., & Beeden, R. (2018). The role of Great Barrier Reef tourism operators in addressing climate change through strategic communication and direct action. *Journal of Sustainable Tourism*, *26*(2), 238–256. https://doi.org/10.1080/09669582.2017.1343339

Great Barrier Reef Marine Park Authority. (2019). *Great Barrier Reef Outlook Report 2019*. GBRMPA. Townsville. https://elibrary.gbrmpa.gov.au/jspui/handle/11017/3474

Great Barrier Reef Marine Park Authority. (2022). Responsible Reef Practices. https://www2.gbrmpa.gov.au/access/responsible-reef-practices

Great Barrier Reef Marine Park Authority. (2023). Tourism visitation data. https://www2.gbrmpa.gov.au/help/tourism-visitation-data

Han, H. (2015). Travellers' pro-environmental behaviour in a green lodging context: Converging value-belief-norm theory and the theory of planned behaviour. *Tourism Management*, *47*, 164–177. https://doi.org/10.1016/j.tourman.2014.09.014

Hannak, J. S., Kompatscher, S., Stachowitsch, M., & Herler, J. (2011). Snorkelling and trampling in shallow-water fringing reefs: Risk assessment and proposed management strategy. *Journal of Environmental Management*, *92*(10), 2723–2733. https://doi.org/10.1016/j.jenvman.2011.06.012

Harahab, N., Riniwati, H., Utami, T. N., & Asmarawati, L. (2020). Improving management of marine ecotourism-based on the value of coral reefs vulnerability as a tourism attraction. In G. T. I. Tawakkal, W. Wike, N. Harahab, A. Utaminingsih, & A. S. Leksono (Eds.), *Iiss 2019 proceedings of the 13th international interdisciplinary studies seminar* (pp. 397–408). Springer. https://doi.org/10.4108/eai.23-10-2019.2293032

Hughes, L., Dean, A., Steffen, W., & Rice, M. (2018). Lethal consequences: Climate change impacts on the Great Barrier Reef. *Climate Council of Australia Limited, Technical Report*. https://www.climatecouncil.org.au/resources/climate-change-great-barrier-reef/

Jennings, G. (2010). *Tourism research* (2nd ed.). John Wiley & Sons.

Juvan, E., & Dolnicar, S. (2017). Drivers of pro-environmental tourist behaviours are not universal. *Journal of Cleaner Production*, *166*, 879–890. https://doi.org/10.1016/j.jclepro.2017.08.087

Karimzadegan, H., & Meiboudi, H. (2012). Exploration of environmental literacy in science education curriculum in primary schools in Iran. *Procedia – Social and Behavioral Sciences*, *46*, 404–409. https://doi.org/10.1016/j.sbspro.2012.05.131

Kennedy, C., & Lindsey, R. (2015, June 17). *What's the difference between global warming and climate change?* Climate.gov. https://www.climate.gov/news-features/climate-qa/whats-difference-between-global-warming-and-climate-change

Kim, M. S., & Stepchenkova, S. (2020). Altruistic values and environmental knowledge as triggers of pro-environmental behaviour among tourists. *Current Issues in Tourism*, *23*(13), 1575–1580. https://doi.org/10.1080/13683500.2019.1628188

Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour. *Environmental Education Research*, *8*(3), 239–260. https://doi.org/10.1080/13504620220145401

Kragt, M. E., Roebeling, P. C., & Ruijs, A. (2009). Effects of Great Barrier Reef degradation on recreational reef-trip demand: A contingent behaviour approach. *The Australian Journal of Agricultural and Resource Economics*, *53*(2), 213–229. https://doi.org/10.1111/j.1467-8489.2007.00444.x

Lamb, J. B., True, J. D., Piromvaragorn, S., & Willis, B. L. (2014). Scuba diving damage and intensity of tourist activities increases coral disease prevalence. *Biological Conservation*, *178*, 88–96. https://doi.org/10.1016/j.biocon.2014.06.027

Le, D., Scott, N., Becken, S., & Connolly, R. M. (2019). Tourists' aesthetic assessment of environmental changes, linking conservation planning to sustainable tourism development. *Journal of Sustainable Tourism*, *27*(10), 1477–1494. https://doi.org/10.1080/09669582.2019.1632869

Levine, A. (2020). Sunscreen use and awareness of toxicity among beach goers in Hawaii prior to a ban on the sale of sunscreens containing ingredients found to be toxic to coral reef ecosystems. *Marine Policy*, *117*, 1–7. https://doi.org/10.1016/j.marpol.2020.103875

Leviston, Z., Walker, I., & Morwinski, S. (2013). Your opinion on climate change might not be as common as you think. *Nature Climate Change*, *3*(4), 334–337. https://doi.org/10.1038/nclimate1743

Lück, M. (2015). Education on marine mammal tours–But what do tourists want to learn? *Ocean & Coastal Management*, *103*, 25–33. https://doi.org/10.1016/j.ocecoaman.2014.11.002

Martin, V. Y., Weiler, B., Reis, A., Dimmock, K., & Scherrer, P. (2017). Doing the right thing': How science can help foster pro-environmental behaviour change in marine protected areas. *Marine Policy*, *81*, 236–246. https://doi.org/10.1016/j.marpol.2017.04.001

Miller, I. B., Pawlowski, S., Kellermann, M. Y., Petersen-Thiery, M., Moeller, M., Nietzer, S., & Schupp, P. J. (2021). Toxic effects of UV filters from sunscreens on coral reefs revisited: Regulatory aspects for "reef safe" products. *Environmental Sciences Europe*, *33*(1), 1–13. https://doi.org/10.1186/s12302-021-00515-w

Minton, A. P., & Rose, R. L. (1997). The effects of environmental concern on environmentally friendly consumer behavior: An exploratory study. *Journal of Business Research*, *40*(1), 37–48. https://doi.org/10.1016/S0148-2963(96)00209-3

Ockwell, D., Whitmarsh, L., & O'Neill, S. (2009). Reorienting climate change communication for effective mitigation: Forcing people to be green or fostering grass-roots engagement? *Science Communication*, *30*(3), 305–327. https://doi.org/10.1177/1075547008328969

Ozekici, Y. K. (2022). Extending value-belief and norm theory with social identity for preventing food waste at restaurants. *Tourism Academic Journal*, *9*(1), 273–291.

Perera, C. R., Kalantari, H., & Johnson, L. W. (2022). Climate change beliefs, personal environmental norms and environmentally conscious behaviour intention. *Sustainability*, *14*(3), 1824–1839. https://doi.org/10.3390/su14031824

Piggott-McKellar, A. E., & McNamara, K. E. (2017). Last chance tourism and the Great Barrier Reef. *Journal of Sustainable Tourism*, *25*(3), 397–415. https://doi.org/10.1080/09669582.2016.1213849

Plathong, S., Inglis, G. J., & Huber, M. E. (2000). Effects of self-guided snorkeling trails on corals in a tropical marine park. *Conservation Biology*, *14*, 1821–1830. https://www.jstor.org/stable/2641533

Porter, B. A. (2018). Impacts of vessel-based day tours on coral reefs. In B. Prideaux, & A. Pabel (Eds.), *Coral reefs: Tourism, conservation and management* (pp. 212–223). Earthscan from Routledge.

Powell, R. B., & Ham, S. H. (2008). Can ecotourism interpretation really lead to pro-conservation knowledge, attitudes and behaviour? Evidence from the Galapagos Islands. *Journal of Sustainable Tourism*, *16*(4), 467–489. https://doi.org/10.1080/09669580802154223

Prideaux, B., & Pabel, A. (2018). Australia's Great Barrier Reef-protections, threats, value and tourism use. In B. Prideaux, & A. Pabel (Eds.), *Coral reefs: Tourism, conservation & management* (pp. 44–60). Earthscan from Routledge.

Prideaux, B., Pabel, A., Thompson, M., & Cassidy, L. (2019) The potential for coral bleaching to affect long-term destination sustainability. In Prideaux, B. & Pabel, A**.** (Eds.), *Coral reefs: Tourism, conservation and management*, Earthscan Oceans, (pp 75–92).

Renfro, B., & Chadwick, N. E. (2017). Benthic community structure on coral reefs exposed to intensive recreational snorkelling. *PLoS One*, *12*(9), e0184175. https://doi.org/10.1371/journal.pone.0184175

Ritchie, B., Prideaux, B., Thompson, M., & Demeter, C. (2022). Understanding tourists' attitudes towards interventions for the Great Barrier Reef: An extension of the norm activation model. *Journal of Sustainable Tourism*, *30*(6), 1364–1383. https://doi.org/10.1080/09669582.2021.1948048

Scannell, L., & Gifford, R. (2013). Personally relevant climate change: The role of place attachment and local versus global message framing in engagement. *Environment and Behaviour*, *45*(1), 60–85. https://doi.org/10.1177/0013916511421196

Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol 10, pp. 271–299). Academic Press.

Singh, A. S., Zwickle, A., Bruskotter, J. T., & Wilson, R. (2017). The perceived psychological distance of climate change impacts and its influence on support for adaptation policy. *Environmental Science and Policy*, *73*, 93–99. https://doi.org/10.1016/j.envsci.2017.04.011

Toyoshima, J., & Nadaoka, K. (2015). Importance of environmental briefing and buoyancy control on reducing negative impacts of scuba diving on coral reefs. *Ocean and Coastal Management*, *116*, 20–26. https://doi.org/10.1016/j.ocecoaman.2015.06.018

Ünal, A. B., Steg, L., & Gorsira, M. (2018). Values versus environmental knowledge as triggers of a process of activation of personal norms for eco-driving. *Environment and Behavior*, *50*(10), 1092–1118. https://doi.org/10.1177/0013916517728991

Vaske, J. J., Beaman, J., & Sponarski, C. C. (2017). Rethinking internal consistency in Cronbach's Alpha. *Leisure Sciences*, *39*(2), 163–173. https://doi.org/10.1080/01490400.2015.1127189

Vercelloni, J., Caley, M. J., & Mengersen, K. (2017). Crown-of-thorns starfish undermine the resilience of coral populations on the Great Barrier Reef. *Global Ecology and Biogeography*, *26*(7), 846–853. https://doi.org/10.1111/geb.12590

Webler, T., & Jakubowski, L. (2016). Mitigating damaging behaviours of snorkellers to coral reefs in Puerto Rico through a pre-trip media-based intervention. *Biological Conservation*, *197*, 223–228. https://doi.org/10.1016/j.biocon.2016.03.012

Whitmarsh, L., & Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology*, *30*(3), 305–314. https://doi.org/10.1016/j.jenvp.2010.01.003

Zhang, L.-Y., Chung, S.-S., & Qiu, J.-W. (2016). Ecological carrying capacity assessment of diving site: A case study of Mabul Island, Malaysia. *Journal of Environmental Management*, *183*(1), 253–259. https://doi.org/10.1016/j.jenvman.2016.08.075