IDENTIFYING INDICATORS TO MEASURE TOURISTS' VIEWS ON CLIMATE CHANGE

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ABSTRACT

Climate change is emerging as a factor that will exercise considerable influence over future patterns of tourism demand. Concerns over the carbon cost of long distance air travel for example may begin to have a detrimental impact on long haul travel in the near future. Surprisingly, the tourism literature has largely ignored the issue of climate change with only a handful of papers, a few special issues of journals and several books (e.g. Becken & Hay, 2007; Hall & Higham 2005) focusing on the topic. In the scientific literature the reverse is true as evidenced by the large number of papers consulted in the preparation of the IPCC report (2007). The research reported on in this paper deals with the preliminary findings of a project that is designed to develop a survey based monitoring system. The surveys will be used to identify key indicators that reflect changing consumer perceptions of climate change and travel. The results are based on the first of a series of surveys to be conducted in Cairns at yearly intervals. Results of the first survey indicate that the majority of consumers have yet to adopt behaviours that reflect concern about climate change. The results

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also identify potential candidates for climate change indicators that may be used to

track shifts in consumer's concerns about climate change.

Key words: Climate change, indicators, Cairns

BACKGROUND TO RESEARCH

The Fourth Report of the Intergovernmental Panel on Climate Change (2007)

contained the following sobering statement (IPCC 2007: 1); 'Warming of the climate

system is unequivocal, as is now evident from observations of increases in global

average air and ocean temperatures, widespread melting of snow and ice and rising

global average sea level'. The report further stated that 'Observational evidence from

all continents and most oceans shows that many natural systems are being affected

by regional climate changes, particularly temperature increases'. The list of expected

impacts of climate change include: retreating glaciers, reduced snow fall in some

areas, shifts in the range of some species, longer and more sever drought, flooding,

sea level rises, reduced summer flows of snow feed rivers in many areas, coral

bleaching, increasing acidification of the oceans, more intense fire events and so on.

The severity of the changes predicted in the report should be cause for alarm. All of

the preceding impacts are likely to cause severe dislocation in many areas of the

tourism industry. Reduced snow fall for example will affect ski resort while coral

bleaching will harm reef based tourism sectors.

There is almost universal agreement in the scientific community that the impacts of

climate change will be severe and long lasting (Matzarakis, 2002; Braum et al. 1999).

The strategies adopted by the global community to combat climate change are based

on mitigation, defined as strategies to reduce the emission of carbon and other gases,

and adaptation, defined as strategies to adjust to the impact of climate change. As

concern about the impacts of climate change escalate, the tourism industry will be

compelled to contribute to mitigation and be forced to adjust through adaptation.

However, there is a substantial risk that failure by some sectors of the tourism industry to develop an understanding of the likely impacts will create large scale disturbances in many tourism markets. Given the seriousness of the problem it is surprising that little of the work undertaken so far has acknowledged that tourism is essentially a demand-driven sector, heavily influenced by the choices of tourists in source markets. Given the role of demand as a factor in determining the size of tourism flows and the products and services consumed a detailed evaluation of tourist views and behaviours in relation to climate change issues is required and is the focus of this study.

The relationship between climate change and tourists occurs at two levels. Firstly, the attractiveness of destinations may change as weather patterns and sea levels alter. Research indicates that many destinations will suffer directly from the effects of climate change. Studies of alpine/skiing destinations (Koenig & Abegg, 1997; Elasser & Burki, 2002; Scott et al., 2003; Becken & Hay, 2007) show that poor, late or short snow seasons will affect operations. Similarly, unstable environmental conditions will increase the level of risk for marine/coastal tourism destinations (Gable, 1997; Hoegh-Guldberg, 1999; Becken & Hay, 2007). Secondly, tourism is a direct contributor to climate change through the emission of greenhouse gases and is also a major user of fossil fuels for transport, heating, cooling and lighting. Estimates suggest that tourism contributes 5% of global emission greenhouse gasses (Becken & Hay, 2007). As our understanding of climate change impacts increase and efforts to combat them are stepped up, a greater consciousness of tourism's role may come into play. According to UNWTO's Secretary General Francesco Frangialli (2007) "it is vital for tourism destinations [...] to anticipate coming changes and to draw their consequences, starting now. [...]. It is not easy to see through this successfully as it entails all at the same time, modifying economic circuits, introducing new technologies, carrying out intensive training, investing in the creation of new products and changing the minds of public authorities, entrepreneurs, host communities and tourists".

To date, few researchers have examined the future of the tourism sector in an evolving political, economic and moral environment, where both an increase in frequency and severity of current natural disasters are expected and abrupt and pervasive "surprises" (Becken & Hay, 2007) may play important roles in the global economic environment. Recent research suggests that the models published by the IPCC (2007) may underestimate the severity of climate change rather than overestimating it, as past changes show that the climate has changed far more dramatically and rapidly than is currently envisioned in the IPCC. One of the areas of increasing concern is the likelihood of "surprises" or tipping points that may amplify or accelerate predicted or unpredicted changes. In their introduction to Tourism Review International's special issue on climate change, Gossling and Scott (2008) also warn that there is a potential for non-linear change in tourist behaviour as climate change awareness and impacts increase.

Tourist attitudes and behaviour to climate change:

Changes in public perception of green house gas emissions for non-essential commodities and the cost of climate change mitigation strategies may cause changes in tourist demand patterns. To understand the relationship between climate and possible impacts on tourism demand it is necessary to understand the importance that climate (described as seasonal patterns of weather) and climate change has on the decision making strategies of consumers planning holidays. Although not significant at present, it is possible that climate related decision making will begin to influence tourism markets in the future either as tourists become aware of their personal carbon foot (Simmons & Becken 2004), or as negative changes at destinations become more apparent. Gossling and Scott (2008, p.3) for example, warn of "increasingly environmentally conscious consumers leaving no choice but to become involved in discussions of climate change impacts and possible responses".

At present, it appears that there is a "blind spot" concerning the public's perception of their carbon holiday footprint. Becken's (2004) study of tourists visiting New

Zealand indicated a relatively low awareness and knowledge of climate-related impacts of air travel by visitors, particularly when compared to their knowledge of carbon footprints in their everyday lives. A later study by Dodds et al. (2008) found that only 16% of their 305 respondents were aware of the concept of carbon offsetting, and that whilst a third of respondents would chose a programme if offered, 80% of them felt that the financial burden for carbon offsetting should fall on the government or airline. Studies by Becken (2004), Gossling and Svensson (2006) and others suggest there are two main issues surrounding the relationship between tourists and climate change. The first these concerns tourists' level of knowledge of climate change. At present knowledge levels are low and appear to focus on the observable, immediate time-frame. This is of concern when addressing less tangible long-term issues associated with climate change.

The second issue of concern is: do tourists care? In the same vein as the previous comment, it is often this highly mobile, wealthier section of the population that contributes to emissions and therefore should care, yet this result does not appear in previous studies. Becken (2004) makes the point that travel is undertaken for personal benefits and that the environmental risks associated with holidays are underestimated and changes to travel behaviour are therefore less likely to happen. Literature from the area of environmental education supports the notion that while information and education are important, environmental attitudes and behavioural shifts are under the influence of the affective realm. Dwyer and Forsythe (2008) argue that in the future long-haul travel will be subject to negative media images as a damaging source of greenhouse gases and be affected by increases in prices from carbon taxes. Collectively, these trends are likely to lead to a decrease in long-haul travel. Tourists will increasingly be faced with the externality costs of their decisions to travel as climate change mitigation strategies, such as carbon trading schemes, are put into place. It is clear that the literature has failed to develop an understanding of the manner in which tourists will respond to future climate. Without this type of knowledge tourism planners and the private sector will have an impaired ability to cope with changing consumer demands driven by climate change factors. One

strategy for assessing changing trends in consumer attitudes towards climate change is to identify change indicators, i.e. quantitative measures that have been shown to be valid and reliable and provide a picture of (social) conditions over time.

The issue of public perceptions of climate change and behavioural intent become particularly important in vulnerable destinations. Tropical North Queensland located in the North East of Australia can be described as vulnerable for several reasons: (i) it is predominantly a fly-in destination, (ii) it is a nature-based tourism destination, whose main attractions (the Great Barrier Reef and the Wet Tropics Rainforest) are vulnerable to climate change impacts (IPCC 2007), (iii) it is what Wall (2003, cited in Loman-Scanlon, 2006) describes as a high energy environment that is "... particularly vulnerable to climate change through modification in the hydrological cycle" and (iv) it is a mass market destination, that has to compete on a global scale dominated by uniformity, particularly for those destinations with similar climatic resources (Dubois & Ceron, 2006).

Based on the premise that Tropical North Queensland is a vulnerable destination, that little knowledge exists surrounding tourism demand-side implications of climate change and that we may face "tipping points" in tourist behaviour, we propose that two critical elements are required to strengthen this region's position in the future: identification of indicators that show changing demand for travel and a monitoring system that can be used to identity changes in consumer views on carbon related issues and for forecasting. Tipping points are deemed to be the levels at which the momentum for change becomes unstoppable.

RESEARCH OBJECTIVES

The objectives of the research were to:

1. Develop and trial a survey instrument that can be used to monitor changes in travel intentions based on climate change factors.

- 2. Identify key climate change related indicators to measure changing consumer travel intensions
- 3. Develop a tourism climate change barometer to communicate changes in key visitor indicators.

A total of 339 completed surveys were collected at Cairns domestic airport in the summer of 2008. The respondents' characteristics are fairly typical of visitors to the region, although Asian markets are under-represented due to language constraints. Overall, the sample consisted of almost equal numbers of males (48%) and females (53%), international (48%) and domestic (52%) tourists. In total, 69% of the respondents were less than 40 years old, indicating a relatively young sample of respondents. The respondents were predominantly students (23%), professionals (18%) or retirees (12%). Most were on their first visit to the region (56.6%) and travelling with their partner (42%), alone (20%) or with friends (18%).

Survey questions were developed to capture information about the motivations to visit the region and the likely impact of climate change on those motivations, focussing strongly on the importance of the Great Barrier Reef as an attraction. Next, the data were analysed using a standard SPSS version 14 program. As with any survey of this nature some limitations were noted including the convenience sampling approach used and the short time period over which the survey was conducted. These limitations will affect the ability of the results to be generalised over a 12 month period.

RESEARCH RESULTS

Tropical North Queensland as a vulnerable destination:

In this section of the results, the vulnerability of Tropical North Queensland was examined based on the following criteria: its dependency on air travel, the main motivations for visiting the region, and the impacts of climate change on its

important natural attractions. Over half of respondents (58%), flew into the region. In response to the question regarding the place of Tropical North Queensland (TNQ) as a destination within the overall travel patterns of respondents, respondents were almost evenly split between those visiting the region as their main destination (42%) and those who chose TNQ as one of a number of destinations visited (45.5%). Few respondents said that TNQ was a stop-over destination for them. Of the respondents who said that TNQ was their main destination, 86.5% were domestic tourists, indicating that most international respondents said that TNQ was one of a number of destinations.

Motivations for visiting the area were measured on a scale of 1-5, where 1 indicated the motivation was not at all important, whilst 5 indicated that it was a very important motivation. Seeing the Great Barrier Reef was, on average, the most important motivation (mean of 4.20), followed by resting and relaxing (mean of 4.02). The rainforest (mean of 3.99), enjoying the natural environment (3.85) and seeing the local wildlife (mean of 3.78) were the next four most important motivations. Many of these motivations are likely to be impacted upon by climate change indicating important implications for the region. Less important motivations were local culture (mean of 3.01), adventure activities (mean of 3.18), spending time with family (mean of 2.93).

Given the importance of the Great Barrier Reef as a motivation to visit the region and its predicted vulnerability to future increases in sea surface temperatures, respondents were asked if they would still revisit the region should future coral bleaching occur. A total of 12.5% would not revisit the region, 40.7% would revisit, and 40.8% were not sure if they would revisit the region. There were significant differences between responses based on current rates of revisitation, where existing repeat visitors were likely to revisit the region (51% of repeat visitors would revisit), even if the reef had suffered large-scale bleaching, whilst first-time visitors might not (28% of first-time visitors would revisit). Again (although it must be noted that sample sizes are small), it would appear that respondents who gave scores of 4

(important) or 5 (very important) to the GBR as a travel motivation were less likely to revisit if the reef deteriorates, whilst respondents who gave scores of 3 (neutral) or less (unimportant or not at all important) were more likely to revisit (Table 1).

Table 1: Responses to revisiting the region if the reef deteriorated based on the importance of the reef as a travel motivation.

	no	Yes	don't know	Total
Very Important (N=60)	23.3%	30.0%	46.7%	100.0%
Important (N=21)	9.5%	42.9%	47.6%	100.0%
Neutral (N=16)	12.5%	62.5%	25.0%	100.0%
Unimportant (N=6)	.0%	75.0%	25.0%	100.0%
Not at All (N=4)	16.7%	50.0%	33.3%	100.0%

Concerns about climate change and conservation behaviour

To investigate the level of concern about specific climate change issues, respondents were asked to assess their attitudes towards a number of climate change impacts. Respondents' most pressing concern was that sea levels would rise. On a scale of 1 to 4, where 4 was "very concerned", the statement that climate change would lead to rising sea levels scored a mean of 3.51. Other important concerns included the increase of extreme weather events (mean of 3.50), general impacts (mean of 3.37), extinction of Australian animals (mean of 3.36), damage to the Great Barrier Reef, (mean of 3.18), damage to the Wet Tropics World Heritage Area (WHA) (mean of 3.29). The less important concerns included the impact of climate change on life quality (mean of 3.12) and international stability (mean of 2.95), as well as the impact of their daily home activities on the environment, which received the lowest score of 2.91. Somewhat surprisingly, there was no statistical difference in the way international and domestic visitors rated their concerns, for instance domestic

respondents (3.19) were only slightly (on average) more concerned about the impacts of climate change on the GBR than international respondents (3.15).

Results indicate that behaviours which indicate a general concern for personal carbon outputs was low. Using an assumption based upon Becken's (2004) work that states that there is evidence that concern for climate change impacts are related to a more general environmental awareness and behaviours respondents were tested for their general level of environmental behaviour. Respondents were asked to rate nine environmentally-friendly behaviours that they undertaken when at home on a scale of 1 (not at all important) to 5 (very important). The most common activities or behaviours are outlined in Table 2.

Table 2: Ranking of statements related to care for the environment

Rank	Item	Mean
1	Recycling my rubbish	4.20
2	Purchasing energy efficient home appliances	4.00
3	Reducing the amount of packaging on consumer products	3.97
4	Using energy efficient lighting	3.95
5	Purchasing bio-friendly products	3.49
6	Using public transport instead of a private car to reduce carbon	3.03
7	Buying green electricity	2.97
8	I prefer to purchase products that include carbon offset schemes	2.81
9	I prefer to shop at stores that offer carbon offsetting schemes	2.65

These results indicate that respondents have yet to adopt behaviours that are consistent with positive personal action to reduce climate change through actions that reduce personal carbon outputs. One surprising result was that social desirability bias, described as the tendency to give answers that are socially desirable or acceptable (Budeanu 2007) appeared to be relatively low based on the responses recorded in Table 2.

To test for relationships (groupings) between variables, as well as the assumption that pro-environmental attitudes are correlated with concern for climate change, a factor analysis on responses to the nine possible concerns was undertaken. The results indicate three distinct factors, the first can be labelled concern about the natural environment, and includes the statements about the Great Barrier Reef, Wet Tropics WHA, Australian animals, impacts of home activities, general impacts and the increase of extreme weather events. The second factor was social impacts and included increase political instability and effects on quality of life, and finally, rising sea level concerns represents the third factor. Returning to the data on climate change concerns, we can identify respondents that group together according to the first, second, and third factor (with some overlap between them, e.g. 56 respondents were concerned about both the social aspects and sea level rise impacts of climate change). Overall there is little distinctive variation in the socio-demographic profiles of the respondents who belong to the various factors. The only exception is that respondents who are retired, self-employed or in the public service are more likely to be concerned about the environmental impacts of climate change.

Next, respondents were asked some general questions about their carbon footprint. The results are shown in Table 3. Again, these results confirm only a low level of climate change awareness and concern regarding possible impacts. Further, the difference between awareness at home and whilst on holiday appears to support Becken's notion of a vacation "blind spot". There does appear, however, to be a latent interest in increasing awareness of carbon footprints both at home and whilst away on holiday, perhaps indicating the presence of Becken's uninformed group.

Table 3:	The respondents'	carbon footprint	t activities and interests.
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	Yes	No	Don't know
I have measured my own carbon footprint at home	13.5%	79.3%	7.2%
I am aware of the carbon footprint of this trip to TNQ	11.3%	74.1%	14.3%
I am interested in finding out about my carbon footprint at home	33.6%	49.1%	17.3%
I am interested in finding out about my carbon footprint on holidays	32.7%	50.9%	16.4%

Respondents were asked a final question concerning future climate change impacts and their travel behaviour. They were offered three possible scenarios how they might react to climate change in the future. Their most common response was that they will face some form of carbon tax (57.1%). A quarter of respondents said that they would look for holiday destinations that have low carbon footprints, whilst only 10.4% would fly less. Respondents were most uncertain about the second statement (low footprint holidays) (43% said they were unsure), and least supportive of the third statement (decreasing flying) (44% said no).

DISCUSSION

The results presented in this paper indicate that there is currently a low level of awareness and concern for climate change impacts amongst visitors to Tropical North Queensland. Further, the link between existing pro-environmental behaviours, concern about climate change and climate-friendly behaviours is a tenuous one; indeed the results of the factor analysis reveals a more complex relationship that would benefit from further analysis.

Evidence presented in Table 2 indicates most respondents have yet to move beyond relatively simple and inexpensive measures of responding to climate change. A greater level of commitment will become apparent when consumers begin adopting behaviours that increase personal cost including switching to green electricity and so on. Adoption of practices (items 3 to 9 in Table 2) that incur greater sacrifice through increased cost will indicate that consumers are beginning to accept personal responsibility for reducing carbon output. A change of this nature can be classed as an indicator of change in consumer behaviour. As the level of change grows and consumers become more conscious of their ability to become part of the solution to climate change a tipping point will be reached. At this point it can be expected that changes in demand will begin to affect destinations. For example, as consumers become conscious of the carbon cost of a long haul flight they will be inclined to switch to closer destinations where the carbon cost of travel is lower. Calls of this nature have already begun to appear (WWF 2001).

Based on the notion of tipping points, we argue for regular monitoring of key indicators that would reveal changes in attitudes and behaviours. The results presented here indicate several candidates for climate change indicators including:

- changes in the number of people who currently measure their carbon footprint
- the number who were interested in finding out the size of their carbon footprint
- willingness to pay a carbon offset
- percentage of respondents who fly less
- purchasing carbon offsets from airlines
- percentage of respondents who participate in conservation programs
- consumer behaviour in regard to buying green electricity, shopping at stores that offer carbon offsets and purchasing products that include carbon offset schemes

Future research will target environmentally-friendly behaviours that respondents undertake when at home to identify the potential for using these as indices of change. In particular, the response relating to the use of public transport as a substitute for private cars indicates a shift in thinking about travel that in the future may lead to changes in the types of transport used during holiday travel. Similarly, increases in the purchase products that include carbon offset schemes is an indicator of growing concern with associated action about climate change.

The data presented in this paper will be used as a base line for future surveys to be undertaken on a regular basis, and expanded to encompass a number of countries allowing a more detailed picture of global trends to be identified. There are, however, several aspects of this research that need further investigation. In particular, the links between intention/attitudes and behaviour needs to be more thoroughly explored. What are the factors that will facilitate the conversion of concern into action? Is it possible to predict the tipping point (awareness that is translated into mass action) for behaviour, and the rate at which travel behaviour might change in the future? Next, a greater understanding of the relationship between pro-environmental attitudes and behaviour and climate change concern could be investigated in more detail; the climate change debate is currently sitting across several forums, including environmental degradation, impact upon society, including issues such as national security, and finally a strong economic argument (including the need to preserve ecosystem services and the cost of adaptation) for mitigating climate change. Any of one of these or a combination may bring about a tipping point and lead to changes in behaviour. Finally, there remains the tricky issue of ethical travel and climate change guilt associated with transport emissions. How will the balance of benefits from travel on one side and tourist impacts on the other play out? Is the demand-side of the tourism industry ready for the proposed climate accreditation schemes? What are the dynamics between supply and demandside in creating greater awareness and acting upon that awareness? Are there any consequences of introducing such schemes before the market is reading and has the level of knowledge to discern between schemes?

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