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To cite this article: Annah E. Piggott-McKellar & Karen E. McNamara (2017) Last chance tourism and the Great Barrier Reef, Journal of Sustainable Tourism, 25:3, 397-415, DOI: [10.1080/09669582.2016.1213849](https://doi.org/10.1080/09669582.2016.1213849)

To link to this article: <https://doi.org/10.1080/09669582.2016.1213849>



Published online: 09 Aug 2016.



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Last chance tourism and the Great Barrier Reef

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ABSTRACT

The publically documented decline in health of the Great Barrier Reef (GBR) has led to its labelling, in media and academic literature, as a last chance tourism destination. That is, a place tourists travel to experience before it is gone. While the GBR has been labelled as such, no empirical evidence has identified that this is actually occurring. This article explores if tourists are motivated to visit the GBR to see it before it's gone, and examines the level of concern tourists have about the range of issues that are threatening the GBR. Drawing on 235 questionnaires with on-site tourists, the results indicate that tourists are seeking travel to the GBR in a bid to see the reef before it's too late. These tourists – identified as "seeking a last chance experience" – were also found to be more environmentally conscious, and have a higher level of concern about the overall health of the GBR. In terms of threats to the GBR, respondents indicated that they were mainly concerned about coral bleaching/disease and climate change, with tourism only considered as a moderate to low concern. The implications of this are discussed.

ARTICLE HISTORY

Received 6 January 2016

Accepted 26 June 2016

KEYWORDS

Climate change; Great Barrier Reef; last chance tourism; sustainable tourism; Australia

Introduction

Over the last decade or more, extensive attention has been directed at the threats facing the health and resilience of the Great Barrier Reef (GBR) in Queensland, Australia. These threats have included coastal development, agricultural run-off, tourism, port development, dredging, fishing and climate change (GBRMPA, 2014; Hughes, Day, & Brodie, 2015). These cumulative impacts have already been felt on the GBR with a substantial decline in coral cover over the last 40 years (Bellwood, Hughes, Folke, & Nyström, 2004; GBRMPA, 2014; Hughes et al., 2015). Based on projections, the GBR will continue to suffer from increased coral bleaching events, sea level rise and a decrease in water quality (GBRMPA, 2014; Hughes et al., 2015), resulting in possible ecosystem collapse by 2100 (Wolanski & De'ath, 2005). The significance of these threats and associated lag time before threats are actually felt in the region, coupled with the sheer size of the region, make it more difficult to protect and manage the GBR. Due to this, the future health of the GBR and its natural values remain, at best, uncertain (GBRMPA, 2014).

The declining health of the GBR has been heavily documented in both scientific literature (Bellwood et al., 2004; GBRMPA, 2014; Hughes et al., 2015; Wolanski & De'ath, 2005) and the media (Driver, 2014; Sturmer, 2015). In recent years, the media focus has been amplified with the United Nations Education, Scientific and Cultural Organisation (UNESCO) threatening to place the Great Barrier Reef World Heritage Area (GBRWHA) on the "in danger" list (Hughes et al., 2015; Sturmer, 2015). Public figures including Richard Branson have publically campaigned to back this move, proclaiming that the GBR is severely threatened by the impacts of

climate change (Mitchell, 2015). Others have also cast a negative light on the health of the GBR, including American President Barak Obama who stated: "The incredible natural glory of the Great Barrier Reef is threatened" (Murphy, 2014, p. 1). With such "doom and gloom" coverage of the long-term health of the GBR, it is important to consider how this negative attention is impacting tourism demand in the region.

The tourism industry on the GBR is important to Australia's economy, with over 1.9 million tourist visitor days in 2013 (GBRMPA, 2014). The industry supports 65,000 full-time jobs, through both direct and indirect employment, and provides \$5.2 billion dollars to the Australian economy annually (GBRMPA, 2014). As the tourism industry is vital to the region, there is likely to be growing concern surrounding how reef degradation will impact tourist visitation patterns (Kragt, Roebeling, & Ruijs, 2009). Some tourism managers on the GBR have expressed concern that increased reports pertaining to the deterioration of reef health will lead to increased visitation in the short term which in turn will lead to greater impacts on the region in the long term (Coghlan & Prideaux, 2007). Concerns such as this are especially relevant, as the GBR has been labelled as a potential last chance tourism (LCT) destination, which is when "tourists explicitly seek vanishing landscapes or seascapes, and/or disappearing natural and/or social heritage" (Lemelin, Dawson, Stewart, Maher, & Lueck, 2010, p. 478). This has occurred in the media, with Qantas running multiple articles on how to protect the GBR "before it is too late" (Southgate, 2007). In addition, the GBR is listed on numerous travel websites and magazines of places to see before they disappear (Gerstacker, 2015; Melko, 2013; Nelson, 2009), including TIME magazine's "10 Amazing Places to See Before They Vanish" (Gibson, 2014). The GBR has also been labelled and discussed as a potential LCT destination within academic literature (Coghlan, 2012; Dawson et al., 2011; Eijgelaar, Thaper, & Peeters, 2010; Frew, 2008; Lemelin et al., 2010; Lemelin, Stewart, & Dawson, 2012).

Given that the GBR is both an important economic commodity and natural ecosystem, this study aims to understand the motivations behind tourists' decisions to travel to the region. The motivations of tourists are useful to understand as this knowledge can help management bodies and policy-makers govern and market the region more effectively (Huang & Hsu, 2009) and help to ensure that local economies and environments are sustained in both the short and long term. This is especially pertinent in the case of LCT as this trend can lead to an increased level of tourism in the short term, leading to increased pressures on the natural environment, exacerbating the impacts from population pressures and climate change (Huebner, 2011). LCT is of increasing interest to tourism researchers and as a niche tourism market has the potential to have a significant impact on the destinations in which people are travelling to see before they disappear.

While a unique concept, LCT fits within debates surrounding the contradictions and paradoxes of the sustainable tourism industry (Weaver, Hughes, & Pforr, 2015). The nature and extent of these paradoxes are complex and broad but lie in the overarching notion that tourism can only be sustainable if it does not involve travel, thus rendering it impossible (Butler, 2015). The paradox most evident with LCT is that travel to a destination to witness it before it disappears is increasing carbon emissions through long-haul travel (especially as many of these locations are in remote areas) and thus adds to the destruction of the very destination (Dawson, Lemelin, Stewart, & Taillon, 2015). Dawson et al. (2015) notes a second paradox that environmental destruction can become an advantage in the tourism market. As Dawson et al. (2015, p. 134) appropriately states, "how can this form of tourism be considered sustainable when the entire foundation of its existence relies on taking advantage of and utilising that which is vulnerable?"

The GBR has been labelled in the media and academic literature as a potential LCT destination; however, whether tourists are in fact being motivated by this has yet to be conclusively shown through empirical evidence. Identifying LCT on the GBR therefore becomes the focus of this study. In addition, this study seeks to understand what tourists' level of concern is for a range of issues threatening the health of the GBR, in particular the impact they themselves are having on the region.

Overview of last chance tourism

LCT is a niche tourism market focused on witnessing and experiencing a place before it disappears. This tourism market can also be referred to as climate change, disappearing or vanishing, doom, dying, endangered or “see it before it’s gone” tourism (Lemelin et al., 2010). LCT emerged in mainstream media in the 1990s with a plethora of websites, travel blogs and books dedicated to destinations that needed to be seen before they disappeared (Lemelin et al., 2012). One such example was the radio documentary series and accompanying book presented and written by Douglas Adams and Mark Carwardine named “Last Chance to See”, released in 1989 and 1990, respectively. In this series the presenters travelled to numerous locations in a bid to witness species that were at risk of extinction. While the concept of LCT in popular press and literature appears to be a relatively new term, it is not a new phenomenon. This concept has been around for a long time with tourists travelling to witness places before they succumb to changes due to natural disasters such as earthquakes or volcanoes, as well as changes from human-induced activities such as land use changes and pollution (Urry, 2004, cited in Lemelin et al., 2012).

Figure 1, developed by Dawson, Stewart, Lemelin, and Scott (2010), illustrates the paradox associated with this particular niche tourism market. The paradox lies in tourists visiting a destination due to its perceived status of being in danger of disappearing forever, further deteriorating the destination through population pressure and on-site activities associated with tourism, as well as the carbon emissions associated with travel, adding to anthropogenic climate change. Collectively, these impacts can further deteriorate the natural value of the place and raise the destination status of it being in danger, creating an even greater market demand for LCT, reinforcing the cycle further.

Another model proposed by Dawson et al. (2011), shown in Figure 2, illustrates how LCT is a function of multiple interacting variables. Global environmental change creates the supply side for LCT as it impacts on places causing them to be vulnerable and in danger in the first place. Both the supply and demand sides of this tourism market can be influenced by externalities, such as habitat loss and media coverage of a deteriorating place, as they can directly impact on the tourism resource therefore making it vulnerable and causing the supply, but also exacerbate demand for it by advertising its impending disappearance. LCT then increases the already present pressures on the vulnerable

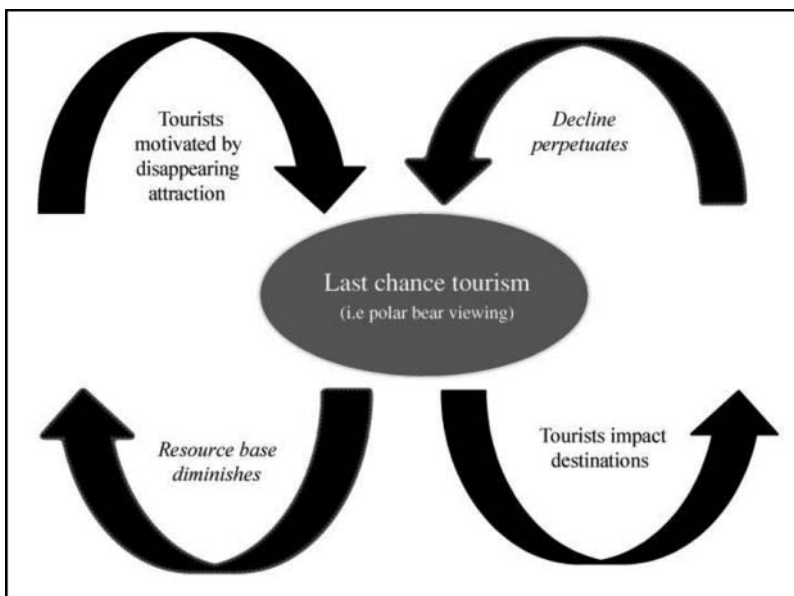


Figure 1. Model showing the paradox associated with LCT (Dawson et al., 2010).

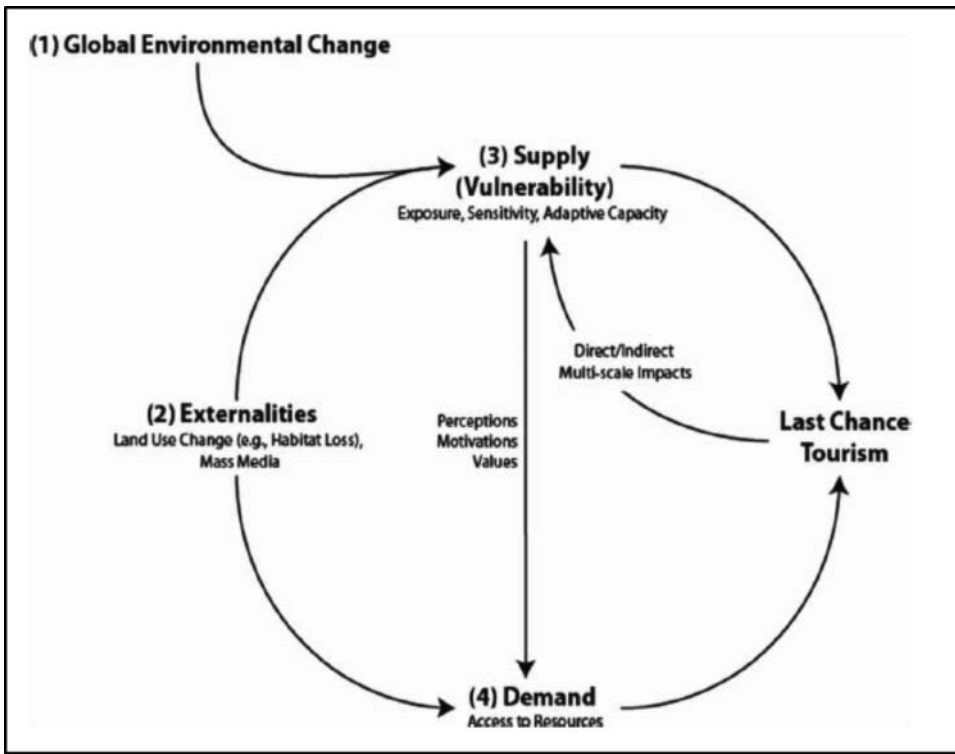


Figure 2. Model showing drivers associated with LCT (Dawson et al., 2011).

destination through both direct (tourist associated activities) and indirect (GHG emissions associated with travel) impacts, exacerbating the vulnerability of the destination.

Both models represent two fundamental aspects of LCT. The first is that demand is necessary for the LCT trend to exist, in that tourists need to be motivated to travel to the destination. The second key aspect of LCT is that tourists are having an impact, and further deteriorating the destination they are travelling to see before it's gone (Dawson et al., 2010; Dawson et al., 2011). These aspects of LCT are important to consider as the implications of increased visitation in the short term from increased demand can lead to exacerbated long-term impacts from increased visitation and associated impacts (Dawson et al., 2011).

In the current climate, LCT is occurring on an even larger scale with entire ecosystems at risk of disappearing within one's lifetime. This has been brought about largely from the level and rate at which humans are themselves contributing to changes to ecosystems, with the most obvious example being anthropogenic climate change (Lemelin et al., 2012), but also from changes in land use, increased levels of pollution, as well as growing population pressures.

The majority of current studies examining the LCT phenomenon focus on the polar regions (Dawson et al., 2010; Dawson et al., 2011; Eijgelaar et al., 2010; Frew, 2008; Johnston, Viken, & Dawson, 2012; Lamers, Eijgelaar, & Amelung, 2012; Lemelin et al., 2010; Maher, Johnston, Dawson, & Noakes, 2010; Stewart, Dawson, & Lemelin, 2012; Vila, Costa, Angulo-Preckler, Sarda, & Avila, 2016). Given that polar tourism relies so heavily on its environmental attributes and is significantly affected by a changing climate to a potential point of irreversibility (Maher et al., 2010), it is a good case study for LCT and thus has been the initial and dominant focus of LCT studies. Other destinations that have been studied are Malaysia (Ahmad, Azman, Darson, & Shamsudin, 2014), Mt Kilimanjaro (Frew, 2008) and the Pacific Islands (Farbotko, 2010; Huebner, 2011; Prideaux & McNamara, 2013). A study by Coghlan (2012) aimed to identify LCT on the GBR, however the results were inconclusive. In addition to

destinations, this trend has also been studied specific to tourism activities including skiing (Steiger, Dawson, & Stotter, 2012), wildlife viewing (Newsome & Rodger, 2012) and bird watching (Hvenegaard, 2012). There is also ongoing research into a range of aspects related to this niche market, including its perceived importance to stakeholders (Ahmed et al., 2014), the ethics and implications of this tourism trend (Dawson et al., 2011), the role of tourism operators in advertising LCT (Frew, 2008), and how climate change might lead to or influence tourist behaviour (Huebner, 2011). A recent study conducted by Dawson et al. (2015) looking at the prevalence of LCT publications over time showed an almost fourfold increase between 2008 and 2013. The majority of this increase was evident in online articles (39%) and blog posts (26%) (Dawson et al., 2015).

Despite the somewhat extensive range of literature on LCT, few studies have used empirical evidence to identify whether tourists are actually travelling as an opportunity to see the attractions before they disappear. Of the few that have aimed to identify this, they have been focused in Churchill Manitoba, specific to polar bear viewing tourists (Dawson et al., 2010), and Antarctica (Maher et al., 2010; Vila et al., 2016). The results of these studies show that some tourist decisions to travel have been influenced by LCT, to varying degrees. Dawson et al. (2010) conducted 334 tourist surveys and identified that the vulnerability of polar bears to a changing climate is influencing tourists' choice to travel. This was portrayed through tourist quotes such as: "I thought I better come see the bears because the next time I am in this country they will be all gone", and "I wanted to see the bears with my daughter because my grandchildren and their children may not ever know polar bears except in a zoo" (Dawson et al., 2010, p. 329). A study examining tourists visiting Antarctica by Vila et al. (2016, p. 9) states: "many visitors merely want a last chance to glimpse a vanishing world". While evidence exists to show this trend is occurring in these regions, the degree to which it is occurring in other areas, outside the polar regions, has not yet been identified. This study seeks to help fill this gap based on a case study of tourists visiting the GBR in Australia.

Study site: the Great Barrier Reef

The GBR is the largest living coral reef ecosystem on the planet stretching 2300 km from just north of Bundaberg in the south to above the tip of Queensland in the north (Figure 3). The Great Barrier Reef Marine Park was created in 1975, encompassing the GBR, and managed primarily by the Great Barrier Reef Marine Park Authority (GBRMPA) in collaboration with the Queensland Government under a joint management agreement. The width of the Marine Park fluctuates between 60 and 250 km, covering a total area of 344,400 km². The GBR is recognised as having Outstanding Universal Value, defined as "natural significance, which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity" (UNESCO, 2012, p. 14), and thus was inscribed as a World Heritage Area in 1981. The boundaries of the World Heritage Area, while very similar to that of the marine park, differ slightly.

The natural value of the GBR can be found in its high and unique biodiversity, which has gained it recognition as one of the most important ecosystems on the planet (GBRMPA, 2014). The GBR is home to over 400 species of hard coral, 150 species of soft coral, 1625 species of fish, as well as 30 species of whales and dolphins, six of the world's seven marine turtle species, dugongs, and numerous species of sharks, sea birds and molluscs, amongst others (GBRMPA, 2014). The region comprises numerous ecosystems (the most iconic of these are coral reefs), but also includes mangroves, seagrass meadows, open water and over 1000 islands (GBRMPA, 2014). All of these ecosystems are important and essential to the overall function and health of the region (GBRMPA, 2014). The GBR is important not only for its natural value but also due to its use for numerous commercial and non-commercial activities, almost all of which are reliant on the natural value and health of the GBR (GBRMPA, 2014).

The natural values of the GBR that make it an iconic and essential ecosystem and those that got it inscribed as a World Heritage Area are under threat from a range of activities and pressures. A study published by the Commonwealth of Australia in 2014 identified that 25 of the 42 metrics used to

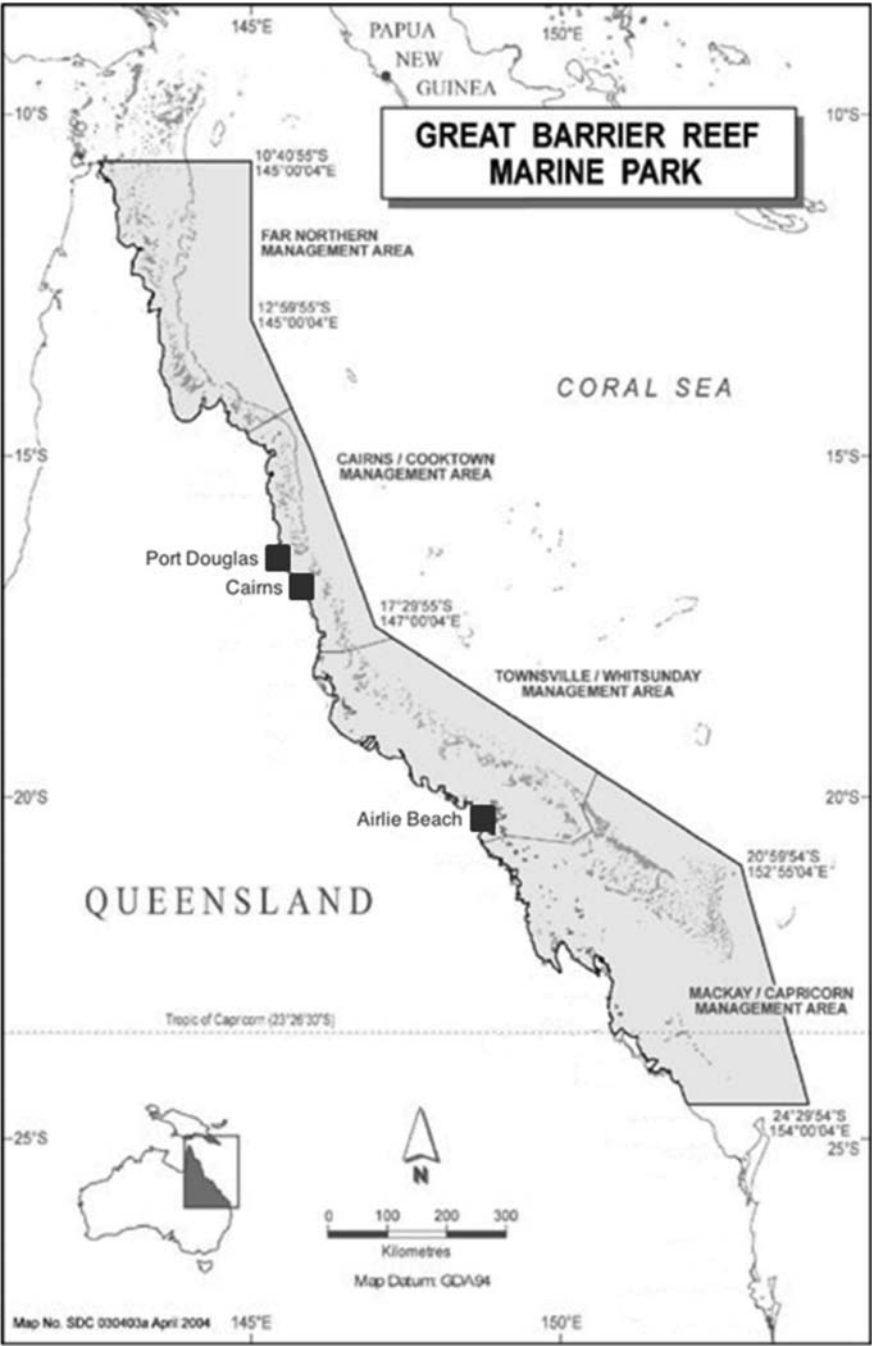


Figure 3. The GBR and the three locations (black squares) where data were collected for this study (adapted from GBRMPA, 2003).

measure the Outstanding Universal Value of the GBR have declined since inscription in 1981 (Hughes et al., 2015).

The threat to the health of the GBR comes from the cumulative impact of multiple sources that are on-site and external to the GBR. The most recent Outlook report, published by GBRMPA (2014) identifies the major factors that directly influence the ecosystem values of the region as coastal

development, land-based run-off, direct use of the region's resources (including the tourism industry), and of overarching concern, climate change. The impacts of climate change come in multiple forms with multiple subsequent impacts. Potentially the most dominant and devastating to the health and resilience of the GBR comes in the form of sea temperature increases, which have risen 0.12 °C per decade since 1950 (GBRMPA, 2014). In the last 20 years, the Coral Sea, which is home to the GBR has experienced 15 of its 20 warmest years with projections that temperatures could increase an additional 2.5° by 2100 (GBRMPA 2014). On the GBR, increasingly warming sea temperatures have led to three major coral bleaching events, which saw extensive amounts of coral deaths across the GBR in events in 1998 (Berkelmans & Oliver, 1999; GBRMPA, 2014) and 2002 (GBRMPA, 2014). As this article is being written, the GBR is in the midst of the most devastating bleaching event in its history with 95% of coral in the northern section of the reef now severely bleached, covering a stretch of over 1000 km (Pratchett & Lough 2016).

Given the focus of this study, we will discuss a little more closely the impacts from the tourism industry as a "direct user" of the GBR, as well as its contribution to other associated impacts, namely climate change. These impacts come in many forms. There are direct impacts, such as anchor damage (De'ath, Fabricius, Sweatman, & Puotinen, 2012), vessels colliding with marine animals, namely turtle and dugong, and discharge of sewage. However these direct impacts tend to be more localised as tourism activities occur in only a small portion of the GBR and as such the impact has been minor (De'ath et al., 2012; GBRMPA, 2014). In addition, as the tourism industry is such a dominant and essential part of the economy along the coast adjacent to the GBR, much of the coastal development can be attributed to the tourism industry for marinas and other ancillary services (GBRMPA, 2014). Therefore much of the impacts associated with development can be in part, attributed to the tourism industry. Likewise with anthropogenic climate change – the tourism industry contributes to global GHG emissions predominately through air travel but also through local transport and other activities in destinations. While it can be shown that tourism itself does play a role in the deterioration of the health of the GBR through both direct, and indirect means, it is just one component in the large array of activities and impacts that threaten the health of the region.

Method

A questionnaire was developed consisting of questions relevant to three main areas: socio-demographics, behaviour and knowledge; motivations for visiting the GBR; and concerns about threats facing the GBR. A quantitative method was adopted due to both time and resource constraints, therefore allowing a large number of responses over a greater geographic location (Kumar, 2014). The questionnaire consisted mainly of closed questions, with only a few open-ended questions. Three tour operators, described in more detail below, provided feedback on the questionnaire and some relevant changes (to wording and specific questions) were made.

The first set of questions consisted of respondents' age, gender, employment, education, activities while on the reef, travel group, length of stay, whether tourists would recommend the reef, if they were aware of eco-certification of their operator, where they sourced information on the reef from, and what their perception of the reef was prior to visiting. These questions were used for multiple analyses, primarily to understand the demographics of people visiting the reef. In addition, these questions were compared against the other sections of the questionnaire (motivations and concerns) to identify trends.

The questions on tourist's motivations for visiting the GBR used in the questionnaire were largely influenced by previous research on motivations, primarily the work conducted by Coghlan and Prideaux (2012). They undertook a study between 2006 and 2010 that included identifying, amongst other things, tourist's motivations for visiting the GBR. Some motivations were removed and added

where necessary. Of primary note was the addition of “to see the reef before it’s gone” and “the beauty and health of the reef is declining”. This was done for the purposes of identifying if LCT is occurring on the GBR. These were worded carefully as to not be leading in anyway. This style of question specific to LCT is similar to that used by Maher et al. (2010) who undertook a study on LCT in Antarctica. A five-point Likert scale was chosen with options ranging from not at all important to extremely important, where respondents could rate the level of importance each motivation was for them in their decision to travel to the GBR.

The questionnaire posed a series of activities and issues that respondents were asked to rate their level of concern about, pertaining to the health of the GBR. These were identified and selected through GBRMPA’s most recent Outlook report. This was done to ensure the most relevant and significant threats were identified. In addition to this, a question asking tourists to rate their overall concern about the health of the GBR was included. A Likert scale was chosen with five options ranging from not at all concerned, to extremely concerned. An added response, not sure, was included to the list of 11 threats to accommodate tourists who were not sure about specific issues and activities.

Tour operators working on the GBR in three locations (Port Douglas, Cairns and Airlie Beach — all tourist hot spots for visiting the GBR) were contacted to help distribute the questionnaires to tourists. Figure 3 shows the location of all three operators (black squares) in the context of the GBR. In total, these three locations account for approximately 85% of all commercial tourism operations (GBRMPA, 2014) and as such were chosen to get the largest and most representative sample size possible. Over 15 operators were contacted as it was hoped at least two operators from each location would participate. However, the response rate was lower than anticipated and consequently only one operator from each location participated in this research. Questionnaires were printed and mailed to the Port Douglas and Airlie Beach operators, which were then distributed over a two-week period in July 2015. Questionnaires were returned via mail. Travel to Cairns was undertaken to distribute questionnaires in this location based on an arrangement with the tour operators who were not willing to disseminate questionnaires themselves but were able to accommodate the researcher to disseminate them on their vessel. This was completed over four days in July 2015, including both weekdays and a weekend. A random sampling method was employed, where questionnaires were disseminated to every second tourist. However, as two of the three operators disseminated questionnaires unsupervised, whether or not this method was employed cannot be verified. As such this is a limit of the research.

As well as being geographically dispersed, the three operators also market their tours to different tourist groups. Operator 1 (Cairns) is a large-scale operator, taking over 300 visitors a day to various locations on the GBR. They market themselves as a relaxing, nature-based experience. Operator 2 (Airlie Beach) is a medium-scale operator marketed as an adventure experience, with their main demographic being backpackers. Operator 3 (Port Douglas) markets itself as a small-scale eco-tour that incorporates education as a large component of the experience, taking up to 45 tourists a day.

Completed questionnaires were inputted into the Statistical Package for the Social Sciences (SPSS; version 22.0) and analysed. Frequencies, means, percentages and cross tabulations were all ascertained, along with a number of statistical tests, such as *t*-tests and analysis of variance (ANOVA).

Sample population: a brief look at socio-demographics and knowledge

As documented above, 235 tourists were surveyed for this study in July 2015. As the surveys were sent to operators for dissemination the response rates from each location cannot be accurately attained. This is due to the quantity of questionnaires each operator aimed to disseminate being unknown, aside from Cairns where the researcher disseminated questionnaires in person. However, based off the number sent to each operator, the response for each location was: Cairns (64%), Airlie Beach (66%) and Port Douglas (39%). Table 1 shows the socio-demographic characteristics of the sample population.

Table 1. Socio-demographic characteristics of respondents.

Variables	Descriptions	Percentage
Operator	Cairns (operator 1)	68%
	Airlie Beach (operator 2)	17%
	Port Douglas (operator 3)	15%
Gender	Female	58%
	Male	42%
Age	18–24	27%
	25–34	24%
	35–44	23%
	45–54	15%
	55+	11%
Nationality	Australia	59%
	Asia	13%
	Europe	12%
	UK and Ireland	10%
	North America	3%
	Other	3%
Australian state	Queensland	34%
	Victoria	32%
	New South Wales	21%
	Western Australia	6%
	South Australia	4%
	Tasmania	2%
	Australian Capital Territory	1%
First time visiting the reef	Yes	60%
	No	40%
Travel party	Couple	39%
	Friends	26%
	Family with kids	14%
	Relatives	10%
	Alone	8%
	Tour group	3%
Education	Diploma or bachelor degree	56%
	Primary or secondary	24%
	Masters or PhD	18%
	Trade	2%
Work in the environment sector	No	92.6%
	Yes	7.4%
Length of stay	1–3 days	10%
	4–7 days	39%
	8–14 days	23%
	15–30 days	12%
	More than one month	8%
Recommend the reef	Live here	8%
	Yes	99.6%
	No	0.4%

As demonstrated above, Cairns by far dominated in terms of questionnaires completed. More female tourists responded, as did domestic tourists. Queenslanders made up the biggest portion of respondents within Australia, followed by Victoria and New South Wales. The majority of tourists were travelling as a couple, followed by those travelling with friends. The majority of tourists were visiting the reef for the first time, with four to seven days being the most frequent length of stay. Only a small portion indicated that they work in the environment sector, with the majority of respondents having completed a diploma or bachelor degree.

These findings have been compared against previous research conducted on the GBR as part of a reef monitoring programme between 2006 and 2010 (Coghlan & Prideaux, 2012). The age range was similar to that identified by Coghlan and Prideaux (2012) with the samples from both studies consisting mainly of younger respondents. In terms of nationality, there were a number of notable differences: more domestic and Asian respondents were captured in the current study while in the Coghlan

and Prideaux (2012) study, more European and UK respondents were surveyed. This discrepancy could be due to the significant increase in Chinese tourists to the region, which increased by 27% to become the largest source market of international visitors in the 2011–2012 financial year (Tourism Queensland, 2011 cited in Zhang & Peng, 2014). Repeat visitation was also higher in the current study (40% of respondents compared with only 13.9% in 2010 according to Coghlan & Prideaux, 2012).

The most popular information modes respondents used to create their perception of the reef were the Internet (68.9%), followed by word of mouth (57%), and news and television (54.4%). Academic literature, including UNESCO and GBRMPA reports, was cited as the least useful (7% of respondents). Respondents were asked to rate (on a scale of 1 = poor, to 10 = pristine) the perception of reef health they had prior to visiting the reef. The results found that the majority of respondents (86.2%) indicated that it was a seven or higher.

The vast majority of respondents (97.4%) were aware of the GBR being a world heritage area, mirroring Carmody and Prideaux's (2008) study which indicated that 96% of respondents were aware of the world heritage status. When respondents were asked to identify if they were aware that the operator they were using was eco-certified, over half were unsure (52.9%), and eight respondents (2.6%) identified that the operator they were using was not certified, despite all three operators being eco-certified to the highest standard by Ecotourism Australia. The number of tourists using an eco-certified operator has increased substantially from 21% in 2004 to 64% in 2013 (GBRMPA, 2014); likely to be due to an increase in the number of eco-certified tour operators (GBRMPA, 2014) rather than tourists making a conscious choice to use an eco-certified operator, as over half of respondents indicated that they were unsure if their operator was eco-certified.

Motivations for travel to the GBR

Respondents were asked to select on a Likert scale (0 = not at all, to 4 = extremely) how important 15 separate motivations were in influencing them to travel to the GBR. Table 2 shows the 15 motivations ranked in order of importance based on mean (0–4), as well as the level of importance placed on each motivation in percentage.

Discovery (of new places and things) was the top motivation for travel for these respondents, followed by rest and relax. This latter motivation matches Coghlan and Prideaux's (2012) work which identified key motivations as snorkelling and diving, climate, and rest and relaxation. The LCT-type

Table 2. The mean level of influence each motivation had on respondent's decision to travel to the GBR and the percentage for each motivational level.

Motivation	Mean	Not at all important (%)	A little important (%)	Somewhat important (%)	Very important (%)	Extremely important (%)
To discover new places and things	3.04	3.5	4.4	14.6	39.8	37.7
To rest and relax	2.87	3.9	6.9	19.5	37.2	32.5
To get away from the demands of everyday life	2.86	3.9	9.2	18.8	33.6	34.5
To see the reef before it's gone	2.83	8	8.5	13.8	31.8	37.9
To experience coral ecosystems	2.83	5.2	7.4	21.8	30.7	34.9
Because the reef is iconic	2.82	5.3	7.5	21.6	31.3	34.3
To spend time with family and friends	2.76	12.2	5.7	13.5	31.3	37.3
The tropical climate	2.71	4.8	7.4	24.5	38.9	24.4
The beauty and health of the reef is declining	2.71	5.9	12.2	17.6	33	31.3
To visit islands	2.61	6.6	11.4	19.3	39.9	22.8
To visit beaches	2.56	6.1	9.2	27.1	37.5	20.1
Snorkelling and/or diving	2.49	8.7	13	23	31.4	23.9
Adventure activities	2.29	4	14.2	29.8	34.7	17.3
The price matched my budget	1.81	18.3	21.4	32.8	15.7	11.8
Unlikely to ever revisit the region	1.60	29.4	16.8	29.4	13.1	11.3

Table 3. The themed motivational groups established with associated means.

	Motivations for visiting the GBR	Mean
Escape/relaxation		2.89
	To discover new places and things	3.04
	To rest and relax	2.87
	To get away from the demands of everyday life	2.86
	To spend time with family and friends	2.76
Last chance to experience		2.79
	To see the reef before it's gone	2.83
	The beauty and health of the reef is declining	2.71
Nature/climate		2.71
	To experience coral ecosystems	2.83
	Because the reef is iconic	2.82
	The tropical climate	2.71
	To visit islands	2.61
	To visit beaches	2.56
Active/adventure		2.37
	Snorkelling and/or diving	2.49
	Adventure activities	2.29

motivations yielded high mean scores with seeing the reef before it's gone as the fourth highest motivation (along with experiencing coral ecosystems) and because the beauty and health of the reef is declining was the eighth highest motivation. "To see the reef before it's gone" yielded the highest "extremely important" percentage (37.9%) as a motivating factor for visiting the region across all 15 motivations.

To simplify these motivations for comparison, they were grouped into four categories (Table 3). This was deemed necessary to analyse across socio-demographic and knowledge-based data using groups instead of 15 separate motivations.

The motivations that were grouped together were labelled by common themes amongst them. The two lowest ranking motivations, "The price matched my budget", and "Unlikely to ever visit the region again" were left out of the analysis as the means were substantially lower than the rest (both <2) and didn't fit within the themes. "To see the reef before it's gone", and "The beauty and health of the reef is declining" were grouped together as these two motivations represent tourists seeking travel to the GBR for the purposes of LCT. This motivational category was aptly named "last chance to experience". The other groups were: "nature/climate"; "active/adventure"; "escape/relaxation". These are similar groupings that have been identified in other studies (see Jenson, 2011). Once grouped, the highest ranking mean motivation for tourists visiting the GBR was "escape/relaxation" (2.89). "Last chance to experience" was the next most important (2.79), followed by "nature/climate" (2.71), with the least important being "active/adventure" (2.37).

T-tests and ANOVAs were undertaken to analyse motivations across socio-demographic and knowledge-based data. This was done to identify if findings and trends were significant, in which case the *p*-value has been provided. Results are still discussed in some cases, when significance was not found but the results are still of interest. Both a Welch and Brown–Forsythe were used to ensure significance was in fact true in cases when tests for homogeneity failed. Table 4 shows all the results from the *t*-tests and ANOVAs that were conducted.

When comparing means across operators it was identified that a "last chance to experience" was the only motivation that maintained a high level (>2.6). It was also the leading motivation for operator 3. The highest motivating factor for operator 2 was "active/adventure", which is not surprising as this operator is marketed at backpackers, with "last chance to experience" coming in as the second highest. "Escape/relaxation" was the main motivation for operator 1, which is also unsurprising as this operator markets itself as a trip to relax on. Amongst age groups, "last chance to experience" was noted as the most influential motivating factor for 45–54 and 55+ age groups. Amongst first time visitors to the GBR, "last chance to experience" motivations were noted as significantly more important, than those who had visited previously (*p* = 0.050). The group who had visited previously noted

Table 4. The results of *t*-tests and ANOVAs that were undertaken on the socio-demographic and general data against the four motivational categories.

Variables	Last chance to experience	Escape/relaxation	Nature/climate	Adventure/active
Operator	$F = 5.851^{**}$	$F = 4.152^{**}$	$F = 1.369$	$F = 16.398^{**}$
Operator 1	2.63 ^a	2.97 ^a	2.71	2.10 ^{ab}
Operator 2	2.88	2.56 ^a	2.83	2.95 ^a
Operator 3	3.33 ^a	2.91	2.56	2.91 ^b
Gender	$t = -1.583$	$t = -0.043$	$t = -0.687$	$t = 1.131$
Male	2.64	2.88	2.67	2.47
Female	2.88	2.89	2.74	2.31
Age	$F = 0.173$	$F = 2.950^{**}$	$F = 1.494$	$F = 6.227^{**}$
18–24	2.75	2.76	2.82	2.72 ^{ac}
25–34	2.75	2.99	2.82	2.56 ^b
35–44	2.76	3.14	2.57	2.12 ^c
45–54	2.85	2.67	2.61	2.43 ^d
55+	2.95	2.68	2.60	1.60 ^{abd}
Nationality	$F = 1.876$	$F = 1.592$	$F = 1.211$	$F = 8.382^{**}$
Australia	2.77	2.95	2.70	2.23 ^a
Europe	2.98	2.56	2.92	3.10 ^{ab}
North America	3.57	2.93	2.83	3.21 ^c
Asia	2.43	2.97	2.52	1.79 ^{bcd}
UK and Ireland	2.70	2.74	2.71	2.67 ^d
State	$t = -3.176^{**}$	$t = -1.446$	$t = -1.956$	$t = -1.252$
Queensland	2.35 ^a	2.80	2.54	2.08
Other	2.99 ^a	3.02	2.80	2.32
First visit	$t = -1.959^{**}$	$t = 2.699$	$t = 0.853$	$t = -2.203^{**}$
No	2.60 ^a	2.95	2.65	2.19 ^a
Yes	2.90 ^a	2.85	2.75	2.50 ^a
Eco-certified	$t = 2.154^{**}$	$t = 0.630$	$t = -0.404$	$t = 0.537$
Yes	2.98 ^a	2.84	2.72	2.34
No/unsure	2.65 ^a	2.91	2.68	2.42
Environment sector	$t = -0.231$	$t = -1.250$	$t = -1.045$	$t = -2.130^{**}$
Yes	2.83	3.13	2.88	3.02 ^a
No	2.76	2.86	2.68	2.41 ^a
Education	$F = 2.022$	$F = 1.158$	$F = 0.695$	$F = 1.621$
Primary	2.00	4.00	2.40	2.86
Secondary	2.71	2.87	2.68	2.10
Bachelor/diploma	2.85	2.88	2.73	2.42
Masters/PhD	2.81	2.87	2.72	2.66
Trade	1.17	2.55	2.24	2.20

Note: ** denotes significance level of 0.05.

Means with the same letter in each group differ significantly based on *post hoc* testing.

Highlighted numbers represent the highest mean for each row.

“escape/relaxation” as the main motivating force. “Last chance to experience” was the leading motivation for tourists aware that the operator they were using was eco-certified, which was significantly greater than those who were unsure of their operators’ eco-certification status ($p = 0.032$). Level of education was not found to significantly impact motivations.

The people who rated “last chance to experience” as high (very or extremely) vs. low (not at all and a little) were compared to identify trends and attributes of “last chance tourists”. It was found that last chance tourists are predominantly female, of older age (45 and over), first time visitors, of higher educational attainment (diploma/bachelor degree or higher), and environmentally conscious (those who are aware of tour operators’ eco-certification). Last chance tourists were also found to travel further distances both internationally and domestically. In addition it was found that people who sourced academic literature to find out about the GBR, including UNESCO and GBRMPA reports (3.43), are significantly more likely to be travelling for a “last chance to experience” ($p = 0.019$), than those who did not (2.75). It was also found to be the main motivating force for this group of people. This indicates that more educated and environmentally aware people are travelling for a “last chance to experience”.

Table 5. Respondents' level of concern towards threats to the GBR.

	Mean	Not/a little concerned (%)	Somewhat concerned (%)	Very/extremely concerned (%)	Not sure (%)
Coral disease and/or bleaching	2.88	12.4	16.4	66.8	4.4
Climate change	2.78	16.2	15.8	64.9	3.1
Commercial fishing	2.66	15.4	26.0	54.6	4.0
As a shipping route	2.64	14.1	30.0	51.5	4.4
Coastal development	2.64	16.8	22.7	57.8	2.7
Introduced species	2.57	17.8	24.4	51.6	6.2
Dredging	2.56	17.8	22.2	46.2	13.8
Tourism	2.50	18.0	30.3	47.4	4.3
Port development and use	2.47	17.3	31.9	44.7	6.1
Agricultural run-off	2.41	17.6	28.6	42.7	11.1
Recreational fishing	1.90	36.4	29.4	28.5	5.7

Concerns about threats to the GBR

Respondents were asked to rate on a Likert scale (from 0 = not at all, to 4 = extremely) how concerned they were about 11 key threats facing the health of the GBR. A question asking respondents to rate their level of concern about the overall health of the GBR was also included. A "not sure" option was also included for each of the individual threats.

The mean level of overall concern for the health of the GBR by respondents was 2.82, which equates to just below very concerned. Table 5 represents the means as well as the percentages for each level of concern associated with each of the 11 threats and activities.

Coral disease and/or bleaching were identified as the major concern for tourists visiting the reef, followed by climate change and commercial fishing. The tourism industry was considered comparatively as a low concern (8th most concerning threat amongst 11), with recreational fishing the lowest.

A study undertaken in 2007 and 2008 (Coghlan, 2012) asked tourists to rank the top five perceived threats to the GBR based on a given list of threats. In 2007, commercial fishing was identified as the most concerning threat, followed by rising sea temperatures (inextricably linked to climate change). In 2008, climate change was considered as the second most concerning threat, showing that concern about climate change has remained at a high level from these earlier studies through to the current study.

Coral disease and bleaching events were listed as the major concern in this current study but less so in these earlier studies, showing how it has only more recently come to the forefront of tourists' concern. This increased concern could stem from increased awareness about coral bleaching and disease, especially post-2010 when coral bleaching events were well-documented in the media as some of the most devastating in the world (Gaskill, 2010; Masters, 2011). Another possible reason for the major concern surrounding bleaching and disease is that they impact the aesthetic value of the reef, and therefore directly influence tourists' experience. While these activities and issues undoubtedly have an impact on the GBR and warrant concern from tourists, equally and arguably more severe threats including agricultural run-off and coastal development, which impact the health of the GBR in less visibly direct means were rated as much lower concerns by tourists. For example, agricultural run-off, was rated as the second least concerning activity, however is listed by GBRMPA (2014) as one of the most severe threats to the GBR as increased nutrients, sediments and pesticides can lead to multiple impacts on the GBR, including coral disease, which was rated as the most concerning threat in this study. This finding suggests that education directly linking the activities that pose a threat to the GBR and how it impacts tourists' experiences directly could be necessary to increase levels of awareness and concern of these activities amongst tourists.

It is also of interest to note that the level of concern about tourism was low, also identified through previous research (Coghlan, 2012). Tourism was listed as the least concerning threat in a study from 2007, and only 8.58% of respondents listed it as a concerning threat in 2008 (Coghlan, 2012). This is despite the fact that tourism on the GBR has a range of impacts, not only directly on

the GBR itself, but also through indirect impacts including coastal development to support the activities of the industry, and emissions related to both air travel and on-site activities (GBRMPA, 2014). This low level of concern about the tourism industry is representative of the disconnection between tourists and the impact they themselves have on a region they are travelling to. According to Becken (2004, p. 340), "Holidays are undertaken to achieve personal benefits and it could therefore be concluded that the environmental risks associated with holidays are underestimated."

This disconnection becomes elevated when you consider the contribution of the tourism industry to climate change. Despite the industry's contribution to climate change, there is evidence to suggest tourists are largely unaware of the link between their own activities and the impact it has on a travel destination (Becken, 2007; Dawson et al., 2010; Dickinson, Robbins, Filimonau, Hares, & Mika, 2013; McKercher & Prideaux, 2011). For example, in a study on Polish tourists, Dickinson et al. (2013) found that while tourists were concerned about climate change, an understanding of the contribution of tourism to this was poor. Furthermore, Dawson et al. (2010) conducted a study on polar bear tourists and found that their own understanding of their contribution to climate change was lacking, as 30% of tourists were unaware that air transportation contributes to climate change.

This research presents similar findings indicative of this disconnection, with tourists rating climate change as the second highest threatening issue to the GBR; however, tourism was rated very low. It was further identified that international tourists, who have travelled greater distances than domestic tourists had a lower concern about the impact climate change has on the GBR. This is of interest and significance as long-haul air travel is the highest emitting form of transportation associated with tourism, contributing more emissions than cars, buses and trains (Hall & Lew, 2009; UNWTO, 2008).

Tourists' level of concern (based on a scale of 1 = not at all/little, 2 = somewhat, 3 = very/extremely concerned) about the overall health of the GBR was compared against their level of motivation to travel for a "last chance to experience". Those who were very or extremely motivated by a "last chance to experience" had a significantly higher level of concern for the overall health of the GBR ($p \leq 0.001$), than respondents who were not. Respondents travelling for a "last chance to experience" also had a significantly higher level of concern for all listed issues (agriculture, $p \leq 0.001$; climate change, $p \leq 0.001$; coastal development, $p \leq 0.001$; dredging, $p \leq 0.001$; disease, $p \leq 0.001$; com fish, $p \leq 0.001$; recreational fishing, $p = 0.002$; introduced species, $p \leq 0.001$; port development, $p \leq 0.001$; shipping, $p = 0.002$), except tourism where an increase in concern was found but was not significant. In addition it was found that of those who are very or extremely concerned about the GBR, the main motivation for travelling was a "last chance to experience". These same tests were conducted comparing levels of concern against other motivations with none receiving similar results, showing that the correlation between motivations and concern about the GBR was unique amongst tourists travelling for a "last chance to experience".

Discussion of LCT findings

The data identified that 69.6% of the population are very or extremely motivated to travel to the GBR "to see the reef before it's gone", indicating that LCT appears to be a strong motivating force for tourists to visit. In addition 64.2% identified that "the beauty and health of the reef is declining" is a very or extremely important motivating factor, further emphasising this. After establishing factor groupings, a "last chance to experience" was identified as the second most important motivation amongst all tourists, more important than the draw for both nature and adventure aspects of the GBR.

This research contributes to the limited empirical studies identifying that tourists are being motivated by LCT, to visit regions before they are gone. In a study of tourists visiting the Antarctic, Maher et al. (2010) asked respondents, using a questionnaire, if a last chance to see the region motivated them in their decision to visit. Results suggested that it was a moderately important motivation for tourists (3.58 on a five-point scale where 1 = high, 5 = low). In a similar study Eijelaar et al. (2010) found that 33% of tourists were visiting the Antarctic "before it disappears" when tourists were asked

to respond with a yes or no response, again identifying that while it was a factor, it was not a dominant one.

This research is the first to identify empirically that LCT is occurring on the GBR in that tourists are being significantly motivated to visit because they believe the condition of the GBR is deteriorating. In a 2007 survey of tourists on the GBR, respondents were asked to identify if the state and health of the GBR influenced their choice to visit, with over half of people stating it did (Coghlan, 2012). This might indicate that more people are now visiting based on the condition of the GBR in a bid to see it before its condition worsens, compared to eight years ago. This previous research however, didn't specify whether the health and state of the GBR was positive or negative from the individual's perspective meaning tourists could have been travelling because they perceived the health and state of the GBR to be in good condition. With a high portion of tourists identifying that their perception of reef health was quite high in this research (37.4% rating it as 9 or 10), this is a rational assertion. This identification of the emergence of LCT can now act as a baseline for future research to identify if tourists are continually travelling for these purposes, and assess how changes in marketing and education impact on this as a motivational force in tourists' decisions.

The emergence of LCT is important to identify as the phenomenon can lead to increased impact on the environmental values of the region tourists are visiting, through both direct and indirect impacts. This is especially the case with LCT as it is expected visitor numbers will increase to witness a destination before it is gone, which will become exacerbated by the increased deterioration of the destination's environmental values. Therefore a greater number of tourists visiting a location for LCT creates a situation that promotes increased demand for LCT and perpetuates the deterioration of the site (Dawson et al., 2011; Lemelin et al., 2010). While respondents have indicated that they are motivated to see the GBR before it's gone, the actual visitor numbers have not increased in any way to suggest that this phenomenon is causing overall greater visitor numbers to the region. This could suggest that it is a growing trend and an increase in visitor numbers could be seen in the future, especially with projections of the increased deterioration of the health of the GBR. This is even more important to consider as the people identified as "last chance tourists" are travelling further distances to see the region, and thus contributing to climate change which is impacting on the GBR.

This is a cause for concern, especially considering that LCT publications are becoming more prevalent in media sources (Dawson et al., 2015) and thus have the potential to reach more tourists. As such management and policy intervention could be necessary to prevent future deterioration to the region through an influx of people travelling to witness the reef before it is gone. It is, however, important to note that other motivations are still dominant in tourist decisions to travel to region, and while there is something disconcerting about people travelling "to see the reef before it is gone" as opposed to "relaxation" purposes, ultimately the impact is the same. Despite what tourists' motivations for travelling are, as this research shows, they are largely unaware of their own influences on the region yet are deeply concerned about it. As such, education linking tourists' own behaviours, how this impacts the region as well as ways to offset this may be useful to incorporate into management structures.

That tourists seeking LCT are travelling longer distances to visit the GBR is representative of the paradox of LCT, in that tourists are contributing to the demise of the ecosystem they are travelling to witness. Dawson et al. (2010) discuss this paradox in the context of polar bear viewing in Churchill Manitoba, noting that to reach Manitoba and view polar bears usually requires long-haul air travel due to the location and difficulty in access, and thus contributes disproportionately large amounts of GHG emissions (Dawson et al., 2010). As climate change is implicated as the major threat to polar bears and their habitat, this then makes the paradox seemingly easy to identify. In the case of the GBR, the factors contributing to the decline in health are much more complex and multifaceted; however, climate change is undoubtedly a large contributing factor to the decline in health of the GBR, and thus the paradox, while not as clear cut, is still salient. In addition to this, this research identified that the specific tourists who are seeking out this "last chance experience" are more concerned about the overall health of the GBR, and in addition the impacts climate change has on the region. The contradiction here is hard to miss, as tourists are either unaware, or are not concerned about the impact

they themselves play in the destruction of the ecosystem that they have identified they are most concerned about, and are actually travelling to witness because of its “in danger status”.

Conclusion

The aims of this research were to investigate tourists’ motivations for visiting the GBR, including the role of LCT in motivating tourists, as well as tourists’ level of concern about the threats facing the health of the GBR.

By identifying the motivations of tourists visiting the GBR it was found that the LCT trend is occurring on the GBR with just under 70% of respondents being strongly motivated to visit the region for this purpose (i.e. to see the reef before it’s gone). This is the first time this trend has been identified on the GBR as well as some of the most convincing empirical evidence identifying that this trend is indeed occurring despite its long lineage as a phenomenon. Through an analysis of who last chance tourists are it was identified that they are predominantly older, more environmentally conscious females who are visiting the region for the first time and who have travelled greater distances, both on a domestic and international scale. Respondents seeking a last chance experience were also found to be more concerned about the health of the GBR. This finding was of interest as it emphasises the paradox involved in LCT, in that tourists are travelling greater distances to view the destination that is in danger, contributing higher levels of emissions and thus exacerbating the impacts of climate change. This is of further interest as tourists noted a high concern about the threat climate change poses on the GBR. This finding shows a strong disassociation between respondents’ beliefs and attitudes towards issues, and their individual behaviours that can have wider implications.

Respondents indicated that they have a high overall concern about the health of the GBR, with the highest level of concern specifically for coral bleaching and disease, followed by climate change. Respondents were found to have only a moderate to low concern about the impacts of the tourism industry on the GBR. This suggests that while tourists are concerned about the GBR there is a level of dissociation between the impacts they themselves have on the region they are visiting. This was even more interesting as tourists were highly concerned about climate change, which can further exemplify this disassociation as the tourism industry itself contributes a significant proportion of emissions, thus leading to exacerbated impacts from climate change. In addition, while tourists showed a good level of understanding of the major threats facing the GBR based on their concern (i.e. climate change, coral bleaching and/or disease, commercial fishing) other equally or even more threatening issues such as agricultural run-off were not found to be of major concern.

This research has identified the emergence of LCT on the GBR, and can thus be used as a baseline for future research to continue identifying if this trend is occurring, and the level at which it might be, on the GBR. This is especially important as identifying changes in levels of this trend can be used to explore the impact of the implementation of specific policy and marketing strategies for the GBR. In addition to this, how specific marketing and policy strategies impact on tourists’ levels of awareness and concern about issues and threats facing the GBR is a further recommended area for future research. This research also presented evidence to suggest that tourists have a limited understanding of the impacts they themselves have on the region in which they are visiting. Further exploration of this is recommended, aiming to identify the extent of this disconnection and disassociation, as it would prove beneficial in leading education and marketing strategies to enhance this understanding. It could also help to inform potential strategies to help ameliorate these impacts, such as offsetting initiatives. Further empirical studies aiming to identify if tourists are being motivated to visit other potential last chance tourist destinations is also suggested as a future research agenda to gauge how widespread this phenomenon is.

Acknowledgments

We would like to thank the tourists who participated in this study and the tour operators who assisted in gathering data. Without their time and dedication this research would not have come to fruition.

Disclosure statement

No potential conflict of interest was reported by the authors.

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