



Tourist responses to climate change: Potential impacts and adaptation in Florida's coastal destinations

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ABSTRACT

Florida, one of the world's most visited tourist destinations, holds one of the most vulnerable positions as a result of climate change. Through a quantitative survey, this study gathered the responses of 432 tourists who had previously visited Florida, with a hypothetical scenario of changed climatic conditions. The examination of the tourist perspective showed the presence of ample sunshine and factors related to beach comfort as the reasons for choosing the destination. In a scenario where beaches disappear and tropical diseases become more widespread, the majority of respondents stated they would choose a different destination. However, respondents would reconsider their intentions if adaptation measures such as reduced prices, coastal habitat conservation and measures to protect beaches from erosion and coastal areas from inundation were in place. The findings suggest that seasonal and geographic shifts in tourism demand could be mitigated by the implementation of adaptation measures at the destination level.

1. Introduction

Some of the most vulnerable areas across the world have already started experiencing the consequences of climate change, with action to deal with them long overdue. The effects of climate change on coastal areas generate severe consequences for the tourism industry. However, despite the high value of tourism properties and economic activities in coastal areas, there remains a paucity of tourism studies related to the impacts of climate change and sea level rise in coastal tourism destinations (Scott, Hall, & Gössling, 2012).

Florida, one of the most visited tourist destinations in the world, holds one of the most 'unenviable' positions in terms of its vulnerability to climate change with the effects already visible, particularly on its coastal areas (Noss, 2011). Climate change and rising sea levels constitute a threat for the sustainability of Florida's coastal resources by increasing the likelihood of flooding, inundation of low-lying lands, saltwater intrusion, and erosion of beaches and barrier islands (Harrington & Walton, 2008). The state's low-lying lands and its economy concentrated in coastal areas make it particularly vulnerable to climate change and sea level rise (SLR). A study by Hauer, Evans, and Mishra (2016) found that previous projections that failed to incorporate population growth in sea level rise impacts hugely underestimated the

number of people at risk and the cost of protecting them. Based on the National Oceanic and Atmospheric Administration's (NOAA) conservative estimate of three feet (about 0.9 m) sea level rise by 2100, 1.2 million people projected to live in Florida's coastal areas are expected to be at risk of flooding from sea level rise (Hauer et al., 2016).

Scott et al. (2012) emphasize the importance of understanding the implications of climate change for tourist demand patterns, and how this constitutes a research priority in the tourism field. As pointed out by De Freitas (2005), the discretionary nature of tourism means that participation will decline as discomfort and dissatisfaction increase. Subsequently, changes in the spatial and temporal features of climate resources will produce significant effects for tourism demand at different levels. That will happen both as a consequence of changing conditions at the destination level and climatic variables perceived as less or more comfortable by visitors (Gössling & Hall, 2006; Gössling, Scott, Hall, Ceron, & Dubois, 2012). In this situation, more insights are necessary into tourists' perceptions in order to understand whether climate change will lead to shifting tourism demand. This is particularly relevant for destinations that are already warm, like Florida. If the perception of what is already perceived as a 'warm' destination changes to 'too warm', then it is when travel flows might suddenly change (Gössling & Hall, 2006). A favorable climate and appealing waterfront

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are main attractions that draw tourists to Florida. The increase of storms, hurricanes and sea level rise in Florida's coastal areas has the power to cause long-term economic impacts to the state's tourism industry and to its attractiveness as a tourism destination (Repetto, 2012).

In spite of the negative consequences of climate change impacts on coastal destinations, timing and effective adaptation and mitigation are vital in determining the extent of climate change impacts (Borisova, Breuer, & Carriker, 2008). Adaptation can be defined as “those actions or activities that people undertake, individually or collectively, to accommodate, cope with, or benefit from, the effects of climate change, including changes in climate variability and extremes” (Becken & Hay, 2007, p. 225). In Florida, with nearly 10% of its land area lying at less than 1 m above sea level, adaptation is especially critical (Noss, 2011). Locally, communities across Florida are developing action plans, investing in storm water pumps, upgrading storm water and sewer systems, and revising building codes. However, these expensive measures to protect homes, businesses, and infrastructure will only serve as a temporary expedient unless climate change is addressed at a wider level (Florida Majors, 2016). Jopp, DeLacy, and Mair (2010) stressed the fact that since the final decision whether to travel to a destination or not is made by individual tourists, tourists are key stakeholders in any adaptation process. Therefore, it is essential to consider and understand their attitudes towards proposed adaptation options and how different adaptation options may affect the appeal of the destination for the tourists.

Despite the urgency for tourism destinations to adapt to climate change, to date, no studies have examined which adaptation measures can prevent a reduction in tourism demand from the viewpoint of the tourists. In an attempt to fill this gap, this study presents the responses, in terms of preferences and visitation intentions, of tourists who have previously visited Florida. The aim of this study is to examine how projected climate change impacts could affect tourism visitation in Florida, and how potential seasonal and geographical shifts in demand could be mitigated through the implementation of adaptation measures at the destination level.

2. Literature review

2.1. Climate change and coastal destinations: impacts and adaptation

Sea level rise is a crucial phenomenon associated to climate change. Over the 21st Century, the global mean sea level will very likely continue to rise due to increased ocean warming and loss of mass from glaciers and ice sheets (Hartmann et al., 2013). While the exact magnitude of global sea level rise and regional variability remains uncertain, sea level rise is considered to be one of the most certain consequences of anthropogenic climate change (Hartmann et al., 2013). The impacts of rising sea levels, especially when combined with changes in storm frequency and intensity, lead to damage of sea defenses, protective mangrove swamps and shoreline buildings, cause beach erosion and create storm-surge damage to coral reefs (Mather, Viner, & Todd, 2005). Additionally, the impacts of sea level rise on coastal areas include phenomena such as erosion, inundation, impeded drainage and increased risk of riverine flooding, salinity intrusion into freshwater supplies, coastal habitat loss through the process of ‘coastal squeeze’ (see Pontee, 2013; Schleupner, 2008), and higher water tables that can negatively affect the stability of foundations of coastal infrastructure (Scott et al., 2012). A particularly challenging phenomenon is the process of coastal squeeze, defined by Pontee (2013), as “one form of coastal habitat loss, where intertidal habitat is lost due to the high water mark being fixed by a defense or structure (i.e. the high water mark residing against a hard structure such as a sea wall) and the low water mark migrating landwards in response to SLR” (p. 206). In the presence of tourism infrastructure, and in addition to habitat loss, the process of coastal squeeze causes a reduction of the beach area available to tourists for leisure purposes.

A number of studies have identified the potential consequences of sea level rise for coastal tourism (such as loss of high-value beaches, destruction of tourism infrastructure and coastal eco-system with loss of biodiversity, increased need for engineering shore protection, changed coastal aesthetics) (e.g. Jones & Phillips, 2009; Phillips & Jones, 2006) and the need for coastal tourism destinations to focus on coastal zone management and planning (e.g. Moreno & Becken, 2009). Other studies have analyzed the impact of sea level rise on tourism infrastructure and coastal resources at the country and state level (e.g. El-Raey et al., 1999; Francia & Juhasz, 1993; Schleupner, 2008; Scott et al., 2012). The largest study conducted on the impacts of sea level rise on tourism analyzed the effects of potential inundation and erosion for major coastal tourism resorts and resort-front beach areas in 19 Caribbean nations (Scott et al., 2012). The study used a geo-referenced database of over 906 major tourism resort properties and estimated that 266 of them would be vulnerable to partial or full inundation by 1-m sea level rise. Such impacts would transform coastal tourism in a region where tourism represents the basis of the economy, with important consequences in terms of both property values and insurance costs, and destination competitiveness and marketing.

The above-mentioned studies have one important limitation. A common critique of engineering and geometric-based sea level rise studies is that they represent potential impacts without considering the extent to which damage could be offset through adaptation, including coastal protection measures (Scott et al., 2012). As argued by Scott et al. (2012), “history teaches us that societies will not sit idly by and watch high-value land, infrastructure and cultural assets be swallowed by the sea” (p.222). Adaptation includes both anticipatory (taken before impacts are observed) and reactive (after impacts have occurred) actions.

Potential impacts of sea level rise, such as land loss and infrastructure damage could be partially prevented through extensive coastal protection (Nicholls et al., 2011). However, Scott et al. (2012) noted that typical coastal protection schemes do not match the key objectives of coastal resorts, which aim at providing unobstructed views of the sea, maintaining unobstructed access to the beach and sea, and the visual perception of an unspoiled beach environment. Additionally, Scott et al. (2012) argued that, while structural protection can easily be designed to protect resort buildings, coastal squeeze will cause the resort to lose its beach unless it is also willing to invest heavily in beach nourishment to make up for the loss. Therefore, some tourism sector assets, such as airports and cruise-ship terminals, and cities that function as important tourism destination, will certainly benefit from structural protection. The same is not so straightforward for coastal resorts, though, which must maintain sufficient beach area and aesthetics to continue attracting tourism clientele (Scott et al., 2012).

It has been noted, however, that adaptation to current climate cannot be interpreted as adaptation to future climate change. In fact, as suggested by Scott et al. (2012), current adaptation initiatives are not necessarily capable of dealing effectively with anticipated future climatic changes projected by climate models. A rise in sea level means that not only protection is needed for the coastline itself, but measures may also be required to protect the hinterland from flooding.

2.2. Tourists' preference for weather and climate conditions in coastal destinations and responses to climate change impacts

Climate is one of the main factors in affecting travel motivations and destination choice (Scott et al., 2012). As such, the implications of climate change for tourist behavior and demand patterns are significant. In this regard, Gössling et al. (2012) argue that “understanding tourist perceptions and reactions to the impacts of climate change is therefore essential to anticipating the potential geographic and seasonal shifts in tourism demand, changes in specific tourism markets, and the overall competitiveness of businesses and destinations” (p. 37). However, as emerged from previous studies (Gössling & Hall, 2006; Gössling

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