Country Document for Disaster Risk Reduction: Antigua and Barbuda, 2016

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Message from Government Authorities

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EXECUTIVE SUMMARY

The Country Document for Disaster Risk Reduction (DRR) presents a 2016 analysis of the status of DRR in Antigua and Barbuda. It identifies priorities and proposes strategies for the comprehensive national management of risk with the protection of human life and the environment as main goals.

This Country Document was prepared within the international context for Disaster Risk Reduction as encapsulated in the SENDAI FRAMEWORK which recognizes 'that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders',

The four priorities of the Framework are:

- Understanding disaster risk
- Strengthening disaster risk governance to manage disaster risk
- Investing in disaster risk reduction for resilience
- Enhancing disaster preparedness for effective response and to 'Build Back Better' in recovery, rehabilitation and reconstruction.

These priorities are further enunciated in the UNISDR paradigm of Disaster Risk Reduction (DRR) – which also informs this document - as the 'systematic efforts to analyse and manage the causal factors of disaster, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.'

The document recognizes as important to the understanding and implementation of DRR strategies the following international reports and strategies:

- 2011 Global Assessment Report on Disaster Risk Reduction (UNISDR, 2011)
- The Yokohama Strategy and Plan of Action for a Safer World
- The Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (HFA)
- The 2005 World Conference on Disaster Reduction
- The Millennium Declaration and the Millennium Development Goals (MDGs), and
- The United Nations Framework Convention for Climate Change (UNFCCC)

The analysis references the Caribbean understanding of DRR as enunciated in:

- The Strategy and Results Framework for Comprehensive Disaster Management (CDM) that calls for, inter alia, 'strengthened and sustained capacity for a culture of safety and community resilience…', and
- The work of the Caribbean Disaster Emergency Management Agency (CDEMA)
- UN Conference on Small Island Developing States (SIDS 2014)
- Regional Framework for Achieving Development Resilient to Climate Change (2009-2015) and its Implementation Plan (2011-2021)

The analysis shares with the CARICOM agenda of building of resilience to the impacts of global climate change the strategy of encouraging action to reduce the vulnerability of natural and

human systems in CARICOM countries to the impacts of a changing climate.' It also calls however for the reduction of the national vulnerability to socio-economic, political, and man-made hazards.

The physical environment of the country is described through the compilation of well documented fact.

- Antigua and Barbuda have co-ordinates of 17.1°N; 61.5°W and 17.4°N; 61.9°W respectively. Antigua is approximately 22.5 wide and 12 miles (19.3 kilometres) long for a total area of108 square miles (280 square kilometres). Antigua is relatively flat with the exception of a hilly region in the southwest - the highest elevation of 1,330 feet. The coastline is jagged with bays, rocky headlands and several coral reefs encircling the island.
- Barbuda, measures sixty-two square miles (161 sq. km) and located is 45 kilometres north of Antigua. Barbuda is described as having 'no significant elevation', rising to its highest point of one hundred and twenty-four feet in the Highlands region. The Codrington Lagoon, the largest lagoon in the Eastern Caribbean, is a central feature of the Barbuda landscape, running along the western side of the island. This lagoon is of special conservation significance as is the largest Frigate Bird Sanctuary in the Eastern Caribbean, located there, which contains over one hundred and seventy species of birds and home to over five thousand frigate birds.
- Redonda is a small uninhabited island located 35 miles south west of Antigua. It is comprised of volcanic rock formation and measures just 0.5 sq miles (1 square kilometre).

The climate of the country is described as moderately arid, tropical maritime as characteristic of the Caribbean tropical zone with an average seventy-five percent (75%) relative humidity. Annual rainfall averages sixty to one hundred and twenty-five centimetres (60-125cm/24-49 inches) with the lower value applicable to eastern Antigua and the higher value associated with the south-west region.

The climate is influenced by:

- The steady easterly trade winds and has a marked dry and wet season. The former extends from January to March/April, when less than twenty percent (20%) of annual rainfall occurs and the latter from August through November receives forty-five to fifty percent (45% to 50%) and also,
- El Niño Southern Oscillation (ENSO) wherein the La Nina conditions tend to cause wetter and colder conditions and the El Niño episodes bring warmer and drier than average conditions during the August/November wet hurricane season.

A total of eighty-six watersheds have been defined in Antigua. They contain 90% of Antigua's ground water supply and 90% of its surface water reservoirs. They are important reservoirs of diverse plants and wildlife that are located in forested areas. They are also prime sites for the location of settlements and tourism facilities.

The country relies on desalinated potable water to meet the national demand of approximately eight million imperial gallons per day. Total production is approximately five-point-five million imperial gallons (5.5 MIG) comprising of eighty-three percent (83%) desalinated water and

seventeen percent (17%) groundwater. There is a hefty daily deficit of around two-point-five (2.5 MIG) or thirty one percent (31%) of daily requirements.

Barbuda is divided into ten (10) poorly defined watersheds which are delineated in the Highlands where surface runoff is normally limited, but may become significant in flood conditions.

The socio-economic context of this analysis is described through detailed review of the population, its project growth and distribution on the island, the conditions of its housing, its literacy and exposure to social factors such as poverty and crime.

The estimated population (2015) was ninety-one thousand, two hundred and ninety five (91,295) reflecting an approximate eighteen percent [17.7%] increase over the last decade. Included in the estimate is the population of Barbuda of one thousand, six hundred and fifteen (1,615) - representing a fifteen percent [15%] growth over the last decade.

A significant portion of the increase in population over the past twenty (20) years has been attributed to returning residents and migrants from CARICOM countries drawn to the country by its comparatively good economic performance in tourism and international business. The 2011 census shows a total of 11,783 Caribbean citizens (other than Antiguan and Barbudan) resident in the country with eighty-six percent arriving from four main countries – Commonwealth of Dominica, Dominican Republic, Guyana and Jamaica.

The median age of the population is 31 years. The size of the dependent population (0-14 plus 65+) is 14,175 males and 14,748 females for a total of 28,923 or 46.4% of the productive population.

The population of Antigua and Barbuda's population is projected to be 97,000 in 2020 (8.9% increase) and 105,000 by year 2030 (7.6% increase). The population is projected to experience a steady increase but slower than the present rate due to slowing fertility rates, the decrease in natural increase, higher life expectancy as well as shifts in the migration pattern.

There is evidence of a twenty year trend of continued de-urbanisation of the population with significant growth in locations on the outskirts of the city – especially on the west and east where an increase of migrant populations is moving into areas where housing, public utilities and sanitation services are poor or limited and settlement extensions occur on poorly drained sites without adequate street drains and sidewalks.

The potential for disasters through the localized hazards of floods, fires and health epidemics is perhaps greater than in most other areas of the country.

There has been a steady increase in the number of households and dwelling units in the nation. According to the data from the 2001 Census, 32% of the country's 20,437 dwelling units were constructed between 1990 and 2001 which coincided with a period of heightened hurricane activity in the country and resultant damage from hurricane related natural disasters. Construction during the period was required not only to meet the demands for new housing and routine repairs but also to restore or rebuild damaged structures. The impact of hurricanes

between 1989 and 2001, led to the application of hurricane resistance practices in new construction and repair or retrofitting of dwelling houses and other structures. Approximately sixty percent (59%) of the thirty thousand two hundred and thirteen dwelling unit were constructed of wood which are less resistant to hurricane and fire.

Sixty seven percent of the households in Antigua and Barbuda have water piped to their premises. Eighty two percent of households in the nation have bathroom facilities inside their dwelling unit. The presence of latrines/cesspits in areas that are prone to flooding presents a hazardous environment that could precipitate health disasters such as the spreading of cholera and gastroentereal diseases.

Antigua and Barbuda can be described as a highly literate society. The nation is served by at least twenty radio stations, the vast majority (17) of which broadcast in the FM band; two (2) cable networks and one (1) broadcast TV station. There are two daily newspapers. Forty-eight percent of the population uses the Internet

Antigua and Barbuda ranks 86th in the World Health ranking [2013] data extracted from WHO, World Bank and UNESCO. The infant mortality (9/1,000 live births) is lower than the regional average of 15/1,000. Birth rates on Antigua and Barbuda have been reduced from 29.6 per thousand in 1970 through 18.8 in 1990 to 12.53 in 2014. The average birth rate is 12.94 births per thousand. The total fertility rate (per woman) in 2013 was 2.1 declining from 3.3 in 1970. Crude death rates have shown steady reduction from 7.3 per thousand in 1970 to 7.1 in 1990 and 6.2 in 2012 decreasing constantly through 6.14 in 2013, 6.11 in 2014 and 6.09 in 2015.

Malignant neoplasm was the leading cause of death in Antigua and Barbuda in 2010. The second ranked principal cause of death in 2010 was heart disease followed by diabetes mellitus. Hypertension was the most reported Non-Communicable Disease (NCD). Public health officials are alarmed however by the increase in prevalence of obesity/overweight.

Antigua and Barbuda is essentially a service based economy, relying predominantly on the tourism industry as the main engine of growth with support from the construction sector. The country grapples with economic, social and environmental challenges such as a narrow resource base, heavy dependence and vulnerability to external markets exacerbated by small domestic markets; high costs for energy, infrastructure, transportation, communication and servicing; fragile natural environments and high levels of vulnerability to natural disasters; volatility in economic growth and limited opportunities for the private sector and a proportionately large reliance of their economies on their public sector. In addition, decades of unsustainable fiscal practices and coupled with weak institutional structures led to an extreme and unsustainable debt burden.

In 2005, the GDP at market prices was estimated at US$459.487 million and the GDP per capita was US$10,513 with major contributions from ‘Transportation and Communications (20.8%)’; ‘Government Services (16.8%)’; ‘Construction (16.2%)’; ‘Financial and Business Services (16.1%)’; and ‘Hotels and Restaurants (9.9%)’. The agriculture sector contributed only 3.6%. in 2005 and has continued its steady decline for a number of years. The main direct and indirect contributor to

GDP is tourism which is the most significant economic driver for the economy. The economy lacks diversity and therefore resilience.

Economic growth has been somewhat volatile during the last decade. These growth patterns underscore the economy's vulnerability to external shocks, high levels of dependence on foreign source markets and reliance on a narrow resource base.

By the end of 2009 Antigua and Barbuda had recorded the worst recession in the country's history as the economy contracted by 10.7% in that year. Over the period 2009-2011 real GDP plummeted by 22.2%. However by 2014 the economy grew by 4.2 percent due to an increase of economic activity in the public sector, wholesale and retail sector and construction. Tourism as represented by hotels and restaurants grew by 5.3 percent. The national debt in 2014 was 1,226 millions of dollars, (98.24% debt-to-GDP ratio) and its public debt per capita is 13,487$ dollars per inhabitant.

In 2015, economic activity is expected to decelerate and reflect growth of 2.6 percent. Based on projections provided by the Eastern Caribbean Central Bank (ECCB), the economy of Antigua and Barbuda is expected to grow by 2.8 percent in 2016 and 2.7 percent in 2017. However there is some optimism that this growth could be larger based on the planned investments of EC$3billion by the government.

Antigua and Barbuda continues to face challenges on its fiscal accounts. In order to ensure fiscal and debt sustainability and achieve a debt to GDP target of 60 percent in 2030, the government has decided to pursue fiscal policy that would lead to primary surpluses over the medium term by improving expenditure management and controls, revenue generation and debt management. The current account deficit amounted to $56.3 million (1.6 percent of GDP).

The overall fiscal deficit amounted to $110.0 million (3.2 percent of GDP) in 2014, while the primary deficit represented 2.0 percent of GDP. Borrowing from the domestic financial system and an accumulation of both external and domestic arrears financed the deficit.

Preliminary estimates for 2015 indicate an improvement in the fiscal performance in 2015 with a possible small primary deficit of 0.2 percent of GDP. This was due mainly to high collections of corporate income taxes and consumption taxes.

Over the medium term the government is aiming to achieve primary surpluses of 3 percent of the GDP. The goal is to generate an underlying primary balance of no less than 3 percent of GDP in 2016. The additional resources would help to fund implementation of key projects that can create employment and expand economic output.

The rate of unemployment in Antigua & Barbuda in 2015 has been recorded at fourteen-point-one percent (14.1%). The youth employment rate is thirty four-point-six percent (34.6%), more than double the overall unemployment rate. A staggering 29 percent of our population or over 8,000 persons either live in poverty or, are at risk of falling into poverty. They earn an annual income of below $6,318, or income below $650 per month. In Antigua and Barbuda the GINI coefficient - the standard measure used in assessing inequality in consumption - is 0.48 indicating high levels of inequality, the worst in the region.

The most vulnerable groups are identified as the poor, the elderly, children and disabled persons. The Government continues its commitment to assist vulnerable groups through a series of programmes managed by the Public Service itself or its statutory authorities. These include:

- The Antigua and Barbuda Social Security Board (ABSSB) implements a contributory pension scheme for formal sector workers which provides age and social pensions as well as invalidity, survivors, sickness, maternity, and funeral benefits;
- The Government administers the Civil Service Pension Scheme, a noncontributory pension plan for public employees.
- The Government provides social assistance through the Board of Guardians'
- Social assistance programs are also provided by several institutions.
- PDV Caribe Antigua and Barbuda Ltd., implements two social assistance programs: the People's Benefit Program (a conditional cash transfer program), and the Senior Citizens Utilities Subsidy

Government spends five-point-two percent (5.2%) of GDP on social protection programmes, much higher than other OECS countries that on average spend three-point-eight percent (3.8%) of GDP.

The national development agenda has been designed on a platform of Sustainable Development aimed at attaining 'a sustainable services economy that improves quality of life, ensures social stability, and balances environmental integrity'. The country shares an international reality with other SIDS which remain 'trapped in the reality of a narrow tax base, high debt, large trade deficits, small underdeveloped domestic financial markets, small private sectors and fragile banking systems' as it continues to face its share of developmental challenges such as global demands, climate change, and other external shocks. 'Fiscal stabilisation, market access, and debt management' are high on the development agenda not only for internal economic stability and order but also in order to attract more Foreign Direct Investment and international aid.

The Human Development Index (HDI) (an average measure of basic human development achievements in a country) considers several social indicators (such as, life expectancy at birth, average age of schooling and expected years of schooling and family income or per capita consumption, etc.). It prioritizes elements of human development such as participation, gender equality, safety, sustainability, human rights and others. This indicator emphasizes the right to a healthy environment, in which DRR is a key component. Among the Caribbean countries, Antigua and Barbuda now ranks third, behind Barbados and The Bahamas although it has lost six places in ranks during 2009-2014.

The Gender Inequality Index (GII), for example, reflects gender-based inequalities in three dimensions – reproductive health, empowerment, and economic activity. A GII value for Antigua and Barbuda is not available. In Antigua and Barbuda, however 24% of parliamentary seats are held by women (1 of 17 in the House of Representatives and 6 of 17 in the Upper House/The Senate); and 81% of women have attained a junior secondary or higher level of education (including 9% with university education) compared to 77% of their male counterparts (including

8% with university education).

The Sustainable Development Goals (SDGs), otherwise known as the Global Goals, are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. The SDGs came into effect in January 2016, and they will continue guide UNDP policy and funding for the next 15 years. Achieving the SDGs requires the partnership of governments, private sector, civil society and citizens alike to make sure we leave a better planet for future generations.

Three of the seventeen goals of the SDGs relate specifically at actions necessary for DRR:

- Goal 13. Take urgent action to combat climate change and its impacts.
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

A Country Strategy for Antigua and Barbuda for the period 2015-18 outlines the assistance strategy sought of the Caribbean Development Bank and planned strategic focus to accelerate the country's economic growth and pursue sustainable development over the outlined period. The Country Strategy Interventions over the period 2015-18 will be geared towards achieving seven outcomes, namely:

- financial sector stability;
- improved access to and quality of education;
- improved physical infrastructure;
- reduced cost of energy and cleaner energy;
- increased private sector competitiveness;
- adequate water and sanitation facilities, and
- better economic management.

The Government reemphasized its firm commitment to 'transforming Antigua and Barbuda into the economic powerhouse of the region' and enunciated a development strategy of 'entrepreneurial socialism' which seeks to utilize capitalist strategies, in collaboration with the private sector, to generate profits for the benefit of the people'. The priorities by enunciated by the Prime Minister to meet the goal include, inter alia:

- Turning The Economy To Solvency and Restoring Our Country's Image
- Economic Development
- Environmental Services
- Social Services

The Constitution of Antigua and Barbuda empowers the Governor General to declare a public emergency in cases of war or the occurrence of 'any earthquake, hurricane, flood, fire, outbreak of pestilence, outbreak of infectious disease or other calamity whether similar to the foregoing or not'. The Emergency Powers (Hurricane, Earthquake, Fire or Flood) Act [Cap 148/1989] makes it

'lawful for the Cabinet after the occurrence in Antigua and Barbuda of any hurricane, earthquake, fire or flood, to declare by proclamation in the Gazette that a state of emergency exists.

The legislative powers of these two Acts have been assumed by the comprehensive Disaster Management Act 2002 which provides for 'the effective organisation of the preparedness, management, mitigation of, response to and recovery from emergencies and disasters natural and man-made in Antigua and Barbuda. It establishes the National Disaster Preparedness and Response Advisory Committee and empowers, as a public officer, the Director of Disaster Preparedness and Response.

There are literally no direct references to DRM or DRR in the existing laws and or legally binding provisions of Antigua and Barbuda. However there are a number of laws that address matters of environmental protection, sanitation and land use control, for instance, that contain directions that can directly reduce vulnerability and risk.

- Environmental Protection and Management Act No. 11 of 2015 - provides for sustainable environmental protection and management
- Physical Planning Act, 2003 - provides a comprehensive framework for planning, establishes the Development Control Authority (DCA) and the Town and Country Planner.
- Public Health Act (Chapter 353; 1957/1989) - establishes the Central Board of Health (CBH).
- Slum Clearance and Housing Act – establishes the Central Housing and Planning Authority (CHAPA)
- The National Solid Waste Management Act 1995 makes direct reference to disasters and hazards, and establishes a National Solid Waste Management Authority (NSWMA).
- Public Utilities Act – establishes and incorporates the Antigua Public Utilities Authority (APUA).
- The Barbuda Act and the Barbuda Land Act, 2007 (Act 23 of 2007) - regulates tenure of and controls the ownership and distribution of lands of Barbuda.
- The Animals (International Movement and Disease Act and Regulations - protection of human health from diseases transmitted by plants and animal
- National Parks Act, Cap. 290 and National Parks (Amendment) Act - the establishment of National Parks and a National Parks Authority (NPA)
- The Plant Protection Act - empowers officers of the State to quarantine and/or destroy suspected or infected organisms.
- The Forestry Act Chapter 178 1941- defines and declares forest reserves

The national annual budget of NODS is legislated by an act of Parliament. The provision of disaster management services is assigned to the Ministry of Social Transformation and Human Resources Development within whose framework NODS functions.

The main normative instrument for disaster risk reduction, technical and political decision making is the Disaster Management Act, No. 13 of 2002 which defines a "disaster emergency" as 'a public emergency declared under the Constitution or the Emergency Powers (Hurricane, Earthquake, Fire or Flood) Act, Cap. 148.

The Act establishes a National Advisory Committee to manage a Disaster Response Policy and a National Disaster Response Plan and appoints a public officer as Director of Disaster Preparedness and Response responsible coordinating the general policy relating to the mitigation of, preparedness for, response to and recovery from emergencies and disasters. S/he is particularly authorized to conduct investigations, studies, surveys, research and analyses relating to ecological systems and environmental quality and document and define changes in the natural environment as these relate to the likelihood of disasters, and to prepare and review hazard risk assessment maps of Antigua and Barbuda.

The State agencies with responsibility for various aspects of environmental management and disaster risk reduction are identified as:

- The Ministry of Agriculture, Lands, Fisheries and Barbuda Affairs has responsibility for some of the most important aspects of disaster risk reduction. Its national portfolio includes Agriculture and Food Production, Lands, Surveys and the Development Control Authority, Fisheries and Animal Husbandry and Veterinary Services.
- The Environment Division is presently within the Ministry of Health and the Environment which manages the Environmental Protection and Management Act.
- The National Parks Authority (NPA) mandated to 'preserve, protect, manage and develop the natural physical and ecological resources and the historical and cultural heritage of Antigua and Barbuda'.
- The Development Control Authority (DCA) manages the National Physical Development Plan which has significant implications for disaster risk reduction and integrated ecosystem management.
- The National Solid Waste Management Authority handles the disposal of solid waste for the Island.
- National Coordinating Mechanism for Environmental Conventions keeps in view all ratified Environmental Conventions. It is a network of government agencies/divisions, national focal points, competent authorities, and NGO's, working to together to facilitate a coordinated and timely response to Antigua and Barbuda's treaty obligations.

The National Comprehensive Disaster Management (NCDM) policy governs the wide field of disaster management. It calls for the linking and coordination of all related national environmental policy and secondary legislation into a legislative framework that supports and promotes the implementation of CDM.

Government, in approving the adoption of the CDM policy as a plank in its efforts to improve the public safety culture and foster disaster management ownership, commits to:

- provide adequate human and financial resources to enhance the administrative structures of NODS enabling, inter alia the establishment of an effective mechanism and programme for management of comprehensive disaster management knowledge
- develop and maintain a framework which enables the capacities and capabilities of communities to support and elaborate its efforts of disaster prevention and mitigation, recovery and rehabilitation.
- mandate that CDM activities be expanded in the public sector and encourages the private

sector and civil society to do the same.

This NCDM policy is intended to be elaborated in disaster preparedness programmatic goals and objectives related to:

- Defined roles of the private sector and civil society
- Enhancing the Disaster Risk Management capacity of lead sector agencies, national and regional insurance entities, and financial institutions.
- The incorporation and integration of Hazard information and Disaster Risk Management into sectoral policies, laws, development planning and operations, and decision-making in tourism, health, agriculture and nutrition, education, planning and infrastructural development.
- The development and implementation of Prevention, Mitigation, Preparedness, Response, Recovery and Rehabilitation procedures in the main sectors of the economy.
- Public safety legislation and regulations updated with regards to mass crowd gathering activities, marine and terrestrial traffic and transportation.

Government recognizes that there are specific and unique requirements in the development and maintenance of a disaster management framework in the 'island community' of Barbuda and will allocate human and financial resources to improve efforts of disaster prevention and mitigation, recovery and rehabilitation and deepen coordination with the identified national agencies.

National Policy Framework and Sectoral Directives for Climate Change Adaptation and Mitigation Actions encourages all agencies in Antigua and Barbuda to explore and access the opportunities being developed by the climate change negotiation process and include considerations of possible impacts of climate change in their planning and development processes.

The Sustainable Island Resource Management Zoning Plan (SIRMZP) creates an "umbrella" that will guide national development to achieve the following objectives:

- Provide for the protection of critical ecosystem functions and habitats, minimizes environmental risks, and seeks to optimize the productive use of environmental resources;
- Promote the development of a network of cohesive mixed- use settlements that offer a range of housing options that respond to different income levels and living preferences while providing ready access to local commerce, public services, and facilities;
- Establish economic growth and employment centres that focus on tourism, professional services, agriculture, and industrial development;
- Presents proposals to improve the configuration and efficacy of the road network and public transportation system;
- Specify substantive and procedural regulations and administrative frameworks that may be used to guide development in accordance with national policies; and
- Provide a framework for the preparation of detailed local plans that are in accordance with national land use priorities and strategies.

Institutional Framework

The responsibility for the effective organisation of the preparedness, management, mitigation of,

response to and recovery from emergencies and disasters natural and man-made in Antigua and Barbuda is entrusted to the National Disaster Preparedness and Response Advisory Committee (NDPRAC), the Secretary of which is the Director of the National Office of Disaster Services (NODS). NDPRAC is a multi-sectoral committee chaired by the Prime Minister and is constituted by law to include two Ministers of Government, members of the Security Forces, and representatives of the Meteorological Department, Antigua Public Utilities Authority, and at least five Ministries (Public Health; Public Safety; Environment; Public Works; Local Government)

The Prime Minister is empowered to appoint representatives of other Ministries, Departments of Government and statutory bodies as s/he thinks fit; and also other persons or organisations, including non-governmental organizations.

The national Disaster Management mechanism is managed by NODS-Coordinating Unit (NODS-CU) which is the state-run agency of the Government responsible for the reduction of national vulnerability to natural and technological hazards. It is the secretariat of the national disaster management mechanism, with specific, inter alia, responsibility for hazard risk reduction management. Since the adoption of the CDM program there have been several improvements to the overall system mainly through role identification and clarification:

- A GoAB Cabinet DRR subcommittee responsible for oversight of national Risk Reduction was appointed in 2010;
- The National Disaster Council is given the responsibility for Oversight/Policy review at national level
- The National Disaster Coordinator is responsible for daily management of the national disaster management system and the management of NODS-CU
- The broad-based National Disaster Committee (NDC) and its Executive body is the technical review committee for DRR and roles & functions, the National Sub-committees
- A National Disaster sub-committee for thematic overview and recommendations was appointed.

District Disaster Committees have been established in each of the seventeen political constituencies [of which Barbuda is one] as volunteer arms of the national emergency organization and are responsible for coordination of community resources to meet the challenges of disaster management.

Each Department of Government is required by law to designate a public officer as a Liaison Officer for communication with the Director/NODS in relation to the procedures. These officers are responsible for the preparation of organizational disaster plans which should be submitted annually to NODS. Preparation rate is poor.

The Caribbean Institute for Meteorology and Hydrology (CIMH) provides scientific and technical direction in supporting its Member States in improving the capacity of their meteorological and hydrological services, through training, research, specialised services and technical advice.

A number of civil society agencies provide support for the disaster risk reduction strategies. They include the Antigua and Barbuda Red Cross, the St John Association of Antigua and Barbuda and the Antigua and Barbuda Amateur Radio Society [ABARS]. Private sector participation in disaster

risk reduction is confined primarily to the telecommunication companies and the media broadcast stations.

Regional and international partners include:

- The Caribbean Disaster Management Agency (CDEMA) is CARICOM's regional coordinating body for disaster risk management. CDEMA forms an important of the DRR network as a key instrument for strategic visioning for CDM in the region, capacity building, and partnership formation.
- The OECS Commission's Disaster Response and Risk Reduction Programme – with its thrust towards building national and community resilience to hazard impacts.
- The Eastern Caribbean Development Partners Group (ECDPG) engaged in information sharing among donors and development partners.
- The Caribbean Development Bank which since 1974 DB has been responding to requests from its Borrowing Member Countries (BMCs) for assistance with post-disaster rehabilitation.

Antigua and Barbuda is exposed to a wide range of natural and anthropogenic hazards. The country is vulnerable to and has experienced several significant hydro-meteorological hazard impacts - predominantly droughts and hurricanes. It has also experienced seismological events such as earthquakes, landslides as well as other physical hazards along with anthropogenic and health related hazards. It is among the top five (5) countries most exposed to multiple hazards. One hundred percent of the land area and one hundred percent of the population is exposed to two or more hydro-meteorological events. More than eighty percent (80%) of GDP is at risk from two or more hazards. Six hazards, listed in order of priority, have been identified:

- Winds / Hurricanes
- Drought
- Storm Surge
- Floods
- Coastal and Stream Erosion
- Earthquakes

Storms have directly impacted the nation forty-nine (49) times at a rate of no less than nine (9) impacts per century. The most significant impacts within the last century have occurred in 1950, 1989, 1995 and 1999. The years; 1950, 1995 and 1999, were also years of multiple storm impacts for the country and in each of these instances of these multiple impacts, all occurred within 1 month of each other.

The majority of damage experienced - over the last few decades - from passing storms have been from water and flood damage due to the impact on property and infrastructure. Over the decade 1989-1999, based on damage assessment reports, the average 'direct' impact of these storms was EC$200 million or US$73.6 million.

Storms have had direct impact on agriculture, environment and infrastructure. Their frequency and impact forced changes in disaster preparedness and mitigation.

Droughts - where the country receives less than average level of precipitation over a prescribed period of time - have been a consistent challenge since the inception of western colonization on the island. The Antigua Meteorological Services (AMS) has recorded twenty four (24) drought episode years between the period 1928 and 2007. The most recent drought of 2014-2015 was severe and caused the declaration of a water emergency.

Drought conditions exacerbate the secondary effects of other hydro-met hazards and result in severe socio-economic impacts.

Flooding is traditionally associated with tropical storm activity in the hurricane season. Recently however seeming minor storm events have yielded significant damage and disruption. An intense deluge lasting only forty-five (45) minutes (October 2015) triggered flash flooding causing damage to infrastructure in St. Johns, its environs and several flood prone areas throughout the country.

Flooding has been exacerbated by man-made activities that have increased the number of flood prone areas in country. The reduction of percolation surface areas and increase in hard surfaces that increase run-off volumes are evident in unplanned zonal development. There is evidence that the flow capacity of drainage systems – especially those in built-up urban and expanding suburban areas – is inadequate.

Coastal flooding is a threat for most of Barbuda as the main community is adjacent the lagoon. In Antigua it is primarily a concern along the three coastal tourism and residential developed corridors Sea-level rise due to climate change may modify the significance of the threat in the future.

A consequence of prolonged exposure to flood conditions is the potential for increased infection rate by waterborne and related vector transmitted diseases.

Earthquakes are frequent, although minor. Antigua and Barbuda is located within the North-eastern Leeward Islands which is one of the more seismically active zones in the Caribbean. The country is situated in near the epicenters of two of the three great quakes recorded in the Caribbean history (magnitude greater than 8 / in 1690 and 1843). In the two year period 2013-2015, the country experienced a minimum of forty-two (42) events of up to 5.9 magnitude.

Rock-fall and landslides are significant threats, primarily associated with seismic activity and/or intense precipitation events. Landslide risk is associated with poor land management practices.

Tornado events have been observed both within TS events and independently off-shore. Occasional 'waterspout' sightings just offshore are not uncommon. When these micro-systems do make landfall however they have the capacity for causing intense localized negative impacts. In Oct. 2013 the main military base of the Antigua and Barbuda Defense Force (ABDF) was struck resulting in damage of approximately EC$7million to multiple structures.

Tsunamis are a real but infrequent hazard with potential to cause devastating impact. Only ten (10) confirmed earthquake generated events have been recorded over the last five hundred years. However over eighty percent (80%) of critical infrastructure lies within one (1) mile distance from the coast and is within the demarcated impact area for a ten (10) metre wave. Tsunamis are

therefore a national disaster management concern.

Fire impacts date back to the 1863 Portuguese rum shop fire. St. Johns City and its environs is characterized by high building density, narrow streets, high intensity of vehicular traffic and an above-ground power grid network. The city therefore has an inherently high level vulnerability to fire hazards. Between 1995-2005 Antigua & Barbuda averaged 240 fires annually. The annual totals for 2006 and 2007 have increased to over 360 and continue to rise.

Anthropogenic threats to which Antigua and Barbuda is vulnerable include bio-hazards, chemical, radiological, transportation-based emergencies (aircraft, automotive and marine), environmental hazards such as pollution spills of terrestrial and marine nature, especially oil.

Health threats tend to be influenced by hydro-meteorological hazards. Their occurrence is not common and they tend to hold low significance in the country's hazard profile. The reduction in biological threats to human health and safety such as gastroenteritis and influenza, and the re-emerging diseases such as tuberculosis and leptospirosis is firmly on the national agenda. The public health challenges have been primarily with controlling vectors such as the *Aedes aegypti* mosquito and the Black Rat and Brown Rat. The nation shares the growing global and regional focus on the pandemic scares of Avian Influenza and swine flu.

Phyto-sanitary hazards such as the infestation by agricultural pests the Pink Mealy bug and the Palm Yellowing bacteria and the arrival of invasive species of the Cuban Tree Frog, the Giant African snail and the predatory Lion Fish are examples of the threats to fisheries, crops and general vegetation.

The country possesses no active volcanoes but its closest neighbor, Montserrat has an active volcano and in circumstances of suitable prevailing winds the island of Antigua has been impacted by ash-fall.

In summary, the risk of loss of life, property damage and loss, and economic costs - both direct and indirect - from more frequent, less severe hazard impacts has significantly increased due to inter alia:

- the greater level of investment in infrastructure and economically vital development activities in hazard sensitive and vulnerable areas;
- a heavy dependence on the vulnerable export industry of tourism and other related service based industries, financial sector services and online gaming among others.
- limited or compromised capabilities by some elements of society for risk absorption or adequate risk transfer options.

The concept of 'vulnerability' links the situation of people in communities with the hazards to which they have been exposed. Contemporary discussions suggest that vulnerability refers to the inability to withstand the effects of a hostile environment or even more simply, 'a measure of possible future harm'. The prescriptive and normative response to vulnerability then is to reduce exposure, enhance coping capacity, strengthen recovery potential and bolster damage control (i.e. minimize destructive consequences) via private and public means.

Natural/environmental vulnerability refers to humans coexisting with the environment without domination and destruction. It also takes into account the vulnerability of ecosystems to direct and indirect human action, and the high risk associated with communities that exploit or inhabit them.

Environmental issues play an important role in maintaining sustainability of the economy. For example, the impact of drought - caused by high seasonal and inter-annual rainfall variability – includes water scarcity where access to water is a challenge to the tourism and agricultural sectors. Drought can exacerbate existing vulnerabilities to other more overt and dynamic events like fires and floods. The protection of watershed areas and the revitalization and rehabilitation of water harvesting practice and structures improves public resilience to drought conditions.

Environmental degradation over recent decades has had a significant impact on coastal defenses. There has been significant loss (in hectares) of mangrove populations since 1980. Intense public education and security surveillance and monitoring programmes are in force

The destruction of mangroves and breaches to natural coastal defenses increase vulnerability to coastal based hazards such as sea-level rise, tidal waves, tropical storm-related impacts. Approximately seventy percent of the nation's tourism accommodation has beachfront locations and therefore has high vulnerability to storm surge, as do important resorts and central infrastructures such as ports and airports, located less than 6 metres above sea level.

A number of illegal acts, to include i) infrastructure development and building on hillsides; ii) beach sand mining on the perimeter of the island, and (iii) uncontrolled sewerage disposal are examples of documented environmental degradation which impact on critical habitats such as coral reefs, sea-grass beds, wetlands and beaches and may increase vulnerability to coastal hazards and threaten economic livelihoods and food production provided by the fisheries sector.

The effects of climate change are expected to exacerbate several prominent hazards and pose challenges for the major sectors of the economy (agriculture, tourism, coastal zone, energy, fisheries, forestry, health, human settlements, and water resources). Thus mitigation against climate change is a critical part of the country's' development and investment strategy and planning frameworks encompass not only the immediate observable future but also the immediate and long-term timeframes.

To date, Antigua and Barbuda has taken several measures to adapt and mitigate the impacts of climate change. The fundamental pillars of mitigation are based on energy use, energy efficiency and utilization of renewable energy.

Adaptation strategies engage a variety of mechanisms to reduce loss and damage from disasters made worse by climate change, including disaster risk management, insurance and other compensatory schemes, building and development codes enforcement, and water storage, supply (ground water and desalination) and efficiency in usage, including irrigation technology and public education'.

Much of the physical vulnerability is a result of exposure of buildings and critical infrastructure to seismic, weather-related hazards. Vulnerability to hurricanes and flooding has significantly

increased in areas of the country where there are numerous houses that are not to regional/local standard, with improper foundations and roof structures.

Flooding has been primarily associated with the passage of storm systems. The most recent instance was Hurricane Gonzalo in 2014 where the high level of damage to tree crop and vegetation by the minimal category 1 storm was a result of the fact that many of the tree trunks and branches were extremely dry. The compounding nature of some hazards requires a very dynamic framework for mitigation measures. Antigua and Barbuda has routinely experienced flooding while going through periods of severe drought.

Land and land management present serious challenge to the development of risk island-wide. There is an artificial scarcity of residential land in Antigua. Many individuals and/or families reside in substandard housing, build in/on unsuitable lands, engage in illegal backfilling of sites or resort to squatting. Non-sustainable activities such as the scraping of hillsides or the backfilling of wetland and water catchments (ponds) compromise slope stability.

Unsuitable building techniques in flood prone areas, primarily in north-east and western sections of Antigua have also compounded the issue as have the altering of water channels, natural and man-made. So too have been littering and illegal dumping.

The institutional structure within the housing sector is fragmented. The Central Housing and Planning Authority (CHAPA) is the main public sector agency responsible for building houses but there are no formal mechanisms for ensuring systematic coordination between itself and many other Government agencies and departments which have a key role to play in housing delivery.

There is ambiguity in public policy concerning the issue of squatting. State interventions to regularize the tenancy of squatting populations have been without strategic view and constrained by the political implications of 'following the law'. Squatting on available land puts the occupants at risk of fire, flooding or social hazards including crime.

Economic vulnerability: Economic viability is inherently linked to the vulnerability in critical sectors of economic importance especially where singular events can have prolonged serious reoccurring effects. The economic vulnerability in the country is particularly high. There is virtual 'mono-crop' dependence on the tourism sector both for GDP and employment. However this sector is susceptible to multiple hydro-meteorological, seismic, physical and environmental hazards and provides a serious mitigation challenge. Any interruption to services - even when damage to hotels and infrastructure may be slight – has significant impact on the social and economic life of the country. The loss of revenue and employment if the tourism sector is affected would significantly affect the overall capacity of the country and its population to recover from disaster.

Average per capita income levels in Antigua and Barbuda are high. However, income is not evenly distributed in the country and there are social groups with little capacity to absorb the losses from a hazard and recover.

Agriculture and fisheries have been the traditional sectors that receive a mass migration of workers displaced from tourism in the event of disruption but at its low level of development has limited capacity to provide financial returns to households and communities and sector-related

businesses to absorb losses and damage - and recover from them.

Social vulnerability: The sources of social vulnerability are multiple and quite diverse. The most important factors that affect vulnerability include 'population growth and distribution' and 'social diversity'. The former - especially increased population density and urbanization - increases vulnerability to disasters. The capacity to absorb the impact of a hazard and recover is limited by the economic characteristics of the group.

Poverty is a primary social factor in increasing population vulnerability, as are the ages of sectors of the population and the prevalence of disabilities. National poverty assessments characterized approximately twenty-nine percent of the population as socio-economically vulnerable, susceptible of slipping easily into poverty.

Crime is one of the key social hazards in poor communities exacerbated in densely populated areas where housing may be substandard and security poor. Antigua and Barbuda is characterized as having a low to moderate crime rate where the number of crimes against property is significantly higher than those against persons.

Political vulnerability is characterized by the frequent turnover in political leadership which can impact the continuity of disaster risk reduction activities. Resilience building can be done in the short term, but governance structures and the involvement of various actors must be in place to ensure the continuity and fulfillment of these shorter-term efforts and achieve sustainable resilience. Sustaining government engagement in risk reduction is a challenge reported by many countries.

Education service delivery bears vulnerability based on the physical vulnerability of the school plants themselves and the impact of hazards that may require citizens in Antigua and Barbuda to relocate to emergency shelters. The vulnerability of education structures to natural and or man-made hazards, especially during a disaster, puts at risk the education of eighty seven percent of the school population (5-16yrs old) and the livelihood of many in education related employment.

No analysis of Institutional or ideological and cultural vulnerability is provided in this Country Document.

A variety of government, NGOs, service and faith based, community level organizations and private sector agents are active in Antigua and Barbuda in DRR. There has been considerable progress in the following areas as mandated in the Hyogo Framework for Action [HFA]:

- Area (1) – 'Integration of the CDM process at the national level' - has begun with the development of ministry CDM plans for the Public sector to lead by example.

- Area (2) - The development and strengthening of institutions, mechanisms and capacities implementation of the CWP multi-year programme' has allowed for the implementation of systematic programmes and projects over multiple budgetary cycles and political administrations.

- Area (3) – The incorporation of risk reduction:

NODS has been able to systematically incorporate risk reduction through its CDM focus into its routine activities and operations such as: Shelter and Shelter Management and Damage Assessment and Needs Analysis (DANA) involving its local, national and regional stakeholders. In addition:

- NODS completed the revision of the National Disaster Management Plan utilizing the Results Based Management framework (RBM) and the national Disaster Management Policy and Legislation has been drafted.
- National and local risk assessments based on hazard data and vulnerability information are available. Multi-hazard maps have been developed and are utilized by multiple agencies including Agriculture and the Department of Environment. Systems are in place to monitor, archive and disseminate data, with the development of the Environmental Information Management Advisory System (EIMAS) and centralized Geographic Information System (GIS).
- The NODS website has been established ensuring that disaster risk reduction information on disasters is available and accessible at all levels.
- School curricula, education material and relevant trainings include disaster risk reduction. The Safer Building course is implemented at Antigua State College and Antigua and Barbuda Institute of Continuing Education.
- DRR has been incorporated into Integrated Coastal Zone Management (ICZM) activities nationally.
- Social development policies and plans are being implemented to reduce the vulnerability of at risk populations through Ministry of Social Transformations' agenda.
- Economic and productive sector policies and plans are being advanced through the Department of Environment Sustainable Island Resource Fund (SIRF) which addresses issues such as the implementation for cash/skill transfer & micro financing.
- Enforcement of building codes is occurring for the interventions in several flood prone areas, the slope stabilization to arrest rock-fall in the Urlings community.
- Procedures are in place to assess the disaster risk impacts of major infrastructural development projects. There is limited consultation and consideration of some major project but EIA process collaboration with DRR assessment has been strengthened.
- Strong policy, technical and institutional capacities and mechanisms for disaster risk management, have been encouraged through several capacity building programmes targeted at schools within the USAID/OFDA Safe Schools Program and the Living Schools project.
- Disaster preparedness plans and contingency plans are in place at all administrative levels, and regular training drills and rehearsals are held to test and develop disaster response programmes, through the Safe School Initiative being spearheaded through the region by the OECS.

Stakeholder coordination at the operational level has been through multiple platforms including:

- Coordination – Planning. There a centralized GIS platform multi-user platform for the

government sectors. The Development Control Authority (DCA), Department of Environment, Lands and Survey Division, Ministry of Agriculture, Department of Environment and NODS have collaborated to establish the national system.

- Coordination/Collaboration - Public Education and Awareness

There have been a number of education and awareness initiatives geared at not only informing the public but also other partner organizations and stakeholders. Activities aimed at the improved understanding of DRR issues at the national and local level have been promoted in multiple public fora including exhibition and street fairs and communities.

- Coordination - Early Warning Systems

Public agencies involved in early warning (Antigua Meteorological Service) have been able to expand the national weather stations network which has improved the available data sets for the improvement forecasting capability; monitoring of drought and potential flash flood conditions in collaboration with NODS and the Ministry of Agriculture.

- Coordination - Response

The enhancement in coordination of the sub-regional focal group system and update focal point activation procedures is also ongoing. Harmonized training and exercise schedule have been established covering essential thematic areas such as Search & Rescue (SAR) which falls under the ABFD and Mass Casualty Management (MCM) to help foster improved ownership of these systems. Response at and from the community level is managed through the national District Disaster Committee (DDC) volunteer system.

The Ministries of Agriculture, Education, Environment and Health have all developed internal organizational structures for oversight of their CDM process. National multi-stakeholder committees for Drought Management, Environmental Technical Advisory and Health Disaster are functioning.

The organisation of the national disaster management system and mechanisms reflect a high level of cross fertilization of members between these various committees even though there is no formal overarching coordination mechanism functioning outside of emergencies. Information and collaborations are engineered between projects and programs, initially through non formal deliberations.

A number and wide scope of social themed projects and programmes are central to continued collaborative planning in Antigua and Barbuda sustainable development, There are tools available to the country for further use in planning, project and program development process.

An expanded holistic approach with adequate national and regional forecasting that is tempered by past 'lessons learned' is necessary for realization of the reduction of underlying risk factors. The core elements of implementable economic policies and plans aimed at the reduction of the vulnerability of economic activities and national developmental choices - need to be geared towards reducing the vulnerability of populations most at risk while addressing long standing socio-economic and environmental issues. Policies and plans must take into consideration those

cultural customs and norms that have developed and persisted during the contested use of resource by stakeholders.

In Barbuda the lagoon is a central part of livelihood for many in eco-tourism/bird sanctuary tous, the fishing and lobster industry, and sand mining activities. Environmental sustainability is a key component to maintaining a higher standard of living and access to resources of the general populace.

Social networks are important to ensuring resilience to climate change that is derived from dependence upon and reciprocity with small social groups of people. The existing social networks and social cohesion are critical to coping with adversity and change.

The CD reinforces critical definitions:

- A hazard is seen as 'a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation',
- Vulnerability is understood as 'the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard'.
- Risk is a function of the potential loss and/or damage based on the exposure to a hazard and the likelihood of its occurrence and the vulnerability of assets to be adversely affected by this hazard based on their characteristics. This is typically expressed as:

  Risk = Hazard x Vulnerability
- Disaster risk is 'the potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.

Disaster risk can be reduced if strategies and mechanisms are developed to mitigate hazards and reduce vulnerabilities. Disasters themselves are manifestations of unmanaged risks and can be understood as 'a social-environmental manifestation of socially constructed risk'. First order effects describe potential damage to physical infrastructure and the environment, while secondary effects consider the potential socio-ecological and economic impact on communities and organizations.

Risk reduction focuses on anticipatory planning to minimise the likelihood of hazards and/or their interaction with the environment and society, thus aiming to lower hazard exposure and reduce vulnerability to them across the society and economy. Hence, this must be applied in policy formulation and development planning, in addition to the post-impact recovery and reconstruction phase.

The IDB has developed a System of Indicators to measure disaster risk and risk management, designed to evaluate the variables related to the potential impact of extreme events and the capacity of society to withstand such. This System of Indicators is intended to:

- Improve the use and presentation of information on risk with identification of its essential social and economic characteristics, thus assisting policymakers in formulating adequate DRM policies and actions, identifying investment priorities to reduce risk and

guide the recovery process
- Measure key elements of vulnerability, identify national capacities and provide data to evaluate the effects of policies and investments on risk management
- Promote the exchange of technical information for public policy formulation and risk management programmes

Risk scenarios help in the identification of the potential losses and damages and the particular vulnerable groups and sectors likely to be affected by a particular hazard event. Vulnerable groups and sectors are more likely to take appropriate mitigating action if they have good quality information on the potential losses and damages which may be incurred. Appropriate disaster preparedness strategies can then be prioritised for specific risk scenarios. The development of risk scenario information is equally important to enable the factoring of risk considerations into development and land use planning to avoid an increase in risk levels in the future.

However there are no clearly defined risk scenarios for Antigua and Barbuda but an alignment of hazard maps with described vulnerabilities will give indication of the changing nature of risk and suggest measures to address them. The scenario should be able to define the hazard parameters, the affected population (location and numbers), vulnerable assets and infrastructure, and expected impacts.

The prioritization of risk scenarios and the identification of areas of intervention are based on the prioritization of hazards, the assessment of their frequency and intensity, and the likelihood of their future occurrence. Hazard analysis was informed by historical impacts according to their probability, frequency, area of impact and magnitude and stakeholder experience. The risk scenario for hurricane/wind and accompanying storm surge has been assigned the highest priority.

The hazard maps show the vulnerability of Antigua and for Barbuda to winds/hurricanes by the return periods of 10 years, 25 years, 50 years and 100 years. For the 50-year return period most of Antigua would be of moderate vulnerability. The long-term vulnerability is similar to the 50-year storm. The central and eastern districts of the island are within the moderate vulnerability zone. The western section of the island is low and some sections of the southern range are within a high vulnerability zone'.

The 50-year storm for Barbuda will subject most of the island to moderate vulnerability with an area south of Codrington in a low vulnerability zone. The long-term vulnerability of Barbuda is similar to the 50-year return storm with a small section on western Area 2/Palmetto Point experiencing low vulnerability to wind.

The long-term vulnerability to storm surge in Antigua is similar to the 50-year storm. All bays along the coast would be subjected to moderate storm surge with the exception of those on the southwest that would have low vulnerability.

The long-term vulnerability of Barbuda is similar to the 50-year return storm with a small section on western Area 2/Palmetto Point experiencing low vulnerability. The Bird Sanctuary, lagoon, sea ports and approximately half of the town of Codrington can be expected to be affected by storm

surge in the long term.

The loss exceedance curve (LEC) describes the probability that a certain level of loss will be exceeded in any given year. The losses at given return periods are a numerical description of the shape of the risk profile and represent the amount of loss expected at each return period. The assessment of risk should transition into decisions on how the risk will be managed and in this case transition to risk transfer as the expected losses and return periods increase.

NODS, in consultation with a wide range of stakeholders completed the instrument 'Criteria Identifying Reduction (DRR) Planning in Latin America and the Caribbean that established the strategic directions considered critical to reduce disaster risk in the country. The tool helped focus discussion and thinking on DRR matters within the identified specific strategic platforms. The strategic directives identified in the 'criteria' analysis are presented in four categories:

A. Apparent and immediately recognizable signs of hazard and exposure

1. Conduct an in-depth hazard analyses with focus on Drought – highlighting its impact in various sectors of the economy e.g. Agriculture, Tourism and Health
2. Conduct a similar analysis on 'Heat wave'.
3. Conduct integrated scenarios and studies of the existing multi-hazard zones/areas

B. Drivers of risks in the country and their configuration in the territory

Agencies generally had fairly good knowledge of the population and the socio-economic status of the communities identified as 'hotspots' and are aware of their physical and health vulnerabilities but should:

- Collaborate with all environmental and disaster management agencies to promote the concept of an apex agency with power to demand accountability from regulatory agencies and support - in particular - the DCA for the implementation of all aspects of the National Physical Development Plan.
- Monitor population access to improved sanitation infrastructure, to improved water sources and communication channels and further empower and support communities to recognize and address root causes of vulnerability
- Collaborate with the management of Essential Services in the communities for the design and implementation of risk reduction strategies on their physical facilities and technological processes.

C. Current capacities for risk management

There is recognition of

- the multi-level nation system that inter alia, has responsibility for promoting community and institutional preparedness for emergencies and disaster.
- Local government structures are weak or non-existent and therefore cannot contribute to DRM and Environmental management.
- Post-disaster/emergency allocation or reallocation of finances falls legally with the

Cabinet and the Ministry of Finance but administrative process for streamlining disbursement are ineffective
- Early warning and hazard monitoring systems are in place but they lack the multi-hazards approach.

Strategies need to be developed and implemented to:
- Ensure the involvement of community groups in the DRM and Environmental Management work of the proposed apex organization
- Establish a National Early Warning System with purpose of developing multi-hazard warning capacities and with a critical responsibility for the proper and timely dissemination of warning or appropriate and timely information

D. Enabling regulations

Recognizing:
- the existence of regulations and legal instruments for DRM but note their non-enforcement
- the existence of inter-agency structures and sectoral institutions assigned DRM responsibilities but note their limited capacity and emergency-only activation and focus
- the existence of sectoral institutions assigned DRM responsibilities but note the focus on disasters/emergencies and absence of a strategic view of DRR

The following strategic directions are recommended:
- In collaboration with other agencies, demonstrate through detailed risk assessments the potential costs of inaction and lack of enforcement of existing laws and regulations.
- Build capacity – knowledge, skills and resources – in inter-agency structures and sectoral institutions with assigned DRM/DRR responsibilities.

E. Trends and future prospects

Acknowledged the existence of scenarios about the impact of climate change and limited mechanisms for risk trend analysis but note the lack of their integration into risk management strategies and the analysis of development trends, and directs:
- Improve capacities for development trend analysis
- Promote the establishment of the apex organization with power to lead the national harmonization of DRR strategies.

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RECOMMENDATIONS

Recommendations are made here to a Government and people that have become steeped in the art of disaster preparedness but less so in disaster mitigation and adaptation. There is not much thought in the wide population about hazards beyond hurricanes. Floods and fires are sometimes seen as spectacle or media events.

The recommendations are made in a national organizational climate where although their importance is recognized by all, collaborative efforts on many fronts are challenged. Our

professionals and technicians operate in organizations where resources are limited, policy is made but not enforced and the demands of the public are at times unmindful of real practical possibilities in small islands states like Antigua and Barbuda.

The transition from a disaster preparedness culture to one of disaster risk reduction is not only a call to review the thinking of leaders and people but also one that challenges the very nature of 'how we do business', how our societies are organized and governed. Recommendations address the issues of organization and project/programme design and implementation.

Recommendation 1.
Review and re-engineer the organizational structure and processes of the 'disaster management hierarchy/establishment' with the aim of mainstreaming disaster risk reduction into development planning from the national to community level.

Recommendation 2
Intensify capacity building to improve the technical ability of local expertise in planning and implementing sustainable risk reduction programmes through training, the development of/introduction to appropriate tools and techniques, and exposure to regional and international policies and programmes.

Recommendation 3
The professional design and implementation of an advocacy programme that directs the national consciousness towards disaster risk reduction while maintaining the importance of preparedness and mitigation.

Recommendation 4
Promote meaningful community level organizations and engage their leadership in the decision making and implementation agendas of the new strategic network.

Recommendation 5
Review decision making processes at all levels to promote the understanding of risk ensuring that information generated in respect to hazards/threats and vulnerabilities are integrated into programming and project decisions

Recommendation 6
Government must demonstrate its commitment to disaster risk reduction through investing in and maintaining critical infrastructure and public property.

Recommendation 7
Government must design and implement financial and economic tools to promote risk reduction at the household and community and national levels and provide a safety net in case of disasters.

Recommendation 8
Ensure effective hazard and disaster response through early warning systems and improvement in emergency management capacities

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ACRONYMS

AAL	Average Annualized Losses
AMO	Atlantic Multi-decadal Oscillation
ABARS	Antigua and Barbuda Amateur Radio Society
ABAPD	Antigua & Barbuda Association of Persons with Disabilities
ABDF	Antigua and Barbuda Defense Force
ABFD	Antigua and Barbuda Fire Department
ABSSB	Antigua and Barbuda Social Security Board
AMS	Antigua Meteorological Services
APUA	Antigua Public Utilities Authority
BAICO	British American Insurance Company
BPOA	Barbados Programme of Action
CALC	Country Assessment of Living Conditions
CAP	[UNDP] Common Alerting Protocol
CARIBE EWS	Tsunami & Other Coastal Hazards EWS for the Caribbean and Adjacent Regions
CariCOF	Caribbean Regional Climate Centre
CARICOM	Caribbean Community
CBH	Central Board of Health
CCA	Climate Change Adaptation
CCCCC	Caribbean Community Climate Change Centre
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CDAC	Caribbean Disaster Assessment Coordination
CDB	Caribbean Development Bank
CDEMA	Caribbean Disaster Emergency Management Agency (formerly CDERA)
CDM	Comprehensive Disaster Management
CDMP	Caribbean Disaster Management Project
CDRT	Community Disaster Response Team
CDRU	Caribbean Disaster Relief Unit
CERMES	Centre for Resource Management and Environmental Studies (UWI)
CERT	Community Emergency Response Team
CHAPA	Central Housing and Planning Authority
CIMH	Caribbean Institute for Meteorology and Hydrology
CNCD	Chronic non-communicable disease
COP21	2015 Paris Climate Conference
COST	CARICOM Operational Support Team
COTED	Council for Trade and Economic Development (CARICOM)
CRMP	Coastal Risk Assessment and Management Programme
CTIC	Caribbean Tsunami Information Centre
CWP	Country Work Programme
CZM	Coastal Zone Management
DaLA	Damage and Loss Assessment
DANA	Damage and Needs Assessment
DCA	Development Control Authority
DDC	District Disaster Committee
DDI	Disaster Deficit Index
DFID	Department for International Development

DIPECHO	Disaster Preparedness Programme, ECHO
DM	Disaster Management
DoE	Department of the Environment
DRR	Disaster Risk Reduction
ECCB	Eastern Caribbean Central Bank
ECHO	European Commission´s Humanitarian Aid and Civil Protection Department
ECLAC	Economic Commission for Latin America and the Caribbean (UN)
EIA	Environmental Impact Assessment
EEZ	Exclusive Economic Zone
ENSO	El Niño Southern Oscillation
EOC	Emergency Operations Centres
EPR	Employment-to-population ratio
EU	European Union
EWS	Early Warning System
FAO	Food and Agricultural Organisation of the United Nations
FCP	Fiscal Consolidation Programme
GAR	Global Assessment Report for Disaster Risk Reduction
GCC	Global Climate Change
GII	Gender Inequality Index
GIS	Geographic Information System
GoAB	Government of Antigua and Barbuda
HDI	Human Development Index
HDR	Human Development Report
HFA	Hyogo Framework for Action
HPS	Hazard Priority Score
HSI	Hospital Safety Index
ICT	Information and Communication Technology
ICZMP	Integrated Coastal Zone Management Plan
IDB	Inter-American Development Bank
IAEA	International Atomic Energy Agency
IFRC	International Federation of Red Cross Red Crescent Societies
IICA	Inter-American Institute for Cooperation on Agriculture
IMF	International Monetary Fund
IPCC	Inter-governmental Panel on Climate Change
IWRM	Integrated Water Resource Management
LIAT	Leeward Island Air Transport
LDI	Local Disaster Index
LEC	Loss Exceedance Curve
MBS	Medical Benefits Scheme
MCM	Mass Casualty Management
MLO	Ministry Liaison Officer
MSJMC	Mount St. John Medical
MTDS	Medium Term Development Strategy
MER	Monitoring Evaluating and Reporting
MDG	Millennium Development Goals
NDPRAC	National Disaster Preparedness and Response Advisory Committee
NCD	Non-Communicable Diseases

NCDM	National Comprehensive Disaster Management
NDC	National Disaster Committee
NDE	National Disaster Executive of the NDC
NCM	National Coordinating Mechanism for Environmental Conventions
NEC	New Economic Charter
NEMS	National Emergency Management System
NEOC	National Emergency Operation Center,
NEP	National Energy Policy
NEST	National Economic and Social Transformation
NGO	Non-Governmental Organisation
NHDC	National Health Disaster Committee
NIWRM	National Integrated Water Resources Management
NOAA	National Oceanographic and Atmospheric Administration (USA)
NODS	National Office of Disaster Services
NPA	National Parks Authority
NPDP	National Physical Development Plan
NPRS	National Poverty Reduction Strategy
NSWMA	National Solid Waste Management Authority
OAS	Organisation of American States
OASIS	Organisation for the Advancement of Structured Information Standards
OECS	Organisation of Eastern Caribbean States
OFDA	Office for Foreign Disaster Assistance (USAID)
OIE	World Organisation for Animal Health
PAHO	Pan-American Health Organisation
PBL	Policy-based Loan
PDNA	Post-Disaster National Assessment
PDP	Physical Development Plan
PGDM	Post-Georges Disaster Management
PML	Probable Maximum Loss
POP	Persistent Organic Pollutant
PPP	Public-Private Partnerships
PVI	Prevalent Vulnerability Index
PWD	Persons with Disabilities
RBM	Results-Based Management
RMI	Risk Management Index
ROI	Return on Investment
RRM	Regional Response Mechanism
SAR	Search & Rescue
SCUSP	Senior Citizens Utilities Subsidy Programme
SEAP	Sustainable Energy Action Plan
SIDS	Small Island Developing States
SRFP	Sub-regional Focal Point
SRC	Seismic Research Centre (UWI)
SDG	Sustainable Development Goals
SIRF	Sustainable Island Resource Fund
SIRMM	Sustainable Island Resource Management Mechanism
SIRMZP	Sustainable Island Resource Management Zoning Plan
SJDC	St. John's Development Corporation**)**

SPAW	Special Protected Areas and Wildlife
TCHWS	Tsunami and Other Coastal Hazards Warning System Project
TS	Tropical Storm
UNCLOS	United Nations Convention on the Law of the Sea
UNDAC	United Nations Disaster Assessment and Coordination
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UNISDR	United Nations Office for Disaster Risk Reduction
UNWHS	United Nations World Humanitarian Summit
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USGS	United States Geological Service
UWI	University of the West Indies
VCA	Vulnerability and Capacity Assessment
WB	World Bank
WHO	World Health Organisation
WHS	World Humanitarian Summit
WSSU	Water and Sanitation Systems Upgrade Project

1. INTRODUCTION

There is clear recognition and unanimity that the Caribbean region is constantly threatened by multiple reoccurring hazards each with significant potential to become major disasters.

Antigua and Barbuda specifically is exposed to a number of hydro-meteorological events that have potential to impact the entire land mass and therefore the entire population. In addition

- The demographic growth is focused in a number of communities that now show high population density, poor housing and infrastructure (particularly roads and drainage), and poverty - making them highly vulnerable. They are generally without the capacities to cope with the consequences of disasters,
- The exposure to health hazards such as the dengue fever epidemic is high.

Climate change continues to exacerbate the natural hazards exposing people, the environment and important sectors of the economy to threats of disaster

In face of these growing challenges, it is important that the Government of Antigua and Barbuda Governments programme to make communities more resilient as a critical part of the nation's sustainable development strategy. It is recognized the improvement in resilience and the lessening of vulnerabilities require multi-sectoral efforts to 'analyse and manage the causal factors of disaster.' (UNISDR, 2009)

1.1 Purpose

This Country Document was prepared within the guidelines of the UNISDR and the National Office of Disaster Services. They share a common objective of 'the reduction of vulnerability and the strengthening of resilience to risks caused by natural hazards'. The CD is designed to:

- provide informational support in the reinforcement of DDR in the design, planning and coordination of national activities that impact directly or indirectly on decreasing vulnerability.
- provide baseline of data and information that will be important in the future evaluation of the DRR interventions.
- become a national reference for policy design and decision making for interventions for DRR

1.2 Objective and Scope

The document provides a comprehensive view of the state of preparedness and programming of national agencies [and some related regional and international partners] in disaster management generally. It analyses socio-economic and environmental conditions of the country and details the history the major hazards. It evaluates present vulnerabilities and capacities at national and community levels and therefore describes the state of DRR in the country. It identifies a series of

recommended actions for the management of risk where reduction in the loss of life is the priority.

It is intended to serve as an important reference tool for international and regional organizations and agencies, and national authorities and communities sharing responsibility for enabling the various elements of risk reduction.

1.3 Methodology

NODS led the consultant through a series of activities that culminated in the production of this Country Document. It includes:

- A series of planning meetings with the Director and Deputy Director and the UNISDR Caribbean Representatives
- A series of stakeholder consultations with Government, non-Govermental and community representatives introducing them to the project and soliciting their ideas on approaches to DRR. One of the consultations was held in Barbuda
- Technical consultations with NODS and the full provision to the consultant of information available to NODS, including its record of photographs
- A validation workshop where the first draft of the document (without recommendations) was presented for discussion. The Set of Criteria for the identification of key actions for DRR planning in Latin America and the Caribbean was administered here. The participants in all the consultations are listed in Annexes 2(a) and 2(b).
- A draft was circulated to critical stakeholders identified by NODS and a meeting scheduled to discussion.
- The second draft was re-circulated electronically to the critical stakeholder pool requesting written submissions
- A final draft was prepared on the basis of feedback from NODS and the critical pool of disaster management officials
- The final draft was presented to a national validation workshop.

Internet research yielded much data and information. The UNISDR 'Instructions for completing the CD' led to critical sources. Many of the various Ministries and agencies involved in environmental and disaster management are involved in regional and or international programmes that require the design of policies and plans and frequent reporting for continued evaluation of progress. The results of two different hazard analyses conducted on the country provided a basis for vulnerability assessment.

2. INTERNATIONAL AND REGIONAL DISASTER RISK REDUCTION CONTEXT

The international context for Disaster Risk Reduction (DRR) is encapsulated in the Sendai Framework for DRR, which is the first major agreement of the post-2015 development agenda. It is a 15-year, voluntary, non-binding agreement which recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders. It aims for the following outcome: '*The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.*

The framework has seven global targets:

1. Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality rate in the decade 2020-2030….
2. Substantially reduce the number of affected people globally by 2030, aiming to lower average global figure per 100,000 in the decade 2020-2030.
3. Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.
4. Substantially reduce disaster damage to critical infrastructure and disruption of basic services…including through developing their resilience by 2030.
5. Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.
6. Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this Framework by 2030.
7. Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.

Four priorities have been enunciated:

Priority 1: Understanding disaster risk

Disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment.

Priority 2. Strengthening disaster risk governance to manage disaster risk

This priority is important for prevention, mitigation, preparedness, response, recovery, and rehabilitation. It fosters collaboration and partnership.

Priority 3: Investing in disaster risk reduction for resilience

Enhanced through public and private investment in disaster risk prevention and reduction

Priority 4: Enhancing disaster preparedness for effective response and to 'Build Back Better' in recovery, rehabilitation and reconstruction.

The recovery, rehabilitation and reconstruction phase is a critical opportunity to build back better, including through integrating disaster risk reduction into development measures

The Sendai Framework is the latest of international agreements on DRR. See Table 1 below:

Table 1: Evolution of the international and regional disaster risk reduction process

Year	Strategy/Agreement/Platform
1989	International Decade for Natural Disaster Reduction
1994	Yokohama Strategy and Action Plan for a Safer World
2000	International Strategy for Disaster Reduction
	Millennium Declaration and Millennium Development Goals (MDGs)[1]
2001	Caribbean Comprehensive Disaster Management Strategy 2001-2006
2002	World Summit on Sustainable Development and Johannesburg Plan of Implementation
2005	World Conference on Disaster Reduction and Hyogo Framework for Action (HFA)[2]
2007	Enhanced Comprehensive Disaster Management Strategy 2007-2012[3]
	First Session of the Global Platform for Disaster Risk Reduction
2009	First Session of the Regional Platform for Disaster Risk Reduction for the Americas
	Second Session of the Global Platform for Disaster Risk Reduction
	Regional Framework for Achieving Development Resilient to Climate Change 2009-2015
2011	Second Session of the Regional Platform for Disaster Risk Reduction for the Americas
	Third Session of the Global Platform for Disaster Risk Reduction
2012	Third Session of the Regional Platform for Disaster Risk Reduction for the Americas
2013	Fourth Session of the Global Platform for Disaster Risk Reduction
2014	Comprehensive Disaster Management Strategy 2014-2024
	Fourth Session of the Regional Platform for Disaster Risk Reduction for the Americas
2015	World Conference on Disaster Risk Reduction[4]
2016	World Humanitarian Summit

The international thrust towards disaster risk reduction was re-energized by the 2011 Global Assessment Report on Disaster Risk Reduction (UNISDR, 2011) which revealed 'that while loss of lives in disasters is decreasing, risk exposure and economic loss are increasing, especially due to small scale highly frequent events'. Human development processes were identified as playing major roles in the configuration of risk constructed by inequality in national socioeconomic growth and international development. Climate change and climate variability in the Caribbean including Antigua and Barbuda exacerbate these socio-economic variables leading to disasters that severely impact on human lives and the environment.

1 http://www.un.org/millenniumgoals/
2 http://www.unisdr.org/hfa
3 http ://www.cdema.org/publications/CDMFramewkInfoSheet.pdf
4 http://www.wcdrr.org/

The Yokohama Strategy and Plan of Action for a Safer World and the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (HFA) were main outcomes of the 2005 World Conference on Disaster Reduction presenting a strategic and systematic approach to the reduction of vulnerability to hazards and the risks they generate. The goal of the HFA is the substantial reduction of disaster losses, in lives as well as the social, economic and environmental assets of communities and countries and until 2015 - was the reference framework for DRR public policy. Its priorities for action**:**

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation
2. Identify, assess and monitor disaster risks and enhance early warning
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels
4. Reduce the underlying risk factors
5. Strengthen disaster preparedness for effective response at all levels

The international context for DRR is also anchored in global agreements such as the Johannesburg Declaration and Plan of Implementation, the Barbados Programme of Action (BPOA) and Mauritius Strategy for Implementation, Agenda 21, and the Millennium Declaration and the Millennium Development Goals (MDGs), which are driving development aid and agendas worldwide. Global climate change (GCC) has also been recognised as a major threat to the sustainable development of Caribbean countries).[5] Antigua and Barbuda is signatory to the United Nations Framework Convention for Climate Change (UNFCCC)

The United Nations World Humanitarian Summit (WHS)[6], set a new agenda on global humanitarian action, with the aim of building a more inclusive and diverse system to end the suffering of millions of women, men and children affected by armed conflicts and disasters. The defined areas of focus are humanitarian effectiveness, reducing vulnerability and managing risk, transformation through innovation, and serving the needs of people in conflict.

<u>Regional</u>

The Caribbean has made significant progress in advancing DRR. The Caribbean Community (CARICOM) adopted in 2001 a Strategy and Results Framework for Comprehensive Disaster Management (CDM) in the region. The effort was led by the Caribbean Disaster Emergency Response Agency which was renamed in 2009 as the 'Caribbean Disaster Emergency Management Agency (CDEMA)' to more accurately reflect the CDM perspective and mandate. Antigua and Barbuda is one of the 18 Participating States of CDEMA and has adopted the CDM Framework.

[5] Barbados Country Document for Disaster Reduction 2014

[6] Held in Istanbul, Turkey, on May 23 and 24, 2016. Attracted 9000 participants from 173 countries, including 55 Heads of State and Government, hundreds of private sector representatives, and thousands of people from civil society and nongovernmental organizations

The CDM Framework has incorporated the principles of the HFA. Its present iteration for 2014-2024 (CDEMA, 2014) depicts the anticipation that a safer and more resilient society will encourage sustainable economic development. It emphasises within its definition of a desired end state resilience in key economic sectors; community resilience especially focused on the most vulnerable groups and gender issues; harmonization with climate change adaptation (CCA); and resources to achieve the strategy, inter alia. With cross-cutting themes of gender mainstreaming, climate change, environmental sustainability, and information and communications technology (ICT), the outcomes of the CDM Strategy are:

1. Strengthened institutional arrangements for CDM implementation at national and regional levels
2. Increased and sustained knowledge management and learning for CDM
3. Improved effectiveness of CDM at sector levels
4. Strengthened and sustained capacity for a culture of safety and community resilience in Participating States

National efforts toward the achievement of the Millennium Development Goals (MDGs) of the Millennium Declaration[7] and most recently achievement of the Sustainable Development Goals[8] have addressed issues related to poverty reduction and environmental sustainability, all relevant to DRR. The latter set of goals, also known as the Global Goals is a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity.

Policy makers in the region are faced with the complex task of aligning the subtle differences presented in both regional and international principles and processes but must maintain recognition of the unique vulnerabilities of SIDS and focus on the critical linkages between natural hazards and/or risk reduction and sustainable agriculture and food security, food security, biodiversity and ecosystem conservation, and resilience to climate change. In other sectors critical linkages must inform the approaches to integrated and sustainable urban planning and human settlements, sustainable development and poverty eradication, and capacity building. They must also be guided by the conclusions of the UN Conference on Small Island Developing States (SIDS 2014) which recognised 'that resilience must be a central tenet of future progress; that DRR is an integral component of sustainable growth of economic sectors such as tourism, agriculture and fisheries; and the interplay of risk reduction and climate change adaptation and their bearing on natural resources, food security and overall development (UN, 2014)'.

[7] The United Nations Millennium Declaration, signed in September 2000, commits world leaders to combat poverty, hunger, sickness, illiteracy, environmental degradation and discrimination against women. The Millennium Development Goals, which stem from the Declaration, define objectives and specific indicators.

[8] https://sustainabledevelopment.un.org/post2015/transformingourworld. The 17 Goals build on the successes of the Millennium Development Goals, while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities

Links to DRR have been established in the Regional Framework for Achieving Development Resilient to Climate Change (2009-2015) and its Implementation Plan (2011-2021) set forth by the Caribbean Community Climate Change Centre (CCCCC) that define the way to the building of resilience to the impacts of GCC. Two important strategic elements of the framework are: 'mainstreaming climate change adaptation strategies into the sustainable development agendas of CARICOM states' and 'encouraging action to reduce the vulnerability of natural and human systems in CARICOM countries to the impacts of a changing climate.'

3. NATIONAL CONTEXT

3.1 Physical Environment

3.1.1 Geographic location and size

Antigua and Barbuda have co-ordinates of 17.1°N; 61.5°W and 17.4°N; 61.9°W respectively. The islands are part of the Leeward Islands which are in the north-eastern section of the Caribbean archipelago. See Fig 1 below

Figure 1 Caribbean Archipelago

Figure 2 Map Antigua and Barbuda

Antigua, which is the largest of the Leeward Islands, is approximately 22.5 miles wide and 12 miles (19.3 kilometres) long for a total area of 108 square miles (280 square kilometres).

Antigua's sister island, Barbuda, measures sixty-two square miles (161 square kilometers) and located 45 kilometres north of Antigua. Redonda is a small uninhabited island located 35 miles south west of Antigua. It is comprised of volcanic rock formation and measures just 0.5 square miles (1 square kilometre). See Fig. 2.

3.1.2 Physiography

The islands of Antigua and Barbuda [and Redonda] sit on an extensive underwater platform known as the Barbuda Bank which has a total area of three thousand, five hundred (3,500) square kilometres (km^2) and are within the estimated one hundred and ten thousand (110,071) km^2 Exclusive Economic Zone (EEZ)[9].

[9] DESCRIBED in the United Nations Convention on the Law of the Sea as the zone within which Antigua and Barbuda has, inter alia, sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds.

The island of Antigua is relatively flat with the exception of a hilly region in the southwest. [See Fig. 3]. Mount Obama (once named Boggy Peak), the highest point in Antigua, reaches an elevation of 1,330 feet. The coastline is jagged with bays, rocky headlands and several coral reefs encircling the island.

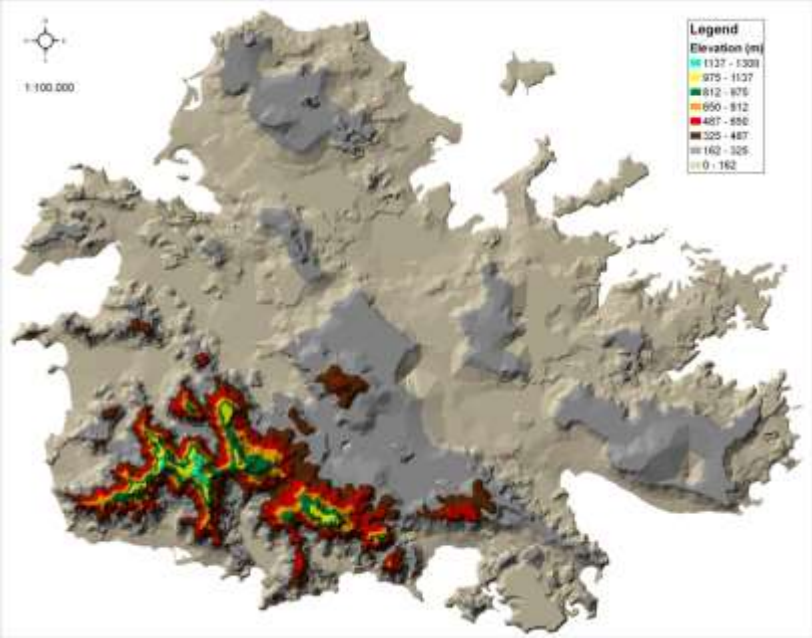


Figure 3 Antigua Topography Source: Antigua and Barbuda EIMAS, 2009

It consists of volcanic and limestone geological formations with a central clay based plain[10]. The major soil types of Antigua can be grouped to reflect the influences of the three main geological regions. [Fig. 4]. The volcanic region consists of igneous rock with soils that are largely clay loams. These soils are neutral to slightly acidic and well-drained. The central plain has some heavy, hard to work, clay soils, but generally well-drained soils laid over tuffs (stratified volcanic detritus) and agglomerates.

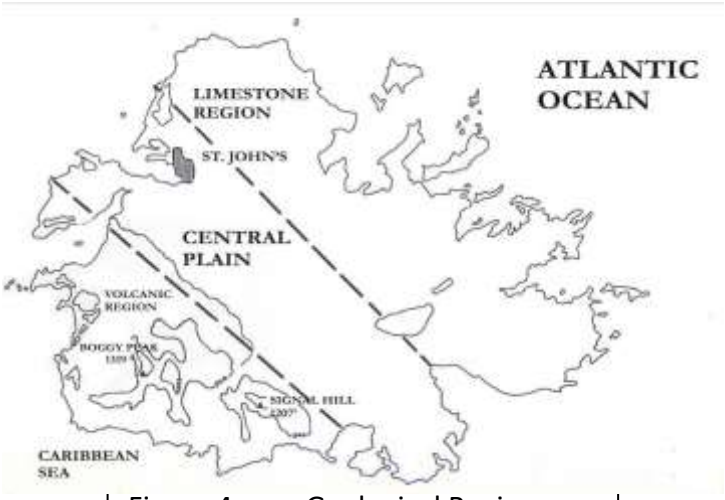


Figure 4 Geological Regions

(www.un.org/depts/los/convention_agreements/texts/unclos/part5.htm)

[10] Source: Preliminary Environmental Analysis for Sustainable Island Resources Management Mechanism (SIRMM) (2010)

In the limestone region, light soils exist over calcareous sandstones, heavier soils over calcareous grits, and deeper well-drained clays over calcareous marl. Some of these contain large amounts of almost pure calcium carbonate. Soils are generally alkaline in this region.

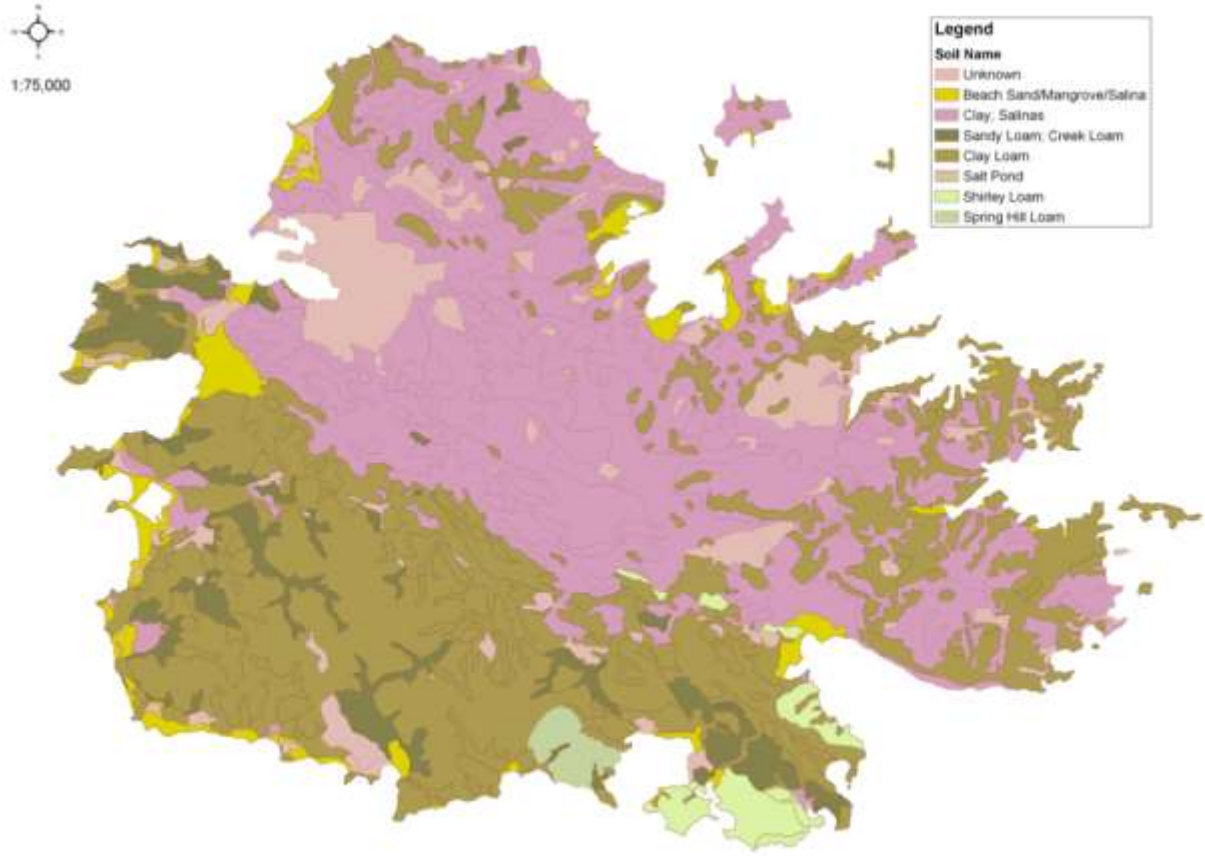


Figure 5 Soil Types location Antigua

The island of Barbuda is described as having 'no significant elevation', rising to its highest point of one hundred and twenty-four feet in the Highlands region. [See Figs 6 & 7]. Approximately seventy-eight percent of the island is covered with three types of homogenous limestone derived soils:

- The Barbuda Series - clay loam containing some kaolinite
- The Codrington Series -black alkaline clay loam soil, and
- The Blackmere Series - brown soil that is clay loam characterized by rapid drainage[11]

[11] Government of Antigua and Barbuda: Natural Hazard Mitigation Policy and Plan for Antigua and Barbuda, USAID/OAS Port-Georges Disaster Mitigation Project July 2001

Figure 6 Map of Barbuda

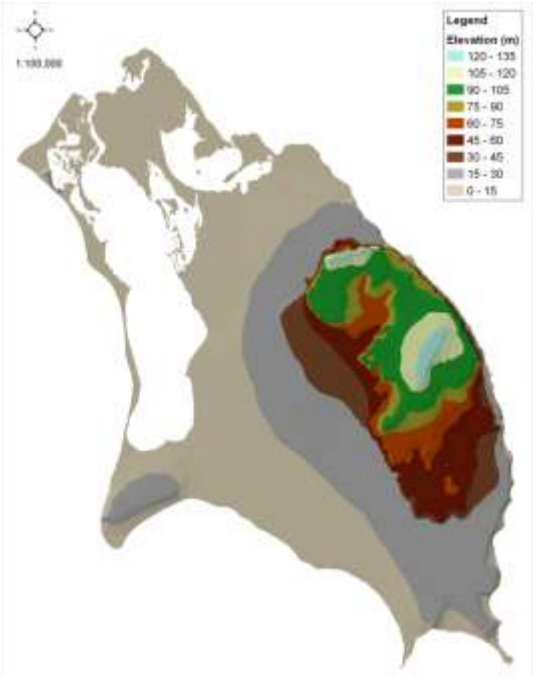


Figure 7 Soil types in Barbuda

Codrington Lagoon is a central feature of the landscape, running along the western side of the island. It is the largest lagoon in the Eastern Caribbean, separated from the sea by a narrow spit of land. This lagoon is of special conservation significance.

Barbuda is home to the largest Frigate Bird Sanctuary in the Eastern Caribbean, containing over one hundred and seventy species of birds and home to over five thousand frigate birds (*Fregata Magnificens*). This sanctuary is also of special conservation significance.

3.1.3 Climate and hydrology

The climate in Antigua and Barbuda is moderately arid, tropical maritime as characteristic of the Caribbean tropical zone. Annual pan evaporation measurements average one hundred and ninety-five centimetres (195 cm/ 77 inches). The generally salubrious climate averages seventy-five percent (75%) relative humidity.

Antigua and Barbuda experience high temperatures year round. The climate is influenced by the steady easterly trade winds and has a marked dry and wet season. Daily temperatures average twenty four degrees Centigrade (24°C/75°F) in December and January and twenty-nine degrees (29°C/84°F°) in August and September. Extremes range from a high of 34° C recorded in August to lows of 15°C recorded in January.

Annual rainfall averages sixty to one hundred and twenty-five centimetres (60-125cm/24-49 inches) with the lower value applicable to eastern Antigua and the higher value associated with the south-west region. Table 2.

Table 2	**RAINFALL by Month/Year**				
	Normal Monthly (mm) 1981-2010	**EXTREME TOTALS (mm) (1928 - 2014)**			
MONTH		Most	Year	Least	Year
January	68.6	217.6	2006	16.3	1931
February	55.9	130.7	1982	8.1	1983
March	51.8	225.9	1967	9.1	1930
April	85.6	245.2	1981	5.9	1944
May	103.6	508.4	1987	6.4	2001
June	69.3	310.5	1938	8.0	1974
July	100.3	224.7	1963	15.6	1976
August	113.0	336.0	2010	38.6	1984
September	144.0	373.0	1995	25.0	1978
October	161.0	384.3	2008	28.6	1953
November	149.4	531.0	1999	23.6	2007
December	101.1	279.9	1971	24.4	1947
Year	1203.1	1764.1	1951	557.0	1983

Antigua has the lowest rainfall of the major Caribbean islands. Typically, there is a dry season that extends from January to March/April, when less than twenty percent (20%) of annual rainfall occurs. The wet season from August through November receives forty-five to fifty percent (45% to 50%) and intermediate months (May, through July and December) receive an average of thirty to thirty-five percent (30% to 35%) of annual total. Precipitation during the rainy season is comes mainly from tropical cyclones that start in the Atlantic Ocean along the Inter-Tropical Convergence Zone (ITCZ). The periods of highest rainfall are associated with the periods of higher temperatures. [Fig. 8]

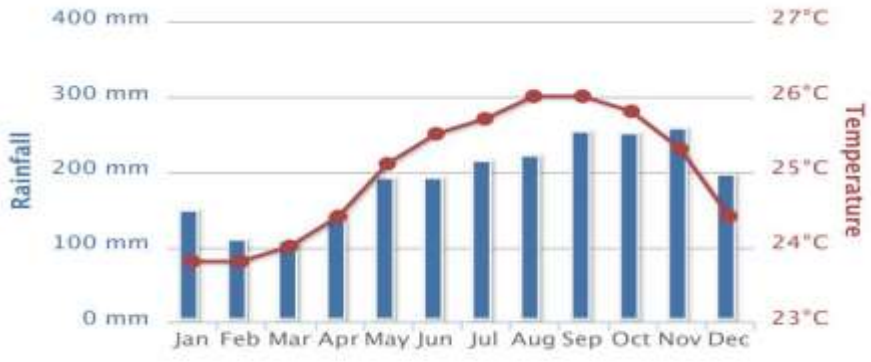


Fig: 8 Average monthly Temperature & Rainfall for Antigua/ Barbuda from 1900-2012 (World Bank Climate Change Knowledge Portal)

El Niño Southern Oscillation (ENSO) influences the climate. La Nina conditions tend to cause wetter and colder conditions. On the contrary, El Niño episodes bring warmer and drier than average conditions during the August/November wet hurricane season.

As can be seen in Table2 and Fig. 8, [Source Antigua and Barbuda Met Office] the country relies on rainfall during the wet season (July-December) to recharge catchments from which water is

sourced during the dry season (January-June). A total of eighty-six watersheds have been defined in Antigua, six of which are considered major because of their socio-economic, agro-ecological and hydrological values. Combined, they constitute 43% of Antigua's land area, sustain 50% of its forests, 90% of its crops and 60% of its livestock production[12]. Further, according to the same source, they contain 90% of Antigua's ground water supply and 90% of its surface water reservoirs. The major watersheds are shown on Figure 9 and referenced by numbers in Table 3.

Figure 9 Major Watersheds of Antigua

The major watersheds are important reservoirs of diverse plants and wildlife that are located in forested areas. They are also prime sites for the location of settlements and tourism facilities. The importance of protecting upland forests to mitigate the severity of flood impacts was more than evident during the storm Hurricane Omar in 2008 which resulted in water damages that affected villages and the Jolly Harbour Resort community.[13]

Table 3 **EXISTING STORAGE VOLUMES OF MAJOR WATERSHEDS IN ANTIGUA**

WATERSHEDS	AREA (hectares)	Existing Storage (hectares)		Ground Water Yield (m^3/year)
		Agricultural	Municipal	
Potworks	3,160	12.4	4,010	220,000
Body Ponds	4,000	81	1622.8	340,000
Christian Valley	1,780	3.7	67.2	610,000
Parham	1,472	13.5	---	---
Fitches Creek	1,040	135.4	---	---
Bethesda	120	218.5	---	---
Source: ESAL 2008 in SIRMZ Plan 2010				

The country relies on desalinated potable water to meet the national demand of approximately eight million imperial gallons per day. Ground and surface water resources are however critical to the country's future and requires protection against settlement growth and pollution from occupied facilities and agricultural uses.

Total production is approximately 5.5 million imperial gallons (MIG) comprising 83% desalinated water and 17% groundwater. This means that there is a hefty daily deficit of around 2.5 MIG or 31% of daily requirements. Under normal conditions, 57% of potable water comes from the sea,

[12] SIRMZ PLAN sourced from Environmental Solutions Antigua Ltd/2008 based on Halcrow/1997 & Fernandez/1990
[13] Ibid

28% from surface catchments and 15% from the ground.

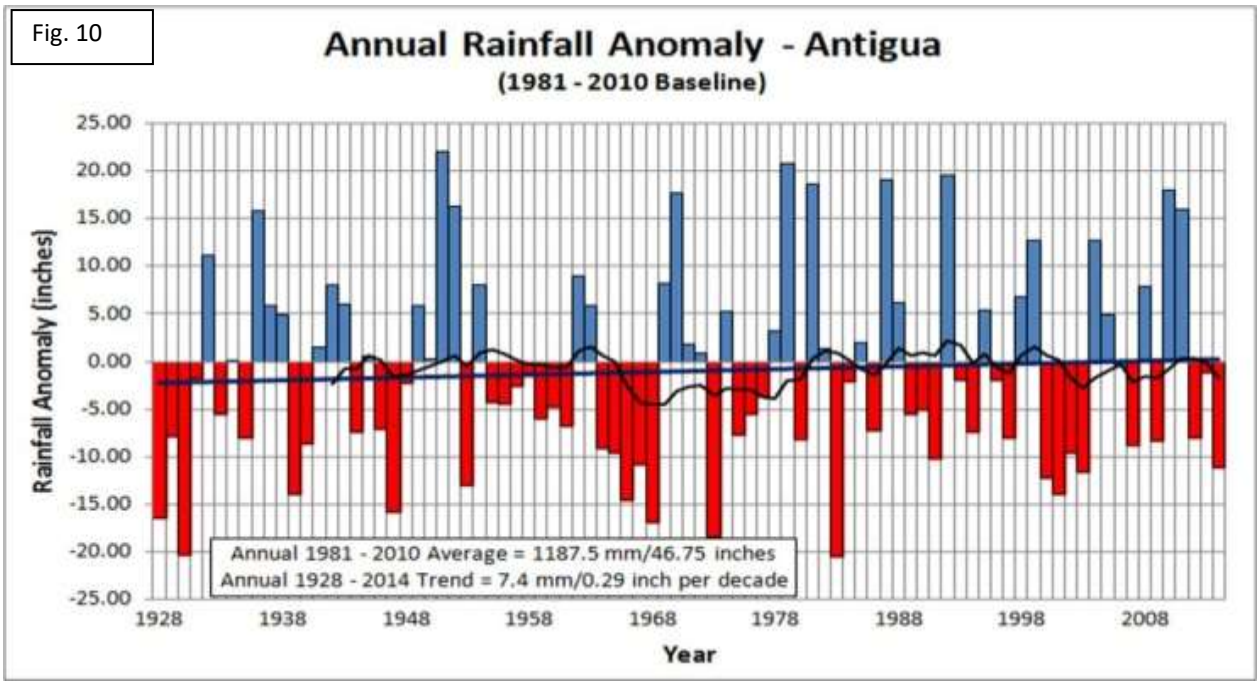
Barbuda is divided into 10 watersheds that are poorly defined and apparently not well studied. The boundaries of the watersheds are delineated in the Highlands, the only area of the island with any appreciable slopes but are not determined for the flat areas of the island, where surface runoff is normally limited, but may become significant in flood conditions[14].

Antigua has been in drought for around two years to date and during such periods surface catchments, which amount to a total capacity of approximately 1346 MIG go dry. Other years of depleted catchments include 2009/2010, 2000-2003, 1991, 1983 and 1973/1974 with perhaps 1983 being one of the most memorable as water had to be barged from Dominica[15].

3.1.4 Climate Variability

Analyses of climate trends in the Caribbean show a warming of surface air temperatures, particularly of daily minimum temperatures, and an increase in the frequency of warm days, warm nights and extreme high temperatures[16]. See Figures 10 and 11 below:

Fig. 10



Climate records[17] for Antigua and Barbuda– using the period 1981 – 2001 as baseline show:

- An average rainfall of 1187.5mm during the baseline period and a historical trend (1928 –

[14] Environmental Solutions Antigua Limited (ESAL 2008

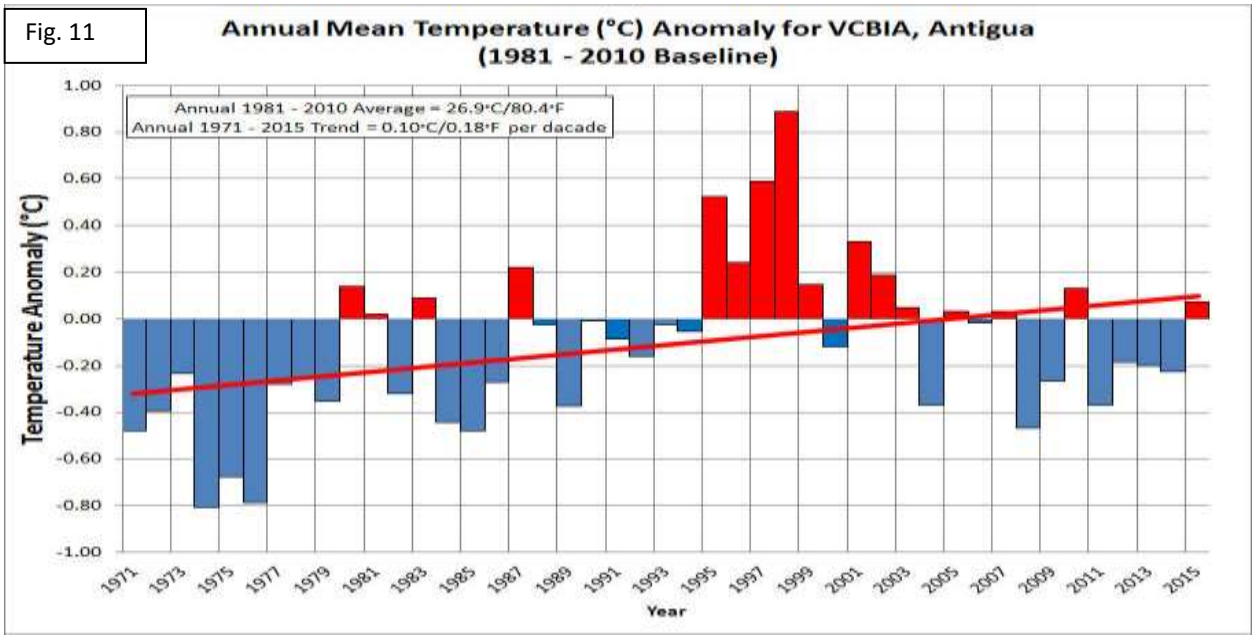
[15] Discussion on water supply from '*Antigua is out of Surface Water Again*' by Dale C. S. Destin, Antigua Met Services, Aug 2015

[16] Stephenson et al (2014)

[17] Records at the Antigua and Barbuda Meteorological Service at the V.C. Bird International Airport (VCBIA) reported at www.antiguamet.com/Climate

2014) of an increase of 7.4mm/0.29inches per decade. The increase is not considered statistically significant.

Fig. 11



- An annual average temperature of 26.9C/80.4F during the baseline period and a statistically significant positive trend of 0.10C/0.18F per decade. There is a significant decline in extremely cold nights, while extremely warm nights are on the increase but not yet considered to be rising significantly.

3.2 Socio-Economic Context

3.2.1 Population and demographics

The 2011 Census indicates that the population of Antigua and Barbuda is eighty-seven thousand, seven hundred and seventy-four [87,774], reflecting an approximate eighteen percent [17.7%] increase over the last decade.

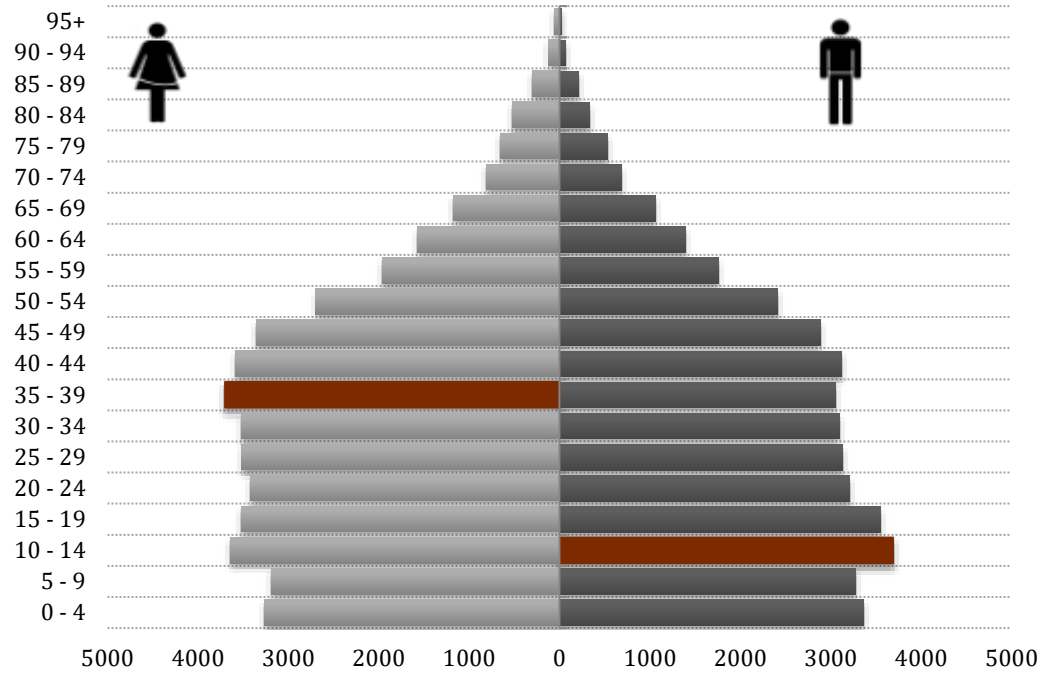


Figure 12: Population Pyramid in Five-Year Age Groups 2011

Based on fertility trends, the population was estimated at ninety-one thousand, two hundred and ninety five (91,295)[18] in 2015. Statistics show an increase of about one thousand (1,000) people annually over the last decade. A significant portion of the increase in population over the past twenty (20) years has been attributed to returning residents and migrants from CARICOM countries drawn to the country by its comparatively good economic performance in tourism and international business.

Table 4
Dependent and Productive Population 2014 (est)

Age range (yrs)	% total pop.	Male	Female
0-14	24.3%	11,289	10,932
15-24	16.8%	7,588	7,723
25-54	42.6%	17,789	21,137
55-64	8.9%	3,694	4,441
15-64	**68.3%**	**29,071**	**33,301**
65+	7.3%	2,886	3,816
Totals		**43,246**	**48,049**

On Antigua, there are ninety 91.4 male residents to every 100 female. The age structure (2014 est.) is shown in the population pyramid [Fig. 12] and Table 4. The population of the productive

[18] Source: CIA World Factbook update of June 30, 2015

age range (15-64 years) is 29,071 males and 33,301 females totaling 62,372 persons. The size of the dependent population (0-14 plus 65+) is 14,175 males and 14,748 females for a total of 28,923 or 46.4% of the productive population. See Table 5. This ratio shows the age composition of a population, not economic dependency since some children and elderly people are part of the labor force, and many working-age people are not. This ratio however compares favorably with other Caribbean countries.[19]

TABLE 5 : **TOTAL POPULATION BY FIVE-YEAR AGE GROUPS BY PARISH FIVE-YEAR AGE GROUPS** 2011

	TOTAL	**St. John City**	**St. John Rural**	**St. George**	**St. Peter**	**St. Philip**	**St. Paul**	**St. Mary**	**Barbuda**
Total	*85,567*	*22,219*	*29,518*	*8,055*	*5,325*	*3,347*	*8,128*	*7,341*	*1,634*
0 - 4	6,623	1,681	2,299	549	405	249	657	606	177
5 - 9	6,460	1,573	2,322	578	421	220	617	566	163
10-14	7,329	1,799	2,607	702	479	281	718	621	122
Total 0-14	**20,412**	**5,053**	**7,228**	**1829**	**1305**	**750**	**1992**	**1793**	**462**
15 - 19	7,073	1,735	2,440	672	468	286	715	633	124
20 - 24	6,624	1,792	2,289	575	438	231	612	554	132
25 - 29	6,647	1,924	2,291	556	400	235	594	513	134
30 - 34	6,617	1,754	2,271	606	416	241	641	562	126
35 - 39	6,748	1,759	2,465	648	361	244	585	556	129
40 - 44	6,712	1,697	2,454	656	426	251	588	528	112
45 - 49	6,241	1,630	2,159	641	401	224	559	540	88
50 - 54	5,110	1,292	1,695	538	319	221	494	457	94
55 - 59	3,721	929	1,195	378	233	162	407	352	65
60 - 64	2,968	759	978	293	186	140	310	253	49
Total 15-64	**58,461**	**15,271**	**20,237**	**5,563**	**3,648**	**2,235**	**5,505**	**4,948**	**1,053**
65 - 69	2,238	572	749	221	126	135	197	196	41
70 - 74	1,500	372	485	156	79	72	168	139	31
75 - 79	1,181	317	396	142	61	52	92	96	24
80 - 84	850	270	213	79	52	39	93	91	12
85 - 89	512	154	147	42	32	31	50	50	7
90 - 94	193	64	43	19	16	9	25	15	1
95+	84	26	19	5	5	9	5	13	1
Total 65-95+	6,558	1,775	2,052	664	371	347	630	600	117

The median age of the population is 31 years [WHO 2013]. The median divides a population into two numerically equal groups; that is, half the people are younger than this age and half are older. It is a single index that summarizes the age distribution of a population[20]. *The age structure of a* population gives indication to the required policy intervention on key socioeconomic issues. Countries with young populations (high percentage under age 15) need to invest more in schools, while countries with older populations (high percentage ages 65 and over) need to invest more in

[19] ww.indexmundi.com › Indicators › Health (2015): Suriname 50.76, Grenada 50.70, Barbados 50.44, Jamaica 48.63, St. Lucia 47.33, St. Vincent and the Grenadines 46.76, Cuba 43.43, Trinidad and Tobago 43.25, The Bahamas 41.25.

[20] The World Factbook: CIA https://www.cia.gov/library/publications/the-world-factbook/fields

the health sector. The age structure can be used to predict potential political issues. For example, the rapid growth of a young adult population unable to find employment can lead to unrest[21].

Barbuda

The total population of Barbuda [2011] stands at one thousand, six hundred and fifteen (1,615) - representing a fifteen percent [15%] growth over the last decade. The population 'maintained its uniqueness' of having more male residents than female [seven hundred and sixty-six (766) female residents, and eight hundred and forty-nine (849) males, or one hundred and ten-point-three (110.3) male residents to every hundred (100) female].

Inward migration

The 2011 census shows a total of 11,783 Caribbean citizens (other than Antiguan and Barbudan) resident in the country with eighty-six percent arriving from four main countries – Commonwealth of Dominica, Dominican Republic, Guyana and Jamaica [See Table 6]. This represents approximately fifteen percent (14.57%) of the total Caribbean population – Antiguans and Barbudans included.

Table 6

Major groups of Caribbean migrants (2011 Census)			
COUNTRY	**Total**	**Male**	**Female**
Dominica	1,769	833	936
Dominican Republic	1,347	481	866
Guyana	3,710	1,644	2,067
Jamaica	3,333	1,281	2,052
Totals	**10,159**	**4239**	**5921**

A further 3,561 residents are from outside the Caribbean region, the majority from the United Kingdom (1,004) and the United States of America (2,596). There is social tension concerning the numbers of migrants, some arguing that the increase in population and therefore widening of the range of skills are fillips the economy needs; others suggesting that the increasing population adds pressure on the already limited resources – especially health, education and social services.

Population trends

The 1991 population census recorded that 30.5% of Antigua and Barbuda's being less than 15 years (youthful population) and approximately 6% fell within the category of over 65 years. By 2001, census figures indicate a 2.5% decrease in the under 15 population at a recorded 28% and a small increase of the percentage of the population over age 65. The percentage of the 15-64 population virtually remained constant between 1991 and 2001. In 2011 we witness a further decline in the

Table 7 PERCENTAGE AGE DISTRIBUTION 1991, 2001, 2011

AGE GROUP (Years	1991	2001	2011
0-14+	30.5	28	24.3
15-64+	63.8	63.4	68.3
65+	5.7	6.4	7.3

Various sources: Population census 2011 (Prelim), 2001 and 1991. Numbers may vary slightly from others shown in this document but not enough to make differences in interpretation

[21] Ibid

percentage of the 0-14+ population and increases in both the percentages of the 15-64+ and 65+ two cohorts. (See Table 7)

The changes in the percentiles of the various age groups reflect a combination of lower birth and death rates, and higher life expectancy. The growth in the population suggests a rise in the economically active population and similarly an indication that more persons are in retirement age, some of whom are still economically active. [See discussion on 'The Elderly Sec. 4.2.3.2]

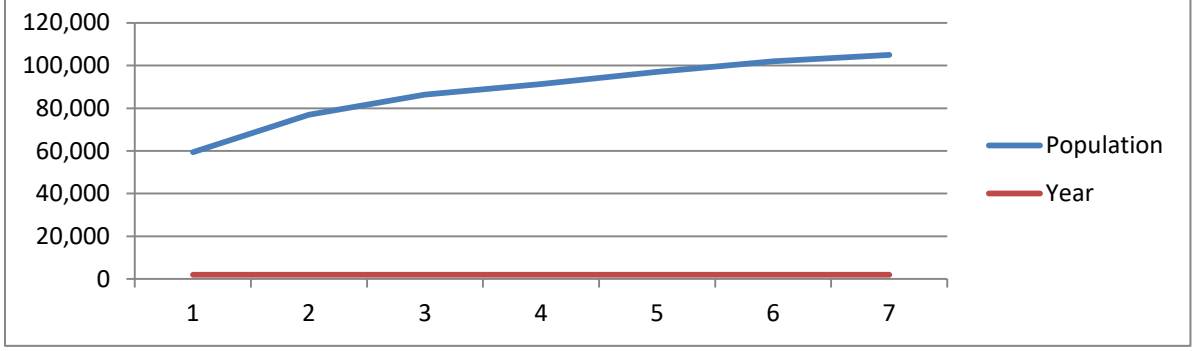
Projected population

The population of Antigua and Barbuda's population is projected to be 97,000 in 2020 (8.9% increase) and 105,000 by year 2030 (7.6% increase) as shown in (Table 8).

Table 8	**ANTIGUA AND BARBUDA POPULATION PROJECTIONS TO 2030**						
Year	2030	2025	2020	2015	2011	2001	1991
Population	105,000[22]	102,00[23]	97,000[24]	91,295 [25]	86,295	76,886	59,355

The population is projected to experience a steady increase but slower than the present rate. Variables including fertility rates, the decrease in natural increase, as well as shifts in the migration pattern, rate of natural increase / decrease, and marital status[26] contribute to the slower rate of population increase.

Figure 13 Population Growth Actual (1991 – 2015) and Projected (2015 – 2030)



[22] Ibid
[23] Estimated
[24] Ibid
[25] Source: CIA World Factbook update of June 30, 2015
[26] The 2008 Revision: http://esa.un.org/unpp: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects

Population settlements and Urbanization

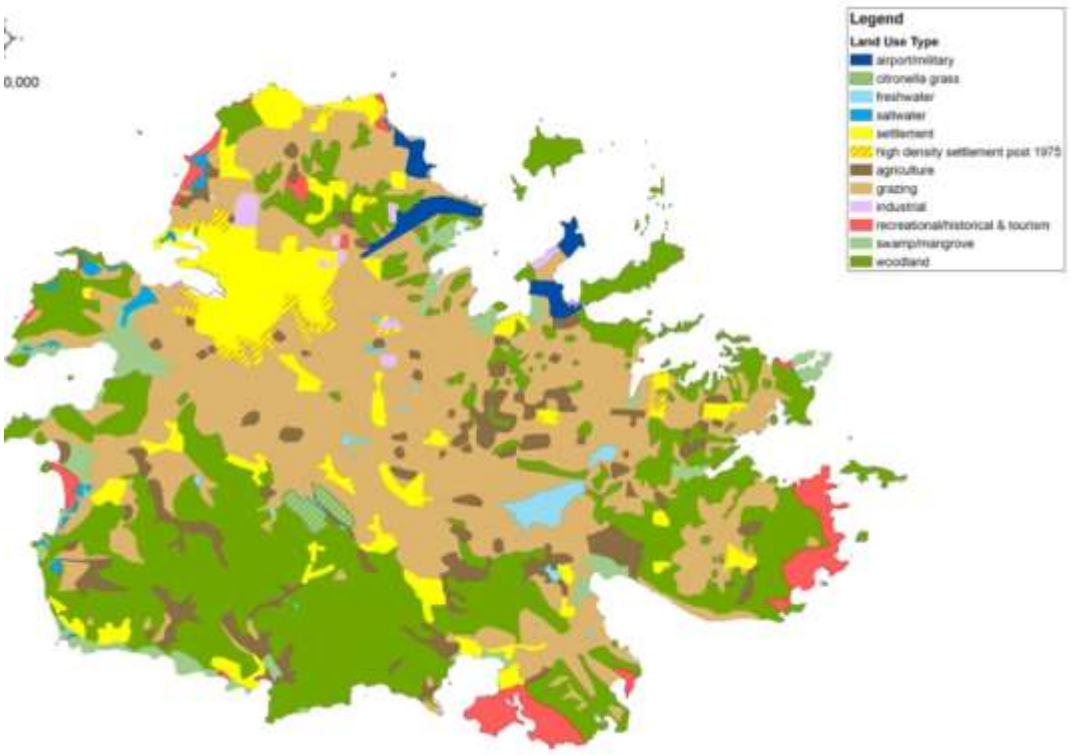


Figure 14 Population Concentrations Source: *Genivar*

The heaviest concentration of settlements in Antigua occurs around St, John's City, along the All Saints Road in the St. John's-St. Paul corridor as shown in the land use map above [Fig. 14]. The nation's capital occupies 2.9 square miles (751 hectares), which is approximately 1.6% of the total land mass[27]. It is the only distinct urban settlement in the country. Census 2011 figures show that St. John City recorded a population decrease of approximately 9.1% during the period 2001-2001. (See Table 9)

The expansion of commerce in the city centre saw the conversion of family homes into business places and the residents moving to middle/upper class settlements in other parishes - St. George, St. Mary's & St. Paul.

St John's continues to be the centre of commerce, entertainment and nightlife although a number of large supermarkets and shopping centres[28] have emerged on the city's fringe. Commercial growth is evident along the Old Parham Road heading from the city centre to the V.C. Bird Airport

[27] GENIVAR: State of the Country Report; Sustainable Island Resource Zoning Plan 2010
[28] Woods, Village Walk, Towne House, Epicurean, Billy's Foodmart, First Choice

and also along the Cemetery Road heading north to the Friars Hill. The expansion of commerce in the city centre saw the conversion of family homes into business places and the residents moving to middle/upper class settlements in other parishes - St. George, St. Mary's & St. Paul.

Table 9	**Population Growth by Parish between 1991, 2001 & 2011**						
Parish / Census District	**2011**	**2001**	**1991**	**+/- 1991-2001**	**Actual % +/- 1991-2001**	**+/- 2001- 2011**	**Actual % +/-2001- 2011**
St. John's City	22,193	24,451	21,514	2,937	13.7	**-2,258**	**-9.2**
St. John's Rural	29,054	20,895	14,121	6,774	47.9	**8,159**	**39.0**
St. Georges	7,838	6,673	4,473	2,200	49.2	**1,165**	**17.5**
St. Peters	5,307	5,439	3,622	1,817	50.2	**-132**	**-2.4**
St. Phillips	3,490	3,462	2,964	498	16.8	**28**	**0.8**
St. Pauls	8,809	7,848	6,117	1,731	28.3	**961**	**12.2**
St. Marys	7,794	6,793	5,303	1,490	28.1	**1,001**	**14.7**
Barbuda	1,810	1,325	1,241	84	6.8	**485**	**36.6**
Country Total	**86,295**	**76,886**	**59,355**	**17,531**	**29.5%**	**9,409**	**12.2**
Source: Population and Housing Censuses 1991, 2001 and 2011							

St. John Rural grew significantly by approximately 41.3% during the period 2001-2011. The significant growth in St. John Rural is evidence of the continued de-urbanisation of the population that has been the trend over the past twenty years. All the other parishes including Barbuda showed an increase in population except St. Philip and St. Peter, which showed a decrease of 3.3% and 2.1% respectively.

The population shift has very little impact on future provision of services as most service centres, be they public or private are located in St. John's city. Virtually all Government offices and services to include the lone public hospital are located in St. John's central.

The growth of the population in St. John's Rural especially on the west and east is associated with the increase of migrant populations moving into areas in the west in particular where housing, public utilities and sanitation services are poor or limited, and settlement extensions occur on poorly drained sites without adequate street drains and sidewalks. The potential for disasters through the localized hazards of floods, fires and health epidemics is perhaps greater than in most other areas of the country.

3.2.2 HOUSING

The 2011 Census enumerated 29,051 households compared to 24,462 households in 2001 and 19,501 in the 1991 census (See Table 10)[29].

[29] Among the 29,051 households enumerated, 1,603 households did not report any population data even though it was established that these are occupied households. In these cases estimates were calculated based on the reported household size for the particular parishes (2011 Census note)

The number of households in St. John Rural significantly increased from 6,861 in 2001 to 10,040 in 2011, representing growth of 46.3 per cent in the last decade. The total St John Parish (city and rural) saw increases of 19.8 per cent in 2011 over 2001, although the number of households in St. John City decreased (Table 4). Barbuda's number of households grew from 392 in 1991, to 456 in 2001, to 544 in 2011. The increase between 2001 and 2011 is 19.3 per cent.

Table 10 Number of Private Households by Parish - 1991, 2001 and 2011						
Parish	**1991**	**2001**	**1991 - 2001 % Change**	**2001**	**2011**	**2001 - 2011 % Change**
St. John City	7,532	7,889	4.7	7,889	7,635	(3.2)
St. John Rural	4,477	6,861	53.2	6,861	10,041	46.3
St. George	1,458	2,223	52.5	2,223	2,719	22.3
St. Peter	1,077	1,472	36.7	1,472	1,815	23.3
St. Phillip	924	989	7.0	989	1,011	2.2
St. Paul	1,929	2,503	29.8	2,503	2,834	13.2
St. Mary	1,712	2,069	20.9	2,069	2,452	18.5
Barbuda	392	456	16.3	456	544	19.3
Total	**19,501**	**24,462**	**25.4**	**24,462**	**29,051**	**18.8**

The average household size for Antigua and Barbuda is 3.0 in 2011 compared with 3.1 in 2001 and 3.2 in 1991. The decrease in household size in 2011 continues the trend evident in 2001 and 1991. This overall decline in national household size is recorded despite the increase in household size in St. Philip, St. Mary and Barbuda (Table 11).

Table 11: **Number of Private Households by Parish, Estimated Resident Population and Household Size 1991/2001/2011**									
PARISH	**1991**			**2001**			**2011**		
	No. of Household	**Estimated Resident Population**	**Average Household Size**	**No. of Household**	**Estimated Resident Population**	**Average Household Size**	**No. of Household**	**Estimated Resident Population**	**Average Household Size**
St. John City	7,532	23,139	3.1	7,889	23,701	3.0	7,635	22,193	2.9
St. John Rural	4,477	14,862	3.3	6,861	21,189	3.1	10,041	29,054	2.9
St. George	1,458	4,670	3.2	2,223	6,447	2.9	2,719	7,838	2.9
St. Peter	1,077	3,791	3.5	1,472	4,817	3.3	1,815	5,307	2.9
St. Phillip	924	3,216	3.5	989	3,293	3.3	1,011	3,490	3.5
St. Paul	1,929	6,496	3.4	2,503	7,779	3.1	2,834	8,809	3.1
St. Mary	1,712	5,700	3.3	2,069	6,435	3.1	2,452	7,794	3.2
Barbuda	392	1,314	3.4	456	1,417	3.1	544	1,810	3.3
TOTAL	**19,501**	**63,188**	**3.2**	**24,462**	**75,078**	**3.1**	**29,051**	**86,295**	**3.0**

Growth in Housing Stock

The 2011 Population and Housing Census show that there were 30,213 dwelling units in Antigua

and Barbuda compared to 18,421 dwelling units in 1991 and 20,237 in 2001 and increase of approximately 47.4% during the last decade. 26% of the dwelling units were located in St. John's City and 61% in the parish of St. John's. [See Table 12]

Table 12 Dwelling Unit Growth by Parish or Census District between 1991, 2001 & 2011 by Population Growth

Parish / Census District	Year			+/- 1991-2001	Actual % +/- 1991-2001	+/- 2001- 2011	Actual % +/-2001-2011	Actual % population +/-2001- 2011
	2011	2001	1991					
St. John's City	7,879	6,577	6,963	(386)	(5.5)	**1,302**	**19.8**	(9.1)
St. John's Rural	10,568	5,562	4,291	1,271	29.6	**5,006**	**90.0**	41.3
St. Georges	2,932	1,819	1,419	400	28.2	**1,113**	**61.2**	20.7
St. Peters	1,829	1,344	1,065	279	26.2	**485**	**36.1**	(2.1)
St. Phillips	1,139	879	886	(7)	(0.8)	**260**	**29.6**	(3.3)
St. Pauls	2,809	2,060	1,835	225	12.3	**749**	**36.4**	3.6
St. Marys	2,512	1,775	1,595	180	11.3	**737**	**41.5**	8.1
Barbuda	545	421	367	54	14. 7	**124**	**29.5**	23.3
Country Total (Net Increase)	**30,213**	**20,437**	**18,421**	**2,016**	**10.9**	**9,776**	**47.8**	**11.29**

Source: Population and Housing Censuses 1991, 2001 &2011

A comparative analysis of the data reveals a 29.5% increase in the country's population between 1991 and 2001, while the net increase in dwelling units was 10.9%. A decade later in 2011, the net increase in dwelling units was forty seven (47.4) percent compared to the population increase of eleven-point three percent (11.29%).

The data suggests a corresponding relationship between the relatively higher population increases (absolute and percentage wise) in St. John's Rural, St. Georges and St. Mary's and growth in dwelling units during the period 2001-2011. St. John's City, although recording a decrease in population of 9.1% showed an increase in the number of dwelling units. These three areas accounted 1,950 units or some 96.7% of the net gain in dwelling units in the country between 1991 and 2001.

Characteristics of the Housing Stock

Data from the 2001 Census show that 32% of the country's 20,437 dwelling units were constructed between 1990 and 2001, 23% between 1970 and 1989, 14% before 1970, while the date of construction of 31% was not known by respondents. Housing construction between 1990 and 2001 coincided with a period of heightened hurricane activity in the country and resultant damage from hurricane related natural disasters. For example, in September 1995, Antigua and Barbuda sustained severe damage from Hurricanes Luis and Marilyn which totally destroyed 756 dwellings. Over 1,280 houses lost their entire roof, 1,366 reported other damages to the roof and 2,262 houses sustained minor damage[30]. Such damages confounded deficiencies resulting from

[30] National Physical Development Plan, 2001

age and sub-standard building practices in the country's housing stock.

Construction during the period was required not only to meet the demands for new housing and routine repairs but also to restore or rebuild damaged structures. The impact of hurricanes between 1989 and 2001, led to the application of hurricane resistance practices in new construction and repair or retrofitting of dwelling houses and other structures. [31]

The use of hurricane clips, steeper roofs, shorter overhangs, hurricane shutters and other measures, now being required by insurance companies as conditions for discounting property insurance premiums, had the effect of making houses more hurricane resistant. The country's housing stock appears to be relatively new, but perhaps more critically, it may be in a much better position to resist wind damage associated with hurricanes[32].

The overall condition of the housing stock in Antigua and Barbuda is not reported but it is expected that a fair share of residential dwellings are of poor condition especially in the low income neighbourhoods of St. John's City and in St. John's Rural and is therefore in urgent need of repair and/or renovation.[33].

Type of Construction

Table 13 **DWELLING UNITS by MATERIAL OF OUTER WALLS & ROOFING 2011**

PARISHES	Total # Dwelling Units	MATERIAL OF OUTER WALLS		ROOFING MATERIAL		
		% Concrete, Block, Stone/ Brick	% Wood	% Concrete	% Sheet metal & similar	% Shingle (Asphalt, wood & other)
TOTAL	**30,213**	39.82	59.06	3	89	7
St. John City	7,879	23.96	75.19	2	91	6
St. John Rural	10,568	46.08	52.28	3	90	6
St. George	2,932	50.27	48.40	3	88	8
St. Peter	1,829	36.85	62.22	2	93	4
St. Philip	1,139	53.03	46.27	1	88	9
St. Paul	2,809	40.19	59.20	4	86	9
St. Mary	2,512	38.30	61.11	3	82	14
Barbuda	545	78.90	20.55	2	94	4
Compiled from 2011 Census Report						

The 2011 Housing/Population census shows that approximately sixty percent (59%) of the thirty thousand two hundred and thirteen dwelling unit were constructed of wood. The percentage of wooden buildings in the country in 2001 was forty four percent (44%)[34]. [Table 13]

[31] GENIVAR: State of the Country Report; Sustainable Island Resource Zoning Plan 2010
[32] Census, 2001 and NPDP, 2001
[33] McHardy, 1994
[34] Census, 2001 and NPDP, 2001

Seventy-five percent of buildings in St. John's City were built of wood. 'Many are constructed of 4 feet by 8 feet (1.2 metres x 2.4 metres) grooved plywood[35], attractive to lower income groups and landlords renting homes in low income areas' because of its lower cost than pine or hardwoods, less time and complexity of construction and therefore lower construction/labour costs. They are however less resistant to hurricane and fire than concrete structure and 'are less resistant to hurricanes than concrete structures, generally more costly to maintain and more vulnerable to pests such as termites'[36].

Approximately ninety percent (90%) of all dwelling units have roofing material of 'sheet metal/galvanized or similar'. The use of concrete for roofing is not prevalent, averaging three percent across the islands.

Barbuda had the lowest concentration of wooden buildings of twenty one percent (20.55%) and had the highest concentration of concrete buildings (79%).

Table **14** **SOURCE OF LIGHTING IN DWELLING UNIT by Parish**

Parishes	Total	Electricity - Private Generator	Electricity - Public	Gas lantern	Kerosene	Solar	None	Other	Don't Know/ Not stated
Total	*84,816*	*1,162*	*80,275*	*230*	*533*	*56*	*647*	*923*	*990*
St. John City	21,643	265	20,252	98	160	16	254	322	276
St. John Rural	29,486	377	28,104	61	139	6	137	226	436
St. George	7,976	84	7,686	13	39	0	67	40	47
St. Peter	5,317	47	4,998	14	50	5	48	121	34
St. Philip	3,322	46	3,149	6	21	6	9	23	62
St. Paul	8,116	204	7,611	19	61	14	63	97	47
St. Mary	7,331	136	6,884	13	61	9	54	87	87
Barbuda	1,625	3	1,591	6	2	0	15	7	1

Source: 2011 Census Report

Table 14 above shows that ninety-eight percent of persons in Barbuda depend on public generation of electricity to provide light in their dwelling unit. Comparatively ninety-five percent of Antigua residents do similarly, confirming the high dependence on the APUA for energy throughout the nation. The percentage dependence is level across the parishes ranging from ninety- sex percent (96%) in St Georges to ninety four (94%) in St. Paul, St. Mary and St. Peter. The remaining five percent of the population depend on private generation, solar or hydrocarbon sources of energy to light their dwelling units.

[35] Trade name T1-11

[36] GENIVAR State of the Country Report; Sustainable Island Resource Zoning Plan 2010

3.2.3 Water and Sanitary Services

The quality of a nation's housing stock is indicated, inter alia, by the availability of water and sanitary services. In 2011, sixty seven percent of the households in Antigua and Barbuda have water piped to their premises. An additional five percent have water piped into their yards and twelve percent depend on catchments – cisterns and/or tanks. Approximately ten percent of households source water from public standpipes or private sources. [Table 15]

Table 15 **NUMBER OF HOUSEHOLDS BY PARISH BY MAIN SOURCE OF WATER SUPPLY**[37]

	# Dwelling units	Private piped into dwelling unit	Public stand pipe	Public piped into dwelling	Public piped into yard	Cistern/tank
Total	*30,213*	*1,604*	*2,579*	*20,264/67%*	*1,575/05%*	*3,557/12%*
St. John City	7,879	361	1,377	5,424	280	297
St. John Rural	10,568	523	553	7,161	563	1,553
St. George	2,932	62	122	2,238	129	339
St. Peter	1,829	30	114	1,226	163	249
St. Philip	1,139	92	41	789	107	84
St. Paul	2,809	218	179	1,716	99	540
St. Mary	2,512	189	192	1,528	164	367
Barbuda	545	129	1	182	70	128

Eighty two percent of households in the nation have bathroom facilities inside their dwelling unit whilst fifteen percent have their facilities located outside the dwelling home. It is assumed here that bathrooms 'inside dwelling units' have flush toilets/septic tanks and that those facilities 'not inside dwelling unit' are cesspits/latrines or other. [Table 16]

Table 16 Number Of Households By Parish By Bathroom Location For Dwelling Unit

PARISHES	**TOTAL Households**	**BATHROOM LOCATION FOR DWELLING UNIT**		
		Inside Dwelling Unit	Not inside Dwelling Unit	Don't know/ Not stated/ No Bathroom
Total	*30,213*	*24,635/82%*	*4,652/15%*	*926*
St. John City	7,879	5,937/75%	1,676/21%	266
St. John Rural	10,568	9,092/86%	1,133/11%	343
St. George	2,932	2,514/86%	364/12%	54
St. Peter	1,829	1,487/81%	291/16%	51
St. Philip	1,139	898/79%	160/14%	81
St. Paul	2,809	2,304/82%	454/16%	51
St. Mary	2,512	1,971/78%	464/18%	77
Barbuda	545	432/79%	110/20%	3
Source: 2011 Housing and Population Census				

[37] Sources such as Minor 'Private not piped into dwelling unit', 'Public well/tank' and 'Spring/River' amounting to approximately xxxx or xxx% of all sources have not been included in the Table.

St. John's City, Barbuda and St. Mary's record the highest levels of external bathroom facilities at 21%, 20% and 18% of households respectively. St. John's Rural, St George and St. Paul record the highest percentages of inside dwelling bathroom facilities at 86%, 86% and 82% respectively.

The presence of latrines/cesspits in areas that are prone to flooding present a hazardous environment that could precipitate health disasters such as the spreading of cholera and gastroentereal diseases.

3.2.4 LITERACY RATE

The Education Act (Chapter 145 of 1973) establishes a 'compulsory school age' which requires that attendance at school for children between the ages of 5 and 16 years be compulsory and free. Government also introduced an Education Levy that provides for a School Bus/Transportation system, a School Meals Programme, a Uniform Assistance Programme, school infrastructure and class materials to encourage and ensure compulsory attendance. Primary education starts at age 5 and lasts for 7 years

Table 17 shows that less than one percent (0.71%) of the population 'fifteen years and older' report having no education.

Table 17 POPULATION 15 YEARS & OLDER BY EDUCATION LEVEL			
Education Level Attained	Total	Male	Female
Total	64,416	30,074	34,342
None	461	218	243
Primary/elementary (1-3)	942	511	431
Primary/elementary (4-7)	8,329	4,372	3,957
Junior Secondary	4,819	2,718	2,101
Secondary (Form 1-3)	4,581	2,339	2,242
Secondary (Form 4-5)	24,270	10,597	13,673
Sixth Form ('A 'Level) - Lower	596	237	360
Sixth Form ('A' Level) - Upper	1,215	446	769
Post Secondary	999	403	596
Post Sec/Pre-University/College	6,884	2,799	4,086
Post Primary - Vocational/Trade	1,665	997	668
Special School/Education	222	98	124
University	5,624	2,420	3,205
Other	902	384	518
Don't know/Not stated	2,906	1,537	1,369
Source: 2011 Census			

The literacy rate is defined as the percentage of people ages 15 and above who can both read and write with understanding of a short statement about their everyday life [UNESCO]. International agencies publish a literacy rate of approximately ninety-nine percent (99%). Examination of the

figures from the 2011 census in Table 18 below show a rate of slightly greater than ninety five percent (>95%.) Antigua and Barbuda can be described as a highly literate society although there is a constant public opinion expression that it is not a reading society. Many communication channels – besides book, magazines and newspapers – exist and are fully utilized.

The nation is served by at least twenty radio stations, the vast majority (17) of which broadcast in the FM band; two (2) cable networks and one (1) broadcast TV station. There are two daily newspapers (except Sunday). A national Information and Communication Technology (ICT) Survey revealed that[38]:

- Access to radios and televisions is almost ubiquitous. Eighty two percent (82%) of respondents has radios; ninety seven percent (97%) has a television, approximately seventy two percent of whom has cable television.
- Seventy eight percent (78%) has one or more mobile phones. Only twelve percent (12%) of households do not have access to a mobile unit.

Table 18 INTERNET USE IN POPULATION 2011

Five-Year Age Groups	TOTAL POPULATION				
	TOTAL	USED INTERNET	DID NOT USE INTERNET	NOT STATED	% USE
TOTAL	84,816	41,008	42,246	1,562	48.3
0 - 4	6,620	348	6,161	111	5.3
5 - 9	6,455	2,386	3,955	113	37.0
10 - 14	7,325	4,976	2,216	133	67.9
15 - 19	7,057	5,509	1,407	141	78.1
20 - 24	6,488	4,560	1,744	185	70.3
25 - 29	6,507	4,224	2,122	161	64.9
30 - 34	6,568	4,079	2,367	122	62.1
35 - 39	6,688	3,797	2,748	142	56.8
40 - 44	6,662	3,405	3,147	110	51.1
45 - 49	6,206	2,766	3,352	89	44.6
50 - 54	5,090	1,999	3,006	85	39.3
55 - 59	3,690	1,180	2,454	56	32.0
60 - 64	2,964	857	2,080	27	28.9
65+	6,415	917	5,411	86	14.3

- Forty seven percent (47%) of households own a computer; sixty percent (60%) of respondents had used one during the past twelve (12) months.
- Thirty six percent (36%) has Internet access at their household.
- Sixty-five thousand (65,000) Internet users as of Jun/09, (74.0% penetration); Facebook users on June 30/11, 33.0% penetration rate[39].

In the 2011 census we see the changes in this scenario where forty-eight percent of the population uses the Internet – penetration in the fifteen-to-nineteen year age group is the highest at seventy-eight percent (78.1%). See Table 18.

There are no communication challenges in communicating disaster risk reduction information or pre-disaster planning and post disaster imperatives. Digital telephone companies have teamed with NODS to broadcast messages and updates on disaster preparedness via text messaging.

[38] Antigua and Barbuda National ICT Household 2008 Surveyhttp://ab.gov.ag/gov_v4/pdf/statistics_reports/Antigua_Barbuda_Household_ICT_Survey_2008.pdf

[39] http://www.internetworldstats.com/carib.htm

3.2.5 Health

Antigua and Barbuda rank 86th in the World Health ranking [2013] data extracted from WHO, World Bank and UNESCO.[40] The infant mortality (9/1,000 live births) is lower than the regional average of 15/1,000.

Birth and fertility rates

Birth rates on Antigua and Barbuda have been reduced from 29.6 per thousand in 1970 through 18.8 in 1990 to 12.53 in 2014.

During the period 2012-2014, the average birth rate is 12.94 births per thousand. It declined by almost 9% from 2012 to 2013 and less than one percent (1%) from 2013 to 2014 (See Table 19).

TABLE 19 BIRTH RATE, 2012-2014

Year	Births	Population	Birth Rate
2012	1,193	86,793	13.75
2013	1,105	88,069	12.55
2014	1,120	89,391	12.53

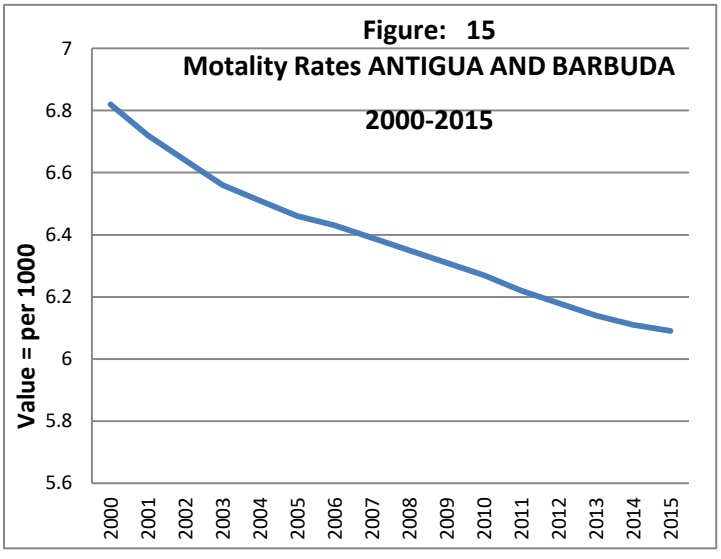
Source: Health Statistics Division, Ministry of Health,

The total fertility rate (per woman) in 2013 was 2.1 declining from 3.3 in 1970 – a reflection of the fact that women are entering the workforce and have knowledge and access to contraceptives and family planning services. Life expectancy has risen from 65.9 years through 71.4 in 1990 to 75.8 years in 2012[41]. Population growth is maintained at present levels through inward migration, a reduction in outward migration and a reduction in death rates.

Mortality rates

Crude death rates have shown steady reduction from 7.3 per thousand in 1970 to 7.1 in 1990 and 6.2 in 2012 decreasing constantly through 6.14 in 2013, 6.11 in 2014 and 6.09 in 2015[42].

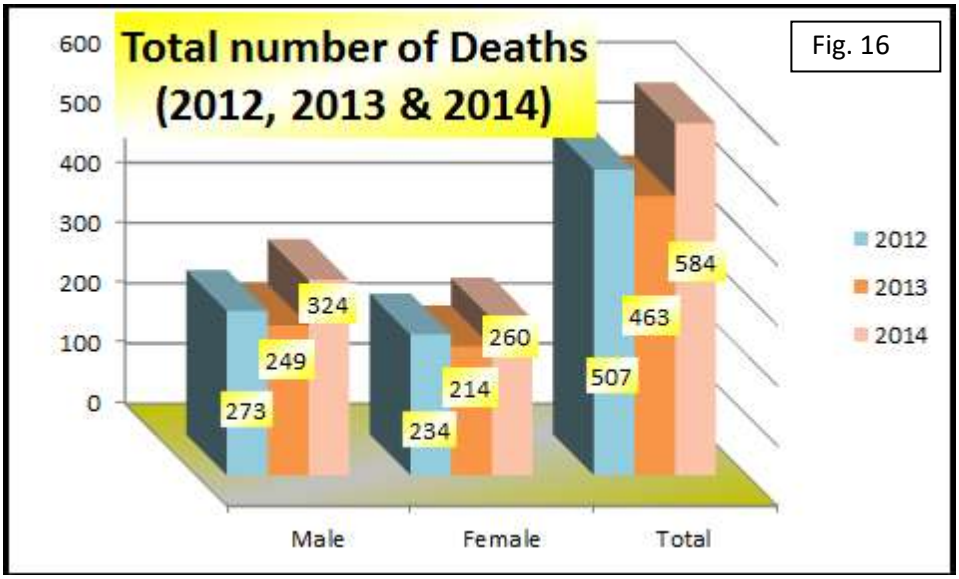
The decrease in death rate is evident although the number of deaths rose to five hundred and eighty-four (584) in 2014, a fifteen-point-two percent (15.19%) increase over the previously highest number of five hundred and seven (507) of 2012. See Figs. 15 & 16 – (Source: Health Statistics Division 2015)



[40] World Health Statistics. WHO 2013 http://www.who.int/gho/publications/world_health_statistics/EN_WHS2013_Full.pdf

[41] www.unicef.org/infobycountry/antiguabarbuda_statistics.html

[42] Health Statistics Division 2015 Report



Ten Principal Causes of Death

The Ten Principal Causes of death in Antigua and Barbuda for the years 2010, 2011 and 2012 respectively[43] are shown in Table 20. Malignant neoplasm was the leading cause of death in Antigua and Barbuda in 2010. The second ranked principal cause of death in 2010 was heart disease followed by diabetes mellitus.

Table 20 TEN PRINCIPAL CAUSES OF DEATH / ANTIGUA AND BARBUDA 2010-2012

2010			2011			2012		
Disease	**Rank**	**# Deaths**	**Disease**	**Rank**	**# Deaths**	**Disease**	**Rank**	**# Deaths**
Malignant Neoplasm	**1**	**116**	Heart Diseases	**1**	**85**	Malignant Neoplasm	**1**	**103**
Heart Diseases	**2**	**68**	Malignant Neoplasm	**2**	**79**	Heart Diseases	**2**	**95**
Diabetes Mellitus	**3**	**49**	Infectious Diseases & HIV/AIDS	**3**	**53**	Diabetes Mellitus	**3**	**53**
Diseases of the Respiratory System	**4**	**45**	Diabetes Mellitus	**4**	**49**	Cerebro-vascular Diseases	**4**	**38**
Cerebro-vascular Diseases	**5**	**42**	Cerebro-vascular Diseases	**5**	**38**	Hypertensive Diseases	**5**	**37**
Hypertensive Diseases	**6**	**41**	Diseases of the Respiratory System	**6**	**29**	Infectious Diseases & HIV/AIDS	**6**	**35**
Infectious Diseases & HIV/AIDS	**7**	**34**	Hypertensive Diseases	**7**	**27**	Accidental & Intentional Injuries	**7**	**27**
Accidental & Intentional Injuries	**8**	**30**	Accidental & Intentional Injuries	**8**	**25**	Diseases of the Respiratory System	**7**	**27**
Diseases of the Genitourinary System	**9**	**16**	Diseases of the Nervous System	**9**	**15**	Diseases of the Digestive System	**9**	**20**
Diseases of the Nervous System	**10**	**14**	Diseases of the Digestive System	**10**	**14**	Diseases of the Genitourinary System	**10**	**16**

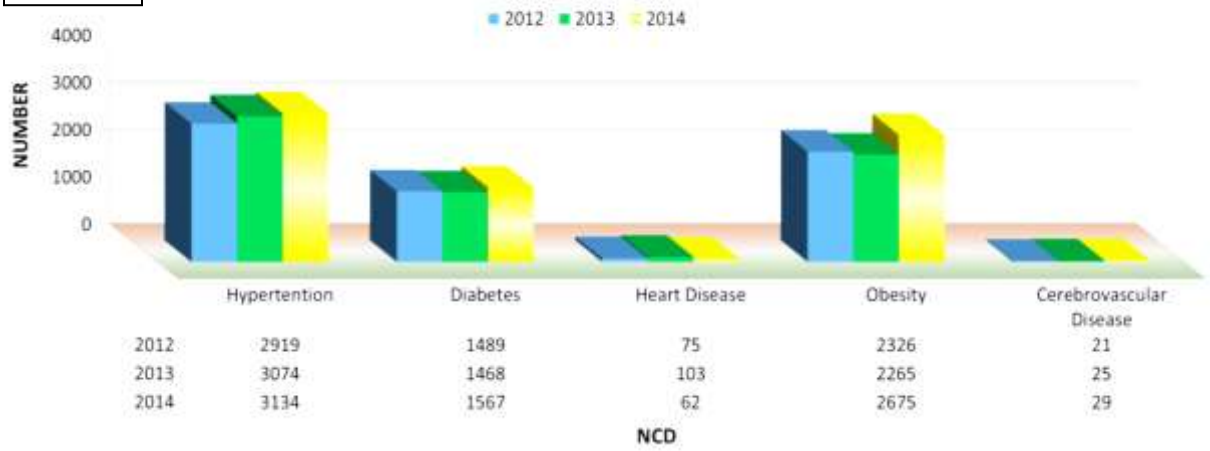
[43] Health Statistics Division note: *To date (December 2015), the Health Information Division has not yet received confirmation for all cases regarding the causes of death for the year 2013 or the year 2014*)

Table 20 illustrates that throughout the three year period of 2010 to 2012, for each year Heart Disease was ranked either first or second as a principal cause of death and that malignant neoplasm, cerebrovascular disease and diabetes mellitus remained ranked within the five top leading causes of death during the entire period. Deaths from hypertensive disease moved from seventh/2011 to fifth place/2012. For the same period, infectious diseases & HIV/AIDS fell from 3rd place to 6th place as a principal cause of death.

Non-Communicable Diseases (NCDs)

The number of reported cases of the leading Non-Communicable Diseases has increased between 2012 and 2014 [See Fig. 17]: *Source: Health Statistics Division Report 2015*]. Hypertension was the

Fig. 17 **Leading Non-Communicable Diseases: 2012, 2013 & 2014**



most reported Non-Communicable Disease (NCD) for each of the three years (*2012, 2013 and 2014*) accounting for approximately forty three (43%) of the leading NCDs reported between 2012 and 2014 and recording an increase of approximately seven percent (7%) over the three year period. The community clinics report that over forty percent of the visits of their clients relate to hypertension and diabetes [See discussion on the Medical Benefits Scheme.] Heart disease and cerebrovascular disease together account for two percent of reported cases, excluding obesity, a condition that may be common among hypertensives and diabetics.[44]

Public health officials are alarmed by the increase in prevalence of obesity/overweight. UN Food and Agriculture Organization (FAO) found that the twin island state is ranked 18th among all countries worldwide with 25.8 percent of its adult population obese citing 'urban lifestyles and rising income levels, coupled with malnourishment among the countries' poor', as helping to make the global obesity rate so rotund.

The relationships between disaster preparedness and NCDs revolve around the understanding that persons so diagnosed tend to be on daily medications for the rest of their lives and therefore

[44] Health Statistics Division Report 2015

need to ensure adequate supplies of drugs for use in post-disaster periods.

Morbidity

Table 21 reveals that between 2012 and 2014 Acute Respiratory Infections (ARI) accounted for approximately 48% of all cases of Communicable Diseases recorded. The number of cases of influenza increased by approximately one hundred and forty-five percent over the two year period under review indicating the possible outbreak of an epidemic in 2014. There was a reduction of sixty-eight percent in the number of cases of Chicken Pox over the three-year period.

Table 21 Selected Communicable Diseases, 2012 – 2014

Disease	2012	2013	2014
Acute Respitory Infection (ARI)	4,217	4,804	3816
Influenza	1,479	1,543	3624
Gastroenteritis	840	1,428	1617
Conjunctivitis	448	255	158
Impetigo	126	132	89
Chicken Pox	161	98	52
Unspecified Pneumonia	7	23	50
Dengue Fever	10	0	9

Source: Health Statistics Division, Ministry of Health

Gastroenteritis showed an increase in cases by approximately 93%. Although relatively small in number, cases of unspecified pneumonia reported increased just a bit more than seven times from 2012 to 2014. Overall there was a 27% increase in number of reported cases of all Communicable Diseases comparing the year 2012 with the year 2014.

HIV/AIDS

The first case of HIV in Antigua and Barbuda was diagnosed in 1985. The number of persons diagnosed HIV positive has steadily increased annually over the last 29 years (*1985-2014*) to a cumulative 1052 with approximately 56% being male and 44% female. Since 2012 the prevalence rate (#cases/population) has been increasing slightly to 0,89 cases per thousand in 2014. [Table 22]

Table 22 HIV & AIDS Prevalence2012 – 2014

YEAR	2012	2013	2014
Cases	729	756	795
Population	86,793	88,069	89,391
Prevalence Rate	0.84	0.86	0.89

Source: Health Statistics Division, Ministry of Health

The epidemic is concentrated in the 15-49 years age group where just over eighty percent (80.8%) of infections occurred between 2005 and 2014. Approximately 16% of infections occur in the over 49 year age group and just below two percent (1.7 %) exist in the under 15 age group. In the year 2014 there were 55 new reported cases of HIV in Antigua and Barbuda where approximately 51% of these were male.

3.2.6 Economic growth and performance

Antigua and Barbuda is essentially a service based economy, relying predominantly on the tourism industry as the main engine of growth with support from the construction sector. Like other Small Island Developing States (SIDS), Antigua and Barbuda grapples with economic, social and environmental challenges such as a narrow resource base, heavy dependence and vulnerability to external markets exacerbated by small domestic markets; high costs for energy, infrastructure, transportation, communication and servicing; fragile natural environments and high levels of vulnerability to natural disasters; volatility in economic growth and limited opportunities for the private sector and a proportionately large reliance of their economies on their public sector. In addition, decades of unsustainable fiscal practices and coupled with weak institutional structures led to an extreme and unsustainable debt burden[45].

In 2005, the GDP at market prices was estimated at US$459.487 million and the GDP per capita was US$10,513. This relatively high GDP per capita was made up of contributions from various sectors as follows: Transportation and Communications (20.8%); Government Services (16.8%); Construction (16.2%); Financial and Business Services (16.1%); and Hotels and Restaurants (9.9%). Comparatively, the Agriculture sector contributed only 3.6% to the value of GDP in 2005 and has continued its steady decline for a number of years. The main direct and indirect contributor to GDP is tourism which is the most significant economic driver for the economy. In 2005, CDB estimates gross tourism revenue amounted to almost 50% of GDP. *Like many* other SIDS in the Caribbean, the economy of Antigua and Barbuda has transitioned from an agrarian to a more service oriented economy within the last 25 years, but the economy lacks diversity and therefore resilience.[46]

Economic growth has been somewhat volatile during the last decade [Fig. Xx]. These growth patterns underscore the constraints highlighted above, in particular the economy's vulnerability to external shocks, high levels of dependence on foreign source markets and reliance on a narrow resource base.

The peak in economic growth of 12.7% in 2006 resulted primarily from the spike in construction activities (of 46%) and other related infrastructural developments in preparation for the region's hosting of the ICC World Cup cricket tournament in 2007. In 2007 the economy returned to its pre-World Cup growth rate of just over 7%. In 2008 the economy was significantly affected by the global financial crisis, the collapse of the Standard Financial Group and the failure of the Trinidad-based British American Insurance Company (BAICO). Economic growth declined significantly of 1.5%.

45

46 Antigua and Barbuda SIDS 2014 Preparatory Progress Report (July 2013) Prepared by Dr. Janil Gore-Francis in collaboration with the Environment Division – Ministry of Agriculture, Housing, Lands, and the Environment

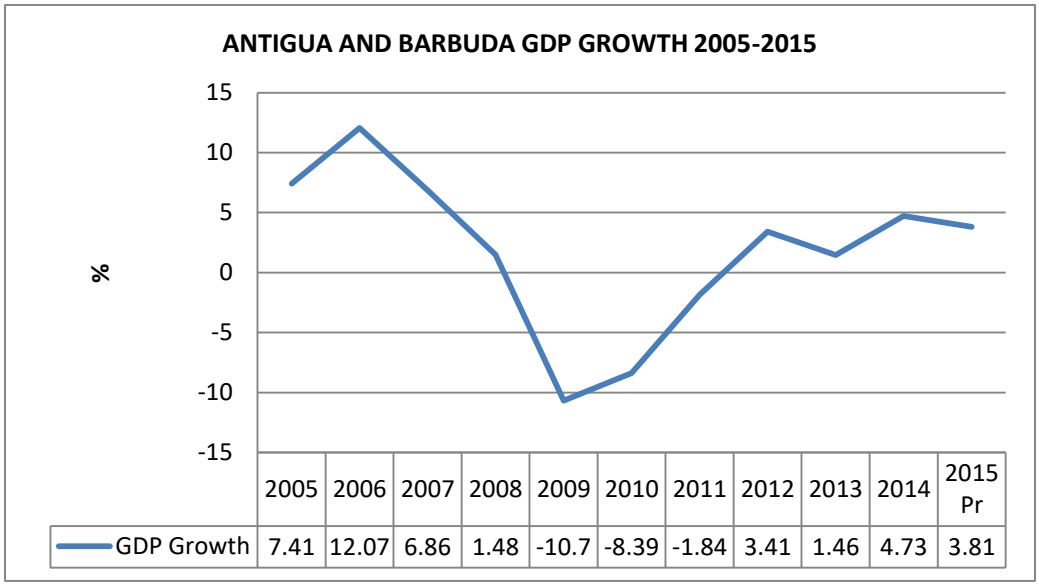


Fig: 18: Antigua and Barbuda Real growth rates 2001 – 2011

By the end of 2009 Antigua and Barbuda had recorded the worst recession in the country's history as the economy contracted by 10.7% in that year. Over the period 2009-2011 real GDP plummeted by 22.2%. Notwithstanding this, by 2010 the economy had begun to show some positive signs. The economy had seen the worst contraction in 2009; in 2010 onwards the rate of contraction decelerated to 8.5% and then to just under 3% in 2011. Real GDP is expected to grow by 0.9 % in 2012 with further projected growth of 2.4%in 2013.

During 2014 the economy grew by 4.2% due to an increase of economic activity in the public sector, wholesale and retail sector and construction. Tourism as represented by hotels and restaurants grew by 5.3% placing the country in the 178th position in the world by nominal GDP. The national debt in 2014 was 1,226 millions of dollars, (98.24% debt-to-GDP ratio) and its public debt per capita is 13,487$ dollars per inhabitant.

The path to economic recovery, however gradual, is being facilitated by two main factors: growth in the tourism and tourism-related sectors and also the implementation of the home-grown fiscal and structural reforms contained in the National Economic and Social Transformation (NEST) Plan. In 2015, economic activity was expected to decelerate and reflect growth of 2.6%. Based on the data from the first half of 2015, there was a decline in tourist arrival of 3.6% and activity in the construction sector was not as robust as 2014. Inflation was low at 0.6%. Hotels and Restaurants is only expected to only grow by 1.6% while construction is expected to grow by 5.6%. Wholesale and retail activity is expected to grow by 3.8%.[47]

[47] Antigua and Barbuda Recurrent and Development Estimates 2016

Based on projections provided by the Eastern Caribbean Central Bank (ECCB), the economy of Antigua and Barbuda is expected to grow by 2.8 percent in 2016 and 2.7 percent in 2017. However there is some optimism that this growth could be larger based on the planned investments of EC$3billion by the government. Strong growth will positively impact the outcome of the debt strategy.[48]

GoAB maintains its commitment to Construction and the Small Business sectors and will focus targeted support to them through improvement in doing-business initiatives, the development and support of tourism-based economic clusters, taxation reform and improved customer friendly Customs Services.

Antigua and Barbuda continues to face challenges on its fiscal accounts. In order to ensure fiscal and debt sustainability and achieve a debt to GDP target of 60 percent in 2030, the government has decided to pursue fiscal policy that would lead to primary surpluses over the medium term.

The overall fiscal deficit amounted to $110.0 million (3.2 percent of GDP) in 2014, while the primary deficit represented 2.0 percent of GDP. Borrowing from the domestic financial system and an accumulation of both external and domestic arrears financed the deficit. The current account deficit amounted to $56.3 million (1.6 percent of GDP).

Preliminary estimates for 2015 indicate an improvement in the fiscal performance in 2015 with a possible small primary deficit of 0.2 percent of GDP. This was due mainly to high collections of corporate income taxes and consumption taxes.

Over the medium term the government is aiming to achieve primary surpluses of 3 percent of the GDP by improving expenditure management and controls, revenue generation and debt management. The goal is to generate an underlying primary balance of no less than 3 percent of GDP in 2016. The additional resources would help to fund implementation of key projects that can create employment and expand economic output.

3.2.7 Poverty and unemployment

Poverty is a major concern of the Government of Antigua and Barbuda. The Prime Minister/Minister of Finance informed the nation of the challenge of poverty in the society:

> ‘A staggering 29 percent of our population or over 8,000 persons either live in poverty or, are at risk of falling into poverty. They earn an annual income of below $6,318, or income below $650 per month. Over the last five years, 2011 to 2015…63 percent of our labour force or approximately 24,000 of 38,000 earn $3,000 or less per month….extending the income bracket to persons earning $5,000 per month or less, the picture becomes a lot more condemning, with

[48] Ibid

approximately 92 percent of the population earning $5,000 or less per month'[49].

These statistics, he affirmed, were not ones with 'which any of us should be prepared to live'. There is policy commitment to discourage intergenerational poverty and a commitment to the development of systems and programmes to allow the poor to climb 'the economic ladder'. See further discussion on the poor/poverty in Sec. 4.2.4.1)

The rate of unemployment in Antigua & Barbuda in 2015 has been recorded at fourteen-point-one percent (14.1%) according to the country's first ever Labour Force Survey[50], which was conducted among persons fifteen (15) to sixty-four (64) years.

The working population is estimated at fifty-seven thousand, four hundred and eighteen (57,418) which shows a labour force participation of seventy-seven percent (77.1%). The survey shows that more women (20,217) are employed than men (17,844) but the employment-to-population ratio (EPR) was slightly higher for men (68.4%) than women (64.5%).

The youth employment rate is thirty four-point-six percent (34.6%), more than double the overall unemployment rate. Persons with tertiary education had the lowest unemployment rate of approximately eight percent (7.9%) and those who completed secondary school had the second lowest rate of fifteen-point-six percent (15.6%).

The standard measure used in assessing is the Gini coefficient. The closer it is to 1.0, the more unequal is the distribution of income in the society; the closer it is to zero, the lower the level of inequality. One long standing thesis is that as a country becomes more developed, inequality may rise initially, but then plateaus and eventually falls. Thus, Gini coefficients of 0.3 and less, tend to be found mainly in developed countries. In Antigua and Barbuda the Gini coefficient[51] is 0.48, the worst in the region.[52]

3.2.8 Most vulnerable groups

In a 2012 report, the United Nations Development Programme (UNDP) noted that 'inequality of outcomes and that of opportunity are highly inter-dependent. Without equal opportunities, systemic patterns of discrimination and exclusion prevent the poor and disadvantaged groups from acquiring economic, political and social resources, resulting in inequality traps and the persistence of inequality across generations'.

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[49] Ibid

[50] Ministry of Trade, Commerce and Industry: Survey conducted in one thousand, five hundred (1550) households during the week of September 14-19th 2015.

[51] The Gini coefficient (also known as the Gini index or Gini ratio) is a measure of statistical dispersion intended to represent the income distribution of a nation's residents, and is the most commonly used measure of inequality.

[52] Minister of Finance Budget Speech 2016

The Government continues its commitment to assist vulnerable groups through a series of programmes managed by the Public Service itself or its statutory authorities. These include[53]:

- The Antigua and Barbuda Social Security Board (ABSSB) implements a contributory pension scheme for formal sector workers which provides age and social pensions as well as invalidity, survivors, sickness, maternity, and funeral benefits;
- the Government administers the Civil Service Pension Scheme, a non-contributory pension plan for public employees.
- The Government provides social assistance through the Board of Guardians
- Social assistance programs are also provided by several institutions.
- PDV[54] Caribe Antigua and Barbuda Ltd., implements two social assistance programs: the People's Benefit Program (a conditional cash transfer program), and the Senior Citizens Utilities Subsidy

Spending on social protection in Antigua and Barbuda is above the average of other OECS countries. Government spends 5.2% of GDP on social protection programmes, much higher than other OECS countries that on average spend 3.8% of GDP[55].

The poor

A 2007 study '*Living Conditions in Antigua and Barbuda: Poverty in a Services Economy in Transition'* provides a detailed analysis of poverty in the country. The study proposes the existence of three fundamentally different categories of persons living below the poverty line[56]:

- the chronic poor, or those individuals and households that have been poor for more than one generation;
- the new poor or those individuals, or households living below the poverty line that have only recently become impoverished as a result of recent changes in the economy; and
- the seasonal poor or those individuals or households that move into and out of poverty on a seasonal basis.

The chronic or long-term poor are described as:

- 'generally bereft of capabilities that would allow them to function adequately in the labour, credit and financial markets'
- 'may lack the accumulated resources to sustain decent living'
- usually lack educational and skill certification,

[53] International Bank for Reconstruction and Development Project Appraisal Document on a Proposed Loan (US$10 Million) to Antigua and Barbuda for a Public and Social Sector Transformation Project (PSST), April 29, 2013

[54] The acronym is commonly used in the name of the programme which is an assistance programme established between energy company Petroles de Venezuela (PDV) and some Caribbean governments

[55] Ibid

[56] KAIRI CONSULTANTS LIMITED In association with THE NATIONAL ASSESSMENT TEAM OF ANTIGUA & BARBUDA: *Living Conditions in Antigua and Barbuda: Poverty in a Services Economy in Transition* submitted to THE CARIBBEAN DEVELOPMENT BANK, August 2007

- have no access to land, beyond miniscule parcels, or other forms of physical capital,
- lack valued assets, and
- tend not to be richly endowed in terms of social capital.

Three poverty indicators were identified:

- The poverty line - which is a monetary measure of the minimum consumption, in dollar terms, of goods and services that would allow a household to meet its basic needs. The poverty line, thus, represents a minimum budget that a household could be expected to spend, over a defined period, if it is to meet its basic minimum food and non-food requirements.

  The poverty line in Antigua and Barbuda in 2005/06, three years before the impact of the international economic recession started being felt, was estimated at EC$6,318 (US$2,366) per annum, when adjustments were made for non-food expenditure.

- The indigence line - which represents the monetary cost of purchasing this selected basket of basic food items. Households unable to meet the cost of obtaining this basket of food items are categorised as critically poor, or indigent.

  The indigence line for Antigua and was estimated at EC$2,449 (US$917) per annum or EC$6.71 (US$2.51) per day.

- The vulnerability line that is set at 125 percent of the poverty line (that is 25% above it). It measures the number of persons who are susceptible to falling below the poverty line, should an unanticipated event such as a natural disaster or some type of economic shock were to occur.

  In this regard, the data show that an additional 10.0 percent of the population was deemed to be vulnerable[57].

Official Government figures (2016) now suggest that persons who earn an annual income of below EC$6,138 or EC$650 per month live in poverty or are at risk of falling into poverty and that 'a staggering 29 percent of our population or over 8,000 persons' so do[58]. Persons who fall in this group are faced with lower levels of income, lack of assets and this inequality in opportunities leads to lower uptake of social services.

<u>The elderly</u>

Populations with medians under 20 years may be described as "young" while those with medians 30 or over, as "old". Median ages of between 20–29 years are considered to be of intermediate

[57] KAIRI Poverty study

[58] Prime Minister/Minister of Finance: Budget Speech 2016

age. The World Factbook updates the WHO estimate of 31 years in 2013 to 31.6 years [Male: 29.8 years and female: 33.2 years (2016 est.)[59]. As such the population of Antigua and Barbuda can be considered as aging'. This is so although the percentage of the population >60 years has virtually remained constant over the last ten years. [See Table 23]

Table 23	**PERCENTAGE POPULATION 60+ ANTIGUA AND BARBUDA**										
Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Value	11.28	11.24	11.2	11.14	11.03	10.87	10.77	10.62	10.49	10.41	10.43

The Antigua and Barbuda Policy on Ageing references the United Nations Principles for Older Persons, adopting the core principles of 'independence, participation, care, self-fulfillment, and dignity'. It also references the Regional Strategy for the Implementation of Latin America and the Caribbean of the Madrid International Plan of Action on Ageing (2003), and The Plan of Action on the Health of Older Persons.[60]

The needs of older persons have been addressed - with varying degrees of intensity – in a number of initiatives embarked upon in the overall national socio-economic development of the country. All national strategic economic and social transformation plans, country poverty assessment and reduction strategies reflect concern for the well-being of older persons. Governmental care and social protection of older persons are executed through three Government Ministries:

- The Ministry of Health which is responsible for the operation of the Fiennes Institute, which provides holistic long stay residential care services free of cost to older persons, who are indigent or whose family cannot or do not provide for them
- The Ministry of Social Transformation, which through its Citizen Welfare Department manages the Government Residential Assistance Care for the Elderly and Eligible (GRACE) which deploys eldercare assistants and welfare aides to provide home care services and recreational activities.
- The Ministry of Finance, with the implementation of the new property tax grants an allowance of EC$150,000 and a further 50% reduction on a qualifying needs basis, in respect of residential property owned and occupied by the elderly.

The Civil Services also manages an additional two programmes aimed at alleviating the financial challenges to the elderly to obtain and maintain utility services:

- A Utilities Programme which makes provision for persons 80 + years, living alone, who are unable to pay their utilities bills, to receive government-paid utilities, and
- The Senior Citizens Utilities Subsidy Programme (SCUSP) which provides a monthly subsidy to all pensioners registered with the Antigua and Barbuda Social Security Board (ABSSB). It

[59] Ibid

[60] ANTIGUA AND BARBUDA Report: National Follow-up to the Regional Strategy to the Brasilia Declaration of the Madrid International Plan of Action on Ageing (MIPAA) 2012

consists of a monthly subsidy applied to utility bills.

The Antigua and Barbuda Pensioners Association and the Antigua and Barbuda Association for Senior Citizens are but two of the non-governmental organizations that advocate for the financial and social protection of older persons.

The issue of an ageing population is of major concern to two statutory bodies – The Antigua and Barbuda Social Security Board (ABBSB) and the Antigua and Barbuda Medical Benefits Scheme (MBS), both funded through mandatory deductions from the salaries of the 'economically active'.

Civil Service Pension Scheme

The Government administers the Civil Service Pension Scheme, a non-contributory pension plan for public employees. In 2010, Government pensions of EC$44.1mil accounted for 1.3 percent of GDP. The Scheme is considered 'more generous than those of the other OECS territories'[61] with payouts peaking at EC$46.7mil in 2009 [Table 24]. Government pays all qualifying Civil Servants pension that are at maximum 'two-thirds of the highest pensionable emoluments drawn by him at any time in the course of his service under the Government'[62].

Table 24
GOVERNMENT EXPENDITURE ON PENSIONS (EC$M) 2007-2011

Year	Government Pensions
2007	26.3
2008	31.5
2009	46.7
2010	44.1
2011	46.2

Source: Budget Office, Ministry of Finance

The Antigua and Barbuda Social Security Board (ABSSB)

The Antigua and Barbuda Social Security Board provides the social protection services of old age or retirement pension and old age assistance pension to its beneficiaries (persons >60 years). Contributors become eligible for a full pension at age 60 if they have made at least 500 weeks of contributions. Reduced pensions (partial pensions) or lump-sum grants (age grants) can be claimed by those with fewer than 500 weeks of contributions. There are also two special pensions (transitional pensions – for those whose working years may have been primarily before ABSSB became operational in 1973 and old age assistance – a non-contributory age pension).

In 2010, ABSSB reported 36,500 active contributors, representing 66 percent of the estimated labor force (and 80 percent of the formal sector employment) and in 2009, provided benefits to 6,000 individuals, or 72 percent of the population, over 60 years old.[63] [Table 25].

[61] International Bank for Reconstruction and Development Project Appraisal Document on a Proposed Loan (US$10 Million) to Antigua and Barbuda for a Public and Social Sector Transformation Project (PSST), April 29, 2013

[62] Laws of Antigua and Barbuda: The Pension Act Cap 311

[63] World Bank

ABSSB, in its analysis of the issue of demographic aging concludes that 'it is likely to face the situation where an increasingly high proportion of pensioners will need to be supported by a continuously decreasing labour force'. The analysis, based on 'a combination of the increasing life expectancy, a slowdown in fertility rates, emigration patterns and the increasing dependency rate of the elderly population (>60yrs) concludes that the combination of all these factors 'will ultimately lead to a substantial increase in the financing of a single pension'.

Table 25: SOCIAL SECURITY- AVERAGE NUMBER OF PENSIONERS & COST 2007-2011						
	AGE PENSIONERS		**OLD AGE PENSIONERS**		**Total # Pensioners**	**Total Cost EC$mil All pensioners**
Year	**#**	**Cost EC$mil**	**#**	**Cost EC$mil**		
2007	4,840	46.4	282	0.9	5,122	47.3
2008	5,215	51.9	240	0.8	5,455	52.7
2009	5,653	58.2	215	0.7	5,868	58.9
2010	6,048	64.0	182	0.6	6,230	64.6
2011	6,528	70.5	157	0.5	6,685	71.0
Total costs 2007-11		**291.0**		**3.5**		**294.5**
Source: Antigua and Barbuda Social Security Board						

For 2010, the national old-age dependency ratio was 15.4%. As such, the age pension expenditure will continue to increase, because a larger number of pensioners will become dependent on the working population for support. In 2010, age pension accounted for 82.3% of total benefit expenditure and is actuarially projected to account for more than 90% of benefit spending in the future.

Currently, employees pay four percent deductions on income up to a maximum of EC$6,500 with employers paying six percent for a total deduction of 10%. New regulations have been legislated for 2017 where the total contribution will rise by 2% to 12% of salary (employee/5% and employer/7%) and increasing the mandatory retirement pension age to 62 years.

Antigua and Barbuda Medical Benefits Scheme

The policies and regulations of the Medical Benefits Scheme are governed by the Medical Benefits Act, Cap. 271. The services offered by the MBS are financed through mandatory employment remittances (Age 16-60 years) of:

- 3½% salary/wage employee contribution
- 3½% salary/wage employer contribution on employee's behalf, and
- 5% Self-Employed Contribution per salaried class

The Medical Benefits Scheme (MBS) offers financial assistance and pharmaceutical supplies to qualified residents of the twin island Caribbean state of Antigua and Barbuda. Our beneficiaries are also entitled to refunds for services rendered through laboratory tests, X-rays, surgery, ultra sounds, electrocardiographs or similar services, hospitalization and drugs. The MBS also provides

financial, managerial and medical supplies to the local hospital and health clinics[64].

Beneficiaries are people suffering with the nine covered non-communicable diseases; namely; asthma, cancer, cardiovascular diseases, certified lunacy, diabetes, glaucoma, hypertension, leprosy, and sickle cell anemia. MBS also focuses on preventative medicine, particularly through a School Outreach Programme which promotes proper nutrition and regular physical activity.

Children

Approximately thirty percent of the Antigua and Barbuda population is younger that eighteen years of age. The negative impacts of disasters and environmental degradation on children's rights to adequate health, standard of living, education, and protection from violence, abuse and exploitation have been documented elsewhere in the Caribbean SIDS.[65] Environmental threats such as natural hazards and climate change are expected to negatively impact children and their families with regard to:

- Lost or lowered family earnings in the fisheries, agricultural and tourism sectors
- Crop failure and the potential effect on nutrition from delayed rains and drought
- Reduced abundance and diversity of fish and implications for nutrition from rise in sea temperatures
- Inability to access food and medicines
- Freshwater shortages from drought and changed spatial distribution of rainfall
- Susceptibility to injury or drowning
- Increased vector and water-borne diseases; children typically have weaker immune systems than adults
- Loss of learning time during emergencies while schools are being used as shelters
- Reduced education opportunities and impact on life choices
- Potential environmental displacement of families in low-lying coastal areas
    - Adjustment to displacement, migration, separation from parents and friends
    - Loss of community, change/loss of identity
- Lack of attention to rights and needs of children in emergency plans and policies
- Rising incidence of conflict fuelled by displaced populations facing shortages in essential items like food and water (O'Garro, 2009; CARICOM, 2008)

It is internationally recognized that 'children generally also have less developed coping capacities to manage the stress of traumatic situations they may face in a disaster situation…and also have lesser abilities to escape a dangerous situation, or even to discern a perilous situation or behaviours.'[66]

[64] mbs.gov.ag
[65] Country Document for Disaster Risk Reduction: Barbados, 2014
[66] Ibid

Persons with disabilities

The community of disabled persons in Antigua and Barbuda is not well defined. Leaders of the Antigua & Barbuda Association of Persons with Disabilities (ABAPD) complain regularly in public forum of their inability to define the population that they serve.

Table 26 PERSONS WITH DISABILITIES ANTIGUA AND BARBUDA 2011

SEEING	Total	Male	Female
Total	*84,816*	*40,395*	*44,421*
No difficulty	77,543	37,548	39,995
Yes, some difficulty	4,790	1,646	3,144
Yes,. lots of difficulty	697	245	452
Cannot do at all	114	55	58
Don't know/Not stated	1,672	901	771

SELF CARE	Total	Male	Female
Total	*84,816*	*40,395*	*44,421*
No difficulty	81,954	38,967	42,987
Yes, some difficulty	497	235	262
Yes, lots of difficulty	211	79	132
Cannot do at all	189	84	106
Don't know/Not stated	1,965	1,031	933

HEARING	Total	Male	Female
Total	*84,816*	*40,395*	*44,421*
No difficulty	81,790	38,928	42,862
Yes, some difficulty	967	403	565
Yes, lots of difficulty	197	77	120
Cannot do at all	46	24	22
Don't know/Not stated	1,816	965	851

UPPER BODY	Total	Male	Female
Total	*84,816*	*40,395*	*44,421*
No difficulty	82,097	39,056	43,040
Yes, some difficulty	546	224	322
Yes, lots of difficulty	178	64	114
Cannot do at all	64	33	31
Don't know/Not stated	1,931	1,018	914

WALKING	Total	Male	Female
Total	*84,816*	*40,395*	*44,421*
No difficulty	79,658	38,300	41,358
Yes, some difficulty	2,414	798	1,616
Yes, lots of difficulty	746	260	486
Cannot do at all	209	88	121
Don't know/Not stated	1,789	949	839

COMMUNICATING	Total	Male	Female
Total	*84,816*	*40,395*	*44,421*
No difficulty	82,205	39,053	43,151
Yes, some difficulty	367	173	194
Yes, lots of difficulty	205	102	103
Cannot do at all	71	40	31
Don't know/Not stated	1,969	1,028	941

REMEMBERING	Total	Male	Female
Total	*84,816*	*40,395*	*44,421*
No difficulty	81,215	38,776	42,438
Yes, some difficulty	1,388	504	884
Yes, lots of difficulty	263	95	168
Cannot do at all	48	19	29
Don't know/Not stated	1,902	1,001	901

Source: 2011 Census Report

Census data exists and is shown in Table 26 above. Attempts to define the population of persons with disabilities based on such census data are fraught with statistical difficulties relating to definitions of disabilities and the identification of persons with multiple disabilities.

The Antigua & Barbuda Association of Persons with Disabilities (ABAPD) is a cross-disability umbrella organization that represents the Disabled Peoples' International in Antigua and Barbuda. ABAPD was founded and managed by persons with disabilities and is a duly constituted and registered not-for-profit organization, guided by the aims and objectives embodied in its Constitution and By-Laws in advocating for the rights and equality of persons with disabilities, while providing support and services where possible. It is our mandate to change the attitude of society towards children & adults with disabilities, and to improve the services available to disabled persons in Antigua[67].

The mission is "to provide the environment which enhances and maximizes the opportunity for every person with a physical, psychological, intellectual and/or sensory impairment and/or limitation in Antigua and Barbuda to achieve his/her full potential in his/her economic, social, religious and political life."

The ABAPD aims to provide access, equality, empowerment and opportunity for disabled locals. The organization affirms that Individuals with disabilities are disproportionately vulnerable in (times of) emergencies, and face numerous challenges accessing resources for response and recovery and has been vocal in its demands that special considerations be offered to persons with disabilities in information sharing and evacuation procedures.

The Antigua and Barbuda Social Security Board provides a disability pension to persons younger than the age of 60, assessed with a disability, and has at least 156 weeks of contributions. It also provides a disability settlement to persons younger than age 60, assessed with a disability, and has at least 52 weeks but less than 156 weeks of contributions. Special consideration are offered to the blind who can get social assistance, if aged 60 or older and blind with annual income from all sources of less than EC$5,000.

3.3 Governance Structure

Antigua and Barbuda is a constitutional monarchy with a British-style parliamentary system of government. It is a multiparty, parliamentary democracy headed by the reigning British monarch who appoints a Governor General as Head of State.

The Constitution of 1981 was promulgated simultaneously with the country's formal independence from Britain. The Constitution includes provisions to secure life, liberty, and the protection of person, property, and privacy, as well as freedom of speech, association, and

[67] dpinorthamericacaribbean.org/AntiguaBarbudaMO.htm

worship. It provides a basis for possible territorial acquisitions, expands upon fundamental human rights, recognizes and guarantees the rights of opposition parties in government, and provides Barbuda with a large measure of internal self-government.

There are three branches of Government - legislative, executive, and judicial.

The legislative function is exercised through a bicameral Parliament consisting of a seventeen-member House of Representatives, responsible for introducing legislation, and the seventeen-member Senate, which reviews and gives assent to proposed legislation. Representatives are elected by popular vote in general elections that are constitutionally mandated every five years but may be called earlier. Senators are appointed by the governor general, the majority (thirteen) of whom are appointed on the advice of the Prime Minister who is the leader of the party that holds the majority of seats in the House of Representatives.

The executive function is exercised through a Cabinet, headed by the Prime Minister which has responsibility for the initiation of Government policies and programmes and the general direction and control of government business. The Governor General appoints other Ministers on the advice of the Prime Minister from either House, but they are not necessarily MPs.

The judicial branch is relatively independent of the other two branches, although the magistrates are appointed by the Office of the Attorney General in the executive branch. The judiciary consists of the Magistrate's Court for minor offenses and the High Court for major offenses. To proceed beyond the High Court, a case must pass to the Eastern Caribbean States Supreme Court, whose members are appointed by the OECS[68].

3.3.1 Political structure and organization

The nation has two main political parties – the ruling Antigua and Barbuda Labour Party (ABLP) and the United Progressive Party which was in power for the period 2004-2014. Prior to that, the ABLP held power uninterrupted for twenty-eight years during the period 1976 to 2004. A small splinter from the ABLP contested very unsuccessfully in the 2014 general elections.

The Prime Minister creates an executive government and consults with the Governor General, in conjunction with the leader of the opposition on the composition of other appointed bodies and commissions.

The present politically led executive is structured into twelve Ministries each headed by a Minister of Government who is a member of the Cabinet. The existing Ministries [2016][69] are:

[68] www.photius.com/countries/antigua_and_barbuda/government/system.html. The analysis here is deemed accurate by author.

[69] The titles and responsibilities of the various Ministries are the sole decision of the Prime Minister who at any time has the power to not only change the titles and responsibilities but also the Minister.

- Ministry of Finance & Corporate Governance[70]
- Ministry of Legal Affairs, Public Safety and Labour
- Ministry of Public Utilities, Civil Aviation and Transportation
- Ministry of Tourism, Economic Development, Investment and Energy
- Ministry of Agriculture, Lands, Fishers and Barbuda Affairs
- Ministry of Education, Science & Technology
- Ministry of Works and Housing
- Ministry of Trade, Commerce & Industry, Sports, Culture & National Festivals
- Ministry of Social Transformation and Human Resource Development[71]
- Ministry of Foreign Affairs and International Trade
- Ministry of Information, Broadcasting, Telecommunications & Information Technology
- Ministry of Health and The Environment

Ministries of Government are supported by a number of statutory bodies in the provision of Government services. The main ones [2016]

- Agriculture Development Corporation (ADC)
- Antigua & Barbuda Investment Authority
- Antigua and Barbuda Hospitality Training Institute
- Antigua and Barbuda International Institute of Technology (ABIIT)
- Antigua and Barbuda Tourism Authority
- Antigua Pier Group Ltd.
- Antigua Public Utilities Authority
- Board of Education
- Central Marketing Corporation (CMC)
- Citizenship by Investment Unit
- Financial Services Regulatory Commission (FSRC)
- Free Trade and Processing Zone

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[70] Ministry of Finance & Corporate Governance: Office of the Prime Minister, Ministry of Finance Headquarters, Prime Minister's Scholarships, Financial Secretary's Office, Treasury Department, Inland Revenue Department, General Post Office, Property Valuation and Tax Compliance, Customs Department, Social Security, State Insurance, Public Sector Investment Programmes, Financial Services Regulatory Commission (FSRC), Free Trade and Processing Zone, Gaming, Defence Force, Office of the National Drug Control Policy (ONDCP), Port Authority, Sea Ports, Corporatization Unit, Antigua and Barbuda Development Bank, Passport and Citizenship, Citizenship by Investment Unit, Merchant Shipping and Shipping Registration

[71] Ministry of Social Transformation and Human Resource Development: Social Welfare Division, Community Development, Social Improvement, Single Parents, Poverty Eradication, Care of the Elderly, Drug Rehabilitation & Reduction Programme, **Disaster Preparedness**, Rural Development, Board of Guardians, Gender Affairs, Ecclesiastical Affairs, Public Administration, The Civil Service, Establishment Department, Training Division, Human Resource Development and Management Services, Pension Reform, Public Sector Transformation & Youth Empowerment (Job Programme), National Youth Council, Youth Department, Empowerment, Local Government, Alliance for Social Well Being

- Housing - CHAPA
- Medical Benefits Scheme
- Merchant Shipping and Shipping Registration
- Mt. St. John's Medical Centre
- National Solid Waste Authority
- PDV Caribe Antigua and Barbuda Ltd.
- Port Authority
- Social Security
- State Insurance

The chairperson and members of the various statutory bodies are appointed by Cabinet for specific terms of services. The membership of some boards is determined in the legislation which empowers the body.

3.3.2 Local government and levels of decentralization

The nation is divided into six parishes[72] and Barbuda. There is no constitutional provision for local government on Antigua but a Local Government Division is established with 'street naming' as its major project.

The Barbuda Council was established under the constitution [Barbuda Local Government Act of 1976] and is responsible for local government on Barbuda. It consists of nine directly elected members, together with the members of the national parliament representing constituencies on Barbuda and a government-appointed member; it has the power to raise taxes; is responsible for agriculture, forestry, public health, public utilities and roads in Barbuda; and is accountable to the Prime Minister through the Minister of Agriculture who has responsibilities for Barbuda Affairs.

3.3.3 Coordination mechanisms between State and non-State actors

The vertical silo structure of the governance system in Antigua and Barbuda seems to foster an intrinsic resistance to coordination within and between State and non-governmental actors.

The National Economic and Social Council Act (2004) represents the major governmental attempt to promote such inter- and intra-sectoral coordination. The Act established a Council - The National Economic and Social Council - the leadership of which is appointed by the Prime Minister in consultation with the Leader of the Opposition and whose membership included a wide cross-section of national sectoral interests.[73]

[72] St George, St John, St Mary, St Paul, St Peter and St Philip

[73] Inter alia, representative[s] of the Barbuda Council, Antigua & Barbuda Trade Union Congress; Antigua Chamber of Commerce and Industry; Antigua and Barbuda Employers Federation; Antigua Hotel and Tourist Association; Professional Organization of Women in Antigua; Antigua and Barbuda Medical Association; The Environmental Awareness Group; Antigua Christian

The Council was expected to:

- to promote the goals of economic growth and development, participation in economic decision-making and social equity;
- to promote consensus on matters pertaining to social policy, and
- to advise the Government on significant changes to social and economic policy;

After a review of its work and the limited success it had achieved, the Council was closed in 2013.

Specific to Climate Change (CC) and DRR, the National Climate Change Adaptation Policy for Antigua and Barbuda calls for the establishment of a National Climate Change Committee with representatives from all major sectors, including Agriculture, Fisheries, Forestry, Natural Resources, Environment, Tourism, Finance, Planning, Transportation, Energy, Information, Education, National Office of Disaster Services (NODS) and non-governmental organizations.

The purpose of the committee is to provide advice to government on all aspects of climate change and supervise climate change projects in Antigua and Barbuda, and.

- Assist all sectors in Antigua and Barbuda in the preparation/adoption of climate change vulnerability studies and adaptation options.
- Convene regular meetings to receive and disseminate information.
- Prepare an Annual National Report on Climate Change. This could include a report on the climate of the country, climate change projects being implemented and the status of the climate change negotiation process.
- Undertake a public awareness campaign to advise all sectors of the population on the threat posed by climate change and proposed options for addressing climate change.

A scan of the organizational interrelationships suggests that the enhancement of synergies needs particular attention to be focused on the following areas[74]:

- Systemic Needs - legislative and policy framework, financial resources, political commitment, public awareness and enforcement of laws
- Institutional Needs - technical and administrative procedures, integrated work programmes and human resource development, and
- Individual Needs - improved employment conditions, improved information and communication flows and training/human resource development.

Council; Antigua and Barbuda Evangelical Association; Antigua Bar Association; Antigua Contractors Association; Antigua and Barbuda Architects Association; Antigua and Barbuda Industrial and Small Enterprise Association; Institute of Chartered Accountants of Antigua & Barbuda; National Youth Council; Antigua and Barbuda Association of persons with Disabilities; Banking Sector nominated by the banks operating in Antigua and Barbuda.

[74] National Capacity Self-Assessment for Global Environmental Management for Antigua and Barbuda: Review of Synergies among the Climate Change, Biodiversity & Desertification Conventions
www.undp.org/content/dam/undp/library/Environment and Energy... · PDF file

3.4 Development Context

The national development agenda has been designed on a platform of Sustainable Development aimed at attaining 'a sustainable services economy that improves quality of life, ensures social stability, and balances environmental integrity'[75]. The following thematic areas have remained central to the challenges of national development regardless of the governing political party in power over the last two decades:

- Fiscal Stabilization;
- Economic Growth;
- Services;
- Social Development;
- Physical & Human Resource Development;
- Information Communication Technology; and
- Public Sector Transformation.

The country shares an international reality with other SIDS in that it remains 'trapped in the reality of a narrow tax base, high debt, large trade deficits, small underdeveloped domestic financial markets, small private sectors and fragile banking systems[76]' as it continues to face its share of developmental challenges such as global demands, climate change, and other external shocks. 'Fiscal stabilisation, market access, and debt management' are high on the development agenda not only for internal economic stability and order but also in order to attract more Foreign Direct Investment and international aid.

The goals of the national development agenda therefore are expressed through practical 'on-the ground-policies, programmes and projects that concentrate on alleviating poverty, reforming health, providing quality education, generating employment, protecting the environment, and preventing crime'[77]. Recognizing that these issues are cross-cutting and intersectoral, Government ministries, agencies and departments; community based and non-governmental organisations; and private sector enterprises are afforded the opportunity to participate in shaping strategies for national development[78] through a developing consultative process.

[75] Antigua and Barbuda MDG Report
[76] PM Gaston Browne: General Assembly of the United Nations General Debate of the 71st Session 2016
[77] Antigua and Barbuda MDG Report
[78] Ibid

3.4.1 Human Development

The Human Development Index (HDI)[79] is an average measure of basic human development achievements in a country Developed by UNDP, it considers several social indicators (such as, life expectancy at birth, average age of schooling and expected years of schooling and family income or per capita consumption, etc.). It prioritizes elements of human development such as participation, gender equality, safety, sustainability, human rights and others. This indicator emphasizes the right to a healthy environment, in which DRR is a key component.

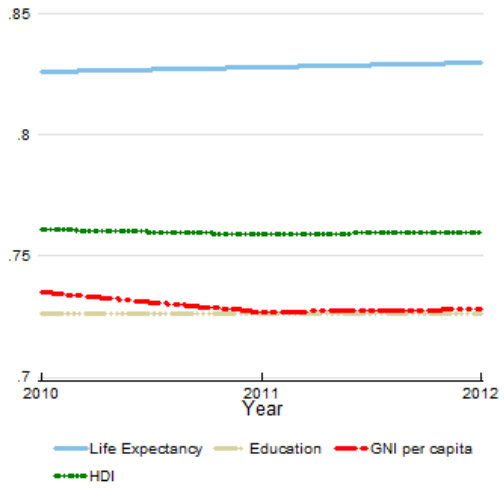

Fig. 19: Trends in HDI Components 2010-12 Source/UNDP

Figure 19 shows the trends in HDI relevant social indicators for Antigua and Barbuda during the period 2010-2012. There is slight improvement in life expectancy, slight decrease in GNI per capita and a no change in 'education' showing in total a slight decrease in HDI ranking. Table 27 confirms that the HDI ranking (vs. other countries in the world) has remained virtually steady with Antigua and Barbuda occupying positions 58 [high] to 61 [low] between 2010 and 2014.

Table 28 shows the HDI and rank for Caribbean countries during the period 1990-2014. Antigua and Barbuda now ranks third, behind Barbados and The Bahamas although it has lost six places in ranks during 2009-2014.

Table 27
HDI / Ranking Antigua & Barbuda

Date	HDI	HDI Ranking
2014	0.783	58º
2013	0.774	61º
2012	0.773	60º
2011	0.772	59º
2010	0.778	58º
Source: UNDP		

It has been recognized that the HDI masks inequality in the distribution of human development across the population at the country level and since 2010 efforts have been made to augment the HDI itself and introduce other indices to evaluate the contexts of poverty or income inequality and gender inequality.

The Inequality-adjusted Human Development Index (IHDI) adjusts the Human Development Index (HDI) for inequality in distribution of each dimension across the population. The IHDI accounts for inequalities in HDI dimensions by "discounting" each dimension's average value according to its level of inequality. The IHDI equals the HDI when there is no inequality across people but is less than the HDI as inequality rises. In this sense, the IHDI is the actual level of human development (accounting for this inequality), while the HDI can be viewed as an index of "potential" human

[79] UNDP Human Development Index (HDI): http://hdr.undp.org/en/statistics/hdi/

development (or the maximum level of HDI) that could be achieved if there was no inequality.[80].

Table 28 TRENDS IN HUMAN DEVELOPMENT INDICES FOR SELECTED CARIBBEAN COUNTRIES (1990-2015)

HUMAN DEVELOPMENT INDEX (HDI) RANK										AVE. ANNUAL HDI GROWTH				
Rank	Country	Value								Change				
		1990	2000	2010	2011	2012	2013	2014	2015	2009 – 2014	1990–2000	2000–2010	2010–2014	1990–2014
55	Bahamas	..	0.778	0.774	0.778	0.783	0.786	0.790	55	2	..	-0.06	0.51	..
57	Barbados	0.716	0.753	0.780	0.786	0.793	0.785	0.785	56	-3	0.50	0.36	0.18	0.39
58	Antigua and Barbuda	..	..	0.782	0.778	0.781	0.781	0.783	58	-6	..	..	0.03	..
64	Trinidad and Tobago	0.673	0.717	0.772	0.767	0.769	0.771	0.772	64	-4	0.63	0.74	0.01	0.57
67	Cuba	0.675	0.685	0.778	0.776	0.772	0.768	0.769	66	-14	0.15	1.28	-0.28	0.54
77	Saint Kitts and Nevis	..	..	0.739	0.741	0.743	0.747	0.752	79	..	..	..	0.44	..
79	Grenada	..	..	0.737	0.739	0.740	0.742	0.750	82	..	..	..	0.43	..
89	Saint Lucia	..	0.683	0.730	0.730	0.730	0.729	0.729	89	-5	..	0.66	-0.02	..
94	Dominica	..	0.694	0.723	0.723	0.723	0.723	0.724	93	-10	..	0.41	0.03	..
97	St. Vincent	..	0.674	0.711	0.713	0.715	0.717	0.720	98	-5	..	0.55	0.30	..
99	Jamaica	0.671	0.700	0.727	0.727	0.723	0.717	0.719	98	-23	0.42	0.38	-0.30	0.28
101	Belize	0.644	0.683	0.709	0.711	0.716	0.715	0.715	101	-7	0.59	0.38	0.19	0.43
101	Dominican Republic	0.596	0.655	0.701	0.704	0.708	0.711	0.715	103	0	0.95	0.68	0.50	0.76
103	Suriname	..	..	0.707	0.709	0.711	0.713	0.714	102	-5	..	..	0.24	..

Source: United Nations Development Programme. Human Development Reports 2015

Antigua and Barbuda is not one of the one hundred and thirty two countries for which an IHDI has been computed but with the worst Gini coefficient in the region[81] [indicating high levels of unequal distribution of income in the society], it is expected that the IHDI would be less than the HDI.

The Gender Inequality Index (GII), for example, reflects gender-based inequalities in three dimensions – reproductive health, empowerment, and economic activity. The index shows the loss in human development due to inequality between female and male achievements in these dimensions[82]. Reproductive health is measured by maternal mortality and adolescent fertility rates; empowerment is measured by the share of parliamentary seats held by each gender and attainment at secondary and higher education by each gender; and economic activity is measured by the labour market participation rate for each gender.

Seemingly no GII value for Antigua and Barbuda is available [UNDP]. In Antigua and Barbuda, however 24% of parliamentary seats are held by women (1 of 17 in the House of Representatives and 6 of 17 in the Upper House/The Senate); and 81% of women have attained a junior secondary

[80] http://hdr.undp.org/en/statistics/understanding/indices
[81] See Sec. 3.2.7
[82] Ibid

or higher level of education (including 9% with university education) compared to 77% of their male counterparts (including 8% with university education). There was a single (1) maternal death recorded between 2012 and 2014 and the adolescent fertility rate is 46 births per 1000 live births [World Bank]. Female participation in the labour market is 51% compared to 49% for men.[83]

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Millennium Development Goals

Table 29. MDGs Status at a Glance 1990-2007: Reaching the Goals and Targets

GOALS/TARGETS	WILL THE GOAL OR TARGET BE REACHED?			NATIONAL SUPPORTIVE ENVIRONMENT		
EXTREME POVERTY Halve the proportion of people living below the national poverty line by 2015	Likely	Potentially	Unlikely	Strong	Fair	Weak
HUNGER Halve the proportion of people who suffer from hunger between 1990 and 2015	Likely	Potentially	Unlikely	Strong	Fair	Weak
UNIVERSAL PRIMARY EDUCATION Ensure that by 2015 children everywhere will be able to complete a full course of primary schooling	Likely	Potentially	Unlikely	Strong	Fair	Weak
GENDER EQUITY 1. Achieve equal access for boys and girls to primary & secondary schooling by 2005 2. Increase women in Parliament to 30% of all members	Likely	Potentially	Unlikely	Strong	Fair	Weak
CHILD MORTALITY Reduce under-five mortality rate by two-thirds by 2015	Likely	Potentially	Unlikely	Strong	Fair	Weak
MATERNAL HEALTH Reduce maternal mortality ratio by three-quarters by 2015	Likely	Potentially	Unlikely	Strong	Fair	Weak
HIV and AIDS Halt and begin to reverse the spread of HIV and AIDS by 2015	Likely	Potentially	Unlikely	Strong	Fair	Weak
MALARIA AND OTHER MAJOR DISEASES Halt and reverse the incidence of Malaria and other diseases by 2015	Likely	Potentially	Unlikely	Strong	Fair	Weak
ENVIRONMENTAL RESOURCES Reverse loss of environmental resources	Likely	Potentially	Unlikely	Strong	Fair	Weak
ACCESS TO SAFE DRINKING WATER Halve the proportion of people without sustainable access to safe drinking water by 2015	Likely	Potentially	Unlikely	Strong	Fair	Weak
OTHER COUNTRY SPECIFIC GOALS/TARGETS						
ACCESS TO AFFORDABLE HOUSING Significant improvement in housing accommodation	Likely	Potentially	Unlikely	Strong	Fair	Weak
DEBT REDUCTION Reduce the debt burden	Likely	Potentially	Unlikely	Strong	Fair	Weak
CRIME REDUCTION Reduce the incidence of criminal offences	Likely	Potentially	Unlikely	Strong	Fair	Weak
OVERALL STATUS	POTENTIALLY			STRONG		

National Millennium Development (MDGs) 2009 report addresses the needs of the elderly, under goal 1- eradicate extreme poverty and hunger. The Government introduced several social

[83] (GOAB, 2011)

assistance programmes for poverty reduction and made some special provisions for older persons such as the exemption from the payment of embarkation tax, and the granting of concessionary property tax rates2 (*page 13*). 1 Volume 1- The main report (2007), page 71, Section 5.3, 'the Elderly' from the Participatory Poverty Assessment.

Sustainable Development Goals

The Sustainable Development Goals (SDGs), otherwise known as the Global Goals, are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity[84].

Figure 20 Sustainable Development Goals

These 17 Goals build on the successes of the Millennium Development Goals, while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are interconnected – often the key to success on one will involve tackling issues more commonly associated with another.

The SDGs work in the spirit of partnership and pragmatism to make the right choices now to improve life, in a sustainable way, for future generations. They provide clear guidelines and targets for all countries to adopt in accordance with their own priorities and the environmental challenges of the world at large. The SDGs are an inclusive agenda. They tackle the root causes of poverty and unite us together to make a positive change for both people and planet.

The SDGs came into effect in January 2016, and they will continue guide UNDP policy and funding for the next 15 years. Achieving the SDGs requires the partnership of governments, private sector,

[84] https://sustainabledevelopment.un.org/post2015/transformingourworld

civil society and citizens alike to make sure we leave a better planet for future generations[85]

Three of the seventeen goals relate specifically at actions necessary for DRR:

- **Goal 13. Take urgent action to combat climate change and its impacts[86]**
  Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries, integrate climate change measures into national policies, strategies and planning, and improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

- **Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development**
  By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans etc

- **Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss**
  By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements, and by 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally,

3.4.2 National development objectives

A Country Strategy for Antigua and Barbuda for the period 2015-18 outlines the assistance strategy sought of the Caribbean Development Bank and planned strategic focus to accelerate the country's economic growth and pursue sustainable development over the outlined period.

The Country Strategy Interventions over the period 2015-18 will be geared towards achieving seven outcomes, namely:

- financial sector stability;

[85] United Nations Development Programme. Human Development Reports 2015 hdr.undp.org/en/countries/profiles/ATG.html

[86] Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.

- improved access to and quality of education;
- improved physical infrastructure;
- reduced cost of energy and cleaner energy;
- increased private sector competitiveness;
- adequate water and sanitation facilities, and
- better economic management.

A major component of the strategy is a proposed USD 50 million Policy-based Loan (PBL), which will be used to support efforts towards stabilizing the financial sector and also encourage continued fiscal reforms. Other interventions include proposed technical assistance to the Government to adequately structure engagements with the private sector, including through Public-Private Partnerships (PPPs). This will be done through the Regional PPP Support facility, the first phase of which was launched by CDB in May 2015.

The CDB Country Strategy closely aligns with the medium-term priorities in the Government of Antigua and Barbuda's Medium Term Development Strategy (MTDS), which was recently prepared for the period 2015-19. The MTDS reflects a sustainable development approach, with the long term goal being to improve the quality of life of all Antiguans and Barbudans.

The national priorities were presented by the Prime Minister and Minister of Finance and Corporate Governance under the theme 'Rebuilding a Stronger, Safer and Prosperous Antigua and Barbuda.[87] The Government reemphasized its firm commitment to 'transforming Antigua and Barbuda into the economic powerhouse of the region' and its recognition that the transformation is only possible if 'all Antiguans and Barbudans have every opportunity to participate in, and benefit from, growth and development programmes which are 'characterized by their transparency and accountability'.

The development strategy of 'entrepreneurial socialism', enunciated by the Government [2016], seeks to utilize capitalist strategies, in collaboration with the private sector, to generate profits for the benefit of the people' with the goal of providing nationals with 'a strong economy, working Social Security and Medical Benefits Schemes, advanced education, safety for their homes and businesses, and good paying jobs'. [88]

The priorities by enunciated by the Prime Minister[89] to meet the goal include, inter alia

- **'Turning The Economy To Solvency and Restoring Our Country's Image**
    - Stabilizing The Financial System To Include The Rescue Of The AbI Bank[90] Rescue

87 The Honourable Gaston A. Browne, GCFO Third Session of Parliament, Thursday, January 21, 2016
88 Ibid
89 Not presented in groupings shown below, for which the author holds responsibility.
90 Privately owned bank presently in receivership

- Debt Management including the Medical Benefits Debt / Social Security
- Wealth Creation /Entrepreneurship

One of the key strategies to turn the economy to solvency is the removal of 'personal income tax in its entirety'. The loss of revenue is projected to be met by a three percent (3%) increase in the revenue recovery charge and the following legislative initiatives:

- The establishment of a revenue court which will allow for the efficient and effective enforcement of tax collection.
- An adjustment to the corporation and business legislation.
- Incorporated business tax act, to capture payments that were previously made by sole traders and partnerships, to include professionals, under the personal income tax act.
- Introduction of a security bond mechanism to identify legally landed alcohol and tobacco products to counter the smuggling of those products which robs the treasury of revenue.

- **Economic Development**
  - Improving Agriculture
  - Infrastructure Development
  - Re-Energizing The Manufacturing Sector

- **Environmental Services**
  - Restoring Public Utilities to include 'Water Supplies' - Providing This Nation With Water Became My First Priority
  - 'Cleaning-Up The Environment'.

- **Social Services**
  - Health Care Services
  - Tackling Crime And Security Effectively
  - Development of Sports and Culture
  - Housing - not-for-profit social housing designed to ensure the redistribution of wealth to the masses. Government created the National Housing Corporation – with mandate for national housing development and urban renewal and goal to build 500 new homes.

4. THE COUNTRY'S DISASTER RISK REDUCTION LEGAL, NORMATIVE AND INSTITUTIONAL PROFILE

4.1 Legal Framework

4.1.1 Constitution

The Constitution of Antigua and Barbuda provides for the protection of fundamental rights and freedoms of the individual to include 'the protection of right to personal liberty', the 'protection from discrimination on grounds of race, sex and religion' and 'the protection from deprivation of property'. It also allows for the infringement of these rights during a public emergency in order to safeguard public health and safety.

The Constitution empowers the Governor General to declare a public emergency in cases of war or the occurrence of 'any earthquake, hurricane, flood, fire, outbreak of pestilence, outbreak of infectious disease or other calamity whether similar to the foregoing or not'. The declaration is time-bound and 'shall lapse after a maximum of twenty-one (21) days unless approved or extended through the resolution of both Houses of Parliament'.

The power of the Governor General and/or the Cabinet to declare public emergencies are encoded in the laws of Antigua and Barbuda:

- The Emergency Act [Cap. 147/1967] empowers the Governor General to declare a state of emergency if he/she is satisfied that 'any action has been taken or is immediately threatened by any person or body of persons of such a nature and on so extensive a scale as to be likely to endanger the maintenance of public order or the defence of Antigua and Barbuda or the maintenance of the public safety or the defence of the community or any substantial portion of the community or any supplies or services essential to the life of the community.

- The Emergency Powers (Hurricane, Earthquake, Fire or Flood) Act. [Cap 148/1989] makes it 'lawful for the Cabinet after the occurrence in Antigua and Barbuda of any hurricane, earthquake, fire or flood, to declare by proclamation in the Gazette that a state of emergency exists.

The legislative powers of these two Acts have been assumed by the Disaster Management Act 2002, Section X of which reads 'The following Acts shall, with its necessary changes as Application of may be made, be read as one with this Act - *(a)* The Emergency Powers Act; Cap. 147 and (b) The Emergency Powers (Hurricane, Earthquake, Fire or Flood) Act Cap. 148.

4.1.2 Disaster Management Act, No. 13 of 2002

This Act provides for 'the effective organisation of the preparedness, management, mitigation of,

response to and recovery from emergencies and disasters natural and man-made in Antigua and Barbuda. It establishes the National Disaster Preparedness and Response Advisory Committee [See Sec. 5.3.2] and empowers, as a public officer, the Director of Disaster Preparedness and Response. The Act:

- sets out guidelines for the functioning of Emergency Operations Centres (EOCs) and emergency shelters (Part IV);
- enunciates the obligations of public servants - which requires inter alia that 'every Permanent Secretary and Head of a Department of Government ensure that there is at all times a public officer of his Ministry or Department designated as the liaison officer for communication with the Director in relation to the procedures. (Part V)
- empowers the Prime Minister to delimit special vulnerable areas for the purposes of the mitigation of, preparedness for, response to and recovery from emergencies and disasters by such areas (Part VI) and to 'prescribe the procedures for holding public consultations under this Act'.

The regional agreement to establish and operate the Caribbean Disaster Emergency Response Agency (CDERA), under this Act is given 'the force of Emergency law in Antigua and Barbuda'.

4.1.3 **Laws and legally binding provisions**

There are no direct references to DRM or DRR in the existing laws and or legally binding provisions of Antigua and Barbuda. However there are a number of laws that address matters of environmental protection, sanitation and land use control, for instance, containing directions that can directly reduce vulnerability and risk.

4.1.3.1 Environmental Protection and Management Act No. 11 of 2015

This ACT provides for sustainable environmental protection and management

- the establishment of effective allocation of administrative responsibilities for environment management,
- the undertaking and coordination of environmental management, and related activities,
- the incorporation of international treaty obligations with respect to the environment into national and law related matters.
- the establishment of one legal regime for the consolidation and implementation of Multilateral Environmental Agreements, and
- the provision of the framework financial mechanism to implement the Act.

4.1.3.2 Physical Planning Act, 2003

The Physical Planning Act (2003) provides a comprehensive framework for planning. The purposes

of this Act are to:

- provide for the orderly, efficient and equitable allocation and development of the resources of Antigua and Barbuda, taking account of all relevant social, economic and environmental factors, so as to ensure that sustainable use is made of land in the interests of the people of Antigua and Barbuda;
- maintain and improve the quality of the physical environment within which human settlements are situated in Antigua and Barbuda;
- foster awareness that all persons and organisations owning, occupying and developing land have a duty to use that land with due regard for the wider interests (both present and future) of society; and
- The establishment of the Development Control Authority (DCA) with planning authority for all land in Antigua and Barbuda

The Act establishes a Town and Country Planner with a clear mandate and authority to function in maintaining and keeping under review all matters pertinent to planning the use and development of land in Antigua and Barbuda. It establishes, if considered necessary, the need for environmental impact assessments (EIA) for various matters such as wastewater treatment, the disposal of sewage, effluent or trade waste, desalination or water purification.

The Town Planner may prepare or cause to be prepared, the review of a development plan for Antigua and Barbuda and may provide for 'prohibiting, regulating and controlling the deposit or disposal of water materials and refuse, the disposal of sewage and the pollution of ponds, salt ponds, gullies, beaches, the foreshore or territorial water.'

The Minister responsible for Barbuda Affairs is empowered to make building regulations in regard to a wide range of matters, including- (a) plumbing and water supply; (b) sanitation; and (c) sewage disposal.

4.1.3.3 Public Health Act (Chapter 353; 1957/1989)

This Act establishes the Central Board of Health (CBH) with administrative powers for the promotion and preservation of both public and personal health of inhabitants. The Act gives the CBH either direct authority or the making of regulations for a wide scope of public actions, inter alia, scavenging and cleansing, the maintenance of sewers and drains and the inspection of nuisances for the maintenance of sanitary conditions and the prevention of food borne illnesses through the ensuring of the quality of food and drugs; the sanitation of private and public spaces e.g. slaughter houses and markets, cemeteries, schools, factories and workshops, hotels and restaurants and other places where food is sold.

The Act gives the Board the power of entry, the authority to impose penalties for the breaking of

its regulation and the recovery of costs and expenses with interest for actions its takes in the interest of public health.

4.1.3.4 Slum Clearance and Housing Act

The Slum Clearance and Housing Act (and the Town and Country Planning Ordinance) established the Central Housing and Planning Authority (CHAPA), which functions under the Ministry of Agriculture, Housing and the Environment primarily to undertake development of 'working class housing'. It is the main government agency responsible for implementation and coordination of housing programmes targeting various income groups. CHAPA also administers a House Loans Programme to provide loans for home improvements and the construction of new housing. CHAPA also has powers to order property owners to 'take down, secure, repair or rebuild' properties considered so 'ruinous or dilapidated' building that they have become either unfit for human habitation or a nuisance

4.1.3.5 The National Solid Waste Management Act 1995

This Act makes direct reference to disasters and hazards. It establishes a National Solid Waste Management Authority (NSWMA) and empowers it with the general responsibility for the management of solid waste and specifically, inter alia to:

- own, operate or contract facilities and equipment for the collection, treatment or processing, reutilization, and disposal of solid waste, non-hazardous and quarantine waste;
- own, operate or otherwise provide for the management of solid waste, solid hazardous and liquid hazardous wastes;
- provide collection and storage facilities at ports, harbours and anchorages for the reception [and transportation] of ship-generated solid waste;
- provide for the storage, treatment or processing, reutilization and disposal of domestic sewage solids;
- provide for the closure, post-closure and remediation where necessary of waste management.

The Act gives the Minister responsible for the NSWMA authority to take any action which he/she considers reasonably necessary for the safe management of solid waste during a state of emergency or natural disaster in Antigua and Barbuda.

It identifies forty-seven waste streams which include at least three that are of significance in disaster risk reduction:

- Waste chemical substances arising from research and development or teaching activities which are not identified and/or are new and whose effects on man/or the environment are not known

- Wastes of an explosive nature not subject to other legislation.
- Waste mineral oils unfit for their originally intended use.

In addition, the Act identifies and defines twelve (12) categories of waste with hazardous characteristics[91] that may be found in the country including explosives, radioactive wastes and four relating to the hazard of fire.

4.1.3.6 Public Utilities Act - CHAPTER 359

THE PUBLIC UTILITIES ACT established and incorporated the Antigua Public Utilities Authority (APUA) and vests in the Authority the following rights:

- Right of Authority to supply electricity.
- Right of Authority to provide telephone services.
- Right of Authority to supply water.

The Authority shall have the exclusive right to supply, distribute, maintain and sell water within Antigua and Barbuda and to perform services incidental thereto. It is empowered 'to do all acts and things necessary for the production, distribution, supply and sale of water to the public in general for domestic and commercial use, and to provide (so far as is practicable) an adequate supply of water for the use of the public in general. APUA is required to construct or lay down any waterworks for improving or augmenting the water supply. It is also empowered to:

- establish, operate and maintain a sewage system in Antigua and Barbuda;
- control, manage, maintain, operate and supervise all watercourses, and waterworks in Antigua and Barbuda. It has authority to extend, alter or repair waterworks for the purpose of connecting or repairing water services or in the case of fire, and
- diminish, withhold, suspend or divert (without prejudice to the payment of charges) the supply of water through the waterworks.

4.1.3.7 Barbuda Act, Cap. 42

The Barbuda Act regulates tenure of lands by the inhabitants of Barbuda. All lands within Barbuda are vested in the Governor General and all inhabitants of Barbuda are tenants of the Crown.

The Act regulates allotments, buildings and provision grounds, allowing the Barbuda Council, with the approval of Cabinet, to allot, distribute and divide all land within villages amongst villagers and to reserve lands for public purposes. Permission from the Council is required for the cutting, growing timber, or burning charcoal within Barbuda.

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[91] Explosive Flammable liquids, Flammable solids, Substances or wastes liable to spontaneous combustion, Substances or wastes which, in contact with water, emit flammable gases, Oxidising, Organic Peroxides, Poisonous (Acute). Infectious substances, Radioactive materials, Corrosives, Liberation of toxic gases in contact with air or water, Toxic (Delayed or chronic), and Ecotoxic.

Licenses, issued by Council are required:

- to shoot deer outside a mandated closed season
- to export and import livestock, and
- to operate boats around Barbuda.

The Council is empowered to supervise the repairs of highways and importantly promulgate sanitary regulations for Barbuda.

4.1.3.8 Barbuda Land Act, 2007 (Act 23 of 2007)

The Barbuda Land Act (2007) establishes a completely different land tenure system in Barbuda than that which exists in Antigua. It confirms that all land in Barbuda is vested with the Crown and owned in common by the people of Barbuda, prohibits the selling of land in Barbuda and directs that the ownership of land cannot be acquired by prescription or otherwise. Every Barbudan[92] may apply to the Council for the grant of exclusive rights over a plot of residential land and/or the right to graze animals in designated areas of land.

The Council is empowered under the Act to administer and develop land in Barbuda, to grant leases of land, and to designate areas of land for various purposes, including residential use; agricultural, forestry; tourism development; fisheries; public or commercial purposes; national parks and development projects. No major developments in Barbuda can take place without the agreement of Cabinet and the consent of Barbudan people. The Act prohibits person from cutting or felling any growing lumber, burn charcoal, destroy mangroves or mine sand without obtaining a permit from the Council.

4.1.3.9 The Animals (International Movement and Disease Act and regulations

The Act seeks to protect human health from diseases transmitted by plants and animal principally through the 'control of the importation into Antigua and Barbuda and the regulation of 'the movement from Antigua and Barbuda of animals, birds, fish, insects and reptiles and of animal carcasses, parts and meats, veterinary biological products, litter and fodder for the purposes of preventing the introduction of disease into Antigua and Barbuda and into other Member States of the Caribbean Community and of providing for the safe and humane movement of animals from Antigua and Barbuda and for other matters related thereto or connected therewith'.

It established the administrative mechanisms for the appointment and functions of a Veterinary Authority and veterinary inspectors. It provides regulation of and both restrictions and penalties for importation of animals, animal and other things.

[92] A person born in Barbuda of whose grandparents one of whom was born in Barbuda. It also covers a child wherever born provided that at least one of the parents is a Barbudan.

The Protection of Animals Act (March 1935/Amended 1993) rules against animal cruelty and the Dogs Registration and Control Act 2006 seeks to protect humans against ferocious and rabid dogs.

4.1.3.10 National Parks Act, Cap. 290 and National Parks (Amendment) Act

The Act provides for the establishment of National Parks and a National Parks Authority (NPA). NPA is mandated to make provision for the preservation, protection, management and development of the natural physical and ecological resources and the historical and cultural heritage of Antigua and Barbuda. The amendment (2004) included the preservation et al of architectural heritage of Antigua and Barbuda and required the NPA to collaborate with the Town and Country Planner to compile a list the buildings of special architectural or historical interest in any part of Antigua and Barbuda.

4.1.3.11 The Plant Protection Act

This Act empowers Veterinary Officers and Plant Protection Officers to enter and inspect premises and where necessary, after testing, quarantine and/or destroy suspected or infected organisms. Officers also have power to declare quarantine zones or a phyto-sanitary emergency and restrict movement of material. They also control the importation and exportation of organisms.

4.1.3.12 The Forestry Act Chapter 178 1941

This Act empowers Plant Protection Officers to define and declare forest reserves, implement actions for the prevention of deforestation and reforestation.

4.1.4 Approved annual budget

The national annual budget is legislated by an act of Parliament. The provision of disaster management services is assigned to the Ministry of Social Transformation and Human Resources Development within whose framework NODS functions. Table 30 shows the budgetary allocations for the past 5 years. There have been minimum increases in the allocations between 2012 and 2015. The 2016 figures are estimates and expenditure may not be approved. NODs continues to function within severe financial constraints but receives support through regional and international organizations and their projects.

Table 30	**NODS Budget 2012-2016 EC$**				
Year	**2016**	**2015**	**2014**	**2013**	**2012**
Budget	933,025	856,832	893,312[e]	886,595	851,934

There are no specific budgetary allocations for DRR activities whether they are executed by NODS or in other sectors – as discussed below in '4.2 Normative Framework'.

4.2 Normative framework

The State agencies with responsibility for various aspects of environmental management and disaster risk reduction in Antigua and Barbuda are discussed below[93]:

- The Ministry of Agriculture, Lands, Fisheries and Barbuda Affairs has responsibility for some of the most important aspects of disaster risk reduction. Its national portfolio includes – as the name of the Ministry implies – Agriculture and Food Production, Lands, Surveys and the Development Control Authority, Fisheries and Animal Husbandry and Veterinary Services.
    - The Fisheries and Forestry Division are the two principal government agencies charged with gathering most of the primary data on the biological resources of Antigua and Barbuda.
    - The Fisheries Division has responsibility for development of the fisheries sub-sector, monitoring fish-stocks and marine resources, as well as a regulatory role in policing fishing practices. The Division has been given powers under the Marine Areas Act (1972) to restrict fishing in certain areas and to preserve habitats, flora and fauna, natural beauty or shipwrecks in marine areas.
    - The Forestry Division has responsibility for managing the country's forest and woodland areas and for reforestation. The primary instrument for management of the upper watersheds is the Forestry Ordinance (cap 99 1941), which provides for the establishment of forest reserves, the granting of permits for harvesting forest resources and for clearing, etc.
- The Environment Division is presently within the Ministry of Health and the Environment. It was initially set up within the Ministry of Tourism and Environment in 1996 and was mandated by the Cabinet to inter alia, identify and coordinate the implementation of national commitments to International Environmental Agreements, including the coordination of implementation of recommendations of the National Coordinating Mechanism; develop and implement a national environmental awareness program; develop and implement projects related to the rehabilitation and protection of the environment; coordinate the development of environmental legislation; and to coordinate the process of conducting EIAs. It manages the implementation of the Environmental Protection and Management Act.

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- The National Parks Authority (NPA) is a financially self-sufficient statutory body with a Board of Directors. It was established through the National Parks Act. This act provides

[93] www.environmentdivision.info/wp-content/uploads/2012/01/NEMS-GEF...

procedures for the designation of any area of land or water as a national park. The NPA is mandated to 'preserve, protect, manage and develop the natural physical and ecological resources and the historical and cultural heritage of Antigua and Barbuda'. The NPA has responsibility for managing the country's single national terrestrial park (Nelson's Dockyard). This is focused on providing a world-class tourism destination based on the historical and natural resources within the park area.

- The Development Control Authority (DCA), administered under the Ministry of Agriculture, Lands, Fisheries and Barbuda Affairs, has responsibility for regulating the use and development of land for urban, economic and infrastructure development. The DCA manages the National Physical Development Plan which has significant implications for disaster risk reduction and integrated ecosystem management. The plan lays out clear policy for land resource development in Antigua and Barbuda and proposes to retain and conserve, as much as possible, of the upper watersheds (and their forest cover) and remaining wetlands.

- The St. John's Development Corporation (SJDC) established through the St. John's Corporation Act (Cap 392/December 1986) has specific responsibilities in the area designated as 'St. John's. These include:
    - Layout, construct and maintain roads, construct and maintain buildings and carry out such other building and engineering operations as may appear to it to be necessary for desirable in, on, over and under land within the designated area
    - Provide and maintain car parks, piers, public parks, public gardens and other public amenities within the designated area
    - Carry out business or undertaking for the development of the designated area

  The Corporation is expected to pay contractors in respect of expenditure incurred by such contractors in respect of their function in connection with the development of the designated area.

  Much of the public and private investments fall in the designated area and that flooding has become a common feature there, demands of SJDC deeper involvement in national DRR activities.
- [Anything in relation to the treatment of urban areas – this is critical given that much of the public/private investmenst are in the city]

- The National Solid Waste Management Authority has recently been created after the last ten years of the government making considerable efforts to provide better management for solid waste and to introduce at least the rudimentary aspects of sanitary landfill as normal practice. The Authority now handles the disposal of solid waste for the Island.

- National Coordinating Mechanism for Environmental Conventions has developed into a forum for the coordinated follow-up, at the national level, to all Environmental Conventions ratified by the Government of Antigua and Barbuda. The role of the NCM is to strengthen communication links between the relevant ministries and departments of Antigua and Barbuda directly involved with the implementation of the Conventions. It consists of a network of government agencies/divisions, national focal points, competent authorities, and NGO's, working to together to facilitate a coordinated and timely response to Antigua and Barbuda's treaty obligations as well as providing a forum for discussions on work-programs for government agencies.

4.2.1 Normative instruments for disaster risk reduction, technical and political decision making

The Disaster Management Act, No. 13 of 2002 does not define ‘a disaster’ or ‘an emergency’. It however defines a "disaster emergency" as ‘a public emergency declared under section 20 of the Constitution or a state of emergency declared under section 2 of The Emergency Powers (Hurricane, Earthquake, Fire or Flood) Act, Cap. 148 ‘on account of the threat or occurrence of a disaster.’

PART II of the Act creates the position of the public officer – ‘Director of Disaster Preparedness and Response’ - who shall be responsible to the Prime Minister for coordinating the general policy of the Government of Antigua and Barbuda relating to the mitigation of, preparedness for, response to and recovery from emergencies and disasters in Antigua and Barbuda.

The Director is required annually, in consultation with the National Advisory Committee[94], to prepare for the approval of the Prime Minister a Disaster Response Policy and a National Disaster Response Plan. The Policy and Plan should be based on a review and appraise the various programmes and activities of the Government (in relation to Disaster Preparedness and Response) and to make recommendations to the Prime Minister.

The Director is authorized to conduct investigations, studies, surveys, research and analyses relating to ecological systems and environmental quality and document and define changes in the natural environment as these relate to the likelihood of disasters, and to prepare and review hazard risk assessment maps of Antigua and Barbuda.

The Act requires that every Permanent Secretary and Head of a Department of Government ensure effective communication with the Director through designated liaison officers who in turn should liaise with persons and organisations within and without Antigua and Barbuda for the purpose of exchanging information and facilitating the harmonisation of the policies of those

[94] See Sec. 5.3.2. Organisation of the national system and mechanism at all levels

persons and organisations with the policies of the Government of Antigua and Barbuda.

4.2.2 Public policies

Comprehensive Disaster Management (CDM)

The national comprehensive CDM policy (2014-2016), established through a strategic planning process documents Government's commitment to:

- the modification of the Disaster Management Act (2002) to link and promote the coordination of all related national environmental policy and secondary legislation into a legislative framework that supports and promotes the implementation of CDM.
- approve the streamlining of the governance structures of i) the national disaster management programme and ii) of NODS to enable more efficient decision making and guidance.
- commit adequate human and financial resources to enhance the administrative structures of NODS enabling i) participation in and support for regional Disaster Management institutions, partnerships and programmes ii) the development of a strong planning framework to implement CDM strategic plans, iii) the design and operation of and systems for monitoring, evaluation and reporting, iv) relief management which incorporates a mechanism for the acquisition and management of relief supplies, shelter/emergency accommodation, medical/health care and financial assistance, and v) enable NODS to establish and an effective mechanism and programme for the management of comprehensive disaster management knowledge.

The policy, in its effort to improve the public safety culture and foster disaster management ownership, mandates that CDM activities be expanded in the public sector and encourages the private sector and civil society to do the same. This policy will be elaborated in programmatic goals and objectives related to:

- Defined roles of the private sector and civil society
- Enhancing the Disaster Risk Management capacity of lead sector agencies, National and regional insurance entities, and financial institutions.
- The incorporation and integration of Hazard information and Disaster Risk Management into sectoral policies, laws, development planning and operations, and decision-making in tourism, health, agriculture and nutrition, education, planning and infrastructural development.
- The development and implementation of Prevention, Mitigation, Preparedness, Response, Recovery and Rehabilitation procedures in the main sectors of the economy.
- Public safety legislation and regulations updated with regards to mass crowd gathering activities, marine and terrestrial traffic and transportation.

The policy commits the national disaster management architecture to develop and maintain a framework which enables the capacities and capabilities of communities to support and elaborate its efforts of disaster prevention and mitigation, recovery and rehabilitation. It is intended to be elaborated in programmatic goals and objectives related to the enhancement of preparedness, response and mitigation capacity (technical and managerial) among public, private and civil sector entities for local level management and response, and:

- The improved coordination and collaboration between community disaster organizations and other research/data partners including climate change entities for undertaking comprehensive disaster risk management.
- The improvement of knowledge and awareness in communities of disaster management and related procedures including safer building techniques.
- The development and application of standardized holistic and gender-sensitive community methodologies for natural and anthropogenic hazard identification and mapping; vulnerability and risk assessments; and recovery and rehabilitation procedures in selected communities.
- The enhancement of Early Warning Systems for disaster risk reduction at the community and national levels

Government recognizes that there are specific and unique requirements in the development and maintenance of a disaster management framework in the 'island community' of Barbuda and will allocate human and financial resources to improve efforts of disaster prevention and mitigation, recovery and rehabilitation and deepen coordination with the identified island and national agencies.

The policy has not been uniformly implemented. At Government level, changes in legislation and increases in budgetary allocations have not yet materialized. NODS however has made 'affordable' changes in its organizational structure and has incorporated the principles of CDM in its strategies and plans.

National Policy Framework and Sectoral Directives for Climate Change Adaptation and Mitigation Actions encourages all agencies in Antigua and Barbuda to explore and access the opportunities being developed by the climate change negotiation process and include considerations of possible impacts of climate change in their planning and development processes.

The National Integrated Water Resources Management (IWRM) Vision and Policy

The National Integrated Water Resources Management (IWRM) Vision and Policy Statement was developed by the stakeholders of Antigua and Barbuda, through a three year long (2008-2011) consultation process. The need to improve water resources management is a pre-requisite to

ensuring the sustainable development of Antigua and Barbuda.

The National IWRM Vision, as agreed by the Antiguan and Barbudan stakeholders in December 2009 is 'ensuring the sustainable management and protection of the water resources and watersheds of Antigua and Barbuda for the equitable, economic, social and environmental benefit of our people and natural resources'. The policy focuses on the integration of the various foundations required to support IWRM becoming a reality. Thus it highlights coordination, integration, inclusion, cost reduction, and increasing benefits across stakeholders rather than sector specific or stakeholder specific strategies.

The National IWRM policy does not specifically attempt to address all water-related issues per se in the country, and should not be considered a draft national water sector policy – rather it is an IWRM policy statement, focused on integrating strategies and activities that contribute to and improve national water, wastewater, land management and disaster preparedness policies and plans.

The National IWRM policy consists of ten strategies or Policy Elements[95]. These are:

- Establish a sustainable national capacity for water resources assessment and management;
- Promote climate adaptation water management across all stakeholders to improve the national capacity to mitigate droughts and floods;
- Promote water demand management, water conservation and efficient water use across all stakeholders and sectors;
- Establish and implement effective wastewater management for urban and rural stakeholders to protect the terrestrial and marine aquatic environment;
- Establish and implement a robust policy and legislative framework for IWRM;
- Establish and implement an effective Institutional Framework for IWRM;
- Establish and implement integrated land use planning mechanism;
- Establish and implement integrated watershed planning and management;
- Ensure inclusive, equitable, transparent and accountable stakeholder participation; and
- Provide sustainable funding support to the IWRM policy implementation.

<u>Emergency shelter policy</u>

It is the policy of the government to take actions to prevent or mitigate the effects of natural and other disasters within its available resources. In keeping with the national disaster policy, [Is this what the CDM Policy should replace? Where is this one discussed? the emergency shelter programme is designed by government to establish a mechanism that provides emergency shelter for members of the public, augmenting the resources of the private sector and non-governmental organizations to

[95] An Integrated Water Resource Management (IWRM) Roadmap for Antigua and Barbuda; financed under the Global Environment Facility-funded Integrating Watershed and Coastal Areas Management Project 2011

cope with the emergency shelter needs resulting from a threatened alert or the impact of a disaster. Persons rendered homeless by a natural or other disaster will be provided with temporary shelter giving priority attention to vulnerable groups, particularly the physically and mentally challenged, the elderly and low-income groups[96].

Sustainable Island Resource Management Zoning Plan (SIRMZP)

The Sustainable Island Resource Management Zoning Plan (SIRMZP)[97] creates an "umbrella" that will guide national development to achieve the following objectives:

- Provide for the protection of critical ecosystem functions and habitats, minimizes environmental risks, and seeks to optimize the productive use of environmental resources;
- Promote the development of a network of cohesive mixed- use settlements that offer a range of housing options that respond to different income levels and living preferences while providing ready access to local commerce, public services, and facilities;
- Establish economic growth and employment centres that focus on tourism, professional services, agriculture, and industrial development;
- Presents proposals to improve the configuration and efficacy of the road network and public transportation system;
- Specify substantive and procedural regulations and administrative frameworks that may be used to guide development in accordance with national policies; and
- Provide a framework for the preparation of detailed local plans that are in accordance with national land use priorities and strategies.

Through the implementation of the Plan, the following national outcomes are to be attained:

- improving the country's socio-economic base;
- reforming the public sector;
- sustaining and conserving the country's biodiversity;
- reducing the national debt/GDP ratio to sustainable levels;
- alleviating poverty;
- reducing vulnerability to national disasters;
- strengthening the relationship between the inhabitants of the island of Antigua and Barbuda; and
- enhancing private and public sector partnerships.

4.3 Institutional framework

The responsibility for the effective organisation of the preparedness, management, mitigation of,

[96] National Emergency Shelter Management Policy/Handbook Development: USAID/OAS Post-Georges Disaster Mitigation: http://www.oas.org/pgdm

[97] Sustainable Island Resource Zoning Plan for Antigua and Barbuda (including Redonda) 2012

response to and recovery from emergencies and disasters natural and man-made in Antigua and Barbuda is entrusted through the Disaster Management Act to the National Disaster Preparedness and Response Advisory Committee (NDPRAC), the Secretary of which is the Director of the National Office of Disaster Services (NODS). NDPRAC is a multi-sectoral committee chaired by the Prime Minister and is constituted by law as:

- The Prime Minister as Chairperson;
- 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 -
    - The Police Force;
    - The Antigua and Barbuda Defence Force;
    - The Fire Service;
    - Meteorological Department;
    - The Antigua Public Utilities Authority;
    - The Ministry responsible for Public Health;
    - The Ministry responsible for the Public Safety;
    - The Ministry responsible for the Environment;
    - The Ministry responsible for Public Works;
    - The Ministry responsible for Local Government;
    - *S*uch other Ministries, Departments of Government and statutory bodies as the Prime Minister thinks fit; and
    - Such 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 National Disaster Executive (NDE) [of the NDC] is established to carry out all necessary counter disaster functions as determined by the NDC in the event that circumstances prevent the NDC from meeting.

4.3.1 Organisation of the national system and mechanisms at all levels

The national Disaster Management mechanism is managed by NODS-Coordinating Unit (NODS-CU). It is the secretariat of the national disaster management mechanism. The national system is comprised of three tiers; a Policy level; an Administrative and the Community level. A diagrammatic representation is shown. [Fig 21]

The operational response arm of the system is the National Emergency Operation Center (NEOC).

Since the adoption of the CDM programme there have been several improvements to the overall system mainly through role identification and clarification. These include:

- A GoAB Cabinet DRR subcommittee responsible for oversight of national Risk Reduction was appointed in 2010;
- The National Disaster Council is given the responsibility for Oversight/Policy review at national level
- The National Disaster Coordinator is responsible for daily management of the national disaster management system and the management of NODS-CU
- The broad-based National Disaster Committee (NDC) and its Executive body is the technical review committee for DRR and roles & functions of the national sub-committees

Fig: 21

- Appointment of a National Disaster sub-committee for thematic overview and recommendations.

The Table 31 and Table 32 (below) respectively summarizes 1) the relationships between disaster management structure entities and 2) identifies some the main multi-stakeholder committees involved in DRR nationally.

Table 31 Summary of relationship of Disaster Management structure entities

Entity	Reports To	Function of Entity	Membership
Prime Minister	CDEMA Council	Policy Decisions	
Cabinet DRR committee	Prime Minster	Oversight of DRR policy implementation	Ministers, delegated members
National Disaster Council	Cabinet DRR committee	Policy recommendation based on advice	Permanent Secretaries, Department Heads
National Disaster Coordinator	National disaster Council	Daily Management of national disaster management system	Director of NODS
National Disaster Committee	National Disaster Coordinator	Technical review of issues and provide advice to National Disaster Coordinator	Designated National Agency Reps – Public /Private/civil society)
National Subcommittees	National Disaster committee	Operational Oversight , provide thematic development advice to ND Coordinator	Designated Thematic focused organizations (Public/Private/civil)

Table 32 DRR Committees in Antigua and Barbuda by Type and Membership		
Type/DRR Thematic Body	**Lead Agency**	**Membership**
Drought	Ministry of Agriculture	National
Environmental TAC	Department of Environment	National
GIS	Lands and Survey Department	Agriculture, Environment, NODS, APUA
Habitat/PSUP	Development Control Authority	CHAPA, Gender Affairs, NODS, Social Transformation, civil society
Integrated Water Resource Management	Antigua Public Utilities Authority	National
Marine Pollution	A.D.O.M.S.	Coast Guard
Nuclear energy (IAEA)	Ministry of Health	Environment, Security, Fire, Police, NODS, Ports
Toxic Chemicals	Pesticide Board	Min of Agric., Health , Dept. of Environment,
Damage Assessment	National Sub-committee	
District Emergency Organization	National Sub-committee	Civil society (Community-based)
Health Welfare & Emergency Shelter management	National Sub-committee	Min Health, Civil society (Service-based, Faith Based)
Emergency Operations, Search & Rescue	National Sub-committee	Fire, Police, Military, E.M.S, PWD
Emergency Supplies Distribution & External affairs	National Sub-committee	Civil society (Service/Faith based/Community) Social; transformation
Emergency Telecommunication	National Sub-committee	Private (Telecomm providers) Ministry of Information, Media Houses, APUA
Public Information Education & Awareness	National Sub-committee	Ministry of Information, Media Houses, Education, Health, Civil society
Public Utilities, Transport & Road Clearance	National Sub-committee	APUA, PWD, Health (CBH, NSWMA)

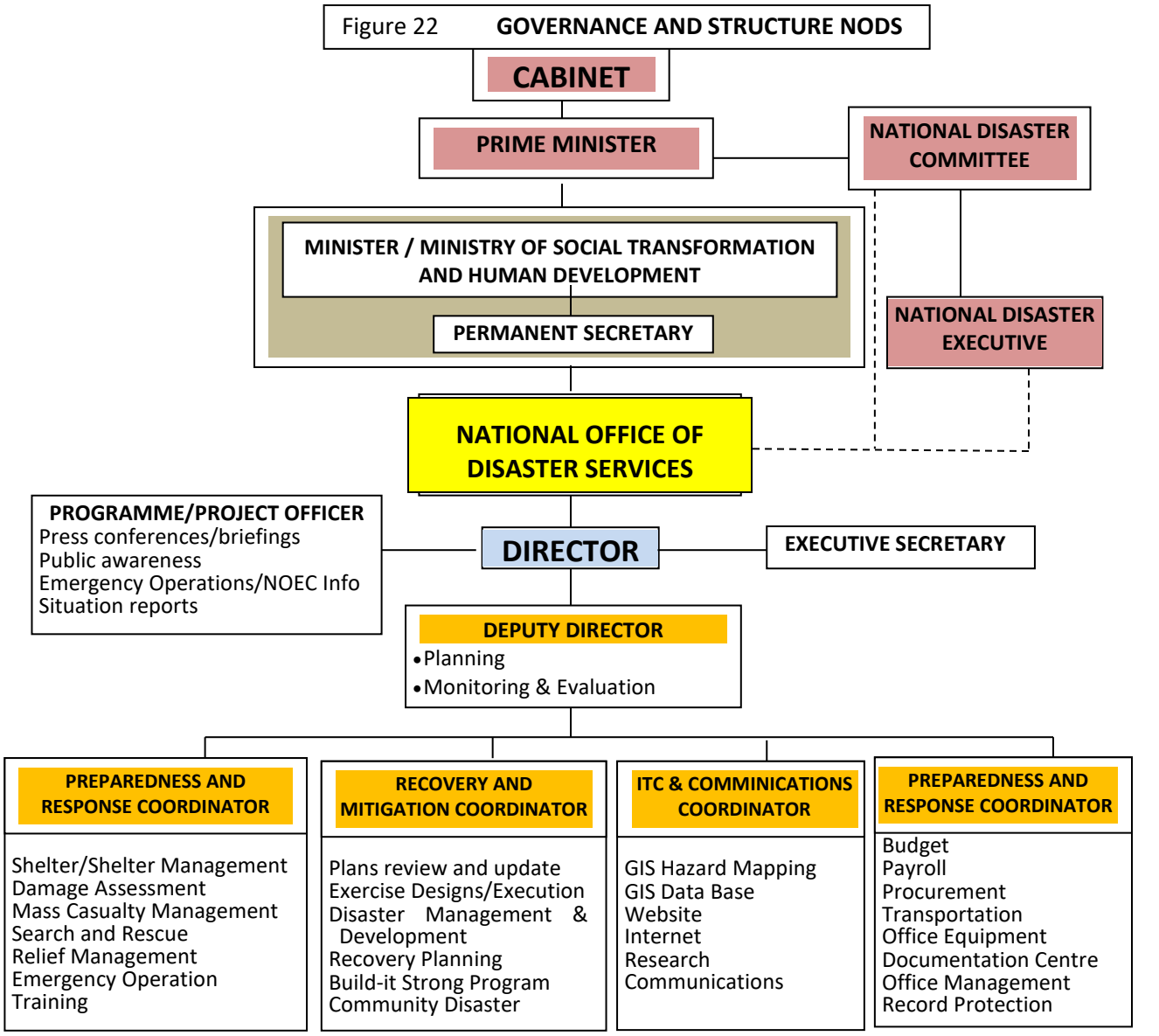
The National Office of Disaster Services (NODS) is a state-run agency of the Government with responsibility to reduce the vulnerability of natural and technological hazards in the twin island state, through multi-sector and integrated hazard risk reduction management. NODS through its operations, seeks at all times to save life and protect property in Antigua and Barbuda. The organization chart is shown below.

NODS is located within the Ministry of Social Transformation and Human Development and relates to the Minister and Cabinet through the Permanent Secretary and the National Disaster Committee. The Director is supported directly by a Deputy Director and technical and administrative staff. The organization chart is shown at Fig. 22.

NODS also provides administrative and emergency support based on requests from the Caribbean Disaster Emergency Management Agency (CDEMA) to assist any of the CDEMA member states.

NODS assists in the planning and execution of comprehensive stakeholder disaster management exercises at the national level. This is done to test the effectiveness of existing plans and identify deficiencies that need to be addressed by various agencies.

Figure 22 **GOVERNANCE AND STRUCTURE NODS**



District Disaster Committees have been established in each of the seventeen political constituencies [of which Barbuda is one] as volunteer arms of the national emergency organization and are responsible for coordination of community resources to meet the challenges of disaster management. Their membership is drawn from the political constituency and members are identified by the political representative of the constituency and NODS. Committees are convened whenever a threatened disaster alert arises or a disaster strikes.

Members of these committees receive training in Community Emergency Response that empowers them to set up teams that will be first responders throughout the 17 districts in Antigua and Barbuda. Training includes the use of emergency telecommunications, first aid, search and rescue, and map-reading that focuses on hurricanes and earthquakes. Trained committee members have been equipped with Community Emergency Response Team (CERT) kits, which

included a helmet, gloves, goggles and CERT vests to clearly identify them.

The Disaster Preparedness Act requires that 'every Permanent Secretary and Head of a Department of Government ensure that there is at all times a public officer of his Ministry or Department designated as the Liaison Officer for communication with the Director in relation to the procedures'. These officers are responsible for the preparation of organizational disaster plans which should be submitted annually to NODS. Preparation rate is poor.

Liaison Officers, through training programmes, have been encouraged to transition their programmes from the existing hurricane focus to comprehensive disaster management and prepare plans accordingly, ensuring that the needs of the various ministries are met and the safety of workers is given priority.

Liaison Officers[98] have also been trained in Post-Disaster National Assessment (PDNA) and have capacity to 'prepare for, lead, conduct and complete national assessments following a disaster and to understand the role of external actors, the use of baseline data sets and internal assessment data sets and processes'.

Scientific and technical agencies[99]

The Caribbean Institute for Meteorology and Hydrology (CIMH) works to support its Member States in improving the capacity of their meteorological and hydrological services, through training, research, specialised services and technical advice. CIMH manages a number of decision-support tools on behalf of the region, including the DEWETRA Platform, Drought Monitor[100] and Precipitation Outlook[101].

Among its most recent initiatives is to address the lack of accurate and consistent climate data and information in the region to understand climate changes, predict impacts, and respond strategically at local, national and regional levels identified in USAID's Rapid Climate Change Vulnerability Assessment (2013). To this end, with the support of USAID, CIMH will establish and house a Regional Climate Centre to provide tailored climate and weather services to support DRR and GCC adaptation; improve data collection for monitoring and forecasting; and build capacities to access, analyse and use climate data to better inform decision-making (USAID, 2014).

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98 Officers drawn from: Finance, Trade, Social Transformation, Tourism, Public Utilities, Agriculture and Fisheries, Education, Health. There was also involvement from the Public Works Department, the Police Department, the Antigua and Barbuda Defence Force and NODS.

99 Extracted from '*Country Document for Disaster Risk Reduction: Barbados, 2014*'

100 Caribbean Drought and Precipitation Monitoring Network http://63.175.159.26/~cdpmn/cdpmn.html

101 Precipitation Outlook http://www.cimh.edu.bb/?p=precipoutlook

Civil society

The Antigua and Barbuda Red Cross was established as a branch of the British Red Cross on the 20th of October 1941, and gained full autonomy when the country became independent from Britain in November 1981. By an act of Parliament in August 1983 it became a National Society. In November 1992, the Antigua and Barbuda Red Cross was recognized as a member of the International Federation of Red Cross and Red Crescent Societies.

The organization's mission is 'to work effectively with the Government in disaster preparedness and response; and in our National Society's mandate, to help fulfill the unmet health needs of the most vulnerable in our communities'. Its products include First Aid Services, First Aid Training, Disaster Preparedness, Response & Rehabilitation, Supporting Fire Victims, Water Safety/ Lifeguarding, Medical Equipment Loan, Youth Services and Tracing/ Uniting families.

Through the Red Cross International [Readiness to Respond USAID/OFDA funded Community-Based Disaster Management program] community volunteers have been trained over the years in responding to, cleaning up and rebuilding after previous hurricanes e.g. Hurricanes Omar (2008) and Earl (2010). Community volunteers were equipped by the Red Cross with chain saws, boots, raincoats, loud speakers and cutlasses.

The St John Association of Antigua and Barbuda is a charitable non-profit organization, formerly known as the St John Ambulance Brigade. The organization offers:

- a free Hospice service which provides at home palliative care for the terminally ill.
- basic life support and first aid training
- first aid cover
- a medical rapid response service – a vehicle is fully equipped with everything needed to deal with almost all emergency medical situations including an Automatic External Defibrillator together with visual and audible warning devices

Antigua and Barbuda Amateur Radio Society [ABARS] is a volunteer group which supports emergency telecommunication through transmission via ham radio and UHF radio.

Private sector

Private sector participation in disaster risk reduction is confined primarily to the telecommunication companies and the media broadcast stations. Both segments of the private sector are involved in public education and awareness, early warning broadcasts/blasts and emergency communication. Although billed as public service, there is the realization that DRR can assist in the reduction of losses in business/income in the event of natural hazards. The potential for strengthening of customer loyalty and business reputation are recognized by those in the private sector that participate in disaster preparedness management.

NODS is still challenged to develop productive linkages with the private sector through inter-sectoral programmes as required in the NCDM policy that calls for the expansion of CDM programmes in both the private sector and civil society in its effort to improve the public safety culture and foster disaster management ownership. There are only occasional positive responses, mainly from the tourism and financial sectors to NODS' invitations to participate in meetings.

Regional and international partners

The OECS Commission's Disaster Response and Risk Reduction Programme[102] is multi-faceted. While termed Disaster Response and Risk reduction, the thrust of the OECS programme is towards building national and community resilience to hazard impacts. This has been achieved to a large extent through strengthening of the capacity of public sector agencies and community households to undertake vulnerability and post impact damage assessments and to implement hazard risk reduction measures.

Programmes have been designed around physical adaptation investments aimed at reducing vulnerability of communities to natural hazards. These have been implemented through a series of interventions in Member States by the Commission with support from several Development Partners.

The mandate for this programme is driven by the OECS Council of Environment Ministers which amongst others, mandated the OECS Commission to continue to mobilise resources, strengthen Regional collaborative and strategic partnerships, and in particular, work with the Caribbean Disaster Emergency Management Agency (CDEMA) and other partners, to develop more effective and harmonised protocols for reducing vulnerability, post disaster activities, and generally for integrating Disaster Risk Reduction into National Environmental Management Strategies.

A number of tools and techniques have been developed or promoted during the last 5 years for use by national governments and communities. Some of the tools and techniques developed under the Programme include

- The OECS Vulnerability Benchmarking Tool (BTool) and the Community BTool
- The National Environmental Management Strategies (NEMS)
- The UNECLAC Damage and Loss Assessment (DaLA) methodology
- The Community Disaster Risk Reduction (DRR) Framework and the Multi-hazard DRR methodology for Low-income Communities
- A harmonised protocol that provides a logical and sequential approach to conducting vulnerability and post impact assessments

The Caribbean Disaster Management Agency (CDEMA) is CARICOM's regional coordinating body

[102] www.oecs.org/index.php/drmu-programmes

for disaster risk management. Among Its functions are[103]:

- Mobilising and coordinating disaster relief
- Mitigating or eliminating, as far as practicable, the immediate consequences of disasters in Participating States
- Providing immediate and coordinated response by means of emergency disaster relief to any affected Participating State
- Securing, coordinating and providing to interested inter-governmental and nongovernmental organisations reliable and comprehensive information on disasters affecting any Participating State
- Encouraging the adoption of disaster loss reduction and mitigation policies and practices at the national and regional level; cooperative arrangements and mechanisms to facilitate the development of a culture of disaster loss reduction
- Coordinating the establishment, enhancement and maintenance of adequate emergency disaster response capabilities among the Participating States (CDEMA, n.d.a)

CDEMA forms an important of the DRR network as a key instrument for strategic visioning for CDM in the region, capacity building, and partnership formation. A significant portion of CDEMA's assistance comes through externally-funded projects. Often Participating States argue that the projects take an overly singular approach and produce much documentation, but at the same time some of the outputs are quite applicable, such as the model Hazard Mitigation Policy and Emergency Shelter Management Policy.

The Eastern Caribbean Development Partners Group (ECDPG) [104] was established to:

- provide a forum for information sharing among donors and development partners, and
- to make strategic decisions regarding programme development and coordination.

Its objective is to facilitate an effective, timely and coordinated response operation, in the event of a rapid onset emergency and request from an affected Member State and in support of the existing regional mechanism (CDEMA, n.d.b).

The partners are able to coordinate their collective humanitarian response as well as supporting the Regional Security System in its response, and post-disaster assessments. The United Nations Resident Coordinator sits as Chair and CDEMA as Co-Chair. Members include the UN System (e.g. UNDP, UNICEF, PAHO), Caribbean Development Bank (CDB), IFRC, USAID/Office of US Foreign Disaster Assistance (OFDA) and the UK Department for International Development (DFID).

Since 1974, the CDB has been responding to requests from its Borrowing Member Countries (BMCs) for assistance with post-disaster rehabilitation. The Disaster Management Strategy and

[103] Extracted from 'Country Document for Disaster Risk Reduction: Barbados, 2014'

[104] Extracted from '*Country Document for Disaster Risk Reduction: Barbados, 2014'*

Operational Guidelines (CDB, 2009) outlines the process for assistance to BMCs for disaster risk management and climate change adaptation, with the overall goal of contributing to sustainable development and poverty reduction by reducing the burdens caused by disasters.

4.4 Regulatory Framework

Policy and technical decision making on DRR are presently made within a regulatory framework comprising enunciated and implied policies and laws primarily aimed at the reduction of risk through physical planning, building codes, environmental impact assessments, natural resource management and climate change adaptation.

The framework however continues to be threatened and in some instances circumvented by the challenges of underdevelopment and the continuous search by political and economic leaders for development opportunities and foreign direct investment especially in the tourism sector. The lure of additional hotels, condominiums, yachting berths and golf courses and the employment benefits they bring to a people where unemployment is estimated at fifteen percent, has catalysed decision making that is contrary, at times, to established regulations and policies.

4.4.1 Regulatory instruments for policy and technical decision-making on DRR

<u>The Physical Planning Act, No. 6 of 2003</u>

The main purpose of the Act is to facilitate a continuous improvement in the quality of life of every person in Antigua and Barbuda. It details regulatory approaches to:

- provide for the orderly, efficient and equitable allocation and development of the resources of Antigua and Barbuda, taking account of all relevant social, economic and environmental factors, so as to ensure that sustainable use is made of land in the interests of all the people of Antigua and Barbuda;
- maintain and improve the quality of the physical environment within which human settlements are situated in Antigua and Barbuda;
- provide for the orderly sub-division of land and the provision of services in relation thereto;
- secure the health, safety, welfare and convenience of persons 'in or about buildings and of others who may be affected by buildings or matters connected with buildings;
- protect and conserve the cultural heritage of Antigua and Barbuda as it finds expression in the natural and the built environment;
- to foster awareness that all persons and organisations owning, occupying and developing land have a duty to use that land with due regard for the wider interests, both present and future, of society.

The Act establishes a Town and Country Planner in Section 6, with a clear mandate and authority to function in maintaining and keeping under review all matters pertinent to planning the use and

development of land in Antigua and Barbuda – including the preparation and/or review of a development plan for Antigua and Barbuda. Among the many matters for which provisions may be made in development plans is, 'prohibiting, regulating and controlling the deposit or disposal of water materials and refuse, the disposal of sewage and the pollution of ponds, salt ponds, gullies, beaches, the foreshore or territorial water."

The Act identifies various matters where an environmental impact assessment (EIA) could be required and authorizes the Development Control Authority (DCA) to impose conditions on a development permit for a wide range of reasons, including the disposal of sewage, effluent or trade waste from the development (Section 27(a) (IV)). By Section 58 of the Physical Planning Act, the Minister may make building regulations in regard to a wide range of matters, including- (a) plumbing and water supply; (b) sanitation; and (c) sewage disposal.

Section 53 allows the Town and Country Planner (if so directed by the Minister), to survey the whole or part of Antigua and Barbuda to determine whether any area of the country ought to be declared an environmental protection area. Under Section 54, the Minister shall consider the report of the Town and Country Planner and may declare the area to be an environmental protection area where he is of the opinion that it is desirable to offer special protection to the area. An order under Section 54 may:

- designate any part of the environmental protection area as an area where only certain development or classes of development may be permitted;
- prohibit any development within the area;
- authorise the carrying out of environmental protection measures within the area;
- provide for the control over the use of land within an environmental protection area for agriculture or forestry;
- require that an EIA be undertaken for any development in the area; and
- re-direct the entry into the area of persons or activities.

The Town and Country Planner may prepare an Environmental Protection Area Management Plan for any area declared to be an environmental protection area. Under Section 57(1) where the Minister is satisfied with information received from the Town and Country Planner, that it is in the public interest for the purpose of preventing or mitigating a specified environmental threat or hazard, the Minister may make orders to protect the environment.

National Building Code

Antigua and Barbuda has passed legislation (as regulations under the Development Control Ordinance) mandating the use of the Antigua Building Code for all buildings in Antigua and

Barbuda. The Code was developed using an OECS model code[105] in recognition of the fact that the damage caused by these extreme natural events affect all sections of society. Emphasis has been placed on the development of building standards which would prevent or mitigate the damage so caused.

The Building Guidelines make use of the building traditions that lead to "safe" construction and introduce construction methods required for the proper use of contemporary materials. They are to be used for the design and construction of simple residential buildings of less than 3,000 square feet in gross area[106]. Designers and constructors of buildings outside the scope of the Guidelines must consult the Building Code for the relevant design and construction requirements.

The Code and Guidelines mandate Structural Design Requirements such as 'Dead Load and Gravity Live Load', Wind Load, Earthquake Load, Block Masonry, Reinforced and Pre-stressed Concrete, Structural Steel and Structural Timber. They also establish requirements for Occupancy, Fire Safety and Public Health.

Integrated Coastal Zone Management Plan (ICZMP)

Antigua and Barbuda are both coral islands with coral reefs, sea grass beds and mangroves which serve as habitats for flora and fauna. Degradation of coastal ecosystems has been occurring as a result of natural disasters, strong ocean currents, pollutants entering the coastal waters, unsustainable exploitation of the coastal flora and fauna and development and sand mining on beaches. The impact of coastal degradation includes loss in recreational opportunities, of natural habitats for flora and fauna and of the natural protection of the coastline. In addition, the loss of livelihoods and economic opportunities to fishers, hoteliers and related business is another reality of the degradation of coastal resources[107].

Antigua and Barbuda has ratified the Cartagena Convention on marine pollution prevention, Protocol Concerning Special Protected Areas and Wildlife (SPAW), United Nations Convention on the Law of the Sea (UNCLOS), Protocol Concerning Pollution from Land-Based Sources and Activities and is a member of the International Maritime Organisation.

The main body responsible for coastal resources is the Fisheries Division of the Ministry of Agriculture whose main activities include data collection and analysis, quality assurance and control, public awareness and training, conservation and environmental monitoring with a focus on coastal and marine biodiversity, and surveillance and control of the waters of Antigua and Barbuda. Fisheries however work with a number of agencies, inter alia, the Forestry Department and the Development Control Authority and Environmental Health.

[105] http://www.oas.org/en/cdmp/
[106] Ibid
[107] National Environmental Summary Antigua and Barbuda 2010

In response to the issue of coastal degradation the GoAB has designated 4 areas as Marine Reserves; is undertaking an inventory of all fisheries areas; and is revising legislation that not only allows for the designation of a marine reserve, but takes into account the protection of specific marine elements as well as coral reef and seagrass damage. The legislation will also provide for a permit system for users.

4.5 National plans and their implementation

A number of attempts have been made over the last decade to create a national strategic development plan without much success. Efforts have seemingly ended up in a framework of 'The Ministry of Finance vs. All others' and the required national focus gets lost in the perpetual battle for limited resources. The pressures of public demand for goods and services and the relative Cabinet power of individual Ministers of Government contribute to uneven implementation. There have been two main interventions.

Caribbean Development Bank (CDB) Country Strategy for Antigua and Barbuda[108]

The Country Strategy document outlines the assistance strategy and planned strategic focus to accelerate the country's economic growth and pursue sustainable development over the period. 2015-2018. The total amount of CDB financing is estimated at USD 106.1 million.

The Country Strategy was developed in consultation with officials of the Government of Antigua and Barbuda, as well as other key stakeholders. Interventions over the outlined period will be geared towards achieving seven outcomes, namely: financial sector stability; improved access to and quality of education; improved physical infrastructure; reduced cost of energy and cleaner energy; increased private sector competitiveness; adequate water and sanitation facilities and better economic management.

A major component of the strategy is a proposed USD 50 million Policy-based Loan (PBL), which will be used to support efforts towards stabilizing the financial sector and also encourage continued fiscal reforms. Other interventions include proposed technical assistance to the Government to adequately structure engagements with the private sector, including through Public-Private Partnerships (PPPs).

The CDB Country Strategy closely aligns with the medium-term priorities in the Government of Antigua and Barbuda's Medium Term Development Strategy (MTDS), which was recently prepared for the period 2015-19. The MTDS evolved from the UPP's political manifesto of 2009 which called for 'a New Economic Charter (NEC) based on our own interests and the sustainability of our people's livelihoods and welfare' and also identified seven outcomes - Good Governance and Anti-

[108] www.caribank.org/news/cdb-approves-country-strategy-for-antigua-and...

Corruption; Fiscal Balance; Education for All; Enhanced Social Development Agenda; Environmental preservation and Superior Physical Infrastructure; Trade, Economic Growth and Sustainability, and Barbuda Development Programme.

National Economic and Social Transformation Plan (NEST Plan)

The NEST Plan (2010 – 2014) became the central national development plan of the previous administration. Introduced in 2009, it was built around four elements:

- Fiscal Consolidation Programme (FCP) – a mix of revenue and expenditure measures including more efficient tax collection, a reduction in the interest bill on both domestic and external debt, and actions to streamline government expenditure and raise revenue, while protecting targeted social spending. The FCP and debt-management strategy are geared to both eliminate debt arrears and reduce the debt-to-GDP ratio over the coming years.
- Institutional reform and strengthening reforms will strengthen the financial sector, including legislation to transform the Financial Sector Regulatory Commission into a single regulatory unit for International financial services, including banks and non-bank institutions.
- Economic Action Plan – encouraging economic activity and employment opportunities through a domestic economic stimulus, and
- Social Transformation Programme - development of health, education and the protection of vulnerable groups including the continuation of school meals programmes and allowances for the elderly, as well as the introduction of unemployment benefits.

Two other planning interventions are noted:

National Poverty Reduction Strategy

A National Poverty Reduction Strategy (NPRS) based on the NEST Plan was prepared[109] in 2010 on behalf of the Government of Antigua and Barbuda and the CDB to cover the period 2011-2015. There is little known about its implementation and impact. The Strategy is built on 5 pillars:

1. Growth and wealth creation
2. Expanding pro-poor employment and income-generating opportunities
3. Modernization of social protection systems and increased resilience of the poor
4. Good governance and public sector management
5. Building resilience through environmental sustainability.

The Sustainable Energy Action Plan (SEAP)[110] is intended to serve as a road map for future energy

[109] Kairi Consultants Inc is a Trinidad and Tobago based consultant company formed in 2010
[110] Antigua and Barbuda SIDS 2014 Preparatory Progress Report (July 2013)

use in Antigua and Barbuda from 2012 until 2030. The SEAP contains short (1-5 years), medium (5-10 years), and long (10-20 years) term actions designed to enhance the implementation of the policies and goals of Antigua and Barbuda National Energy Policy (NEP). These actions foster energy conservation, energy efficiency, and diversification of energy source and energy use needed for sustainable energy consumption and generation.

The strategies identified to meet the above are as follows:

- Strategy1: Energy Conservation and Energy Efficiency
- Strategy 2: Renewable Energy Development
- Strategy 3: Education and Awareness

5. THE STATE OF DISASTERS RISK IN THE COUNTRY

5.1 Historical Disasters Analysis

Antigua and Barbuda is exposed to a wide range of natural and anthropogenic hazards. [Table 33]. The risk profiles of the two islands vary slightly in terms of priorities but the types of hazards to which both islands are vulnerable are generally common. Antigua is characterized by densely populated areas and major infrastructural investment and development in the coastal zones.

Table 33. **TYPES OF HAZARDS IN ANTIGUA AND BARBUDA**

GEOLOGICAL HAZARDS	WATER & CLIMATIC HAZARDS	ENVIRONMENTAL HAZARDS	BIOLOGICAL	CHEMICAL, INDUSTRIAL ACCIDENTS	ACCIDENT RELATED
1. Earthquake	1. Tropical Cyclone	1. Environmental pollutions	1. Human / Animal Epidemics	1. Chemical disasters	1. Boat/ Road/ Air crash / Accidents
2. Tsunami	2. Tornado/ Hurricane	2. Deforestation	2. Pest attacks	2. Industrial disasters	2. Rural /Urban fires
3. Volcanic eruption	3. Floods		3. Desertification	3. Oil spills / Fires	3. Electric Accidents
4. Landslide	4. Drought		4. Pest Infection	4. Nuclear	4. Forest fires
	5. Hailstorm		5. Food poisoning	5. Landfill Fires	5. Building collapse
	6. Cloudburst		6.Invasive Species		6. Bomb /serial blasts
	7. Landslide				7. Festival
	8. Heat & Cold wave				

Source: NODS: National CDM Strategy Plan [2014 – 2016]

The country has experienced several significant hydro-meteorological hazard impacts - predominantly droughts and hurricanes; seismological events such as earthquakes, landslides as well as other physical hazards; anthropogenic and health related hazards. Table 34 below provides a synopsis of some major historical impacts to the twin-island state.

Table 34 Summary Of Major Hazard Events In Antigua and Barbuda Since 1642

HAZARD	TIMEFRAME	INCIDENTS	RETURN PERIOD (Years)
Drought	1731-2015	33	8.6
Earthquake (Magnitude ≥ 6.0)	1690-2007	6	52.8
Fire	1995-2005 2006-2010	240(Annual average) 375(Annual average)	0.004 0.003
Flood (Moderate-Major)	1974-2015	16 -	2.6
Landslide (Moderate-Major)	2008-2015	5	1.4
Storms (Tropical Storms, Hurricanes)	1642-2015	49	7.6
Tsunami	1690-2015	2	162.5

(Sources: Antigua Meteorological Services, ABFD, APUA, UWI Seismic Research Centre, NODS)

The most recent significant hydro-meteorological impacts to affect the country are summarized in the Table 35 below:

Table 35 Summary Of Most Recent Significant Hydro-Meteorological Hazard Events In Antigua/Barbuda					
Date	**Hazard**	**Deaths**	**Persons Affected**	**Economic Loss (US $)**	**SECTOR AFFECTED**
Oct 2015	Flood	NA	Island wide		Commerce, Health
2014-2015	Drought		Country wide		Utilities, National Water supply
Oct 2014	Hurricane		Country wide	3.5 M	Education (schools); Public Infrastructure; Agriculture; Housing
Oct 2013	Tornado	NA	< 300	2.6 M	Military -ABDF Camp Blizzard
May 2013	Flood	NA	Island wide		Infrastructure; Agriculture
1950-1999	Storms	12	50,514	543.6 M	Agriculture, Health Education, Tourism
1983	Drought		75,000		Agriculture, Tourism
(Sources: EM-DAT http://www.emdat.be/country_profile/index.html; Antigua Meteorological Services, ABFD, APUA, UWI Seismic Research Centre, NODS)					

Storms

Storms have directly impacted the State forty-nine (49) times at a rate of no less than nine (9) impacts per century, i.e. in the almost four (4) century time span there is an approximate average return time span of eight (8) years. In 1795 an earthquake was recorded during the occurrence of a hurricane.

The most significant impacts within the last century have occurred in 1950, 1989, 1995 and 1999. Not only have these impacts changed the outlook of disaster management, the years; 1950, 1995 and 1999, were also years of multiple storm impacts for the country and in each of these instances of these multiple impacts, all occurred within 1 month of each other.

Droughts

Droughts have been a consistent challenge since the inception of western colonization on the island and in 1863 to 1865 made a severe impact on mortality of 47.8 per 1,000 individuals. In a 75 year span - 1874 to 1949 - drought claimed the lives of 14 persons. Between the years 1983-85, Antigua went through one of its most severe episodes which had serious economic and social impacts especially for the agriculture sector. The tourism industry suffered from inadequate water supply for its guests; consequently the government had to import water from Dominica by barge, costing millions of dollars[111].

The Antigua Meteorological Services (AMS) has recorded 24 drought episode years during the period 1928 and 2007. The most recent drought of 2014-2015 was severe for the region, especially the Leeward Islands and saw the Antigua Public Utilities Authority (APUA) declaring and emergency as most surface reservoirs were depleted and the main one, Pot Works Dam, was reduced to only a 6 week national supply. See Fig: 23 below. At this point the majority of water production was being serviced by desalination plants.

[111] Drought | NODS Antigua Barbuda: nods.gov.ag/hazzards/drought

Fig: 23 Pot Works Dam, May 2016, Source: NODS

Flash flooding

Flash flooding is traditionally associated with tropical storm activity in the hurricane season (June to November). Recently however, relatively minor storm events have yielded significant damage and disruption. An intense deluge lasting only 45 minutes (October 19th 2015) triggered flash flooding causing damage to infrastructure in St. Johns, its environs and several flood prone areas throughout the country.

Similar impacts were seen in the Labor Day rains of May 6th 2013. Major flooding island-wide was experienced in the passage of Hurricane Omar in October of 2008, causing significant damage to housing, public and private property and infrastructure. It is however the floods experienced in the passage of TS Lenny in 1999 that were responsible for re-shaping the country's entire outlook to flood mitigation and management of water channels and catchments.

The history of seismological and physical hazards impacts are shown in Table 36.

Table 36 **SUMMARY OF MOST RECENT SIGNIFICANT SEISMOLOGICAL & PHYSICAL HAZARD EVENTS**

DATE	HAZARD	SECTOR AFFECTED
Jun 2012	Fire	Airline (LIAT Hangar)
2006-207	Fire	Annual average ≥360
1995-2005	Fire	Annual average ≥240, Housing, Agriculture, Business
Oct 1974	Earthquake	Infrastructure, Port/shipping, Energy sector (WIOC),

(Source: NODS Impact Inventory Database

Earthquakes

Antigua and Barbuda is located within the North-eastern Leeward Islands which is one of the more seismically active zones in the Caribbean and experiences regular seismic events. The country frequently receives minor quakes. Between the 15/Oct. 2013 and 25/June 2015, no less than 42 events measuring between 3.6 & 5.9 magnitude were experienced in its immediate sub-region [112].

Significant shakes have been a relatively common experience in recent history. In March of 1985 a quake measuring 6.6 struck the sub-region. There was another measuring 7.4 event in November 2007. However the last major quake to cause extensive damage was in 1974. There is historical evidence of the real threat posed by large scale events, as the epicenters of two of the three great quakes (magnitude greater than 8), recorded in the Caribbean history, have been situated in close proximity of Antigua in 1690 and 1843[113].

Fire

Historical records indicate large scale fire impacts as far back as 1863 when a Portuguese rum shop caused a fire that burnt for over 10 hours. In 1944 most of St. Johns City was damaged by what became known as 'Bryson Fire'. Another significant event occurred in 1991, when a fire in the Green Bay Hill area destroyed multiple homes, it however had a single casualty, a pregnant woman, the incident became known as the 'King Obstinate Fire.' In 1999 the national penal facility Her Majesty's' Prison (HMP), was almost burnt to the ground when several inmates set fire to it extensively damaging buildings and necessitating the evacuation of prisoners. (NODS 2005)

Between 1995-2005 Antigua & Barbuda averaged 240 fires annually. The annual totals for 2006 and 2007 have increased to over 360 and continue to rise. (Antigua and Barbuda Fire Department, ABFD). More recently in June of 2012 Leeward Island Air Transport (LIAT) home-base hanger was razed to the ground, with the loss of an aircraft among the physical losses to the airline.

Anthropogenic Threats

Antigua and Barbuda is vulnerable to a variety of anthropogenic threats. These include bio-hazards, chemical, radiological, transportation-based emergencies (aircraft, automotive and marine), environmental hazards such as pollution spills of terrestrial and marine nature, especially oil. Most of the incidents have been mainly industrial and transportation related accidents.

Health threats tend to be influenced by hydro-meteorological hazards. Their occurrence is not common and they tend to hold low significance in the country's hazard profile. There have been outbreaks of communicable diseases in the past - such as gastroenteritis, and influenza in recent years. Diseases such as tuberculosis and leptospirosis are re-emerging. The growing global and regional focus on the pandemic scares of avian Influenza, Swine Flu, the Chikungunya and Zika

[112] (UWI Seismic Research Centre Sep 2015)

[113] Tumbling & Aspinall 1974.

viruses have placed these types of threats firmly on the national agenda.

In summary, the risk of loss of life , property damage and loss, and economic costs - both direct and indirect - from more frequent, less severe hazard impacts has however significantly increased. This can be seen to be the result of a number of key factors:

- The greater level of investment in infrastructure and economically vital development activities in hazard sensitive and vulnerable areas;
- A heavy dependence on the vulnerable export industry of tourism and other related service based industries, financial sector services and online gaming among others.
- Limited or compromised capabilities by some elements of society for risk absorption or adequate risk transfer options.

The level of the country's vulnerability/security is also influenced by the fact that it is a net importer of the majority of its goods and food and therefore at risk to external natural, economic and anthropogenic pressures.

5.2 **Hazards / Threats**.

Antigua & Barbuda is among the top five (5) countries most exposed to multiple hazards. The lack of significant topographic variability results in open exposure to the full force of storm hazards. One hundred percent of the land area and one hundred percent of the population is exposed to two or more hydro-meteorological events. Antigua and Barbuda is among the top twenty countries with an estimated 80.4% of GDP at risk from two or more hazards.[114]

Hazard identification and prioritization was conducted during a Hazard Mapping Prioritization Workshop in Antigua during August 2000[115]. The workshop produced a list of six hazards which are listed in order of priority below:

- Winds / Hurricanes
- Drought
- Storm Surge
- Floods
- Coastal and Stream Erosion
- Earthquakes

Hurricanes and droughts are frequent recurrent hazards. Wind, storm surge and waves are caused by hurricane and tropical storm activity and are closely related. More recently flooding has become a serious threat exacerbated by man-made activities that have increased the number of flood prone areas in country by expanding the range/scope of inundation from natural floodplains

[114] World Bank 2005, "Natural Disaster Hotspots. A Global Risk Analysis'. Table 1.1b and Table 7.2b

[115] Rogers, C. 2000, Hazard Mapping / Vulnerability Assessment Prioritization Workshop Report. http://www.oas.org/pgdm

to non-traditional areas with very little flood history. The legal framework empowers the DCA particularly and the CBH and NSWMA to make interventions that could reverse this trend.

Seismic and physical hazards such as earthquakes and increasingly fires are the next most prevalent. Landslides also pose some risk and are associated with poor land management practices. This vulnerability is more evident in the southern region of the Antigua. The country possesses no active volcanoes but its closest neighbor, Montserrat has an active volcano and in circumstances of suitable prevailing winds the island of Antigua, most significantly in the south, has been impacted by ash-fall.

Non-traditional hazards such as extreme wind events (tornadoes) have also made recent impacts and are now a part of the country's outlook in terms of hazard profile.

Fig 24 Project Impact Area for 10m wave (Source: NODS)

Tsunamis are a real but infrequent threat. Their potential to cause devastating impact necessitates that some priority consideration be given to them. Like so many other SIDS, the vast majority of critical infrastructure - over 80%, - lies within 1 mile from the coast and is within the demarcated impact area for a 10 metre wave as shown in the Figure 24.

5.2.1 **Hydrometeorological Hazards**

5.2.1.1 Storms

Over the decade 1989 to 1999 - covering storms from Hurricane HUGO to Tropical Storm (TS) Lenny - the average 'direct' impact of these storms based on damage assessment reports was EC$ 200 Million or US$ 73.6 Million dollars [Table 37].

Table 37 AVERAGE DAMAGE TO SECTORS FROM STORM IMPACT 1989-99

SECTOR	AVERAGE DAMGE COST RANGE (US$ M)
Agriculture & Fisheries	0.4 – 8.1
Business	6.7- 29.4
Education	2.0 – 5.5
Environment	6.9 – 36.8
Health	1.5 – 11.3
Housing Stock	1.5 – 28.6
Public Infrastructure	1.8 – 20.2
Tourism	11.3 – 30.0
Utilities	0.8 – 8.2
(Source: NODS)	

Hurricane Hugo sparked the revamping of building codes and practices within the country and sub-region. The impact on the country was a shock to the system as the country had experienced four decades without any storm impact. Subsequently two of the strongest storms in this period that occurred after had major social impacts. They were Hurricane LUIS a category four (4) storm in September of 1995 and GEORGES a category two (2) in September of 1998. See Table 38.

Table 38 SOCIAL IMPACTS OF STORMS 1995 - 1999

Event	Year	Impact Duration	Casualties	Persons Impacted		Homes Damaged/ Destroyed	'Direct' Impact Cost (US $ M)
				Homeless	Displaced		
LUIS	1995	Sept 3/4/5	2 deaths	>3000	>11,272	>6,000	118.97
GEORGES	1998	Sept 20/21	234 injured	>3000	3,489	4,438	77.29
JOSE	1999	Oct 20/21	13 injuries		4,217 shelters	3,897	76.35
LENNY	1999	Nov 18/19/ 20	1 death	Victims evacuated. by boat			

(Source: NODS 2004)

Hurricane Jose and TS Lenny followed each other so closely that their impact is often considered singularly. Although not as strong as the previous three (3) storms, TS Lenny's direct impact was comparable to that of Hurricane Georges, notably on agriculture, environment and infrastructure. It dumped twenty-six (26) inches of rain in a twenty-four (24) hour period. The resulting flood waters effectively cut the island of Antigua into three distinct parts. The development of TS Lenny was considered a peculiar behaving storm, forming in the Caribbean Sea and traversing a complete 180 degrees to impact the country. Its impact opened up national dialogue and refocused the country's outlook and approach to flood mitigation and management. Residents in at least one inland community, namely Pigotts, had to be rescued from rooftops in boats.

5.2.1.2 Drought

Drought was analyzed on the basis of watersheds and considered environmental, meteorological, hydrological, infrastructural, human and land use factors. They can be classified by several types of impacts namely;

1. Meteorological – less than average level of precipitation of a prescribed period of time.
2. Hydrological - the availability for surface and groundwater, catchment, stream way (ghauts) flows
3. Agricultural- water availability based on the effects on agriculture, from availability for husbandry, watering crops to soil moisture

Antigua and Barbuda frequently experiences meteorological droughts and occasional hydrological and agricultural ones. The country has a marked dry season between the months of January to May and is characterized by having one of the lowest rainfall profiles of the region, as seen in

ANNEX 3, an average rainfall of less than forty (40) inches of precipitation fell in the drought years from 1928 to 2007 (Antigua Meteorological Services). Frequent and prolonged drought, based on national records, occur with an average periodicity of approximately every 3 to 5 years.

These drought conditions do exacerbate the secondary effects of other hydro-met hazards such as strong winds impacting vegetation, brittle tree cover and crops are most as was experienced in the agricultural sector during the passage of Hurricane Gonzalo in 2014. The country does experience prolonged effects resulting in severe socio-economic impacts to a lesser extent. This is due to several factors, namely;

- The majority of the water supply is not from surface reservoirs and ground wells but desalination plants.
- Most residences are built with water storage capacity such as cisterns and water tanks in accordance with the national Building Code, enforced by the DCA, enabling them to cope with extended periods of limited water supply and rationing.

There are currently on-going efforts to re-establish some of the traditional historic communal water harvesting infrastructure in various communities across Antigua such as Willikies in the north-east of the island and Wallings Dam in the south. There are calls for the refurbishing of the wells in Barbuda that have been blocked and unusable through illegal dumping practices. [Fig. 25]

Fig: 25 Illegal Dumping in Well on road to Sir McChesney High School in Barbuda Source: NODS

Extensive public education and awareness campaigns encourage a return to water harvesting practices, the minimization of domestic, communal and commercial water wasting activities and robust reporting of leaks by members of the public have had some success in helping to curb/modify public behavioral practices.

5.2.1.3 Floods And Storms

The majority of damage experienced - over the last few decades - from passing storms has been from water and flood damage due to the impact on property and infrastructure. Flooding in SIDS can be manifested in several ways namely:

- Flash flooding - rapid onset of flood water by precipitation/failure of damming structures

- River/stream - overflow of the banks of a water course
- Coastal - inundation by coastal/sea water
- Ponding – accumulation in catchment areas and flood plains

The country receives most of its rainfall during the hurricane season from July to November and is vulnerable to all types of flooding, more so the island of Antigua. Barbuda is a coral limestone island and is more subject to coastal flooding and ponding event due to its extremely flat profile as seen in the figures below.

Fig: 26 Flodding in Cashew Hill, Bendals/Bathlodge area 2008, Source: NODS

Fig: 27 Flooding in St. Johns City 2015, Source: NODS

Antigua is characterized as having a very quick run-off. (PWD) It can be characterized into three distinct topographical regions; the low rolling limestone hills in the north-east of the island; the flat clay basin located in the central region and; the volcanic hilly section of the South/South-west of the island. A significant number of water catchments are found in the north-east and central region which also supports an extensive agricultural belt of the island. Ponding and flash floods are prevalent in this section of the island.

The picture on the left [Fig.26] is ponding flood in central Bathlodge community while the two [Fig 27] on the right show flash floods from a 45 minute intense rainfall in St. Johns in 2015. Vehicles were swept away in spill over waters from the city's main catchment, 'Country Pond'. The inadequacy of the city's drainage network was exposed.

The reduction of percolation surface areas and increase in hard surfaces that increase run-off volumes are evident in unplanned zonal development. NODS has recommended that these issues be central in the determination of flow capacity when designing and developing drainage systems especially for built-up urban and expanding suburban areas in Antigua.

There are many seasonal streams or *ghauts* traversing the central and northern zone of the island. With increased flooding events resulting from non-storm related episodes of intense rainfall there have been significant levels of stream way flooding due to backfilling activities in numerous ponds and alterations to water channels. An example of this occurs in the 'Osbourn' area, upstream of

the 'Pigotts' community where the reduced retention capacity of the floodplain results in an increased water volume entering and overflowing the adjacent Burma ghaut, causing severe flooding in the surrounding community [Fig 28].

Fig: 28 Pigotts flooded as Burma Ghaut overflows 2015. Source: NODS

Fig: 29 Flooding in Crabbe Hill area Source: NODS

More recently human activity has caused some areas to become flood prone areas. A list of the most prevalent flood prone areas is made available in Annex 4 (NODS 2004). Flooding may be exacerbated by the expected increase in intensity of hydro-meteorological events due to climate change. The Caribbean Institute for Meteorology Hydrology (CIMH) predicts that wetter dry seasons and an increase in number of intense wet spells during the wet season are expected across the region. (CariCOF: CIMH 2016)

Coastal flooding is threat for most of Barbuda as the main community is adjacent to the lagoon. In Antigua it is primarily a concern along the three coastal corridors with tourism and residential development - on the west coast running from Dickenson Bay area to St. Johns Harbour, on the south-west coast from Jolly Beach to Crabbe Hill area [Fig 29], and on the south coast from Johnsons Point to the Falmouth/English Harbour area. There are some areas on the eastern coast that experience coastal water intrusion, however due to the sparse nature of human settlement and development there is minimal impact on the population. As sea-level rise due to climate change continues to be major concern the potential impact areas under threat may be modified significantly in the future.

Table 39 Economic impact of Hurricanes OMAR and EARL in Antigua/Barbuda

YEAR	EVENT	ECONOMIC COST (US$)
2010	EARL	19.2 M
2008	OMAR	17.8 M
(Source: CARIBSAVE-b: 2012)		

The level of impact of flooding is a serious economic concern. The direct cost of Hurricane Jose/TS

Lenny incident in 1999 of US$76.85millions far exceed the cost of Hurricane Omar (2008) and Earl (2010) the last two storm impacts to cause major flooding. [Table 39]. Continued building in several low lying areas and questionable development choices have led to an increase in the number of persons and property exposed to flood waters. A prime example is the community of West Palm Beach in the Bolans area within the St. Mary South district where community expansion has encroached into the path of the floodplain of one of the island's largest watersheds.

The secondary consequence of prolonged exposure to flood conditions is the potential for increased incidence rates of waterborne and related vector transmitted diseases.

Reducing structural vulnerability to issues of flooding has an added benefit of helping to reduce vulnerability for seismic risk as well. The proper siting of housing, improving the robustness of critical infrastructure (drainage construction) and the use of appropriate materials are examples of positive interventions when done in a coordinated environment and collaborative manner.

5.2.1.4 **TORNADOES**

The country lies within the cross hairs of the trade winds and numerous tornado events have been observed both within TS events and independently off-shore. These occasional 'waterspout' sightings just offshore are not uncommon and therefore have not triggered major cause for alarm in public perception. When these micro-systems do make landfall however they have the capacity for causing intense localized negative impacts.

Such was the case on October 6th 2013 when one such system did make landfall in the Coolidge area, North-east section of Antigua, impacting the main military base of the Antigua and Barbuda Defense Force (ABDF), Camp Blizzard [Fig 30]. Even though the system only made landfall for less than one (1) minute, it caused nearly 7 million Eastern Caribbean dollars worth of damage to multiple structures - including the soldier barracks, officers' quarters, warehousing and administrative buildings as well as power and water generation facilities.

Fig: 30 Tornado impact, Camp Blizzard 2013: **Source: NODS**

The regional weather outlook for the next forecasting season was discussed at the third meeting[116] of the CIMH/CariCOF conference in Roseau Dominica in May of 2016. It was noted that

[116] Attended by CIMH, CCCCC, regional meteorologists, disaster management officials and researchers from the University of the West Indies (UWI) and other project affiliated institutions

heat-waves were not traditionally considered a major hazard in the region, but they present an ever increasing threat.

There are few formalized coordinated collaborations between the meteorology, health, agriculture and disaster management disciplines in the immediate sub-region for this particular hazard. With the projected impact of climate change indicating a trend towards hotter minimum and average temperatures for the region, there exists a need for emphasis on the monitoring and analyses of such situation as there currently exists a wide information gap in actionable knowledge/information on the matter.

5.2.1.5 **EARTHQUAKE**

Antigua & Barbuda resides within one the most seismically active regions in the Caribbean and receives hundreds of quakes per year as shown by the maps [Figs 31 & 32] from UWI Seismic Research Centre. The size of the symbols indicates the magnitude of the event. (UWI Seismic Research Centre)

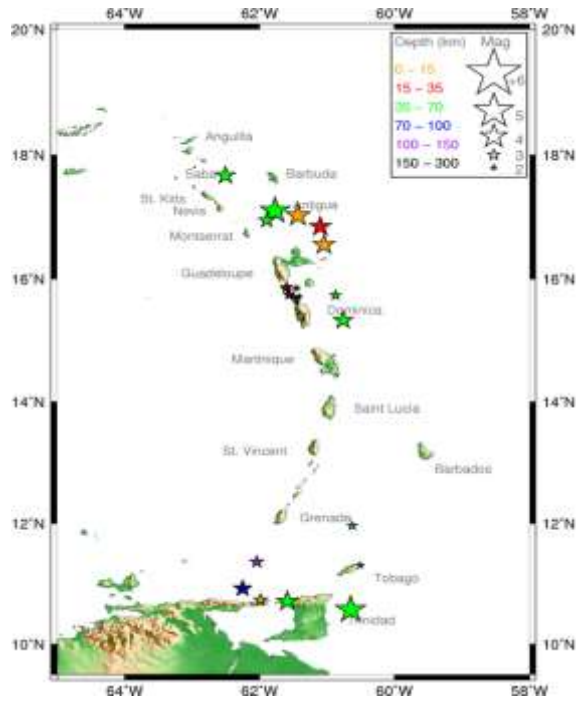


Fig: 31 Activity 15th – 31st March 2011

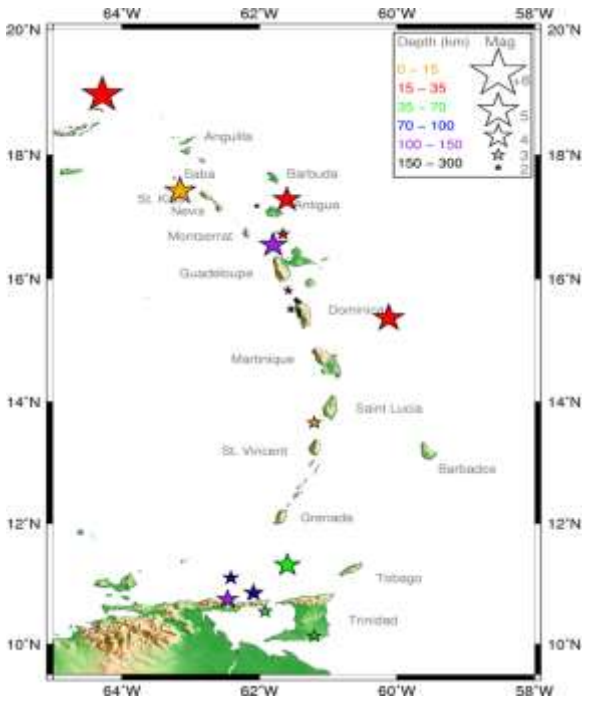


Fig: 32 Activity 01st – 15th April 2011

It is noted that the subsequent improvements in the Building Code - though initially focused on TS systems – have resulted in an increase of resiliency in the housing and building stock to the numerous seismic events experienced by the State.

Rock-fall and landslides are significant threats, primarily associated with seismic activity and

intense precipitation events. [Figs 33, 34, 35]. The more prominent landslides and rock fall events occur in the southern hilly region of the country along the Sherkley Mountain range. Many of the hills along this range are not solid rock but agglomerate, a mixture of rock, volcanic ash and mud.

Activities on slopes such as the removal of vegetation cover for farming or building - coupled with soil saturation from intense or prolonged precipitation - can create hazardous conditions.

Fig: 33 Rock fall - Jennings/Ebenezer area Source NODS

Fig: 34 Landslide threatening road in Folly Ghaut

Fig: 35 Potential road undermine and collapse: Source NODS

There are several points on the southern corridor highway (highlight/arrow in Fig. 36) that are threatened by landslide and rock-fall. If such were to occur, it could mean the blockage of the only access route from St. John's to Jennings Village and communities beyond - Bolans, Crabbe Hill, Johnson Point, Urlings and Old Road. These communities collectively represent an approximate 8.3% percent of the general population. (GOAB, Min of Fin: 2014)

Fig: 36 Major Access Routes Source: NODS

5.2.1.6 TSUNAMI

Tsunamis have been an infrequent hazard within the Caribbean and in a five hundred (500) year period only ten (10) confirmed earthquake generated events have been recorded killing approximately three hundred and fifty (350) people. (Seismic Research Centre)

The tele-tsunami generated in the 1755 Lisbon earthquake was recorded to have impacted the island. The focus has shifted however to more localized regional potential sources. Many Caribbean states like Antigua and Barbuda are heavily reliant on tourism and historically most of

the investment and infrastructural development has been focused in the coastal regions. The travel times of these events from a relatively localized source will leave little time for preparation and response. The country currently has a highly substantial risk to much of its critical infrastructure form these events.

The tsunami generated in the Haiti earthquake of 2010 is a reminder of this vulnerability. In response to this most Caribbean states, Antigua and Barbuda included, along with the installation of seismic monitoring stations, have developed national Tsunami Warning Protocols and the necessary warning threshold criteria (ANNEX 5) to support them. In Antigua & Barbuda the National Focal Point is NODS and the National Warning Tsunami Centre is the Meteorological Office

5.2.2 Anthropogenic/Manmade

Socio-economic and technological hazards such as pollution, fires, explosions, spills, deforestation in highly sensitive environmental areas, among others are of concern nationally. Factors such as high population density in urban areas coupled with challenges to the provision of basic services such as water, electricity, health, education and transportation to those in impoverished areas provides a platform for exacerbation of existing social vulnerabilities.

5.2.2.1 Fires

Fires are a frequent occurrence in the country, especially in Antigua and although individually not as devastating as other hazard impacts, the cumulative effect and cost of response is substantial. The profile of fire hazards includes not only electrical and vehicle fires but also conflagration caused by the burning of domestic and yard waste (rubbish) and grass or brush fires. There has been a noted decrease in reported fires from all fire stations island-wide except St. Johns in the months leading up to December (Christmas season). House, rubbish, grass (brush) and electrical fires account for about 60% of all fires.

Fig: 37 St. Johns City threat neighboring houses: Source: NODS

Fig: 38 House fire in Clare Hall area, Source: NODS

Figures 37 & 38 illustrate the high vulnerability of populations in dense housing in circumstances

of unregulated development. There are elevated levels of occurrence of fires in higher density, slightly more impoverished and less regulated settlements in the urban outskirt of the city.

5.2.2.2 Public Health and Safety Emergencies

Past public health and safety emergencies have been limited outbreaks of communicable diseases such as gastroenteritis, and influenza. Past public health and safety emergencies have been limited outbreaks of communicable diseases such as gastroenteritis, and influenza. The country has also experienced emerging and re-emerging diseases such as Chikungunya, Tuberculosis and Leptospirosis. The public health challenges have been primarily with controlling vectors such as the *Aedes aegypti* mosquito and the Black Rat and Brown Rat (*Rattus norvegicus*).

Susceptibility to recent global communicable disease threats, for many Caribbean SIDS, has been noted at their ports of entry and the need to strengthen their epidemiological systems for monitoring and tracking is deemed vital. The fact that the region relies heavily on tourism - a travel intensive industry - makes the threat of infected persons entering the region a highly significant one. Illnesses and epidemics that are of concern include avian flu, malaria, yellow fever, cholera, among others. The health, tourism and aviation sectors are on high alert.

Training for mitigation against communicable diseases such as A1N1, Chikingunya, and the Zika virus, has been focused not only on health personnel but to staff at both ports of entry. The capacity for isolation and quarantine areas and the acquisition of specially designated equipment and vehicles provide some logistical challenges to systems that lack the necessary resources to accommodate large number of victims/patients.

5.2.2.3 Phyto-sanitary Emergencies and Invasive Species

The Ministry of Agriculture, through its Plant Protection Unit, Fisheries Division and Department of Environment has dealt with a number of phyto-sanitary situations generated in recent years by pests and pathogens. The arrival of the predatory Lion Fish (*Petrois volitans*) into national waters, the infestation of agricultural pests such as the Pink Mealy bug and the Giant African snail (*Achatina fulica*), the invasive Cuban Tree Frog (*Osteopilus septentrionalis*) and most recently the Palm Yellowing bacteria carried by the Plant Hopper (*Myndus crudus*) are examples of the challenges threatening fisheries, crops and general vegetation.

Strengthening of plant protection presence at the ports of entry has been undertaken. Eradication programmes, using bait and traps, are underway for the giant African snail and tree cutting programmes for the removal of infected palm and coconut trees island-wide are being conducted in collaboration with the other national stakeholders. The use of Lionfish as a food source has been promoted.

5.2.2.4 Spills and Transportation

The majority of accidents in Antigua and Barbuda, primarily in Antigua are vehicular accidents. There are characteristically very few deaths by motorists every year. Below [Table 40] is a brief snapshot of vehicular accidents and associated injuries for year 2006 and 2007.

Table 40	**Summary of Traffic Accidents in Antigua and Barbuda 2006-2007**		
Year	**Accidents**	**Injuries**	**Fatalities**
2007	1,122	N/A	10
2006	836	158	8
Source: GOAB Statistics Division			

Air and marine vessel incidents are even more infrequent but the most common marine incident is fuel oil spills. The majority of these oil and fuel spills tends to be the result of transmission and re-fueling procedures. Inland, these spills have been small and associated with transfer of Heavy Fuel Oil to the central West Indies Oil Company depot facility, the refueling activities for the main power plants at Crabbes Peninsula in Antigua and the Lagoon area in Barbuda and/or re-fueling stations at the several marinas and docks around Antigua.

5.3 VULNERABILITY

The concept of 'vulnerability' has over the years always linked the situation of people in communities with the hazards to which they have been exposed. In the mid-nineties it was defined as 'the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard. It involves a combination of factors that determine the degree to which someone's life and livelihood is put at risk by a discrete and identifiable event in nature or in society'[117].

The more recent descriptions point to vulnerability as the 'characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard'. (UNISDR, 2009). Contemporary discussions suggest that vulnerability refers to the inability to withstand the effects of a hostile environment[118] or even more simply, 'a measure of possible future harm'. The prescriptive and normative response to vulnerability then is to reduce exposure, enhance coping capacity, strengthen recovery potential and bolster damage control (i.e. minimize destructive consequences) via private and public means.[119]

5.3.1 Analytical criteria and methodology

Two vulnerability assessments have been conducted in Antigua and Barbuda recently. The Red

[117] Hans-Georg Bohle et al (1994)

[118] Wolf T PhD et al: World Health Organization WHO, Genève 2013

[119] Shitangsu Kumar Paul (Ph. D.) Vulnerability Concepts And Its Application In Various Fields: A Review On Geographical Perspective; J. Life Earth Sci., Vol. 8: 0-0, 2013

Cross conducted a Vulnerability and Capacity Assessment (VCA) in three communities – Bendals, Yorks and Pigotts (2011); and the Pan American Health Organization, using the Hospital Safety Index tool it developed, completed an assessment of the vulnerability of the nation's main hospital, the Mount St. John Medical Centre (MSJMC) (March 6-8, 2013)

Vulnerability and Capacity Assessment (VCA)

The Antigua and Barbuda Red Cross with technical and managerial oversight from the International Federation of Red Cross Red Crescent Societies (IFRC) and funding by UK's Department for International Development (DFID) Caribbean office implemented a one-year project – 'Improving Climate Change Resilience of Caribbean Communities'[120] aimed at bringing together community-based risk reduction activities with climate change adaptation, shelter strengthening and health interventions.

The project allowed for the development and piloting of a climate change adaptation tool[121] and cost benefit analysis methodology that focused on demonstrating impact by measuring behaviour change and using cost benefit analysis as an integral part of taking decisions on where programmatic investments should be made.

The resulting Vulnerability and Capacity Assessment (VCA) was achieved through administration of a comprehensive baseline/end line survey that incorporated assessment tools to consider:

- Hazard and vulnerability mapping
- The identification and implementation of climate change adaptation measures such as risk reduction/resilience micro-projects, and
- Community empowerment and improved health education and increased awareness - refresher training for Community Disaster Response Teams (CDRTs) and the provision of response equipment.

An evaluation of the Project conducted in 2014 (Field visits in late February to mid March) yielded major dissatisfaction with the assessment tools/KAP surveys suggesting that there were challenges with the quality, length and appropriateness of some the questions in both KAP surveys. CDRT reported that the questions were 'too long and time-consuming, as well as repetitive in places' and in some instances 'culturally inappropriate.' In addition, IFRC was unable to assure the quality of the use of the baseline/end line surveys. Technically, interviewers did not have the knowledge of climate change to properly frame questions that they and community respondents did not understand.

[120] Implemented by the Red Cross Societies of Antigua and Barbuda Red Cross, Jamaica and Suriname together with the Caribbean Regional Representation Office of the International Federation of Red Cross and Red Crescent Societies funded by the UK's Department for International Development (DFID) March 2012-February 2014

[121] The project adopted the impact measurement tool that had been originally developed by American Red Cross (ARC) and Johns Hopkins University (JHU) as part of ARC's Latin America Risk Reduction Activity I programme in Central and South America.

Hospital Safety Index (HSI)

The Hospital Safety Index is an assessment tool that 'provides a way of estimating the probability that hospitals and other health facilities will be able to continue providing health care during floods, hurricanes, earthquakes, and other natural disasters. The index helps authorities decide which health facilities should have priority for improvements and what improvements are needed to enable them to function in emergency situations'[122].

The Hospital Safety Index is available as a tool kit and includes the following:

- A Guide for Evaluators of Safe Hospitals, which provides theoretical and methodological guidance on the assessment process, from planning to question-answering, to calculating the index.
- A form titled "General Information on the Health Facility," to be completed by the hospital emergency committee.
- A "Safe Hospitals Checklist" for use by evaluation teams. It consists of 145 items whose assessment results are used to calculate the index.
- The "Safety Index Calculator," an electronic spreadsheet that provides the final calculations of the index.

The final HSI score places a health facility into one of three categories of safety, helping determine where interventions are most urgently needed:

- Category A: deemed able to protect the life of their occupants and likely to continue functioning in disaster situations
- Category B: can resist a disaster but in which equipment and critical services are at risk
- Category C: the lives and safety of occupants are deemed at risk during disasters

PAHO consultants, at the end of a three day assessment exercise concluded that MSJMC was rated at Category A, having received a score of eight (8) out of a total of ten (10) points which was the highest mark to date of all hospitals in the Caribbean assessed by PAHO's Hospital Safety Index.[123]

The assessment indicates that MSJMC will remain structurally intact after a hazard event, has staff well-trained in emergency response, and articulated and tested contingency plans for continued operations after the event.

5.3.2 Components

Wilches-Chaux (1993)[124] suggested a number of approaches to identifying vulnerability. These are:

[122] www.paho.org/hq/index.php?option=com_content&view=article&id=584...

[123] March 6-8, 2013. Comment reported at the workshop made by Tony Gibbs, a Fellow of the Royal College of Engineers and one of the PAHO consultants who conducted the vulnerability assessment

[124] Wilches-Chaux, G. 1993. La Vulnerabilidad Global. http://www.desenredando.org/public/libros/1993/ldnsn/

- Natural/environmental vulnerability: determined by the intrinsic environmental limits of living organisms e.g. extreme temperatures; refers to humans coexisting with the environment without domination and destruction. It also takes into account the vulnerability of ecosystems to direct and indirect human action, and the high risk associated with communities that exploit or inhabit them.

- Physical vulnerability: refers specifically to the location of settlements in zones of risk and deficiencies in physical structures to withstand such risk

- Economic vulnerability: demonstrates an inverse relationship between per capita income and disaster losses; it occurs at multiple levels:
    - Local/individual – factors of unemployment, insufficient income levels, exploitation, work instability, difficulty accessing educational services, health & leisure activities
    - National – excessive dependence on external uncontrollable factors e.g. prices of fuel, inputs and manufactured products, servicing external debt

- Social vulnerability: the level of internal cohesion and organisation of the affected community; the more complex the formal and informal network, the more easily a society can absorb impacts of a disaster

- Political vulnerability: constitutes the level of autonomy of a community to make decisions; refers to the concentration of decision-making power, centralisation in governmental organisations and weaknesses in political autonomy at the local and community levels.

- Ideological and cultural vulnerability: dictated by a community's perception of the world's and man's role in it e.g. passivity, fatalism, belief in myths, etc.

- Educational vulnerability: refers to the lack of educational programmes, inadequate instruction or instructors, capacity and materials, unavailability of education programmes that include DRR at local and regional levels, the community's level of understanding of the issues involved in DRR.

- Institutional vulnerability: refers to the obsolete and or rigid institutions in which bureaucracy and political power reside.

5.3.3 Vulnerability analysis based on selected criteria

Climate change

The effects of climate change are expected to exacerbate several prominent hazards and pose challenges for the major sectors of the economy (agriculture, tourism, coastal zone, energy, fisheries, forestry, health, human settlements, and water resources). Thus mitigation against

climate change is a critical part of the country's' development and investment strategy although all planning frameworks are yet to encompass not only the immediate observable future but also the medium and long-term timeframes.

To date, Antigua and Barbuda has taken several measures to adapt and mitigate the impacts of [125]climate change. In September 2016, the Ministry of Health and the Environment submitted its Third National Communication (TNC) to the UN Framework Convention on Climate Change (UNFCCC). The Second National Communication was submitted in November 2011. In the 2011-2016 period, the country enacted the Environment Protection and Management Act; developed the National Physical Development Plan, issued an Energy Policy; and made commitment through the UNFCC's Copenhagen Accord 'to reduce the countries green house gas emissions by 25% of its 1990 levels by 2020. The country submitted its Intended Nationally Determined Commitments (INDC) in preparation for the 2015 Paris Climate Conference (COP21) Agreement and took part in those meetings.

The fundamental pillars of mitigation are based on energy use, energy efficiency and utilization of renewable energy. The country has invested significantly in solar energy, from the establishment of a three Megawatt (3MW) solar farm at the International Airport to the outfitting of solar panel on government office complexes and the transitioning of the road lighting network to solar based. The capacity building element involving the transfer of skills in installing the equipment on certain buildings by 'second chance' residents of Her Majesty's Prison is also a form of social resilience, giving them a skill set and opportunity for employment upon their release.

Adaptation strategies engage a variety of mechanisms to reduce loss and damage from disasters made worse by climate change, including disaster risk management, insurance and other compensatory schemes, building and development codes enforcement, and water storage, supply (ground water and desalination) and efficiency in usage, including irrigation technology and public education'[126]. Adaptation strategy targets directly applicable to DRR are enunciated in the TNC:

- By 2030, all buildings improved and prepared for extreme climate events, including drought, flooding and hurricanes
- By 2030, the waterways protected to reduce the risks of flooding and health impacts
- By 2030, an affordable insurance scheme is available to farmers, fishers, and residential and business owners to cope with losses resulting from climate change

<u>Environmental vulnerability</u>

Environmental issues play an important role in maintaining sustainability of the economy. The

[125] Antigua & Barbuda Third National Communication on Climate Change 2015 prepared on behalf of the Government of Antigua and Barbuda Department of Environment, Ministry of Health and the Environment UNEP/GEF/ABED

[126] (GoAB, Department of Environment; 2009) In its Second National Communication on Climate Change about adaptation initiatives;

destruction of mangroves and breaches to natural coastal defenses increase vulnerability to coastal based hazards such as sea-level rise, tidal waves, tropical storm-related impacts, including storm-surge, tsunamis and coastal erosion.

Reefs are a major component of the country's' coastal defenses. There are four (4) types of reefs found in Antigua and Barbuda:

- Barrier reefs found on Antigua's' southern shore;
- Bank barrier reefs offshore on northeastern and southwestern coast;
- Fringing reefs on the eastern northern and southern coast, and
- Patch reefs found mainly in Barbuda.

There are thirty six (36) mangrove sites in Antigua constituting 3.22% of its land mass and nine (9) sites in Barbuda making up 5.04% of its land[127]. Environmental degradation over recent decades has had a significant impact on coastal defenses. Fig. 39 demonstrates the loss in hectares of mangrove populations since 1980 with major destruction of ecosystems taking place in areas such as Jolly Beach, McKinnons Salt Pond and Deep Bay. The upward swing of the graph since 2005 is partly the result of intense public education and security surveillance and monitoring.

Infrastructural development and building on hillsides leading to erosion are land-based activities that increase environmental degradation. So too are beach sand mining on the perimeter of the island and uncontrolled sewerage and solid waste disposal.

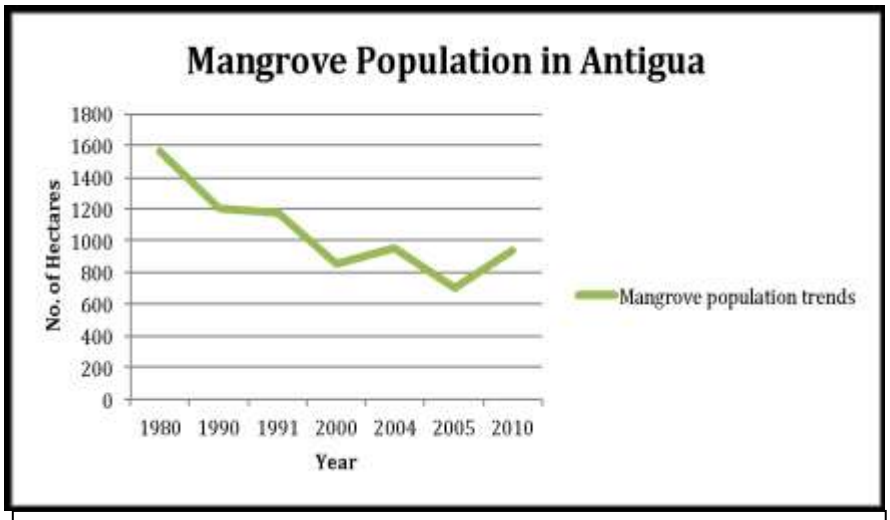


Fig: 39 Mangrove Population in Antigua / Source: Dept. of Environment

These illegal actions impact on the critical habitats such as coral reefs, sea-grass beds, wetlands and beaches. They may increase vulnerability to coastal hazards; threaten economic livelihoods and food production provided by the fisheries sector. Changes may be forced on cultural activities and practices relating to the health, spiritual and recreational use of beaches.

Environmental degradation and climate change-based Sea Level Rise (SLR) continue to pose significant threats to critical infrastructure in the tourism, transport and other sectors. The destruction of mangroves and breaches to natural coastal defenses increase vulnerability to

[127] GoAB, Department of Environment: 2014

coastal based hazards such as sea-level rise, tidal waves, tropical storm-related impacts.

It was noted earlier that the majority of Antigua and Barbuda's tourism infrastructure is located along the coast, which increases the vulnerability of the tourism industry to storm surge. In 2000 it was estimated that 39 of the 55 (approx. 70%) of the nation's tourism accommodation have beachfront locations (UNEP, 2000). Google satellite maps (2016)[128] show that of 90 properties approximately the same 70% has beachfront accommodations and therefore has high vulnerability to storm surge and sea level rise, as do important resorts and central infrastructures such as ports and airports, located less than 6 metres above sea level.

The areas at greatest risk to SLR and storm surge in Antigua include Dickenson Bay, Fort Bay, and Runaway Bay. In Barbuda, Coco Point, Palm Beach and Palmetto Point, are at risk to SLR and storm surge, with Low Bay at greatest risk.[129]

Agriculture

The agricultural sector has not been a major contributor to the GDP of the country nor has it been a generator of foreign revenue. The sector has also not been a major employer, with only 0.9% of the population, roughly a third (31%) of this group being women, still engaging in subsistence farming.[130] But the domestic economy continues to rely on agricultural production. The agriculture value added (%GDP) however has shown only very slight increase since 2000 ranging from 1.886% to 2.118% in 2015[131].

The impact of hazards such as drought and other climate-related changes in temperature, and storm patterns 'may seriously impact agricultural production and threaten food security'.

There is need to expand the understanding of the vulnerability of the sector and programme for its wider social and economic implications such as the enhanced vulnerability to pests and weeds through changed hydrologic and atmospheric conditions, accelerated soil erosion and increased salinization and heat stress, particularly on poultry and livestock; and a reduction of rough pastures available for livestock. [132].

Critical also is the understanding that drought can exacerbate these existing vulnerabilities to other more overt and dynamic events like fires and floods. There is a possibility of denuded vegetation cover and parched soils triggering other hazards such as wildfires and modifying

[128] 88 hotels on Antigua, Antigua & Barbuda. Book your hotel: www.booking.com/region/ag/antigua.html
[129] Simpson et al., (2012)'. (CARIBSAVE-b: 2012)
[130] GOAB: 2014
[131] Agriculture, value added (% of GDP) | Data / data.worldbank.org/indicator/NV.AGR.TOTL.ZS
[132] JAMES, Philmore: Policy Framework For Integrated (Adaptation) Planning and Management in ANTIGUA AND BARBUDA [In collaboration with The Caribbean planning for Adaptation to Climate change (CPACC)] March 2002

hurricane hazard in particular localities.

Challenges to the ecological balance have been observed. Brush fires, considered another agriculture environmental-based hazard, have decreased the density of native grass species that are better suited to holding/retaining soil have contributed to soil loss[133] and allowed the encroachment of the invasive Lemon Grass species (*Cymbopogon spp)*.

Antigua and Barbuda is considered to be relatively free of Persistent Organic Pollutants (POPs)[134] although there is heavy agricultural-based pesticide use in areas with high water tables and ground water extraction such as the Bendals/Bathlodge area, thus water quality monitoring programs must remain stringent.

Water resources

Water scarcity is caused by high seasonal and inter-annual rainfall variability. Most of the rainfall is received with severe intensity during the rainy season from July to December. Further to this, especially during droughts, there is loss of surface stored water because existing reservoirs have high evapo-transpiration rates as they are often shallow and exposed. Droughts also make aquifers more susceptible to salt water intrusion into groundwater supply. Reduction in reservoir storage capacity is experienced due to sedimentation precipitated by land degradation. There is also the matter of inadequate reservoir design and catchment management.

Table 41
Water Source Contribution to Daily Production rate

SOURCE	% Contribution to Daily production
Desalination	60
Surface (Dams & Ponds)	30
Ground (wells)	10
Source APUA	

Access to water can therefore be a challenge. The APUA is responsible for daily water production. The national daily requirement is 27,273m³ or six million Imperial gallons (6.0MIG). This is produced from a number of sources namely; surface water, groundwater and desalination which provides the bulk [Table 41]. During periods of extreme or prolonged drought the contribution by desalination may be as high as ninety percent (90%). (APUA)

The Authority registers approximately 26,000 consumers - comprising domestic, commercial, industrial, agricultural and Government users. The Authority offers a Bulk Water Depot (Trucking/Shipping) and provides one hundred and forty five (145) public standpipes island-wide for the public good. (APUA 2015)

Most squatters rely on the communal outlets. A high level of abuse of the communal services by segments of the private sector – construction and car-wash for example – is reported where individuals/entrepreneurs draw water from these services to avoid paying commercial rates. This

[133] Department of Environment: 2016
[134] GOAB, Environment Division:2007

abuse, coupled with system leakages from aging pipelines, poor maintenance, sedimentation of dams and reservoirs, and/or malicious damage, puts an undue strain on the service provider, which in times of drought has resorted to water rationing schedules in the attempt to provide equitable distribution to all communities.

The protection of watershed areas and the revitalization and rehabilitation of water harvesting practice and structures improves public resilience to drought conditions. The incorporation of Climate Change considerations into the setback from water courses and update for drainage system criteria for the national building codes is a necessary step in adapting to not only SLR but increased precipitation as well. This takes into account the identification of structural and non-structural vulnerabilities and their link to specific climate related hazards.

Physical vulnerability

Many of the existing hazard vulnerabilities stem from the overall status for the natural and built-up environments within both islands. Much of the physical vulnerability is as a result of exposure of buildings and critical infrastructure to seismic and weather-related hazards, thus national developmental actions influence the level of vulnerability experienced by sections of the populace to varying degrees.

St. Johns City and its environs, characterized by high building density coupled with narrow streets designed and laid out in 1702, houses approximately one third the islands population (UN-Habitat-b: 2011) See Fig. 40. It features high intensity of vehicular traffic and an above-ground power grid network. The city therefore has an inherently high level vulnerability to fire hazards. See Fig. In the event of earthquake – which is also a significant hazard - fire risk in the area would be compounded. (CDB: 2007, UN-Habitat-a: 2011)

Fig: 40 Aerial view of St. Johns City and environs

Fig: 41 Business fires in St. Johns 2013 /NODS

While the traditional Caribbean houses proved to be highly resistant to hurricanes, the gradual

adoption of new building styles and structural systems may have significantly increased vulnerability to hurricanes in recent decades. In areas such as Green Bay / Grays Farm that have higher than average national levels of unemployment, poverty and crime, there are numerous houses that are not to regional/local standard, with improper foundations, roof structures etc (OECS: 2015), greatly increasing vulnerability to hurricanes and flooding.

The compounding nature of some hazards requires a very dynamic framework for mitigation measures. Antigua and Barbuda has routinely experienced flooding while going through periods of severe drought. Flooding has been primarily associated with the passage of storm systems notably Tropical Storm (TS) Marilyn and Hurricane Luis in 1995, Hurricane Georges in 1998, and Hurricane Jose and TS Lenny in 1999. The most recent instance was Hurricane Gonzalo in 2014. It was noted by technicians in their survey and damage assessments that the high level of damage to tree crop and vegetation by the minimal category 1 storm was a result of the fact that many of the tree trunks and branches were extremely dry.

Land and land management

There is an artificial scarcity of residential land in Antigua. 'Private land owners tend to hold land as a means of financial security, a show of wealth, and to pass on to their children'. (UN-Habitat-a: 2011). Many individuals and/or families reside in substandard housing, build in/on unsuitable lands, engage in illegal backfilling of sites or resort to squatting.

The housing situation is further compounded by the fact that 'the institutional structure within Antigua and Barbuda's housing sector is fragmented. While the Central Housing and Planning Authority (CHAPA) is the main public sector agency responsible for building houses, there are many other Government agencies and departments which have a key role to play in housing delivery but there are no formal mechanisms for ensuring systematic coordination between these various agencies and departments'. (UN-Habitat-a: 2011). This UN analysis was confirmed in 2016 consultations.

Fig: 42 Littering/illegal dumping blocking drains
Source: NODS

The backfilling of wetland and water catchments (ponds) for building purposes (residential and commercial) is a challenge. Unsuitable building techniques in flood prone areas, primarily in north-east and western sections of Antigua have also compounded the issue. The altering of natural water channels has been a significant contributing factor to immediate and future flood vulnerability. So too have been littering and illegal dumping. Fig: 42.

Building in water catchment areas during dry spells or inadequate setback to stream ways are serious problems. This is prevalent in several rural and urban areas island wide as experienced during flood events especially in impoverished areas where residents lack or have limited risk transfer options like insurance. See Figs 43 & 44 below:

Fig: 43 Flooding impact urban squatting, Skerrits Pasture on stream bank Source: NODS

Fig: 44 House relocated by stream flood waters, Buckley Line Source: NODS

Unsustainable commercial practices such as considerable mining of 'ghaut sand' by the construction sector and improper land use and farming practices on slopes in the south of the island (clearing of hillside vegetation) without terracing, strapping of other mitigation contingencies have also created problems for infrastructure construction and maintenance with frequent blockage of drains resulting in flooding from significant rain events that then furthers, through erosion, the instability of infrastructure as seen below in Figs. 45 & 46.

Fig:45 Road network compromised by storm surge, Source: NODS

Fig: 46 Erosion undermining road Crabbe Hill, Source: NODS

Land management is a serious challenge to the development of risk island-wide. Non-sustainable activities such as the scraping of hillsides for building purpose without the use of terracing and

establishing adequate vegetation cover compromise slope stability. For example, the immediate environs of the Cancer Centre and the Mount St. John Medical Centre (MSJMC) have suffered several slope stability instances. See Figures 47 & 48.

Fig: 47 Slope instability after heavy rains 2008

Fig: 48 Retaining Wall Collapse 2015 /NODS

Squatting

There is ambiguity in public policy concerning the issue of squatting. One of the larger squatting communities is located on the outskirts of the city, habited primarily by persons from the Dominican Republic) and occupies State lands. Estimates of the population of this community range as high as three thousand (3,000). State interventions to regularize the tenancy of this population have been without strategic view and constrained by the political implications of 'following the law'.

Squatting on available land may put the occupants at risk of flooding or other social hazards including crime. See Figs. 49 & 50. The inability of squatters to access utility services lead many residents to illegally connect to these services – primarily electricity – or 'borrow current' from neighbours. The questionable wiring and no-fuse utilization of electricity increase the potential for fire incidents as shown in Fig. 51 below.

Fig: 49 High density of housing, Source: NODS

Fig: 50 Squatters in floodwaters Source: NODS

Fig: 51 Multiple homes destroyed Perry Bay, / NODS

Barbuda

Barbudans are faced with numerous transportation and logistical challenges. The underdeveloped ports of entry, seaport and airport, affect inter-island commerce and movement of people generally ultimately affecting tourism, finance and social services. See Fig. 52.

Fig: 52 Unsecured/managed Wharf facility in Barbuda to accommodate both passenger craft and commercial export Source: NODS

Economic vulnerability

Economic viability for any SIDS is inherently linked to the vulnerability in critical sectors of economic importance especially where singular events can have prolonged serious reoccurring effects.

The economic vulnerability in the country is particularly high. There is virtual 'mono-crop' dependence on the tourism sector both for GDP[135] and employment. This sector is susceptible to multiple hydro-meteorological, seismic, physical and environmental hazards and presents a serious mitigation challenge. Any interruption to services - even when damage to hotels and infrastructure may be slight – has significant impact on the social and economic life of the country. The loss of revenue and employment if the tourism sector is affected would significantly affect the overall capacity of the country and its population to recover from disaster.

Average per capita income levels in Antigua and Barbuda are high. However, income is not evenly distributed in the country and there are social groups (such as in the Green Bay / Grays Farm area) whose capacity to absorb the losses from a hazard and recover is limited. In this particular area and similar others, a minimum of twenty-seven percent[136] of householders are either renting and/or do not possess land titles and are therefore not subject to either credit or insurance to protect against economic loss and permit a rapid recovery of damaged housing and infrastructure. There have also been some fears expressed by parties affiliated with the sector, of a growing reluctance of the reinsurance industry to cover assets in risk prone countries like Antigua and Barbuda, further increasing the economic vulnerability of the island.

[135] Tourism is the biggest contributor, over seventy (70%), US$ 1.29 Billion. (The World Bank).

[136] GOAB Ministry of Finance 2014

Agriculture and fisheries have been the traditional sectors that receive a mass migration of workers displaced from tourism in the event of disruption. However because of their under-development and diminished economic importance, the level of financial returns are significantly less than those in tourism and they therefore offer only a limited capacity to households and communities and sector-related businesses to absorb losses and damage - and recover from them.

Fig: 53 Inappropriate/Illegal building over gutter, St. Johns 2016 / *NODS*

Some in reacting to economic pressures and a lack of opportunity seek to create financial livelihoods through licensed and unlicensed opportunities such as vending and construction. Sometimes well-meaning ventures expose people in the surrounding environment developmental hazards. As seen above [Fig. 53/Source: NODS] actions by individuals in private and civil society sectors also have the potential to place a number of persons at considerable risk. Public outcry led to a stoppage of construction and intervention.

Social vulnerability

The sources of social vulnerability are multiple and quite diverse. The most important factors that affect vulnerability include 'population growth and distribution' and 'social diversity'. The former, especially increased population density and urbanization, increases vulnerability to disasters. The capacity to absorb the impact of a hazard and recover is also related to social factors, such as health and educational levels, the existence of community organisation and other family, community and religious group support systems, as well as the existence of social services provided by Government and may be limited by the economic characteristics of the group[137].

Age and disability are other factors that affect vulnerability. Multiple social net measures have been implemented by the GoAB including subventions to the elderly; vagrancy control programs; and grants to associations for persons with disabilities. St. Johns Rural and City districts possess the highest poverty gap ratio (G0AB, Min. of Finance: 2009).

[137] Donner W & Rodríguez H: Disaster Risk and Vulnerability: The Role and Impact of Population and Society 2011 www.prb.org/Publications/Articles/2011/disaster-risk.aspx

Poverty is a primary social factor in increasing population vulnerability. National poverty assessments characterized approximately twenty-nine percent of the population as socio-economically vulnerable, susceptible of slipping easily into poverty.

The challenge of poverty is particularly evident among single mothers with no spousal support, whose poverty rates generally exceed those of single or married women. Such women find themselves either working longer hours or entering into financial supporting relationships that may lead to or compound a host of other hardships, ranging from land tenure/homeownership to interrupted education. The welfare of children is compromised with household heads having to work longer thus providing them with less interaction and supervision. (UN-Habitat-a:2011).

Crime is one of the key social hazardz in poor communities. Although Antigua and Barbuda is characterized as having a low to moderate crime rate, the number of crimes against property is significantly higher than those against persons. See Table 42. This social hazard is greatly exacerbated in densely populated areas where housing may be substandard and security poor.

Table 42 Summary of Crimes against Persons & Property 2006-2007

CRIME	2006	2007
Against Person	442	567
Against Property	2899	3073
Miscellaneous Offence	150	N/A
Total	3471	3640

Source: GOAB, Statistics Division

Political vulnerability

The 'ayes-have-it' of the practiced Westminster political model makes the country and people vulnerable to political machinations which however in Antigua and Barbuda are challenged by the actions of some trade unions, the media and socio-political oriented community organizations. The revitalization of a local government structures has been discussed as one approach to reduce political vulnerability but the idea has been abandoned based on the cost of imposing another level of government on a small population in a struggling economy.

Frequent turnover in political leadership can impact the continuity of disaster risk reduction activities. One challenge is the length of the political term at the local level, which generally peaks at eight years. Resilience building can be done in the short term, but governance structures and the involvement of various actors must be in place to ensure the continuity and fulfillment of these shorter-term efforts and achieve sustainable resilience. A high turnover in leadership was noted as one of the chief barriers to sustaining urban risk reduction programmes.' (UNISDR: 2012)

In Antigua and Barbuda, as with other SIDS, the challenge of re/focusing successive political administrations is constant and critical to the implementation of multi-year work socially

beneficial programs and projects whose life cycles are longer than the five-year political cycle. This is not unique to SIDS. Sustaining government engagement in risk reduction is a challenge reported by many countries.

Education vulnerability

Twenty-six (or 67%) of the thirty-nine official hurricane shelters in Antigua and Barbuda are school plants. Education service delivery bears vulnerability based on the physical vulnerability of the school plants themselves and the impact of hazards that may require citizens in Antigua and Barbuda to relocate to emergency shelters.

Post Hurricane Luis assessments revealed that 'thirty-seven government schools and nine private schools out of a total of 71[138] were damaged'[139] leading to the closure of some schools and the sharing of facilities – through a shift system – among others. No studies have been done to test the impact on the educational attainment levels of students in damaged schools and that of those that whose schools remained fully functional.

The vulnerability of these education structures to natural and or man-made hazards, especially during a disaster, puts at risk the education of eighty seven (UNICEF} percent of the school population (5-16yrs old) and the livelihood of many in education related employment.

Two case studies of vulnerability in communities

The National Physical Development Plan (NPDP) provides a framework for zoned development but the lack of local area plans to help guide local building decisions contributes to uncoordinated and poorly regulated zonal engineered processes. Squatting in several areas is a significant problem placing many citizens and residents at risk to fires, floods, health hazards etc. One such example is the Cashew Hill community.

The Cashew Hill area is located in St. John's City area. It is one of the eight communities that constitute the Body Pond watershed that covers approximately 10,500 square metres and stretches from John Hughes in the south east to Hansons Bay on the west coast [Fig 54]. Historically an agricultural community, Cashew Hill consisted predominantly of cane fields that were eventually converted into house lots and sold at low prices. As the population grew, demand for more residential space increased and the hydrological conditions of this natural water catchment were altered to satisfy the needs of a growing suburban population.

[138] 39 government schools and 32 private schools in the country

[139] Antigua and Barbuda National Plan to Reduce the Vulnerability of School Buildings to Natural Disasters 1998

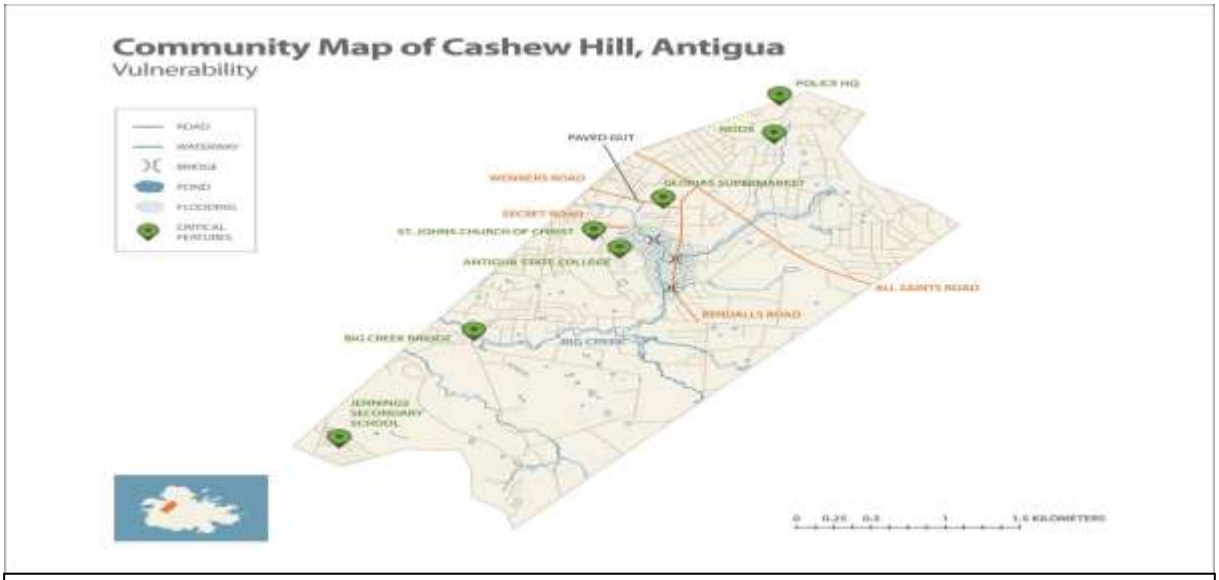


Fig: 54 **Cashew Hill Community, Source: CARIBSAVE**

The community has been negatively affected by increased population pressure, poor sanitation and drainage conditions, flooding, inappropriate infrastructural development, water resource management challenges and limited social cohesion[140]. There have been outbreaks of zika, chikungunya and dengue fever, and concerns about water quality and food safety and security.

Localized multi-hazard mapping profiles used in conjunction with surveys and historical/ traditional knowledge are used to Identify 'hotspot areas', those flood-prone or geologically unstable areas. These tools should be central to the country's development process. They, in turn, can help shape local area plans, identify mitigation initiatives to avoid many developmental pitfalls. This approach is crucial in any SIDS, like Antigua and Barbuda, where relocation of entire communities may not be economically or socially feasible.

West Palm Beach

The West Palm Beach Community (of Bolans Village) is a relatively small community of 2,600 persons, 52% of which are female with an estimated 3.2 persons per household. Sixty percent of the homes in the area are headed by single women/parents, most of whom are employed as hotel workers.

[140] (CARIBSAVE: 2012)

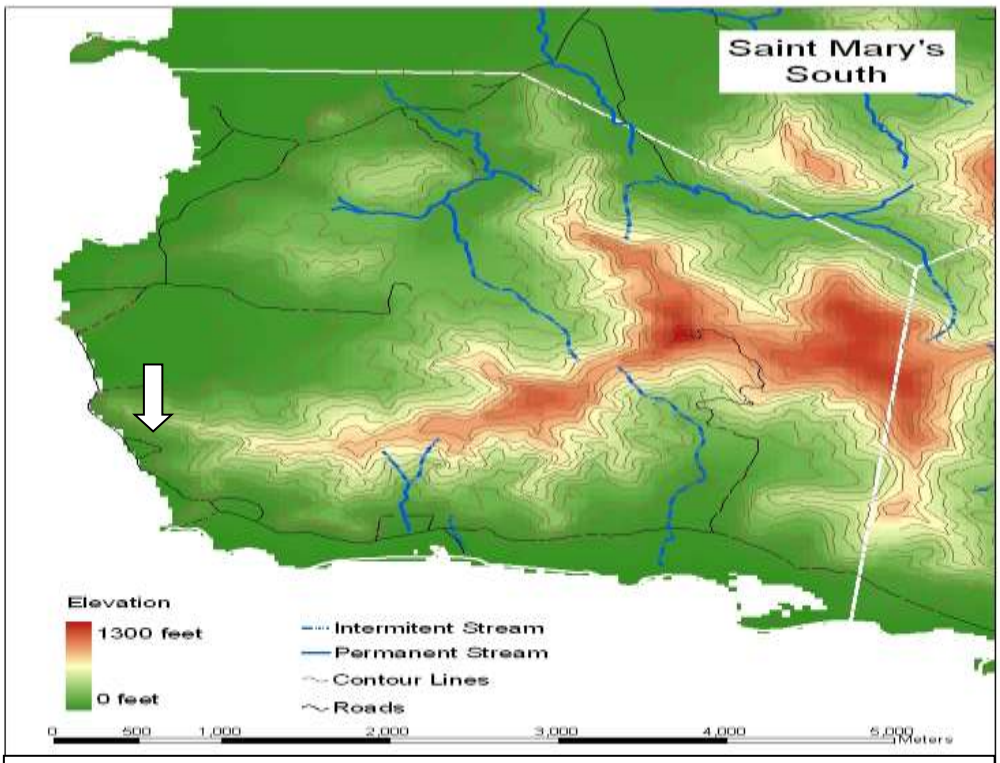


Fig: 55 **ST MARY'S SOUTH topography mapping** **Source: NODS**

The community is located downstream of two major watersheds with significant rates of runoff [Fig. 55 with arrow indicating location] resulting in flood damage to houses and other infrastructure, loss of agricultural produce and loss of water. Flood water depths of up to sixteen (16) feet have been recorded in the community after severe storms/hurricanes; up to five (5) feet after heavy rains and occasionally up to one (1) foot after regular/persistent rain. There is regular disruption of community social, economic and other activities.

Studies and hazard mapping of the area have been conducted by national and international agencies.[141] Hazard maps of the area have been prepared by the National Office of Disaster Preparedness and the Bolans community in 2005 and a Community Disaster Response Plan was developed in 1997; revised in 2011 and is presently under review. The plan was developed by the Community in consultation with NODS and a consultant.

[141] 1. PROJECT: TCP/ANT/3101/TCP Facility - Component 2 / Agricultural Feeder roads and water storage project by Aldin Crump, National Consultant – Civil Engineering FAO - December 2009
2. National Country Report on Building Climate Resilience through Innovative Financing Mechanisms for Climate Change Community Consultations - Project Coordinator: Ms. Ruleta Camacho / Prepared by Ms. Nneka Nicholas, Environment Division, Government of Antigua and Barbuda
3. Natural Hazard Mitigation Policy and Plan for Antigua and Barbuda - July 2001 prepared as part of the USAID/OAS Post-Georges Disaster Mitigation (PGDM) Project

A mitigation plan - based on recommendations of community members, contractors/engineers, the Public Works Department of the Ministry of Works, Agriculture Extension Division, Water Division/APUA & NODS - is to construct two (2) embankment dams, one (1) upstream of the watershed runoff and one (1) adjacent to the West Palm Beach Community.

It is expected that both dams will collect and store water, regulate the flow downstream and adjacent flow to the community; provide water to agriculture, agro-industry, and the APUA. The plan will also address social/cultural and health vulnerabilities by lessening the interruptions to family, social and cultural activities and reducing the size of habitats for water-borne and vector-borne diseases. In the medium to long term economic vulnerabilities of farm income and food security will be mitigated through increased acreage available to agriculture, for cash crops, fish farming and hydroponics, because of flood risk reduction. Water resources will be enhanced as the Antigua Public Utilities Authority will have a source to re-charging wells and aquifers in the area.

The approach to reducing vulnerability was through retroactive analysis which proved effective in mitigating the serious challenges in the area and could be applied to other areas. The expanded study of the Bolans watershed area within the St. Mary's South District involved government and civil society through District Disaster Committee volunteers involvement and community consultations.

The involvement of civil society in this project was paramount. Such initiatives are more appropriate and applicable if conducted in a participatory manner that address issues such as the needs of the elderly and differently-able, the economic benefits of the project to the farming community, to youth, and aspects of access and evacuation for all members of the community, regardless of ambulatory status.

Projects such as these provide an appropriate discussion platform for resource procurement, allocation and deployment as a critical management component of any DRM system.

5.4 CAPACITIES

A variety of government, NGOs, service and faith based, community level organizations and private sector agents are active in Antigua and Barbuda in DRR. The assessment of the country's progress through platforms facilitated by the Hyogo Framework for Action [HFA] provides a comprehensive critical step in charting a necessary path to improved resilience nationally.

There has been considerable progress since the submission of Antigua and Barbuda's Progress report on the HFA 2009-2011. Under the Strategic goals 2011–2013:

Area (1) – 'Integration of the CDM process at the national level' - has begun with the development of ministry CDM plans for the Public sector to lead by example.

Area (2) - The development and strengthening of institutions, mechanisms and capacities through the implementation of the multi-year Country Work Programme (CWP) has allowed for the implementation of systematic programmes and projects over multiple budgetary cycles and political administrations.

Area (3) – The incorporation of risk reduction:
NODS has been able to systematically incorporate risk reduction through its CDM focus into its routine activities and operations such as: Shelter and Shelter Management and Damage Assessment and Needs Analysis (DANA) involving its local, national and regional stakeholders[142].

NODS completed the revision of the National Disaster Management Plan utilizing the Results Based Management framework (RBM). The national Disaster Management Policy and Legislation were also drafted along with the necessary regulations. There has been notable progress made under each of the five (5) Priorities for Action based on the last progress report, with update to twenty-nine (29) verification parameters over fourteen (14) core indicators;

Under Priority for Action 1 – 'to ensure that disaster risk reduction is a national and a local priority':

- Under Core indicator (1) National policy and legal framework - the NPDP was established and Ministries have been mandated to draft their respective CDM strategies and plans.
- With reference to Core indicator (2), the allocated national budget has not significantly changed however under Core indicator (4) several national stakeholders from various sectors including the Red Cross, Military Cadet and the Ministry of Education have become involved in and fully embraced several DRM initiatives.

Under Priority for Action 2 – 'Ensure that disaster risk reduction is a national and a local priority'/Core indicator (1) - National and local risk assessments based on hazard data and vulnerability information are available. Multi-hazard maps have been developed and are utilized by multiple agencies including Agriculture and the Department of Environment.

- Under Core indicator (2) systems are in place to monitor, archive and disseminate data, with the development of the Environmental Information Management Advisory System (EIMAS) and centralized GIS system. The Department of Environment and Land and Survey have been able to direct project development more efficiently through identification of key hazards and vulnerabilities.

[142] PrevenmtionWeb: 2010

- Under Core indicator (4) – 'National and local risk assessments take account of regional/trans boundary risks, with a view to regional cooperation on risk reduction', actions are limited to marine issues such as dumping of dredge material, oil spills and the recent sargassum sea weed problem.

Priority for Action 3 - Ensuring that disaster risk reduction is a national and a local priority

- Core indicator (1), relevant information on disasters is available and accessible at all levels. The NODS website has been established with the national Public Library project soon to commence.
- For Core indicator (2) 'School curricula, education material and relevant trainings include disaster risk reduction', no DRR material has been produced but the subject is being taught as part of a disaster management course in Medical universities.
- Under Core (3) while there have been several post graduate studies done, no structured programme exists.

Priority for Action 4 – Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.

- Core indicator (1), DRR has been incorporated into Integrated Coastal Zone Management (ICZM) activities nationally.
- Under Core indicator (2), social development policies and plans are being implemented to reduce the vulnerability of at risk populations through Ministry of Social Transformations' agenda.
- With Core indicator (3), economic and productive sector policies and plans are being advanced through the Department of Environment Sustainable Island Resource Fund (SIRF) which addresses issues such as the implementation for cash/skill transfer & micro financing.
- Core indicator (4) – 'Planning and management of human settlements incorporate disaster risk reduction elements', enforcement of building codes is occurring for the interventions in West Palm Beach area, drainage upgrade in several flood prone areas, the slope stabilization to arrest rock-fall in the Urlings community and the implementation of the Safer Building course at Antigua State College and Antigua and Barbuda Institute of Continuing Education.
- In Core indicator (6), procedures are in place to assess the disaster risk impacts of major infrastructural development projects. There is limited consultation and consideration of some major project but EIA process collaboration with DRR assessment has been strengthened.

Priority for Action 5 – 'Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation'

- Core indicator (1), strong policy, technical and institutional capacities and mechanisms for disaster risk management, have been encouraged through several capacity building

programmes targeted at schools within the USAID/OFDA Safe Schools Program and the Living Schools project.

- Under Core indicator (2), disaster preparedness plans and contingency plans are in place at all administrative levels, and regular training drills and rehearsals are held to test and develop disaster response programmes, through the Safe School Initiative being spearheaded through the region by the OECS.

The Table 43 below gives a summary of all changed progress core indicators.

Table 43 SUMMARY OF CORE INDICATOR CHANGES SINCE HFA PROGRESS REPORT 2009-2011		
VERIFICATION	**2009 - 2011**	**Present**
Priority for Action 1 Ensure DRR a national/local priority - Institutional Implementation		
Core indicator 1		
DRR included in development plans and strategies?	No	Somewhat /YES
National development plan	No	Yes
Core indicator 4		
Institutional commitment Achieved	not substantial	Yes
Priority for Action 2 Ensure DRR a national/local priority - Hazard vulnerability assessment		
Core indicator 1		
Gender disaggregated vulnerability and capacity assessments	No	Yes
Core Indicator 2		
Reports generated and used in planning	No	Yes
Core indicator 4		
Regional or sub-regional monitoring and reporting mechanisms	No	Yes
Action plans addressing trans-boundary issues	No	Limited
Priority for Action 3 Ensure DRR a national/local priority – Info. access/Curricula/Public Awareness		
Core indicator 1		
Established mechanisms for accessing DRR information	No	Somewhat/Yes
Core indicator 2		
University curriculum	No	Somewhat/Yes
Core indicator 3		
Research outputs, products or studies	No	Somewhat
Research programmes and projects	No	Not structured
Studies on the economic costs and benefits of DRR	No	Limited
Priority for Action 4 Ensure DRR a national/local priority – Polices/Plans/Vulnerable populations		
Core 1		
Integrated planning (for example coastal zone management)	No	Yes
Core indicator 2		
Conditional cash transfers	No	Yes
DRR aligned poverty reduction, welfare policy and programmes	No	Yes
Microfinance	No	Yes
Core indicator 3		
National and sector public investment systems incorporate. DRR	No	Yes/some

Core indicator 4		
Is there investment to reduce the risk of vulnerable urban settlements	No	Yes
Investment in drainage infrastructure in flood prone areas	No	Yes
Slope stabilization in landslide prone areas	No	Yes
Training of masons on safe construction technology	No	Yes
Provision of safe land for low income households and communities	No	Somewhat
Core indicator 6		
Impacts of major development projects on disaster risk assessed	Not complete	Some
Assessments of project impact (dams, irrigation schemes etc) disaster risk	No	Somewhat
Impacts of disaster risk taken account in EIA	No	Yes
Priority for action 5 Ensure DRR a national/local priority – Capacities/Contingencies/Finances		
Core indicator 1		
National schools/health safety facility programmes/policies in emergencies	No	Yes
Policies and programmes for school and hospital safety	No	Yes
Training/mock drills in school and hospitals for emergency preparedness	No	Yes
Core indicator 2		
Contingency plans with gender sensitivities	No	Yes
Number of verification indicators changes		**29**
Number of Core indicators update		**14**
(Source: PreventionWeb; 2010/NODS; 2015)		

The regional/national enhanced CDM brand of DRM focuses on several core functions and critical sectors highlighted in the following text that are essential Institutional assessment of capacity and achievement. Enhanced capacity for stakeholder coordination at the operational level has been through multiple platforms including;

Coordination - Planning

There is a centralized Geographic Information System (GIS) platform for the government sectors as various agencies had been utilizing various GIS platforms and different projection. In order to stream line the process and produce a comprehensive multi-user platform various agencies including; Development Control Authority (DCA), Department of Environment, Lands and Survey Division, Ministry of Agriculture, Department of Environment and NODS have collaborated to establish a national system. It is housed and managed by the Survey Department.

Coordination/Collaboration - Public Education and Awareness

There have been a number of education and awareness initiatives geared at not only informing the public but also other partner organizations and stakeholders[143]. These have provided a forum for technology and information exchange, alongside the development of networks and management improvements among other resources to strengthen capacities. Activities aimed at the improved understanding of DRR issues at the national and local level have been promoted in

[143] As reported by NODS in the last multi-year 2009-2012 CWP Report

multiple public fora including exhibitions and street fairs in communities.

These fora also provide a key opportunity to effectively manage the public expectation as the actual capabilities of the national system and agencies versus preconceived notions.

NODS, with limited funding, fields and responds to requests from a wide cross section of interest groups[144] requesting participation in their programmes. The requests are varied ranging for informative sessions, training, and facilitation of exercises to the drafting of plans. The topics can range from traditional hazard awareness (earthquake, flooding, hurricane, tsunami readiness etc) to crisis management. Attempts have been made to synchronize visits with other agencies outreach programs utilizing a significant volume of material is produced through regional partners (CDEMA, USAID/OFDA, PAHO etc) and adapted to local situations.

Coordination - Early Warning Systems

Public agencies involved in early warning (Antigua Meteorological Service) have been able to expand the national weather stations network which has improved the available data sets for the improvement forecasting capability; monitoring of drought and potential flash flood conditions in collaboration with NODS and the Ministry of Agriculture. In light of the EU funded UNDP Common Alerting Protocol (CAP) in 2013 and the subsequent UNDP project aimed at Strengthening Resilience and Coping capacities in the Caribbean through Integrated Early Warning Systems in 2015, Antigua and Barbuda through NODS has acquired a CAP server to provide a uniform platform for timely information sharing and is now in the process of procuring the necessary hardware and software and other steps for completing/upgrading the national early warning system.

Coordination - Response

The enhancement in coordination of the sub-regional focal group system and update focal point activation procedures is also ongoing. Evaluation of capabilities of Antigua and Barbuda, as the Sub-Regional Focal Point (SRFP) is critical along with information sharing for the sub-region member. In terms of fostering better coordination and collaboration between response agencies and with the support of the Cabinet of GOAB decision towards the strengthening mass gathering emergency management capacity, harmonized training and exercise schedule have been established covering essential thematic areas such as Search and Rescue (SAR) and Mass Casualty Management (MCM) to help foster improved ownership of these systems.

The national SAR mechanism which falls under the ABFD (Fire Department) with ABDF (Defense

[144] Public sector agencies, private sector companies (Hotels, banks, insurance companies etc.) schools (Colleges, secondary and primary schools, early childhood centers) and civil society (Community and Faith/Service based Organizations, NGOs, senior citizen centers to schools for differently-able).

Force) as the secondary head, has been coordinating with NODS in updating the national SAR Guidelines in 2016. The guidelines outline the functioning of the system and the mechanisms to accommodate external assistance from the regional and international systems. They further outline the function of this national interface mechanism which any United Nations Disaster Assessment and Coordination (UNDAC) facilitated response would utilize for integration into national procedures and protocols[145].

There has also been work done to upgrade the site at Crabbes into a sub-regional training facility. New heavy duty equipment for the ABDF; appliances for ABFD and Personal Protection Equipment (PPE) have been sourced for the establishment of an E911 emergency call system.

The national response mechanism is handled by trained agency representatives functioning according to the regional CDEMA standards in an upgraded, outfitted National Emergency Operation Center (NEOC)[146]. The capacity for rapid response and the state of readiness of public and private facilities is of concern in light of the sudden impact of traditional hazards such as earthquakes and non-traditional ones like the tornado impact of October 2013.

The management of response capacity at the community level is significantly more challenging due to the management of and dynamic turnover of volunteers. Response at and from the community level is managed through the national District Disaster Committee (DDC) volunteer system.

Antigua is divided into 7 parishes which are further subdivided into 16 districts along political boundary lines. Barbuda is considered as one district. There are therefore seventeen (17) districts. A list of the major communities within the districts is contained in Annex 6. Each District Disaster Coordinator and his/her team of volunteers are trained in multiple aspects of disaster management including emergency telecommunications, damage assessment etc. Local response efforts are spearheaded by trained personnel and/or Samaritans during most flooding events.

The DDCs have access to community members with resources such as trucks, backhoes etc. as well as Community Emergency Response Teams (CERTs) and other trained personnel. A list of areas of national training disciplines can be found in Annex 7. They also work in cooperation with NGOs, faith based groups and other service based groups such as Red Cross, St. Johns Ambulance. The regional office of the IFRC has been working to harmonize its work program with CDEMA's regional Enhanced CDM work program and guide its national bodies to do the same. Great strides

[145] UNDAC supported a PAHO/UN Dept. of Humanitarian Affairs Emergency Response Mission to Antigua and Barbuda [and Barbados] September 10-17th 1995 in the wake of the passage of Hurricane Luis. The PAHO assessment mission identified needs with regard to water distribution, basic sanitation, cleaning of debris, vector control, hospitals/health centres and shelters. UNDAC coordinated the international aid response. http://reliefweb.int/map/antigua-and-barbuda/undac-missions-americas-1993-january-2011

[146] CDEMA 2001

towards this were demonstrated at the recent Regional Humanitarian Response Meeting between IFRC and CDEMA in July 2016

There have been several initiatives of note in the development of capabilities in critical sectors that continue to integrate DRR activities further into operational policies, plans and procedures.

Agriculture

The Ministry has developed internal organizational structure for oversight of its CDM process and this is strengthened through the establishment of a Ministry Liaison Officer (MLO) for disaster management related matters. The completion of the second Agricultural Census in Antigua and Barbuda in 2007 (GOAB 2012) provided a data basis for shaping development initiatives including; Skill transfer projects and improved techniques like the shade house projects funded by USAID and those for schools funded by the FAO - along with the expansion of aquaculture farms funded by FAO. There has also been the installation of weather stations done in collaborations with private farms, funded by CIMH. The Ministry also continues its work in rehabilitating water catchments and dams, as well as the development of programs with the Royal Police Force of Antigua and Barbuda (RPFAB) to curb praedial larceny.

A national multi-sector stakeholder Drought Management Committee headed by the Ministry of Agriculture has been established to holistically manage the mitigation of the complex vulnerabilities and impacts associated with drought hazard and its related effects. This body is informed by national technical and traditional knowledge, and available regional documentation.

Education

The Ministry has been developing its internal organizational structure for oversight and has designated a liaison officer for disaster management related matters along with officers responsible specifically for secondary and primary school disaster management matters under the Director of Education. As part of a requirement by the Cabinet of GoAB, the Ministry has mandated schools not only to develop individual facility comprehensive disaster management plans but the mandatory execution of disaster management activity drills at a minimum of once per semester.

The Ministry has also received external support through funding of several initiatives to include:

- The Brazil government sponsored Living Schools program for improving school design and infrastructure;
- The Spain government sponsored mentorship program and the School Safety Training Course funded by USAID/OFDA, aimed at developing capacity of DRM system in teachers/principals.
- The Child Friendly School initiative to review educational institutions policy in conjunction

with national stakeholders spearheaded by the OECS that utilizes a Result Based Management (RBM) approach for more effective Monitoring Evaluating and Reporting (MER).

Environment

The Environment Division has been upgraded to a Department of Environment with new resources, facility and staff to compliment its' expanded mandate as outlined in the adopted new Environment Bill. There has been the establishment of a national multi-stakeholder (Public and civil society sector) Environmental Technical Advisory Committee (TAC) with administrative oversight, responsibility for the management, monitoring and guidance of program and project development on all of the country's obligations to regional and international environmentally related treaties and conventions. The body seeks to maximize the use of the regional and national repository of technical information and cultural knowledge available.

Many of the resultant projects are developed through the Sustainable Island Resource Management Mechanism (SIRMM) to be funded by the Sustainable Island Resource Fund (SIRF), the facility established to maximize local investment along with external support. These include conservation as well as various intervention projects such as the establishment of protected areas and parks (terrestrial and marine) on the south, northeastern, western and southern coasts of Antigua and also in Barbuda. There is also the expansion of private sector eco-tourism business which has aided in improving the standing of environmental issues in the national debate.

Health

The overall Health CDM sector plan and the supporting agencies and institution plans have been developed under the 2002 Disaster Management Legal Framework for the comprehensive management of environmental, medical and public health issues in Antigua and Barbuda. The National Health Disaster Committee (NHDC) which is the entity established within this paradigm shift, under the overall direction of the Minister responsible for Health, is tasked with a number of critical responsibilities including;

- To develop policies for the efficient management of health emergency/disaster under the direction of the National Health Disaster Committee as provided for in the Emergency Powers legislations;
- To develop alert systems – warnings and dissemination of counter emergency/disaster information (Health Sector Disaster Management Plan 2016).

The establishment of several facilities has increased capacity in several areas of the health sector:

- The laboratory services have been expanded and now include a new microbiology laboratory with analytical capabilities.

- A newly established Cancer Treatment Centre has improved the range of treatments available to national and sub-regional patients.
- A new primary care clinic has been established within the rural St. Johns' district.
- The ambulance fleet of the Emergency Medical Services (E.M.S) has been expanded.
- The collection fleet of the National Solid Waste Management Authority (NSWMA) which supports the Central Board of Health (CBH) in the management of bulk waste has been improved, has been enlarged and this has enhanced the sector's response capabilities to community and environmental based requests for assistance.

The organisation of the national disaster management system and mechanisms at all levels is described in Section 5.3.1. There is no formal overarching coordination mechanism functioning outside of emergencies. There is however exchange of ideas and information between managers as many serve together on various committees. Potential for improved collaboration between managers in project/programme planning and implementation is therefore strong and can be realized when the platforms where the existing informal deliberations take place are made formal.

There has been development in national humanitarian aid networking. CDEMA has been working extensively harmonizing its regional Caribbean Disaster Assessment Coordination (CDAC) and CARICOM Operational Support Team (COST) programmes with that of the UN OCHA UNDAC. There have been several joint deployments to regional impacts within the last decade and a number of CDEMA Coordinating Unit personnel and disaster management officials from around the region, including several persons from NODS, have been cross trained in the UNDAC methodology.

Testing of the cooperation of civilian-military humanitarian regional systems has been conducted through numerous regional exercises in the region. Two examples of this are:

I. Trade Winds exercises involving regional military and disaster management services from the Caribbean and Latin America, facilitated through the US Southern Command (USSOUTHCOM). Antigua and Barbuda has hosted this exercise on three occasions.

II. The *Fuerzas aliadas Humanitarias* (FAHum) - (Allied Humanitarian Forces) is a regional exercise that tests the civil defense-military humanitarian complex in which Antigua and Barbuda has participated since 1998. The exercise is also assisted through USSOUTHCOM in collaboration with CDEMA. Antigua and Barbuda has held stages of the exercise. This initiative has both military and disaster management agencies engaged in multiple scenarios for regional/international SAR to the security based operations.

Nationally Antigua and Barbuda has increased the level of investment in regards to its humanitarian focus in many of its programmes. The Ministry of Social Transformation itself has reported over thirty seven (37) social programmes functioning, however without a centralized MER system (Ministry Social Transformation 2016). The level of involvement from its disaster

management mechanism is increasing. The country recently hosted a regional tabletop exercise in July 2016 involving representatives for UN OCHA, UNICEF, UN WFP and CDEMA which focused on delivery of humanitarian aid in the region utilizing existing structures. This activity brought to light some real challenges that exist among the various stakeholders, primarily the limitations of the national physical and organizational capacity and commitment to receive and distribute humanitarian aid in an accountable manner and the use of such aid as a catalyst to improve the resilience of affected communities.

Table 44 below provides a summary of various DRR projects implemented in Antigua and Barbuda addressing the country's' risk profile.

TABLE 44 SUMMARY OF DRR RELATED PROJECTS/ PROGRAMMES IMPLEMENTED IN ANTIGUA AND BARBUDA

Type	Project	Level of implementation	Sustainability
Capacity	CERT Training (NODS)	Local	Ongoing
Capacity	Skill transfer solar panel installation (DoE)	Sub-National	Ongoing
Capacity	Cadet Corp Disaster Management Program.(NODS)	National	Ongoing
Capacity	Zero Hunger Initiative (Soc. Trans)	National	Annual
Capacity	Financial Empowerment Center (OAS)	National	Piloted
Capacity	Job transfer Skills (Labor)	National	Ongoing
Develop	Participatory Slum Upgrade Project (UN-Habitat)	Sub-National	Ongoing
Develop	Home Mitigation Cassada Gardens/Friars Hill (DoE)	Local	Piloted
Develop	Safe School initiative (OECS/USAID)	National	Completed
Develop	Road network and Drains (PWD)	National	Ongoing
Drought	upgrading of water catchment (APUA)	National	Ongoing
Drought	Installation of Desalination Plants (APUA)	National	Completed
Environment	Barbuda Lagoon protected area (DoE)	National	Ongoing
Environment	National Park protected area (National Parks)	Sub-national	Ongoing
Environment	Giant African Snail eradication (Plant Protection)	National	Ongoing
Environment	Black/Brown Rat eradication (DoE/EAG)	Sub-National	Ongoing
Environment	Revival McKinons Salt Pond (DoE)	Local	In progress
Environment	Tree Cutting(Phyto-sanitary pest control) (APUA)	National	Ongoing
Environment	Green House Gas Inventory (DoE)	National	Ongoing
Environment	GCCA Sustainable Land Management (OECS/DoE)	National	Piloted
Energy	Solar farm airport	Sub-National	Implemented
Energy	Solar Street Lights (APUA)	National	Ongoing
Energy	Solar Panels government Offices (DoE)	National	Ongoing
Health	Radioactive inventory (Health/IAEA)	National	Ongoing
Health	Toxic Chemical Inventory (Health)	National	Ongoing
Health	Vector Control (CBH)	National	Annual
IWRM	Bolans/Body Ponds Watershed Mang (DoE/APUA)	Sub-National	Ongoing
Planning	GIS Mapping of critical facilities (Lands/Survey)	National	Implemented
Planning	Ministry CDM plans (NODS)	National	Ongoing
Social	Update person with disabilities (Soc. Trans)	National	Ongoing
Social	Street Pastors/soup kitchen (Faith bsd)	National	Ongoing
Social	HAPPI program for homeless (Soc. Trans)	National	Ongoing
Social	Utility subsidy for senior citizens (Petro Caribe)	National	Ongoing
Social	National Social Protection Bill (Soc Tans)	National	Piloted
Social	National Poverty Assessment (CDB)	National	Completed

Tool inventory

Below is a list of DRR tools available to the country for further use in planning, project and program development processes.

TABLE 45 **LIST OF SEVERAL OF AVAILABLE DRR TOOLS FOR DEVELOPMENT PLANNING**

TOOL	TYPE	USE
IPCC Green House Gs inventory software	Climate Change	Hazard profile mapping
CariCOF Climate Outlook – (CIMH)	Climate Change	Drought and flood forecasting
Sustainable Land Management (SLM) in the Eastern Caribbean- (OECS/GCCA)	Climate Change	Sustainable Land Management
Tsunami Tide tool with travel times (IOC)	Coastal vulnerability	Coastal vulnerability & planning (coastal development & evacuation)
Draft Coastal Development Setback Guidelines for Antigua and Barbuda – (OECS)	Coastal zone management	Coastal vulnerability & planning
Draft Model Integrated Coastal Zone Management Policy for OECS	Coastal Zone management	Plan. Costal vulnerability
DRR Education Toolkit (CDEMA)	DRR	Teaching/Learning
Benchmarking B-Tool OECS	DRM	Physical, social, economic vulnerability
UN ECLAC Handbook for Disaster Assessment 2014	DRM	Sector by sector analysis of parameters to investigate
Guidance Tool: manual for Mainstreaming Climate Change Adaptation into a CDM Country Work Programme (CDEMA)	DRM Planning	Comprehensive Country Work Plan development
CDM Monitor (CDEMA)	DRM Monitoring	Capture & analysis of performance data of regional CDM Strategy 2014-24.
Flash Environmental Assessment Tool (FEAT) UN-OCHA	Environmental Impact	Potential waterways, animal, Human safety
Emergency Response Handbook 2008 9 (US Dep. Transport/Transport Canada)	Hazmat	Port/Community Safety - Plan. for movement
Hazard Identification Tool (HIT) – UNEP/UN-OCHA	Hazard Identification	Manage secondary risk, consequence of disasters
Building codes - (OECS)	Infrastructure – General	Structural safety
Earthquake Readiness – Teachers Tool Earthquake Readiness – Business Tool (CDEMA)	Infrastructure – General	Physical, social, economic vulnerability
Build It Strong Manual (NODS/USAID)	Infrastructure – Housing Stock	Structural safety
PAHO Hospital Safety Index	Infrastructure – Health sector	Health Facility safety
CARDIN virtual Library http://www.mona.uwi.edu/cardin/virtual_library/searchlibrary.asp	Research resource	CDM
PreventionWeb http://www.preventionweb.net/english/	Research resource	Manage risk, consequence of disasters
DEWETRA Platform	Research resource -Hazard Impact	Back ground information on impacts
CIMH Drought and precipitation monitoring for enhanced water resources management in the Caribbean	Water management	Establish Monitor/ warning systems for drought/flood in vulnerable communities
Model Water policy (Policy/Act) for countries in OECS Model Water law for countries in OECS (USAID)	Water Resource Management	Plan. For Water conservations and management

5.5 REDUCTION OF UNDERLYING RISK FACTORS

Principal 4 of the HFA calls for an expanded holistic approach, tempered by lessons learned', to

national and regional planning and forecasting as necessary for the realization of reduction of underlying risk factors. In the context of a SIDS, with limited resource, high physical and economic vulnerability to physical, weather related and external economic pressures:

> 'Disaster risks related to changing social, economic, environmental conditions and land use, and the impact of hazards associated with geological events, weather, water, climate variability and climate change are addressed in sector development planning and programmes as well as in post-disaster situations.'

The aim of reducing the reducing the vulnerability of populations most at risk must be one of the core elements of implementable economic policies and plans. Long standing socio-economic and environmental issues must be addressed. Policies and plans must take into consideration those cultural customs and norms that have developed and persisted as resources are contested for by stakeholders. The reduction of the vulnerability of economic activities and national systems remain paramount in sustainable development.

> 'The issue of coastal squeeze remains a concern for many small islands as there is a constant struggle to manage the requirements for physical development against the need to maintain ecological balance (IPCC, 2014). The high density of tourism development on the coast increased the vulnerability to climate change and SLR as well as the risk of degradation of coastal and marine biodiversity (Simpson et al., 2012). A reduction in the width of the beach buffer zone due to SLR and storm surge will increase the vulnerability of coastal infrastructure to erosive wave action and can contribute to the loss of critical fish landing sites in Antigua and Barbuda'. (CARIBSAVE-b: 2012)

In Barbuda the lagoon is a central part of livelihood for many who conduct eco-tourism tours to its frigate bird sanctuary, are active in the fishing and lobster industry, and employed in sand mining activities. Under the SIRMM established in the DoE, the protected park area was established along with zoning laws. See Fig. 56.

Currently the responsibility for enforcement of fisheries regulations and the prevention of illegal fishing in the Exclusive Economic Zone (EEZ) is shared by the Fisheries Division and the Antigua and Barbuda Defence Force Coast Guard. An insufficiency of resources hinders effective enforcement of laws. There has been a call for two additional boats, the establishment of a base and look-out stations and the provision of evidence collecting equipment[147].

There is also need for long term physical planning of community access considerations - both during emergencies and in respect of long term community developmental options to minimize the creation of easily isolated areas/groups. New housing communities tend to emerge as extensions of St. John's city/parish and/or existing villages on available land. There locations are

[147] WAITT Institute: Enforcement recommendations for Barbuda Blue Halo Initiative Dec 2013 waittinstitute.org/bluehalobarbuda

not informed by safety or other studies. There are several vulnerability points along the national road network that can isolate significant portions of the population. (OECS: 2014)

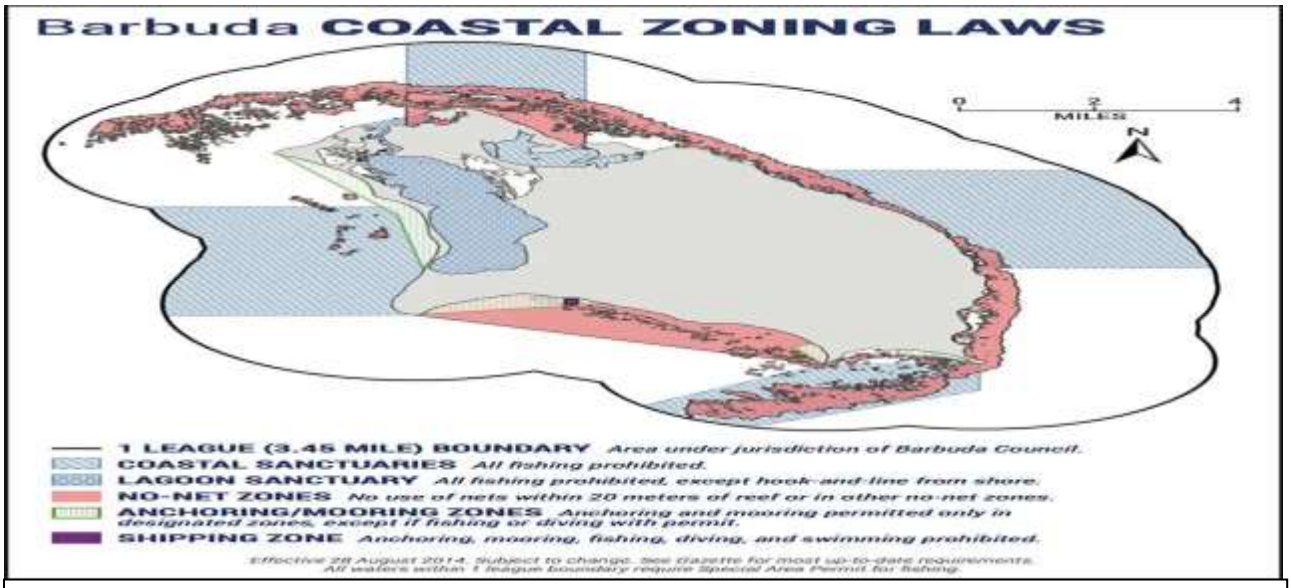


Fig: 56 Barbuda Coastal Zoning Laws Source: Department of Environment of GOAB

As the population increases, environmental sustainability is a key component to attaining a higher standard of living and access to resources of the general populace. Constant improvements in the level of basic service provision e.g. water, is required as indicated in Goal seven (7) of the country's MDGs. In Antigua and Barbuda, the number of homes with access to water improved from 67.5% in 1991 to 79.2% in 2001[148].

Government also recognizes the need for targeted programmes to assist vulnerable groups and continues to support Active Labour Market Programmes (ALMP)' such as employment programmes and services to increase income and employability of the low-income unemployed population affected by economic crisis, natural hazards and climate change.

Fragmentation of SIDS through socio-political forces is a great challenge within the region. The bi-polarization of national communities is an impediment to garnering support for the sustainable development process as noted in a National Vulnerability study:

> The existing social networks and social cohesion are critical to coping with adversity and change. Social networks are important to ensuring resilience to climate change that is derived from dependence upon and reciprocity with small social groups of people (Mendis et al., 2003). (CARIBSAVE-b: 2012)

[148] (GoAB, Finance: 2009)

6. DISASTER RISK ANALYSIS

The concepts of 'hazard' and of 'vulnerability' have been discussed earlier in this document. A hazard is seen as 'a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation' and vulnerability is understood as 'the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard'. Vulnerability was discussed/assessed as arising from various physical, social, economic, and environmental factors.

Risk is a function of the potential loss and/or damage based on the exposure to a hazard and the likelihood of its occurrence and the vulnerability of assets to be adversely affected by this hazard based on their characteristics. This is typically expressed as:

Risk = Hazard x Vulnerability

Disaster risk is 'the potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period. The definition of disaster risk reflects the concept of disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socio-economic development, disaster risks can be assessed and mapped, in broad terms at least. (UNISDR)

Disaster risk can be reduced if strategies and mechanisms are developed to mitigate hazards and reduce vulnerabilities. Disasters themselves are manifestations of unmanaged risks[149] and can be understood as 'a social-environmental manifestation of socially constructed risk'. First order effects describe potential damage to physical infrastructure and the environment, while secondary effects consider the potential socio-ecological and economic impact on communities and organisations (Cardona, 2014)

Risk reduction focuses on anticipatory planning to minimise the likelihood of hazards and/or their interaction with the environment and society, thus aiming to lower hazard exposure and reduce vulnerability to them across the society and economy. Hence, this must be applied in policy formulation and development planning, in addition to the post-impact recovery and reconstruction phase[150].

[149] Maskrey A – GTZ Consultant: Disaster Early Warning Systems in Antigua and Barbuda: An Assessment of Disaster Early Warning Systems in Antigua and Barbuda and An Action Plan for Enhancing Capabilities; September 1997

[150] Barbados Country Document for Disaster Reduction 2014

6.1 Analytical criteria and methodology

The IDB has developed a System of Indicators to measure disaster risk and risk management[151], designed to evaluate the variables related to the potential impact of extreme events and the capacity of society to withstand such. This System of Indicators is intended to:

- Improve the use and presentation of information on risk with identification of its essential social and economic characteristics, thus assisting policymakers in formulating adequate DRM policies and actions, identifying investment priorities to reduce risk and guide the recovery process
- Measure key elements of vulnerability, identify national capacities and provide data to evaluate the effects of policies and investments on risk management
- Promote the exchange of technical information for public policy formulation and risk management programmes

The System comprises four (4) indices[152]:

- The Disaster Deficit Index (DDI) shows potential economic losses countries can face and their governments' financial capacity to address such costs. It measures the state's capacity to pay in order to recover from the economic losses if a catastrophic event – the type that can occur once every 50, 100 or 500 years – were to happen today/2016. A DDI greater than 1.0 indicates economic losses would exceed the state's financial capacities (the greater the DDI, the greater the financial gap).

  No assessments have been don for Antigua and Barbuda but in 2008 studies, countries like Honduras, Barbados, Nicaragua, El Salvador, Dominican Republic, Peru, Panama and Guatemala all had DDI greater than 1.0. The estimated damage to Antigua and Barbuda in 1999 from of Hurricane Jose/TS Lenny was estimated at US$76.85millions. Hurricane Jose can be considered a 1-50year event and Lenny was a tropical storm. Without any indication of major economic growth positive changes in social characteristics, it is safe to assume that the index for Antigua and Barbuda is greater than 1.0 also.

- Local Disaster Index (LDI) attempts to capture social and environmental risk that result from recurrent small-scale events (extensive risk) that chronically affect sub-national and local levels, especially low income groups.

  The reality that small islands like Antigua and Barbuda exist as a near homogeneous

[151] Measuring Disaster Risk: Economic losses caused by natural disasters in Latin America and the Caribbean 1900-2009 (US$ million): www.iadb.org/exr/disaster/idea_ddi.pdf

[152] These represent a summary of the main indicators, however each indicator is based on a family of sub-indicators, more thoroughly explained in IDB, 2010a

geographic entity lessens the importance of this index in this analysis although flooding in particular tends to take place in a number of identified areas where low income groups reside. [See…]

- The Prevalent Vulnerability Index (PVI) gauges the fragility and exposure of human and economic activity in disaster-prone areas and the social and human capacity to absorb the impacts of disasters. The three composite indicators that make up this index consider factors such as demographic growth, population density, poverty and unemployment levels, soil degradation caused by human action, gender balance, social expenditures and insurance of infrastructure and housing.

  No assessments have been done for Antigua and Barbuda but in 2008 studies, 3 CARICOM countries (Jamaica, Trinidad and Belize) and the Dominican Republic showed a high prevalent vulnerability index. The fragility and exposure of human and economic activity in Antigua and Barbuda suggests that this index is high also.

- Risk Management Index (RMI) measures a country's risk management performance. It combines several measures to evaluate the capacity to identify and reduce risks, respond and recover from catastrophes as well as to provide financial protection and risk transfer. An index below 50 is considered unsatisfactory.

  CARICOM countries Barbados, Jamaica and oil-rich Trinidad and Tobago all had indices below fifty (50).

Task Team on Preparedness and Resilience of the Inter-Agency Standing Committee (IASC)

The IASC[153] in promoting Emergency Response Preparedness (ERP) and seeking to optimise the speed and volume of critical assistance delivered immediately after the onset of a humanitarian emergency defined risk as 'impact x likelihood' and developed both impact and likelihood scales for hazards. See Table 46.

The methodology suggests that scores of 1-7 indicate low risk, 8-14 – medium and 15-25 – high. For example a moderately likely event (3) of moderate impact (3) produces a risk score of nine (9) and would be considered of moderate risk. A likely event (4) that potentially has severe impact (4) would indicate high risk (4x4=16).

[153] Emergency Response Preparedness (ERP): Risk Analysis And Monitoring Minimum Preparedness, Advanced Preparedness and Contingency Planning; prepared by the Task Team on Preparedness and Resilience of the Inter-Agency Standing Committee (IASC). The Group is composed of representatives from IASC UN agencies, the International Federation of the Red Cross and NGOs. July 2015

Table: 46 **IMPACT AND LIKELIHOOD SCALES**	
IMPACT	**LIKELIHOOD**
Negligible (1) Minor additional humanitarian impact. Government capacity is sufficient to deal with the situation.	**Very unlikely (1)** A remote chance of an event occurring in the current year, from 0-5%. e.g. Seasonal hazards that have happened once or less in the last twenty years.
Minor (2) Minor additional humanitarian impact. Current country level inter-agency resources sufficient to cover needs beyond government capability.	**Unlikely (2)** The event has a low chance of arising in the current year, from 5 to 15%. e.g. Seasonal hazards that have happened one to three times in the last twenty years.
Moderate (3) Moderate additional humanitarian impact. New resources up to 30% of current operations needed to cover needs beyond government capacity. Regional support not required.	**Moderately likely (3)** The event has a viable chance of arising in the current year, from 15-30%. e.g. Seasonal hazards that have happened two or three times in the last ten years, or once or twice in the last five years.
Severe (4) Substantive additional humanitarian impact. New resources up to 50% of current operations needed to cover needs beyond government capacity. Regional support required.	**Likely (4)** The event has a significant chance of arising in the current year, from 30-50%.. e.g. Seasonal hazards that happen every second or third year, e.g. two times in the last five years.
Critical (5) Massive additional humanitarian impact. New resources over 80% of current operations needed to cover needs beyond government capacity. L3-scale emergency	**Very Likely (5)** The event has a positive chance of arising, over 50%. e.g. Seasonal hazards that have happened three or more times in the last five years, or five or more times in the last ten years.

6.2 Definition of risk scenarios

Risk scenarios help in the identification of the potential losses and damages and the particular vulnerable groups and sectors likely to be affected by a particular hazard event. Vulnerable groups and sectors are more likely to take appropriate mitigating action if they have good quality information on the potential losses and damages which may be incurred. Appropriate disaster preparedness strategies can then be prioritised for specific risk scenarios. The development of risk scenario information is equally important to enable the factoring of risk considerations into development and land use planning to avoid an increase in risk levels in the future. (Maskrey 2007)

There are however no clearly defined risk scenarios for Antigua and Barbuda but an alignment of hazard maps with described vulnerabilities will give indication of the changing nature of risk and suggest measures to address them. The scenario should be able to define the hazard parameters, the affected population (location and numbers), vulnerable assets and infrastructure, and expected impacts.

6.2.1 Prioritisation of risk scenarios and areas for intervention

For the purposes of this document, the prioritization of risk scenarios and the identification of areas of intervention are based on the prioritization of hazards, the assessment of their frequency

and intensity, and the likelihood of their future occurrence. Hazard analysis[154] has been done on Antigua and Barbuda through the USAID/OAS Post-Georges Disaster Mitigation Project (PGDM) There has also been some level of vulnerability analysis to estimate the impact of these hazards on the population, economy, property and biophysical resources.

Hazard analysis was informed by historical impacts and stakeholder experience. The most frequently occurring and important hazards identified by stakeholders were tropical cyclones, drought, storm surge and floods. Hazards were then ranked on a relative ranking scale according to their probability, frequency, area of impact and magnitude. Seismic hazards (i.e. tsunamis and earthquakes) with low frequency but very high impact potential were accorded very low significance although it is recognized that 'the damage and disruption can be extremely devastating to power, communications, transport, productive capacity and social infrastructure across the entire country'[155]. The following Hazard Priority Score (HPS) was generated in the USAID/OAS/PGDM, Table 47.

Table 47 **HAZARD PRIORITY SCORE**	
HAZARD	HAZARD PRIORITY SCORE
Wind/Hurricane	6
Drought	5
Storm Surge	4
Floods	3
Coastal and Stream Erosion	2
Earthquake	1

On this basis, the risk scenario for hurricane/wind and accompanying storm surge has been assigned the highest priority. The logical structure of the scenario and examples of the information it should contain are shown in Table 48 below.[156]

Table 48	**EXAMPLE OF RISK SCENARIO: Hurricane, Wind, Storm Surge**			
MAP OF AFFECTED AREAS POTENTIAL AFFECTED POPULATION			**Additional relevant information e.g. socio-cultural**	
Impacts: TOURISM e.g. hotel closures, marinas, employment, Govt. tax revenue etc	Impacts: ENVIRONMENT e.g. coastal erosion, habitats, seawater intrusion etc	Impacts: HOUSING / INFRASTRUCTURE e.g. Roof loss, roads/bridges	Impacts: HEALTH e.g. Health services, Sanitation	Impacts: UTILITIES e.g. Electricity, Water, Communications

The hazard maps for winds and storm surges, showing geographical information and locations of potential affected communities/populations are shown for Antigua in Figures 55-64. The maps and text interpretations in this section of the document were taken from the report 'Hazard and Vulnerability Assessment for Antigua and Barbuda' produced by Eva Hodgkinson-Chin for the Post-

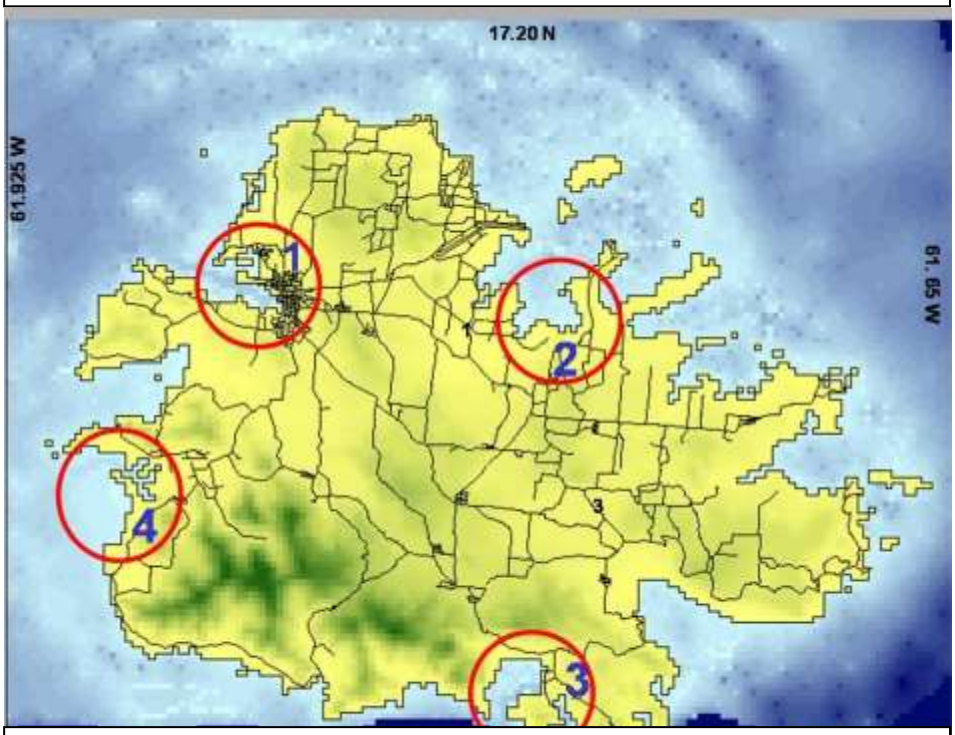
[154] Government of Antigua and Barbuda: Natural Hazard Mitigation Policy and Plan for Antigua and Barbuda July 2001. This document was prepared as part of the USAID/OAS Post-Georges Disaster Mitigation Project (PGDM).

[155] Barbados Country Document for Disaster Reduction 2014

[156] Adapted from Barbados Country Document for Disaster Reduction 2014

Georges Disaster Mitigation Project· and the Natural Hazard Mitigation Policy and Plan for Antigua and Barbuda July 2001[157].

Figure 57 ANTIGUA TOPOGRAPHY



POINTS OF INTEREST

1. **ST. JOHN'S:** Main town, with the harbor at the end of a deep inlet. Includes commercial, recreational, and fishing facilities
2. **PARHAM:** Town and harbor at the end of a broad, shallow bay. Important Desalination & Power Plants at Crabbes Peninsula two (2) km. northeast of the town. Flood plain west of town
3. **ENGLISH AND FALMOUTH HARBOURS:** International yachting centres
4. **JOLLY HARBOUR:** Major resort complex with hotel on beach and yacht harbor dredged from natural lagoon

[157] Government of Antigua and Barbuda: Natural Hazard Mitigation Policy and Plan for Antigua and Barbuda July 2001. PGDM

FIG: 58 Antigua Wind/Hurricane Vulnerability by Return Periods 10, 25, 50 & 100 years

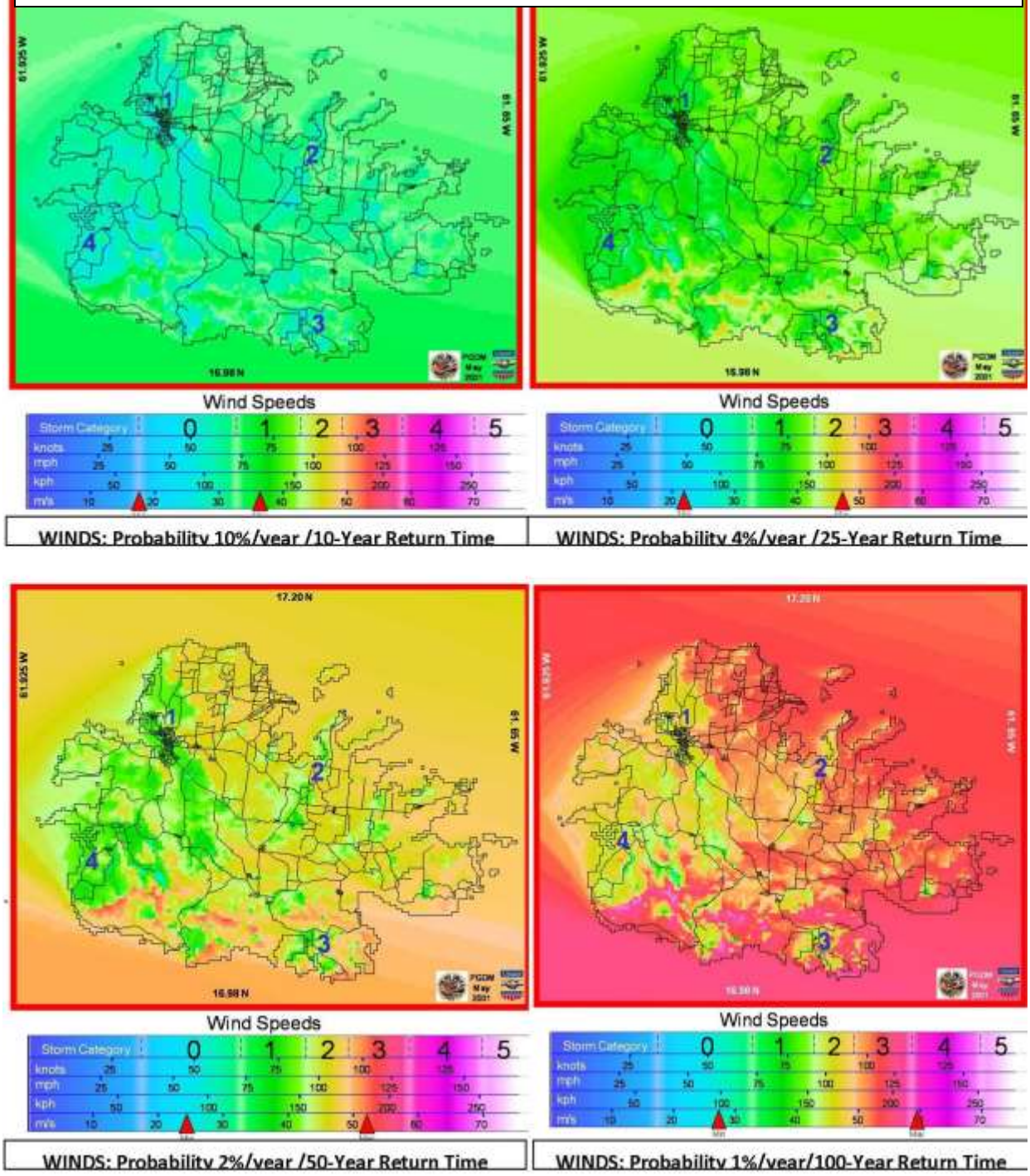


Figure 57 shows a topography map of Antigua identifying the main points of interest – the main town and important harbours. Fig. 58 above indicates the vulnerability of Antigua to winds by the return periods of 10 years, 25 years, 50 years and 100 years (PGDM).

- The 10-year return period subjects the entire island to low vulnerability. Minimal damage would be expected from tropical storm and hurricane category 2 wind strength.

- The 25-year return period would generate low vulnerability for most of the island with some sections of the southern range experiencing moderate vulnerability. This would create hurricane category 2 winds and moderate damage.
- For the 50-year return period most of Antigua would be of moderate vulnerability. The western coast would have a low vulnerability with sections of the southern coast subjected to high vulnerability. Category 3 and 4 winds would be expected with extensive and extreme damage.
- The 100-year storm would place most of the island within the high vulnerability zone. The western third of the island and pockets in the central and eastern districts would have a medium vulnerability. Category 4 winds with extreme damage would be expected.

The long-term vulnerability is similar to the 50-year storm. The central and eastern districts of the island are within the moderate vulnerability zone. The western section of the island is low and some sections of the southern range are within a high vulnerability zone'.

Figure 59 below shows the vulnerability of Antigua to surges by the return periods of 10 years, 25 years, 50 years and 100 years (PGDM).

FIG: 59 ANTIGUA Surge Vulnerability by Return Periods 10, 25, 50 & 100 years

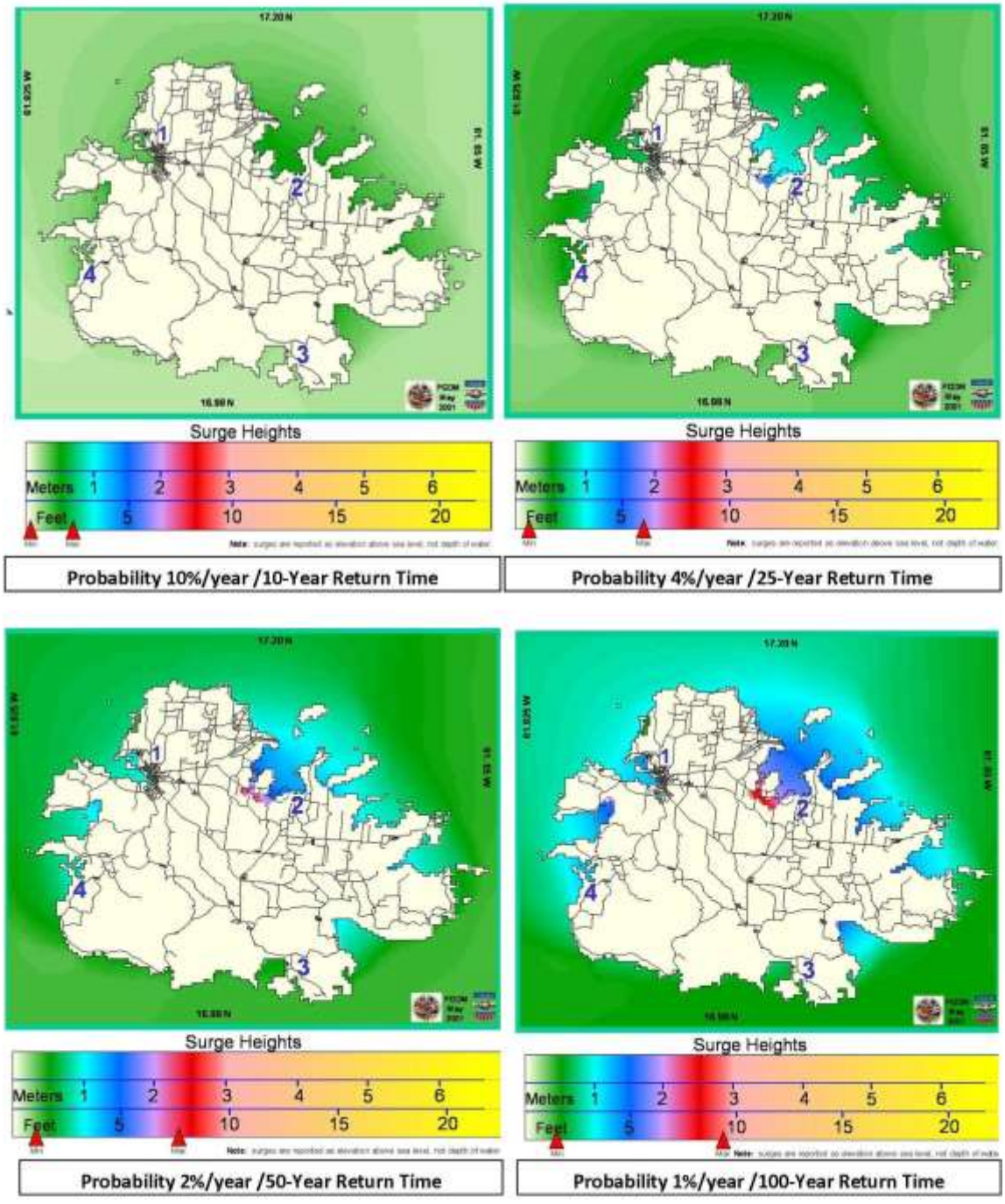


Figure 59 shows that for:

- the 10-year period the entire coast with the exception Area 2 – (Fitches Creek / Parham

Harbour) would experience low storm surge vulnerability. It would be similar to that experienced in a tropical storm with some damage and surge to the heights of 0.1 to 0.5 meters. Area 2 would experience medium storm surge vulnerability with surge varying between 0.5 and 1.5 meters (minimal damage.)

- The 25-year return period would place most of the coast within a moderate vulnerability storm surge zone and the southwestern section of Area 2 would be subjected to high vulnerability. Intrusions of moderate storm surge would be expected in the Area 4 (Hanson's Bay and Jolly Harbour). The sea would surge in Area 2/Parham Harbour to three (3) meters and cause extensive damage.
- The 50-year return period increases the area of intrusion around Area 2 and Area 4 moderately vulnerable to storm surge..
- The 100-year return period increases the vulnerability of the Area 4 to high and results in high storm surge throughout Area 2/Parham Harbour.

In summary, the long term vulnerability of Antigua to storm surge and indicates all bays along the coast would be subjected to moderate storm surge with the exception of those on the southwest that would have low vulnerability. Area 4/(The Hanson Bay and Jolly Harbour) are moderately vulnerable to storm surge. Area 2/Parham Harbour has a high vulnerability as shown in Figure 60 below:

Figure 60 **ANTIGUA – LONG TERM VULNERABILITY STORM SURGE TOPOGRAPHY**

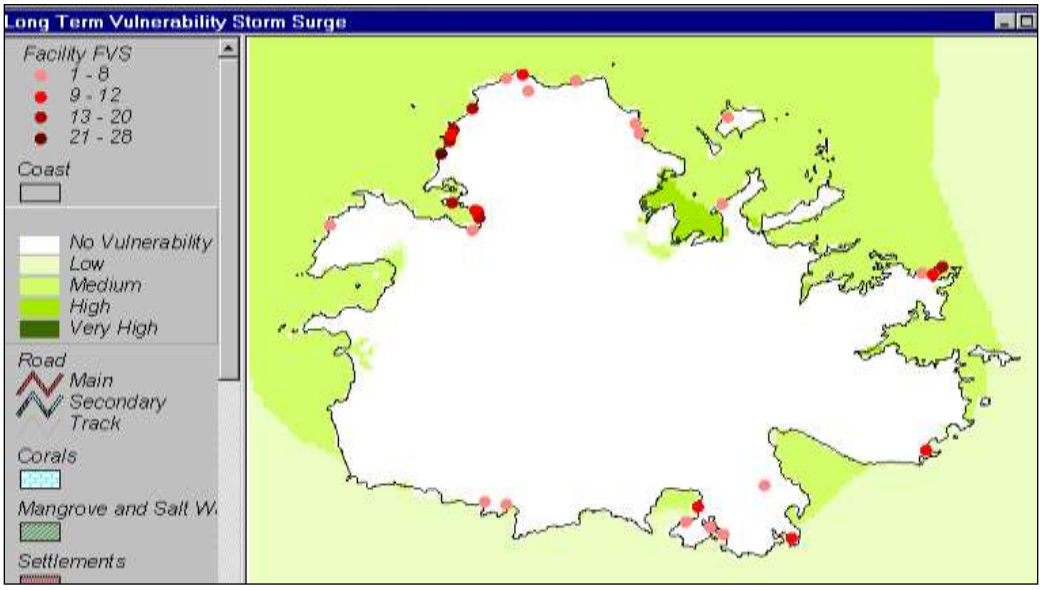
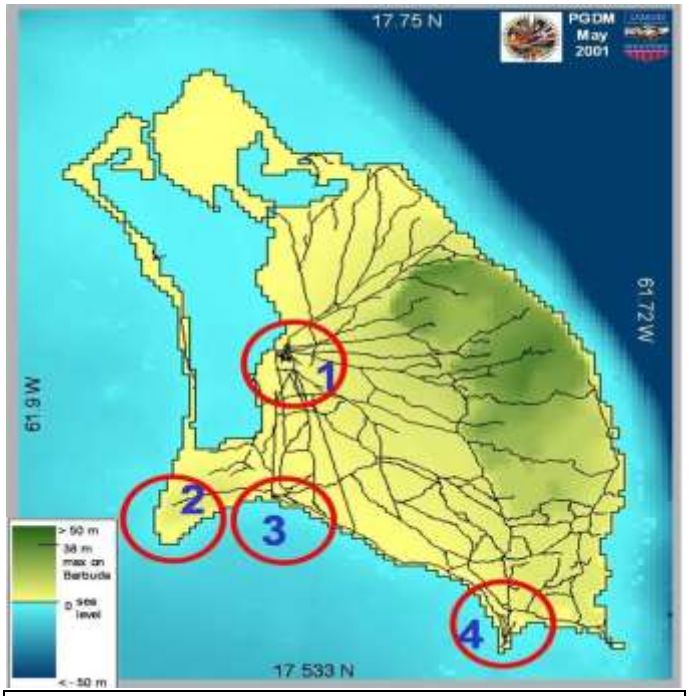


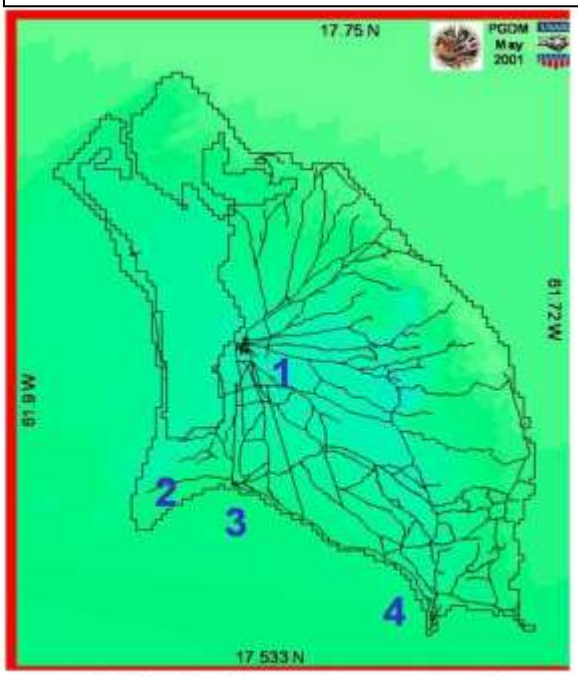
Figure 61 BARBUDA TOPOGRAPHY



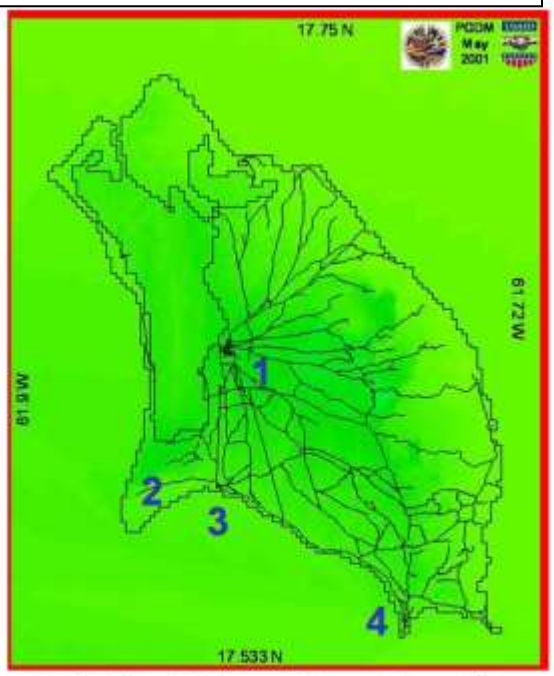
POINTS OF INTEREST

1**. CODRINGTON**: Main town, on a lagoon, with airstrip to the south
2. **PALMETTO POINT**: Sandy peninsula with hotel, subject to erosion
3. **MARTELLO TOWER**: Dock for sand quarry, serving as the main harbor for the island
4. **COCO POINT:** Resort with private airstrip. Offshore are numerous reefs

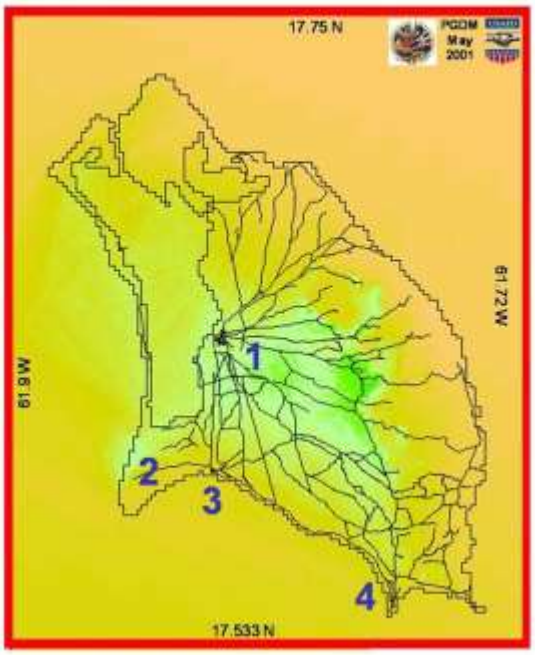
FIG: 62 BARBUDA Wind/Hurricane Vulnerability by Return Periods 10, 25, 50 & 100 years



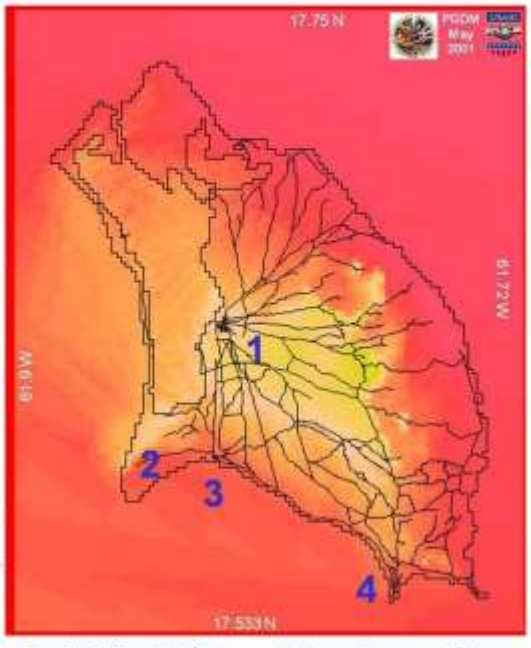
Probability 10%/year—10 year Return Time



Probability 10%/year—10 year Return Time



Probability 2%/year—50 year Return Time



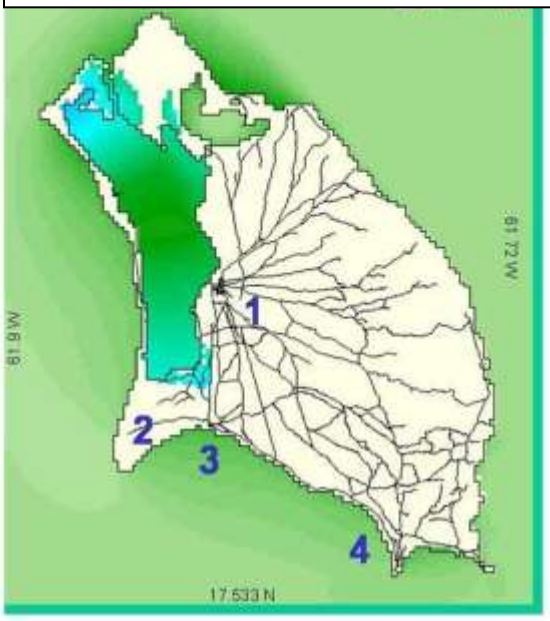
Probability 1%/year—100year Return Time

Figure 61 shows a topography map of Barbuda indicating main points of interest – the main town, peninsula, dock and resort. Fig 62 indicates the expected vulnerability to winds of Barbuda for various return periods:

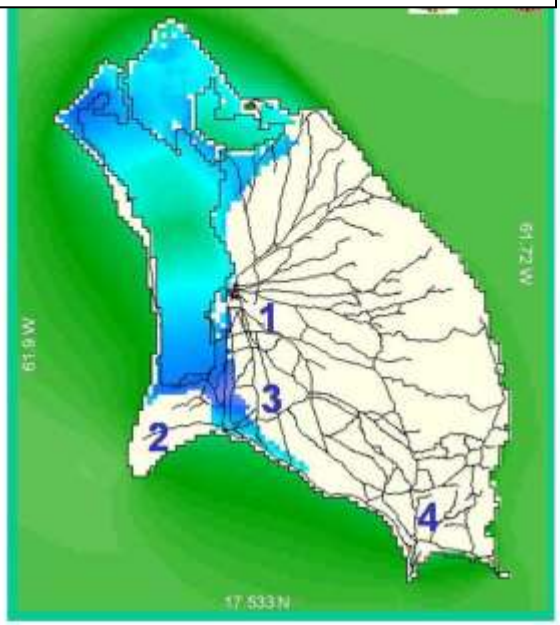
- The 10-year and 25-year storms are predicted to place Barbuda in an area of low vulnerability with winds between 17 and 43 meters/second.
- The 50-year storm will subject most of the island to moderate vulnerability with an area south of Codrington in a low vulnerability zone. Moderate winds are between 43 and 50 meters / second and would be categorized as a category 2 hurricane.
- The 100-year storm would place most of Barbuda into a zone of high vulnerability to winds which would be of category 3 hurricane force and extensive damage could be expected'.

The long-term vulnerability of Barbuda is similar to the 50-year return storm with a small section on western Area 2/Palmetto Point experiencing low vulnerability to wind.

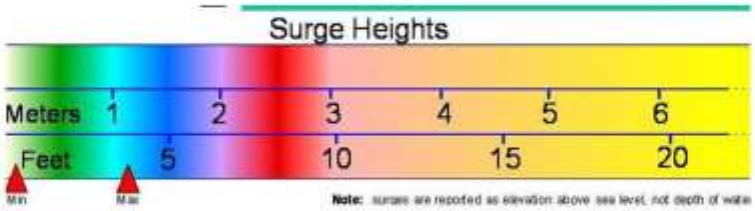
FIG: 63 BARBUDA SURGES Vulnerability by Return Periods 10, 25, 50 & 100 years

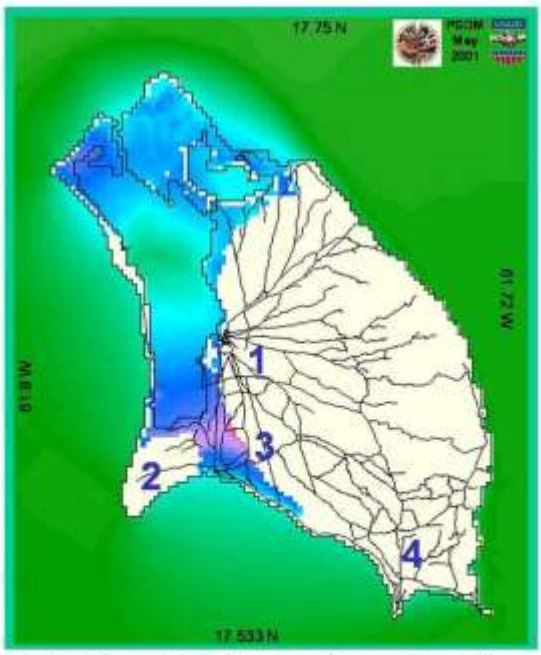


Probability SURGES 10%/year—10 year Return Time

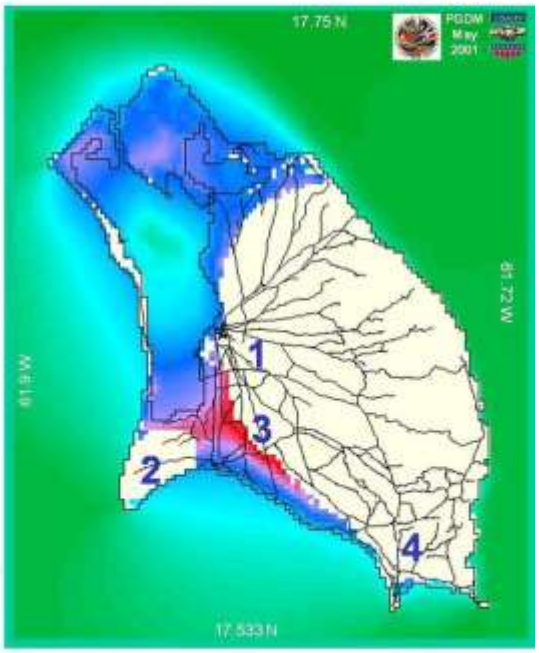


Probability SURGES 4%/year—25 year Return Time





Probability SURGES 2%/year—50 year Return Time



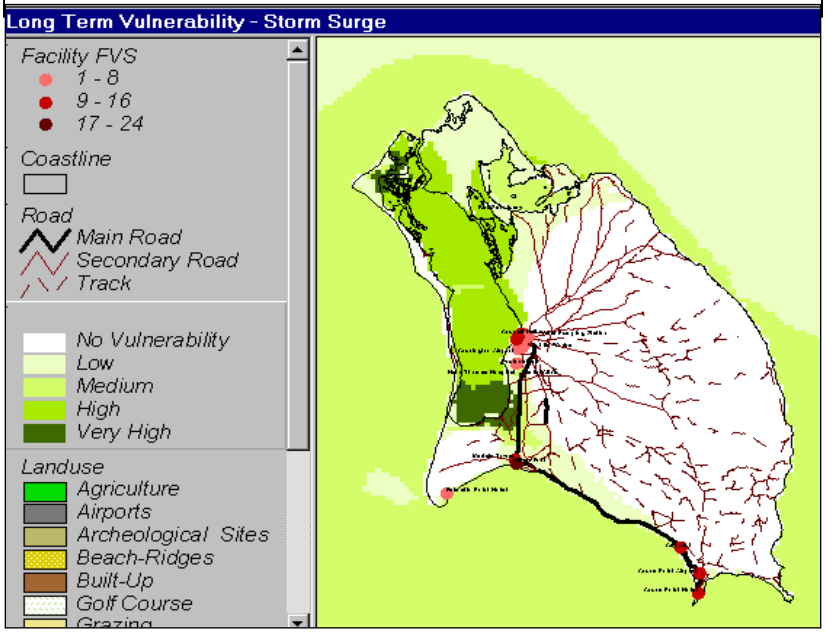
Probability SURGES 1%/year—100 year Return Time

Figure 63 indicates the expected long-term vulnerability of Barbuda to Storm Surge:

- The entire coastline has a moderate vulnerability to storm surge. There is low vulnerability to an inland intrusion along the south coast.
- The northeast of the island has a low vulnerability.
- There is moderate vulnerability in that area which extends southwards from the lagoon across the peninsula.
- The entire lagoon including the mouth has a high vulnerability with surge building in the south of the lagoon in excess of 3.0 meters.

When these hazard maps are overlaid on maps showing the location of population centres and critical facilities it is revealed that: 'The Bird Sanctuary, lagoon, sea ports and approximately half of the town of Codrington can be expected to be affected by storm surge in the long term. Most of the inland areas affected by storm surge are areas of mixed grazing/woodlands'. See Figure 64 below:

FIG: 64 BARBUDA Long term Vulnerability STORM SURGES



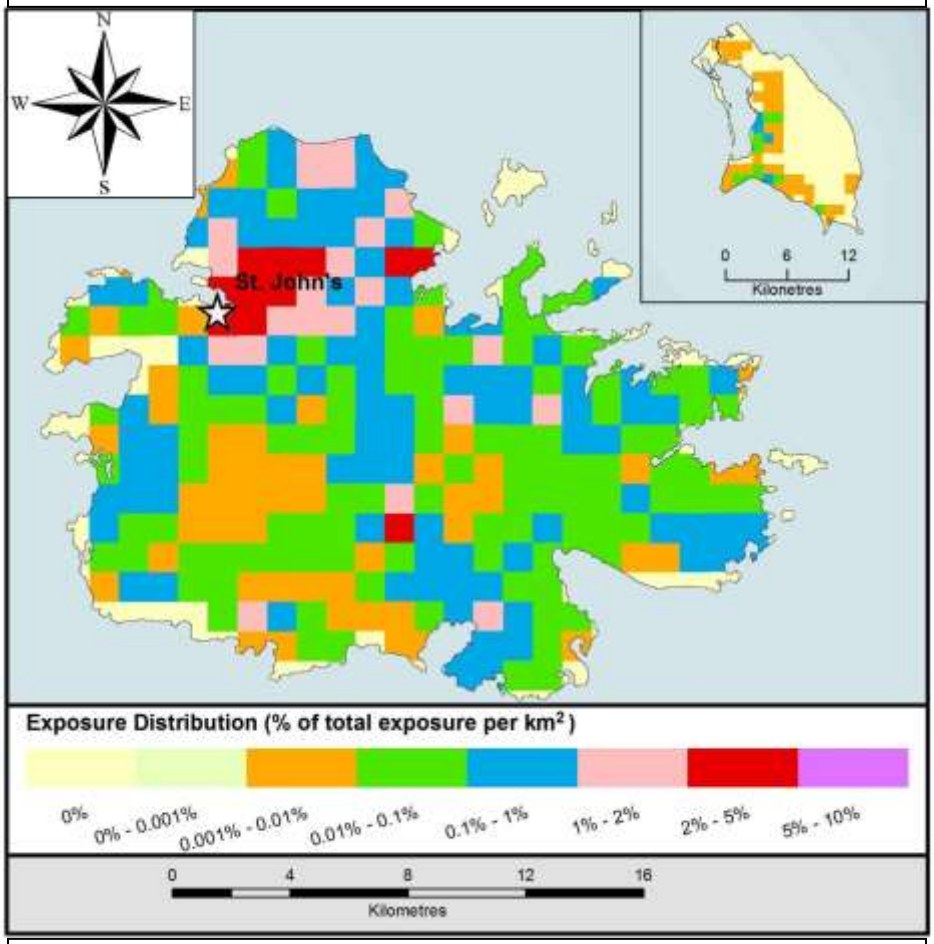
6.3 Country Risk Profile

The Caribbean Catastrophe Risk Insurance Facility (CCRIF) has generated a country risk profile for Antigua and Barbuda through a generic modeling framework[158] that takes into account: hazard assessment, damage and vulnerability modeling, loss estimation and portfolio loss calculations.

[158] The Multi-Peril Risk Evaluation System (MPRES) catastrophe modeling platform. It was developed and is supported by Kinetic Analysis Corporation (KAC), a bespoke risk modeling company

Using remote sensing data and economic and demographic statistics[159] (2011/2012), the Kinetic Analysis Corporation (KAC) generated a database with the spatially distributed density and value of physical assets at risk in Antigua and Barbuda. The exposure databases were designed specifically 'to provide acceptable estimates for losses from hydro-meteorological and geophysical hazards suffered by physical assets in the country'. The variations in the databases as shown below in Figure 65 represent the 'exposed value' – that is, the amount of value at risk of total loss[160].

FIG: 65 ANTIGUA AND BARBUDA EXPOSURE DISTRIBUTION (% of total



Source: CCRIF 2013

The exposure map was used in the CCRIF MPRES model to produce tropical cyclone (excluding rain) and earthquake national risk profiles [in the form of loss exceedance curves] where the 'risk profile' presents losses for the country at difference probabilities of occurrence – more precisely referred to as 'probabilities of exceedance'[161].

[159] Population, GPD, Economic composition of the economy – Agric/2.1%, Industrial/19.6% & Services/78.3%.
[160] CCRIF Antigua and Barbuda Country Risk Profile 2013
[161] Ibid

The national risk profiles [exceedance curves] for tropical cyclone [and earthquake] are shown in Figure 66 below. The loss exceedance curve (LEC) describes the probability that a certain level of loss will be exceeded in any given year.

FIG: 66 ANTIGUA Loss Exceedance Curve (Tropical Cyclone and Earthquake) 2013: *Source: CCRIF 2013*

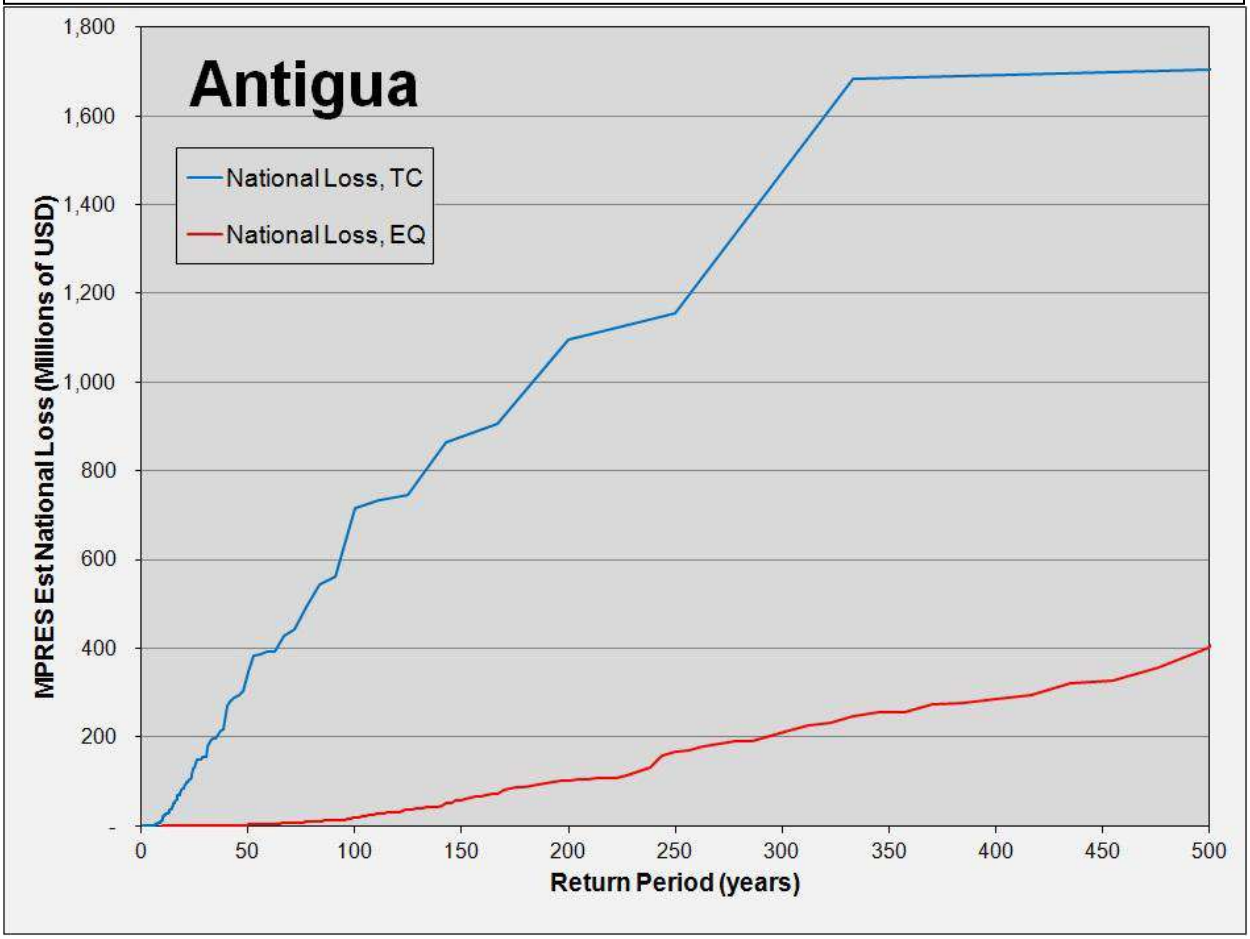


Table 49 below tabulated the key statistics drawn from the loss exceedance curve where the average annualized loss [AAL] represents the loss that is expected each year when averaged over the full synthetic catalogue period. The losses at given return periods are a numerical description of the shape of the risk profile and represent the amount of loss expected at each return period.

Table 49 Summary of Tropical Cyclone and Earthquake Losses

Return Period (yrs)	TC National Loss (USD)	EQ National Loss (USD)
20	86,360,300	275
50	348,322,600	2,232,460
100	717,261,000	18,585,500
250	1,155,480,000	168,013,000
500	1,704,490,000	402,142,698
750	1,784,250,000	680,206,000
1,000	1,784,250,000	977,272,000
AAL	23,321,896	40,870,153
Standard Deviation of AAL	130,988,874	338,781,34

'Antigua's economy is dominated by tourism, and that sector is particularly vulnerable to hurricane impacts. Although a building code has been adopted in the country and engineered structures are built to resist earthquake shaking and high winds, the general level of building resilience to both earthquakes and hurricane hazards is modest which, given the high hazard levels, leads to high risk. Limited enforcement of development planning protocols and growing reliance on a single economic 'engine' both tend to increase catastrophe risk from the national perspective'[162]. The assessment of risk should transition into decisions on how the risk will be managed and in this case transition to risk transfer as the expected losses and return periods increase.

[162] Ibid

7. STRATEGIC DIRECTIONS FOR DISASTER RISK REDUCTION IN THE COUNTRY

NODS, in consultation with a wide range of stakeholders[163] completed the instrument 'Criteria Identifying Reduction (DRR) Planning in Latin America and the Caribbean[164] that established the strategic directions considered critical to reduce disaster risk in the country.

Most stakeholders had not worked with a 'stoplight tool' before and found difficulty with the language and/or the grouping of a series of ideas within a single question. Discussion at the group consultation was limited among those with disaster management technical knowledge who contributed most to the NODS approved version shown in Table 50 below. The tool helped to focus discussion and thinking on DRR matters within the identified specific strategic platforms A-E.

TABLE 50 CRITERIA IDENTIFYING REDUCTION (DRR) PLANNING IN LATIN AMERICA AND THE CARIBBEAN

A. APPARENT AND IMMEDIATELY RECOGNIZABLE SIGNS OF HAZARD AND EXPOSURE		**COMMENTS**
1. In the selected geographical areas, where there is a potential for destructive impact and/or a record of impacts, what are conditions that best describe the hazard and their monitoring?	• There are areas with recurring events, and there are records of previous impacts that have caused damages and losses.	Selected areas are districts of hazard 'Hotspots'
	• There is a mapping of hazards and multi-hazards (and/or danger) or forecasts based on probabilistic criteria, but this information is outdated. An expert assessment is required to determine current conditions.	
2. In the territorial areas selected, are there geo-referenced and territorially disaggregated records of frequent impacts of hazards related to seasonal events (droughts, floods or landslides)?	Existing information but without territorially disaggregated information on the impact of disasters. The existence of this type of information is essential to improve the quality of decision-making.	Need in depth analysis of drought on numerous sectors (Agri, Health, Tour). Analysis of non-traditional 'Heat wave' hazard to be done
3. In selected territorial areas, are there studies and action plans on multi-hazard or transborder hazard conditions, including extreme climate variability events such as the impacts of climate change?	Historical information and hazard studies show the existence of multi-hazard zones or areas, but integrated scenarios and studies are not conducted for multihazard, trans-border hazards and/or impacts of climate change. There are no action plans.	Department of Environment has Climate Change Adaptation related document
B. DRIVERS OF RISKS IN THE COUNTRY AND THEIR CONFIGURATION IN THE TERRITORY		
4. In the selected areas, what are the characteristics of environmental degradation in areas with historical impacts or influenced by hazards?	Environmental degradation presents high indicators of impairment that generate severe impacts and can interact with the hazards, increasing the exposure and vulnerability of the population.	All (slide, desertification, deforestation, flooding, soil cover
5. What is the composition of the population in terms of their socioeconomic conditions and their exposure to hazards in selected area?	The socio economic indicators selected are low for 20% to 50% of exposed populations.	See National Poverty Assessment Report
6. In the selected territorial area, what are the essential conditions and access to services, and which are exposed to hazards?	• The population without access to essential services (***) Is between 20% and 50% of the population in areas exposed to hazards from the selected areas.	Agreed
	• Essential services are vulnerable and exposed to the identified hazards, but actions are being developed for their management.	

[163] Stakeholders Consultation on draft CD October 18/19 2016

[164] Revised version in the framework of the DIPECHO Action Plan 2013 Key Actions for Disaster Risk

	• The percentage of the population without access to improved sanitation infrastructure, to improved water sources and communication channels is equal to or less than the national/regional average	
7. In the selected territorial area, what are the conditions and the implementation of the regulatory framework related to the Risk Management and Environmental Management, especially in those areas exposed to hazards?	There are enabling regulations for Risk Management (safe and orderly use and occupancy of urban and rural territory, protection and management of watersheds, slopes, ecosystems and environment, building and planning codes to reduce risks), but low or emerging implementation. Formal accountability mechanisms by State agencies are not implemented for Risk Management and Environmental Management.	National Physical Development Plan (NPDP). No harmonization of monitoring and evaluation. No local Area Plans developed to support NPDP. No single agency with the resource or capacity to accomplish everything at National level
8. How are the processes of use, occupation and transformation of land in urban areas exposed to hazards in the selected territorial areas?	Moderate occupation of at-risk urban areas (between 5 % and 30 % of the population in the selected area) without planning processes or control with an increasing trend towards (unsafe) squatting in hazard-prone urban and suburban areas. Regulations and monitoring mechanisms are only partially implemented.	Agreed
C. CURRENT CAPACITIES FOR RISK MANAGEMENT		
9. Are there capacities and decentralized structures for emergency and disaster response appropriate for existing hazards in the selected area?	A coordinated and participatory structure operates as part of the national system with deconcentrated and decentralized structures, community and institutional preparedness for emergencies/ disasters is part of the system.	Agreed
10. Mechanisms for coordination of local governments (consortia, associations and commonwealths) based on basins, ecosystems productivity, etc. are in place in the selected area?	There are no coordination mechanisms of local governments in place for DRM and Environmental Management.	Agreed
11. What are the conditions of the resources for preparedness and emergency or disaster response/management of relevant governments in the selected territorial areas? (Processes may be implemented by the central government)	There are legal frameworks in place that enable the allocation or reallocation of resources once a disaster or emergency has occurred; access to resources is not streamlined or administrative processes are ineffective.	Agreed
12. What is the status of early warning and monitoring systems that enable the analysis, monitoring and generation of timely information for decision making and notifying communities about hazard conditions in the selected area?	• There are early warning and hazard monitoring system(s) in place, but they lack a multi-hazard approach and/or they are not linked to the National Early Warning System, if any; • No clear criteria for management and territorial prioritization for proper and timely dissemination of warning or appropriate and timely information.	Multi-hazard warning system required. Protocols and operating procedures required
D. ENABLING REGULATIONS		
13. Are there appropriate legal frameworks for DRM? What is the state of implementation of these national, sub-national or local instruments (laws, regulations, decrees, etc.)?	Regulations and legal instruments exist for DRM, consistent with national and international legal frameworks, but they are not implemented.	Agreed - not fully Implemented
14. What are the characteristics and conditions of inter-agency structures (platforms, management committees, coordination meetings, etc.) for coordination and decision-making in the selected area?	There are inter-agency structures linked to form a coordination and participation system, platform or entities, but its activation, capacity and work are limited and temporary (often activated only in case of emergency)	Process needs to be formalised
15. What are the characteristics of the	There are some sectoral institutions with	Formalised integrated

sectoral capacity (regulation, technical and resources) in the selected area? (Sectoral is understood as the ministries, public companies, institutions, etc.)	internally assigned Risk Management responsibilities and specific planning but limited in terms of DRM as a comprehensive process of territorial development or focused primarily on disasters or emergencies.	approach is required to include sector
16. What are the characteristics of the legal bodies for the decentralization of DRM towards territorial governments?	There are legal bodies that clearly define the responsibilities and powers of territorial authorities, however, they are unknown to the authorities, are not implemented and/or resources are not allocated.	Needs clarity; Disaster legislation defines authority, supported regionally by CDEMA Treaty Agreement
E. TRENDS AND FUTURE PROSPECTS		
17. What is the degree of integration of scenarios about the impacts of climate change in the Risk Management Strategies of the selected area?	There are scenarios about the impacts of climate change, but they are not coordinated or integrated into the risk management strategies.	Climate Change is integrated into existing Risk Management Strategies however national harmonization if all strategies is required
18. What is the status of mechanisms for risk trend analysis, and its relation to similar observatories or similar mechanisms for the analysis of development trends in the selected area?	There are mechanisms for risk trend analysis, but they are not linked to the development analysis and observatories	Agreed. Trend analysis is limited and capacity is required

The strategic directives identified in the 'criteria' analysis are presented in four categories:

F. Apparent and immediately recognizable signs of hazard and exposure

1. Conduct an in-depth hazard analyses with focus on Drought – highlighting its impact in various sectors of the economy e.g. Agriculture, Tourism and Health
2. Conduct a similar analysis on 'Heat wave'.
3. Conduct integrated scenarios and studies of the existing multi-hazard zones/areas

G. Drivers of risks in the country and their configuration in the territory

Agencies generally had fairly good knowledge of the population and the socio-economic status of the communities identified as 'hotspots' and are aware of their physical and health vulnerabilities but should:

- Collaborate with all environmental and disaster management agencies to promote the concept of an apex agency with power to demand accountability from regulatory agencies and support, in particular the DCA, for the implementation of all aspects of the National Physical Development Plan.
- Monitor population access to improved sanitation infrastructure, to improved water sources and communication channels and further empower and support communities to recognize and address root causes of vulnerability
- Collaborate with the management of Essential Services in the communities for the design and implementation of risk reduction strategies on their physical facilities and technological processes.

H. Current capacities for risk management

There is recognition of:

- The multi-level nation system that inter alia, has responsibility for promoting community and institutional preparedness for emergencies and disaster.
- Local government structures are weak or non-existent and therefore cannot contribute to DRM and Environmental management.
- Post-disaster/emergency allocation or reallocation of finances falls legally with the Cabinet and the Ministry of Finance but administrative process for streamlining disbursement are ineffective
- Early warning and hazard monitoring systems are in place but they lack the multi-hazards approach.

Strategies need to be developed and implemented to:

- Ensure the involvement of community groups in the DRM and Environmental Management work of the proposed apex organization
- Establish a National Early Warning System with purpose of developing multi-hazard warning capacities and with a critical responsibility for the proper and timely dissemination of warning or appropriate and timely information

I. Enabling regulations

Recognizing:

- the existence of regulations and legal instruments for DRM but note their non-enforcement
- the existence of inter-agency structures and sectoral institutions assigned DRM responsibilities but note their limited capacity and emergency-only activation and focus
- the existence of sectoral institutions assigned DRM responsibilities but note the focus on disasters/emergencies and absence of a strategic view of DRR

The following strategic directions are recommended:

- In collaboration with other agencies, demonstrate through detailed risk assessments the potential costs of inaction and lack of enforcement of existing laws and regulations.
- Build capacity – knowledge, skills and resources – in inter-agency structures and sectoral institutions with assigned DRM/DRR responsibilities.

J. Trends and future prospects

Acknowledged the existence of scenarios about the impact of climate change and limited mechanisms for risk trend analysis but note the lack of their integration into risk management strategies and the analysis of development trends, and directs:

- Improve capacities for development trend analysis
- Promote the establishment of the apex organization with power to lead the national harmonization of DRR strategies.

_____

8. RECOMMENDATIONS

Recommendations are made here to a Government and people that have become steeped in the art of disaster preparedness but less so in disaster mitigation and adaptation. There is not much thought in the wide population about hazards beyond hurricanes. Floods and fires are sometimes seen as spectacle or media events.

The recommendations are made in a national organizational climate where although their importance is recognized by all, collaborative efforts on many fronts are challenged. Our professionals and technicians operate in organizations where resources are limited, policy is made but not enforced and the demands of the public are at times unmindful of real practical possibilities in small islands states like Antigua and Barbuda.

The transition from a disaster preparedness culture to one of disaster risk reduction is not only a call to review the thinking of leaders and people but also one that challenges the very nature of 'how we do business', how our societies are organized and governed. Recommendations address the issues of organization and project/programme design and implementation.

Recommendation 1.

Review and re-engineer the organizational structure and processes of the 'disaster management hierarchy/establishment' with the aim of mainstreaming disaster risk reduction into development planning from the national to community level.

This recommendation:

- recognizes existing established committees designed to promote inter-sectoral cooperation but urges a strategic evaluation of their impact and efficacy and identification of their core common functions as a basis for promoting cooperation.
- seeks to harmonize and make more efficient the national approach to the prevention, mitigation, preparedness, response, recovery and rehabilitation regarding disaster risk through collaboration and partnerships of all major stakeholders, including community representation.
- Initiates a review of the existing legislative process and the institutional framework – particularly addressing the existing lax approach to enforcement of planning, for implementing measures.
- proposes the critical task of developing an organizational structure that will identify the necessary processes to understand and act on reducing exposure, its impact and vulnerability to disasters. It will focus the important work being delivered in agencies like NODS, the Environmental Division, the various Ministries, NGOs/CBOs etc. into a holistic approach to climate change and channel all disaster management efforts into social and

environmental protection, physical planning and ultimately disaster risk reduction for the protection of human life.

- calls for centralized handling of data capture and dissemination of information, policy alignment and shared implementation of jointly created projects and programmes, and
- strongly asserts that the Government of Antigua and Barbuda must allocate dedicated 'new' financial and other resources to enable this critical plan

Recommendation 2

Intensify capacity building to improve the technical ability of local expertise in planning and implementing sustainable risk reduction programmes through training, the development of/introduction to appropriate tools and techniques, and exposure to regional and international policies and programmes.

- The development of skills in hazard/risk assessment, communication, data and technology management, and the integration of disaster and climate risk considerations should be prioritized.

Recommendation 3

The professional design and implementation of an advocacy programme that directs the national consciousness towards disaster risk reduction while maintaining the importance of preparedness and mitigation.

- The programme must include a public education and awareness element, target community groups/NGOs and place emphasis on formal delivery of information in the schools/education sector. It must also, importantly include specially designed programmes for leaders in politics, government and religion.
- The content of the programme is aimed at raising awareness of the impacts of environmental change and degradation of ecosystem on disaster risk

Recommendation 4

Promote meaningful community level organizations and engage their leadership in the decision making and implementation agendas of the new strategic network.

Recommendation 5

Review decision making processes at all levels to promote the understanding of risk ensuring that information generated in respect to hazards/threats and vulnerabilities are integrated into programming and project decisions.

- This approach requires full incorporation of disaster risk analysis and assessments, and their implications for disaster risk reduction, as expressed in various scenarios.

Recommendation 6

Government must demonstrate its commitment to disaster risk reduction through investing in and

maintaining critical infrastructure and public property.

- Two sectoral areas are identified for investment in critical infrastructure – a) flood mitigation and b) water storage.
- Critical public assets include heath and education facilities, air and sea ports, and Government offices

Recommendation 7

Government must design and implement financial and economic tools to promote risk reduction at the household and community and national levels and provide a safety net in case of disasters.

- Poverty reduction programmes in the 'hotspot' areas hold the highest priority in this strategy. The introduction of incentives to promote risk transfer options is an important element.
- Government and Government agencies must encourage and support community based cultural programmes and practices that promote environmental protection generally and flood mitigation and storm protection specifically
- A tax or other fiscal mechanism to ensure the sustainable financing of the proposed apex organization

Recommendation 8

Ensure effective hazard and disaster response through early warning systems and improvement in emergency management capacities

- The response is shaped by the understanding of the cross sectoral nature and integration of vulnerabilities within human settlements. For example, the delay in responding to a flooding hazard or disaster has potential to exacerbate vulnerability levels to social/community affairs, health (water borne diseases), water resources, agriculture and other economic livelihoods.

ANNEXES

APPENDIX 1

PURPOSE AND BACKGROUND OF THE CONSULTANCYOF THE CONSULTANCY

The consultant will coordinate the preparation of the development of the Disaster Risk Reduction Country Document within a timeframe of 6 month in which the consultant will work 60 days. The country document will be developed in a consultative process. The detailed methodology will be defined between the national consultant and the National Office of Disaster Services (NODS). UNISDR will provide technical support.

In the Caribbean, 11 countries have prepared country documents under the leadership of the respective National Disaster Management Agency. The DRR country documents are expected to become a national reference for policy design and decision making for interventions for DRR as well as to provide support in the planning and coordination of activities with cooperation entities.

The preparation of the Antigua and Barbuda Country Document will be guided by the 'Common Format for the Country Profile Document' and will consider the application of the "Set of Criteria for the Prioritization of DRR at national Level" which will support the identification of DRR focus areas at national, sub-national and local levels.

Created in December 1999, the United Nations Office for Disaster Risk Reduction and secretariat of the International Strategy for Disaster Reduction (UNISDR) is the designated focal point in the United Nations system for the coordination of disaster reduction and to ensure synergies among the disaster reduction activities of the United Nations and regional organizations and activities in socio-economic and humanitarian fields. Led by the United Nations Special Representative of the Secretary-General for Disaster Risk Reduction, UNISDR has around 100 staff located in its HQ in Geneva, Switzerland, and 5 regional offices and other field presences. Specifically, UNISDR coordinates international efforts in disaster risk reduction, and guides, monitors and reports on the progress of the implementation of the Hyogo Framework for Action as well as the in 2015 adopted Sendai Framework for Disaster Risk Reduction; campaigns to create global awareness of disaster risk reduction benefits and empower people to reduce their vulnerability to hazards; advocates for greater investments in disaster risk reduction to protect people's lives and assets, and for increased and informed participation of men and women in reducing disaster risk; and informs and connects people by providing practical services and tools such as Prevention Web, publications on good practices, and by leading the preparation of the Global Assessment Report on Disaster Risk Reduction and the organisation of the Global Platform for Disaster Risk Reduction.

ECHO: Humanitarian Aid and Civil Protection department of the European Commission
The Humanitarian Aid and Civil Protection department (ECHO) was created in 1992 as an expression of the European solidarity with people in need all around the world. In 2004 it became the Directorate-General for Humanitarian Aid before integrating Civil Protection in 2010 for a better coordination and disaster response inside and outside Europe.

In 1996, ECHO launched a specific programme, DIPECHO (Disaster Preparedness ECHO) dedicated to disaster preparedness, targeting vulnerable communities living in the main disaster-prone regions of the world.

ECHO's humanitarian mandate prescribes a focus on saving lives, providing relief and thus assisting the most vulnerable groups. ECHO prioritizes 'people-oriented' preparedness measures and, therefore, focuses on supporting strategies and complementing existing strategies that enable local communities and institutions to better prepare for, mitigate and respond adequately to natural hazards by enhancing their capacities to cope and respond. This increases their resilience and reduces their vulnerability.

ECHO's support is a combination of community-based projects and projects at national or regional level that strive to increase resilience in the event of natural hazards. Projects are implemented through a wide range of partners, including local organisations that provide access to the most marginalized and vulnerable people.

DIPECHO Programme

The DIPECHO Programme contributes to the implementation of the Sendai Framework for Action 2015-2030. A key element in the DIPECHO program is the development of key contributions in Disaster Risk Reduction (DRR) so as to identify successful models for replication elsewhere by national/sub-national authorities or other funding instruments of the European Commission, other donors.
The Caribbean region experiences multiple disasters: The region is prone to hurricanes, floods, flash floods, tsunamis, landslides and mudslides. Some islands experience earthquakes and volcanic eruptions. The physical risk is combined with socioeconomic factors, such as high population density, fast demographic growth, inequality and great poverty. The combination of these factors results in highly vulnerable communities, with few coping capacities in the event of disaster. Moreover, climate change is likely to negatively affect disaster trends in the region.

DIPECHO Action Plan for the Caribbean 2015 -2016

The 2015-2016 DIPECHO Action Plan for the Caribbean aims to contribute to the overall goal of resilience building by providing most vulnerable populations and communities with sound technical solutions to improve their preparedness for natural hazards. In this sense, the 2015-2016 Action Plan, looks to further initiatives that contribute to regional cooperation, exchange of information, capacity building and training and advocacy at national and regional level as means to build resilience.

The DIPECHO Programme is explicit in its objective to contribute to the implementation of the Hyogo Framework for Action 2005-2015 (HFA) and its successor the Sendai Framework for Disaster Risk Reduction 2015-2030 in the region. Furthermore, the current DIPECHO Action Plan aims to establish greater collaboration and coordination between partners and to facilitate the exchange of information, allowing programming of common outcomes and the harmonization of practices.

ANNEX 2(a)		
LIST OF ORGANIZATIONS INVITED TO THE CONSULTATIONS		
Wednesday June 22	**Thursday June 23**	**Friday June 24**
Ministry of Foreign Affairs	Chamber of Commerce	Persons Differently Abled Assn
Ministry of Finance	Small Business Association	Youth Reps.
Ministry of Agriculture	Engineering Association	Red Cross
Ministry of Labour	Architect Association	Antigua Christian Council
Ministry of Trade	Contractors Association	Adventist Disaster Relief Agency
Ministry of Tourism	APUA	Evangelical Association
Ministry of Works/Housing	CHAPA	District Disaster Coordinators
Economic Development	DCA	EAG
Legal Affairs	Airport Authority	Antigua Hotels and Tourist Assn
Ministry of Information	Port Authority	Fiennes Institute
Ministry of Education	Mount St John Medical Centre	Clareview Hospital
Fisheries Department	A&B Defence Force	Antigua Labour Party
Lands Division	Met Office	United Progressive Party
Community Development Division	Aviation	Youth Affairs Department
Department of Environment	Coast Guard	Culture Department
Community Health	Immigration	Sports Department
Environmental Health	Fire Department	Local Government Dept
Police Department	National Parks Authority	St John's Development Corp.

ANNEX 2 (b)		
PARTICIPANTS IN CONSULTATION AND VALIDATION WORKSHOPS		
Alex Nicholas	Ministry of Information	Director of GIS
Bernard Walker	Persons with Disabilities Assn	President
Brian Cooper	EAG	Board Member
Carole Lincoln	Local Government	Head Local Govt. Officer
Charline Buntin	Ministry of Health and EMS	Senior Executive Officer
Chelo Francis	Ministry of Education	Liaison Officer
David Matthery	Mount St. John Medical Centre	Director of Operations
Deverel Forde	Antigua and Barbuda Airport Authority	Director of Safety and Security
Devorah Simmons Francis	Ministry of Social Transformation	Community Field Officer
Diane Martin	Ministry of Legal Affairs	Liaison Officer
Elerie Farrell	Antigua & Barbuda Institute of Architects	President
Fitzroy Anthony	Royal Antigua and Barbuda Police Force	Asst. Commissioner of Police
Frederick Southwell	Development Control Authority / Ministry of Lands, Fisheries and Barbuda Affairs	Chief Town and Country Planner
George Joseph	Ministry of Sports	Liaison Officer
Glen Josiah	Ministry of Health	Property Manager
Gregory Mason	Ministry of Tourism	Supervisor of Beaches
Jasiel Murphy	National Parks Authority	Environmental Officer
Jennifer Murray	NODS	District Disaster Coordinator
Londel Benjamin	Ministry of Social Transformation	Parliamentary Secretary
Lori-Ann Henry Johnson, Dr	Ministry of Health	National Disaster Coordinator
Major A. Michael	Antigua and Barbuda Defense Force	Administrative Officer
Marcus Scot	St. John's City South	District Disaster Coordinator
Philmore Abiola James	Fisheries Division	Deputy Chief Fisheries Officer
Rawle Punter	Ministry of Agriculture and Fisheries	Fisheries Officer
Rawle Punter	Fisheries Division	Fisheries Officer
Rosemarie Weston	Foreign Affairs, International Trade	Senior Foreign Service Officer
Stephen Samuel	Dept. of Youth Affairs	Programme Officer
Suzette Sanseulotte	Antigua and Barbuda Red Cross	Volunteer Commander
Verbin Peters	Royal Antigua and Barbuda Police Force	Acting Inspector
Wayne Knowles	SDA Church	Director
Wendy Valentine	Persons with Disabilities Assn	Secretary
Wingrove Meade	Central Housing and Planning	Building Inspector
BARBUDA		
Calvin Webber	Health / Hospital	Manager
Claude Burton	Public Health / Solid Waste	Manager
Daphne DeSouza	Barbuda Council	Disaster Worker
Eddie Joseph	Mechanical Workshop	Supervisor
Jason Mapp	Barbuda Council	Officer
Ordrick Samuel	Community Organizer	Community Organizer
Randolph Moses	Barbuda Fire Dept	Officer
Ricky Michael	Labour Department	Officer
Roland Cuffy	Royal Police of Antigua and Barbuda	Inspector

Ruperta Beazer	Public Works	Officer
Sonnet Thomas	Fisheries Dept.	Clerical Officer
Tessa Webber	Barbuda Council	Member

ANNEX 3

RAINFALL IN DROUGHT YEARS 1928-2007

Year	Annual Rainfall Total
1928	30.90
1929	39.48
1930	27.06
1935	39.42
1939	33.51
1940	38.77
1947	31.58
1953	34.37
1964	38.24
1965	37.81
1966	32.82
1967	36.52
1968	30.48
1973	28.30
1975	39.70
1980	39.15
1983	26.83
1991	37.22
1994	39.95
1997	39.30
2000	35.13
2001	33.50
2002	37.81
2003	35.73
Drought Years – 1928 to 2007 (rainfall in inches)	

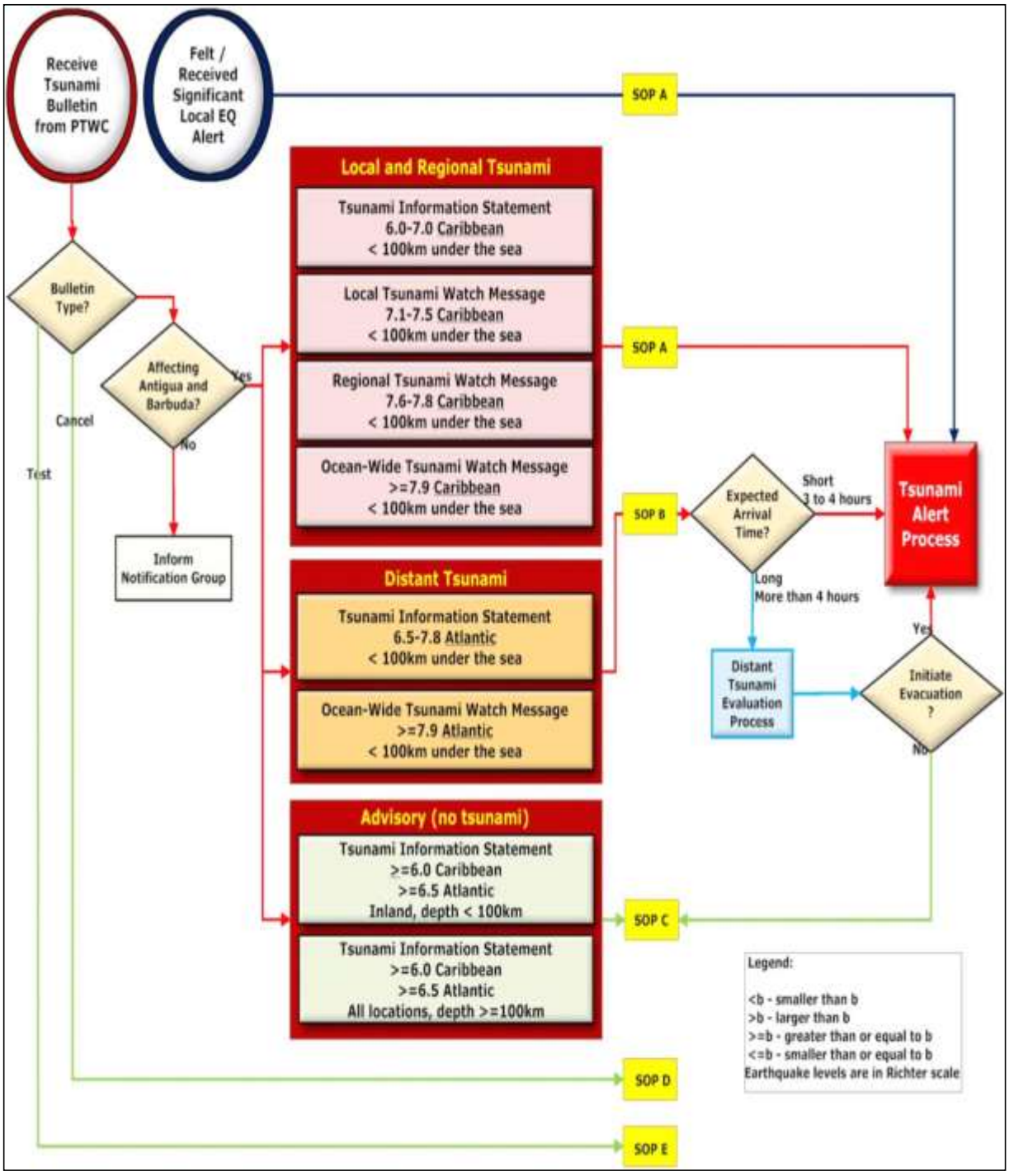
ANNEX 4
PREVELANT FLOOD PRONE AREAS IN ANTIGUA AND BARBUDA

ANTIGUA	
AIRPORT ROAD	**ALL SAINTS (Mc POND)**
BOLANS	**BATH LODGE**
BENDALS ROAD	**BATHESDA**
CASSADA GARDENS	**CEDAR GROVE**
COBBS CROSS	**FREETOWN**
GRAYS FARM	**GOLDEN GROVE (EXTENSION**
JENNINGS	**JOHN HUGHES (FOLLY GUT)**
LIBERTA (Areas close to watercourse)	**LIGHTFOOT**
Mc KINNONS	**OLD PARHAM ROAD**
PAYNTER (EAST&WEST)	**PICADILLY**
PIGOTTS (BURMA ROAD)	**SWETES (Areas close to watercourse**
VILLA & POINT (Wilkinson' Cross, St. John &Dickenson Bay streets)	**YORKS VILLAGE**
BARBUDA	
LAGOON & MARL HOLE AREA I	

ANNEX 5

CRITERIA FOR TSUNAMI ALERT THRESHOLD

Tsunami Information Statement	6.0-6.5, >100km, inland	None or very minor	Caribbean	No	None	NA	ADVISORY	NO ACTION SOP C checklist
	6.0/6.5-7.0, <100km, undersea	None or very minor	Atlantic	No	None	NA	ADVISORY	NO ACTION SOP C checklist
Tsunami Threat message	7.1-7.5, <100km, near/undersea	Local Tsunami	NE, Central, South (Caribbean basin)	Yes	St. John, Point/Villa, Old Road, Whyte sands/Blue waters, Bethesda, Barbuda, Long Island	<1hr	WARNING	Evacuate threatened coast SOP A checklist
			NE, Central, south (Atlantic side)	Yes	St.John, Point/Villa, Old Road, Whyte sands/Blue waters,			Evacuate threatened coast SOP A checklist
Tsunami Threat message	7.1-7.5, <100km, near/undersea	Local Tsunami	NE, Central, South (Caribbean basin)	Yes	St.John, Point/Villa, Old Road, Whyte sands/Blue waters, Bethesda, Barbuda, Long Island	<1hr	WARNING	Evacuate threatened coast SOP A checklist
		Distant	NE, Central, south (Atlantic side)	Yes	St.John, Point/Villa, Old Road, Whyte sands/Blue waters, Bethesda, Barbuda, Long Island		WARNING	Evacuate threatened coast SOP B checklist
			>300km	No	NA	Not given	INFO	Monitor subsequent messages
	7.6-7.8, <100km, near/undersea	Regional	<1000km	Yes		<3hrs	WARNING	Evacuate threatened coast SOP A checklist
			>1000km	No		Not given	INFO	Monitor subsequent messages SOP C checklist
	7.9 and greater, < 100km	Basinwide/ Distant	Potential for a basin-wide tsunami	Yes	ALL	<3hrs	WARNING	Evacuate coasts within 3 hrs ETA SOP B checklist
			Potential for a basin-wide tsunami	No	ALL	>4 hrs	WARNING	Standby prepare to evacuate SOP B checklist
			Potential for a basin-wide			6 hours	INFO	Monitor subsequent messages


Receive Tsunami Bulletin from PTWC
Felt / Received Significant Local EQ Alert
SOP A
Local and Regional Tsunami
Tsunami Information Statement
6.0-7.0 Caribbean
< 100km under the sea
Local Tsunami Watch Message
7.1-7.5 Caribbean
< 100km under the sea
Regional Tsunami Watch Message
7.6-7.8 Caribbean
< 100km under the sea
Ocean-Wide Tsunami Watch Message
>=7.9 Caribbean
< 100km under the sea
Bulletin Type?
Affecting Antigua and Barbuda?
Yes
No
Cancel
Test
Inform Notification Group
SOP A
SOP B
Expected Arrival Time?
Short
3 to 4 hours
Long
More than 4 hours
Tsunami Alert Process
Distant Tsunami
Tsunami Information Statement
6.5-7.8 Atlantic
< 100km under the sea
Ocean-Wide Tsunami Watch Message
>=7.9 Atlantic
< 100km under the sea
Distant Tsunami Evaluation Process
Initiate Evacuation ?
Yes
No
Advisory (no tsunami)
Tsunami Information Statement
>=6.0 Caribbean
>=6.5 Atlantic
Inland, depth < 100km
Tsunami Information Statement
>=6.0 Caribbean
>=6.5 Atlantic
All locations, depth >=100km
SOP C
SOP D
SOP E
Legend:
<b - smaller than b
>b - larger than b
>=b - greater than or equal to b
<=b - smaller than or equal to b
Earthquake levels are in Richter scale

ANNEX 6
COMMUNITTES WITHIN THE DISTRICT DISASTER COMMITTEE SYSTEM

DISTRICT	MAJOR VILLAGES/COMMUNITIES
ll Saints East & St. Luke's	All Saints `Swetes John Hughes Old Road
All Saints West	All Saints west Buckleys Freemans' Village Sea View Farm
City East	Fort Road Gambles Terrace
St. John City West	Point Villa
City South	South Newgate St High street
Rural East	Clare Hall Cassada Gardens St. Johnson's Village Sutherlands Wireless road
Rural West	Cooks Hill Five Islands Grays Farm Grays Hill Green Bay Donavans Hatton Lovelace Road Perry Bay Union Road
Rural North	Crosbies Cedar Grove Coolidge Yorks
Rural South	Golden Grove Ottos Radio Range Valley Road Mary E. Pigott St.
St. Mary's North	Bathlodge Bendals Brownes Avenue Cashew Hill Golden Grove Jennings
St. Mary's South	Bolans Crabb Hill Johson Point Urlings
St. Phillips North	Glanvilles New Field Seatons Willikies
St. Phillips South	Bathesda Christian Hill Freetown St. Phillips Village
St. Paul	Cobbs Cross English Harbour Falmouth Picadilly Liberta
St. Peters	Pares Parham Gunthropes
St. Georges	New Winthropes Pigotts Potters
Barbuda	Codrington

ANNEX 7

AREAS OF TRAINING FOR NATIONAL VOLUNTEERS

TYPE OF TRAINING	FUNCTION
Basic Disaster Management	Orientation of local, national, Regional systems, National/local hazard and vulnerability profiles, response and recovery and mitigation practices.
Community Emergency Response Team (CERT)	Elements include basic search and rescue, map reading skills, Basic Life support, Basic Disaster Management, Emergency Telecommunication
Initial Damage Assessment - IDA	Rapid rough assessment of damage
Damage Assessment and Needs Analysis - DANA	Detail sector damage assessment
Emergency Care and Treatment -ECAT	Life support in the field, basic First Aid including CPR
Emergency Telecommunications	Radio Operation
Incident Command System - ICS	Establishment of Field Organization and command and reporting procedures
Mass Casualty Management - MCM	Event/Incident management of multiple casualties
Emergency Road Clearance	Creating/maintaining primary critical access
Shelter and Shelter Management - SSM	Establishment of Shelter Team and management structure and basic operations to open, run and report on shelter activities.

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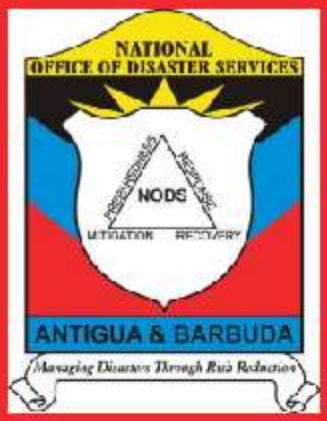

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