

Chapter 7

Coastal Climate Readiness and Preparedness: Comparative Review of the State of Florida and Cuba



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Abstract Property owners living near the coast benefit from geographically specific amenities. However, residents of coastal zones are often faced with the risk of natural hazards, such as hurricanes and the increased risks stemming from the threats of climate change including rising seas. To effectively manage coastal zones, and better equip them for climate resilience and preparedness, decision-makers depend on information with which they balance risk, benefit, and use.

The work described in this book chapter focuses on one highly developed coastal areas in Florida, more specifically regional government. Informed by regional evacuation studies and broader compliance with Florida Law, hurricane evacuation zones have changed several times since historically active 2004–2005 hurricane seasons. These zones should communicate risks to the property market, and by assuming efficient markets, they should be incorporated into home prices. We evaluate the trends of policies in place in India by comparing a difference in approaches to the risks and policies in place to prevent large-scale disasters, costs, and mitigation of damage.

This chapter uses the comparative analysis of varying approaches to issues geographical position and the balance between ecosystem service amenity (e.g., distance-to-shore and view), sub-national policies, and natural hazard risk. We provide an overview of current policies in place, a review of the amenity-based analysis of the risk averseness, explicit incentives, and governance structures to make the housing market account for low-probability catastrophic risk scenarios. We look how effective markets compensate for incorporated natural hazard risks.

The book chapter draws on comparison to the emergent practices in regional settings in Florida and compare the emergent practices in Cuba and/or Carribean region and provides for potential applicability of models. These are all places with similar risk exposure and morphology but vary on national and sub-national institutions.

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Overview

The proximity to the coast has its benefits and disadvantages. Studies have found that there is a “healthy coast” effect, where those living within proximity to coast have relatively higher health and well-being, compared to interior residents (Wheeler et al. 2012). However, residents and businesses in coastal zones often face the risk of natural hazards, such as hurricanes and the increased threats stemming from the climatic changes including rising seas, heat waves, and beach erosion. To effectively plan for climate-resilient coastal zones, and better equip planners, administrators and first responders plan for climate resilience and preparedness. Decision-makers depend on information with which they balance risk, benefit, and land use in planning. The book chapter compares the risks and practices in the regional settings of Florida to the practices in Cuba with the mention of the Caribbean with the potential generalization of strategies and policies. While the regions differ significantly in political, population, economic, and even geographical arrangements and structure, the coastal areas of both the State of Florida and Cuba face similar threats.

The review provides an analysis of enduring risks and practical approaches to climate readiness with the consideration of plans to address climate risk assessments in these distinctly geographically, politically, and economically dissimilar regions. The two regions are exposed to similar risk but vary in responses at a national and sub-national level of governments. The specific interest is in the existing practices, and policies in place are included in the review with specific recommendations for improvement to processes and policies. The authors of the book chapter examine the current state of climate preparedness in the specific coastal areas of Florida and the Caribbean with a particular focus on Cuba. The similarity of threats provides for a unique understanding of the responses and preparedness strategies deployed in these areas under consideration.

Defining Climate Readiness and Preparedness

The study of various processes and tools available to coastal areas and regions affected by hurricanes and frequent natural hazards and also influenced by the climate change offers insight into collaborative nature of emergency preparedness and disaster mitigation. In recent years, the increased strength and frequency of devastating impacts of hurricanes renewed the debate and research into climate preparedness and readiness. Beyond storms, far-reaching effects of extreme weather events prompt the necessary responses by administrators to confront the impacts with the specific economic, environmental, governing, and social characteristics. The four

effects may best be labeled through the Quadruple Bottom Line lens, described as the organizational and community aptitude to entrench well-defined practices and programs to “address economic, social, environmental, and governance aspects of sustainability, whereas governance is defined through fiscal responsibility and resilience, community engagement for efficient service delivery, transparency, and accountability” (Alibašić 2017, p. 41).

Due to their geography and location, Florida, Cuba, and the remainder of the Caribbean are prone to prolonged impacts of natural hazards, further increased due to climate risks. A deployment of preparedness- and readiness-related measures to address the community’s emergency preparedness and disaster recovery is of paramount importance. Cities and regions in Cuba, Florida, and the rest of the Caribbean are on the front lines of natural hazards, and they must plan for the natural disasters. Resilience may best be described as the organizational and systematic capability “to respond and adapt quickly to societal demands, transformational, internal and external shocks, and governing, economic, environmental, cultural, and social changes” (Alibašić 2018d, p. 2). Moreover, resilient organizations and communities not only withstand shocks and disasters but continue to thrive in the post-disaster environment (Alibašić 2018d).

Within the parameters above, the readiness and preparedness plans and strategies must and should include all aspects and levels of infrastructure and institutional knowledge and support to incorporate available climate and resilience information. Being climate resilient and prepared supports the longevity of a community and enables them to rebound back from disasters. The social conditions and connectedness within the regions affect regional readiness and preparation in the face of natural disasters. Beyond practical implications, local, state, and regional planners and administrators have an ethical role and responsibility to prepare for and address the effects of climate change and enable communities to thrive after the disasters. The ethics of resilience is embedded into the core governance structure as administrators bear responsibilities and ownership of the inherent nature of planning and preparing for disasters (Alibašić 2018e). On a global level, there is a direction by national and sub-national level governments to seek resilience in planning to harden infrastructure and to improve governance of the preparedness and readiness. Building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation, is one of the goals in the disaster risk reduction and resilience in the United Nations 2030 Agenda for Sustainable Development (UNORR 2015).

Climate Change Risks and Vulnerabilities and Responses

The impact of natural hazards and extreme weather on most vulnerable population has been noted for severity and prolonged impacts. Among others, Alibašić (2018a, b, c, d), Blaikie et al. (1994, 2014), Bullock et al. (2014), López-Marrero and Tschakert (2011), Luber et al. (2014), Nordgren et al. (2016), Smit and Pilifosova

(2003), The Task Force (2014), Wisner et al. (2004), Wamsler (2014), and Wisner et al. (2012) offered insights into the impact of natural hazards and extreme weather effects on the population in disaster-prone areas and the roles and responsibilities of local, state, and national governments in assessing and preparing to protect vulnerable population and infrastructure. The climate change exacerbated the effects and consequences of the flooding, sea level rise, wildfires, heat waves, and more intense and frequent hurricanes.

The case of the catastrophic impact of the hurricane Maria on Puerto Rico provided ample examples of the importance of planning for natural hazards and incorporating long-term preparedness and resilience strategies. The long-lasting impact on lives and infrastructure from the recent Hurricane Maria on the US island of Puerto Rico are significant while still being documented and analyzed (Zorrilla 2017). A further investigation into the precise social, economic, and environmental effects of the Hurricane Maria is warranted. Lessons from disasters such as Maria can serve to further climate readiness and preparedness plans in the future. For example, Guion et al. (2007) offer a social marketing approach to disaster preparedness and response lessons from Hurricane Katrina.

The threats and consequences from climate change impact are well recognized and documented (Fletcher 2013; IPCC 2014a, b; Karl et al. 2009; Mach et al. 2016; Malcolm et al. 2006; Pecl et al. 2017; Segan et al. 2015; Stott et al. 2016; Silva et al. 2013; Urban 2015; Visser et al. 2014). The risks of increased frequency and length of hurricanes are also being acknowledged (Mann et al. 2017). Moreover, Wuebbles et al. (2017) in the Fourth National Climate Assessment report for the US Global Change Research Program offered the conclusive evidence of climate change impact in the USA and the effect it has on people in all corners of the nation.

Hsiang et al. (2017) attempted to answer the fundamental question of the cost of climate change to the USA economy, and concluded “the bulk of the economic damage from climate change will be borne outside of the United States, and impacts outside the United States will have indirect effects on the United States” economy (p. 1369). In that sense, it is useful to compare and contrast various disaster threats and emergency preparedness responses between various regions and countries. Climate change will increase the pressure on economies globally (O’Brien and Leichenko 2000). NCEI’s 2018 report shows the extent of the economic impact from various natural disasters from 1980 to 2018 as of July 9, 2018, across the USA from events “with losses exceeding \$1 billion (CPI-Adjusted) each across the United States” (Fig. 7.1).

Finally, in addition to the damage from natural disasters such as hurricanes and flood, measuring in billions of dollars annually and human casualties, climate change will increase such predicaments. The annual damage indicated in the Hsiang et al. (2017), Fig. 7.2, is showing county-level median scenario for the predicted climate damage in the period 2080–2098; the economic impact of climate change will be significant in the state of Florida.

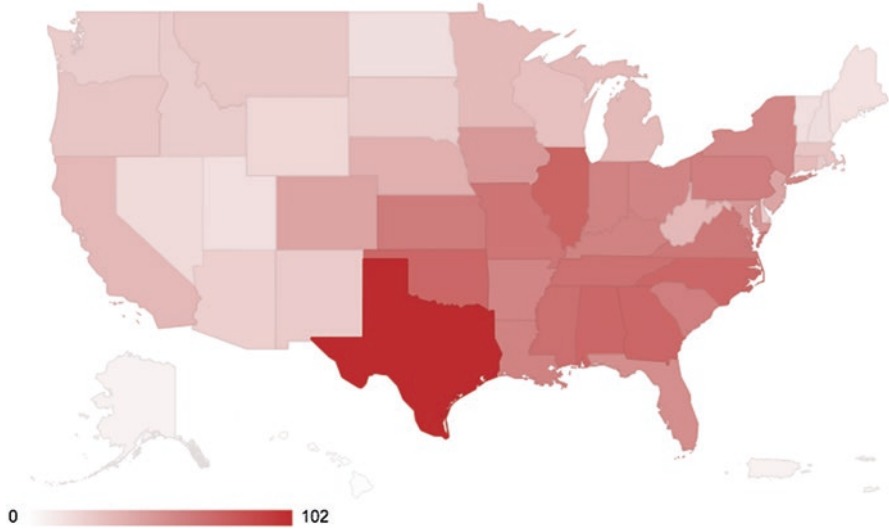


Fig. 7.1 NOAA National Centers for Environmental Information (NCEI) US Billion-Dollar weather and climate disasters state-by-state analysis for the 1980–2018 period as of July

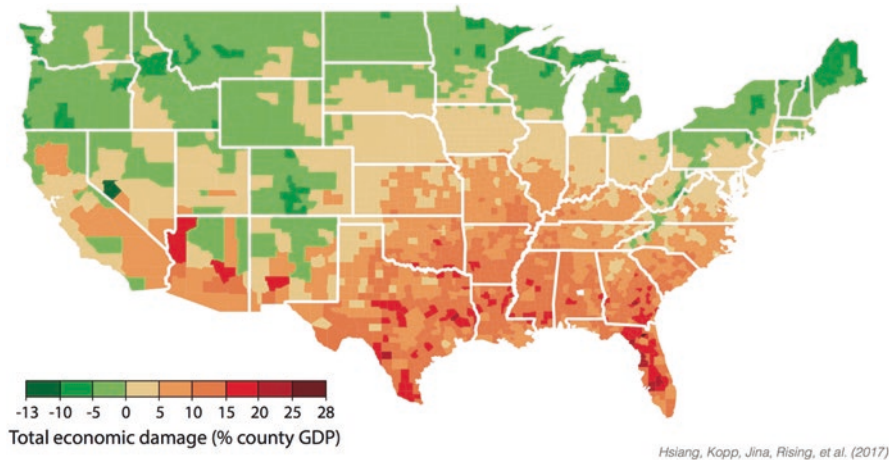


Fig. 7.2 County-level projected scenarios of climate change data for 2080–2098

Climate Readiness and Preparedness in Florida

The global risks with severe consequences of climate change are real and well documented. Reese (2017) provided an overview of the National Oceanic and Atmospheric Administration assessment of the risk to coastal communities such as

sea level rise. According to Bloetscher (2012) in Florida, the southeast Florida, the Florida Keys, and southwest Florida are the most vulnerable to the sea level rise in Florida. The potential scenarios for average global sea level rise include “low” (a rise of 0.3 m or about 1 foot) to “extreme” (2.5 m or about 8 feet) (Reese 2017, NOAA n.d.). The National Ocean Service (n.d.) of the National Oceanic and Atmospheric Administration warned of the increasing rates of the sea level rise. The NOAA’s Sea Level Rise Viewer is advantageous in assessing risks and vulnerabilities in the coastal area. Common consequences of the climate change can be summarized as coastal and beach erosion, sea level rise, and health and economic impact (Climate Central and ICF International 2015).

Under the editorial leadership of Chassignet et al. (2017), a group of authors published an extensive assessment of the climate change effects in Florida cities and recommendations for adaptation strategies. The impacts include land use, water resources, energy supply, infrastructure, human resources, and all sectors of the economy, environment, oceans, cities, and communities, human health, and governance. As noted by Bloetscher et al. (2017), “Climate change, especially sea level rise, will have adverse impacts on water, sewer, transportation and stormwater infrastructure, putting properties and the economic opportunities at “risk of failure of these systems” (p. 311).

Furthermore, the Bureau of Epidemiology’s report from 2015 pointed out the significant impacts on communities from deadly hurricanes and extreme weather with the highest number of casualties occurring from such events are in the State of Florida. The report points to prolonged risks to the most vulnerable population and the infrastructure. As noted in the Climate Central report and projections, many coastal cities face several risks associated with global warming, including sea level rise, multiplying extreme flood of uncertainty in the coastal regions (Strauss et al. 2014).

Since the creation and recommendations made by the White House State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience under President Obama, President Trump’s administration worked aggressively to reverse the gains in addressing climate change made under the previous administration. Without the national climate readiness and preparedness leadership, many states and local governments are left to their own devices to plan for the inevitable impacts of climate change on their communities.

For the past 8 years under the previous administration, the State of Florida government has abdicated its responsibility and efforts to confront the climate change. The Florida Center for Investigative Reporting documented the decision by the previous Governor’s administration not to allow the state of Florida employees to use climate change and global warming in reports and communication (FCIR 2015). Korten (2015) noted that Florida Department of Environmental Protection officials “...have been ordered not to use the term ‘climate change’ or ‘global warming’ in any official communications, emails, or reports, according to former DEP employees, consultants, volunteers and records obtained by the Florida Center for Investigative Reporting.” The effect of such blatant disregard for scientific facts is that the state of Florida has not made the necessary investments to prepare the coastal regions for the impacts of climate change (Dennis and Fears 2017; Caputo

2017). Most climate readiness and resilience efforts are fragmented, and the majority of the burden of facing the impacts of climate change is passed onto the local and county governments. Some examples of successful regional climate preparedness planning include the efforts underway in the counties of Broward, Miami-Dade, Monroe, and Palm Beach Counties (Southeast Florida Regional Climate Change Compact Counties 2012; Broward County 2015, 2017). The fragmentation of planning leads to less desirable consequences of exhausting local funds for plans and investments beyond the necessary service provisions of public safety and infrastructure as perceived by the local government constituents. In particular, Torres et al. (2018) offered the insight into perspectives on climate change adaptation capacity from Broward County, Florida. Similarly, Patterson et al. (2017) compared the Broward County's adaptation activities to the ones in the UK and Brazil. Other exemplary planning activities are taking place in places from Miami-Dade County to Satellite Beach to Sarasota.

Finally, in areas most prone to the devastating impacts of the hurricane and other natural disasters, and impending sea level rise such as Pensacola and other parts of North West Florida, there is no regional or local plans to prepare and ready the community for climate change. This lack of planning is a direct consequence of the lack of leadership. Only recently the city council of the City of Pensacola appointed the Task Force on Climate Adaptation and Mitigation to make recommendations to the council on climate preparedness and readiness. However, the work of the Task Force was not endorsed or supported by the Mayor of the City. As noted by Alibašić (2018b), "Chief features of climate change actions at the local governments' level are the cities' ability to prepare their respective communities to be more agile and adaptive to extreme weather events and disasters, with 'resilience efforts [that] are flexible' and strong leadership commitment" (p. 4).

Cuba and Caribbean Regional Disaster Assessment

The natural hazards and vulnerabilities to extreme weather in coastal Cuba are examined in depth. With their research findings, Alonso and Clark (2015), Carter et al. (2014), Fernández and Pérez (2009), Pichler and Striesnig (2013), Kelman (2017), Lizarralde et al. (2015), López-Marrero and Wisner (2012), and Sims and Vogelmann (2002) deliver an improved understanding of the practical and policy implications surrounding climate preparedness and responsiveness to the climate threats in the coastal communities in Cuba and the broader context of Caribbean region. Figure 7.3 from the Centre for Research on the Epidemiology of Disasters (2018) represents a broad spectrum of natural disasters and the number of population affected by those. Figure 7.4 shows the total damage from storms from 1990 to 2018.

The threats and damage from natural disasters will further intensify in intensity due to climate change. Alonso and Clark (2015) pointed out that "for a small island nation such as Cuba, it is particularly important to identify as precisely as possible the most probable impacts of climate change, and thus determine scientifically-

CUB_Natural_1900_2018_total_affected

Disaster No	Type	Date	Total affected
2017-0381	Storm	08-09-2017	10000000
2001-0612	Storm	04-11-2001	5000012
2005-0351	Storm	08-07-2005	2500000
1998-9210	Drought	00-01-1998	820000
1993-0063	Flood	24-11-1993	532000
1985-0134	Storm	18-11-1985	468891
2008-0352	Storm	29-08-2008	450019
1996-0231	Storm	17-10-1996	336676
2002-0636	Storm	01-10-2002	281470
1999-0400	Storm	14-10-1999	254900
Created on: July 18, 2018			
Source: EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be , Brussels, Belgium			

Fig. 7.3 Total affected population by natural disasters in Cuba from 1900 to 2018

CUB_Natural_1900_2018_total_dam

Disaster No	Type	Date	Total damage (1000 US\$)
2017-0381	Storm	08-09-2017	13200000
2016-0355	Storm	28-09-2016	2600000
2008-0352	Storm	29-08-2008	2072000
1998-0381	Storm	22-09-1998	2000000
2008-0384	Storm	08-09-2008	1500000
2005-0351	Storm	08-07-2005	1400000
1993-0012	Storm	13-03-1993	1000000
2004-0415	Storm	14-08-2004	1000000
2005-0585	Storm	19-10-2005	700000
1963-0030	Storm	04-10-1963	500000
Created on: July 18, 2018			
Source: EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be , Brussels, Belgium			

Fig. 7.4 Total damage from natural disasters from 1900 to 2018

based actions to prevent or reduce their adverse consequences and formulate the necessary adaptive measures.”

Unlike the US political system, Cuba is defined and controlled by a single-party system and is one of the very few remaining communist countries in the world. The planning, including economy, emergency preparedness, and disaster response, is centralized. All climate readiness and preparedness actions are initiated and conducted with tacit approval from the party in power.

The United Nations Development Programme (UNDP) suggests that Cuba serves as the model for readiness and preparedness in a resilient Caribbean region. While the emphasis of this chapter is on Cuba, it is noteworthy a body of research focusing on other parts of the Caribbean region. The studies produced by Gamble (2014), Lam et al. (2014), Pichs-Madruga (2017), Taylor et al. (2012), and Tompkins (2005) offer a comprehensive examination of the state of the climate preparedness and readiness in the Caribbean islands beyond Cuba.

Conclusion

Regional and local governments have a role and responsibility to the residents and business, to confront the challenges and the threats of the changing climate and natural hazard. As a result of several direct and indirect factors, including but not limited to the economic and social factors, in Florida local governments and regional planning agencies deploy programs and policies to mitigate and adapt to the climate change. The more centralized planning role in Cuba indicates less flexibility on the part of planning agencies to adopt certain types of climate adaptation or mitigation measures. The range of climate resilience and readiness planning is evolving in nature, reflecting the changes in circumstances. Beyond the ethical responsibilities in alleviating the risks of climate change and reducing the negative environmental impacts, administrators and planners utilize climate preparedness and readiness to predict and void potential costly infrastructure and casualties (Alibašić 2018f, g).

The politics of climate change are on full display in the USA. Counterintuitively, on one hand, there is a democratically elected governor in the state of Florida who for political and dialogical reasons forbids the use of phrase climate change by state employees and hinders attempts to prepare and plan for climate change. On the other hand, there is an repressive, one-party system which openly promotes and supports climate readiness efforts, or at least it is not deliberately sabotaging them for ideological and political purposes.

Furthermore, in comparing the fragmented and localized approaches to climate preparedness and readiness in Florida to those of more centralized in Cuba respectively, the authors were able to discern the established patterns of confronting climate change:

- Recognizing the threats are tangible, and why and how these specific pressures need to be addressed.
- Examining, analyzing, and determining the localized data related to climate change threats and impacts.
- Building adaptive and mitigating frameworks for addressing climate change at all levels of government.
- Engaging, relevant stakeholders at local, regional, state, and national levels in both the public and the private sector.

The imperative for climate preparedness and resilience stems from devastating effects the climate change has on coastal cities and regions. The lack of adequate and urgent readiness and climate preparedness planning will lead to devastating consequences for communities around the world. Despite the difference in approaches, communities and local governments on the ground are the most effective when there is strong and unequivocal support from all levels of government including state and national administrators and elected officials.

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