

**Assessing Climate Change Vulnerability and Adaptive  
Capacity of Small Island Tourism Destinations:**

***Why Non-Climatic Factors and Climate Change need an  
equal platform.***

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## Abstract

Small islands, and climate-sensitive economic sectors such as tourism, are particularly vulnerable to the adverse impacts of climate change. Knowledge gaps remain in how to comparatively assess the vulnerability and adaptive capacity of tourism destination communities, including the non-climatic factors and multi-causal nature of social vulnerability. My research compares a Community-Based Vulnerability Assessment (CBVA) and an Indicator approach to assess a site-specific tourism destination in Barbados. The first involves carrying out a CBVA with stakeholders whose livelihoods are most connected to tourism related activities. The second examines the viability of developing and applying a set of indicators at the destination and household level by consulting community members, key informants and surrounding neighbourhoods. This working paper presents preliminary and partial findings from the CBVA approach and how non-climatic factors were found to have been a key source of social vulnerability.

**Keywords:** climate change, vulnerability, adaptive capacity, small islands, tourism

## 1 Research Context

### 1.1 Problem Statement

Appropriate climate change adaptation measures need to be planned and implemented in small islands and coastal areas, which are particularly vulnerable to climate change. Knowledge gaps remain in how to comparatively assess the vulnerability and adaptive capacity of communities, particularly for climate-sensitive economic sectors such as tourism. My research investigates two methods to assess the climate change vulnerability and adaptive capacity of a small island tourism destination in Barbados: a Community-Based Vulnerability Assessment (CBVA) and an Indicator approach. In particular, my research examines what approach, or combination of, is the most useful when assessing a site-specific tourism destination in a small island. This working paper presents preliminary and partial findings from the CBVA approach and how non-climatic factors were found to have been a key source of social vulnerability.

### 1.2 Theoretical context

Recent climate change impact and adaptation studies focus on social determinants, by assessing the vulnerability and adaptive capacity of communities and institutions at the local and regional levels (Burton, Huq, Lim, Pilifosova, & Schipper, 2002; Fussel & Klein, 2006; Patt, Schröter, de la Vega-Leiner, & Klein, 2009; Schröter, Polsky, & Patt, 2005; Smit & Wandel, 2006; Agrawal, 2008). This is useful when the goal is to target adaptation strategies towards the most vulnerable groups, sectors and geographic areas (Downing & Patwardhan, 2004; Burton et al., 2002; Fussel & Klein, 2006). Differential vulnerabilities and adaptive capacities can also exist within and amongst a community, in response to changing environmental or social conditions, which can be examined by assessing their socio-economic determinants (Smit & Pilifosova, 2003; Smit & Wandel, 2006).

My research applies an integrated conceptual framework to examine vulnerability and adaptive capacity to climate change (Smit & Pilifosova, 2003; Turner et al., 2003), where climate change is seen as a multi-scale global change problem with diverse actors (Patt et al., 2009; Adger, 2006; Eakin & Luers, 2006). Here vulnerability is considered dynamic, scale and time dependent and where it can be increased by multiple interacting non-climatic drivers. Due to this dynamic nature, vulnerability cannot be reduced to a single metric or easily quantified (Smit & Wandel, 2006; Adger, 2006). For these reasons, it is easier to measure the processes that condition a system's vulnerability and adaptive capacity (Brooks, Adger, & Kelly, 2005; Eriksen & Kelly, 2007; Patt et al., 2009).

### **1.3 Empirical Context**

As the number of climate change vulnerability and adaptive capacity assessments accumulate over time, methods and frameworks for *cross-study comparisons* become necessary. Comparative evaluation can identify those communities that are the most vulnerable or have the least adaptive capacity, enabling the target of adaptation initiatives (Smit & Wandel, 2006). Such comparisons can also analyze findings from several local studies and allow key actors or decision makers within a community or a region, who lack the time or resources to conduct their own comprehensive assessments, to make informed decisions about adaptation (Burton et al., 2002; Eakin & Luers, 2006; Polsky, Neff, & Yarnal, 2007; van Aalst, Cannon, & Burton, 2008). Quantitative and qualitative indicators and other self-assessment qualitative tools, such as Community-Based Vulnerability Assessment, can be used to assess the determinants of vulnerability and adaptive capacity (Birkmann, 2006; Arakida, 2006). The particular approach, or combination of, depends on the particular system's need and context.

Some determinants of vulnerability and adaptive capacity (i.e. perceptions of risk) are not so easily captured by indicators. Place (community)-based case studies can collect descriptive information on the determinants of vulnerability and adaptive capacity, as they are highly local and based on a community's qualitative knowledge of their geographical and social environments (Birkmann, 2006). Such assessments obtain information on the components and determinants of vulnerability to identify ways in which adaptive capacity can be increased and exposure-sensitivities decreased (Smit & Wandel, 2006). The studies are participatory as they empirically identify the most feasible and practical adaptation strategies directly from the community. The approach recognizes the community as the primary system of interest, but also identifies the broader conditions within which it functions, including multiple stressors. Comparing results of place-based involves comparing across communities to identify common characteristics '*...that contribute to or moderate vulnerabilities and the features of adaptive strategies that are effective*', p285 (Smit & Wandel, 2006).

## 1.4 Tourism, Climate Change & Livelihoods

Undertaking a sectoral approach to vulnerability and adaptive capacity assessments can focus efforts at the local scale, where there can be a large number of actors and variables (Birkmann, 2006). My research focuses on the tourism sector, which in addition to contributing to climate change<sup>1</sup>, is one of the most exposed to climate change impacts (Gössling & Hall, 2006; Scott et al., 2008). Tourism also links to other sectors that are to be adversely impacted, including agriculture, water supply, coastal management, human health, nature conservation and urban planning (Huq & Reid, 2004; Klein, Schipper, & Dessai, 2005). Of all tourism stakeholders, tourism destination<sup>2</sup> communities and tourism operators have the least adaptive capacity and are the most vulnerable to the socioeconomic and biophysical impacts of climate change, due to their investment in immobile capital assets and/or reliance on local resources (Scott & Jones, 2006).

Scott et al. (2008) present four pathways in which the competitiveness and sustainability of tourism destination communities will be impacted by climate change. Direct climate change impacts include changes in the length and quality of climate-dependent tourism seasons and changes in the number of weather extremes, leading to infrastructure damage, higher operating costs and business interruptions for the industry. Indirect impacts include impacts to livelihoods, changes in water availability or biodiversity loss. Tourist mobility and behaviour are likely to be impacted by national or international mitigation policies which aim to curb greenhouse gas emissions. Unmitigated climate change could also result in reduced global GDP, which could reduce the discretionary wealth of tourists and have negative implications for tourism dependent nations (indirect societal impacts). To reduce the impacts of climate change on tourism and the sector's contribution to climate change, tourism stakeholders will need to engage in mitigation and adaptation efforts, particularly in developing countries and small island states (Scott et al., 2008).

## 2 Case-Study: A Caribbean Tourism Destination Community

### 2.1 Climate Change Impacts, Vulnerability & Adaptive Capacity

My research took place in a tourism destination in Barbados, a small island located in the Eastern Caribbean. Much of the Caribbean's infrastructure and settlements, including fifty percent of its population, are located along the coasts and face high exposure to coastal impacts (Mimura et al., 2007; Nicholls et al., 2007; Simpson et al., 2009). The Caribbean also has a low knowledge level of climate change impacts and faces low adaptive capacity (Intergovernmental Panel on Climate Change, 2007; Hall, 2008; Scott et al., 2008).

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<sup>1</sup>In 2005, it was estimated that the tourism sector contributed approximately 5% to global CO<sub>2</sub> emissions, which amounts to the total emissions estimates of Canada and Britain (Scott et al., 2008).

<sup>2</sup> "... marketable destination... from a small nation to a region, or to a specific resort or site" p21 (UNWTO, 2004).

Long-term biophysical impacts of climate change to coastal areas include sea level rise, increases in air and sea surface temperature and changes in rainfall patterns and natural ecosystems (Dasgupta et al, 2007; Mimura et al., 2007; Nicholls et al., 2007). Sudden and extreme climate-related events are also expected to increase, including the frequency of heat-waves (drought) and of tropical storms and hurricanes, leading to intense rainfall, flooding, storm surges and landslides. Water quality and availability may be affected due to declining groundwater recharge and saltwater intrusion into fresh water aquifers (Mimura et al., 2007; Nicholls et al., 2007). Other potential impacts to coastal areas include those to biodiversity, human health and economic and socio-cultural resources.

The vulnerability of coastal communities to climate change is also increased by multiple non-climatic stressors, including poverty, population growth, resource depletion and growing demand for waterfront properties and tourist developments (Nicholls et al., 2007; Scott et al., 2008; Simpson, Gössling, & Scott, 2008). Predicted socio-economic impacts include adverse impacts on the economy and employment, through the loss of income and infrastructure, particularly to key economic and climate-sensitive sectors such as tourism and agriculture (UNFCCC, 2000; Dulal et al., 2009). Small islands States, in particular Small Island Developing States (SIDS), face the same impacts as coastal areas, though more intensely due to their limited size, narrow resource base and proximity to sea level (UNFCCC, 2005). In addition, many small islands and SIDS have low adaptive capacity and less diversified economies, often relying on a few economic activities such as fisheries or tourism (Mimura et al., 2007; Scott et al., 2008; Simpson, Gössling, Scott, Hall, & Gladin, 2008).

Coastal zones, including those in the Caribbean, are the most attractive tourist areas in the world (Scott et al., 2008). The Caribbean is considered a *'tourism vulnerability hotspot'* because climate change impacts are predicted to be significant and the sector is vital to the region's economy. Many Caribbean countries are considered developing countries and/ or small island developing states and tourism is estimated to be the single largest economic sector in the region's GDP (14.8% in 2004) (Simpson, Gössling, & Scott, 2008). For these reasons, it is feasible to assess the vulnerability and adaptive capacity of Caribbean communities in a tourism context (Gössling & Hall, 2006; Scott et al., 2008). To know which Caribbean tourist destinations will benefit from climate change and which ones will not, local and regional climate change impact, vulnerability and adaptive capacity assessments and methods are needed (Scott et al., 2008; Hall, 2008; Amelung, Moreno, & Scott, 2008; Amelung et al., 2008; Simpson, Gössling, Scott, Hall et al., 2008). Such assessments would then lead to the identification and prioritization of coastal adaptation options in destination communities, which remain an important knowledge gap for small island and coastal areas (Gössling & Hall, 2006; Scott et al., 2008; Mimura et al., 2007; Nicholls et al., 2007).

## 2.2 Barbados

Barbados is a small island developing state (UNFCCC, 2005) and in 2008, the island had an approximate population of 275,000 (Government of Barbados, 2008). Over the years, as Barbados moved away from sugar production, its population drifted from inland agricultural areas to areas along the western and southern coasts. This resulted in the urbanization of the two coasts as the economic base diversified to include activities such as tourism. Traditional fishing villages on the

southern and western coasts also became attractions for residential and tourism development (Wilkinson, 1997). Today, Barbados is one of the most densely settled countries in the world (Wilkinson, 1997).

Tourism is a key economic driver in Barbados, contributing 14.1% of direct and 48.1% of direct and indirect<sup>3</sup> GDP in 2010 (World Economic Forum, 2011). In 2010, the industry in Barbados was valued at \$1.8 billion, producing approximately 18% of direct and 53% of direct and indirect employment (World Economic Forum, 2011). Until recently, like the majority of Caribbean countries<sup>4</sup>, Barbados was categorized as an upper middle income country by the Organization for Economic Cooperation and Development (OECD), from which it received Official Development Assistance (ODA). At the end of 2010, Barbados graduated from this list and was no longer eligible for ODA (UNDP, 2011). Some government officials question whether the country is ready for this higher development status, as the lack of aid means it will have a harder time reaching its Millennium Development Goals for 2015 (Barbados Advocate, 2011a). Furthermore, as a small island state, Barbados continues to face the threat of the reversal of any human development gains from natural disasters or the continued effects of the economic recession (Barbados Advocate, 2011a).

I chose to base my study-site in Barbados, as like other small islands, it is exposed to long-term changes in climate and climate-related hazards. Barbados is often spared the worst effects of the region's tropical storms and hurricanes as its far eastern location in the Atlantic places it outside the principal hurricane strike zone. Last October, Tropical Storm Tomas, which was later upgraded to a Hurricane, hit the island, the first to cause severe damage to Barbados since Hurricane Janet in 1955. Hurricane Tomas resulted in excessive rainfall, flooding and high winds which damaged the housing stock, agriculture sector, road infrastructure, power lines and disrupted the utilities. To address damages, the island received a payout of US \$8.5 million from the Caribbean Catastrophe Risk Insurance Facility (CCRIF) (CDEMA, 2010).

Barbados has a relatively lower vulnerability and higher adaptive capacity than islands in the region (Climate Investment Funds, 2009). Due to this higher capacity, it is fairly information rich, so data availability and the capacity of its organizations will provide insight as to what sort of data and capacity might exist in its less developed neighbouring islands. The Caribsave Partnership, the organization my research is affiliated with, is also headquartered in Barbados and provided research support.

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<sup>3</sup> The first figure shows the 'direct impact only' and the production side of the industry. The second figure shows the direct and indirect impact of the travel and tourism economy, by traditional travel service providers and industry suppliers (World Economic Forum, 2011).

<sup>4</sup> With the exception of the Dominican Republic (Lower Middle Income Countries) and Haiti (Least Developed Countries) (OECD, 2009).

## 2.3 Study Site: Oistins

The stretch of tourist facilities (hotels and restaurants) along the south and west coast, made it challenging to define a distinct 'tourist destination' in Barbados. For this reason, I chose the destination community of Oistins, located on the south-coast of the island and with the defined boundaries of a town, as a study-site. Oistins is a historic and the fourth distinct town of Barbados with an approximate population of 2200 (Barbados Statistical Service, 2000). The community supports small-scale and large-scale tourism related activities, is low-lying and very close to the coast. Tourism-related activities are also connected to the consumption of local fisheries as Oistins hosts the largest fishing community in the island. CARIBSAVE and its local partners identified Oistins as their pilot study site to carry out a vulnerability and adaptive capacity assessment under the guise of their Caribbean '*Livelihoods Gender Poverty & Development (LGPD)*' Project. My research builds on their initial consultation of fishermen and local emergency representatives in August of 2010 (Caribsava, 2010).

Over the years, the Oistins' fish-market has become a key agro-tourism destination with key attractions including the food and craft vendors, the fishermen and fish-vendors, the jetty to view the fishing vessels and the turtles, and the boatyard. The fish-market's Friday night 'fish-fry' has been ranked as the #1 tourist nightlife spot in Barbados in 2008 and #2 in 2006 (Hoyos & Corsello, 2008; Hoyos & Downing, 2006). The fish-market is not fully dependent on tourists, as it is also frequented by locals. Friday night is the busiest night of the week, providing up to 75% of business for food and craft vendors. Some vendors stated that during the dinner hour, most of the clients are tourists, especially during the tourist season. Other tourist attractions and facilities in Oistins include the two beaches bordering either side, neighbouring hotels, restaurants and services. The community also has residential neighbourhoods, two of which are located directly across the fish-market and are in a lower socio-economic bracket. These neighbourhoods served as the site to assess household level vulnerability and determine how connected livelihoods were to tourism and/or fisheries related activities.

## 3 Methodology

### 3.1 Research Approach

My research applies two methods to assess the climate change vulnerability and adaptive capacity of the tourism destination of Oistins: a Community-Based Vulnerability Assessment and an Indicator approach. The first involves carrying out a CBVA with stakeholders whose livelihoods are most connected to tourism related activities, of which this working paper presents preliminary and partial findings. The second examines the viability of developing and applying a set of indicators at the destination and household level by consulting community members, key informants and conducting household surveys. My research examines the strengths and limitations of each, in particular, which approach, or combination of, is the most useful to assess the vulnerability and adaptive capacity of a site-specific tourism destination in a densely populated small island.

My field research was carried out in the summer and fall of 2010 and winter of 2011. In the summer of 2010, I visited Oistins and set out to identify key stakeholders. In the fall of 2010, I further consulted key informants to develop the destination and household level indicators. I then applied the household level indicators by consulting surrounding neighbourhoods. In the winter of 2011, I returned to Barbados to collect data to apply the destination-level indicators and consulted further stakeholders using the CBVA approach.

### **3.2 Key Stakeholders**

As local stakeholders are a key source of adaptive capacity, they were instrumental to my research (Handmer, 2003; Conde & Lonsdale, 2004). I undertook a focused approach which facilitated the participation of the most influential and most vulnerable stakeholders (Few, Brown, & Tompkins, 2007; Kloprogge & Sluis, 2006). Tourism stakeholders are those '*... involved directly in the tourism sector and those whose livelihoods are affected by tourism ... or those that have other relevant expertise*', pg 36 (Simpson, Gössling, Scott, Hall et al., 2008). My research targeted the following three groups of tourism stakeholders: i) Those whose livelihoods are most connected to the tourism related activities of Oistins, ii) who live in neighbourhoods adjacent to the key attractions and iii) key informants who have other relevant expertise and/or information (e.g. local and national government, community groups, tourism organizations, NGOs and universities).

### **3.3 Research Activities**

For the Community-Based Vulnerability Assessment exercise, I developed a semi-structured qualitative interview based on the framework of (Smit, Hovelsrud, & Wandel, 2008). In the winter of 2011, I interviewed 45 individuals from the following groups:

- *At the fish-market:* food vendors, craft vendors and fisher-men;
- *Tourist related businesses:* large and small hotels, including staff of the large hotels, restaurants and taxi-drivers;
- *Beach-related activities:* water sports operators, clothes vendors and lifeguards; and
- *Institutional level* to provide insight as to the institutional and macro issues affecting the destination: local level government, local emergency organization, Director of national conservation organization, Chair of the tourism advisory committee, Manager of the fish-market and a Professor of fisheries.

The interviews assessed the exposure-sensitivity and coping capacity of stakeholders to changing environmental and social conditions in the past 10 years. They then assessed the future exposure-sensitivity of stakeholders to changing environmental and social conditions and the resources and support that would be needed to adapt.

## 4 Results

### 4.1 Preliminary Findings

Preliminary examination of the results from the Community-Based Vulnerability Assessment interviews, suggest that stakeholders are experiencing differing exposure-sensitivities to climate related events. It is interesting to note that any climate related impacts they are experiencing are all exacerbated by exposure-sensitivities from changing social and economic conditions. Key impacts to livelihoods from both types of stressors include less economic revenue due to weather variability, a decrease in tourists (due to the economic recession) and the rising cost of living. The following are some preliminary and partial results, which need to be analyzed in further detail.

#### **Current (and Past) Exposure-Sensitivities:**

##### **Environmental Changes (Climate-Related Events)**

###### *Direct Impacts:*

I asked interviewees about their perceived changes in the weather or natural environment, in the past 10 years, and whether any of the changes had made it difficult for them to carry out their livelihoods. Most interviewees observed the following climate-related events, though more so in the past year. Only some provided observations for a longer period. Resulting impacts to livelihoods differed, based on the type of environmental change and the type of livelihood activity.

<b>Observed Direct Long-Term Changes</b>	<b>Impacts to Tourist Related Activities and/or Livelihoods</b>
Stronger winds – can result in stronger and higher swells (waves).	Have made it difficult for: <ul style="list-style-type: none"> <li>• Some tourists to swim in, though some like to swim in strong waves, putting them at risk.</li> <li>• Carry out water sports activities.</li> <li>• Take out fishing boats in, resulting in lower fish-catch and supplies to food vendors.</li> </ul>
Heavier and/or increased rains	<ul style="list-style-type: none"> <li>• <i>Same comments as above.</i></li> <li>• Less tourists come to eat at the fish-market, shop with the vendors or swim at the beach.</li> </ul>
Increased heat, especially in the summer	<ul style="list-style-type: none"> <li>• Resulting in <u>NO</u> major impact to date. Most tourists like the heat.</li> </ul>
<b>Experience with recent Extreme-Weather Related Events (Hurricane Tomas)</b>	Only a few interviewees experienced direct impacts, as the majority of impacts were felt elsewhere on the island. <ul style="list-style-type: none"> <li>• Electricity and power out for a few days.</li> <li>• Outdoor tables broken.</li> <li>• Flooding.</li> </ul>

*Indirect Impacts:*

Interviewees were asked whether changing weather has led to any indirect impacts upon biophysical resources important to their livelihoods. In particular, I asked fisher-folk about impacts to fisheries, which are purchased by food vendors for the consumption by tourists and locals. I asked fisher-men about any observed changes in the coral reef-fish catch close to shore and changes in pelagic<sup>5</sup> fish caught 5-150 km off-shore. Fishermen did not observe any changes in the harvest of pelagics, which might be hard to observe due to their migratory nature. They did notice changes in the reef-fisheries populations, which could be due to increased coral bleaching, but also due to other stressors, such as over-fishing and the bacteria fish kill of 1990s. Such impacts are addition to the direct impacts of weather variability affecting their journey at sea (noted above)

*Tourist mobility and behavior:*

Tourist mobility and behavior might be affected by the British *Air Passenger Duty* (APD) tax, which is charged to outbound passengers from the United Kingdom as part of their Government's plan to reduce greenhouse gas emissions. The tax was created in 2008 and charges rose in 2009 and in 2010. The APD has four bands to account for distance travelled between London and the capital city of the destination country. The Caribbean falls into the third band: Band C (4001 – 6000 miles), which meant that, in November of 2010, the tax to be paid for the lowest airfare was 75£ per person (ABTA, 2011). The Caribbean Tourism Organization (CTO) has lobbied against the tax and in March of 2011, the British Government announced it would not increase the APD in 2011 and would freeze it until 2012. This decision was based on the need to distribute the duty more fairly and to improve the banding system given the current economic conditions (Barbados Advocate, 2011b).

*Indirect societal impacts:*

Scott et al. (2008) note that long-term unmitigated climate change could reduce global GDP and the discretionary wealth of tourists, leading to indirect negative societal impacts for destinations. Such impacts are already being felt, though due to a non-climatic stressor, that of the recent economic recession [detailed below].

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<sup>5</sup> Surface dwelling fish of the open-sea, which are the main fisheries consumed by locals and tourists.

## Social and/or economic changes (Multiple non-climatic stressors)

### Direct Impacts:

I asked interviewees about their perceived changes in any social or economic conditions in the past 10 years, and whether this had resulted in any impacts upon their livelihoods. All respondents attested to changing social and economic conditions affecting their livelihoods, especially since 2008, when the worldwide economic recession started.

Social & Economic Changes	Impacts to Tourist Related Activities and/or Livelihoods
Economic Recession since 2008 <sup>6</sup>	<ul style="list-style-type: none"> <li>• Less tourists in the past two to three years and even if they visit, less spending.</li> </ul>
Inflation (5.4% in 2010) <sup>7</sup>	<ul style="list-style-type: none"> <li>• Rising cost of food, gas<sup>8</sup>, electricity and supplies, making it harder to make a profit.</li> <li>• Increase in the national Value Added Tax (VAT) by 2.5% to 17.5%.</li> </ul>
British Air Passenger Duty Tax	<ul style="list-style-type: none"> <li>• Increased airfares for British tourists to the Caribbean could result in decreased visitors. The British represent the main tourist market for Barbados and are already visiting and spending less due to the recession.</li> </ul>

### Coping strategies

The following is a partial list of coping strategies presented by interviewees to address the current impacts of environmental and/or social changes on their livelihoods, followed by a partial list of the types of resources they have to cope.

<b>Coping Strategies:</b>
<ul style="list-style-type: none"> <li>• Engage in more aggressive marketing to bring in tourists to the Oistins fish-market, beyond Friday nights.</li> <li>• Cut costs by reducing the portion size of meals and/or reduce hours of staff.</li> <li>• Cease livelihood temporarily or permanently (i.e. close shop, reduce hours or stop fishing)</li> </ul>
<b>Types of resources that stakeholders have to adapt:</b>
<b>Social</b>
<ul style="list-style-type: none"> <li>• Some individuals have created networks with recurring tourists or amongst hotel staff to share used goods [barter] and/or supply goods.</li> </ul>
<b>Financial</b>
<ul style="list-style-type: none"> <li>• Some people who are salaried (i.e. lifeguard, hotel staff) automatically pay into the national insurance (employment) scheme. Other, independent self-employed individuals do not (i.e. clothes vendor, food vendor or fisherman)</li> </ul>

<sup>6</sup> Resulted in a decline of stay-over tourist arrivals by 8.7%, from 2008 figures, in 2009 (ECLAC, 2010). In 2009, Barbados' GDP declined by 3.6% and tourism revenues declined by 6.6% (ECLAC, 2010). Preliminary figures for 2010 had stay over arrivals grow by 2% from 2009 (Barbados Advocate, 2011c).

<sup>7</sup> Barbados Advocate, 2011d

<sup>8</sup> The island had to pay almost 7% more for oil imports in 2010 (Barbados Advocate, 2011e).

<b>Physical</b>
• Some individuals have other businesses they can depend on (i.e. catering).
<b>Human</b>
• Some individuals have other training or skills they can depend on (i.e. seamstress, carpentry or farmer).
<b>Natural</b>
• Some food vendors have relatives working as fishermen, from which they can obtain fish directly.
<b>Institutional</b>
• Some individuals are members of groups (i.e. Bay Garden Vendors Association (BGVA), Barbados Hotel & Tourism Authority (BHTA), Small Business Association, Intimate Hotel Association), which can facilitate discuss of issues, marketing, etc.

**Future Exposure-Sensitivities**

I asked interviewees about their opinions of climate continuing to change in the future, as predicted by the world’s scientists. Many thought future climate-related changes are possible, though many did not want to think about the future and let ‘one day come at a time’ and live in the moment. Some individuals thought God would take care of them. Others thought one should prepare for future changes by taking action to adapt or mitigate emissions (i.e. conserve energy or use less fuel).

I then asked whether they thought such environmental changes could impact upon their destination and further increase the vulnerability of their livelihoods. Most stakeholders felt that future climate-related changes could result in direct impacts to their natural environment (i.e. beach, fisheries or coral reefs), many of which are important for tourists. Infrastructure could also be further damaged (i.e. stalls or boats). This could all lead to a decrease in business and decrease in tourists. Some also thought that increased heat could lead to increased energy bills through demands for air-conditioning.

Finally I asked whether they perceived social and/or economic conditions would continue to change in the future and if so, whether it would result in further impacts to their livelihood. Many felt that if the social and economic conditions mentioned earlier remained un-checked, they would continue to cause negative impacts.

### **Future Adaptive Capacities**

The following is a partial list of the types of resources and/or institutional support that interviewees would need to adapt to future environmental and/ or social changes:

<b><i>Social</i></b>
<ul style="list-style-type: none"> <li>• Further strengthen the capacity of fisher-folk associations so they can set prices amongst fisher-folk and receive a fairer price when selling to food vendors, fish cleaners or customers.</li> </ul>
<b><i>Financial</i></b>
<ul style="list-style-type: none"> <li>• Make content insurance a requirement when obtaining a license for a vending kiosk.</li> </ul>
<b><i>Physical</i></b>
<ul style="list-style-type: none"> <li>• Implement the plan to create a sheltered area for the fish-market’s craft vendors, who currently sell out in the open.</li> </ul>
<b><i>Human</i></b>
<ul style="list-style-type: none"> <li>• Individuals should take advantage of any training offered by their member organizations.</li> </ul>
<b><i>Institutional:</i></b>
<ul style="list-style-type: none"> <li>• Continue to diversify the tourism market away from a ‘north-south’ relationship to neighbouring countries in the ‘south’.</li> </ul>
<ul style="list-style-type: none"> <li>• Emergency Management Planning (EMP): <ul style="list-style-type: none"> <li>▪ Facilitate greater coordination between the local District Emergency Organization and the Constituency Council to prepare an EMP and identify vulnerable groups in the destination. This will be a challenge as both organizations operate with part-time staff.</li> </ul> </li> </ul>
<b><i>Natural</i></b>
<ul style="list-style-type: none"> <li>• Increase the capacity of the local fishing fleet to harvest a greater amount of pelagics to support local and tourist consumption and thus rely less on imported pelagics.</li> </ul>

## **4.2 Analysis**

Preliminary results from the Community Based Vulnerability Assessment interviews in Oistins, suggest that interviewees were for the most part familiar with climate change and its possible impacts, though other non-climatic stressors were currently thought to be more important and to be causing more adverse impacts. Stakeholders are facing social vulnerability due to long-term changes in climate, though resulting impacts to their livelihoods are not as severe. All stakeholders are facing social vulnerability due to non-climatic stressors. The manner in which stakeholders are coping with present social and environmental changes and plan to adapt to future changes, might be indicative of how they would adapt to further long-term changes in weather and increases in sudden and extreme climate-related events. For these reasons, enhancing the adaptive capacity of stakeholders to address the current stressors would help them to prepare for any future changes of either or both types of stressors.

## 5 Next Steps

The next steps of my research plan are to analyze the findings from the Community-Based Vulnerability Assessments in more detail and compare them to the information obtained by developing and applying the destination and household level indicators. By examining the strengths and limitations of each approach and how they might integrate, my results will inform future assessments and adaptation planning in the region. It will also shed light on the feasibility of a sectoral approach and the scale of its assessment. I would also like to investigate whether observed climate-related changes are consistent or inconsistent with scientific predictions of climate change.

Findings regarding the feasibility of the two approaches, and the subsequent vulnerability and adaptive capacity assessment of Oistins, will enable me to suggest measures to strengthen the adaptive capacity of local stakeholders. In addition to sharing my research results with the academic community, I will share them with the range of stakeholders consulted: local level organizations such as the District Emergency Office, local government, NGOs such as the Caribsave Partnership and Red Cross, national government organizations, large and small scale tourism organizations and other academic researchers in the region. Stakeholders in Barbados and/or the region could refer to my results as how to best engage in future climate change adaptation planning for a site specific tourism destination.

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