

“Captain the island’s sinking!” - Climate change and tourism in Speightstown, Barbados, West Indies

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ABSTRACT

Climate change for Barbados has several direct impacts, rising sea level, dying reef and sea grass communities leading to compromised coastal protection. Climate change results in more frequent and intense storm events. Combined with reduced reef protection, the impact of high magnitude events on coastal communities is devastating. In the Caribbean, the coast is a major tourist attraction and many urban centers are located there.

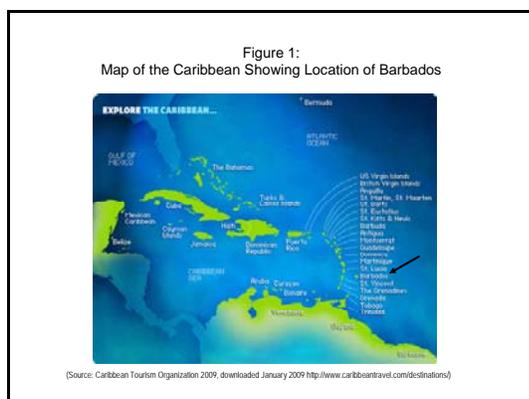
This paper documents the like impact of climate change on the historic township of Speightstown, Barbados.

Base maps were prepared which identified all the tourism, wholesale/retail, service, fisheries, heritage, transportation and residential features. A computer model generated 50, 100 and 150 year storm events. The likely impact was superimposed on the base map. Two scenarios are presented: Scenario 1. The impact of a high magnitude 50 year event (a temporary condition), the estimated total impact is US\$31 million (US\$19.8 million associated with the loss of tourism and heritage attractions). Under Scenario 2 sea level rise equating to the level of the 50 year event the area is totally lost (1,095 homes; 46 wholesale/retail businesses; 41 tourism and heritage establishments; 28 service businesses; and 60 fisheries operations). Speightstown as we know it would cease to exist.

Keywords: Climate Change; heritage; tourism; storm surge.

1. INTRODUCTION AND BACKGROUND

Barbados is a small eastern Caribbean country located at 13° 05' north latitude and 59° 37' West longitude (see Figure 1).



It is the most easterly of the Caribbean islands, with an estimated population of 274,000, persons [11]. This largely coral limestone island is 166 sq miles in area. This geology lends itself to miles of white sandy beaches which since the

1960s have been a primary motivation for tourist visitation (Barbados Ministry of Tourism, 1998). In 2007 the island recorded 575,000 long stay visitor arrivals and 616,000 cruise ship passenger arrivals [12, p. 2]. These visitors produced US\$953.4 million in visitor expenditure in 2007 [11, p. 225]. Tourism to Barbados, like so many of its Caribbean neighbors, is a major employer with tourism and other services contributing about three-quarters of GDP and 80% of exports [13]. As an open dependant economy tourism is a major contributor the island’s important foreign exchange earnings.

For the Caribbean the situation is not dramatically different from that of Barbados. The 32 member countries of the Caribbean Tourism Organization are dependant on tourism, so much so that researchers such as Jayawardena [17] have stated that the Caribbean is one of the more tourism dependant regions of the world.

Overall in 2007, the year for which the most recent data is available, the Caribbean recorded 22.7 million long stay visitor arrivals and 19.2 million cruise passenger arrivals [8]. Such that Barbados with its 575,000 long stay visitor arrivals and 616,000 cruise ship passenger arrivals [12] represented 2.5% of the region’s long stay and 3.2% of the cruise ship passenger arrivals. Not as large a share of Caribbean tourism as Jamaica or the Bahamas, but also not as small as Anguilla and Grenada.

Heritage Tourism and the Caribbean

Heritage and cultural tourism are defined as “travel to sites that in some way represent or celebrate an area, community or people’s history, identity or inheritance. Heritage attractions are typically divided into three categories: built heritage, natural heritage and cultural heritage” [19, p. 38].

The Caribbean’s natural heritage is largely its coastal environment with its beaches and reefs, while its mountains and vistas; forests and rivers are additional attractions, the sea, sand and sun are still the primary motivators for travel to the Caribbean [21, 22]. A Government of Barbados 1998 study [3] indicated that for 78% of visitors to the island, the physical environment was a very important factor in the decision to vacation in that country.

Cultural heritage represents the way of life of the people, their food and customs, belief systems and traditions; dances, rituals and festivals, those elements that are passed on from generation to generation. The peoples of the Caribbean predate Christopher Columbus’ arrival in 1492. Researchers even estimate that pre-Columbian communities may have been living in the Caribbean from 9,000 years before the present [1]. Some of these communities are still in existence today. The arrival of the Europeans brought new customs and traditions to the Caribbean. Spanish, Dutch, French, English, Danish and Portuguese traditions were added to the region. Indentured servants, enslaved Africans and later Chinese and Indian

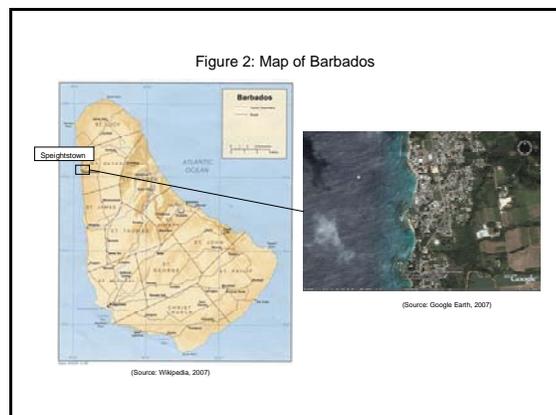
indentured servants all add to the rich tapestry of Caribbean cultural heritage. More recently there has been much movement between the islands, from both North and South America. For Barbados, having been a British territory from 1625 to 1966, and being a member of the British Commonwealth, the cultural influences have primarily been British, African, and most recently East and South Asian and American. The population is estimated to be comprised of 90% black, 4% white and 6% Asian and Mixed [13].

Built heritage represents the buildings, monuments and other structures that are part of the response of the community to the physical environment, be they economic structures such as factories or mines, military structures such as forts and signal towers, or simply houses or statues. The rich architectural styling is evident across the region. The Barbados National Trust is an active not-for-profit agency in the preservation of Barbados' built heritage.

The combined built and cultural heritage environment was indicated as an important decision making factor for 17% of visitors to Barbados [3].

Speightstown and Barbados

Speightstown is located on the northwest coast of Barbados, 12 miles north of the capital, Bridgetown (see Figure 2).



It is the second largest urban centre in Barbados with a population of approximately 4,000 persons [4]. It is the commercial center of the northern parishes of St. Lucy, St. Peter, St. Andrew and the northern part of St. James. According to the 1989 Arthur Young Study [2, p. 5], Speightstown, at one time also called Spikestown, appears to have been settled around 1630, as the parish of St. Peter was one of six parishes created in the island in 1629. Its name was reputedly derived from William Speight, an early landowner who had the distinction of being elected to the House of Assembly in 1639 when the assembly was first formed. The town rose to prominence as a trading port with 5 jetties and 3 forts to defend itself within 30 years of its foundation [2, p.4].

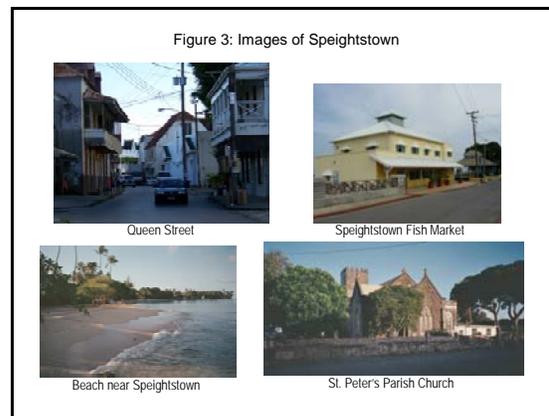
The study [2] goes on to report that Speightstown is of national historical and architectural importance. The robust 18th century architecture with its overhanging balconies and residences upstairs of the down stairs commercial operations, is the only example of its kind on the island. Historically known as Little Bristol, Speightstown was the first port and commercial centre of Barbados and for many years shipped sugar directly from its 5 jetties to Bristol England. Speightstown was also the location

where Oliver Cromwell's troops under Sir George Ayscue, Commander of the Commonwealth fleet, in 1649 focused his efforts in trying to quell the insurrection and confiscate estates of the Barbadians loyal to Charles I. The small forts of Speightstown were able to repel the attacks until 1652 when the "Charter of Barbados" was signed in Oistins. These articles of capitulation gave Barbados rights and privileges unheard of at the time. It has been suggested that the "Oistins Charter" was the model for the American Declaration of Independence. Over the past 300 years Speightstown's fortunes have been link with agriculture, retailing and today, it also includes tourism and its associated service industries. The true retail character of the town emerges on Saturdays with the side-walk market, with its vendors along Church and Queen Streets.

A number of redevelopments have taken place since. These include the new Speightstown Fish Market and Esplanade, the Boardwalk, establishment of the Speightstown Mall, re-development of Arlington and the re-development of one of the Plantation's Limited warehouses into a retail establishment focused on upscale interior design. However a unique value of Speightstown lies in the heritage of the location. A relatively large number of buildings have special historical significance (See Figure 3);

- The streetscape along Queen Street still maintains examples of the traditional Speightstown architecture, with the overhanging balconies for upstairs residences with street level commercial activity
- The St. Peter's Parish church located on Church Street which was built in 1629, was destroyed and rebuilt in 1665 and again destroyed in 1831. The unique Georgian style was the product of the 1831 construction. In 1980, the church's square tower was partially destroyed, but this has subsequently been beautifully restored.

Much of the significance of the township remains in its maritime tradition.



Climate Change

While it may be agreed that the only thing constant in life is change (French writer François de la Rochefoucauld), it is accepted that human nature may well be resistant to change, preferring a state of constancy. That globally climate is changing or that there are changes in the average weather over time is virtually undisputed [24]. This research paper does not examine the causes of such climate change, whether such change is part of the natural cycle of change over time, or has been a result of human activity; neither does this paper attribute responsibility to any society, community or nation, for increased carbon emissions which has contributed to global warming and climate change. Whether such change can be attributed to volcanic eruptions or to increases in green house gas emissions, climate change is currently having an impact of life as it presently exists. It is especially true for small island developing states which by their very nature are subject to the increased impact of climate change (Caribbean Disaster Emergency Response Agency [7]).

2. PURPOSE OF THE STUDY

The purpose of this study is two-fold. To assess: 1. the likely impact of climate change on heritage tourism in Speightstown, Barbados, using the storm surge assessment conducted by Smith Warner International Limited [26], and 2. to apply this same model in examining the likely impact of sea-level rise on the heritage tourism in Speightstown Barbados. Overall the paper has a third objective which is to draw attention to the likely devastating impact of sea level rise and climate change on this seaside community.

3. Review of the Literature

A selected and limited literature review of the likely impact of climate change in the Caribbean indicated that the material can be divided into two broad categories: marine impacts, and terrestrial impacts.

The marine impacts resulting from global warming and sea level rise have been noted by Mieczkowski [18]; Becken and Hay [5] and according to the forecast by the United Nations Inter-governmental Panel on Climate Change [16], it will not only be the gradual and imperceptible rising of sea level, but there will be more intense and more frequent high magnitude events, such as, hurricanes, tropical storms and tropical depressions [23], [24]. Fish et al [14] have estimated three scenarios for sea level rise in the Caribbean of the order of 0.2, 0.5 and 0.9 meters. They estimate that with a 0.5 meter rise in sea level there might be a 32% loss of the total beach area.

In addition there has been increasing alkalinity of seawater and reef bleaching [15] [28] reducing the quality of the beach and the associated activities as well as snorkeling, scuba and snuba diving activities, and reducing the effectiveness of the reef environment in protecting the coast from the high magnitude storm events. This does not take into consideration the devastating impact on the fisheries for the local community.

The terrestrial impacts include changes in the eco-systems associated with disease vectors and the increased incidence of illness [28] [20]. Where cycles of natural predation are no longer coincident such that the natural controls for vectors are removed, illness increases. This is evident in the increase in

mosquito populations and the associated incidence of dengue fever. Such outbreaks have implications not only for the local population but also for visitors. In addition increases in rainfall, some of which is un-seasonal, has resulted in increased run-off and reef silting. Migration of species both terrestrial and marine creatures, have been facilitated by changing climatic conditions.

Overall climate change has and will produce a negative impact on the appeal of tourism destinations [19] [10]. This is the very environment on which the tourism industry in Barbados and the Caribbean relies [24]. Belle and Bramwell [6] report that Barbados' tourism policy makers and industry managers are very much aware of the likely impact of climate change on the tourism industry. While policy makers believed that any response to the likely impact should include a policy response, industry managers are less favorably disposed to such a policy response.

4. METHODOLOGY

This paper is based on research conducted by Smith Warner International Limited (SWIL) in its assessment of the implications of sea level rise and the estimation of the impact on the tourism sector in the Speightstown area of Barbados [26].

The SWIL [26] Study; 1. Identified the project area and produced base maps, using topographic maps, aerial and satellite photographs; 2. Produced computer simulated mapping of the Speightstown area likely to be affected (3 scenarios were prepared) 50, 100 and 150 year storm event; 3. Estimates were prepared of the likely impact of the storm surge events on seven economic sectors, namely tourism; wholesale and retail; services; fisheries; transportation impact; heritage; and residential. 4. Heritage buildings were identified by the Barbados Town and Country Planning Department and the Barbados National Trust. The values of the heritage buildings were assessed based on current construction cost provided by two architectural firms; from estimates provided by the George Washington House Restoration Project and from the Barbados National Trust.

This paper proposes two scenarios: 1. Estimates of the likely storm surge impact as outlined by SWIL, and 2. The application of the SWIL model to examine the implications of sea level rise to the level of the storm surge.

The general methodology used herein for the prediction of storm surge at the shoreline can be summarized in the following steps:

1. First, a synthetic database of storms was generated using the properties of the existing historical population, in order to have a long-term database and a more reliable statistical interpretation of the probable storm occurrences and intensity in the study area. The generation of these storms was performed by applying a Monte Carlo simulation method. This method takes into account the number of storms that have passed within 300km of St. Peter in the last 105 years, the properties of these actual storms, the multi-decadal variations of storm occurrence in the region and the slow-rising trend of the average number of hurricanes per year in the region.
2. Second, the deep water wave and water level conditions resulting from the passage of hurricanes, was assessed. Considerations related to climate change were taken into account by considering first, the long-term trends on local and global water levels, and then the anticipated increases in frequency of occurrence and storm intensity;
3. The deep water conditions were then transformed to the nearshore/shallower areas regions using SWAN (Simulating Waves Nearshore), a third-generation wave model that computes random, short-crested wind-generated waves in coastal regions and inland waters. This model is also able to simulate the complex nearshore processes that lead to storm surge;
4. Finally, the storm surge inundation areas were identified by applying the predicted storm surge values at the shoreline to the specific topographic characteristics of the study site.

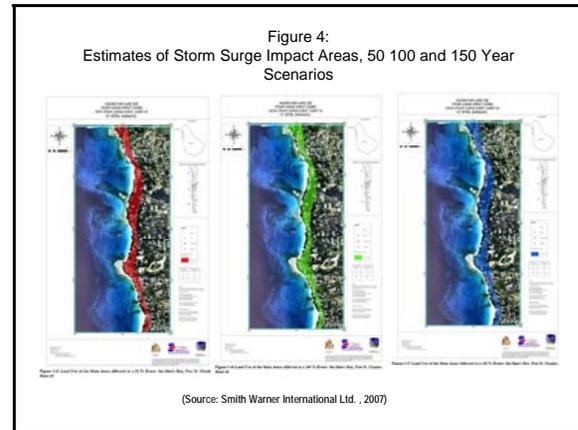
It should be noted that accurate bathymetric and topographic information are key factors in the accurate estimation of storm surge and the identification of the inundation areas.

Storm Surge Hazard Maps were generated by integrating the predicted inundation zones and topography of the area in a GIS (Geographic Information System) compatible environment, overlaid on top of satellite imagery. Hazard maps corresponding to the three scenarios investigated, namely the 50-yr, 100-yr and 150-yr hurricane events, were prepared.

[26, p III]

5. FINDINGS AND DISCUSSION

It must be noted that the area of likely area of impact projected by the Smith Warner International Limited computer storm surge simulation did not vary significantly between the 50 year event, 100 year event, and 150 year events (see Figure 4).



Based on the SWIL [26] simulation the 50 year event was used to estimate the impact on the Speightstown area for the seven sectors.

Scenario 1: Under this scenario, the total available estimated impact was US\$31 million as outlined in Table 1. There was only temporary dislocation of services and life in the community, and after a period of reconstruction, life in the Speightstown area returns to some semblance of normalcy. This area has encountered a number of high magnitude inundation events which would suggest that this scenario may indeed be realistic.

TABLE 1: Estimates of Available Sector Storm Surge Impact

SECTOR	NOTES	US\$
Tourism	Disruption of business: 14 accommodation establishments, 8 restaurants and 2 itinerant food vendors	\$0.5 m
Wholesale & Retail	46 businesses	\$3.6 m
Health & other Services	4 commercial banks, post office, 8 medical facilities, 2 schools, 8 churches, 2 gasoline service stations, 2 art galleries	No estimate available
Fisheries	60 fishing enterprises	\$1.1 m
Transportation	Resurfacing 7 miles of road	\$0.9 m
Heritage	Repair or replacement 17 heritage buildings	\$19.3 m
Residential	1,095 homes/dwellings	\$5.7 m
TOTAL AVAILABLE		\$31 m

(Source: [26])

Scenario 2: Under this second scenario of sea level rise to the level of the 50 year storm event, the entire area would realize a migration of the coastline inland and this entire area would be permanently submerged. All the businesses and activities in this part of Speightstown would cease to exist as we know it. The cultural and built heritage of the area would be eliminated. While some of these structures might be available for viewing by scuba and snuba divers and snorkelers, unless the buildings were relocated, they would largely not be available to be enjoyed by visitors or the people of Barbados. Such relocation would significantly exceed the estimated US\$19.3 million under

scenario 1. The Scenario 1 estimate does not include the cost of acquiring the land for the reconstruction of the buildings.

6. CONCLUSION AND FUTURE RESEARCH

Whether it is brought about by the slow almost imperceptible “normal” rise in sea level or the high magnitude catastrophic event Barbados and Speightstown are sinking! Climate change and the associated sea level rise may eliminate the businesses and activities in this part of Speightstown, and Speightstown would cease to exist as we know it! Major disruption associated with the culture (way of life) of the community is not easily quantifiable. In some countries rising sea levels have resulted in the relocation of buildings and entire communities. This is a very real option for coastal communities.

Support is therefore recommended for the mitigation of global warming, the reduction of green house gas emission by hotels, and Caribbean businesses. But it must be part of a global imperative. In the interim future research should document the built, natural and cultural heritage of this area for posterity, just in case! In the words of Charles Darwin (n.d.) “It is not the strongest of the species that survives, nor the most intelligent, but the one that is most responsive to change.”

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