

DISASTER RISK REDUCTION IN ANTIGUA AND BARBUDA

SITUATIONAL ANALYSIS
2022



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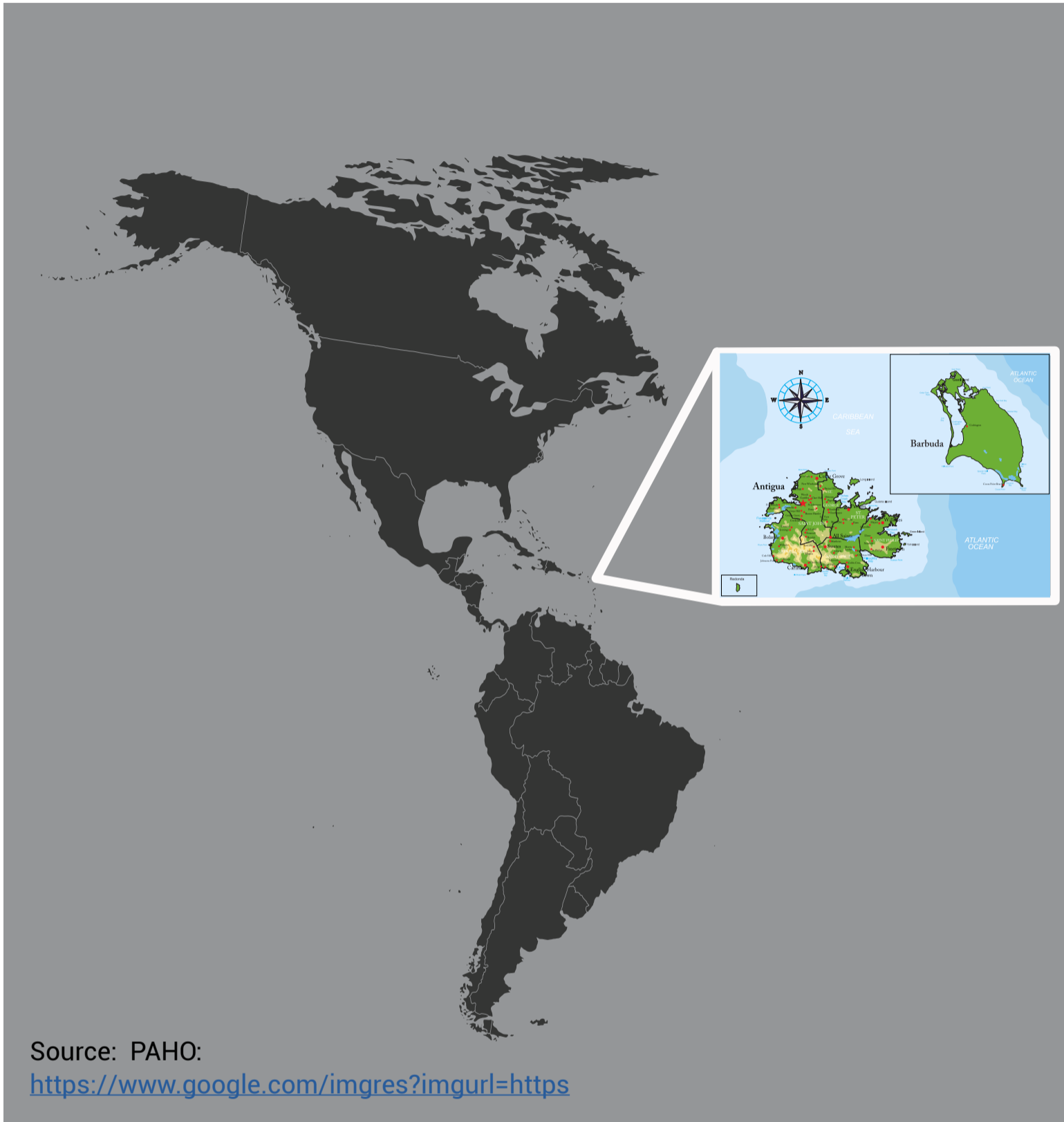
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List of Acronyms

CARICOM	Caribbean Community
CARPHA	Caribbean Public Health Agency
CCRIF SPC	Caribbean Catastrophe and Risk Insurance Facility Segregated Portfolio Company
CDEMA	Caribbean Disaster Emergency Management Agency
CDM	Comprehensive Disaster Management
CSSI	Caribbean Safe Schools Initiative
CWP	Country Work Programme
ECHO	European Commission's Humanitarian Aid Office.
ECLAC	Economic Commission for Latin America and the Caribbean
GIS	Geographic Information System
ICT	Information Communication Technology
IDB	Inter-American Development Bank
IFRC	International Federation of Red Cross and Red Crescent Societies
INDC	Intended Nationally Determined Contribution
NDC	Nationally Determined Contribution
NDPRAC	National Disaster Preparedness and Response Committee
NEOC	National Emergency Operations Centre
NODS	National Office for Disaster Services
OAS	Organization of American States
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
OECS	Organisation of Eastern Caribbean States
OFDA	Office of U.S. Foreign Disaster Assistance
PAHO	Pan American Health Organization
POPs	Persistent Organic Pollutants
SAMOA	Small Island Developing States Accelerated Modalities of Action
SDGs	Sustainable Development Goals
SFDRR	Sendai Framework for Disaster Risk Reduction
SFM	Sendai Framework Monitor
SIDS	Small Island Developing State
SIRMZP	Sustainable Island Resource Management Zoning Plan
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children's Emergency Fund

Antigua and Barbuda at a Glance



Location	17.4°N 61.5°W
Land Mass	440 km ²
Climate	Tropical Maritime
Population	85,567 (2011)
Languages	English (official)
Human Development Index	0.778 Rank 78 (2019)
Gender Inequality Index	No Data
Global Health Security Index	29 Rank 147 (2019)
Climate Risk Index	118 (2019)

Executive Summary

The COVID-19 pandemic has demonstrated the complex nature of risk, serving as a reminder for deliberate efforts to reduce disaster risk within an interconnected environment. As the world embarks on a path to recovery, national and global leaders must now rethink the concept of risk in support of a systemic approach. In 2015, United Nations member states adopted the Sendai Framework for Disaster Risk Reduction. Priority 1 of the Sendai Framework is premised on understanding disaster risk, recognising that appropriate policy, action and planning require adequate and comprehensive knowledge on disaster risk. The current pandemic has served a clarion call at the global, national and local levels to widen the understanding of risk, acknowledging that policies must transition from select and limited hazards to a multi-hazard, interconnected planning environment.

The Sendai Framework establishes seven targets to be achieved in support of resilience. Target E of the Framework aims to substantially increase the number of countries with disaster risk reduction strategies. These strategies are pivotal instruments within the national governance mechanism that outline a roadmap for reducing disaster risk and are even more critical now as countries continue on their recovery paths from the pandemic. These strategies, as well as sectoral policies, plans and strategies must be informed by country-specific evidence and risk contexts in support of systemic risk governance and the 2030 Agenda. This study seeks to inform the development and revisions of critical national instruments including the Country Work Programme, National Adaptation Plan, National Development Strategy, sectoral policies, strategies and plans, and other supporting national instruments for implementation of the 2030 Agenda. This report presents the risk profile for Antigua and Barbuda, exploring hazards, vulnerabilities, exposures and capacities. The review and recommendations will therefore be of particular interest to the stakeholders at the national, subnational, regional and global levels, including state and sectoral entities, private sector organisations, academia, donor agencies, civil society organisations, and other stakeholders interested in understanding the risk environment for Antigua and Barbuda in support of targeted interventions. The issues, needs and gaps within

the national framework for disaster risk reduction have informed the recommendations about the priority areas for intervention. The findings of this report should be deliberated through stakeholder consultations to agree upon interventions and further elaborate the activities, timeframes, budgets and indicators for implementation of activities in support of the outcomes.

Antigua and Barbuda's location, topography, climatic features, development practices and anthropogenic activities render the islands susceptible to a range of hazards that result in losses and consequently hinder the country's path to sustainable growth and development. As with many similar Small Island Developing States (SIDS) within the Caribbean, Antigua and Barbuda's most common hazards occurrences are tropical cyclones, floods and droughts. These hazards when realised, result in significant societal, economic, and environmental losses. The country is also faced with the underlying threat of climate change and its cascading impacts across varying sectors, which in turn stymie development goals. Consequently, deliberate efforts are required to reduce disaster risk, and mitigate against and adapt to climate change. This joint agenda in support of sustainable development demands coherence across policies to maximise resources and ensure shared ownership across stakeholders.

Antigua and Barbuda has undertaken crucial activities to strengthen its disaster risk environment. Apart from being a signatory to international and regional agreements that support disaster risk reduction, Antigua and Barbuda has developed its enabling legislation through the Disaster Management Act (2002) and established the National Office for Disaster Services as the competent authority for disaster risk management, that forms part of its wider institutional framework. Additionally, several projects have been implemented over the years through partnerships with national, regional and international agencies to reduce disaster risk. While a long-term development plan has not been produced, the country's previous Medium Term Development Strategy (2016-2020) provides a strong indication of the country's commitment to addressing gaps within its disaster risk management arena.

Notwithstanding progress to date, this study reveals that there are additional areas for strengthening within the national context for disaster risk reduction in support of sustainable development. These include: investment in disaster risk management; designated and delineated responsibilities; data availability for risk-informed planning; recovery planning with the aim of “building back better”; community planning and sectoral mainstreaming. These gaps, among others, have informed the recommendation of the potential priority areas for action in support of resilience and systemic risk governance.

Disasters result in death, injury, exacerbated vulnerabilities such as poverty and marginalisation, psychological stress, and ultimately disrupted societies. Disasters expose social vulnerabilities but also, widen these gaps in the absence of strong institutional mechanisms that support “building back better”. The human and social impacts of disasters are especially significant in developing countries such as SIDS due to elements of exposure, limited economic capacities and varying physical, social and economic vulnerabilities. Susceptible to its fair share of disasters to date, Antigua and Barbuda has grappled with the social impacts of disasters. The ongoing COVID-19 pandemic is a pertinent example of the complex nature of the impacts of disasters. As at April 04, 2022, Antigua and Barbuda had recorded a total of 7,493 confirmed cases of the virus and 135 deaths. Though this may appear insignificant, for small countries such as Antigua and Barbuda, with a population of less than 100,000, these losses are considerable. Moreover, with the pandemic’s impact on travel and tourism, the economic impacts have resulted in knock-on societal impacts.

Historical events also signify the need for considered planning to reduce the social impacts of disasters. Between 1874 and 1949, 14 lives were lost due to drought. In 1991, Antigua experienced a major fire, known as “The King Obstinate Fire” where several homes were destroyed and a pregnant woman was burnt to death. In 1995, Hurricane Luis resulted in two deaths, over 11,000 persons displaced and over 6,000 homes destroyed or damaged. The hurricane wreaked havoc on the country’s health sector, where the main hospitals and six health facilities were

directly destroyed or damaged. Water supply and healthcare access were disrupted for several weeks. Not long after in 1998, Hurricane Georges made landfall as a Category 2 system bringing widespread loss which saw over 200 persons injured, over 3400 persons displaced and over 4,400 homes destroyed or damaged. In 2017, one of the Atlantic’s strongest and most destructive storms, Hurricane Irma made landfall on September 06 as a Category 5 system. The hurricane destroyed approximately 95% of both public and private properties. Days later, Barbuda was impacted by Hurricane Jose, and then Hurricane Maria impacted the country a mere two weeks later. Preparations for Hurricane Jose resulted in all residents of Barbuda being evacuated to shelters in Antigua.

These losses demonstrate the multiplicity of the hazard context of Antigua and Barbuda but more so, highlight the significant social impacts that are brought on by disasters. Important to note is the potential for disasters to exacerbate underlying social vulnerabilities. The COVID-19 pandemic and its cascading impacts on varying areas of society demonstrates this relationship. A report on the impact of COVID-19 in 2020 estimated that poverty levels in Antigua and Barbuda would have increased to 23.7 % from pre-pandemic levels of 3.7% (in 2008/2009). Poverty interplays with varying areas of risk, contributing to social and physical vulnerability. The mental health impacts of disasters must not be forgotten. Post-traumatic stress disorder, emotional instability, stress, anxiety and substance abuse are common occurrences post-disaster. While some persons eventually recover, recovery of mental health is not always achieved.

Priority Areas for Action

Outcome 1-Strengthened institutional arrangements for disaster risk reduction.

Outputs:

- 1.1 Enhanced legislation and delineation of roles for disaster risk reduction mainstreaming.
- 1.2 Increased investment in NODS.
- 1.3 Strengthened institutional arrangements for local involvement in disaster risk reduction.
- 1.4 Building codes and regulations enforced for disaster risk reduction.
- 1.5 Risk incentives for mitigation instituted.
- 1.6 Strengthened policy coherence in support of the joint agenda.
- 1.7 Strengthened arrangements for integration of private sector in disaster risk reduction activities.
- 1.8 Dedicated disaster fund instituted.
- 1.9 Enhanced arrangements for the institutionalisation of household and individual risk transfer mechanisms.

Outcome 2-Enhanced disaster risk reduction planning for effective response, recovery and rehabilitation.

Outputs:

- 2.1 Recovery policy developed and implemented.
- 2.2 Enhanced Multi-Hazard Early Warning System.
- 2.3 Enhanced preparedness for biological hazards.
- 2.4 Strengthened planning for business continuity across key sectors and state institutions.
- 2.5 Improved arrangements for the protection of critical infrastructure.

Outcome 3- Increased and sustained knowledge for disaster risk reduction.

Outputs:

- 3.1 National comprehensive risk repository established for evidence-based action.
- 3.2 National public awareness strategy developed and implemented.
- 3.3 Improved data collection, disaggregated by variables for risk-informed planning.
- 3.4 Enhanced application of GIS for risk mapping and modelling.

Outcome 4-Enhanced arrangements for disaster risk reduction mainstreaming across sectors.

Outputs:

- 4.1 Strengthened sectoral policies with considerations for disaster risk reduction and all phases of disaster management.
- 4.2 Increased investment in sectors for disaster risk reduction activities.

Outcome 5-Strengthened community resilience.

Outputs:

- 5.1 Enhanced planning for vulnerable groups in disaster risk reduction activities.
- 5.2 Improved community engagement and involvement.
- 5.3 Strengthened training and testing regime at the community level.
- 5.4 Enhanced arrangements to address the underlying drivers that contribute to social vulnerability at the community level.

1. Introduction

It has long been recognised that disaster risk reduction is necessary to safeguard lives, physical assets, environmental resources and economies. Over the years, global strategies have evolved, calling for coherence in support of sustainable development and recognising the importance of climate change considerations and disaster risk reduction within the development arena. In 2015, countries adopted the Sendai Framework for Disaster Risk Reduction, serving as a call to action for countries to take urgent action to address disaster risk reduction in support of resilience and steering the path to sustainable development. Target “E-1” of the targets established by the Framework, establishes the need for a substantial increase in the number of countries that adopt and implement national disaster risk reduction strategies. Disaster risk reduction strategies, or Country Work Programmes under the Caribbean Disaster Emergency Management Agency (CDEMA) arrangement, establishes a country’s roadmap to disaster risk reduction for a three to five year period. This study seeks to inform the development and revisions of the Country Work Programme for Antigua and Barbuda, as well as the design and revisions of other critical national instruments including the National Adaptation Plan, National Development Strategy, sectoral policies, strategies and plans, and other supporting national instruments for implementation of the 2030 Agenda.

The report serves as a compendium of risk information for Antigua and Barbuda, establishing the country risk profile, analysing the hazard context, existing vulnerabilities, capacities and gaps to determine the priority areas for action and interventions in support of systemic risk governance. The review and recommendations will therefore be of particular interest to the stakeholders at the national, subnational, regional and global levels, including state and sectoral entities, private sector organisations, academia, donor agencies, civil society organisations, and other stakeholders interested in understanding the risk environment for Antigua and Barbuda in support of targeted interventions. The findings of this report should be deliberated through stakeholder consultations to agree upon interventions and further elaborate the activities, timeframes, budgets and indicators for implementation of activities in support of the outcomes.

1.1 Human and Social Impacts of Disasters

Disasters result in death, injury, exacerbated vulnerabilities such as poverty and marginalisation, psychological stress, and ultimately disrupted societies. Disasters expose social vulnerabilities but also, widen these gaps in the absence of strong institutional mechanisms that support “building back better”. The human and social impacts of disasters are especially significant in developing countries such as SIDS due to elements of exposure, limited economic capacities and varying physical, social and economic vulnerabilities¹. Susceptible to its fair share of disasters to date, Antigua and Barbuda has grappled with the social impacts of disasters. The ongoing COVID-19 pandemic is a pertinent example of the complex nature of the impacts of disasters. As at April 04, 2022, Antigua and Barbuda had recorded a total of 7,493 confirmed cases of the virus and 135 deaths². Though this may appear insignificant, for small countries such as Antigua and Barbuda, with a population of less than 100,000, these losses are considerable. Moreover, with the pandemic’s impact on travel and tourism, the economic impacts has resulted in knock-on societal impacts.

Historical events also signify the need for considered planning to reduce the social impacts of disasters. Between 1874 and 1949, 14 lives were lost due to drought. In 1991, Antigua experienced a major fire, known as “The King Obstinate Fire” where several homes were destroyed and a pregnant woman was burnt to death³. In 1995, Hurricane Luis resulted in two deaths, over 11,000 persons displaced and over 6,000 homes destroyed or damaged⁴. The hurricane wreaked havoc on the country’s health sector, where the main hospitals and six health facilities were directly destroyed or damaged⁵. Water supply and healthcare access were disrupted for several weeks. Not long after in 1998, Hurricane Georges made landfall as a Category 2 system bringing widespread loss which saw over 200 persons injured, over 3400 persons displaced and over 4,400 homes destroyed

- 1 Wallemacq, P and House, R. 2018. Economic losses, poverty & disasters: 1998-2017. United Nations Office for Disaster Risk Reduction, Centre for Research on the Epidemiology of Disasters. https://www.preventionweb.net/files/61119_credeconomiclosses.pdf
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- 5 Gibbs, T and D van Alphen. 1996. Impact of Hurricane Luis on the health services of Antigua and Barbuda. World Health Statistics quarterly. Rapport Trimestriel de Statistiques Sanitaires Mondiales. 49(3-4):200-203.

or damaged⁶. In 2017, one of the Atlantic's strongest and most destructive storms, Hurricane Irma made landfall on September 06 as a Category 5 system. The hurricane destroyed approximately 95% of both public and private properties. Days later, Barbuda was impacted by Hurricane Jose, and then Hurricane Maria impacted the country a mere two weeks later. Preparations for Hurricane Jose resulted in all residents of Barbuda being evacuated to shelters in Antigua⁷.

These losses demonstrate the multiplicity of the hazard context of Antigua and Barbuda but more so, highlight the significant social impacts that are brought on by disasters. Important to note is the potential for disasters to exacerbate underlying social vulnerabilities. The COVID-19 pandemic and its cascading impacts on varying areas of society demonstrates this relationship. A report on the impact of COVID-19 in 2020 estimated that poverty levels in Antigua and Barbuda would have increased to 23.7 % from pre-pandemic levels of 3.7% (in 2008/2009)⁸. Poverty interplays with varying areas of risk, contributing to social and physical vulnerability. The mental health impacts of disasters must not be forgotten. Post-traumatic stress disorder, emotional instability, stress, anxiety and substance abuse are common occurrences post-disaster. While some persons eventually recover, recovery of mental health is not always achieved⁹.

1.2 Economic Impact of Disasters in the Country

Disasters disrupt economies. While historical trends have pointed to significant human and social impacts of disasters, recent trends are indicative of the catastrophic economic impacts of disasters. A 2018 study on the economic losses of disasters¹⁰ found that between 1998 to 2017, "*Hurricanes that swept through the Caribbean and made landfall on the Americas caused the greatest economic losses of all climate-related disasters both in absolute terms, and as a percentage of Gross Domestic*

Product." These findings reinforce the vulnerability of Caribbean territories to the crippling economic impacts of disasters, that ultimately hinder development progress. Economies of SIDS are often open and susceptible to exogenous shocks. This is especially the case for undiversified economies that are heavily reliant on vulnerable sectors such as tourism as in the case of Antigua and Barbuda.

Tourism is the mainstay of the country's economy, contributing 58.3% to Gross Domestic Product (GDP) in 2014, with a then projected increase of 64.1% in 2025¹¹. Apart from tourism, construction is the only other major contributing sector to GDP. In 2018, the country recorded economic growth due to increased earnings from the tourism and construction sectors¹². Despite this, economic growth has been described as "volatile" due to the country's susceptibility to exogenous shocks, narrow resource base and high dependence on foreign markets¹³. Between 2008 and 2009, the economy contracted severely resulting in one of its worst recessions, due to its dependency on and its susceptibility to the global financial market. This is even more prevalent today amidst the COVID-19 pandemic that has presented an equally challenging economic crisis, as it has a public health one. An early study of Caribbean economies and COVID-19, postulated that Antigua and Barbuda's economy would have contracted by 13.8% by the end of 2020 and that unemployment rates would have increased significantly¹⁴.

Historical occurrences have also resulted in significant economic losses. Between 1989 and 1999, tropical cyclones have been estimated to result in direct impacts amounting to USD 73.6 million. Following Hurricanes Irma and Maria in 2017, economic impacts were devastating. The Global Facility for Disaster Risk Reduction estimated significant losses arising from the catastrophic events (Figure 1), acknowledging that the tourism sector accounted for 44% of the total damage cost of physical assets, followed by housing at 37%¹⁵.

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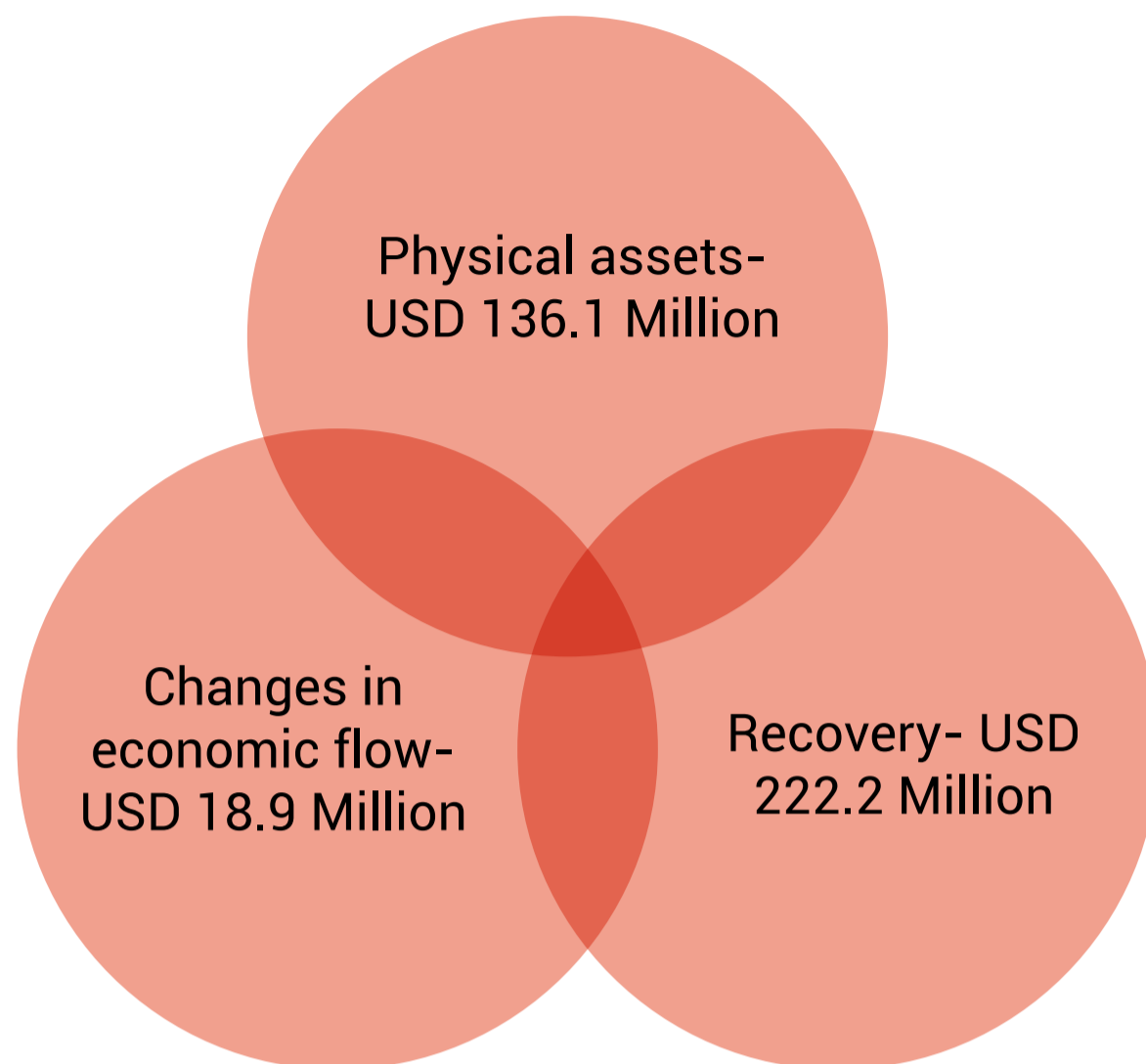


Figure 1: Economic Impacts of Hurricanes Irma and Maria on Antigua and Barbuda

1.3 Social Demographic Characteristics

The latest census report for Antigua and Barbuda showed that in 2011, the recorded a population of 85,567, 1634 of which reside in Barbuda¹⁶. Of the 2011 population, 44,518 were women and 40,896 were men, showing a slightly lower ratio of women. At this time, 6571 of the population were over the age of 60 (just under 8%) and 13,104 persons were below age 15 years, i.e. 24.3% of the population. Life expectancy in 2011 was recorded at 73.8 and 80.4 years for men and women respectively, an increase from 2001 (71.5 years for men and 78.2 for women) thereby suggesting progress in expanding the life expectancy rates. Migration is a growing feature of the country's population, with 30% of the country's population in 2011 being foreign-born. The country's population is predominantly African in origin (87.3% in 2011), with the second largest ethnicity being those that identify as mixed, comprising 3.8% of the population at the time. There is also a small indigenous population and several other ethnicities that constitute the population ethnic makeup. More

recent data from the World Bank indicate that the 2020 population stood at 97,928 of which 48.3% are male and 51.7% is female¹⁷.

The largest concentration of the population reside around the city. The 2011 census revealed an interesting trend of a decreasing population within the country's city centre of Saint John's, though with population increases around the city in Saint John's Rural. Poverty remains one of the underlying development challenges faces the country. In 2005/2006, the poverty headcount index showed that 18.35 of population were considered to be below the poverty line¹⁸. Recent studies suggest that poverty levels in the country would have increased to 23.7% due to COVID-19¹⁹. In 2019, Antigua and Barbuda's Human Development Index (HDI) was recorded at 0.778 (high), placing the country at a rank of 78 out of 189 countries. This value is above the average of 0.753 for countries in the high human development group and below the average of 0.766 for countries in Latin America and the Caribbean. Due to data unavailability, there is no Gender Development Index value for Antigua and Barbuda.

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19 USAID, UNICEF. 2020. The socio-economic impact of COVID-19 on children and young people in the Eastern Caribbean Area. <https://www.unicef.org/easterncaribbean/media/2311/file/The%20socio-economic%20impact.pdf>

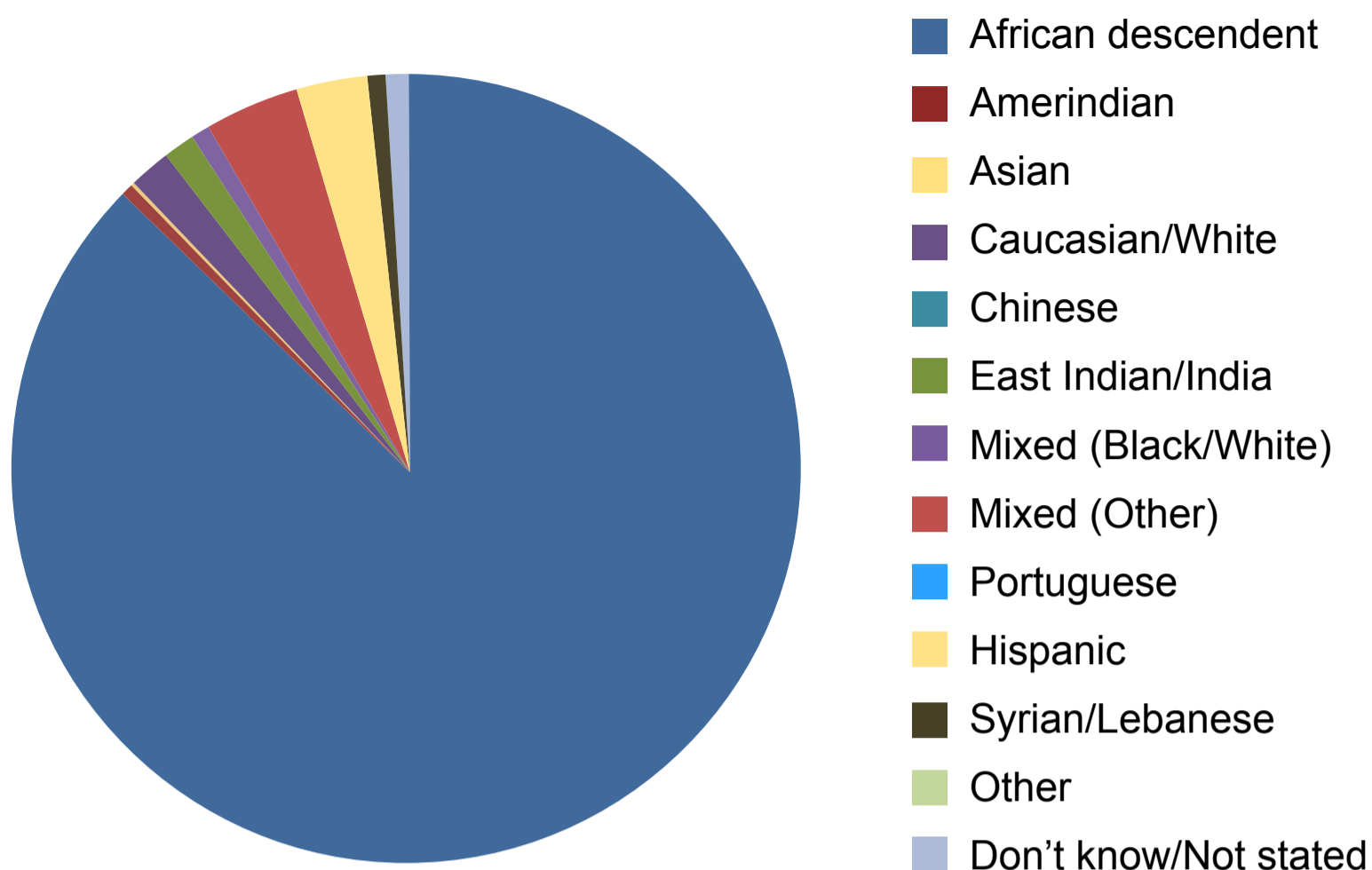


Figure 2: Population by ethnicity in 2011²⁰

1.4 Natural and Landscape Characteristics

The country of Antigua and Barbuda is made up of three main islands: Antigua, Barbuda and Redonda (uninhabited). Antigua is located at 17.1°N, 61.5°W and Barbuda is found at 17.4°N, 61.1°W, 54 kilometres north of Antigua, between the Caribbean Sea and the Atlantic Ocean. Antigua is the larger of the two islands, spanning 280 square kilometres, while Barbuda is a land mass of 141 square kilometres²¹. Antigua is relatively flat, though is home to the country's highest point- Boggy Peak- located in the southwestern area of the island, that has an elevation of 402 metres (1319 feet)²². Barbuda is relevantly flat with low-lying hills of elevations not exceeding 40 metres (131 feet). The country has a vast watershed network, comprising 68 watersheds (of which six are major) in Antigua and 10 watersheds in Barbuda²³.

Antigua and Barbuda enjoys a relatively arid tropical maritime climate, influenced by its location and the effects of the easterly trade winds. Two seasons dominate the climate based on precipitation patterns: a dry season that spans January to June annually and a wet season from July to December. The dry season is marked by low precipitation whereas the wet season sees significant rainfall. The wet season coincides with the Atlantic Hurricane season from June to November annually, which increases the risk of tropical cyclone impact to the islands. Antigua and Barbuda is recognised as having lower rainfall amounts than its neighbouring Caribbean countries, with severe droughts occurring every 5-10 years. There is little variation in daily seasonal temperatures. Monthly temperatures can range from 23.9° Celsius to 29.6 °Celsius²⁴. Climate projections indicate an increase in daily and mean annual temperatures, including temperature extremes, decreased annual rainfall and increased intensity of tropical cyclones²⁵.

20 Government of Antigua and Barbuda. 2017. 2011 Population and Housing Census. <https://statistics.gov.ag/wp-content/uploads/2017/11/2011-Antigua-and-Barbuda-Population-and-Housing-Census-A-Demographic-Profile.pdf>

21 Government of Antigua and Barbuda. 2020. Antigua and Barbuda's First Biennial Update Report. Ministry of Health, Wellness and the Environment. <https://unfccc.int/sites/default/files/resource/Antigua%20and%20Barbuda%20-%20UNFCCC%20Biennial%20Update%20Report%201%20-%20Final.pdf>

22 Government of Antigua and Barbuda. 2020. Antigua and Barbuda's First Biennial Update Report. Ministry of Health, Wellness and the Environment. <https://unfccc.int/sites/default/files/resource/Antigua%20and%20Barbuda%20-%20UNFCCC%20Biennial%20Update%20Report%201%20-%20Final.pdf>

23 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

24 Government of Antigua and Barbuda. 2020. Antigua and Barbuda's First Biennial Update Report. Ministry of Health, Wellness and the Environment. <https://unfccc.int/sites/default/files/resource/Antigua%20and%20Barbuda%20-%20UNFCCC%20Biennial%20Update%20Report%201%20-%20Final.pdf>

25 Government of Antigua and Barbuda. 2015. Intended Nationally Determined Contribution.



Figure 3: Physical Map of Antigua and Barbuda²⁶

26 Source: <https://www.ezilon.com/maps/north-america/antigua-and-barbuda-physical-maps.html>

2. Disaster Risk Profile

The Inform Risk Index examines three dimensions of risk: hazard and exposure, vulnerability and lack of coping capacity. The Index ranks Antigua and Barbuda as 147 out of 191 countries and an overall risk category of low²⁷ (2.2) in 2021²⁸. The Hazard and Exposure dimension assesses elements of natural and anthropogenic hazards and gives a score of 1.5 out of 10 (i.e. very low). The Vulnerability dimension considers a country's economic, political and social characteristics that can be destabilised in the event of a hazard occurrence and gives a score of 2.1 (low) for Antigua and Barbuda. Lack of coping capacity which exacerbates vulnerability, assesses the governance arrangements that aid in reducing disaster risk, producing a value of 3.5 (low) for the twin-island state. Despite these apparent low values, caution should be exercised in underestimating the nature of risk and the detrimental impacts hazards can have on the country. The ongoing COVID-19 pandemic as well as the 2017 hurricanes (Irma and Maria) serve as a staunch reminder of the devastating impacts of hazards on the country. This section presents the risk component analysis for Antigua and Barbuda. Supporting evidence is compiled in a risk component catalog in Appendix I.

2.1 Hazards

Antigua and Barbuda's location, topography, climatic features, development practices and anthropogenic activities render the islands susceptible to a range of hazards that result in losses and consequently hinder the country's path to sustainable development. As with many similar SIDS within the Caribbean, Antigua and Barbuda's most common hazards occurrences are tropical cyclones, floods and droughts. These hazards, while deserving prioritisation, must not be the only hazards considered in the disasters risk planning landscape. Furthermore, climate change has the potential to create new and augment existing risks, therefore, country risk assessments must continuously evolve to keep abreast with the changing nature of risks. The following paragraphs present the hazard profile for Antigua and Barbuda, with specific reference to eight hazard clusters as presented by the United Nations Hazard Definition and Classification Review Technical Report²⁹.

Hydrometeorological hazards dominate the country hazard landscape. One of the most recent and prevalent disasters to have affected the country was the compounding effect of Hurricanes Irma and Maria in 2017. Due to the small landmass of the islands, one storm can directly affect the entire population, resulting in major flooding, storm surge and strong winds and widespread devastation. In September 2017, Hurricane Irma made landfall as a Category 5 system wreaking havoc across many Caribbean islands, including Antigua and Barbuda. Essential services such as healthcare, electricity, water, sewage and waste systems were significantly disrupted. Livelihoods were uprooted. For Barbuda in particular, the hurricane destroyed approximately 90% of the island's infrastructure resulting in it being deemed uninhabitable for its population of over 1600 persons³⁰. In the country's First Biennial Update Report to United Nations Framework Convention on Climate Change (UNFCCC), the risk of hurricanes and the compounding impact of climate change on these tropical systems were emphasized, highlighting that between 1851-2011, the country has been impacted by 93 tropical storms, 44 of which were hurricanes³¹. The Report further determined that hurricanes often result in total loss of GDP.

Drought is a well-recognised hazard in the national risk planning landscape. The 2015 Nationally Determined Contribution reiterates that the country is vulnerable to water shortages as a result of droughts which tend to occur every 5-10 years. With climate change expected to reduce annual rainfall by 30%-50% by 2090 to an already water-scarce country, coupled with increased temperatures, and with sea level rise expected to increase salt water intrusion and contamination of freshwater supplies, the risk of drought for the islands is of grave concern³². Between 1928 and 2007, 24 drought episodes were recorded for the islands³³. Between 2014 and 2015, the country suffered a significant drought that affected utilities nationwide. A drought occurrence

27 Inform Risk Index Values: 0 –2: Very Low 2.1-3.5: Low 3.6-5: Medium 5.1-6.5: High 6.6-10: Very High

28 Inform Index for Risk Management. 2021.

29 United Nations Office for Disaster Risk Reduction. 2020. Hazard Definition & Classification Review Technical Report.

30 O'Malley, Stephen. 2017. Resident / Humanitarian Coordinator Report on the Use of Cerf Funds Antigua and Barbuda Rapid Response Storm (Hurricane, Cyclone, Etc.). Central Emergency Response Fund. https://cerf.un.org/sites/default/files/resources/17-RR-ATG-27500-NR01_Antigua%20and%20Barbuda_RCHC.Report.pdf

31 Government of Antigua and Barbuda. 2020. Antigua and Barbuda's First Biennial Update Report. <https://unfccc.int/sites/default/files/resource/Antigua%20and%20Barbuda%20-%20UNFCCC%20Biennial%20Update%20Report%201%20-%20Final.pdf>

32 Government of Antigua and Barbuda. 2015. Intended Nationally Determined Contribution.

33 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

between 1983 to 1985 caused major disruption to the tourism sector, resulting in knock-on economic costs as the country was forced to import water from neighbouring Dominica³⁴. Historically, droughts have also resulted in the loss of life. These wide-reaching impacts of drought occurrences reinforce the need for considered planning for the hazard, especially in the context of climate change.

Flood risk is also very prevalent and as such, the Nationally Determined Contribution (2015) outlines a key adaptation target as having all buildings improved and prepared for extreme climate events, including "drought, flooding and hurricanes." While flooding is synonymous with tropical storms and hurricanes, flooding also occurs outlines of these extremes where the country experiences riverine, coastal and flash flooding. Due to the natural topography, run-off in Antigua is quick following downpours often resulting in flash flooding. Development practices that have increased the presence of impermeable services, have compounded this issue resulting in increased run-off and flash flooding. Intense rainfall also results in waterways being flooded due to limited retention capacities³⁵. Coastal flooding is also a risk due to the country's relatively-low lying topography and concentration of activities for tourism along the coasts. Other hydrometeorological hazards also constitute the country's risk profile. Tsunamis, although uncommon, is a recognised risk due to the country's position in a seismologically active region. Some studies suggest that the major extra-regional historical earthquakes resulted in major and minor tele-tsunamis that impacted several islands of the Caribbean³⁶. To a much lesser extent, heat and cold waves, hailstorms, downbursts and tornados are referenced as hydrometeorological threats facing the state.

Geological hazards include earthquakes and tsunamis triggered by earthquakes. Minor earthquakes are relatively frequent in Antigua and Barbuda and earthquakes have been common throughout the country's hazard history. In 1974, a large earthquake resulted in building damages and land slippage. The West Indies Oil refinery on Antigua suffered major damages. On August 27, 1990, a 4.9 magnitude earthquake occurred during the wee hours of the morning which was followed by a hurricane. On November 29, 2007, a 7.4

magnitude earthquake occurred, although damages were negligible. While recent losses of earthquakes have been generally low, earthquakes can lead to catastrophic impacts due to their unpredictability. Additionally, Antigua and Barbuda rests in a geologically active region, on the subduction zone in the Caribbean that results in volcanic and earthquake hazards. While there are no volcanoes on the islands, the country's National Office for Disaster Services (NODS) affirms that the country can be affected by eruptions of nearby volcanoes in Montserrat and Saint Vincent and the Grenadines³⁷. Landslides are also a present risk, which can also be triggered by hydrometeorological events.

Biological hazards have gained global attention recently due to the COVID-19 pandemic. The Inform COVID-19 Risk Index that aims to identify "countries at risk from health and humanitarian impacts of COVID-19 that could overwhelm current national response capacity, and therefore lead to a need for additional international assistance," placed Antigua and Barbuda at a rating of 3.6 i.e. Medium Risk, indicating there is much needed improvement to build country capacity to manage pandemics³⁸. There is need for widening the scope of biological hazards that are considered in the country's risk landscape. Infectious diseases while well-recognised in the country's health profile, are not often considered hazards, with the exception of communicable disease outbreaks of influenza, foodborne, water-borne and vector-borne illnesses. The country's National Strategic Plan for Health (2016-2020) further recognises health concerns such as varicella, conjunctivitis, sexually transmitted infections, HIV and AIDS. Vector-borne diseases such as Chikungunya and Zika are very prevalent risks with noted efforts to minimise their prevalence.

The Pesticides and Toxic Chemicals Act, 2008 identifies a range of chemicals that are considered hazardous, some of which are controlled and others prohibited. Persistent Organic Pollutants (POPs) constitute a significant chemical hazard and the Government of Antigua and Barbuda has taken deliberate efforts to manage these through its National Implementation Plan for the Management of Persistent Organic Pollutants (2007). There is however, the absence of a consolidated chemical hazard risk database to acknowledge the varying chemical hazards that pose a risk to the country. Societal hazards lack due consideration in the national landscape. Economic shock is largely

34 O'Marde, Dobrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

35 O'Marde, Dobrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

36 Clouard V. et al. 2017. Tsunami deposits in Martinique related to the 1755 Lisbon earthquake. Hazards Earth Systems Science.

37 National Office for Disaster Services. <http://nods.gov.ag/hazzards/volcanoes/>

38 Poljanšek, K et al. 2020. INFORM Covid-19 Risk Index. European Commission. <https://publications.jrc.ec.europa.eu/repository/handle/JRC120799>

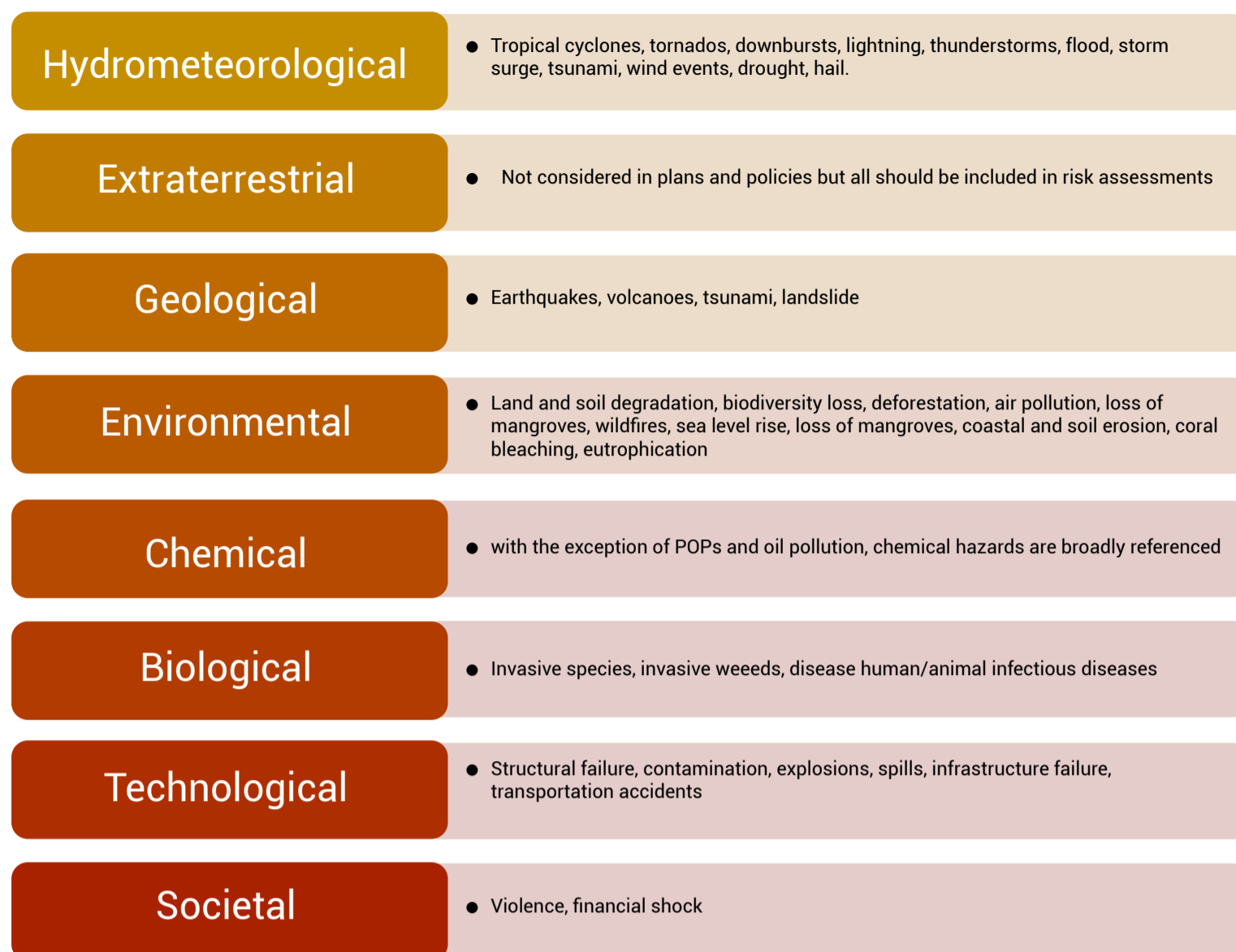


Figure 4: Summary of documented hazards for Antigua and Barbuda under the United Nations Hazard Definition and Classification Review Technical Report, 2020

the main societal hazard that has been given due consideration. Between 2008 and 2009, the country's experienced one of its worst recessions, due to challenges in the global financial market, reinforcing the potential for economic shocks. Violence while acknowledged, is considered in the context of its risk to the development within the Medium Term Development Strategy (2016-2020).

Technological hazards are recognised as waste hazards, oil spills and fires as a result of industrial activities and non-compliance, and building collapse. While road traffic accidents are common and result in fatalities annually, air and marine accidents are less frequent. Oil spills occur occasionally within the marine environment as a result of bunkering activities. Oil spills on land are less frequent but occur in small amounts³⁹. Fires are relatively common, predominantly taking the form of house fires. However, a major historical fire, known as the "Bryson Fire" resulted in the destruction of much of Saint Johns in 1991. A few years later in 1994, the King Obstinate Fire resulted in several buildings being burnt and one fatality. More recently in 2012, a fire at the airport resulted in the destruction of two hangars, an aircraft and two office buildings⁴⁰. There is little evidence to support the consideration of

other technological hazards within the national risk landscape. Emerging risks such as cyber hazards are much less considered in national hazard risk documents.

Environmental hazards occur as a result of degradation of the natural systems. Development processes often compete with the natural environment and can result in unsustainable practices that create environmental hazards. In the case of Antigua and Barbuda, these include air pollution, biodiversity loss, sea level rise, loss of mangroves, coastal and soil erosion, coral bleaching, eutrophication, wildfires and soil degradation. Climate change not only exacerbates these environmental hazards, but increase hydrometeorological, biological and societal hazards. Therefore, climate change is an underlying driver of risk, with cascading impacts across varying areas, which can result in system failure if not appropriately planned for, mitigated against, and adapted to. The 2020 Biennial Update Report confirms that Antigua and Barbuda has already started experiencing the impacts of climate change namely through intensified storms, extended droughts and saltwater intrusion⁴¹. There is therefore urgent need for consolidated efforts to combat climate change.

³⁹ O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

⁴⁰ National Office for Disaster Services. <http://nods.gov.ag/hazzards/fire/>

⁴¹ Government of Antigua and Barbuda. 2020. Antigua and Barbuda's First Biennial Update Report. <https://unfccc.int/sites/default/files/resource/Antigua%20and%20Barbuda%20-%20UNFCCC%20Biennial%20Update%20Report%201%20-%20Final.pdf>

2.2 Vulnerability

2.2.1 Social Vulnerability

Social vulnerability examines how the “*conditions rooted in historical, cultural and socio-economic processes impinge on an individual's or society's ability to cope with disasters*”⁴². The relationship between social systems and disaster risk is multi-dimensional. Social development aids in addressing the underlying causes of disaster risk while disasters often exacerbate underlying social vulnerabilities. Social vulnerability considers how factors such as income and poverty, education, ethnicity, gender, age, disability and household circumstances affects ability to cope with hazard impacts.

Perhaps the most significant and dynamic contributor of social vulnerability is poverty. The poor and indigent are often disadvantaged, without the financial capacity to mitigate against, prepare for, appropriately respond to and recover from hazard impacts. Disasters can often widen poverty gaps and leave these groups further disadvantaged, diminishing their capacity to cope. Data from 2005/2006 in the 2007 Survey of Living Conditions for Antigua and Barbuda, estimated that 18.3% of the population were below the poverty line, including 3.6% who were considered indigent⁴³. The report showed that a further 10% of the population were vulnerable to poverty. Recent studies suggest that poverty rates are expected to have increased as a result of the economic fallout from COVID-19. In a 2020 study, it was estimated that poverty rates in Antigua and Barbuda would have risen to 23.7% due to the pandemic⁴⁴. Directly related to the issue of poverty is inequality. With the pandemic significantly affecting the most vulnerable populations in the most vulnerable countries, studies affirm that inequality would have also risen⁴⁵. A report by the UNDP, UNICEF and UN Women further posits that the unemployment rate for the country would pass 30% arising from the pandemic.⁴⁶

Education influences social vulnerability, contributing to issues of employment, poverty and inequality but this relationship is much more complex. The 2007 Survey of Living Conditions found that among those categorized as poor, 22.3% had received a primary level education and 42.9% had attained secondary level education. However, the study revealed an interesting trend where the likelihood of the household being poor was reduced by 91% where the head of the household has at minimum, primary school education compared to no education. Data from the World Bank in 2015, shows that the literacy rate was approximately 99% showing a largely literate population⁴⁷. Attainment of tertiary education is slightly higher for women than men. Data from 2011 and 2012 revealed that there was significantly greater participation of women in tertiary education than men⁴⁸.

The gendered landscape of disaster risk is complex. While many studies conclude that women may be more vulnerable to disaster risk due to the interplay of underlying social conditions, other studies argue that women often possess additional coping capacities. Antigua and Barbuda's population feature a slighter higher number of women to men. Despite recording a high human development index, lack of data has resulted in the inability to determine the index disaggregated by sex. Similarly, there is no Gender Inequality Index value for the country. The absence of disaggregated data hinders comprehensive vulnerability assessments for evidence-based decision-making. Despite this, other areas reveal key trends as it relates to gender and vulnerability in Antigua and Barbuda. The 2007 Survey of Living Conditions revealed that unlike usual trends, women were only marginally more affected by unemployment than men, and unemployment was very low for women. The study further showed that women dominated the hospitality sectors (hotels and restaurants) which points to a potential fallout and increased gaps as a result of the detrimental impacts COVID-19 has had on the tourism and hospitality sector. In the aftermath of Hurricane Irma that revealed the difficulties faced by women and girls, there was a significant need for dignity kits for women and a wider need to have a “gender lens on disaster management”⁴⁹.

42 Mavhura, Emmanuel, Bernard Manyena, and Andrew E. Collins. 2017. “An Approach For Measuring Social Vulnerability In Context: The Case Of Flood Hazards In Muzarabani District, Zimbabwe”. *Geoforum* 86: 103-117. doi:10.1016/j.geoforum.2017.09.008.

43 Kairi Consultants Limited. 2007. Living Conditions in Antigua and Barbuda: Poverty in a Services Economy in Transition. Caribbean Development Bank. <https://catalog.ihnsn.org/index.php/catalog/4066/download/54998>

44 USAID, UNICEF. 2020. The socio-economic impact of COVID-19 on children and young people in the Eastern Caribbean Area. <https://www.unicef.org/easterncaribbean/media/2311/file/The%20socio-economic%20impact.pdf>

45 ECLAC, UNDRR. 2021. The coronavirus disease (COVID-19) pandemic: an opportunity for a systemic approach to disaster risk for the Caribbean. COVID-19 Report.

46 UNDP, UNICEF and UN Women. 2020. Antigua and Barbuda COVID-19 Heat Report Human And Economic Assessment Of Impact.

47 <https://data.worldbank.org/indicator/SE.ADT.LITR.ZS?locations=AG>

48 <http://uis.unesco.org/country/AG>

49 Kotsinas, Melina. 2020. Climate (In)justice: An Intersectional Feminist Analysis of Disaster Management in Antigua and Barbuda in the Aftermath of Hurricane Irma. *The IAPSS Journal of Political Science* Vol 47. <https://politikon.iapss.org/index.php/politikon/article/download/326/329>

With women and girls constituting a large portion of the population, and approximately 30% of households being female-headed⁵⁰, there is need for gender considerations in disaster risk reduction initiatives but these must be underpinned by gender analyses. Studies also reveal the underlying social vulnerabilities in Antigua and Barbuda. A presentation on the “Socio-economic impact of the Cost of Extreme Weather Events on Women in Antigua And Barbuda,” revealed interesting findings that demonstrate the complex nature of social vulnerability. The presentation posited that:

- Females engage in a greater level of disaster preparedness
- Flood damage costs are disproportionately affecting women
- Transactional sex appears to be on the rise for single parent female-headed households
- Boys are dropping out of school to find work to assist their single parent mothers
- Women are becoming more vulnerable⁵¹

These findings serve as an urgent call for action to understand gender gaps and build capacity in support of disaster risk reduction and resilience. The Medium Term Development Strategy (2016-2020) further highlighted the need to tackle national gender issues including gender-based violence, premature termination of education by teen mothers and the sexual exploitation of women. A publication by the Canada Caribbean Resilience Facility revealed that gender-sensitive considerations were absent in the allocation of resources for disaster response⁵². Additionally, as revealed by the 2014 Country Gender Assessment, there is no National Gender Policy that provides a framework for addressing gender issues, thereby creating a gap in the country's policy infrastructure for integration and inclusion⁵³.

Other vulnerable groups include the elderly, children and persons with disabilities. Young persons often account for higher poverty rates, rendering them more vulnerable. The 2007 Survey of Living

Conditions validated this trend, revealing that 21% of the youth population (15-24) lived in households below the poverty line and 15.7% were considered vulnerable to poverty. The survey unearthed an interesting trend where many elderly persons were gradually being deprived of traditional familial networks due to migration and as such, many elderly persons although with considerable social networks, ended up living alone with no one to care for them. The elderly are deemed vulnerable due to reduced mobility, underlying chronic health conditions and other socioeconomic factors. The absence of necessary structures to support and include this group within the risk planning landscape leaves them further exposed. The 2011 census revealed a persons with disabilities population of 3239 persons, with the incidence of disability being slightly more prevalent among women than men⁵⁴. The Disabilities and Equal Opportunities Act, 2017 aims to establish the legal framework for the protection of the rights of persons with disabilities, however there are no direct provisions for considered disaster risk inclusion of the group. Despite this, some evidence suggests that efforts have been underway to include these groups in the conversation on disaster risk⁵⁵.

Healthcare services are managed and financed through budget allocations. The Medical Benefits Scheme also provides financial and other assistance towards the cost of medical services and allows recipients to access services outside of the public care structure. The public healthcare system comprises 25 health clinic for primary care services within communities, and the Mount St. John's Medical Centre- the country's main hospital, a 186 bed facility located in Antigua. Barbuda has one clinic and a smaller hospital. Based on a 2018 health profile by the World Health Organization non-communicable diseases accounted for 82% of deaths in the country and the three leading causes of death were cancer, heart disease, and diabetes, thereby suggesting the increased need for health and wellness promotion. Communicable diseases were also one of the ten leading causing of mortality⁵⁶. The Medium Term Development Strategy (2016-2020) reinforces the prevalence of

50 Government of Antigua and Barbuda. The Socio-economic Impact of the Cost of Extreme Weather Events On Women In Antigua And Barbuda. https://unfccc.int/sites/default/files/resource/03_Pres_AF%20Event_Antigua%20and%20Barbuda.pdf

51 Government of Antigua and Barbuda. The Socio-economic Impact of the Cost of Extreme Weather Events On Women In Antigua And Barbuda. https://unfccc.int/sites/default/files/resource/03_Pres_AF%20Event_Antigua%20and%20Barbuda.pdf

52 Canada Caribbean Resilience Facility. Antigua and Barbuda. <https://documents1.worldbank.org/curated/en/605611611899109346/pdf/Antigua-and-Barbuda-How-Disaster-Resilient-is-Antigua-and-Barbuda-s-Public-Financial-Management.pdf>

53 Huggins Tamara. 2014. Antigua and Barbuda Country Gender Assessment. Caribbean Development Bank. https://www.caribank.org/sites/default/files/publication-resources/Country%20Gender%20Assessment_Antigua%20and%20Barbuda_Volumes%201%20and%202_June%202014.pdf

54 Government of Antigua and Barbuda. 2017. 2011 Population and Housing Census. <https://statistics.gov.ag/wp-content/uploads/2017/11/2011-Antigua-and-Barbuda-Population-and-Housing-Census-A-Demographic-Profile.pdf>

55 CDEMA. 2013. Antigua Disaster office meets with Association of Persons with Disabilities <https://www.cdema.org/news-centre/news/42-antigua/1276-antigua-disaster-office-meets-with-association-of-persons-with-disabilities>

56 World Health Organization. 2018. Antigua and Barbuda Country Cooperation Strategy. <https://apps.who.int/iris/rest/bitstreams/1137313/retrieve#:~:text=The%20health%20systems%20in%20Antigua,km%20of%20every%20major%20community.>

lifestyle diseases and ill-health facing the country. The Strategy further highlights the need to expand the level of services offered at the public hospital, noting that many needed services are not available at public care facilities.

2.2.2 Physical Vulnerability

Physical vulnerability refers to *“The conditions determined by physical processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards”*⁵⁷.

Physical vulnerability considers how aspects of physical development such as housing, infrastructure and settlement patterns enhance an entity's risk. For Antigua and Barbuda, these take the form of population growth, urbanisation, housing and the increasing pressure on the natural environment to meet development needs.

The Sustainable Island Resource Management Zoning Plan (SIRMP, 2011) highlights that 32% of the country's population reside in a landmass of 1.6% that constitute St. Johns. While the city centre of St. John's has been experiencing downward growth in population size, much of the country's population still reside here. Additionally, the outskirts of St. John's Rural have been incurring increasing population growth⁵⁸. The largest concentration of the population reside in and around St. John's whereas the southern and eastern parts of Antigua feature more rural populations and lower densities⁵⁹. Congestion, sanitation and waste issues characterise the city centre. The Medium Term Development Strategy (2016-2020) successfully articulates these issues, itemising inadequate drainage and sewage, dilapidated structures, poor road infrastructure, poor traffic management and inadequate parking facilities as some of the major issues facing the city centre. Barbuda's physical vulnerability became prevalent following Hurricane Irma in 2017 that destroyed 90% of the islands infrastructure. The island struggles with issues of transportation, accessibility and underdeveloped ports that affect ability to conduct everyday activities⁶⁰.

Due to population increases and limited physical capacity coupled with economic circumstances, there is an increasing demand for housing. However, a 2011 study by UN Habitat found that the Central Housing and Planning Authority is only able to meet 40% of the demand for residential land. The Medium Term Development Strategy (2016-2020) further highlighted that despite strides in human development, many persons (employed and otherwise) are still unable to afford decent housing. Squatting continues to be a major concern, fueled by unclear policies, unaffordability, immigration and a lack of enforcement by the relevant authorities⁶¹. One of the country's largest squatter communities lie on the city outskirts and is mainly comprised of immigrants from the Dominican Republic⁶². The issue of squatting is twofold, triggered by underlying social vulnerability but subjected to harsher hazard impacts including issues of crime and violence⁶³. Additionally, squatting settlements are characterised by sanitation challenges that often increase health risks. In the 2011 report by UN Habitat, squatter conditions of Piggotts Village (north-central Antigua) revealed that the settlement is located on the edge of a pond that collects animal waste, garbage and rubble, lending to health risks. The fragmented institutional framework for housing has been identified as a contributor to issues facing the housing sector⁶⁴.

Unsustainable development practices exacerbate environmental degradation. Sand mining within the construction sector and improper agricultural practices on the slopes of the island have compounded drainage issues and increased the risk of flooding⁶⁵. Activities in the tourism sector along with residential developments have resulted in the damage of marine habitats, mangroves and corals and the partial loss of the essential ecosystem services they provide⁶⁶. National policies and strategies on coastal zone management often aid in addressing these issues. While a coastal zone policy has not been prepared for the country, the SIRMZP (2011) provides the needed framework for sustainable physical development and establishes the implementation of setback limits

57 Amended from United Nations Officer for Disaster Risk Reduction

58 Government of Antigua and Barbuda. 2017. 2011 Population and Housing Census. <https://statistics.gov.ag/wp-content/uploads/2017/11/2011-Antigua-and-Barbuda-Population-and-Housing-Census-A-Demographic-Profile.pdf>

59 UN Habitat. 2011. Antigua And Barbuda: National Urban Profile. <https://mirror.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3322>

60 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

61 UN Habitat. 2011. Antigua And Barbuda: National Urban Profile. <https://mirror.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3322>

62 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

63 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

64 UN Habitat. 2011. Antigua And Barbuda: National Urban Profile. <https://mirror.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3322>

65 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

66 Government of Antigua and Barbuda. 2015. Medium Term Development Strategy 2016-2020.

for development of the coastal zone. The Intended Nationally Determined Contribution (2015) provides an unconditional target of the revised Building Code which aids in addressing matters of physical vulnerability. Research has revealed that the Draft Building Code was prepared in 2020, which provides a useful entry point to reduce vulnerability if enforced. Despite this, the governance framework to minimise physical vulnerability requires strengthening. The SIRMZP premised that disincentives for building in flood-prone areas are not reflected in property insurance mechanisms. Likewise, applications for development of these areas are often approved without mandating the necessary mitigation actions⁶⁷.

Antigua and Barbuda has undertaken meaningful activities that symbolise its commitment to addressing infrastructural vulnerability. In 2013, with support from PAHO, a vulnerability assessment of the country's main hospital – Mount St. John's Medical Centre – was conducted which revealed that at the time, the facility was considered Category A under the Hospital Safety Index, meaning that it was deemed able to protect the life of their occupants and likely to continue functioning in disaster situations⁶⁸. Notwithstanding, a 2017 study highlighted the need for the Government of Antigua and Barbuda to increase investment in critical public infrastructure including schools, hospitals, ports and government offices⁶⁹. In fact, it is estimated that over 80% of the country's critical infrastructure lies within a one mile distance from the coast and is within the demarcated impact area for a ten metre wave⁷⁰. Against this backdrop and with learnings from the COVID-19 pandemic, critical infrastructure protection becomes even more crucial. The telecommunications sector proved itself to be an essential stakeholder in supporting resilience and business continuity during the pandemic⁷¹. Yet, Hurricane Irma in 2017 brought significant damage to telecommunications infrastructure, especially in Barbuda⁷². Critical infrastructure protection is therefore paramount to resilience.

67 Sustainable Island Resource Management Zoning Plan. 2011 https://environment.gov.ag/assets/uploads/attachments/816fb-sustainable_island_resource_management_zoning_plan_antigua_barbuda.pdf

68 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

69 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

70 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

71 UNDRR. 2020. Disaster risk reduction and the Caribbean private sector: The role of the telecommunications sector in the context of Covid-19.

72 <https://reliefweb.int/report/antigua-and-barbuda/antigua-and-barbuda-and-saint-kitts-and-nevis-hurricane-irma-mdr49009-1#:~:text=Irma%20struck%20Barbuda%20in%20the,fisheries%20on%20the%20affected%20islands.>

2.3 Exposure

The “*Situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas*” creates exposure⁷³. In 2010, the Global Facility for Disaster Risk Reduction premised that Antigua and Barbuda was among the top five countries most exposed to multiple hazards, acknowledging that the entire landmass and population is exposed to two or more hazards⁷⁴. This hazard exposure also results in economic risk, where it was estimated that 80.4% of the country's GDP was at risk from two or more hazards⁷⁵. These hazard exposures are largely as a result of the country's location, physiography and development patterns. Located within the Atlantic Hurricane Belt, the islands are exposed to tropical cyclones that have created devastating impacts in the past. The Inform Risk Index places Antigua and Barbuda at a value of 8.4 (out of 10) in terms of its exposure to tropical clones⁷⁶. Similarly, the country's location within a seismologically active region, along the margin of the eastern Caribbean plate, results in its exposure to earthquakes. The Inform Risk Index places the country exposure to earthquakes at 5.4. Due to the islands small size, these magnitude events (earthquakes and tropical cyclones) pose a risk to the entire population, with the potential to disrupt societal and economic conditions. The Inform Risk Index further recognises that the country has a significant exposure rate to vector-borne diseases (5.2) and to epidemics (3.5).

Exposure is also a result of the development and settlement patterns. Much of the country's settlements and economic activities including tourism infrastructure, are located in the coastal zone⁷⁷, which is susceptible to a range of hazards, including climate change, sea level rise and storm surge. A one-metre level rise in sea level would affect 10% of the country's main tourist resorts, 2% of its major roadways and all its seaports⁷⁸. The country's capital city and main business district and urban centre, is located in the low-lying coastal

73 United Nations General Assembly. Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction. 2016.

74 Global Facility for Disaster Risk Reduction. 2010. Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes. Antigua and Barbuda.

75 Global Facility for Disaster Risk Reduction. 2010. Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes. Antigua and Barbuda.

76 Inform Risk Index

77 Government of Antigua and Barbuda. 2015. Medium Term Development Strategy 2016-2020.

78 Government of Antigua and Barbuda. 2015. Intended Nationally Determined Contribution.

zone. St. John's is home to the country's critical infrastructure that provides port services, power generation and potable water supply⁷⁹. Hazard impacts to the capital can therefore disrupt the country at large. These exposures while a core determinant of risk, by themselves do not result in disasters. Instead, characteristics of vulnerability interplay with exposure to determine risk. Therefore, while Antigua and Barbuda may be exposed to a range of hazards, the country need not be vulnerable to these hazards if appropriate actions are taken to reduce vulnerability, promote adaptation and build resilience.

⁷⁹ Global Facility for Disaster Risk Reduction. 2010. Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes. Antigua and Barbuda.

3. Governance Framework

3.1 International Framework

3.1.1 Sustainable Development Goals

The 2030 Agenda for Sustainable Development adopted in 2015 under the United Nations General Assembly presents seventeen (17) Sustainable Development Goals (SDGs) that serve as a universal call to action for countries to implement strategies to promote peace and prosperity for all persons. The Agenda recognizes that poverty eradication must be accomplished through a holistic approach with adequate considerations for health, education, environmental sustainability and climate change. Antigua and Barbuda's commitment to sustainable development are evident within the country's Medium Term Development Strategy 2016-2020, and other supporting instruments within the policy framework.



Figure 5: The United Nations Sustainable Development Goals

3.1.2 Sendai Framework for Disaster Risk Reduction

The Sendai Framework for Disaster Risk Reduction 2015–2030, was adopted at the Third United Nations World Conference on Disaster Risk Reduction in 2015. The Framework builds on its predecessor- the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters, and provides countries with concrete actions to reduce disaster risk. It recognizes that the state has the primary role to reduce disaster risk but that responsibility must be shared with other stakeholders including local government, the private sector and communities. The Sendai Framework establishes four priority areas for action and seven targets (comprising 38 indicators) through which member countries can measure their progress.

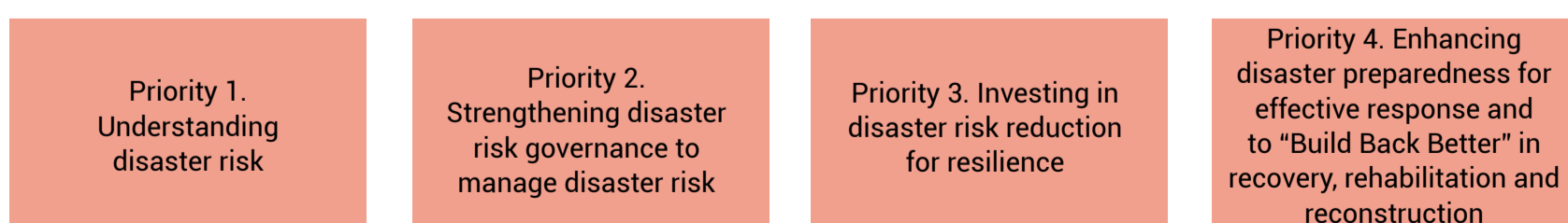


Figure 6: Priority Areas for Action under the Sendai Framework for Disaster Risk Reduction

3.1.3 The Paris Agreement on Climate Change

The Paris Agreement is a legally binding international treaty on climate change, adopted by parties in 2015. Recognizing the impacts anthropogenic activities have on climate change, the Agreement was established to limit global warming to well below 2 degrees Celsius (ideally to 1.5 degrees Celsius), compared to pre-industrial levels. The Paris Agreement brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects. This is especially crucial for Small Island Developing States (SIDS) that are disproportionately affected by climate change. Parties have also agreed to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change, in contribution to sustainable development. Under the Paris Agreement, countries undertake Nationally Determined Contributions in response to climate change. As part of its commitment to address climate change under the Paris Agreement, Antigua and Barbuda submitted its Intended Nationally Determined Contributions in 2015, which were subsequently approved and became its Nationally Determined Contribution. Antigua and Barbuda ratified the Paris Agreement in 2016.

3.1.4 Small Island Developing States Accelerated Modalities of Action (SAMOA) Pathway

The SAMOA Pathway was instituted in 2014 to promote sustainable development within these SIDS due to their unique challenges such as climate change. The framework establishes thematic areas to promote sustainable development within SIDS which include: climate change, inequality, green and ocean based economy, sustainable energy, food security and waste management.

3.2 Regional Framework

3.2.1 Comprehensive Disaster Management (CDM) Strategy 2014-2024

CDEMA's Comprehensive Disaster Management (CDM) Strategy 2014 – 2024 replaced the CDM Strategy 2007-2012. The CDM Strategy and Programming Framework is aligned with key international instruments such as the Sendai Framework for Disaster Risk Reduction, the

Sustainable Development Goals, and the Paris Agreement on Climate Change and aims to enable safe and resilient CDEMA Participating States through comprehensive disaster management. The Strategy adopts a comprehensive approach, targeting all hazards in all phases of disaster management, involving all peoples. The CDM Strategy is established through a wide participatory process that outlines the results framework for Participating States. Climate change, gender, ICT and environmental sustainability underpin all interventions within the strategic areas. The Strategy provides the enabling environment to achieve the desired results in seven areas (Figure 7) and prescribes a CDM blueprint that provides a conceptual framework to facilitate CDM implementation at the national level and achieve the future desired state for Participating states. The blueprint illustrates the standard for CDM implementation through the development of an effective enabling environment, governance structures, strengthened National Disaster Offices, capacities, frameworks, core functional areas and competencies to promote CDM.

CDEMA's Regional Response Mechanism consists of contingency and response guidance tools (plans, protocols, policies, guidelines) which outline coordinated response mechanisms at the regional level, in response to hazard events affecting Participating States. The Regional Coordination Plan was established to facilitate the mechanism, in support of National Plans. The Regional Coordination Plan necessitates that National Plans include procedures for triggering the regional mechanism and addresses the key emergency response functions. Hazard-specific plans have been developed for a range of priority hazards for Participating States. CDEMA Coordinating Unit's Contingency Plan establishes the mechanisms for coordinating at the regional level⁸⁰. Under the CDEMA agreement, Antigua and Barbuda is designated the Sub-Regional Focal Point with responsibility for providing essential support to the CDEMA Coordinating Unit in the coordination of response operations for Anguilla, British Virgin Islands, Montserrat and St Kitts and Nevis. The responsibilities of the Antigua and Barbuda as a Sub-Regional Focal Point are to:

- Acquire and maintain comprehensive information on the facilities and services available in each of the countries for which they bear responsibility;
- Maintain and test communications with the CDEMA Coordinating Unit and key response agencies on a period basis;

⁸⁰ CDEMA Country Work Programme for Comprehensive Disaster Management.

- Maintain independent fuel and power supplies and ensure that relevant physical facilities are in a condition to withstand a major disaster;
- Keep and maintain an equipment package that contains essential items in serviceable and optimal working condition⁸¹.

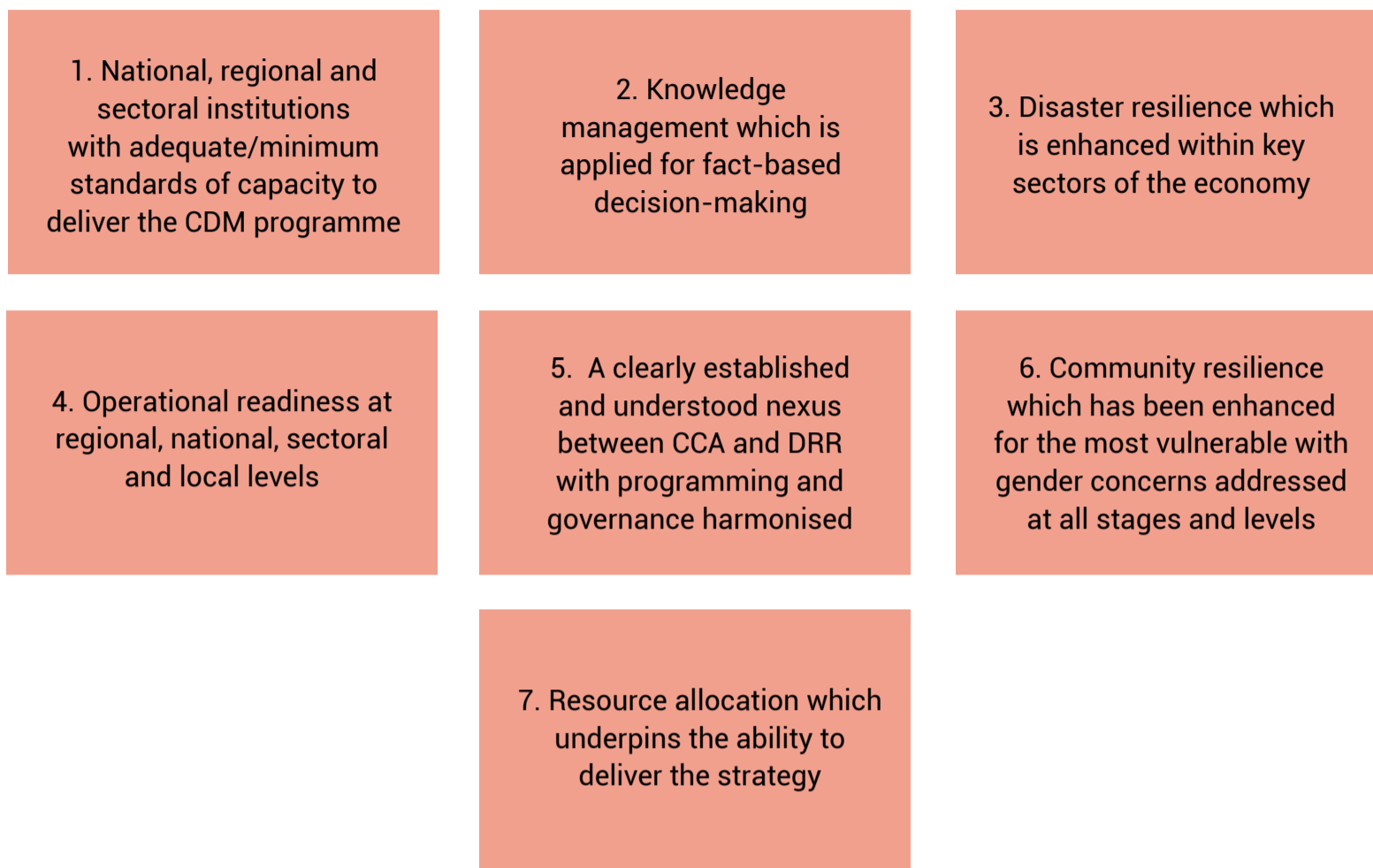


Figure 7: Elements of the Future Desired State for CDEMA Participating States under the CDM Strategy 2014-2024

3.2.2 Caribbean Resilience Framework

In 2018, Caribbean Community (CARICOM) members adopted the Caribbean Resilience Framework. Aligned to the CDEMA's Comprehensive Disaster Management Strategy, the framework establishes five pillars of resilience that are to be addressed in support of reducing vulnerability to hazard impacts:

- I. Social Protection for the Marginal and Most Vulnerable
- II. Enhancing Economic Opportunity
- III. Safeguarding Infrastructure
- IV. Environmental Protection
- V. Operational Readiness and Recovery

3.2.3 Antigua and Barbuda Declaration on School Safety

In 2017, in Antigua and Barbuda Declaration on School Safety was signed by twelve (12) Ministries of Education, including Antigua and Barbuda. The Declaration establishes the Caribbean Safe School

Initiative (CSSI) which provides a framework to promote school safety in the member countries. The Declaration promotes activities to build resilience within the education sector, disaster risk reduction and resilience education and awareness building. The Declaration establishes key commits as follows:

- Engaging in the multi-stakeholder "Worldwide Initiative for Safe Schools", by supporting the implementation of the Comprehensive Safe School Framework and the Model Safe School Programme in the Caribbean for public and private facilities at all levels;
- Building resilience in the education sector;
- Sourcing financial and other resources from the national, regional, and the international community, from public and private sectors, to aid in strengthening efforts in disaster risk reduction education sector;
- Coordinating with national and regional disaster management bodies to integrate the tenets of comprehensive disaster management into education policies and plans and to ensure alignment with existing national and regional

81 National Office of Disaster Services. <http://nods.gov.ag/about-cdema/>

disaster risk reduction and climate change resilience building strategies;

- Strengthening coordination and cooperation mechanisms among stakeholders at the community, national, regional and international levels;
- Fostering greater collaboration among the Ministries of Education in the Caribbean with relevant private sector entities, non-governmental organisations as well as other regional and international entities;
- Defining and implementing a framework to track and measure progress on the implementation of the actions identified in the Road Map on School Safety to be authorised by the Minister of Education.⁸²

3.2.4 Saint George's Declaration on Principles for Environmental Sustainability in the Eastern Caribbean

The Saint George's Declaration of Principles for Environmental Sustainability is an environmental policy adopted by members of the Organisation of Eastern Caribbean States (OECS) that provides a framework for environmental management in alignment with the sustainable development process. The 2006 Declaration establishes four main goals for environmental policy against the backdrop of sustainable development and with linkages to disaster risk reduction:

- Goal 1: Building the capacity of Member States and regional institutions to guide and support processes of sustainable development
- Goal 2: Incorporate the objectives, perspectives, resources and talents of all of society in environmental management
- Goal 3: Achieve the long-term protection and sustained productivity of the region's natural resource base and ecosystem service it provides
- Goal 4: Ensure that natural resources contribute optimally and equitably to economic, social and cultural development⁸³

3.2.5 Agreement Establishing the Caribbean Public Health Agency

In 2011, Caribbean Community Member States (of which Antigua and Barbuda belongs), signed the Inter-Governmental Agreement that established

the Caribbean Public Health Agency (CARPHA). In so doing, member countries committed to the establishment of a regional, umbrella agency that inter alia, promotes and develops measures for the prevention of disease in the Caribbean and supports the Caribbean Community in preparing for and responding to public health emergencies. Under the agreement, Ministers of Health from all member countries that form the Council, commit to promoting policies and programmes to protect health and prevent disease, including the implementation of improved public health infrastructure.

3.3 National Framework

Antigua and Barbuda's policy context continues to evolve and show progress towards systemic planning for disaster risk reduction in support of sustainable development. The following outlines the major national policy instruments, plans, legislations and strategies that contribute to the governance framework for disaster risk reduction and climate change adaptation in Antigua and Barbuda.

3.3.1 Disaster Management Act, 2002

A significant component within the normative framework for disaster risk reduction, is the presence of dedicated disaster management legislation, via the Disaster Management Act (2002). Adopting a comprehensive approach, the Act provides the legislative support for the institutional framework for disaster management, establishing the National Disaster Preparedness and Response Advisory Committee and the framework for subcommittees. The Act also provides the enabling environment for shared ownership, mandating all government institutions to appoint liaisons to the Director of Disaster Preparedness and Response. A core component of the legal instrument is its mechanism for the identification of "specially vulnerable areas" where Government can prioritise mitigation, preparedness, response and recovery initiatives, thereby suggesting a level of evidence-based actions. The Act also establishes the guidelines for Emergency Operations Centres and shelters.

3.3.2 Emergency Powers (Hurricane, Earthquake, Fire or Flood) Act

The Emergency Powers (Hurricane, Earthquake, Fire or Flood Act) authorizes the Cabinet to declare a state of emergency following the occurrence of a

⁸² United Nations Office for Disaster Risk Reduction. Antigua and Barbuda Declaration on School Safety. <https://eird.org/americas/safe-school-caribbean/2019/A&B%20Declaration.html>

⁸³ Organisation of Eastern Caribbean States. 2006. St. George's Declaration of Principles for Environmental Sustainability in the OECS.

hurricane, earthquake, fire or flood in Antigua and Barbuda. The Act further authorizes the Cabinet to make orders, such the acquisition and distribution of vital supplies, and the demolition of dangerous structures.

3.3.3 Medium Term Development Strategy 2016-2020

Antigua and Barbuda's Medium Term Development Strategy (MTDS) provides a roadmap to propel the country towards its development objectives and its vision of *"A harmonious, prosperous and modern Antigua and Barbuda founded on the principles of sustainability and inclusive growth, where equality of opportunity, peace and justice prevail for all citizens and residents."* Premised on the concept of sustainable development through a systems approach, the MTDS establishes four dimensions for sustainable development:

- Optimal generation of national wealth
- Enhanced social cohesion
- Improved health of the national environment and sustained historical and cultural assets
- Enhanced citizen security

Each development dimension sets out the strategies (necessary conditions) and their accompanying actions in support of the country's development agenda. Dimension 3 includes a stated strategy that targets disaster risk management and climate change resilience, serving as a significant entry point for high-level support and implementation of disaster risk reduction initiatives, inclusive of climate change mitigation and adaptation. Accompanying actions include the preparation of a mitigation plan; strengthening of coordination arrangements for disaster risk management; development of a climate change policy and establishment of a disaster risk financing strategy. These actions solidify Government's commitment to tackling the issues facing the disaster risk environment at a developmental level. Dimension 2 "Enhanced social cohesion" also prescribes a range of necessary conditions and actions that aid in addressing the underlying drivers of disaster risk such as social and physical vulnerability. The MTDS is therefore well-poised to establish the needed focus on disaster risk reduction. However, the MTDS was set to expire in 2020. This study has not revealed a revised and updated strategy for development, thereby potentially reducing the investment and emphasis on these needed activities.

3.3.4 Intended Nationally Determined Contribution (2015)

Antigua and Barbuda's Intended Nationally Determined Contribution (INDC) under the United Nations Framework Convention on Climate Change, presents the country's mitigation efforts to reduce greenhouse gas emissions, while also outlining adaptation actions. The INDC lays out Antigua and Barbuda's commitment to global mitigation and adaptation efforts in nine critical sectors: energy, health, tourism, agriculture, waste, water, transportation, forestry and land-use. The INDC establishes mitigation and adaptation targets as follows:

Conditional Adaptations Targets:

- By 2025, increase seawater desalination capacity by 50% above 2015 levels.
- By 2030, all buildings are improved and prepared for extreme climate events, including drought, flooding and hurricanes.
- By 2030, 100% of electricity demand in the water sector and other essential services (including health, food storage and emergency services) will be met through off-grid renewable sources.
- By 2030, all waterways are protected to reduce the risks of flooding and health impacts.
- By 2030, an affordable insurance scheme is available for farmers, fishers and residential and business owners to cope with losses resulting from climate variability.

Conditional Mitigation Targets:

- By 2020, establish efficiency standards for the importation of all vehicles and appliances.
- By 2020, finalise the technical studies with the intention to construct and operationalise a waste to energy plant by 2025.
- By 2030, achieve an energy matrix with 50 MW of electricity from renewable sources both on and off-grid in the public and private sectors.
- By 2030, all remaining wetlands and watershed areas with carbon sequestration potential are protected as carbon sinks.

Unconditional Targets:

- Enhance the established enabling legal, policy and institutional environment for a low carbon emission development pathway to achieve poverty reduction and sustainable development.
- By 2020, update the Building Code to meet projected impacts of climate change.

With deliberate efforts to mitigate against and adapt to climate change, the INDC provides direct and indirect benefits to the disaster risk planning landscape. Moreover, the unconditional target of the revised Building Code, provides direct benefits to addressing factors that contribute to physical vulnerability. Research has revealed that this target was met as the Draft Building Code was prepared in 2020. However, other targets of the INDC are contingent upon the receipt of financial support from international agencies.

3.3.5 Environmental Protection and Management Act, 2019

The Environmental Protection and Management Act aims to provide for environmental protection and management of natural resources, and institutes the appropriate administrative responsibilities for sustainable environmental management. The Act establishes the authority of the Department of Environment to oversee and coordinate all matters pertaining to the environment. A key function of the Department as outlined within the Act is to *“Coordinate the development and implementation of government's sustainable development, climate change, environment and natural resources management policies and activities,”* providing a meaningful entry point for the implementation of climate change considerations within the context of sustainable development. While disaster risk reduction is not explicitly addressed within the Act, there are co-benefits to disaster risk reduction by the activities prescribed. The Act provides for the development of a National Environmental Policy Framework, which provides an assessment of climate change vulnerabilities and risks, and evaluates the social, human health, economic and ecological considerations concerning the environment. Apart from climate change, the Policy Framework also makes provisions for chemicals management, biodiversity and desertification. The Act also makes provisions for pollution control and management and the implementation of the Environmental Impact Assessment. These activities create direct benefits to the disaster risk landscape while also providing an opportunity for integrated assessments.

3.3.6 Physical Planning Act, 2003

The Physical Planning Act makes provisions for physical development in Antigua and Barbuda so as to preserve and improve the quality of the physical environment. The Act establishes the Development

Control Authority with planning authority and aims to enable orderly, efficient and equitable allocation and development of the resources with considerations for social, economic and environmental factors, so as to ensure that sustainable use is made of land. The Act therefore aids in addressing the underlying drivers of risk with co-benefits to the disaster risk planning environment.

3.3.7 Sustainable Island Resource Management Zoning Plan, 2011

The Sustainable Island Resource Management Zoning Plan (SIRMZP) was prepared with the overarching objective of providing a strategic framework to address development issues. The Plan serves as the country's roadmap to sustainable physical development, providing a framework for the protection of critical ecosystem services to minimise environmental risks, while also advocating for sustainable development of sectors in support of economic growth. The linkage with disaster risk is evident, both directly and indirectly within the Plan which acknowledges that disasters can hinder growth. Additionally, the Plan recognises that development activities can enhance vulnerability. Five goals are established by the SIRMZP, with indirect and direct benefits to disaster risk reduction.

3.3.8 National Solid Waste Management Act 1995

The National Solid Waste Management Act establishes the National Solid Waste Management Authority. The linkages with disaster risk management are evident within the responsibilities of the National Solid Waste Management Authority as outlined within the Act, which includes: treatment and disposal of hazardous waste; and to prepare plans and programmes to address the problems of solid waste management.

Research has suggested the presence of additional policies that contribute to disaster risk reduction. However, these have not been produced for analysis. These include the National Environmental Policy, Comprehensive Disaster Management Policy and the National Disaster Plan.

3.4 Institutional Framework

The institutional framework for disaster risk management in Antigua and Barbuda comprises three tiers at the policy, administrative and community levels.

3.4.1 National Context

In 1984, the National Office of Disaster Services (NODS) was established as a division in the Ministry of Health and Home Affairs. The NODS is the national agency charged with overseeing and coordinating disaster risk management operations in Antigua and Barbuda. The major areas of responsibility include: Preparedness and Awareness; Education and Training and Exercising. The NODS also designates and manages the National Emergency Operations Centre for the coordination of response and recovery operations.

In 2002, with the passing of the Disaster Management Act, the institutional mechanism for disaster risk management was solidified. The legislation institutes the National Disaster Preparedness and Response Advisory Committee (NDPRAC) and outlines its responsibilities. The NDPRAC comprises representatives from varying state agencies, and affords the option of coopting representatives from civil society. The NDPRAC is chaired by the Prime Minister and comprises:

- The Minister responsible for public safety
- A Minister or public officer nominated by the Prime Minister to serve as Chairperson in the absence of the Prime Minister from any meeting;
- Such other members as may be nominated by the Prime Minister to represent -
 - o The Police Force;
 - o The Antigua and Barbuda Defence Force;
 - o The Fire Service;
 - o The Meteorological Department;
 - o The Antigua Public Utilities Authority;
 - o The Ministry responsible for Public Health;
 - o The Ministry responsible for the Public Safety;
 - o The Ministry responsible for the Environment;
 - o The Ministry responsible for Public Works;
 - o The Ministry responsible for Local Government;
 - o Other Ministries, Departments of Government and statutory bodies as the Prime Minister thinks fit;

- o Other persons or organisations, including non-governmental organisations, as the Prime Minister thinks fit who volunteer or are required by law to perform functions related to the mitigation of, preparedness for, response to and recovery from emergencies and disasters in Antigua and Barbuda.

The Director of Disaster Preparedness and Response within the NODS, serves as Secretary to the NDPRAC. The Act authorizes the Director and the NDPRAC to convene other committees for the purpose of disaster management. The Act further aims to strengthen governance and accountability arrangements by each Permanent Secretary and Head of Government across the varying institutions to appoint a liaison officer for communication with the Director of the NODS in relation to the procedures of the Ministry or Department and to report annually to the Director.

3.4.2 Local Level

At the local level, District Disaster Committees are established for the seventeen District Disaster Committees are established in the seventeen political constituencies (16 in Antigua, 1 for Barbuda). District Disaster Committees are led by a Director and a Deputy Director and are predominantly comprised of volunteers. These committees function as part of the national disaster system, coordinating disaster management activities at the community level. A key feature of these committees, is that their membership is determined by the political representative of the constituency and the NODS⁸⁴ though membership is considered open for those who reside in and wish to serve their community.

3.4.3 Community

The community level is synonymous with the subnational/local level. District Committees are directly linked to communities within which they cover with its membership being volunteers from the community.

⁸⁴ O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

4. Policy Coherence

Target 17.4 of SDG 17 acknowledges the need for policy coherence in support of sustainable development. This section summarises the coherence of the main policy instruments for development and climate change with the three governing international frameworks in these areas i.e.: the Sustainable Development Goals (SDGs), the Paris Agreement and the Sendai Framework for Disaster Risk Reduction. The instruments analysed include the Medium Term Development Strategy (2016-2020) and the Intended Nationally Determined Contribution (2015). While in 2008, Antigua and Barbuda developed the revised Comprehensive Disaster Management Policy, this has not been revealed for analysis. Additionally, a Climate Change Policy was not produced to inform the analysis of this study.

4.1 Strategic Coherence

Strategic coherence assesses whether the SDGs, climate change adaptation and disaster risk reduction are explicitly addressed jointly or if there is an aim to strengthen the relationship and linkages between the areas. There is a level strategic coherence of presented within the Medium Term Development Strategy (MTDS) although overall, it is low. There is limited explicit recognition of global and regional instruments in support of integrated sustainable development. However, the MTDS articulates its alignment with the SDGs. While the vision and goals of the policy present a clear linkage among disaster risk reduction, climate change and sustainable development, this linkage is not explicitly outlined within the MTDS, which has a vision of, *“A harmonious, prosperous and modern Antigua and Barbuda founded on the principles of sustainability and inclusive growth; where equality of opportunity, peace, and justice prevail for all citizens and residents.”* Despite this, the MTDS clearly recognises the importance of disaster risk management and climate change resilience, as this is considered a “necessary condition” for country development. Mainstreaming the agendas into sectors, while suggested, is not explicitly recognised. While strategic coherence within the Intended Nationally Determined Contribution (INDC) is low, it is still evident through the INDC’s acknowledgement of the country’s commitment under the UNFCCC and its wider acknowledgement of climate change considerations in support of sustainable development. Climate change is discussed within the

context of sustainable development. One of the two unconditional targets established by the INDC is to *“Enhance the established enabling legal, policy and institutional environment for a low carbon emission development pathway to achieve poverty reduction and sustainable development,”* which presents an inherent linkage with the climate change agenda. The linkage with disaster risk reduction however, is less established.

4.2 Conceptual Coherence

Conceptual coherence explores how climate change adaptation, disaster risk reduction and sustainable development are linked through the concept of risk. There is substantial evidence in support of conceptual coherence of the SDGs, climate change and disaster risk reduction within the MTDS. Though not the stated vision, it is clear that the MTDS is underpinned by the concept of resilience. While there is no definition of resilience provided by the MTDS, resilience is referred to in the context of economic resilience, climate resilience and social resilience. Moreover, its recognition of climate change and disaster risk as underlying development challenges creates the coherence through the concept of risk. The MTDS recognises that challenges with land-use planning, housing and settlements are risk factors that contribute to vulnerability. Climate change is recognised as a risk factor. Although focus is placed on the environmental impacts, there is a brief indication of the impacts of climate change on vulnerable groups (such as the poor) and the need for social protection. The impacts of climate change and disasters to the economy is also established. Social equity considerations, while not articulated in their linkages to vulnerability reduction, are evident by the Strategy’s second development goal of “Enhanced social cohesion” and the range of actions prescribed that address matters of education, poverty and gender. Its advocacy for preparation of a National Disaster Mitigation Plan presents a valuable opportunity for integration in the governance framework.

There is substantial evidence of conceptual coherence within the INDC. With resilience-building the implicit theme, the INDC establishes the widespread impacts on climate change that exacerbate disaster risk. Furthermore, climate change is recognised as a development challenge within the INDC. The linkage between climate

change and disaster risk is established through extreme events, as well as cascading impacts such as health implications and economic impacts. However, the complete nature of this relationship is not well explored. Similarly, the INDC lacks adequate consideration for social considerations in climate change, erring in comprehensively addressing the underlying drivers of vulnerability.

4.3 Institutional Coherence

Institutional coherence explores whether coordination between the sustainable development agenda, climate change adaptation, and disaster risk reduction is envisioned, and if/how institutional arrangements support coherence. There is little evidence in support of institutional coherence. While the MTDS has a clearly identified lead, coordinating mechanisms at a subnational/local level are not outlined. The Ministry of Finance and Corporate Governance is identified as the lead mechanism for the MTDS, tasked with monitoring the achievement of the Strategy and the elements that support sustainable development. The Ministry is also responsible for both budgetary allocations and overseeing national development planning through a sustainable development approach. Roles and responsibilities are not provided and there are no prescribed joint mechanism for institutional coherence within the MTDS, thereby limiting coherence.

There is little evidence in support of institutional coherence within the INDC. The INDC errs in establishing a mechanism for joint coordination. A framework for vertical integration at the subnational level is also absent from the policy instrument.

4.4 Operational Coherence

Operational coherence considers the measures, actions and activities that bring together the SDGs, climate change adaptation and disaster risk reduction, and the extent to which planning transcends across sectors. There is little evidence in support of operational coherence within the MTDS, and as such, coherence is considered low. The range of activities that span varying sectors, contributing directly and indirectly to the agendas indicate a level of operational coherence. However, there is need for strengthening the sectoral activities to better attain coherence as many sectoral activities fail to integrate disaster risk reduction and climate change. For example, sectoral activities for tourism fail to recognise and encourage planning for tourism sector

resilience to disaster risk. Roles and responsibilities are provided for some actors based on activities but not for all stakeholders. Consequently, there is need for strengthening operational coherence.

Operational coherence within the INDC is also suggested by the target sectors which include energy and transport, industry, health, tourism agriculture, land use and water. Additionally, the INDC is based on multi-stakeholder engagement comprising public sector, private sector and civil society that form a Technical Advisory Committee. Despite this, the INDC errs in creating specific opportunities for coherence such as through capacity building activities.

4.5 Financial Coherence

Financial coherence explores whether and how funding strategies and investments bring together the sustainable development agenda, climate change adaptation and disaster risk reduction and allows for the mobilization and reassignment of funding across the agendas. Financial coherence within the MTDS is low. While the MTDS provides useful insight into the potential sources of funding for implementation of action, it errs in providing a mechanism for joint funding or reallocation of funding and also budget estimations, thereby limiting financial coherence. Despite this, the advocacy and provisions for risk insurance mechanisms for disaster risk, provides an entry point and suggests some level of financial coherence.

There is promise towards financial coherence in the INDC. Preliminary budget estimates are provided for both mitigation and adaptation initiatives and the Green Climate Fund, the Global Environment Facility, the Adaptation Fund and bilateral and multilateral partnerships are identified as sources of funding. The INDC promotes risk insurance facilities for select areas. A key adaptation target within the INDC is that by 2030, an affordable insurance scheme will be available for farmers, fishers, and residential and business owners to cope with losses resulting from climate variability. Though focused on climate risk, these can have co-benefits to the disaster risk environment. A missed opportunity is the recognition of development funding sources for reassignment of the joint agenda.

4.6 Monitoring, Evaluation and Reporting Coherence

Monitoring, evaluation and reporting considers whether coordination and synergies for the SDGs climate change adaptation and disaster risk reduction monitoring, evaluating and reporting is present, thus enabling accountability, especially in the context of regional and international commitments. There is some suggestion of monitoring, evaluation and reporting coherence within the MTDS, through its establishment of a monitoring and evaluation indicator framework and the inherent linkages of these activities. The MTDS briefly highlights reporting of SDG implementation progress and the linkage of the MTDS to this reporting arrangement. Notwithstanding, the MTDS does not refer to a joint framework.

There is some suggestion of monitoring, evaluation and reporting coherence within the INDC, through reference of reporting arrangements under the UNFCCC and Paris Agreement as well as the clearly articulated targets. Notwithstanding, the INDC does not refer to a joint framework, thereby limiting coherence.

5. Disaster Risk Reduction Interventions and Capacities

This section examines Antigua and Barbuda's disaster risk reduction capacities and areas for improvement under the priorities established by the Sendai Framework for Disaster Risk Reduction.

5.1 Priority 1 – Understanding Disaster Risk

Priority 1 of the Sendai Framework acknowledges that appropriate planning for disaster risk must be driven firstly by comprehensively understanding the risk context. Disaster risk assessments must therefore go beyond the hazards themselves to examine the dimensions of vulnerability, exposure and capacity that all contribute to risk, so as to promote risk-informed policies and actions. This priority therefore promotes data collection and analysis; comprehensive risk assessments; risk mapping and modelling; training, education and public awareness; and information dissemination for evidence-based action.

Comprehensive and consolidated risk data, addressing the dimensions of vulnerability, exposure and capacity, are largely absent from the national environment. This study was unable to reveal a comprehensive national risk repository that is accessible to varying stakeholders for evidence-based action. Risk information, while available, is fragmented across varying instruments, policies, strategies and plans. Despite this inherent challenge, in 2017, in partnership with the UNDRR, the European Commission's Humanitarian Aid and Civil Protection Department, the country published its "Country Document for Disaster Risk Reduction," which provides useful insight into the risk profile of the country, with considerations for multiple hazards affecting the state, in addition to elements of vulnerability and capacity.

Monitoring of progress made towards the targets under the Sendai Framework is facilitated through the Sendai Framework Monitor (SFM). Antigua and Barbuda's reports under the SFM between 2015 and 2010 are currently in progress, with no completed reports to date⁸⁵. As such, there is no validated data to determine the extent of the country's progress towards the targets of the Sendai Framework.

⁸⁵ <https://sendaimonitor.undrr.org/>

Antigua and Barbuda's 2017 Sendai Readiness Review Report revealed key insights into the country's capacity for data collection. The Report highlights the NODs as the agency responsible for the collection of disaster loss data and the Environmental Department as another key agency responsible for the collection of disaster risk reduction data. The Report also shows the collection of disaggregated data for key areas such as deaths, hazard type, location, and also shows some level of sex-disaggregated data collection. However, the Report also indicates that some data are not disaggregated by income and disability. Moreover, as highlighted by the Human Development Report for the country, the unavailability of sex-disaggregated data has resulted in the inability to produce values for gender development, thereby signifying data gaps.

The country's designated statistical authority—the Statistical Division under the Ministry of Finance and Corporate Governance—provides a key opportunity to strengthen data collection efforts. The Division was established in 1975 under the General Statistics Act, charged with the responsibility of providing data collection, analysis and publication services to provide the foundation to promote efficient policy and actions to improve the country⁸⁶. Other sectoral entities also support data collection efforts. The Antigua and Barbuda Meteorological Services collects data regarding rainfall patterns and climate variables. The Ministry of Education and Sports is responsible for collecting and maintaining data as it relates to education and schools, while the Ministry of Health, Wellness and The Environment collects health data and through the Health Inspectorate collects public health and sanitation data⁸⁷. The Ministry of Agriculture and Fisheries has responsibility for agricultural data collection including registered farmers, fisheries, crops, etc. Yet despite these responsibilities, data availability challenges exist.

Risk mapping was recognised as a strength in the GFDRR's review of disaster risk reduction in Antigua

⁸⁶ Statistical Division. <https://statistics.gov.ag/about-us/>

⁸⁷ World Bank. 2013. Open Data Readiness Assessment Prepared for the Government Antigua and Barbuda. <https://openknowledge.worldbank.org/bitstream/handle/10986/19001/883480WP00Box30ent020130614000Final.pdf?sequence=1&isAllowed=y>

and Barbuda in 2010⁸⁸. Geographic Information System (GIS) technologies are a recognised opportunity, with a designated GIS Specialist on staff in the NODS⁸⁹. The Development Control Authority also has GIS capabilities and a designated GIS Officer⁹⁰. In 2001, through a partnership with the Organization of American States (OAS), hazards maps were produced for: floods; earthquakes; winds; drought; storm surge; and erosion. Despite this strength, the report highlighted significant gaps in data management for GIS application⁹¹. Notwithstanding these meaningful measures, risk is dynamic. Consequently, risk assessments, maps and models must be “live” to match the evolving nature of risk for appropriate planning and decision-making.

Training, education and awareness building is evident within the national framework for disaster risk reduction^{92,93}. However, public awareness activities are widely fragmented, ad hoc and limited⁹⁴. The 2017 Country Document for Disaster Risk Reduction outlines strengthening the public awareness and education mechanism as a key area for action, addressing the varying areas of disaster risk reduction, with adequate considerations for mitigation and preparedness⁹⁵. The study further highlights risk assessments, communication and data management as a main area for reinforcing support of improved disaster risk reduction. These recent findings therefore suggest a need for more considered efforts as they relate to priority 1 of the Sendai Framework for Disaster Risk Reduction. The Disaster Management Act (2002) requires that hazard risk assessments maps are prepared and reviewed and that public awareness initiatives are conducted. The Act therefore provides the needed legislative support for building capacity within these areas.

88 Global Facility for Disaster Risk Reduction. 2010. Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes. Antigua and Barbuda.

89 NODS. <http://nods.gov.ag/nods-staff/>

90 OAS. 2001. Antigua/Barbuda Hazard Vulnerability Assessment Project: Final Report. <http://www.oas.org/pgdm/document/abvulnas/chinfinl.doc>

91 OAS. 2001. Antigua/Barbuda Hazard Vulnerability Assessment Project: Final Report. <http://www.oas.org/pgdm/document/abvulnas/chinfinl.doc>

92 CDEMA. 2013. Volunteers in Antigua and Barbuda complete shelter management and initial damage assessment training. <https://www.cdema.org/news-centre/news/42-antigua/1201-volunteers-in-antigua-and-barbuda-complete-shelter-management-and-initial-damage-assessment-training>

93 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

94 Global Facility for Disaster Risk Reduction. 2010. Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes. Antigua and Barbuda.

95 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

5.2 Priority 2 – Strengthening Disaster Risk Governance to Manage Disaster Risk

Priority 2 of the Sendai Framework calls for disaster risk governance at the national, regional and global levels to be enhanced for effective disaster risk management. Governance considers the mainstreaming environment for disaster risk reduction across sectors for shared ownership and integrated efforts; legislative and policy context; the institutional framework for disaster risk reduction; the application of incentives for adherence to requirements; and community involvement and empowerment.

Antigua and Barbuda's commitment to international and regional agreements shows promise within the country's governance arrangements and serve as entry points for enhancing these mechanisms. A major strength within the national framework for disaster risk reduction is the availability of dedicated disaster management legislation via the Disaster Management Act, 2002 that mandates specific activities and structures (Section 3.3.1). Additionally, establishing the Prime Minister as the Chairperson of the National Disaster Preparedness and Response Advisory Committee enables high-level support. By mandating liaison officers within every state agency, the Act facilitates mainstreaming of disaster risk reduction.

The availability of a dedicated national competent authority for disaster risk management- NODS- is also a meaningful measure within the governance structure for disaster risk reduction. With a decentralised three-tiered structure for disaster risk management, targeting varying stakeholders, at the national, local and community levels, Antigua and Barbuda presents a commendable structure for disaster risk management. Despite this, local structures for disaster risk management are considered weak and sometimes “non-existent”⁹⁶, creating a significant gap to the mainstreaming of disaster risk reduction activities and the concept of shared ownership. Likewise, while the multi-stakeholder institutional structure is commendable, the sectoral institutions lack the capacity to appropriately and effectively contribute to disaster risk reduction; instead focusing on response activities and coordination⁹⁷. Community involvement, while

96 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

97 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

promoted, is not as its desired level. The 2017 Country Document for Disaster Risk Reduction highlights the need for “meaningful community level organisation and engagement in decision-making” to improve the disaster risk reduction structure. Furthermore, the extent to which the private sector is involved in disaster risk reduction is described as “limited to mostly the telecommunications sector’s involvement in emergency warnings.”⁹⁸

Over the years, Antigua and Barbuda has initiated and development Country Work Programmes to provide the strategic direction for disaster risk reduction. Its previous CWP 2013 concluded in 2016 and a new draft CWP was prepared to cover the period 2020-2024. This study was however unable to access the

draft CWP and determine its level of approval and endorsement for implementation. Notwithstanding, the approval and implementation of a CWP can prove a significant mechanism within the governance framework for disaster risk reduction.

Table 1 summarises key activities across varying sectors and instruments that comprise the mainstreaming environment for disaster risk reduction in Antigua and Barbuda. While there is evidence of mainstreaming across sectoral policies and strategies, disaster risk reduction is only implicit in some activities. Furthermore, the absence of some sector specific policies and strategies, creates a gap within the mainstreaming environment.

⁹⁸ Private sector involvement in disaster risk reduction has been described as “limited to mostly the telecommunications sector’s involvement in emergency warnings. ”

Sector	Instrument / Activity	Description
Land-Use and Development	SIRMZP, 2011	Provides a strategic framework to address development issues for the protection of critical ecosystem services to minimise environmental risks, while also advocating for sustainable development.
	Physical Planning Act, 2003	Establishes the Development Control Authority as the competent body to control and oversee the development, surveillance and control development activities.
	Crown Lands Act, 1917 and Land Settlement Regulations, 1952	Establishes the mechanism for allocation of government lands, management of water bodies and forest conservation.
	Beach Protection 1957, (Amendment), 1993	Establishes the authority of the Ministry of Public Works to control and manage mining of aggregates from beaches.

Sector	Instrument / Activity	Description
Education	Antigua and Barbuda Declaration, 2017	Aims to build resilience in the education sector, promote school safety and integrate comprehensive disaster management into education policies and strategies.
	National Plan to Reduce the Vulnerability of School Buildings to Natural Disasters, 1998 ⁹⁹	Assesses the vulnerability of schools to natural hazards with the aim of establishing recommendations for their safety and protection.
Health	National Strategic Plan for Health, 2016-2020	While there is no direct reference to disaster risk and health, the plan focusses on health risk reduction by improving service delivery at the primary and secondary levels, epidemiological surveillance, among other activities that aid in managing select biological hazards.
Water	National Integrated Water Resources Management Policy Statement, 2011	Establishes strategies that contribute to and improve national water, wastewater, land management and disaster preparedness plans and actions.
Environment	Environmental Protection and Management Act, 2019	Establishes the legal framework for the management, conservation and protection for sustainable management of the environment. The Act establishes the authority of the Department of Environment to oversee and coordinate all matters pertaining to the environment.
	Antigua & Barbuda's 2015-2020 National Action Plan: Combatting Desertification, Land Degradation & Drought	Provides a strategy for managing the impacts of desertification, land degradation and droughts to build resilience.
	Bush Fires Act, 1901	Establishes control that prohibits bush fires.
	Forestry Act, 1941	Establishes a framework for the protection and conservation of forests. <i>A Climate Change Policy was not revealed by desk research for review and analysis</i>
Tourism		<i>A Tourism Policy or Strategy was not revealed by desk research for analysis</i>

⁹⁹ OAS. <https://www.oas.org/cdmp/schools/anbplan.htm>

Sector	Instrument / Activity	Description
Social Services	Food and Nutrition Policy, 2012	Establishes a framework to achieve sustainable food and nutrition security and to eliminate malnutrition. The Policy also sets out provisions to increase food safety nets and food emergency management systems.
	Social Protection Bill, 2020	Establishes a legislative framework for the prevention, reduction and elimination of economic, discriminatory and social vulnerabilities as it relates to poverty and deprivation in Antigua and Barbuda; and establishes the Social Protection Board, a National Social Protection Commission and a Social Protection Appeals Tribunal to oversee the activities within the legislation.
Energy	National Marine Pollution Contingency Plan, 2016	Outlines the mechanisms for oil spill prevention and response, including the roles and responsibilities of stakeholders for operational response.
Housing	Slum Clearance and Housing Act, 1948	No direct reference to disaster risk but institutes a low-income housing scheme.
	Housing Sector Recovery Plan, 2000	Provides a framework for safer housing in the aftermath of Hurricane Georges.

Table 1: Summary of policy instruments across sectors that support disaster risk reduction mainstreaming

5.3 Priority 3 – Investing in Disaster Risk Reduction for Resilience

Priority 3 of the Sendai Framework for Disaster Risk Reduction calls for public and private investment in disaster risk reduction, comprising both structural and non-structural measures. Investing in disaster risk includes financial investment, risk transfer mechanisms; land-use mainstreaming; strengthening building codes; critical infrastructure investment; social protection mechanisms for vulnerable groups; integrating disaster risk reduction into environmental management practices and strengthening tourism sector resilience.

Projects over the years suggest there is investment in disaster risk reduction initiatives (Table 2). Despite this, financial investment for disaster risk reduction has been identified as a major area for improving. The operational expenses of the NODS are covered by a budget under central government, however, this

allocation is described as “tight”¹⁰⁰. Additionally, there is no dedicated disaster fund for pre-disaster risk reduction activities or post-disaster response recovery. Instead, monies for disaster response and recovery are accessed from the Contingency Fund under the Finance Administrative Act, 2006. When an emergency or disaster is declared and the National Emergency Operations Centre is activated, the Prime Minister can engage the Minister of Finance to disburse monies under the Contingency Fund. However, there is an established limit to the initial disbursement and the overall disbursement must not exceed 25% of the total national budget of that year¹⁰¹. The 2017 Country Document for Disaster Risk Reduction further highlights a gap with the administrative process for streamlining the disbursement of funds for disaster risk management.

¹⁰⁰ UN Habitat. 2011. Antigua And Barbuda: National Urban Profile. <https://mirror.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3322>

¹⁰¹ Organization of American States. CELP Profile Antigua and Barbuda.

Project	Description
CERT Training	Local
Skill transfer solar panel installation	Subnational
Cadet Corp Disaster Management Programme	National
Zero Hunger Initiative	National
Financial Empowerment Center	National
Participatory Slum Upgrade Project	Subnational
Home Mitigation Cassada Gardens/Friars Hill	Local
Road Network and Drains Upgrades	National
Upgrading of water catchment	National
Installation of Desalination Plants	National
Barbuda Lagoon protected area	National
National Park protected area	Subnational
Giant African Snail eradication	National
Black/Brown Rat eradication	National
Revival McKinons Salt Pond	Local
Tree Cutting (Phyto-sanitary pest control)	National
Green House Gas Inventory	National
GCCA Sustainable Land Management	National
Solar farm airport	Subnational
Solar Street Lights	National
Solar Panels Government Offices	National
Radioactive Inventory	National
Toxic Chemical Inventory	National
Vector Control	National
Bolans/Body Ponds Watershed Management	Subnational
GIS Mapping of critical facilities	National
HAPPI program for homeless	National
Utility subsidy for senior citizens	National

Table 2: Disaster Risk Reduction Projects at the local, subnational and national levels in Antigua and Barbuda¹⁰²

Risk transfer mechanisms are present at the country level but lacking at the household and individual level. Antigua and Barbuda has been a member of the Caribbean Catastrophic Risk Insurance Facility Segregated Portfolio Company (CCRIF SPC) since 2009. Following the Hurricane Irma in 2017, the CCRIF SPC paid out over USD 6.5 million to Antigua and Barbuda¹⁰³. Property insurance is required only through mortgages instituted by financial institutions and not required by law¹⁰⁴. Tourism, the mainstay of the economy, presents some level of risk transfer mechanisms. In 2010, the Global Facility for Disaster Risk Reduction premised that 80% of the tourism sector was insured¹⁰⁵.

Regulatory and policy instruments, where available, are unenforced, thereby creating gaps in the mainstreaming disaster risk reduction into development activities. While there is a building code that aids in mainstreaming disaster risk reduction into development through structural measures, enforcement remains a challenge¹⁰⁶. The new Draft Building Code (2020) provides an opportunity to address this area. However, enforcement is an ongoing challenge across the regulatory environment due to limited human resource and technical capability, as well as unclear legal mandates that often overlap creating disjointed activities and issues with accountability¹⁰⁷. Risk incentives for disaster mitigation activities are

¹⁰² Sourced from: O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

¹⁰³ <https://www.ccrif.org/about-us>

¹⁰⁴ Global Facility for Disaster Risk Reduction. 2010. Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes. Antigua and Barbuda.

¹⁰⁵ Global Facility for Disaster Risk Reduction. 2010. Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes. Antigua and Barbuda.

¹⁰⁶ Global Facility for Disaster Risk Reduction. 2010. Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes. Antigua and Barbuda.

¹⁰⁷ UN Habitat. 2011. Antigua And Barbuda: National Urban Profile. <https://mirror.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3322>

inherently lacking¹⁰⁸. Furthermore, disincentives for building in flood-prone areas are not reflected in property insurance mechanisms, and applications for development of these areas are often approved without mandating the necessary mitigation actions¹⁰⁹.

The Sendai Framework establishes the need to promote and integrate disaster risk management throughout the tourism sector. This is especially crucial for tourism-dependent economies like Antigua and Barbuda. However, with the exception of measures such as insurance facilities, tourism sector planning is an area for strengthening. This is most evident by the inherent absence of a tourism policy or adaptation strategy with considerations for disaster risk. The 2017 Country Document for Disaster Risk Reduction established the need for increased state investment in and protection of critical infrastructure as a priority. The study identified the following as requiring increased investment: flood mitigation infrastructure; water storage facilities; healthcare facilities; education facilities; state offices; sea and air ports¹¹⁰.

Investing in disaster risk reduction also involves investing in and addressing the underlying drivers of vulnerability such as inequality and poverty. Antigua and Barbuda's Social Protection Bill, 2020, provides the needed entry point to address underlying causes of vulnerability. The Bill establishes a Social Protection Fund which will be accessed to disburse assistance to qualifying persons which include the elderly, persons with disabilities and the poor. The objectives of the Fund as established with the bill are to:

- Establish an efficient, complimentary and demand-driven mechanism for delivering basic services and infrastructure to a vulnerable person, utilising non-governmental organisations, community organisations and local government organisations;
- Finance small-scale projects in the following areas, namely, basic infrastructure and small-scale productive activities;
- Provide for the improvement of living conditions, promotion of community participation and enhancement of social protection infrastructure related to health, education, financial and other assistance;

- Provide assistance or skill training opportunities to vulnerable persons to alleviate socio-economic hardship or otherwise¹¹¹.

These activities therefore create significant benefits to the comprehensive disaster risk management environment, addressing directly the social vulnerabilities that contribute to risk.

5.4 Priority 4 – Enhancing Disaster Preparedness for Effective Response to “Build Back Better” in Recovery, Rehabilitation and Reconstruction

Disaster recovery operations provide an opportunity to “build back better” so as to eliminate or minimise previous vulnerabilities. Priority four of the Sendai Framework involves preparedness plans, business continuity planning, strengthening early warning systems, critical infrastructure resilience, training and exercising, community planning, recovery and reconstruction policies and relief and donations policies. The 2017 Country Document for Disaster Risk Reduction suggests a response-centric environment within the mainstreaming framework for disaster risk reduction, indicating a potential need for enhancing mitigation, preparedness and recovery capacities.

A recovery policy is absent within the national landscape. Despite this, the Housing Sector Recovery Plan (2000) suggests provides a hopeful indication to building back better. The Plan establishes mitigation goals for housing during reconstruction so as to reduce vulnerability. The Plan establishes the responsibilities of key stakeholders in housing sector recovery including those of homeowners; government; the construction sector; and the finance and insurance sector. Notwithstanding this strength, there is need for a comprehensive recovery policy. There is little evidence that indicate an adequate level of business continuity planning among state agencies and key sectors. Business continuity planning allows for expedited recovery and restoration of essential services in the aftermath of a disaster and is therefore critical to recovery objectives.

Training and exercising of existing plans and systems are necessary for effective response in support of recovery. While this study has produced

¹⁰⁸ O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

¹⁰⁹ GENIVAR. 2011. Sustainable Island Resource Management Zoning Plan. https://environment.gov.ag/assets/uploads/attachments/816fb-sustainable_island_resource_management_zoning_plan_antigua_-_barbuda.pdf

¹¹⁰ O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

¹¹¹ Government of Antigua and Barbuda. 2020. Social Protection Bill, 2020.

evidence in support of training and exercising¹¹², it is unclear whether a comprehensive training and exercise strategy exists. Notwithstanding, there is a definitive need to strengthen exercising activities. The 2017 Report on early warning systems in Antigua and Barbuda highlighted the need for community-wide drills on a larger scale¹¹³. The National Disaster Plan outlines the coordinating mechanism for response operations however, this Plan has not been produced for analysis. The presence of a National Emergency Operations Centre (NEOC) and a multi-sectoral institutional framework for response coordination signifies a strength within the national framework. Response arrangements are especially crucial for Antigua and Barbuda that functions as the sub-regional focal point. In 2017, the enhancement of arrangements for coordination as the sub-regional focal point were ongoing¹¹⁴.

As a signatory to the Antigua and Barbuda Declaration on school safety, it is evident that the Government of Antigua and Barbuda acknowledges the importance of disaster-resilient schools. While schools are essential for the functioning of a society in support of the country's development priorities, schools also serve as emergency shelters in disaster situations. In 1998, the National Plan to Reduce the Vulnerability of School Buildings to Natural Disasters aimed to assess the vulnerability of schools to promote school safety and resilience. Though commendable, this information is now inherently outdated and this study was unable to produce evidence of more recent assessments of these critical infrastructure. On the other hand, Antigua and Barbuda has undertaken recent measures to strengthen its healthcare infrastructure. Utilising the PAHO's Safe Hospital Toolkit, the country's main referral hospital, Mount St. John's Medical Centre was rated a Category A facility¹¹⁵, indicating that the facility is likely to withstand disasters and protect people and property therein. Ratings for other health facilities have not been revealed by this research. However, there is a need for a comprehensive vulnerability assessment of critical infrastructure in support of addressing these shortfalls and promoting resilience.

112 https://www.iode.org/index.php?option=com_oe&task=viewEventRecord&eventID=2669

113 Gazol, Claudia. 2017. Strengthening Early Warning Systems in the Caribbean Antigua and Barbuda.

114 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

115 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

Early warning systems are paramount for timely decision-making and action. The Antigua and Barbuda Meteorological Service provides forecasting and monitoring services for hydrometeorological hazards. The University of the West Indies Seismic Research Centre based in Trinidad and Tobago provides monitoring services for earthquake hazards affecting the islands. Antigua and Barbuda have developed Tsunami Warning Protocols and a threshold criteria. Tsunami warnings are issued under the Meteorological Service¹¹⁶. Antigua and Barbuda has made significant strides in improving its early warning capabilities¹¹⁷. In 2013, Antigua and Barbuda implemented its Common Alerting Protocol that provides a platform for timely information dissemination¹¹⁸. However, a key challenge to the early warning platform is the presence of "dead zones" in agencies where telecommunication devices are prohibited and as such, pertinent risk information is not relayed. The 2017 Country Document for Disaster Risk Reduction further highlights the need for strengthening early warning capabilities to address multiple hazards, as current mechanisms are focused on hydrometeorological hazards. In spite of progress to date, there is need for the national mechanism for disaster preparedness, response and recovery to be strengthened.

A Further Look Into Multi-Hazard Early Warning Systems

Effective early warning systems can reduce loss and impacts incurred from hazard occurrences. An early warning system as defined by the UNDRR is "*An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events.*"¹¹⁹ Within this context, four interrelated components underpin

116 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

117 Gazol, Claudia. 2017. Strengthening Early Warning Systems in the Caribbean Antigua and Barbuda.

118 O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua.

119 [https://www.undrr.org/terminology/early-warning-system#:~:text=Annotations%3A%20Effective%20%E2%80%9Cend%2Dto,the%20hazards%20and%20possible%20consequences%3B%20\(](https://www.undrr.org/terminology/early-warning-system#:~:text=Annotations%3A%20Effective%20%E2%80%9Cend%2Dto,the%20hazards%20and%20possible%20consequences%3B%20()

early warning systems if they are to be effective:

- Disaster risk knowledge;
- Hazard detection, monitoring and forecasting;
- Warning dissemination and communication and;
- Preparedness and response capabilities¹²⁰.

Target G of the Sendai Framework for Disaster Risk Reduction calls for a substantial increase in the availability of and access to multi-hazard early warning systems (MHEWS) and disaster risk information and assessments to people by 2030. MHEWS encompass *“several hazards and/or impacts of similar or different type in contexts where hazardous events may occur alone, simultaneously, cascading or cumulatively over time, and taking into account the potential interrelated effects.”*¹²¹ Cognisant of the multi-hazard context of Antigua and Barbuda, Figure 8 maps the status of MHEWS under the four components of early warning systems, utilising the UNDRR’s Hazard Taxonomy groupings¹²². It is evident that early warning systems for hydrometeorological hazards are more advanced than capacities for other hazard categories, and there is an overall need to strengthen the MHEWS mechanism for the country.

¹²⁰ [https://www.undrr.org/terminology/early-warning-system#:~:text=Annotations%3A%20Effective%20%E2%80%9Cend%2Dto,the%20hazards%20and%20possible%20consequences%3B%20\(](https://www.undrr.org/terminology/early-warning-system#:~:text=Annotations%3A%20Effective%20%E2%80%9Cend%2Dto,the%20hazards%20and%20possible%20consequences%3B%20()

¹²¹ [https://www.undrr.org/terminology/early-warning-system#:~:text=Annotations%3A%20Effective%20%E2%80%9Cend%2Dto,the%20hazards%20and%20possible%20consequences%3B%20\(](https://www.undrr.org/terminology/early-warning-system#:~:text=Annotations%3A%20Effective%20%E2%80%9Cend%2Dto,the%20hazards%20and%20possible%20consequences%3B%20()

¹²² United Nations Office for Disaster Risk Reduction. 2020. Hazard Definition & Classification Review Technical Report.

GEOLOGICAL HAZARDS	HYDRO METEOROLOGICAL HAZARDS	ENVIRONMENTAL HAZARDS	BIOLOGICAL HAZARDS	CHEMICAL HAZARDS	TECHNOLOGICAL HAZARDS
1. Earthquake	1. Tropical Cyclone/ Tornado	1. Deforestation	1. Human Epidemics & Pandemics	1. Oil Pollution	1. Boat/Road / Air crash / Accidents
2. Tsunami	2. Flood	2. Land & Soil Degradation	2. Animal Epidemics & Pandemics	2. Persistent Organic Pollutants	2. Infrastructural Failures
3. Volcanic Eruption	3. Storm Surge	3. Biodiversity	3. Pest Infestation		3. Fires
4. Landslide	4. Drought	4. Environmental Pollution	4. Invasive Species		4. Explosions
	5. Cloudburst	5. Wildfires			5. Spills & Leaks
	6. Landslide				
	7. Heat & Cold Wave				

Colour	EWS Components Represented	Colour	EWS Components Represented
	<ul style="list-style-type: none"> • C1- Disaster Risk Knowledge 		<ul style="list-style-type: none"> • C3- Warning Dissemination and Communication
	<ul style="list-style-type: none"> • C2-Hazard Detection, Monitoring and Forecasting 		<ul style="list-style-type: none"> • C2-Hazard Detection, Monitoring and Forecasting • C3- Warning Dissemination and Communication

Figure 8: Status of MHEWS for Antigua and Barbuda

6. Stakeholder Analysis

Partnerships are imperative to effective disaster risk reduction recognising that risk transcend geographical boundaries, and the varying contexts of vulnerabilities and capacities at the global, regional, national levels and local levels. The Sendai Framework for Disaster Risk Reduction is built on the foundation of all-of-society involvement and partnership. Partnerships are especially critical to SIDS like Antigua and Barbuda due to the islands' disproportionate vulnerability to climate change and its related hazards, as well as limited resource capacities for mitigation, adaptation and effective recovery.

Antigua and Barbuda's institutional framework for disaster risk reduction is representative of its commitment to shared ownership at the national and local levels. National stakeholders form a critical part of the institutional mechanism for disaster risk management. These stakeholders have been identified within Section 3.4 of this report. Private sector involvement in disaster risk reduction has been described as "limited"¹²³ and there is therefore a need to capitalise on this partnership. At the regional and international level, Antigua and Barbuda is signatory to a range of instruments that foster collaboration and support. As a CDEMA Participating State, Antigua and Barbuda has benefitted from technical and financial support to strengthen its disaster risk management capacities¹²⁴. Additionally, in the aftermath of Hurricane Irma in 2017, several CARICOM neighbours heeded the country's call for assistance and supported immediate response and recovery needs.

Several disaster risk reduction projects undertaken in Antigua and Barbuda have been financed by regional and international agencies due to funding limitations at the national level¹²⁵. In 1993, the OAS and USAID signed a USD 5 million Office of Foreign Disaster Assistance (OFDA) funded agreement, to provide technical assistance for disaster mitigation in select countries of the Caribbean, of which Antigua and Barbuda benefitted under the Post-Georges Disaster Mitigation project. The project was premised on the concept of mitigation being an integral aspect of development if countries were to achieve sustainable development. In 2013, Antigua

and Barbuda accessed funding via the World Bank for its Public and Social Sector Transformation Project that was instituted with three underpinning objectives with benefits to the social vulnerability element of risk: : (i) strengthening capacity in managing public policies and public service; (ii) improving the efficiency of social protection spending and; (iii) improving the income and employability of the vulnerable population through temporary employment and training programs. In 2017, through a multipartite partnership with ECHO, CDEMA, IFRC, UNDP and OCHA, Antigua and Barbuda implemented an initiative to strengthen its early warning systems¹²⁶. Antigua and Barbuda has also benefitted in major projects funded by the Inter-American Development Bank (IDB), UNDP and other international governments¹²⁷.

The value of partnerships to Antigua and Barbuda is best demonstrated in a statement made by the Global Facility for Disaster Risk Reduction that posited, "*Antigua and Barbuda's capacity to respond to a major disaster without major outside support will remain limited for the foreseeable future.*" With economic growth and development progress erased by the COVID-19 pandemic, these partnerships are even more critical as the country aims to return on its path to sustainable development and resilience.

¹²³ https://www.climatelinks.org/sites/default/files/asset/document/2021-09/Antigua.and_.Barbuda.May_.2021.Final_.pdf

¹²⁴ CDEMA. <https://www.cdema.org/index.php/news-centre/42-antigua>

¹²⁵ UN Habitat. 2011. Antigua And Barbuda: National Urban Profile. <https://mirror.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3322>

¹²⁶ Gazol, Claudia. 2017. Strengthening Early Warning Systems in the Caribbean Antigua and Barbuda.

¹²⁷ Global Facility for Disaster Risk Reduction. 2010. Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes. Antigua and Barbuda.

7. Impacts and Institutional Response to COVID-19

At the time of preparation of this study, the world continues its fight against COVID-19 which was declared a pandemic by the World Health Organization on March 11, 2020. A year later, global and national efforts continue to minimise this threat which has reinforced the interconnected nature of risk. Antigua and Barbuda recorded its first case of the virus on March 13, 2020. From the onset, Antigua and Barbuda has managed to keep its case count low, recording less than ten new cases daily (with some exceptions during waves). As at April 04, 2022 Antigua and Barbuda has recorded a total of 7,493 cases since its first case, 8 active cases and a seven day moving average of zero cases¹²⁸, symbolising the country's advantageous position in curbing the spread of the virus.

Timely and decisive action can be credited for the country's public health success. At the time when COVID-19, then the Novel Coronavirus, was regarded as a Public Health Emergency of International Concern before its graduation to pandemic, the Ministries of Health and Tourism convened a meeting on March 10, 2020 with the Antigua and Barbuda Hotels and Tourist Association and the Antigua Workers Union, to develop a plan of action for the sector and enable tourism sector preparedness¹²⁹. By March 15, 2020, the Ministry of Education, Science and Technology announced the early closure of all educational institutions to minimise the spread of the virus¹³⁰. Early action also saw the Government of Antigua and Barbuda restricting incoming visitors and instituting a multi-sectoral COVID-19 task force to oversee planning and management of the virus¹³¹. Health sector preparation involved the preparation of isolation facilities and human resource capacity building through the arrival of medical teams from neighbouring Cuba¹³². Through its Ministry of Health, Wellness and the Environment, the Government of Antigua and Barbuda also developed COVID-19 guidelines for various institutions. On

March 27, 2021, following recommendation by the Cabinet, the Governor General declared a state of emergency, the closure of non-essential services and a resulting curfew to restrict the movement of persons in an effort to limit the spread of the virus¹³³. By June 1, 2020, Antigua and Barbuda commenced the first phases of the reopening of its borders with necessary health protocols instituted. On September 23, 2020, led by the NODS and staffed with multi-sectoral representatives, the NEOC was activated to coordinate the pandemic response¹³⁴.

Since its onset, COVID-19 has not only brought a public health challenge, but created economic fallout and social disruption. In response to this, the Government of Antigua and Barbuda enhanced social protection measures. The Antigua Public Utilities Authority suspended the disconnection of water and electricity utilities of customers in arrears, in addition to the application of discounts¹³⁵. External tariffs on food imports and new tax measures were suspended; a one-year investment incentive for home renovation was instituted; and social safety net programmes were expanded¹³⁶. Global and national recovery is only possible through robust vaccination regimes to secure the road to recovery. However, developing countries initially met significant challenges accessing the necessary vaccines supplies to support recovery efforts. On April 08, 2021, the country received its first tranche of COVID-19 vaccines via the COVAX facility¹³⁷, and by March 28, 2022, approximately 65% of the population had received at least one dose of the vaccine¹³⁸.

Despite successes, the pandemic exposed underlying vulnerabilities of the health sector, while also resulting in the loss of 42 lives to date. Antigua

128 <https://www.worldometers.info/coronavirus/country/antigua-and-barbuda/>

129 Government of Antigua and Barbuda. 2020. Tourism and Health Officials meet with Hoteliers to share Corona Virus action plan. March 04, 2020. St. Johns, Antigua. https://ab.gov.ag/media_page.php?page=225

130 Ministry of Education, Science and Technology. 2020. Closure of Educational Institutions. March 15, 2020. https://ab.gov.ag/pdf/MoEST_COVID-19_Closures.pdf

131 Antigua and Barbuda Tourism Authority. 2020. Antigua and Barbuda update on Coronavirus/COVID-19. March 16, 2020. St. Johns, Antigua. https://ab.gov.ag/pdf/Covid-19_Statement_update%20.pdf

132 Government of Antigua and Barbuda. 2020. Cuban anti-COVID Medical Team Arrives in Antigua. March 26, 2020. https://ab.gov.ag/media_page.php?page=230

133 Government of Antigua and Barbuda. 2020. Media Statement. March 27, 2020. https://ab.gov.ag/pdf/covid_news/mar_27_2020_State_of_Emergency_in_Antigua_and_Barbuda.pdf

134 National Office for Disaster Services. 2020. National Emergency Operations Centre activated for Covid-19 response. September 23, 2020. <http://nods.gov.ag/national-emergency-operations-centre-activated-for-covid-19-response/>

135 Antigua Public Utilities Authority. 2020. APUA Offers Assistance during COVID-19 Crisis. March 27, 2020. https://ab.gov.ag/pdf/covid_news/mar_27_2020_APUA_Offers_Assistance_During_COVID_19_Crisis.pdf

136 UNDP, UNICEF and UN Women. 2020. Antigua and Barbuda COVID-19 Heat Report Human And Economic Assessment Of Impact.

137 PAHO. 2021. Antigua and Barbuda receives the first COVID-19 vaccines through the COVAX Facility. April 8, 2021. <https://www.paho.org/en/news/8-4-2021-antigua-and-barbuda-receives-first-covid-19-vaccines-through-covax-facility>

138 <https://covid19.gov.ag/>

and Barbuda lacked the national capacity to test for the virus in the early stages, with samples being sent to the Caribbean Public Health Agency (CARPHA) laboratory in Trinidad and Tobago. Additionally, at the time the country's first case was recorded quarantine and isolation capacity was still being established¹³⁹. The 2019 Global Health Security Index, assessing a country's ability to prevent, detect, respond to health emergencies, along with its health capacity, norms and risks, places Antigua and Barbuda at a score of 29 (least prepared), below the global average of 40.2 and ranking 147 out of 195 countries assessed¹⁴⁰. This signifies an urgent need for addressing shortfalls as it relates to health sector ability to manage emergencies and to strengthen health system resilience.

COVID-19 has revealed the systemic nature of risk, creating cascading impacts across a range of sectors. It has exacerbated underlying vulnerabilities and eroded the path to development. With tourism a mainstay of Antigua and Barbuda's economy and travel essentially halted by the pandemic, the socioeconomic impacts have been equally catastrophic. A 2020 report on the impact of COVID-19 estimated that poverty levels in Antigua and Barbuda would have increased to 23.7% from pre-pandemic levels of 3.7% (in 2008/2009)¹⁴¹. Another 2020 study by the Economic Commission for Latin America and the Caribbean (ECLAC) revealed that women represent the larger portion of persons employed in tourism activities, thereby suggesting that women have been especially affected by the economic fallout of the pandemic¹⁴². COVID-19 has therefore widened inequality gaps and stymied the path to development. As countries attempt to recover from these crippling impacts, they are now presented with an opportunity to "build back better" to cultivate resilience.

139 Government of Antigua and Barbuda. 2020. PM announces first case of Coronavirus in Antigua and Barbuda – urges nation not to panic. March 13, 2020. St. Johns, Antigua. https://ab.gov.ag/media_page.php?page=227

140 <https://www.ghsindex.org/country/antigua-and-barbuda/>

141 USAID, UNICEF. 2020. The socio-economic impact of COVID-19 on children and young people in the Eastern Caribbean Area. <https://www.unicef.org/easterncaribbean/media/2311/file/The%20socio-economic%20impact.pdf>

142 Mulder, Nanno. 2020. The impact of the COVID-19 pandemic on the tourism sector in Latin America and the Caribbean, and options for a sustainable and resilient recovery. International Trade. ECLAC.

8. Summary of Issues and Gaps

Antigua and Barbuda has made significant progress in building its disaster risk reduction capacity to support sustainable development. Notwithstanding, there are shortfalls in the existing system that requires strengthening. Acknowledging the opportunity presented by COVID-19 to strengthen disaster risk management capability in support of building back better, Antigua and Barbuda is currently well-poised to address these shortfalls. These areas for improvement are summarised in Figure 9 below.



Figure: 9: Summary of issues and gaps

9. Priority Areas for Action

The problems, issues and needs as revealed by this study have informed the recommendation of potential priority areas for revisions of Country Work Programme as well other national and sectoral policies and strategies, in support of a resilient nation and the sustainable development agenda. Table 3 establishes these priority areas into outcomes and outputs for the policy environment. The finalisation of the Country Work Programme can present an opportunity to addressing these areas. Considerations for gender, climate change, ICT and environmental sustainability should be treated as cross-cutting themes, in keeping with the CDM Strategy and Programming Framework 2014-2024.

OUTCOMES	OUTPUTS
1. Strengthened institutional arrangements for disaster risk reduction.	1.1 Enhanced legislation and delineation of roles for disaster risk reduction mainstreaming.
	1.2 Increased investment in NODS.
	1.3 Strengthened institutional arrangements for local involvement in disaster risk reduction.
	1.4 Building codes and regulations enforced for disaster risk reduction.
	1.5 Risk incentives for mitigation instituted.
	1.6 Strengthened policy coherence in support of the joint agenda.
	1.7 Strengthened arrangements for integration of private sector in disaster risk reduction activities.
	1.8 Dedicated disaster fund instituted.
	1.9 Enhanced arrangements for the institutionalisation of household and individual risk transfer mechanisms.
2. Enhanced disaster risk reduction planning for effective response, recovery and rehabilitation.	2.1 Recovery policy developed and implemented.
	2.2 Enhanced Multi-Hazard Early Warning System.
	2.3 Enhanced preparedness for biological hazards.
	2.4 Strengthened planning for business continuity across key sectors and state institutions.
	2.5 Improved arrangements for the protection of critical infrastructure.
3. Increased and sustained knowledge for disaster risk reduction.	3.1 National comprehensive risk repository established for evidence-based action.
	3.2 National public awareness strategy developed and implemented.
	3.3 Improved data collection, disaggregated by variables for risk-informed planning.
	3.4 Enhanced application of GIS for risk mapping and modelling.

OUTCOMES	OUTPUTS
4. Enhanced arrangements for disaster risk reduction mainstreaming across sectors.	4.1 Strengthened sectoral policies with considerations for disaster risk reduction and all phases of disaster management.
	4.2 Increased investment in sectors for disaster risk reduction activities.
5. Strengthened community resilience.	5.1 Enhanced planning for vulnerable groups in disaster risk reduction activities.
	5.2 Improved community engagement and involvement.
	5.3 Strengthened training and testing regime at the community level.
	5.4 Enhanced arrangements to address the underlying drivers that contribute to social vulnerability at the community level.

Table 3: Potential Areas for Action

These proposed interventions should be deliberated through stakeholder consultations to agree on the priority areas for national policies and strategies and further elaborate the activities, timeframes, budgets and indicators for implementation of activities in support of the outcomes.

Addressing Systemic Risk

COVID-19 has reinforced the need for systemic risk planning. Hazards and their impacts are not isolated. Climate change further states the case for systemic risk planning, with current and projected impacts cascading across sectors and systems. Countries are now challenged to strengthen risk governance for risk-informed sustainable development that is underpinned by the understanding of systemic risk and the integration of systems-based approaches across governance arrangements and tools¹⁴³. In its path to recovery and realigning actions to strengthen resilience and regenerate sustainable development, Antigua and Barbuda, like its Caribbean counterparts, must strengthen efforts to advance systemic risk planning including:

1. Improving mechanisms to access, analyse, visualise and share data

In keeping with the Global Risk Assessment Framework and the Sendai Framework, systemic risk planning must be supported by data across sectors and systems. Understanding systemic risk calls for multi-stakeholder dialogue and collaboration that enables the consolidation of risk data (including the complex nature of vulnerability, hazards and exposures) in support of improved analytical approaches to understanding the dynamic and interconnected nature of risk, and the cascading impacts across sectors and systems¹⁴⁴.

2. Improving inter-disciplinary, cross-sectoral, and multi-stakeholder involvement in disaster risk reduction

Beyond the need for multi-stakeholder involvement in risk data compilation, is the need for strengthened institutional mechanisms that create a platform for enhanced cooperation across stakeholders for actions geared towards addressing the underlying risk drivers. Institutional mechanisms must therefore support collaboration across state (interministerial and sectoral collaboration at national and subnational levels) and non-state

actors, including civil society, private sector, academia, and the media. Systemic risk planning calls for a paradigm shift from recognising the national disaster offices as the main entity for risk reduction, to mainstreaming risk reduction and management across the spectrum of stakeholders.

3. Strengthening efforts to mainstream disaster risk reduction into development planning

Mainstreaming risk reduction into development planning supports risk-informed policies and actions across sectors for systemic risk planning¹⁴⁵. Development pillars and sectors must integrate risk planning into activities in support of resilience. Key sectors such as health, tourism, transportation, housing, urban development, agriculture, water, etc. must be equipped with the necessary capacities to promote mainstreaming so as to address the underlying drivers of risk that contribute to system failure when risk is realised.

4. "Building back better" and integrating risk into recovery plans¹⁴⁶

COVID-19 presents an opportunity for revising and strengthening mechanisms, plans and strategies for disaster risk reduction in support of sustainable development. In its path to recovery from COVID-19, it is critical that Antigua and Barbuda's recovery tools and actions acknowledge the need systemic risk planning, propelling the paradigm shift from response to risk management, integrating mitigation, preparedness and monitoring into disaster risk management processes¹⁴⁷.

¹⁴³ ECLAC, UNDRR. 2021. The coronavirus disease (COVID-19) pandemic: an opportunity for a systemic approach to disaster risk for the Caribbean. COVID-19 Report.

¹⁴⁴ ECLAC, UNDRR. 2021. The coronavirus disease (COVID-19) pandemic: an opportunity for a systemic approach to disaster risk for the Caribbean. COVID-19 Report

¹⁴⁵ ECLAC, UNDRR. 2021. The coronavirus disease (COVID-19) pandemic: an opportunity for a systemic approach to disaster risk for the Caribbean. COVID-19 Report

¹⁴⁶ ECLAC, UNDRR. 2021. The coronavirus disease (COVID-19) pandemic: an opportunity for a systemic approach to disaster risk for the Caribbean. COVID-19 Report

¹⁴⁷ ECLAC, UNDRR. 2021. The coronavirus disease (COVID-19) pandemic: an opportunity for a systemic approach to disaster risk for the Caribbean. COVID-19 Report

5. Understanding existing capacities and gaps, and strengthening arrangements

Finally, adopting and promoting systemic risk planning must first commence with an in-depth assessment of national capacities, policies and frameworks, and understanding where there may be shortfalls. In recovery from the fallout of the pandemic and in strengthening resilience for future risks, countries must commence with a review of existing institutional and governance mechanisms to understand the barriers to effective systemic risk planning. This report provides useful information that can support Antigua and Barbuda in understanding some of its existing capacities and areas for intervention to advance systemic risk planning efforts.

10. Conclusion

Global risk is increasing and these effects are disproportionately felt across Small Island Developing States and the developing and least developed world at large. This expanding risk profile demands deliberate efforts to protect lives and resources, and safeguard the path to sustainable development. Antigua and Barbuda's commitment to sustainable development, and specifically disaster risk reduction and climate change action, is evident by its involvement with essential international and regional instruments that promote the coherence agenda. These commitments have been translated into national policies, legislations and strategies that aim to reduce disaster risk and address the threat of climate change. Antigua and Barbuda has instituted a range of actions that contribute to disaster risk reduction. Notwithstanding measures to date, this study revealed some urgent areas for strengthening within the upcoming strategic period. These include data collection and analysis for risk-informed policies; planning for recovery with the aim of "building back better"; increased investment for disaster risk reduction; and enhancing arrangements for community resilience.

The underlying and prevalent threat of climate change and its rippling impacts across varying areas must be treated across all sectors and policies. Climate change exacerbates disaster risk which in turn hinders the path to sustainable development. Achievement of the targets under the SDGs therefore require a coherent approach, especially in limited-resource settings that are characteristics of SIDS. The ongoing COVID-19 pandemic has reinforced the need for the application of a systemic risk concept. The pandemic has not only crippled health systems, but has caused large degrees of unemployment, widened inequality gaps, stymied economic growth and ultimately eroded progress made in achieving the SDGs. As Antigua and Barbuda is on its path to recovery from the crisis, like the rest of the world, the country is provided with an opportunity to rethink its understanding of and planning for risk, and the need for cultivating resilience at the national, sectoral and local levels. This study explored the varying underlying dimensions of risk that create the risk profile for Antigua and Barbuda. These findings will be useful in setting the context for disaster risk reduction in support of building back better and the sustainable development agenda.

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Appendices

Appendix I: Risk Components

HAZARD CATEGORY	HAZARD CLUSTER	HAZARDS IDENTIFIED	SOURCE
Hydro-meteorological	Convective-related	Downbursts Lightning	O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf
	Convective-related	Thunderstorm	http://nods.gov.ag/hazzards/thunderstorms/
	Flood	Coastal Riverine Surface water Flash	Nationally Determined Contribution, 2015 http://www.sustainablesids.org/knowledgebase/intended-nationally-determined-contribution-2015-of-antigua-and-barbuda Government of Antigua and Barbuda. 2020. Antigua and Barbuda's First Biennial Update Report. https://unfccc.int/sites/default/files/resource/Antigua%20and%20Barbuda%20-%20UNFCCC%20Biennial%20Update%20Report%201%20-%20Final.pdf O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf OAS. 2001. Antigua/Barbuda Hazard Vulnerability Assessment Project: Final Report. http://www.oas.org/pgdm/document/abvulnas/chinfinl.doc http://www.oas.org/pgdm/hazmap/flood/maps/bbflood.jpg http://www.oas.org/pgdm/hazmap/flood/maps/anflood.jpg

HAZARD CATEGORY	HAZARD CLUSTER	HAZARDS IDENTIFIED	SOURCE
	Marine	Storm surge Tsunami	<p>Nationally Determined Contribution, 2015 http://www.sustainablesids.org/knowledgebase/intended-nationally-determined-contribution-2015-of-antigua-and-barbuda</p> <p>OAS. 2001. Antigua/Barbuda Hazard Vulnerability Assessment Project: Final Report. http://www.oas.org/pgdm/document/abvulnas/chinfinl.doc</p>
	Precipitation-related	Drought	<p>Nationally Determined Contribution, 2015 http://www.sustainablesids.org/knowledgebase/intended-nationally-determined-contribution-2015-of-antigua-and-barbuda</p> <p>Government of Antigua and Barbuda. 2020. Antigua and Barbuda's First Biennial Update Report. https://unfccc.int/sites/default/files/resource/Antigua%20and%20Barbuda%20-%20UNFCCC%20Biennial%20Update%20Report%201%20-%20Final.pdf</p> <p>OAS. 2001. Antigua/Barbuda Hazard Vulnerability Assessment Project: Final Report. http://www.oas.org/pgdm/document/abvulnas/chinfinl.doc</p> <p>Government of Antigua and Barbuda. Antigua & Barbuda's 2015-2020 National Action Plan: Combatting Desertification, Land Degradation & Drought. https://www.latinamerica.undp.org/content/rblac/en/home/library/poverty/antigua--barbudas-2015-2020-national-action-plan-combatting-des.html</p> <p>Government of Antigua and Barbuda. National Environmental Summary, 2010. http://www.pnuma.org/publicaciones/FINAL%20NES%20Antigua%20Barbuda%20Nov%202010-%20edited.pdf</p>
	Precipitation-related	Hail	<p>O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf</p>

HAZARD CATEGORY	HAZARD CLUSTER	HAZARDS IDENTIFIED	SOURCE
	Temperature-related	Heatwave Coldwave	O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf
	Wind-related	Tropical cyclone Tropical Storm Wind	Sustainable Island Resource Management Zoning Plan, 2011 https://environment.gov.ag/assets/uploads/attachments/816fb-sustainable_island_resource_management_zoning_plan_antigua_-_barbuda.pdf Nationally Determined Contribution, 2015 http://www.sustainablesids.org/knowledgebase/intended-nationally-determined-contribution-2015-of-antigua-and-barbuda Government of Antigua and Barbuda. 2020. Antigua and Barbuda's First Biennial Update Report. https://unfccc.int/sites/default/files/resource/Antigua%20and%20Barbuda%20-%20UNFCCC%20Biennial%20Update%20Report%201%20-%20Final.pdf O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf
		Tornado Wind	O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf OAS. 2001. Antigua/Barbuda Hazard Vulnerability Assessment Project: Final Report. http://www.oas.org/pgdm/document/abvulnas/chinfinl.doc

HAZARD CATEGORY	HAZARD CLUSTER	HAZARDS IDENTIFIED	SOURCE
Extraterrestrial			<i>Not considered in country documents</i>
Geohazard	Seismogenic (earthquakes)	Earthquake Ground shaking	<p>OAS. 2001. Antigua/Barbuda Hazard Vulnerability Assessment Project: Final Report. http://www.oas.org/pgdm/document/abvulnas/chinfinl.doc</p> <p>O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf</p> <p>Government of Antigua and Barbuda. National Environmental Summary, 2010. http://www.pnuma.org/publicaciones/FINAL%20NES%20Antigua%20Barbuda%20Nov%202010-%20edited.pdf</p>
	Shallow geohazard	Landslide	<p>O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf</p> <p>http://nods.gov.ag/hazzards/landslide/</p> <p>Government of Antigua and Barbuda. Antigua & Barbuda's 2015-2020 National Action Plan: Combatting Desertification, Land Degradation & Drought. https://www.latinamerica.undp.org/content/rblac/en/home/library/poverty/antigua--barbudas-2015-2020-national-action-plan-combatting-des.html</p> <p>http://www.oas.org/reia/iwcam/pdf/Antigua%20and%20Barbuda/abreport.pdf</p>

HAZARD CATEGORY	HAZARD CLUSTER	HAZARDS IDENTIFIED	SOURCE
Environmental	Environmental degradation	Air pollution	https://www.iamat.org/country/antigua-and-barbuda/risk/air-pollution Government of Antigua and Barbuda. Environmental Protection and Management Act, 2019. http://laws.gov.ag/wp-content/uploads/2019/08/No.-10-of-2019-Environmental-Protection-and-Management-Bill-2019.pdf
	Environmental degradation	Biodiversity Loss	Sustainable Island Resource Management Zoning Plan, 2011 https://environment.gov.ag/assets/uploads/attachments/816fb-sustainable_island_resource_management_zoning_plan_antigua_-_barbuda.pdf
	Environmental degradation	Sea Level Rise	Nationally Determined Contribution, 2015 http://www.sustainablesids.org/knowledgebase/intended-nationally-determined-contribution-2015-of-antigua-and-barbuda Government of Antigua and Barbuda. 2020. Antigua and Barbuda's First Biennial Update Report. https://unfccc.int/sites/default/files/resource/Antigua%20and%20Barbuda%20-%20UNFCCC%20Biennial%20Update%20Report%201%20-%20Final.pdf http://www.oas.org/reia/iwcam/pdf/Antigua%20and%20Barbuda/abreport.pdf
		Coastal Erosion	Sustainable Island Resource Management Zoning Plan, 2011 https://environment.gov.ag/assets/uploads/attachments/816fb-sustainable_island_resource_management_zoning_plan_antigua_-_barbuda.pdf OAS. 2001. Antigua/Barbuda Hazard Vulnerability Assessment Project: Final Report. http://www.oas.org/pgdm/document/abvulnas/chinfinl.doc Government of Antigua and Barbuda. Antigua & Barbuda's 2015-2020 National Action Plan: Combatting Desertification, Land Degradation & Drought. https://www.latinamerica.undp.org/content/rblac/en/home/library/poverty/antigua--barbudas-2015-2020-national-action-plan-combatting-des.html

HAZARD CATEGORY	HAZARD CLUSTER	HAZARDS IDENTIFIED	SOURCE
		Loss of mangroves	Government of Antigua and Barbuda. National Environmental Summary, 2010. http://www.pnuma.org/publicaciones/FINAL%20NES%20Antigua%20Barbuda%20Nov%202010-%20edited.pdf
		Deforestation	http://www.oas.org/usde/environmentlaw/WaterLaw/Antigua_and_Barbuda.htm http://www.oas.org/reia/iwcam/pdf/Antigua%20and%20Barbuda/abreport.pdf http://www.fao.org/3/y1717e/y1717e07.htm
		Death of coral reefs	Government of Antigua and Barbuda. 2020. Antigua and Barbuda's First Biennial Update Report. https://unfccc.int/sites/default/files/resource/Antigua%20and%20Barbuda%20-%20UNFCCC%20Biennial%20Update%20Report%201%20-%20Final.pdf Camacho et al. Status of coral reefs in Antigua & Barbuda: using data to inform management. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7271886/ Government of Antigua and Barbuda. National Environmental Summary, 2010. http://www.pnuma.org/publicaciones/FINAL%20NES%20Antigua%20Barbuda%20Nov%202010-%20edited.pdf http://www.oas.org/reia/iwcam/pdf/Antigua%20and%20Barbuda/abreport.pdf
		Salinity	Government of Antigua and Barbuda. 2020. Antigua and Barbuda's First Biennial Update Report. https://unfccc.int/sites/default/files/resource/Antigua%20and%20Barbuda%20-%20UNFCCC%20Biennial%20Update%20Report%201%20-%20Final.pdf Nationally Determined Contribution, 2015 http://www.sustainableislands.org/knowledgebase/intended-nationally-determined-contribution-2015-of-antigua-and-barbuda

HAZARD CATEGORY	HAZARD CLUSTER	HAZARDS IDENTIFIED	SOURCE
		Eutrophication	https://www.cbd.int/doc/world/ag/ag-nr-01-en.doc
		Soil degradation	Government of Antigua and Barbuda. Antigua & Barbuda's 2015-2020 National Action Plan: Combatting Desertification, Land Degradation & Drought. https://www.latinamerica.undp.org/content/rblac/en/home/library/poverty/antigua--barbudas-2015-2020-national-action-plan-combatting-des.html Government of Antigua and Barbuda. National Environmental Summary, 2010. http://www.pnuma.org/publicaciones/FINAL%20NES%20Antigua%20Barbuda%20Nov%202010-%20edited.pdf
	Environmental degradation (forestry)	Wildfires	Government of Antigua and Barbuda. Antigua & Barbuda's 2015-2020 National Action Plan: Combatting Desertification, Land Degradation & Drought. https://www.latinamerica.undp.org/content/rblac/en/home/library/poverty/antigua--barbudas-2015-2020-national-action-plan-combatting-des.html Government of Antigua and Barbuda. National Environmental Summary, 2010. http://www.pnuma.org/publicaciones/FINAL%20NES%20Antigua%20Barbuda%20Nov%202010-%20edited.pdf
Chemical			Pesticides and Toxic Chemicals Act, 2008 http://extwprlegs1.fao.org/docs/pdf/ant84662.pdf http://extwprlegs1.fao.org/docs/pdf/ant84662.pdf
	POPs	Mining	National Implementation Plan for the Management of Persistent Organic Pollutants, 2007 http://chm.pops.int/Portals/0/download.aspx?d=UNEP-POPS-NIP-AntiguaandBarbuda-1.English.pdf
	Hydrocarbons	Oil pollution	http://www.oas.org/reia/iwcam/pdf/Antigua%20and%20Barbuda/abreport.pdf

HAZARD CATEGORY	HAZARD CLUSTER	HAZARDS IDENTIFIED	SOURCE
Biological	Aquaculture	Algal Bloom	https://www.cbd.int/doc/world/ag/ag-nr-01-en.doc
	Insect infestation	Insect pest infestation	O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf
	Invasive species	Invasive Species	O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf Government of Antigua and Barbuda. National Environmental Summary, 2010. http://www.pnuma.org/publicaciones/FINAL%20NES%20Antigua%20Barbuda%20Nov%202010-%20edited.pdf
	Invasive species	Invasive weeds	Nationally Determined Contribution, 2015 http://www.sustainableids.org/knowledgebase/intended-nationally-determined-contribution-2015-of-antigua-and-barbuda Government of Antigua and Barbuda. National Environmental Summary, 2010. http://www.pnuma.org/publicaciones/FINAL%20NES%20Antigua%20Barbuda%20Nov%202010-%20edited.pdf
	Infectious disease (human and animal)		National Strategic Plan for Health 2016-2020 https://pancap.org/pc/pcc/media/pancap_document/National-Strategic-Plan-for-Health-Antigua-and-Barbuda-29-March-2016-1.pdf O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf

HAZARD CATEGORY	HAZARD CLUSTER	HAZARDS IDENTIFIED	SOURCE
Technological	Construction/ Structural Failure	Building collapse	O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf
	Industrial failure / non- compliance	Explosion Leak Spill Fire	Environmental Protection and Management Act, 2019 http://laws.gov.ag/wp-content/uploads/2019/08/No.-10-of-2019-Environmental-Protection-and-Management-Bill-2019.pdf O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf http://nods.gov.ag/hazzards/fire/ NODS. 2016. National Marine Pollution Contingency Plan, 2016. http://www.racrempeitc.org/sites/default/files/Attachments/Antigua%20and%20Barbuda.pdf
	Waste	Solid waste Wastewater Hazardous Waste	National Solid Waste Management Act 1995 http://laws.gov.ag/wp-content/uploads/2018/08/a1995-10.pdf Nationally Determined Contribution, 2015 http://www.sustainablesids.org/knowledgebase/intended-nationally-determined-contribution-2015-of-antigua-and-barbuda Government of Antigua and Barbuda. National Environmental Summary, 2010. http://www.pnuma.org/publicaciones/FINAL%20NES%20Antigua%20Barbuda%20Nov%202010-%20edited.pdf

HAZARD CATEGORY	HAZARD CLUSTER	HAZARDS IDENTIFIED	SOURCE
Technological			http://www.oas.org/reia/iwcam/pdf/Antigua%20and%20Barbuda/abreport.pdf Government of Antigua and Barbuda. Environmental Protection and Management Act, 2019. http://laws.gov.ag/wp-content/uploads/2019/08/No.-10-of-2019-Environmental-Protection-and-Management-Bill-2019.pdf
	Transportation	Air Transportation Accident	O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf
	Transportation	Marine waters	O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf
	Transportation	Road Traffic Accident	O'Marde, Dorbrene. 2017. Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016. National Office of Disaster Services. St. Johns, Antigua. https://reliefweb.int/sites/reliefweb.int/files/resources/54920_annex04drrcdantiguaandbarbuda.pdf
Societal	Behavioural	Violence	Medium Term Development Strategy 2016-2020 https://observatorioplanificacion.cepal.org/sites/default/files/plan/files/antigua_barbuda_medium_term_development_strategy.pdf



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