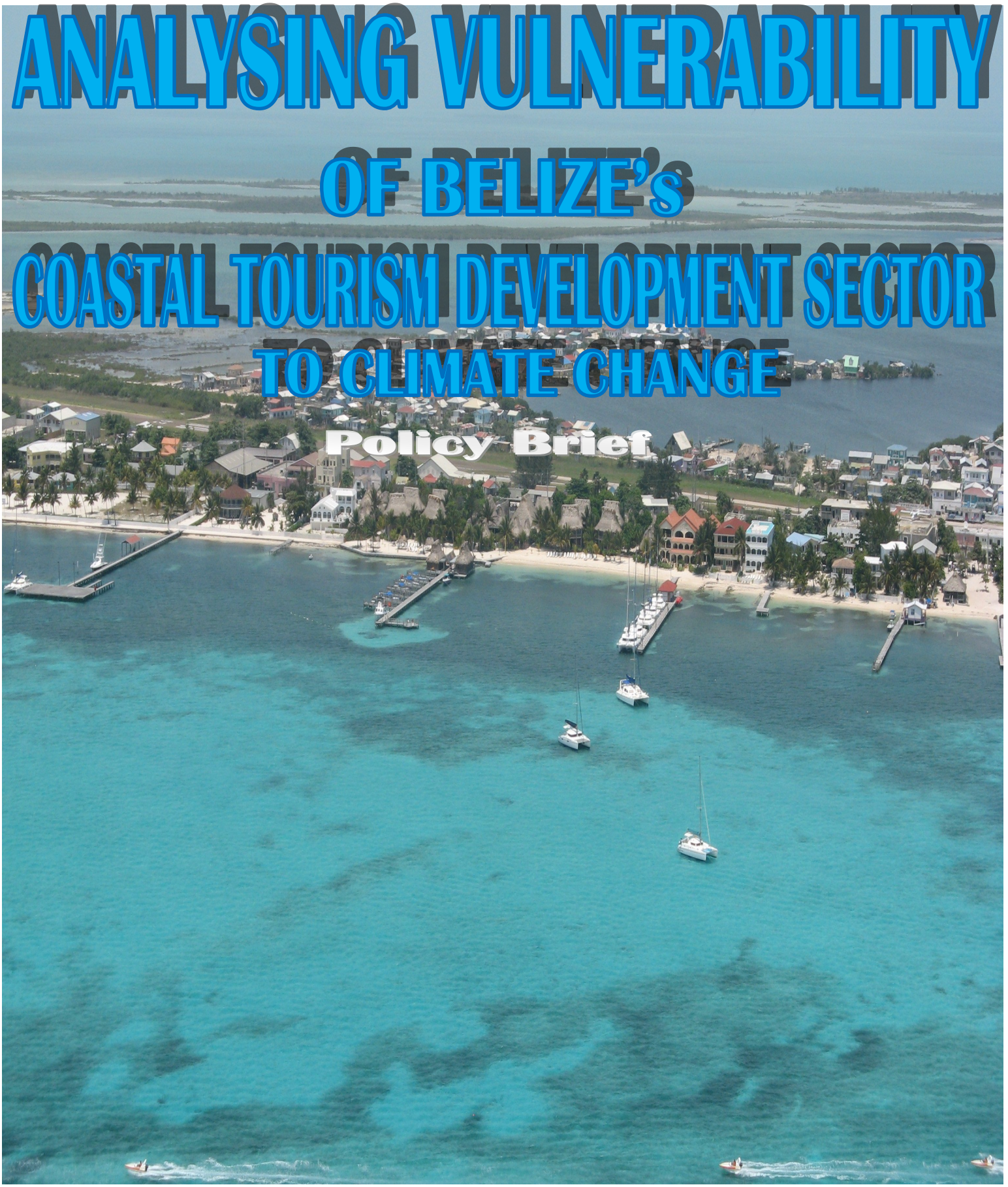
ANALYSING VULNERABILITY OF BELIZE's COASTAL TOURISM DEVELOPMENT SECTOR TO CLIMATE CHANGE

Policy Brief



Keywords: climate change, sustainable tourism development, resilience, adaptation

Key Messages:

- Belize's tourism industry is highly vulnerable to the potential adverse impacts of climate change, which emphasizes the importance of identifying climate resilient areas.
- The physical infrastructure, destination sites and natural environment that support Belize's marine-based tourism industry are located within the coastal zone, which increases the vulnerability of the industry to climate change.
- Vulnerability assessments as presented here identify areas that can be prioritized for adaptation action, and those that can facilitate climate-compatible tourism development opportunities.

Policy review and sound development planning can lead to maximum returns from tourism investments.

Introduction

Global climate change has severe adverse implications for developing countries, such as Belize that are heavily reliant on natural resources for economic growth. Identifying particularly vulnerable areas is therefore critical for ensuring future economic sustainability, especially with regard to the tourism industry, which is the largest contributor to the Belizean economy. Currently, most of the major physical infrastructure, transportation hubs, tourism attractions and hotels that support marine-based tourism are located within the coastal zone. This poses a potential threat for the tourism industry since Belize is particularly vulnerable to climate change impacts. Therefore, conducting vulnerability assessments will help to highlight priority areas for investment in tourism development in climate resilient areas, and will build the adaptive capacity of the industry.

In Belize, important attractors for the tourism industry include natural features found within the coastal zone such as the barrier reef, atolls, and several hundred cayes. The existence of these irreplaceable natural features, coupled with the fact that almost 40% of Belize's population resides within coastal areas, emphasizes the importance of including climate adaptation strategies in development planning. As a developing nation, Belize has limited resources available to invest in extensive studies to determine and mitigate projected climate change effects. Thus, vulnerability assessments are an effective and cost efficient tool to anticipate future changes associated with climate change, highlight areas at highest risk, maximize development investment through sound planning, and prioritize adaptation action within industries.

Why Conduct Vulnerability Assessments for the Tourism Sector?

The Intergovernmental Panel on Climate Change (IPCC) defines vulnerability as "*the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes*" (IPCC, 2007). Vulnerability can vary depending on the characteristics of that system including its exposure, sensitivity, and adaptive capacity (Snover et al., 2007). Using this concept, an assessment of vulnerability can help to identify the structural integrity of tourism infrastructure, estimate the potential for damage and disruption of tourism services, and prioritize areas for implementing adaptive strategies into development planning. These areas, once identified, will become hallmark destinations to attract tourism development that will both decrease investor risk and encourage responsible sustainable development.

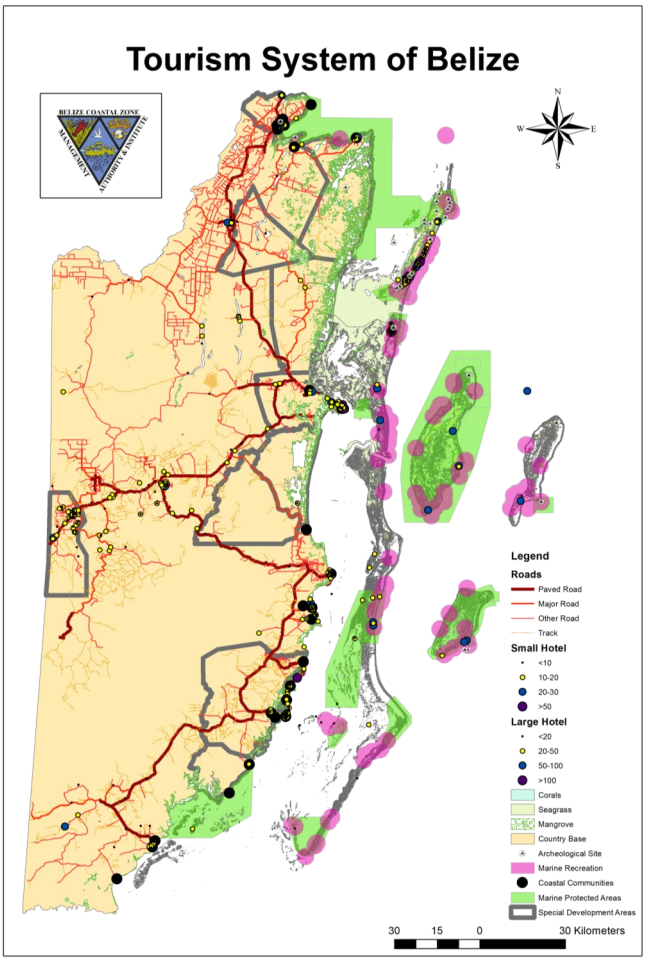
Vulnerability Assessment of the Tourism Sector in Belize in Belize

With limited resources to invest in adapting to current and future changes, decision makers are faced with tough decision about where to target investment. Identifying particularly vulnerable areas and the factors that contribute to vulnerability can help to inform such decisions. Multiple vulnerability assessments have been carried out in Belize for different geographic areas, sectors and ecosystems, e.g. tourism (Richardson, 2007), mangroves (Cherrington *et al.*, 2010), the coastal zone (CATIE/TNC, 2012), resulting in numerous datasets and maps. Information from these initiatives and other available datasets were reviewed, mapped where possible and aggregated to give a picture of the current status and vulnerability of Belize's coastal areas used for tourism or designated for future tourism development. Therefore, this project funded by CARIBSAVE and the Climate and Development Knowledge Network (CDKN) aims at assessing the current vulnerability of Belize's tourism system to climate change, including the coastal ecosystems on which it depends, and how current policies facilitate or hinder climate-compatible tourism development based on healthy coastal ecosystems

Methodology

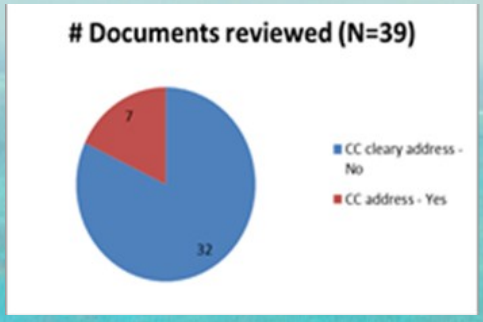
Vulnerability Assessment & Creation of Vulnerability Index Map

We created a base map of Belize's tourism system using GIS, which includes the natural environment, physical infrastructure and tourist destinations (**Figure 1**). This base map was then used to develop a vulnerability ranking for the different tourism areas based on tourism investments and socio-economic contributions. In order to investigate the vulnerability of the tourism system to climate change, data layers representing different indicators of vulnerability (exposure, sensitivity and adaptive capacity) were compiled using GIS (**Figures 2 & 3**). Each indicator was ranked, and a composite vulnerability index was developed. The resulting vulnerability map shows the relative vulnerability of regions within the coastal zone, which are ranked from low to high vulnerability (**Figure 4**). Finally, a map was created to identify resilient areas that may be prioritized for future adaptation actions and prioritized for potential future tourism development (**Figure 5**).



Policy Review

We conducted a policy review to consider both explicit policies - those that are formulated with the intention to address tourism, coastal/marine health and/or climate change adaptation; and implicit - those that were formulated to address other issues but are relevant in that they influence vulnerability to climate change impacts or ecosystem health. A total of 39 documents were analysed; 24 public policies, strategies and plans, and 15 relevant laws (Acts, Legislations and Regulations. Of these, only 7 effectively accounted for climate changes and related impacts.



Potential Effects of Climate Change on Belize's Tourism Sector

Exposure indicators to climate change were mapped using the following four critical climate effects on tourism in coastal areas.

- Rise in sea surface temperature
- Increased storm intensity
- Sea Level Rise
- Changes in rainfall patterns and air temperature

Rise in sea surface temperature

Exposure

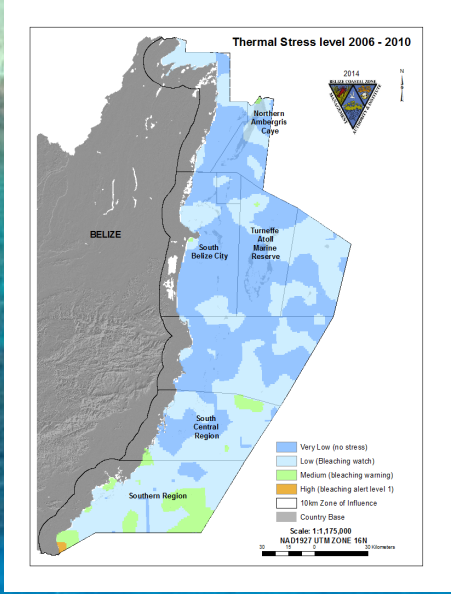


Figure 2: Exposure to thermal stress from 2006 – 2010 (Source: CATIE/TNC, 2012)

Sensitivity

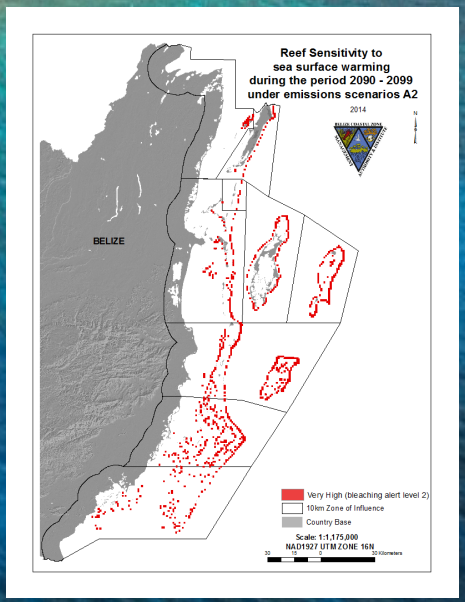


Figure 3: Reef sensitivity to sea surface warming from 2000 - 2009 (Source: CATIE/TNC, 2012)

The level of exposure to thermal stress in the study area from 2006 to 2010 was mapped as seen in **Figure 2**. Bleaching occurred mainly in northern Ambergris Caye, South Belize City, Turneffe Atoll Marine Reserve, South Central Region and Southern Region during this period. Various areas are also undergoing thermal stress, demonstrating the need for a monitoring system in the coastal zone to identify bleaching and the capacity of coral reefs to recover.

Current and future thermal stress was overlapped with coral reefs as seen in **Figure 3**. Results indicate that under a 2090-2099 thermal stress shows that the coral reef will be exposed and suffering a very high thermal stress, with a high impact. Thus, coral mortality from climate change may reduce the appeal of visitors that would like to participate in underwater recreational activities.

Determining tourism industry vulnerability to climate change

A weighted arithmetic aggregation was used to determine the potential impact of climate change to the tourism sector using the following formula:

$$PI = \frac{(EX + SE)}{2}$$

Equation 1: Formula for determining potential climate change impact.

Where PI is the potential impact composite indicator, EX is the vulnerability component exposure, and SE is the vulnerability component sensitivity.

Tourism Vulnerability Map

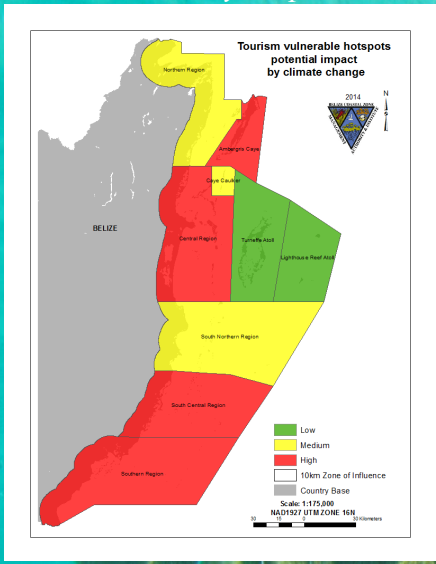


Figure 4: Vulnerability Index of Belize's Tourism System

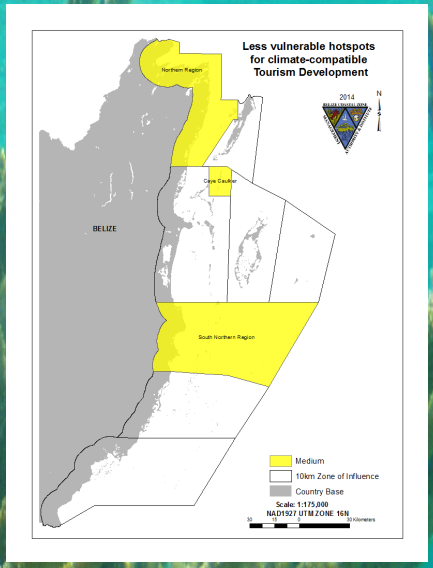


Figure 5: Areas for Climate-Compatible Tourism Development

The highest potential impact to the tourism areas will be to the popular destination of Ambergris Caye, Central Region, South Central Region and Southern Region **(Figure 4)**. Hence, there is a need to prioritize these areas for adaptation interventions. Less vulnerable hotspots for climate-compatible tourism development were identified as seen in **Figure 5**. This assessment also illustrates areas that may be prioritized for future research into their potential for climate-compatible tourism development. These include; Northern Region, Caye Caulker and South Northern Region.

Policy Recommendations:

The following key policies recommendations are urgently required to help bolster the country's ability to adequately address climate change threats with the appropriate actions that will minimize the impacts:

- ***National Sustainable Tourism Master Plan*** - revise to integrate green climate adaptation options to help deal with current and future disaster risk reduction (DRR) and climate risk factors within the tourism development landscape.

Coastal Zone Management (CZM) Act - ensure that the CZM Act is effectively revised to grant greater protection to Belize's coastal habitats, including those beyond the high water mark, and that it is "climate-smart" to sufficiently address risks and vulnerabilities posed by a changing climate. A revised CZM Act will also grant greater strength to the implementation of the Belize Integrated Coastal Zone Management Plan.

- ***Environmental Impact Assessment (EIA) Regulations*** - ensure that the EIA Regulations, including associated development checklist, fully call for the accounting of the value of nature in combating risks and vulnerability related to climate change effects
- ***Mangrove Regulations*** - revise/update the mangrove regulation of grant greater protection to mangroves, and reflecting the critical goods and services provided by these ecosystems in buffering against climate impacts; climate-smart the regulation.
- ***Horizon 2030 Development Plan*** - need to clearly account for the influence (negative or positive) of climate change on our environmental, social, and economic sectors. Belize's main economies are nature-based and climate change may compromise some of the benefits we are receiving from nature if appropriate planning and management actions are not set in place.

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Biography

Chantalle Clarke-Samuels is the Director of the Belize Coastal Zone Management Authority and Institute. Nadia Bood is a Reef Scientist and Climate Adaptation Advisor for the World Wildlife Fund Mesoamerican Reef Program. Leandra Cho-Ricketts is the Administrative Director and Marine Science Director at the University of Belize Environmental Research Institute (UB ERI) where she is in charge of the marine science programs at the Institute.

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