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The potential implications of environmental deterioration on business and non-business visitor expenditures in a natural setting: A case study of Australia's Great Barrier Reef

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Abstract

Nature-based tourism can be an important source of income for regional economies but relies on a healthy environment. Using data collected from business and non-business visitors to Australia's coast adjacent to the Great Barrier Reef, the authors generate estimates of the potential financial impact of environmental degradation, demonstrating a novel way of testing and controlling for hypothetical response bias. More than 90% of non-business visitors and 67% of business visitors came to the region for at least one nature-related reason. Average daily expenditure was similar for both visitor segments (≈AUD$190), but the determinants of expenditure varied. All visitors reacted much more negatively to the prospect of environmental degradation than to a 20% increase in (local) prices, although business visitors were much less responsive than non-business visitors. Adjusting for hypothetical response bias, the authors estimate that substantial environmental degradation could reduce visitor expenditures (and thus local tourism incomes) by at least 17%.

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business and non-business visitors, environmental degradation, Great Barrier Reef, hypothetical response bias, visitor expenditure

Introduction

Nature-based tourism[1] can be an important source of income for regional economies. The economic impact of all national parks in Canada, for example, was estimated to be CAN$1.25 billion per annum in 1995 (Eagles, 2002); globally, whale-watching industries contributed an estimated US$2.1 billion in total expenditures during 2008 (O'Connor et al., 2009), and the shark diving industry in Palau generated US$18 million during 2011 (Vianna et al., 2012). But nature-based tourism relies heavily on the health of its environment (Orens and Seidl, 2009; Uyarra et al., 2005). Thus, when assessing potential developments that generate economic growth, but which might also incur environmental damage, one needs to consider potential negative knock-on effects that might occur in the nature-based tourism sector.

Different types of visitors are likely to have different expenditure patterns (Brida and Scuderi, 2013; Laesser and Crouch, 2006; Wang et al., 2006), are likely to be motivated by different things (Eagles, 1992; Fodness, 1994) and are thus also likely to respond differently to environmental degradation. As such, determining the potential financial impact of environmental degradation in the tourism sector is a non-trivial exercise since it requires information about visitor expenditure patterns and about the likely response of different visitor segment to environmental degradation.

A commonly found visitor group to any nature-related tourism site is, unsurprisingly, nature tourists. But nature visitors are not the only ones who visit sites renown for nature. About 10% of visitors of the Taibai Mountain Region in China and an unreported number of visitors of the Northern Gudbrandsdal in Norway came for business or conferences (Veisten et al., 2014; Zeng, 2013). Between 2009 and 2013, approximately 20–28% of visitors to the Queensland towns adjacent to the Great Barrier Reef (GBR) came primarily for business (Tourism and Events Queensland, 2013; Tourism Research Australia, 2013b). This number begs one to question the extent to which environmental degradation is likely to affect this visitor segment compared to other visitor segments.

As regards expenditure, nature tourists have been assessed as heavy spenders (Leones et al., 1998; Mehmetoglu, 2007; Saayman and Saayman, 2014); conference participants and business travellers also tend to spend more than leisure visitors (Jang et al., 2003; Laesser and Crouch, 2006; Suh and McAvoy, 2005; Wang et al., 2006). However, it is not clear who spends more in natural settings: nature or business visitors. Similarly, it is not clear whether business visitors who are also attracted to nature spend more than business visitors who have no such inclination. Zeng (2013) looked at the expenditure patterns of convention visitors in a nature reserve (the Taibai Mountain Region) in China and found that they spent more than other visitors. But the study did not determine if those convention visitors were also nature tourists, so it is not clear what part of their higher expenditure is attributable to their business status and what part is attributable to their nature focus. In short, although many studies have examined the determinants of leisure visitor expenditure at nature-based tourism sites (Kruger et al., 2012; Leones et al., 1998; Mehmetoglu, 2007; Saayman and Saayman, 2014), the same attention has not been applied to business visitors in the same setting. To the best of our knowledge, the subject has only been addressed by Veisten et al. (2014) who examined the link between visitor characteristics with several nature-related variables,

including nature orientations and 'new ecological paradigm' (NEP) scores, in Northern Gudbrandsdal Norway. They found that 'business' was associated with higher expenditure but not with any nature orientations or NEP. On the other hand, visitors with higher NEP scores were associated with higher expenditures. Whether or not these results are applicable to other settings remains to be seen.

As regards the potential impact of environmental degradation, previous studies have found that visitors to nature-related sites would be likely to reduce the length of their visit or avoid visiting the site altogether if either price increased or nature was damaged. For example, Zeng (2013) found that 55% of visitors to Taibai, China, would not have visited if the nature reserve did not exist. Similarly, in the Bussaco Forest in Portugal, researchers predicted that a 50% increase in entrance fees would likely generate a 41% decline in the intended number of visits, while a fire that damaged 25% of the woodland would generate a 47% visitation drop (Simões et al., 2013). And Uyarra et al. (2005) found that about 80% of visitors in Bonaire and Barbados would not revisit (even at the same price) in the event of coral reef and/or beach degradation. Some researchers have also linked contingent behaviour responses to information about visitor expenditure (e.g. the loss of open space in the Gunnison (Colorado, USA) could result in a 42% decrease in skier days, and a total direct loss of almost US$10.5 million (Orens and Seidl, 2009)). But to the best of our knowledge, no one has compared the likely financial impact of environmental degradation to different visitor segments.

In this article, we use data collected from more than a thousand visitors to the Australian coast adjacent to the GBR to examine the potential financial impact of environmental degradation. Two different visitor segments are examined: business and non-business visitors, with business visitors formally defined as those 'attending to business, going to a meeting and/or to a conference'. We first look at the expenditure patterns of both visitor groups. We then look at the determinants of total regional expenditure for each group separately, specifically testing to see the possible effect of nature-related trip motivations. We then examine the possible effect of some environmental and financial scenarios to the visitation of both visitor groups through some contingent behaviour-type questions. Specific research questions for this article are thus as follows:

1. Which visitor segments spent most on which types of goods and services?
2. Do tourists with nature-related preferences have different expenditure patterns than others?
3. What is the likely financial impact of further environmental degradation on specific visitor segments?

When addressing question 3, we demonstrate a novel method of testing, and subsequently controlling for, hypothetical response bias. As such, the contribution of this article is both empirical (generating new insights for the GBR, and for those interested in nature-based and/or business tourism) and methodological. Its findings may thus have considerable appeal to a broad range of readers.

We answer our research questions using the four steps identified in Figure 1. First, we look at the expenditure patterns of each visitor segment and at the sectors in which most money was spent. Second, we use multiple regressions to look at determinants of expenditure, specifically checking to see if nature-related trip motivations and activities are statistically significant determinants for each visitor segment, after controlling for other variables. Third, we use data collected from visitors about the impact which various hypothetical scenarios involving environmental degradation and/or increased prices would have had on their decision

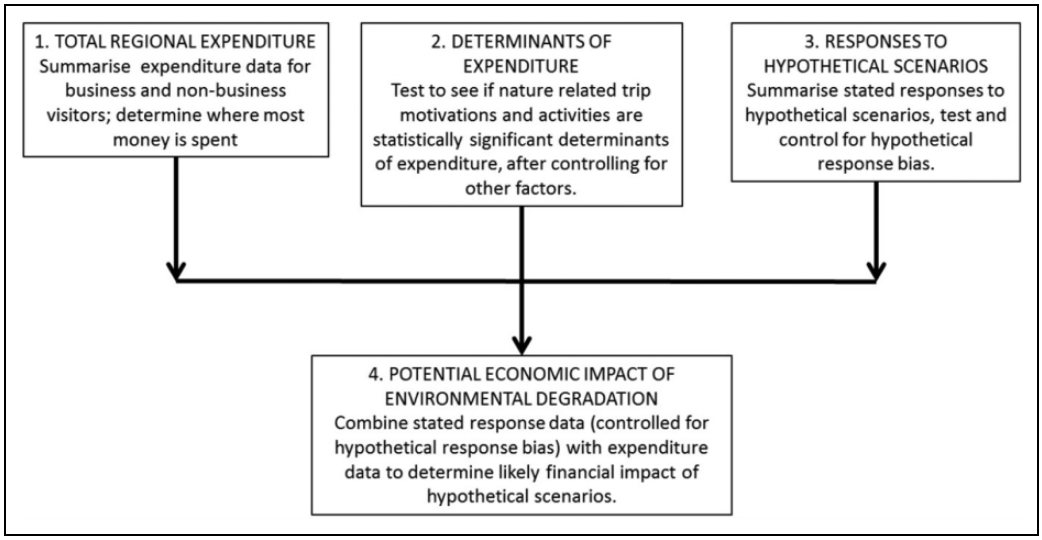


Figure 1. Overview of methods.

to visit the region and/or on their length of stay. We test responses for hypothetical bias, control for it, and combine the controlled responses with expenditure data to estimate the regional reduction in visitor expenditure that could occur in response to each hypothetical scenario. Further details are provided in the ensuing sections (after providing a brief overview of the study region and of our data collection methods), with our discussion following the organization structure of Figure 1.

Methods

Study region

The Great Barrier Reef World Heritage Area (GBRWHA) lies on the north-east coast of Australia, specifically along the coast of Queensland (Figure 2). It is the longest barrier reef on the planet, covering over 340,000 km^2 (larger than the United Kingdom, Switzerland and the Netherlands combined) and stretching approximately 2300 km (about the same length as the distance from Vancouver to Mexico) (GBRMPA, 2014a). The GBR has over 2000 km^2 of mangroves and 6000 km^2 of seagrass beds, more than 1500 species of fish and over 350 species of hard coral. Six sea turtle species, over 130 species of sharks and rays, 215 species of birds, 30 species of whales and dolphins and the dugongs use the GBR as their habitats or as a migratory route.

In 2013, at least 1.5 million people spent either a half-day or full-day in the GBRWHA (GBRMPA, 2014b), and the tourism industry is estimated to have contributed more than AUS$6.4 billion per annum from direct tourism expenditures to the Australian economy during 2012 (Deloitte Access Economics, 2013). Visitors travel to GBRWHA for a variety of different reasons: for holiday, to visit friends/relatives, for business, education and 'other' reasons (Deloitte Access Economics, 2013; Tourism Research Australia, 2013b), although each year more and more visitors come to the region for business (Deloitte Access Economics, 2013). Between 2007 and 2012, the

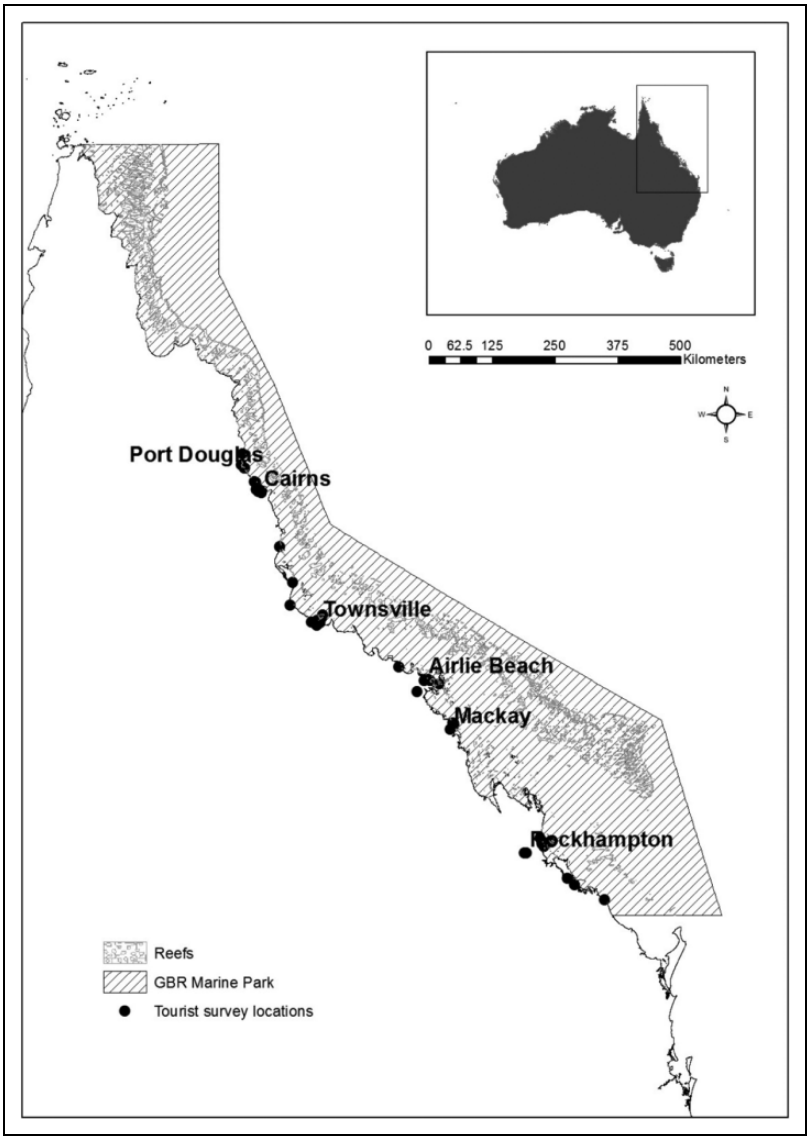


Figure 2. The Great Barrier Reef World Heritage Area. (Map by Diane Jarvis, James Cook University.)

share of leisure travel to the region fell by 6%, while the share of business travel rose by 2.2% (Deloitte Access Economics, 2013), and in 2012, more than 6 million visitor days in the region in 2012 were attributed to business visitors.

Nonetheless, the total number of days/nights which tourists spent in the region each year has grown by only 4% between 2007 and 2012, with international visitation falling by approximately 10% over the same period (Deloitte Access Economics, 2013). This decline is in contrast to the growth in international tourism arrivals which Australia has experienced (5%, September 2012

to September 2013; Tourism Research Australia, 2013a) and with the worldwide growth in international tourism (5% for year 2013; World Tourism Organization, 2013). This relatively poor tourism performance has been attributed to the global financial crisis, the high Australian dollar and natural disasters in Queensland (Deloitte Access Economics, 2013). We note, however, that the first factor should also have affected tourism worldwide; and the second would have affected international visitors to Australia. As such, the region's relatively poor tourism performance (when compared to Australia and the rest of the world) is solely explained by either natural disasters or (more likely) other factors too.

As noted earlier, nature-based tourism relies heavily on the health of its environment (Orens and Seidl, 2009; Uyarra et al., 2005). The catchment area that drains into the GBR lagoon has a population of approximately 1,115,000 people that is rapidly increasing (GBRMPA, 2009), and the sediment, nutrient and pesticide loads that drain into the lagoon are far higher today than they were in pre-European times (Furnas, 2003; Lewis et al., 2009; Kroon et al., 2012). More recently, researchers have documented substantive declines in coral cover (De'ath et al., 2012) and the UNESCO World Heritage Committee is now watching the GBR with a view towards adding it to the list of world heritage–endangered sites. It thus seems possible that at least some of the (relatively) poor performance of the GBR tourism industry may be attributable to environmental degradation. Moreover, increasing economic activity in and around the GBRWHA, such as port expansions and proposals for mega casinos (Dalton, 2014; DSDIP, 2014), may generate environmental degradation above and beyond that which has already been observed. This region thus offers itself as an excellent case study site for research such as this.

Many studies have been done in the GBR region that examine expenditure patterns and economic impacts of reef-based tourists (see e.g. Access Economics, 2005, 2008; Deloitte Access Economics, 2013; Driml, 1994; Driml and Common, 1995; Stoeckl et al., 2010). Several researchers have also used contingent behaviour–type models to look at the way in which recreation use values (consumer surpluses) would be affected if there were a decline in reef quality (Kragt et al., 2009) or water quality (Rolfe and Gregg, 2012) and to look at the way that recreational fishing values might change as conditions change (Prayaga et al., 2010). But to the best of our knowledge, no study has compared the expenditure patterns of business and non-business visitors in the GBR catchment area, nor compared the likely reaction of these visitor groups to environmental degradation, using that information to generate estimates of the likely financial impact of such degradation on regional economies.

Questionnaire development and data collection

We first conducted an extensive literature review to familiarize ourselves with the context in which we were operating and with previous studies in the region. The literatures consulted included those focusing on tourism expenditure in the region (cited above) and in Australia (Athanasopoulos and Hyndman, 2008; Deloitte Access Economics, 2013), those focusing on trip motivations and those which highlight the link between tourism activities, expenditures and contingent behaviours (Christie et al., 2007; Lawson, 1991). Afterwards, we conducted a series of workshops with key regional stakeholders including those associated with the tourism industry, the Great Barrier Reef Marine Park Authority, Queensland government, recreational and commercial fishers.

SPENDING PER DAY (AU$) while in the GBRWHA region	$0	$1-20	$21-50	$51-100	$101-151	$151-200	$201-300	More than $300 per day
Food and drinks bought at grocery and convenience stores	❒	❒	❒	❒	❒	❒	❒	☐, how much? $_____
Food and drinks bought at cafés, restaurants, bars, etc (including takeaways)	❒	❒	❒	❒	❒	❒	❒	☐, how much? $_____
Accommodation	❒	❒	❒	❒	❒	❒	❒	☐, how much? $_____

Figure 3. Expenditure excerpt from the questionnaire.

We used insights from those workshops and the literature to develop some draft questionnaires, which sought basic socio-demographic information and also information about motivations and activities. One half of those surveyed were asked also asked about their willingness to pay to help solve issues affecting the reef (reported on in Farr et al., 2014); the other half – and that which is relevant here – were asked information about expenditures and contingent behaviours (more details below). The questionnaires were trialled with colleagues, in subsequent workshops, and with visitors at the Cairns airport on 12 June 2012 (pilot sample size of 50). We visually reformatted the questionnaire upon receiving feedback from the respondents. The final version of the questionnaire was distributed to the GBRWHA visitors over a 12-month period to control for seasonality (July 2012 to July 2013, with a total of 136 separate collection days). The questionnaires were distributed at several tourist destinations between Port Douglas and Great Keppel (see Figure 1), with enumerators collecting data from visitors at airports, ferry terminals, caravan parks, hotels and beaches. The questionnaires were also translated into Japanese and Chinese and distributed by native speakers of those languages. A total of 36 tourism operators (randomly selected to represent accommodation establishments, tour operators and attractions in different regions) also agreed to distribute the questionnaires to their guests, providing us with access to an even broader range of visitors.

Data analyses

Total regional expenditure. Our question that sought to determine the total amount each visitor group spent in the region used an approach that has proven to be a robust method of estimating expenditure (Stoeckl et al., 2005, 2010). First, each respondent was asked to indicate how much their travel party spent per day on accommodation; food and drinks bought at grocery and convenience stores (hereafter referred to as *groceries)*; and food and drinks bought at cafes, restaurants, bars etc. (hereafter referred to as *cafes*) (see Figure 3). Recognizing that there are many 'one-off' purchases during holidays, we also framed the questions about expenditure on car rental (hereafter referred to as *car)*, fuel, fishing charters, other boating trips and excursions (including non-fishing boat charters, ferries and snorkelling/diving trips, hereafter referred to as *ferries and boat trips*), and souvenirs around expenditure per trip (rather than per day).

Many respondents only provided information about spending on categories in which expenses were incurred, leaving other rows blank. Those 'missing' values were, in fact, true zeroes and to

treat them as missing values would have been to inflate estimates of the average expenditure on that item (Stynes and White, 2006). So we replaced blank responses with a zero if the respondent reported positive spending in at least one other category (Catlin et al., 2010; Stynes and White, 2006). We also removed five questionable cases claiming zero expenditure during a 3-month visit.

Responses to questions about daily expenditure were converted to estimates of trip expenditure by multiplying the midpoint of each range that was selected (or the highest amount if more than AUD$300) by the number of days spent in the region. We then generated estimates of total regional expenditure (per party per trip) by adding total expenditures on each item. Dividing that amount by the number of people travelling together gave us an estimate of expenditure per person per trip.[2]

Determinants of expenditure. Most expenditure studies include numerous demographic variables in regressions – the intention being to capture the influence of the ability to pay (income) and 'tastes' or preferences (indirectly, through other variables such as age, gender and education). Nonetheless, a growing body of literature calls for the inclusion of other variables that more directly measure tastes and preferences, formally: attitudes, behaviours, opinions about the trip, trip motivations (Brida and Scuderi, 2013; Laesser and Crouch, 2006; Mehmetoglu, 2007) and preferences for nature (Lawson, 1991; Veisten et al., 2014). So in addition to collecting demographic and socioeconomic data, we also collected information about trip motivations (also known as 'pull factors' – see e.g. Uysal and Jurowski (1994: 844)) and information about nature-/outdoor-related activities undertaken when visiting the region.

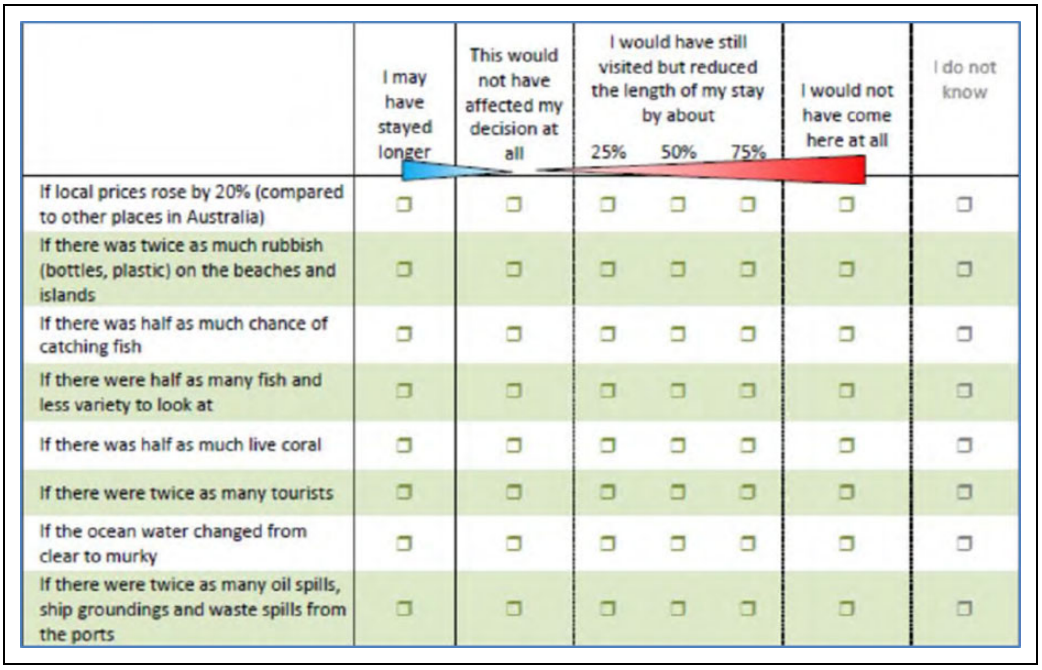
Our hypothesis was thus that:

H1: Expenditure per person per trip is a function of demographics, socioeconomics, motivations and activities

Appendix 1 provides a descriptive overview of the demographic and socioeconomic variables used in this analysis and the results section briefly summarizes key issues of interest. The discussion below focuses on the construction of our variables that measure 'motivation' and 'activities'.

First, we presented visitors with a list of 21 different potential motivators that were developed in consultation with the literature and during the workshops referred to above. We asked respondents to indicate, on a 5-point Likert scale (from *very important* to *very unimportant*), how important each was when deciding whether to come to the region. Items were randomized (producing 24 different versions of the questionnaire) to avoid respondent bias in answering multiple choices (Roberson and Sundstrom, 1990; Synodinos, 2003). Nine of these motivations were related to nature, so we created a single measure of nature motivations by combining nine trip motivations into a single scale (Cronbach's α on standardized items = .953), with higher values indicating more nature-related pull factors/trip motivations.

Second, respondents were asked to provide information about the number of times they participated in various activities, including spending time on the mainland beaches; on the islands; at the offshore reefs; snorkelling or scuba diving; going out on a private motor boat or jet-ski; paying for a boat trip or island visit; going sailing, kayaking, windsurfing and so on; and going fishing, spearfishing or crabbing. Responses to these questions were firstly divided by the length of stay



	I may have stayed longer	This would not have affected my decision at all	I would have still visited but reduced the length of my stay by about			I would not have come here at all	I do not know
			25%	50%	75%		
If local prices rose by 20% (compared to other places in Australia)	❒	❒	❒	❒	❒	❒	❒
If there was twice as much rubbish (bottles, plastic) on the beaches and islands	❒	❒	❒	❒	❒	❒	❒
If there was half as much chance of catching fish	❒	❒	❒	❒	❒	❒	❒
If there were half as many fish and less variety to look at	❒	❒	❒	❒	❒	❒	❒
If there was half as much live coral	❒	❒	❒	❒	❒	❒	❒
If there were twice as many tourists	❒	❒	❒	❒	❒	❒	❒
If the ocean water changed from clear to murky	❒	❒	❒	❒	❒	❒	❒
If there were twice as many oil spills, ship groundings and waste spills from the ports	❒	❒	❒	❒	❒	❒	❒

Figure 4. The contingent behaviour scenarios and responses

(since these two must be related, the variables thus capture activity intensity) and then grouped using principal component analysis (PCA, varimax rotation).

When estimating expenditure equations, we kept our data relating to business and non-business visitors separate. First, we used a Tobit specification (Halkos and Jones, 2012) censored at zero to identify determinants of total expenditures.[3] The analysis was somewhat complicated by the fact that length of stay is an important determinant of expenditure (Mehmetoglu, 2007; Thrane and Farstad, 2011) and thus must be included in the regressions. However, length of stay is also determined by variables that influence expenditure. As such, there were interrelationships between the independent variables (formally, endogeneity). We controlled for this endogeneity by taking a two-step approach. First, we used a negative binomial regression to identify determinants of length of stay. We then used the predicted values from that model inside the expenditure regressions (only for expenditure items where length of stay found to be endogenous; in other models, we used the observed values for length of stay). We found evidence of multicollinearity between two of our dummy variables (one representing international visitors, the other representing first-time visitors), so we dropped the 'first visit' variable.

We also examined expenditure on individual components of expenditure (e.g. accommodation and boat trips). Here, we used the 'double-hurdle' approach (Brida and Scuderi, 2013; Cragg, 1971), which treats the decision of whether to spend on a particular item or not as separate from the decision of how much to spend on that item was used. Specifically, we used Probit regression in the first stage (when examining the decision to spend or not to spend) (Weagley and Huh, 2004), and a Tobit specification (Halkos and Jones, 2012), in the second stage (i.e. when examining how much was spent).[4]

Responses to hypothetical scenarios and potential economic impact of environmental degradation. Respondents were presented with eight hypothetical scenarios and asked to indicate how these would have affected their decision to visit the region and/or their length of stay in the region (Figure 4). These scenarios were loosely based on recent environmental and financial events in this part of Australia. Specifically, research shows that there has been a 50% decrease in GBR coral cover between 1985 and 2012 (De'ath et al., 2012) – so one of our 'hypothetical' questions asked tourists to tell us how their decision to visit the region would have been affected if there had been 'half as much live coral to look at'. This proportion was also used in other scenarios relating to fish catch (50% decline in the chance of catching a fish), fish viewing (half as many fish to look at), rubbish (twice as much rubbish on beaches and islands), oil spills, ship groundings and waste spills (twice as many) and the number of tourists (twice as many). Interestingly, the prospect of having twice as many tourists is now a real possibility in the northern section of the GBRWHA: to wit the recent tourism development proposal for a mega casino precinct north of Cairns (Dalton, 2014). The 20% price increase scenario was chosen to reflect the (approximate) 20% appreciation of the Australian dollar against the Euro that occurred between January 2010 and June 2012 when data collection activities began[5] and which is often considered to be a factor inhibiting tourism growth (Deloitte Access Economics, 2013).

The wording of the question allowed us to use responses to estimate the potential loss of visitation that could occur in each scenario. Specifically, if respondents indicated that:

- they would not have come at all, then potential visitation loss was recorded as 100%;
- they would still have visited but reduced their length of stay by 75%, 50% or 25%, then potential visitation loss was recorded accordingly;
- it would not have affected their decision to visit, then potential visitation loss was recorded as 0;
- they may have stayed for longer, then potential visitation 'loss' was recorded as a gain – in this case, a 200% gain (in the absence of better information).

Recognizing the problem of hypothetical bias, we firstly used responses to our scenario that involved a 20% price increase, to generate a (very approximate) estimate of price elasticity of demand (dividing mean percentage reduction in length of stay by 20% – the percentage increase in price). We then compared this estimate with other estimates of price elasticity found in the literature, noting it was implausibly high. In their review of contingent valuation studies, List and Gallet (2001) suggested that contingent valuation responses should be scaled downward by a factor of three to account for hypothetical response bias, so we did this with our responses, and then recalculated price elasticities. These estimates fell within the range of estimates often found within the literature, indicating that List and Gallet's suggested 1/3 scaling of responses is, in this case, appropriate.

For each respondent, coded responses to the hypothetical questions about likely reaction to each hypothetical scenario, i, were thus divided by three (to control of hypothetical response bias) and then multiplied by total expenditure to generate estimates of the potential financial impact of those hypothetical responses.

$$\begin{aligned}&\text{Potential loss of expenditure per person per trip}_i\\&\quad = \text{Current expenditure per person per trip}\\&\qquad \times \text{potential (\%) loss of visitation}_i\text{(adjusted for hypothetical response bias).}\end{aligned} \tag{1}$$

Table 1. Expenditure by category and visitor segment (mean AUS$, per visitor).

Item	Non-business visitors	Business visitors
Daily expenditure on		
Groceries*	20.72	28.83
Cafes and restaurants	32.38	38.10
Accommodation	64.11	75.92
Total expenditure on		
Groceries	300.09	254.51
Cafes and restaurants	321.53	236.85
Accommodation	681.76	571.64
Car hire	72.59	53.50
Fuel	74.18	64.44
Fishing charters	32.48	3.62
Ferries and boat trips*	174.87	62.82
Other attractions*	50.20	21.09
Souvenirs	27.07	15.90
Total expenditure (all categories)	1,757.48	1,289.77
Average daily expenditure (all categories)	188.85	190.43

*Statistically significant differences between spending of business and non-business visitors.

Results

Overview of respondents

In total, we received more than 2000 completed tourist questionnaires, with just over one-half providing information about expenditure. However, not all respondents provided information about trip motivation, activities, or other demographic or socioeconomic variables, so these incomplete observations were removed from the analysis, resulting in 435 questionnaires for which we had a complete set of responses to all questions. Of these 435 questionnaires, 57 (13.1%) indicated that 'attending to business, going to a meeting and/or conference' was their main trip motivation; the other (differently motivated) 378 respondents were thus, by our classification, non-business visitors. Out of the 57 business visitors, 57.9% of them were domestic visitors. Because 20–28% of domestic visitors and about 5% of international visitors to this region came for business (Tourism Research Australia, 2013b), our statistics over-represented the domestic business visitors.

As noted earlier, responses to the activity-related questions were grouped using PCA (varimax rotation). These loaded neatly into two components (explaining 58.2% of variation): (1) nature-related or beach/island activities (spending time on the beach, on the island, at offshore reefs, snorkelling and diving) and (2) boat-related physical activities (went on a private boat, sailing, kayaking, windsurfing, fishing and crabbing).

Appendix 1 provides summary statistics of the variables used in our analysis, for business and non-business respondents. Both visitor segments had different demographic characteristics (e.g. a higher percentage of business visitors were male, business visitors were also less likely to have come from overseas), but most importantly for this article, business visitors had lower nature-related motivation scores and fewer beach/island activities per day compared to non-business

Table 2. Determinants of total expenditure for business and non-business visitors.

	Business visitors	Non-business visitors
Age	–0.010* (0.005)	0.008** (0.003)
Education	0.055 (0.054)	0.037 (0.044)
Income	0.000003 (0.000)	0.000002** (0.000)
Male	–0.163 (0.146)	0.095 (0.081)
International visitor	0.186 (0.248)	0.369*** (0.140)
Visitors from Australia (non-Queensland)	0.325* (0.178)	0.441*** (0.137)
Beach/island/reef leisure activities per day	1.410*** (0.249)	0.652*** (0.214)
Private boating and fishing activities per day	–0.476 (0.580)	0.047 (0.104)
Nature-related factors as trip motivation	–0.015* (0.008)	0.014** (0.007)
Length of stay	0.019*** (0.003)	0.016*** (0.001)
N	57	378
F test	14.75***	17.01***
Akaike information criterion	2.09	2.491
Bayesian information criterion	−86.28	−1254.4

Note: Robust standard errors in parentheses.
*Significant at the 10%.
**Significant at the 5%.
***Significant at the 1%.

visitors. Evidently, the groups are distinct in terms of demographics, socioeconomics, motivations and activities, justifying our decision to treat them as two separate visitor segments.

Total regional expenditure

As shown in Table 1, the total expenditure of non-business visitors was greater than that of business visitors (although these differences were not statistically significant); average daily expenditures were remarkably similar. Almost 30% of all money was spent on accommodation; an additional 30% on food and beverages (either from grocery stores or at cafes and restaurants).

Determinants of expenditure

Table 2 presents the determinants of total expenditure for business and non-business visitors; Appendix 2 shows model results for the individual components of expenditure.

For both groups, higher expenditure was associated with length of stay (in line with expectations, those who stay longer, spend more). It was also associated with activities undertaken whilst in the region; those who spent much time on the beach, and/or who went to an island or the reef spent more than those who did not. For both groups of visitors, higher expenditure was also associated with origin: our 'base' category was visitors from within Queensland, with the dummy variables signifying visitors from elsewhere in Australia, or from overseas. Visitors from other parts of Australia spent significantly more than visitors from Queensland. For non-business visitors, those from overseas also spent significantly more than visitors from Queensland, although business visitors from overseas spent similar amounts to those from within Queensland.

Although non-business visitors who were highly motivated by nature spent more than those not motivated by nature, this effect worked the other way for business visitors: those motivated by

nature spent less than their non-nature counterparts. More will be said of this important observation later in the Discussion section.

Appendix 2 presents regression results from our investigation of determinants of expenditure on the specific types/categories of expenditure listed in Table 1. Results are largely consistent with those explaining total expenditure, although this more detailed analysis allows for the identification of other factors, for example:

- Visitors from outside Queensland (elsewhere in Australia or overseas) are more likely to purchase and/or are likely to spend larger amounts of money on souvenirs, snorkelling, diving, ferries and boat trips to the reef or other attractions (with the exception of business visitors from overseas).
- International visitors are less likely to spend money (and/or spend smaller amounts of money) on rental cars and fuel than visitors from Queensland; Australian visitors from outside Queensland spend more money on rental cars than their Queensland counterparts.
- Nature focused non-business visitors and/or those with relatively high participation rates in beach/island and reef activities were higher spenders in several categories, than their non-nature-focused visitors (although nature-focused non-business visitors were less likely to hire a car).
- Non-business visitors, who spent a relatively large proportion of their time on private boats and/or fishing, spent less money on accommodation and groceries; business visitors who spent a relatively large proportion of their time on private boats and/or fishing were more likely to spend at least some money on accommodation and fuel than their non-boating/fishing business counterparts but were less likely to spend money on 'other' attractions.

Responses to hypothetical scenarios and potential economic impact of environmental degradation

Figure 5 summarizes answers to our questions about the likely response of visitors to hypothetical changes in the environment and in prices. Both visitor groups responded most negatively to the prospect of degradation in water clarity, more frequent oil spills, ship groundings and waste spills and reductions in coral cover. Non-business visitors were much more responsive to all hypothetical changes than business visitors, and these differences were statistically significant for all scenarios except for 'half as much chance of catching fish' and 'half as many fish to look at'.

Using actual responses, our estimates of the price elasticity of demand were -1.533 for business visitors and -2.282 for non-business visitors; much more elastic than estimates from other researchers (Peng et al., 2014; Sakai, 1988).[6] After having adjusted for hypothetical bias (dividing responses by 1/3 in line with List and Gallet, 2001), our estimates were -0.511 and -0.761 for business and non-business visitors – much closer to other researcher estimates.

Figure 6 thus shows the potential loss of visitor expenditure that could occur in each scenario, after having adjusted for hypothetical bias, by dividing all stated responses by one-third (all scenarios). Most apparent is the observation that degradation of the environment could generate much more significant financial losses than increases in price (akin to an appreciation of the exchange rate). Taking into account what visitors spend most money on (Table 2), the economic sectors likely to suffer the most from our hypothetical environmental problems are, in order: the accommodation sector, the retail, restaurant and cafe sectors, and providers of ferries and boat trips.

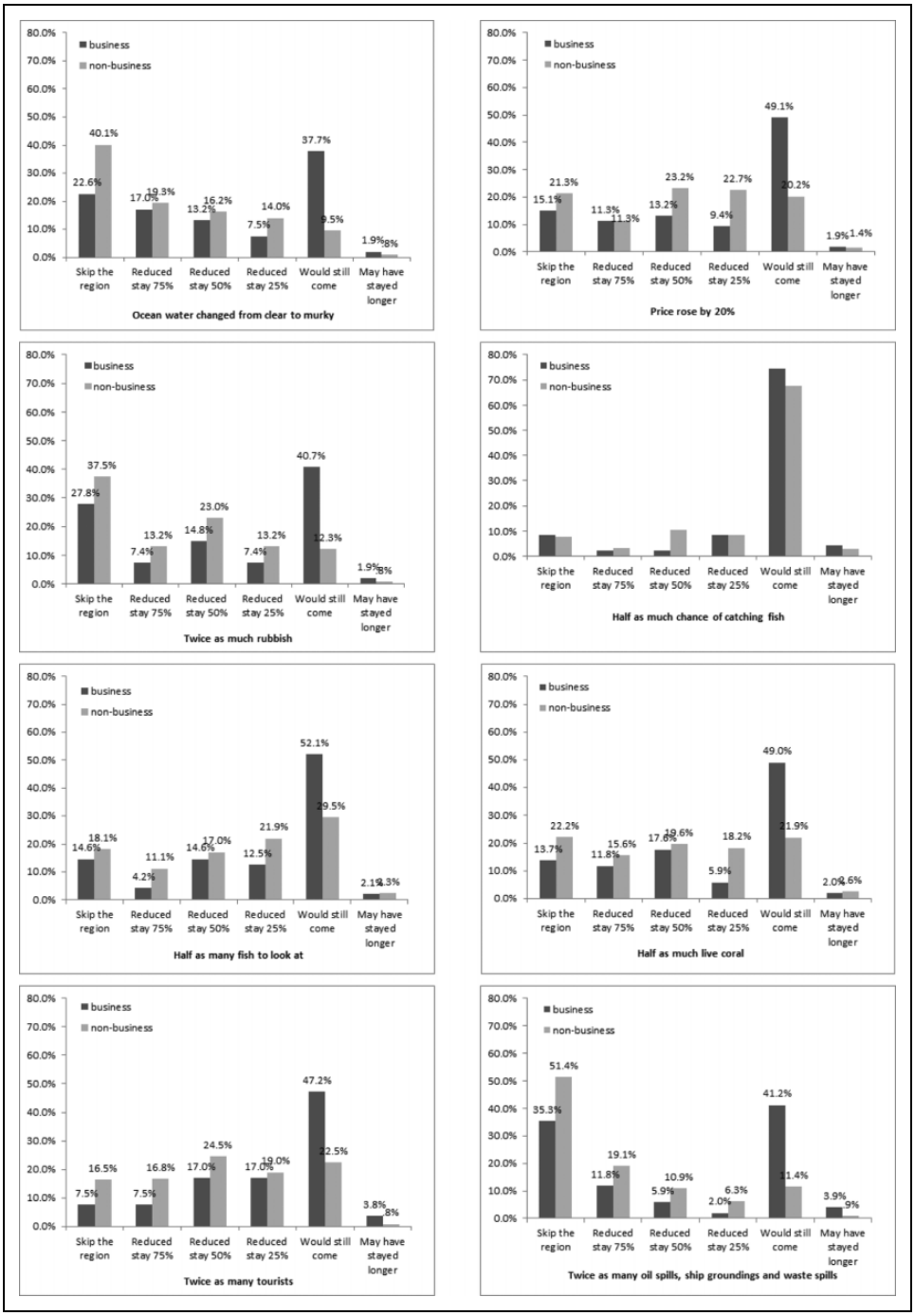


Figure 5. The visitation proportion losses over eight scenarios in The Great Barrier Reef World Heritage Area (GBRWHA).

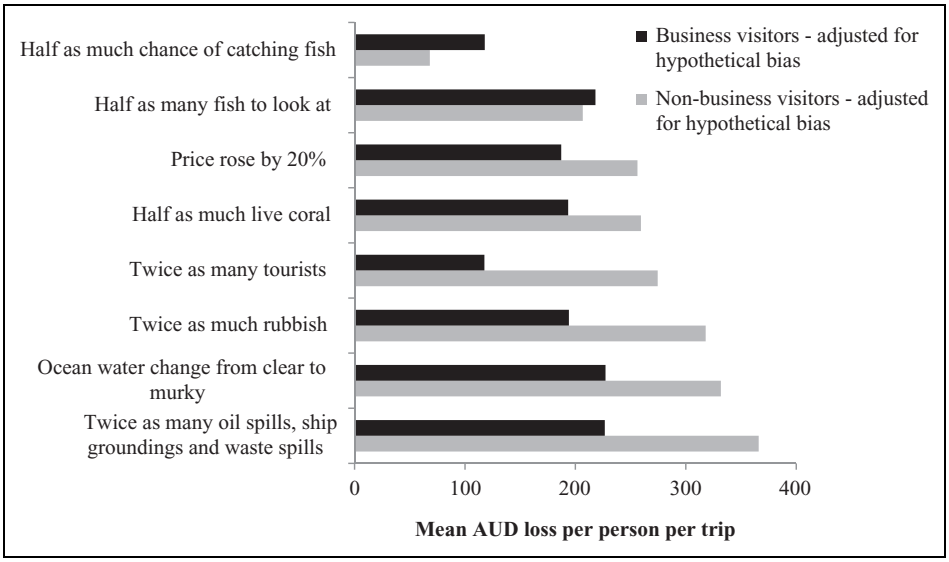


Figure 6. The potential loss in visitor expenditure from shorter stay (AUD$ per visitor).

Discussion

In this article, we set out to answer three specific research questions:

1. Which visitor segments (business or non-business) spend most on which types of goods and services?
2. Do tourists with nature-related preferences have different expenditure patterns than others?
3. What is the likely financial impact of further environmental degradation on specific visitor segments and, by extension, different sectors of the regional economy?

Contrary to the findings of other researchers (Jang et al., 2003; Laesser and Crouch, 2006; Suh and McAvoy, 2005), we found that the total expenditure per person per trip was lower for business visitors than for non-business visitors (approximately AUD$1290 compared to 1760; Table 1). Moreover, business visitors spend virtually the same per day in total expenditure (AUD$190 compared to AUD$188). This finding also differs from other studies in other regions which report higher mean daily expenditures by business visitors (Sakai, 1988; Suh and McAvoy, 2005) – most likely reflecting the fact that non-business visitors may spend, on average, less per day on accommodation than business visitors, but they are more likely to spend money on other things (such as ferry/boat trips and souvenirs). Our daily expenditure estimates are marginally higher than the average daily expenditure estimates of all types of visitors (AUD$149) reported in Deloitte Access Economics (2013) but align well with their daily expenditure estimates for overnight visitors (AUD$175). Our expenditure estimates thus seem 'plausible' for the overnight visitor cohort.

As regards our second research question, in accordance with other researchers (Leones et al., 1998; Mehmetoglu, 2007; Saayman and Saayman, 2014; Veisten et al., 2014), we found that non-business visitors with strong nature-related preferences spent more than those motivated by other things. But this was not so for business visitors: those who had strong nature preferences had lower

total expenditure than business visitors with weak nature preferences. Since this result is counter-intuitive, we compared business visitors with a relatively strong preference for nature (those scoring at least 1 on the nature-related trip motivation, hereafter *nature-business visitors*) with those who had interest in nature (scoring 0 on nature-related trip motivations, *non-nature business visitors*). Two-thirds of our business visitors were apparently nature-business visitors. These nature-business visitors stayed for a longer period of time (13.7 nights, compared to 8.9 nights), which might lead one to suspect that they should be spending more. But these nature-focused business visitors spent less per-night on accommodation (AUS$94.4 vs. AUS$127.8), thus explaining this result.

Both business and non-business visitors who spent a large proportion of their time pursing beach, island and/or offshore reef activities, spent more than other visitors (and not just in one sector). Evidently, for non-business visitors, it is both the trip motivation (in this case, nature) and the beach/island/reef activities undertaken that are associated with higher expenditure. For business visitors, it is the latter that seems to matter most. That said, our questionnaire did not differentiate between business visitors who came for meetings and those coming for conferences. Neither did our questionnaire differentiate between business visitors who come to the region of an occasional meeting (or conference) and those who are essentially 'fly-in, fly-out' (FIFO) workers – a common group in this region (approximately 7 days; Welters et al., 2013a, 2013b). Previous research indicates that many conference attendees select conferences with at least one eye on leisure activities (Park and Boo, 2010) and that a region's attractiveness and sustainable practices are important factors for convention site selection (Boo et al., 2008; Draper et al., 2011; Sox et al., 2013). As such, it seems likely that conference attendees may have higher expenditures (Laesser and Crouch, 2006) than other business groups. Similarly, the motivations and activities of FIFO workers are likely to differ from those of conference visitors and other business people will likely differ. Future research could usefully investigate differences between these sub-sectors.

The part of our analysis that was designed to inform research question three indicates that business and non-business visitors alike, view the prospect of environmental degradation much more negatively than the prospect of a 20% increase in (local) prices. This is particularly interesting in light of the fact that the higher Australian dollar is often 'blamed' for observed reductions in visitor numbers (Deloitte Access Economics, 2013). Our research suggests that environmental degradation may be playing an even more significant role than the higher currency and that further degradations could impact regional economies. Specifically, we estimate that the region could lose up to about AUS$220 per business visitor and 360 per non-business visitor if there were more oil spills, ship groundings and/or waste spills in the GBR World Heritage Area. Those numbers correspond to 17.6% and 20.8% of the current non-business and business visitor total expenditures per person per trip, respectively. Losses of similar magnitudes might also occur if the ocean changed from clear to murky, or if there was twice as much rubbish on the beaches and islands.

We urge readers not to treat these estimates as definitive predictions, but rather to focus on the take home message, that degradation of the environment could have a more substantive impact on the tourism industry than higher prices or exchange rates. Our analysis clearly indicates that hypothetical response bias is an issue, and although we have undertaken measures to control for that bias, our final estimates of impact are inherently imprecise. Moreover, our estimates of impact derive from average responses and thus fail to highlight the fact that different types of business and non-business visitors will likely respond differently. Farr et al. (2014) found that in the GBR catchment, visitors from China or from within Queensland were (on average) willing to pay less to help improve water quality within the GBR lagoon than visitors from elsewhere. They also found that willingness to pay varied according to how 'important' they felt water quality was, and – most relevant here – upon their

perceptions of water quality. These perceptions will, of necessity, depend upon baselines: People who originate from very degraded environments will likely view the GBR as being (relatively) pristine, and those from less degraded environments may feel differently. As such, one would expect much variation in responses to environmental degradation for different visitor groups.

Our research also highlights the fact that business visitors are much less responsive to all hypothetical scenarios than non-business visitors. That business visitors are less sensitive to price increases than non-business visitors is hardly surprising and accords with previous research (and with the reality that people who are not paying their own bills are likely less responsive to prices than others). What is perhaps more interesting, however, is our finding that although business visitors are less sensitive to the prospect of environmental degradation than their non-business counterparts, they are not completely inure. Further research is needed to explain why this is so, but we believe it is most likely due to the fact that at least some business visitors come to the region for meetings, conferences or other, and they extend their stay for a day or so, to better explore the region. Degradation of the environment may not remove the 'core' reason for their visit but could reduce the incentive to extend the stay.

Finally, we note that when devising estimates of the 'potential financial impact' of these scenarios, we used a novel approach to test for (and subsequently control for) hypothetical response bias. Specifically, our hypothetical scenarios included a question about (likely) response to higher local prices. We were able to use responses to that question to generate a very approximate estimate of price elasticity which could be compared with estimates available from the broader literature. By doing so, we were able to assess the believability of hypothetical responses, finding them, as expected, to be implausibly high. We were also able to use insights from the literature to scale responses, again using our price scenario to check the plausibility of recalibrated responses. The technique is admittedly rudimentary and could do with further refinement, but we feel that subsequent (improved) variations in this method could help to improve the reliability of results from a broad range of studies using contingent (hypothetical) responses.

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Notes

1. The term "nature tourists" is used here to describe visitors who indicate that nature or nature-based activities are their main reason for visiting a particular site (Leones et al., 1998). Although a nature tourist can also be an ecotourist, we do not interchange the two terms for this article. Rather, we consider the latter as having a set of intrinsic environmental values (Wight, 1996) or high "new ecological paradigm" scores (Veisten et al., 2014), while the former mainly refers to the trip motivation; it is used here to indicate that it is to enjoy nature.
2. Sun and Stynes (2006) suggest that one should generate estimates of mean per-person expenditures by dividing the (sample) mean of expenditure by the (sample) mean size of travel party (instead of estimating expenditure per travel party on a case-by-case basis). We acknowledge that the sample approach suggested by Sun and Stynes (2006) generates lower overall estimates of 'mean' expenditure, but deliberately choose to work with individual-level data, to ensure that it is possible to examine the way in which expenditure varies across demographics, motivations and activities.
3. We also used ordinary least square (OLS) and truncated regressions for this purpose. Because these models did not perform as well as the Tobit specification, the results from OLS and truncated regressions are not reported in this article.
4. We also used OLS and truncated regressions for the second-stage finding, as expected, that these models did not perform as well as the Tobit specification, so have not included those results in this article.
5. The data were taken from monthly figures provided by www.oanda.com/currency/converter/. Euro was taken as the basic point because Europe is a traditional market source for the Great Barrier Reef World Heritage Area (Deloitte Access Economics, 2013).
6. The price elasticities for business visitors and non-business visitors who visited Hawaii were -0.332 to -0.622 and -0.642 to -0.887, respectively (Sakai, 1988). The average price elasticities for business and non-business visitors based on a meta-study were -0.35 and -1.102, respectively (Peng et al., 2014).

Supplemental material

The appendix file(s) are available at http://te.sagepub.com/content/by/supplemental-data.

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