CHAPTER 2

Review of Literature

About the chapter

This chapter presents a review of the existing literature and provides background on climate change, tourism, and the relationship between the two. In addition, how climate change impacts the tourism industry is reviewed. The concept of vulnerability, its conceptual origins, and the applicability to climate change impact studies as applied to the tourism sector are discussed. Next, the role of perception in shaping the social construction of vulnerability is explored.

Section A: Review of the Existing Literature

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2.1 Introduction

Whilst the world climate has undergone many changes throughout the earth’s history, the current rate of change has resulted in growing global concern for climate change (Leiserowitz, 2006; Kellstedt et al., 2008; Smith et al., 2009). The climatic changes that are taking place suggest that the world may experience these changes continuously regardless of efforts made to mitigate the effects (Simpson, 2011). The vulnerability of countries to climate change may vary based upon their developmental levels and geographical features, as these factors will determine how sensitive the country is to climate change impacts (Smit & Wandel, 2006). The changes in climate are regionally unique, and therefore will diversely influence the communities there, with significant effects on the tourism sector (Perch-Nielsen, 2008).

The relationship between tourism and climate is an intricate one (Perch-Nielsen, 2008) as tourism is highly dependent on climatic conditions (Hernandez & Ryan, 2011). Tourism is the reason for many environmental problems as this industry has an impact on the natural surroundings (Mustafa et al., 2012). As a means of escaping the severity of daily life, tourists tend to indulge in higher levels of consumption than they would at home, this is evidenced through large amounts of water, energy and other resources consumed at the tourist destinations (Williams & Ponsford, 2009). The tourism sector is a large contributor to harmful impacts on the natural environment as the tourism operators, especially those in the accommodation industry, want to provide their guests with comfort and luxury which leads to the overuse of water resources for tourists (Cole, 2012). While tourism is evidently beneficial to an area economically it also brings with it many undesirable environmental consequences (Graci & Dodds, 2008).
An analysis of the existing literature demonstrates the significance of climate to tourism, as climate can affect the seasonality of tourism, where tourists choose to go and what activities they participate in as well as their overall experience of a tourist destination by means of how satisfied and safe they feel (Morabito et al., 2004; Becken, 2005; Kyriakidis & Felton, 2008; Richins et al., 2009; Gössling et al., 2012). As tourists seek destinations with a more favourable climate, current popular destinations may become less attractive (Rosselló & Waqas, 2015). The ability of tourism destinations to mitigate or adapt to climate change is prevented by the inequality between the concern given to developing the tourism sector, and planning for the consequences of climate change (Mohan & Morton, 2009). In order to adapt to climate change, all societies and economic sectors will need to get involved in the years to come, despite this, however many sectors, including the tourism sector, have already begun to adapt (Simpson et al., 2008). The tourism sector has the ability to make a huge contribution in tackling climate change due to its rapid growth and being a core driver of global economic development (Mukogo, 2014). This allows for the sector to lead the way by adopting green practices and emphasizing sustainability while educating their guests by using environmental management initiatives (Mukogo, 2014). However, this would require innovation and resources from the sector being targeted at this problem (Scott et al., 2008). By putting forward a strong and sufficient response to climate change, the better the chances are that tourism will develop into a highly sustainable sector (Pollock, 2008).

This chapter will discuss the existing literature on the global changes in climate and the tourism relevant to this research. Thus, the chapter will develop by investigating the relationship that exists between climate change and tourism. First, considering the developed and developing world contexts of how climate change will impact upon these countries, and their ability to cope with the consequences. Next, the perspectives of the public are discussed and how various factors may influence the people’s perspectives, thereby affecting their
ability to identify what climate change is and how to perceive the risk of it. Finally, a review of the literature in terms of how climate change and tourism are linked by considering how climate change may impact upon tourism in various areas and how tourism operators can effectively cope.

### 2.2 Relating Climate Change and Tourism

The relationship between climate and tourism has been studied with the intention of exploring the types of impacts climate conditions can have on the tourism industry. Tourism is always dependent on climate, particularly through the length of outdoor recreation seasons and the quality of recreational activities (De Freitas, 2001). This is because climate affects the nature of the physical landscape upon which tourism in a given area relies (Scott et al., 2007).

These relationships have the potential to be altered as climate change is altering the climate locally. Changes in climatic variables like precipitation can affect the form of tourism in a location, while ecosystem change can modify the physical resources available to tourism. Finally, tourists’ decisions can be altered by the anticipated climate conditions at the destination. Loomis and Crespi (1999) categorized the effects of climate change on tourism into direct and indirect impacts.

#### 2.2.1 Direct Impacts of Climate Change on Tourism

Direct impacts on the tourism industry are manifested as the influences of climatic conditions on the attractiveness of a location for certain types of tourism activities and when they can occur. Since climate defines the season length for tourism activities, seasonality is an extremely important aspect of tourism (Butler, 2001). In addition to being defined by climatic constraints, seasonality is also established by the attitudes of tourists. Lise and Tol
(2002) examined the influence of temperature on vacationer comfort, and determined that tourists have preferred vacation activities and will travel to a location with a climate suitable for these. Climate change is a potential threat to a tourism industry structured around seasonality. Winter-based tourism, which depends on consistent snowfall and low temperatures throughout the winter, is an illuminating example of how seasonality changes could affect tourism (Smith, 1993). On the other hand, changes in seasonality could benefit certain types of tourism. Harrison et al (1999) speculated that longer, drier summers would be beneficial to tourism in Scotland, which is currently limited by the short summer season, because warmer temperatures would lengthen the period of time in which summer recreation is attractive to tourists.

Climate also impacts tourism operations and subsequent economic well-being of industry through physical hazards. Becken (2005) explained that for Fiji where the tourism infrastructure is low-lying, vulnerability to sea level rise is widespread. For Mediterranean area tourism, the increase in extreme heat waves could increase health risks for tourists and ultimately reduce the attractiveness of the area (Amelung and Viner, 2006). This example is illustrative of how the operating costs of a tourism business can be altered due to climatic changes because the timing and intensity of outdoor recreation impacts the type of infrastructure. Climate and weather extremes, in which temperature or precipitation is severe than normal conditions, can interfere with business activity, cause changes in infrastructure, and increase insurance costs (Simpson et al., 2008). Longer term shifts in climate can compel temporary resource closures and affect water supplies (Cabrini et al., 2009). Depending on the region and the structure of the tourism community, direct impacts of climate change may have both positive and negative consequences for the industry (Cabrini et al., 2009).
2.2.2 Indirect Impacts of Climate Change

In addition, climate is a determinant of ecosystem dynamics. Climate change can affect the physical environment by causing shifts in the distribution of wildlife patterns and plant species. Climate change will alter ecosystem resources that tourism industry utilizes, which in turn indirectly affects tourism profitability. Changes to regional ecosystems and the effects they have on tourism industry are labeled as indirect impacts, since these types of impacts are derived from climate change but are not the direct effects of climate on the tourism industry itself. Since the quality of the environment is extremely important for tourism that is based on natural resources, any landscape and resource changes could result in reduced attractiveness of a region for tourism (Scott, 2003). Extreme temperatures coupled with reduced precipitation will change ecosystem dynamics by increasing wildfire potential in many regions of the world. Flannigan et al. (2005) projected that Canada will experience a 74% to 118% increase in fire area in the next hundred years. In addition, changes in biodiversity and an increase in natural hazards can influence landscape aesthetic (Simpson et al., 2008).

While direct climate change impacts have both positive as well as negative impacts on the industry, such as a longer summer season, indirect impacts tend to be largely negative. For example, the 1988 Yellowstone fire caused the summer season to end four weeks earlier than normal, resulting in a yearly visitation reduction of 15% and an economic loss of $60 million regionally (Scott et al., 2007). Wildfires in Colorado during the summer of 2002 caused visitation to drop by 40% in areas, destroyed infrastructure, and caused river outfitters to lose 40% of their normal business (Scott, 2003). Drought conditions causing a 2.1% drop in water levels at Lake Mead, Nevada and a 5.4% drop at Lake Powell, Utah resulted in decreased recreational use and a loss of $32.1 million in visitor spending (Morehouse et al., 2007).
As a result of these direct and indirect factors, climate has an influence in when and where recreational activities take place. Climate change, by directly altering climatic factors and indirectly altering ecosystem resources that tourism depends on, has potential implications for the tourism industry. Ultimately, the degree to which a tourism community is affected by climate change will depend on how climate change is manifested in the local area, how tourists respond to the changes, and the ability of the tourism community to cope with these changes (Scott, 2003).

2.3 Climate Change and Vulnerability

The frameworks given by many climate impact researches have their origins in the concept of vulnerability. Because vulnerability has roots in several different areas, it is difficult to give an accurate definition since the loss being experienced and who is being affected differ on a case-to-case basis (Cutter, 1996). Broadly defined, vulnerability is a potential for loss or damage (Eakin and Luers, 2006). It can also be defined as “the degree to which an individual, group or system is susceptible to effects of climate change” (McCarthy et al., 2001). Yet other definitions explain vulnerability as “the ability or inability of individuals or social groupings to respond to, in the sense of cope with, recover from or adapt to, any external stress placed on their livelihoods and well-being” (Kelly and Adger, 2000) and “the capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard” (Blaikie et al., 1994). In the context of climate change, vulnerability is generally thought of as a certain way to evaluate the level of risk certain individuals, social groups, and communities face, as well as specific resources or regions that have the potential to be harmed (Eakin and Walser, 2008).
2.4 International Concern for Climate Change

Global climate change is the alteration of the earth’s climate over time (Marshak, 2008). The world’s climate has shown to be both cooler and warmer than it is now due to the constant change in climate, nevertheless the average global temperature is presently increasing and at an unprecedented rate (Allaby, Twist & Megonigal, 2008). Academic research has most recently placed a high level of focus on global warming and climate change (Higham & Hall, 2005; Ehmer & Heymann, 2008; Nickerson, Becerra & Zumstein, 2011; Ramasamy, 2012). There is a vast amount of evidence to support that the climate is changing (Berrang-Ford, Ford & Paterson, 2011). Despite this, the key issue is why such pressing issues today such as climate change and environmental problems are not dealt with the same enthusiasm and ideals as disasters of the past like war and tyranny (Beck, 2010). While the climate change debate has continued for several decades raising increased concern and awareness, it remains a low priority in respect to other social, environmental and political issues (Leiserowitz, 2006).

The international level of awareness and concern for climate change has risen exceptionally as a response to events of Al Gore’s documentary ‘An Inconvenient Truth’, the Intergovernmental Panel on Climate Change’s (IPCC) fourth and fifth assessment report on climate change, and both the Al Gore and the IPCC being awarded the Nobel Peace Prize in 2007 (Mertz et al., 2009). The IPCC, established in 1988 by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO), released scientific evidence in the first IPCC Assessment Report of 1990 which highlighted the challenge of climate change and emphasized the significance of international cooperation to deal with its consequences, which in turn lead to the formation of the United Nations Framework Convention on Climate Change (UNFCCC) (IPCC, 2014). The international response to climate change is represented by the UNFCCC and its Kyoto Protocol (Lambrou & Piana,
However the Kyoto Protocol is generally viewed as a failure (Wiley & Gostin, 2009) with it being argued to be a result of its design which made enforcing the Protocol difficult if not impossible (Barrett, 2008). The need for newer and faster technology to be implemented has been expressed, in order to decrease greenhouse gas levels to avoid detrimental outcomes (Thomas, et al., 2004).

Several studies suggest that there is a need for greater action by governments with both national and international regulation (Leiserowitz, 2006; Lorenzoni, Nicholson- Cole & Whitmarsh, 2007). There is no world government, there is however nearly 200 governments and each is given sovereign equality within international law (Barrett, 2008). With multiple actors at different levels of government, often approaches to climate change are not aligned and thus the ability to get governments to interact within international laws is limited (Osofsky, 2009). For instance, countries such as China, India, Brazil and certain countries in Africa, refuse to agree to any international approach that will limit the economic abilities of their citizens (Beck, 2010).

Due to the uncertainty regarding the exact processes of climate, dangerous decision making is taking place and policies based on these decisions can result in negative anthropogenic interference with the climate system through carbon taxing (Mastrandrea & Schneider, 2004). Even though uncertainty exists, some consensus does occur between scientists by acknowledging anthropogenic drivers is the main cause of climate change due to the burning of fossil fuels and therefore the release of greenhouse gases, thus calling for carbon taxing (Oreskes, 2004). It has been observed that due to large climate change contributing countries such as the United States delaying adoption of climate change policies has had a domino effect on other countries thus promoting inaction (Nordhaus, 2010). This is because while global concern due to extreme climate events has grown, the world’s super power, the United
States, has unfortunately failed to address the issue of climate change significantly (King, 2004). Despite this many climate change polices and agreements have been considered with the international community seemingly focused primarily on mitigation (Wiley & Gostin, 2009). An in depth look at the Copenhagen Accord, an agreement to act as a successor to the Kyoto Protocol, reveals that while many developing countries have joined the Accord, this positive move is overshadowed by the fact that they have actually agreed to very little (Nordhaus, 2010).

Climate change is a major challenge that needs to be considered for a multitude of perspectives, which requires various approaches (Barrett, 2008). Due to the general failure of creating an international framework which would be able to stabilize emissions, there has been a realization that climate change is unavoidable, which has given a boost to research (Berrang-Ford et al., 2011). While climate change policy is essentially driven by research, they remain separate fields so while frameworks for international agreements are important it is necessary to understand what climate change research is focused on and what consequences can be expected as such if these agreements are not met (O’Brien, Eriksen, Schjolden & Nygaard, 2004). It has been identified that globally at least 136 major cities are located in low lying areas (Sherbinin et al., 2006), and thus are vulnerable to a rise in sea level (Nicholls & Lowe, 2004). Therefore a large amount of climate change research has concentrated on individual issues with particular attention to sea level rise (McGranahan et al., 2007). The second most widespread focus considers heat extremes and the impacts that it will have on future climate, particularly with regards to heat stress (Hunt & Watkiss, 2011). These topics are of a research interest as the condition of the environment is changing rapidly and while the cause of this change is debated, there is no doubt that there is a change taking place (Steyn, 2012).
Global studies on coastal regions have shown that proper development and land use planning needs to take place making use of reliable scientific tools to perform vulnerability assessments that determine which coastal areas are under threat (Mcleod et al., 2010). The density of human populations in coastal areas is extremely high and in many cities these populations will be affected by sea level rise and its secondary effects (Mustelin, 2010). Such effects have been identified in a study done on major cities by Hunt and Watkiss (2011) which found that a city such as Mumbai in India would experience structural instability as a result of coastal shifting and many informal communities would not be fit to live in due to sea level rise. The study also looked at climate change in Rio de Janeiro in Brazil with increased concern over coastal erosion and a decreased ability of wetlands to buffer storm surges as these issues are predicted to enhance the impacts of sea level rise (Sherbinin et al., 2006). These increased occurrences of heat waves, floods and storms will all result in secondary impacts from climate change such as diseases (Agrawala et al., 2011).

Extreme climatic events as well as natural hazards are expected to become more frequent and severe (Faling, 2012). As a result there are many issues within climate change, these include: temperature and precipitation changes, sea level rise, changing storm patterns, and the effects that these issues have on human settlements and the biota (Mather et al., 2009; James & Hermes, 2011; Tandross et al., 2011). Climate change also poses a huge risk for extinction of various flora and fauna globally with an expected 15-37% of species being resolved to extinction by 2050 in the sample regions modeled by Thomas et al. (2004). Research done by Parmesan (2006) on the ecological and evolutionary responses to recent climate change, show the biological variation linked with climate change. It is explained that species will become restricted in range, and as a result will ultimately experience a decrease in population size, with those in polar or mountain top areas predicted to be the first to undergo extinction (Wilson et al., 2005). The ranges are shifting significantly suggesting an average shift of
about 6.1 km per decade towards the poles (Parmesan & Yohe, 2003). It has also been considered that interactions between species such as that of the predator-prey relationship will change as has been observed in the past and this has resulted in genetic shifts in species (Bradshaw & Holzapfel, 2006). This genetic shift can allow the species to adjust to local effects of climate change, however very minimal evidence exists to suggest that this will assist in mitigation towards negative effects at the species level (Nussey et al., 2005).

To deal with the possible effects it is suggested that building resilience to climate change is imperative to assisting humans in effectively coping with the environmental impacts (Adger, Arnell & Tompkins, 2005). The ability to adapt and be resilient would lie in our understanding of climate change and its processes, such as how factors such as water vapour, lapse rate, clouds, snow, and sea ice are associated with the feedbacks and these can affect the estimates of climate sensitivity (Bony et al., 2006). Research by Brown and Southworth (2006) discussed the possibility for each city to individually address climate change through infrastructure and development that is green. Similar research has used cities in the U.K. as case studies, to show that green space within a city can assist in adaptation to climate change with temperature difference (Gill, et al., 2007). Trinidad and Tobago has an effective community-based coastal management system in place, and this is used as an efficient example to substantiate the argument that adaptation will be possible by immediate action building resilience (Adger, et al., 2005). Despite these developments though, it is important to realize that climate science is highly uncertain (Bony, et al., 2006). It is also important to note that the availability of resources to become resilient and the risk from climate change will be different at spatial and societal scales (Tompkins & Adger, 2004).

Building resilience may also be derived from governmental action but also support from the public (Semenza et al., 2008). The public social context can aid in either increasing or
weakening perceptions of climate change risk (Lorenzoni & Pidgeon, 2006). It is no surprise that the public's perceptions and understanding of climate change is being increasingly considered in research and policy (Wolf & Moser, 2011). In the last few years it has been observed that the degree of reported concern for climate change has decreased to some extent, and this has been accompanied by a rise in people voicing their uncertainty regarding whether a human influence on climate is real (Leiserowitz et al., 2010; Whitmarsh, 2011). A decrease in concern can be attributed to numerous reasons, such as more pressing issues of economic status, crime and job security, as all these issues have tended to dominate the mass media over the last few years thus drawing attention away from climate change (Hamilton, 2011). Yet, despite this the fall in public opinion that has been suggested is not quite as severe as believed (Spence et al, 2010). It seems though that due to more urgent concerns that the public is being tested on their capacity to care about climate change (Nielson, 2011). More recently studies have aimed to probe deeper into public perceptions of climate change, and thus look further than focus on levels of concern and awareness (Poortinga et al, 2011; Devine-Wright et al., 2015). A study done in the UK determined that a large number of people would support the use of public taxes to finance low-carbon policies to deal with climate change (Spence et al, 2010).

There is a considerable amount of support for climate change policies despite the level of certainty about climate change by scientists and the public alike (Lorenzoni et al., 2007). It is possible though that the volume of attention paid is not continuous at all times due to the lack of continuous coverage by the media and thus from time to time it may fade from the collective public conscience (Nielson, 2011). Studying the perceptions people have of climate change can be difficult as the concept of climate is not one which people normally think extensively about (Wilson, 2011). This is problem is explained by Hulme (2008, p. 2-3): “Climate cannot be experienced directly through our senses. Unlike the wind which we feel
on our face or a raindrop that wets our hair, climate is a constructed idea that takes these sensory encounters and builds them into something more abstract”.

As a result significant knowledge gaps remain on public perception, particularly tourist perceptions and their behavioral responses to a climate or environmental change (Moreno, 2010). A large knowledge gap of public perception considers why public opinions may differ and three main fields of research exist that aim to explain this: socio-demographic effects, cognitive effects and geographic effects (Shao, 2012). Socio-demographic such as age, race, gender and education have all been identified to have an influence on perceptions of climate change (Leiserowitz, 2006; Dunlap & McCright, 2008; Hamilton & Keim, 2009; van der Linden, 2015). However, overall these studies portray an unclear picture of how socio-demographic factors affect perceptions (Shao, 2012). Cognitive effects include attitudes, beliefs and worldviews which are shown to influence environmental concern determined by information put out in the public domain (McCombs, 2013).

Public perception based studies on climate change show that often people understand the issue of climate change and are interested in being active in mitigation processes (Semenza et al., 2008). Nevertheless, it has been found that the problem is not willingness to participate but rather taking an actual active role and this could be linked to a lack of experiencing the consequences of climate change first-hand (Weber, 2010; Spence et al., 2011). The way in which people contextualize climate change may not necessarily be environmentally based and instead may be based on their consideration of their health and livelihoods (Wolf & Moser, 2011). Public perception can also be related to their individual surroundings thus those who live in areas considered vulnerable to climate change impacts, such as low-lying coastal areas, are shown to have an increased sense of personal risk (Spence et al., 2011). It has been noted that there has been a recent decline in the level of public attention and concern
regarding climate change as a result of extensive media coverage causing information fatigue and the influence of recent weather conditions such as cool or warm conditions (Ratter, 2012). This level of concern needs to be addressed as the perceptions of the public are crucial in determining the socio-political context in how the policy makers’ function as the perception of risk can either significantly encourage or limit the political, economic and social action that is necessary to deal with the risks (Leiserowitz, 2006). This event of information fatigue by extensive media coverage demonstrates how large a role mass media plays in providing information to the public and there has been a number of studies considering this (Boykoff & Boykoff, 2004; Boykoff, 2008). Examples of media coverage include an online article which focuses on the aftermath of Hurricane Sandy notes the importance of the public understanding scientific assessments and therefore suggests the potential for these assessments to be written in a way that can be understood at a public level (Clark, 2013). Another article discussed a meeting between 200 nations to reduce greenhouse gas emissions from the year 2020 and this is considered a negative means of combating climate change, because the longer action is withheld the worse the level of effects to address as well as the higher the costs of doing so (Doyle, 2012). Many mass media articles discuss skepticism towards climate change, such as viewing climate change as an Armageddon story which is being fed to the public, and those in denial suffer from the “Armageddon Complex” (Marom, 2013). It understands the public as reluctant to take action because of the belief that climate change cannot really be so harmful or that it is not their responsibility to take action but rather that of the climate experts (Wheeler, 2008). The topic of climate skepticism is also popular within politics as the skeptics believe that the medieval warming period is evidence for global climate change to be considered part of a natural cycle (Alfred, 2013). The vulnerability of Africa is observed in the article by Taggart (2015) in which the area of St Louis in Senegal is flooding due to a rise in sea level and the Atlantic Ocean advancing while
the city is protected by a thin 17km sand spit, the village of Doun Baba Dieye has completely disappeared and it is expected that the rest of the city will follow.

Mass media would ultimately fall into the category of cognitive effects as mentioned previously, however it is not the only cognitive factor that needs to be considered (Boykoff, 2008). Cognitive effects can also involve how people make decisions when faced with risk and this is done through personal experience and statistical information (Weber, 2006). Nevertheless, it has been determined that people favor personal experience over statistical information (Marx, Weber, Orlove, Leiserowitz, Krantz, Roncoli & Phillips, 2007). The last field of perception research focuses on geographic effects with the public’s views of the environment found to differ with location (Hamilton, Colocousis & Duncan, 2010; van der Linden, 2015). The perceptions can have a few core issues that are globally shared among people anywhere in the world (Crona et al., 2013). In regards to a climate change study done by Brody, Zahran, Vedlitz & Grover (2008) showed that geographic variables such as elevation, distance to the coastline and proximity to sea level rise rely on certain physical experiences and can therefore affect the relationship between real risk and perceived risk.

2.5 The General Public’s Awareness of Tourism and Climate Change

A number of opinion polls and quantitative attitude surveys have been conducted which provide insights into the public’s attitudes towards flying and climate change. These polls have been conducted by numerous organizations including Channel 4 (2005), the BBC (2007), the Guardian (2007), Ipsos MORI (2007), the Department for Transport (2010) and the National Centre for Social Research (2012). These surveys are conducted to investigate a number of different areas, such as the public’s experiences of and attitudes towards air travel in general (Department for Transport 2010), the public’s attitudes towards flying and environmental concern (National Centre for Social Research 2012), and the public’s general
attitudes towards climate change related issues (Ipsos MORI 2007). In most cases these surveys contain only a small number of attitude statements relating to air travel and the impacts on climate change.

In the most recent Department for Transport (2010) study, which was based on a module of questions included in the Office for National Statistics’ Omnibus Survey in February 2010, 62% of respondents agreed that air travel harms the environment. The proportion agreeing with this statement in 2010 is lower than the 66% that agreed in the 2008 survey and the 70% that agreed in 2006 (Department for Transport 2010). Of the 62% of respondents that agreed air travel harms the environment, 45% of them mentioned climate change/global warming/ozone damage as one of the environmental impacts (Department for Transport 2010). The survey results indicate that the majority of UK residents have a general awareness that air travel harms the environment, although awareness levels have dropped over the last four years, with just over a quarter of respondents (28%) identifying an impact on climate change.

Similar questions to those asked in the Department for Transport study are also asked as part of The British Social Attitudes Survey. The British Social Attitudes Survey has been undertaken annually since 1983 and has included questions on air travel and climate change since 2003 (National Centre for Social Research 2012). A question about belief in climate change was included for the first time in the 2011 survey. Over three quarters of respondents (76%) believed that climate change is happening and that humans are, at least partly, responsible (National Centre for Social Research 2012). A further 16% believed that climate change is taking place but not as a result of human actions, and 7% did not believe that climate change is taking place (National Centre for Social Research 2012). This suggests that public acceptance of the scientific consensus on human-induced climate change is quite high. The percentage of respondents agreeing that the current level of air travel has a serious effect
on climate change was 64% in 2011; the same figure as when the question was first asked in 2005. This result is consistent with the findings of the Department for Transport (2010) study.

Whilst providing a snapshot of the public’s views, these surveys do not explore deeper beliefs and focus on stated attitudes rather than measuring actual behaviour. For example, in The British Social Attitudes Survey (2012) 24% of respondents said they were prepared to travel less by plane, with a further 5% claiming they have already reduced their air travel to help tackle climate change and 23% insisting they never fly at all. It can be argued that these surveys may be suffering from elements of social desirability bias (Sterngold et al. 1994). This proposition is supported by the results of the Guardian/ICM poll (2007), which reported that 13% of passengers said they had given up flying as a result of climate change, with a further 34% reducing their number of short-haul flights and 31% reducing long-haul flights. The Guardian article acknowledges that “the growing number of air travelers suggests that the reality may differ”. The poll also reported that 29% of passengers have used a carbon offsetting scheme, forcing the Guardian to comment “Again, that claim may be running ahead of what is actually happening”.

In a review of existing research into public attitudes to climate change and transport behaviour, Anable et al. (2006) claim the evidence suggests that recognition of the concept of climate change among the UK population is extremely high, but a sophisticated understanding appears to be random and inconsistent. When it comes to air travel, the authors conclude that the evidence suggests that only one third of the UK population identify air travel as a cause of climate change. Examining the growth in air travel by UK residents over the past few decades, Anable et al. (2006) argue that to date very little research has been carried out to understand the real motivations for the changing patterns of air travel. As a result, knowledge of the link between air travel, climate change and the decision-making processes of UK residents with respect to flying is also low.
2.6 Tourists’ Awareness of Tourism and Climate Change

To date, there has been limited specific research undertaken to investigate whether tourists are aware of the impacts their travel and holidays have on climate change. However, a small number of studies have been published in the tourism and transport literature that offer some insight into tourists’ awareness, attitudes and behaviour towards climate change. Research conducted with tourists suggests that there is generally a low level of awareness of the impacts holidays, and particularly air travel, have on climate change (Gössling et al. 2006; Shaw and Thomas 2006, Becken 2007; Randles and Mander 2009; Barr et al. 2011; Dickinson et al. 2011). In Becken’s (2007) study amongst international tourists in New Zealand, participants showed a low awareness of air travel’s impact on climate change. Participants did acknowledge climate change as a ‘massive problem’ and ‘happening now’ but links between their own travel behaviour and climate change were rarely made. Similar to Becken’s (2007) findings, Randles and Mander (2009) concluded that, on the whole, interviewees in their study had a very low level of awareness and understanding of the science of climate change, but were of the opinion that something significant was happening. Barr et al. (2011) found in their focus group research that most participants expressed concern about global climate change, but there was general debate and uncertainty regarding the cause of climate change and the role of humans. These studies suggest that overall awareness of climate change is high, but the link between holidays and climate change is rarely made by tourists.

This view is further supported by the findings of Gössling et al. (2006) and Shaw and Thomas (2006). In their study conducted with international tourists holidaying in Zanzibar, Gössling et al. (2006) concluded that the majority of visitors surveyed were unaware of their contribution to climate change and the consequences of their travel. When asked about environmental problems associated with tourism, responses focused on local, visible and immediate problems, such as waste, fresh water availability and land development. Only a
small minority of respondents (17%) mentioned emissions of greenhouse gases from air travel (Gössling et al. 2006). Shaw and Thomas (2006) conducted qualitative research with a small group of international students studying in the UK and found that very few expressed any concern about the environmental costs of air travel. Of the minority of participants that were aware that air travel contributes to climate change, none of them believed that there was much that an individual could do to combat the problem (Shaw and Thomas 2006). Signs of increased tourist awareness of the impacts of holidays and flying on climate change were evident in a more recent study of attitudes towards long-haul holidays in New Zealand amongst UK participants. In this qualitative study, Cohen and Higham (2011) found a spectrum of awareness of the impacts of air travel on climate change. This spectrum ranged from participants who were largely unaware of air travel’s climate change impact to several who were aware and beginning to show signs of what Cohen and Higham (2011) label ‘consuming air travel with a conscience’. Cohen and Higham concluded that most of the participants in their study were aware to some degree of the impact of air travel on climate change.

Research into tourists’ awareness of and attitudes towards holidays, air travel and climate change has revealed a general unwillingness to accept personal responsibility for tourism’s contribution to climate change. In Becken’s (2007) study, a large number of tourists did not feel accountable for the GHG emissions from their air travel and did not consider mitigation of aviation’s impacts as a personal responsibility. Instead, responsibility for addressing the climate change impacts of air travel was seen to lie with airlines, governments and international organisations. A similar view was expressed by the participants in Randles and Mander’s (2009) study. Other people and groups were considered more to blame for the climate change impacts of flying than they were as individuals. As a consequence, they were unwilling to change or restrain their air travel behaviour. These findings are supported by Cohen et al. (2011) who found that the responsibility for mitigating the climate change
impacts of flights and holidays was placed on others, such as governments, rather than with individual tourists. In their survey of Swedish air travellers, Gössling et al. (2009) found that air passengers put their own responsibility for dealing with the environmental impacts of aviation last; after aircraft producers, airlines, governments and intergovernmental organizations. Only a third of air travelers surveyed accepted any personal responsibility for aviation emissions (Gössling et al. 2009). It is possible that some tourists may be genuinely unaware of the impacts that their holidays and air travel are having on climate change, whilst others may have a greater level of awareness but choose to deny or play down their own personal responsibility either by not accepting that their actions are having a significant impact or by passing on the responsibility and blaming others. Böhler et al. (2006, p.667) highlight the fact that levels of awareness and propensities for denial are closely related when they state that:

“The motivation for the long-haul traveler to get into contact with foreign cultures, to explore foreign landscapes or to exhibit a lifestyle different from the mainstream population might be stronger than the realization that air travel causes environmental damage”.

A small number of researchers have also found that some individuals are relatively comfortable with participating in environmental behaviors in and around the home but are less prepared to do so in a holiday situation (Böhler et al. 2006; Becken 2007; Bergin-Seers and Mair 2009; Barr et al. 2010; Dickinson et al. 2011). Becken (2007) found that tourists perceived environmental responsibility differently in the holiday context compared with their everyday situation at home. In this study, tourists indicated that GHG mitigation should focus on the home environment rather than on travel, which was perceived to be an extraordinary and therefore negligible contribution to overall emissions. Barr et al.’s (2010) study suggested that, for some individuals, being environmentally conscious at home could be used to justify or trade-off their lack of commitment whilst on holiday. Randles and Mander (2009), Dickinson et al. (2010), and Cohen and Higham (2011) also found evidence of
participants demonstrating their pro-environmental behaviors around the home as a way of ‘legitimizing’ air travel for holidays and short breaks. Barr et al.’s (2011) research illustrated a major difference in attitudes towards climate change and air travel, as opposed to conventional, home-based environmental practices. The most committed individuals to home-based environmental activities were of the view that flying has a negative impact for the environment. However, these individuals continued to fly regularly despite recognizing the potentially contradictory behaviour (Barr et al. 2011). The unwillingness of tourists to engage in environmentally friendly practices in a holiday context is particularly pronounced when it comes to air travel. Studies suggest that tourists are extremely resistant to changing their flying behaviour patterns in order to reduce the impacts on climate change (Becken 2007; Randles and Mander 2009; Barr et al. 2010). These studies indicate that many tourists consider the right to fly and freedom to travel as an integral part of their lives that they would not be willing to give up. Gössling et al. (2009) found that a considerable share of air travellers perceive it as difficult or irrelevant to fly less often. The authors argue that flying is now a contemporary form of travel that is an integrated and unquestionable part of many people’s lifestyles. Randles and Mander (2009) concluded that, for the vast majority of their participants, flying has become a habit when it comes to making overseas holidays and trips. Rather than engaging in considered decision-making through a process of rational evaluation of the alternative transport modes, participants were automatically choosing to fly (Randles and Mander 2009). Cohen et al. (2011) argued that some of their participants were unable to disentangle air travel from the notion of taking a holiday and consequently viewed tourist air travel as an embedded way of life. This supports the findings of Randles and Mander (2009) that many tourists automatically think of flying when planning their holidays.

Studies also demonstrate that awareness of the impacts of holidays and flying on climate change does not necessarily lead to changes in behaviour. Cohen and Higham (2011) found that several participants were aware of air travel’s impact on climate change, but were
unwilling to change their behaviour in response. These participants expressed perceived positive benefits of tourism as a reason for continuing their air travel behaviour and attached too high of an importance on their holidays to consider adapting them. The participants in Barr et al.’s (2011) study were also keen to emphasize the positive benefits that they had realized by travelling with low-cost carriers and were unwilling to change their flying behaviour. In their study with Hong Kong residents, McKercher et al. (2010) found that tourists who took the most frequent international holidays were more aware of climate change than less frequent travelers, but also the least willing to change their flying and holiday patterns.

Randles and Mander (2009) discovered that participants were strongly against the introduction of restrictions limiting their ability to fly as much as they desired or could afford, but were less resistant towards higher taxes on air travel. However, in order to accept higher taxes, participants wanted to see clear and direct evidence that the revenue raised would be used to address the climate change impacts of aviation. Becken (2007) and Barr et al. (2010) also found evidence that objections to increased taxes were not as strong as opposition to quotas or limits on air travel, as participants stated they would simply ‘pay the tax’ and keep flying anyway. Despite an intention to pay increased environmental taxes in the future in order to continue current flying patterns, Barr et al. (2010) discovered there was skepticism of green taxes amongst the participants in their research and doubts expressed as to whether the proceeds were being used to directly tackle environmental problems.

Although, overall, the research studies discussed have unearthed a strong resistance to tourists’ changing their current holiday and flying practices, there are a few indications that small adjustments to future travel behaviour could be made. In Becken’s (2007) study, some participants differentiated between what they perceived as ‘legitimate holidays’ and ‘dispensable trips’, such as short breaks or shopping trips. The interviewees in Randles and Mander’s (2009) study elaborated further on this distinction between types of holiday.
Randles and Mander (2009) found participants considered some flights as indispensable, for a range of different reasons, but envisaged some flights ‘around the margins’ that could be substituted for different transport modes or even trips that did not need to be made at all. The core trips, which were considered as ‘no-go’ areas in terms of being targeted for emissions reduction included regular trips to visit family and friends living abroad, special events such as weddings, and the long-planned major annual overseas holiday. Participants expressed a view that they would be prepared to reduce their flying for some of the spontaneous ‘bargain’ short break trips they took using air travel, but only as a result of externally imposed restrictions on the number of flights they could take. They were not prepared to voluntarily reduce the number of flights and short breaks they took.

In their qualitative research with participants from the UK and Norway, Cohen et al. (2011) found evidence of shifting consumer discourses towards negative valuations of frequent air travel. However, the participants in the study were themselves regular flyers. Some of the participants were critical of the over-consumption of short-haul flights using low-cost airlines, whilst maintaining that annual holidays involving air travel were sacrosanct (Cohen et al. 2011). Cohen and Higham (2011) report a number of participants that exhibited a ‘carbon conscience’ about flying and a desire to change their future air travel behaviour. But these were future intentions and, at present, these participants were still continuing to fly to holiday destinations.

2.7 Climate Change and its Effects

Climate change, also called global warming has started to affect the earth more and more in forms of an increase in the temperature, extreme weather and a rising sea level (European Union, 2006). The earth’s atmosphere filters some of the heat from going back out in to space and is comparable to a greenhouse. Natural greenhouse gas emissions exist on the earth but since the industrialization, the concentration of the gases has increased substantially. Carbon
dioxide stands for 75% of all the emissions being released in the world by the burning of fossil fuels like oil, coal, woods etc. by the humans (European Union, 2006). The tourism industry is a big user of these fossil fuels especially in transportation e.g. one mode of transport responsible for the fastest growing of greenhouse gas emission is air planes (Becken and Hay, 2007:119).

The mean temperature has increased by 1°C during the 20th century in Europe and scientist of climate predicts that the temperature will increase further by 2°C and 6.3°C in Europe by the year of 2100 (European Commission, 2006). An increased in the temperature affects the season but also the snowfall. In some areas in the European Alps, the amount of snow can reduces by as much as 30% in the year of 2020 and in the year of 2050, by 50%. The winter tourism industry in the Alps has declined the last five years and especially the Swiss Alps has suffered consistent economical losses for several years. (Climatic research unit, 1999)

Intergovernmental Panel on Climate Change (IPCC) has listed three future scenarios during the periods between 1990-2100 (IPCC, 2014). These three scenarios will affect both economic and social factors in many sectors, including the tourism industry:

- Overall global temperature will increase by 1.4°C to 5.8°C
- Sea levels will rise by 9 cm to 88 cm by 2100
- Regional and seasonal variations

Hall and Higham (2005) continue to argue the consequences for the Alpine regions considering these scenarios. The ski season will be shorter while the season providing non-ski activities will be longer than before. The demand for ski resorts located at higher altitude will increase but the overall demand for skiing could also decrease consider the uncertainty of snow covered areas. The ski resorts that will be most affected by climate change are the ski resorts located on an altitude beneath 2000 m above sea level (Elsasser and Burki, 2002). Ski resorts in such areas must adapt to climate change or perish eventually.
Research by Moen and Fredman (2007) has attempted to project the regional effects of climate change on a ski resort in the southern parts of the Swedish mountain range. The snowfall is argued to decrease in number of days but increase cumulatively. The season regarding snowfall will therefore become shorter but during that time the snowfall will be larger in total (millimeters).

Inland northern and southern parts of Sweden is said to account for a smaller part of ski-ticket sales. Sales in the mountain regions accounts for the majority 80%. According to the projections, the specific ski resort risk a reduction of skiable days by 40-60% out of 162 that was skiable in 2007. In addition, the reduced expenditure in Sweden at ski resorts because of less skiable days could amount to between 900-1755 million SEK, a significant but rough amount caused by differences of impact by either cumulative snowfall or mean daily temperature. The research argues that it is necessary to develop alternative activities to skiing that do not rely on the existence of snow coverage. (Moen and Fredman, 2007)

Studies have shown that both the length on the season and the snow amount has decreased significantly since mid-1980s. (Becken and Hay, 2007:37) Due to shorter seasons, the demand for snow covered areas increases on the ski resorts which become especially important on occasions like Christmas or winter sports holidays (Bürki, Elsasser and Abegg, 2003). Not surprisingly since most of the tourists activities in the Alps involve snow. In the planning stage of a ski trip, an evaluation of whether the ski resorts has the ability to offer snow or not becomes a crucial aspect in the final choice of ski resort. The fact that tourists are very dependent on the snow is further confirmed in research. When ski resorts has suffered from poor snow conditions over a period of time, 49% of the skiers would choose another snow reliable ski resort and 32% would ski less often (Burki, Elsasser and Abegg, 2003). It is interesting in this research that almost half of that sample would choose another ski resort with more reliable conditions, because it states the dependency on good snow conditions.
2.8 Adaptation Strategies

The projected impact concerns the ski resorts snow reliability. There are definitions on the concept e.g. 'a ski resort could be considered as snow reliable if, in 7/10 winters, a sufficient snow cover of at least 30 to 50 cm is available for ski sport on at least 100 days between December 1 and April 15.' (Burki, Elsasser and Abegg, 2003) This however is based on the condition of the alps and not Sweden, but the principle is the same, that snow reliability is a measurement or appreciation of the conditions i.e. snow depth and temperature at ski resorts and the “ski ability” in those conditions.

A model of adaptation strategies for climate change was developed by Elasser and Burki (2002). It depicts the general strategies available to a ski resort facing the effects of climate change. The strategies for maintaining ski tourism are in direct concern with snow reliability. Maintaining ski tourism is mostly a matter of maintaining snow reliability.

Development of higher terrain is not considered relevant to this study; the possibilities to do this in Sweden are slim. The strategy is developed with the natural features of the Alps as a prerequisite, the Swedish ski resorts are often at the highest possible terrain under the available conditions.

Fatalism strategies Cancel ski tourism and Business as usual are not supposed to be interpreted as real strategies (Elsasser and Burki, 2002). Instead these are the different outcomes if a business fails to adapt to climate change, either by disregarding the threat or adapting unsuccessfully.

Subsidies are a measure of maintaining ski resorts which are of economical importance to the region. Subsiding minor resorts are sometimes argued to have further significance in promotion of the industry as a whole. New generations are often introduced to skiing in the slopes at these minor resorts, so subsidies of these could act as a preemptive investment in the
industry’s future. However, the significance is a debated issue (Burki, Elsasser and Abegg, 2003).

Another strategy is to develop alternatives to skiing at the resorts. This strategy was also addressed as revenue diversification by Scott and McBoyle (2007:1421). Their revenue diversification contained spa and sports facilities, retail stores, rafting, mountain biking. Generally they are similar activities but with more than one purpose, both one that would attract non skiers in the winter season, but also activities that expanded in to other seasons. Diversification could compensate for a diminishing winter season and from a business’s survival point of view, alternatives to ski tourism could be developed (Scott and McBoyle, 2007).

2.8.1 Artificial Snowmaking

Artificial snowmaking is one of the contemporary strategies, a snowmaking method which is used to negate the effects of diminishing snow fall as well as to a push for prolonging the season (Elsasser and Burki, 2002; Scott and McBoyle, 2007). It is a procedure that uses snow canons which discharge compressed air and cold water into the air that freezes on impact resulting in ice particles (Vijay, 2011:62). Besides technological advances in snow canons and energy efficiency, new methods for producing snow have been developed which are operational in up to +20°C (Vijay, 2011). Scott, McBoyle and Minogue (2006) argued that artificial snowmaking is commonly used in North America which is why the skiing there is less pervious to climate change. Further, they argued that it is general practice to use artificial snowmaking in many resorts today, a fact that have not been taken into account in research and which is why the industry might not be as vulnerable after all. Hall and Higham (2005:214) mentioned that Norway as a case does not use artificial snowmaking due to climate change at all but instead, as a method to prolonging the season. This had become a market trend which the ski facilities had to adapt to in order to remain competitive.
However, artificial snowmaking is investment intensive and not every ski resort has the resources to sustain its large energy consumption. Besides energy, large amounts of water are also necessary in the process, this is sometimes opposed by local communities and environmental organizations. However, more sustainable approaches are being developed i.e. construction of water reservoirs to mitigate the mitigation of climate change effects. (Scott and McBoyle, 2007)

2.8.2 Ski Slope Design

The depth of snow which is necessary to maintain downhill skiing varies on the shape of the terrain. A smooth terrain made up of soil or grass would only require minor snowfall to prevent skiers carving into the ground when skiing. If the terrain is uneven with large rocks, the snow cover would have to extend above those rocks with a margin. Consequently, contouring the slopes and removing any obstacles or rocks can be done to sustain the activities in event of less natural snow fall or a reduction in artificial snow production; this is also a method in the development of new ski slopes. Additionally, development of new ski areas can be done on a higher altitude, in a favorable cardinal direction or simply in snow reliable regions (Scott and McBoyle, 2007).

2.9 Perceptions of Tourist towards Global Warming

Burki (2000) conducted focus group interviews of representatives from the tourism industry perception of climate change. The major view was that climate change and its effects had been given disproportional attention in media and politics compared to how they experienced it, they did however agreed in that climate change was present. Strategies for climate adaptation had begun taking its form but they were not necessarily labeled climate change adaptation strategies.

The Swedish Environmental Protection agency (2009) investigated the Swedes perceptions of climate change and concluded that they perceive themselves as aware of climate change,
conscious about their actions concerning climate change and making at least some changes in order to mitigate its effects. Additionally their positive attitudes towards companies which actively participate in climate change mitigation have increased. But they have begun to demand more and better labeling of these kinds of companies in order to identify them.

A survey of winter tourism entrepreneur’s perception about climate change in northern Sweden revealed consistent results in that their business would not suffer any significant effects the next 10 years. It was suggested that entrepreneurs in a continental climate would worry less over climate change than costal climate situated entrepreneurs. The differences in continental and costal climate are unfavorable to costal situated entrepreneurs which therefore would have a larger incentive to consider climate change. (Brouder and Lundmark, 2011)

Scott and McBoyle (2007) stressed that there is a knowledge gap when it comes to demand adaptation to climate change from tourists, in contrast to the supply side that have been more researched. Hence, the tourist’s role in winter tourism and choice of destinations has not been given enough attention (Unbehaun, Pröbstl and Haider, 2008). They conducted a survey on 538 skiers in Vienna, Austria on their perceptions and attitudes on the ski destinations. The results revealed that climate change is not a new phenomenon for the skiers, 73% are aware of the problem and 70% of the informants had experienced problems concerning poor snow conditions during previous vacations (Unbehaun, Pröbstl and Haider, 2008). If a ski resorts would suffer from poor snow conditions repeatedly, 68% of the skiers would choose another ski resort with more reliable snow conditions. The loyalty towards a ski resort is not enough for the skiers if the ski resort does not have the ability to guarantee snow during the visit. Ski resorts are trying to develop new activities not involving snow due to the uncertainty of snow covered areas, like spa facilities. Though, this kind of new activities is not relevant for the skiers in this survey where sureness of snow and winter experience is the top two
determinations in the choosing of ski resorts. At the bottom of the list comes shopping and also activities not involving snow. (Unbehaun, Pröbstl and Haider, 2008)

The researchers of the survey stress the need to avoid marketing a ski resort as snow reliable because of artificial snow production. Even though artificial snow production is a climate change adaptation strategy to maintain the season and provide snow coverage, artificial snow is perceived to be less favorable to ski on than natural snow. (Unbehaun, Pröbstl and Haider, 2008)

2.10 Climate Change Skepticism

A study by Koenig (1998 cited in Bicknell and McManus, 2006) investigated managers’ perceptions about climate change in Australian ski resorts. The results revealed that nine out of ten managers were unaffected by the concerns of climate change in the process of planning the resorts. Three reasons why the managers felt like this was suggested, there is lack of evidence about the impacts of climate change, that the projections could be too far in the future for a resort which plan only a few years ahead and finally that the development in the technology will mitigate the presumed reduced snow fall. (Koenig, 1998 cited in Bicknell and McManus, 2006:5)

Norgard (2011) found signs of climate change skepticism in Norway when the snowfall decreased significantly in 2001 in the community Bygdaby. The snow usually comes in November but this particularly year, it did not fall until mid-January. Even though Norway has a fairly high public support concerning climate change and an awareness of the phenomenon, no actions were taken. People lived as usual even though many got affected by the reduced season. Norgard argued that public response is quite low when it comes to behavioral changes or movement activities, not just in Bygdaby but worldwide.

Consistently, Saarinen (2006) investigated perceptions from nature based tourism entrepreneurs in Finland and found that half of the sample was unconvinced or skeptic of the
existence of climate change as a phenomenon. Additionally it was found that the entrepreneurs had adapted to new conditions described as ‘*market changes and weather variations*’ (Saarinen, 2006).

Hall and Higham (2005) claimed that the response from the tourism industry concerning climate change has been in denial. Small medium enterprises have barriers to respond to the impacts of climate change compared to tourists and a few tour operators which could respond at once. Even though there is consensus concerning climate change articulated in organizations i.e. IPCC (Oreskes, 2004) there are simultaneously signs of climate change denial evident with entrepreneurs in the tourism industry. More seriously it could be said, this perception is not uncommon in the local government and planning bodies (SEPA, 2012).