

St. Vincent and the Grenadines Country Profile



September 2014

Prepared by:
Reynold Murray



Disaster Risk Reduction Country Document: Saint Vincent and the Grenadines, 2014
December 2014

National Emergency Management Organisation (NEMO)
Ministry of National Security, Air and Sea Port Development
Kingstown
St. Vincent and the Grenadines

National coordination:

National Emergency Management Organisation (NEMO)
Howie Prince, Director
Michelle Forbes, Deputy Director

Regional coordination:

Sandra Amlang (UNISDR)
Alexcia Cooke (UNISDR)

Author:

Dr. Reynold Murray

Proof reader:

Michelle Forbes

Cover page design:

Maria Camila García Ruiz

This document covers humanitarian aid activities implemented with the financial assistance of the European Union. The views expressed herein should not be taken, in any way, to reflect the official opinion of the European Union, and the European Commission is not responsible for any use that may be made of the information it contains.

ECHO

European Commission's Humanitarian Aid
and Civil Protection department
Regional office for the Caribbean
Santo Domingo, República Dominicana
Email: echo.santo-domingo@echofield.eu
URL: <http://ec.europa.eu/echo/>
<http://www.dipecholac.net/>



Humanitarian Aid
and Civil Protection

UNISDR

United Nations Office for Disaster
Risk Reduction
Regional office for the Americas
Ciudad del Saber (Clayton), Panamá
Email: eird@eird.org
URL: <http://www.eird.org/>
<http://www.unisdr.org/americas>



Contents

1. Executive Summary.....	6
2. Acronyms.....	8
3. International and Regional Disaster Risk Reduction Context.	13
3.1. International Context.....	13
3.2. Regional Context.....	14
3.3. National DRR Context.....	15
4. NATIONAL CONTEXT.....	18
4.1. Physical Environment.....	18
4.1.1. Geographic Location	18
4.1.2. Physiography.....	19
4.1.3. Climate	20
4.2. Socio-Economic Context.....	21
4.2.1. Population and Demographics.....	21
4.2.2. The Economy	22
4.2.3. Poverty and Unemployment	23
4.3. Governance Structure	24
4.3.1. Political Structure and Organization	24
5. St. Vincent and the Grenadines' Legal, Normative and Institutional Disaster Risk Reduction Profile.....	28
5.1. Legal Framework	28
5.1.1. Constitution.....	28
5.1.2. Laws and legally binding provisions	29
5.2. Normative framework.....	29
5.2.1. Normative Instruments for Disaster Risk Reduction: Technical and Political Decision Making	29
5.2.2. Public Policies.	30
5.3. Institutional framework	31



5.3.1.	Organization of the National System and Mechanisms	31
5.3.2.	National Plans and their Implementation.	32
6.	The State of Disaster Risk in St. Vincent and the Grenadines.....	34
6.1.	Historical Disasters Analysis	34
6.2.	Hazards / Threats.....	37
6.3.	Hazard Background Information.....	38
6.3.1.	Natural Hazards: Geological	38
6.3.2.	Natural Hazards: Hydro meteorological Hazards.....	42
6.3.3.	Anthropogenic/Man-made Hazards	43
6.3.4.	Emergencies affecting Public Health and Safety	44
6.4.	Vulnerability.....	45
6.5.	Capacities	51
7.	Disaster Risk Analysis in St. Vincent	56
7.1.	Definition of Analytical Criteria and Methodology	56
7.2.	Definition of Risk Scenarios:	61
7.3.	Prioritization of risk scenarios and areas for intervention	66
8.	Strategic Direction for Disaster Risk Reduction in SVG.....	69
8.1.	Hazard, Vulnerability and Risk Mapping.	69
8.2.	Strengthening Capacities.	70
8.3.	Training in EOC Management.....	71
8.4.	Early Warning Systems.....	71
8.5.	The Country Profile Process	72
9.	Conclusions and Recommendations	73
10.	APPENDIX 1	76
11.	REFERENCES.....	93



List of Figures

Figure 1. Organisation Structure of NEMO.....	16
Figure 2. Location of St. Vincent and the Grenadines	19
Figure 3. . Real GDP growth Rate 2001 to 2013 (source statistical office).....	23
Figure 4. Volcanic Risk Zones for SVG	39
Figure 5. Eastern Caribbean Epicentres 1900 – 2005 (magnitudes 5.0 and above)	41
Figure 6. Storm Surge and Coastal Erosion Hotspots, (USAID, 2007).	50
Figure 7. Composite Hazard Map of St. Vincent	62
Figure 8. Storm Surge Hazard Map	64
Figure 9. Landslide Hazard Map	65

List of Tables

Table 1: Summary of major events impacting St. Vincent and the Grenadines 1900 to 2013	35
Table 2: Summary of the eruption of La Soufriere, SVG, Adapted from Seismic Research Centre (n.d.).....	36
Table 3. Some disaster support agencies; capacity, challenge and vision.....	55
Table 4. Hydro- Met Hazard 2008-2013 (Source NEMO).....	58
Table 5. Samples of Community responses from North Windward and North Leeward	60
Table 6. Priority rating for selected Hazards.	68

1. Executive Summary

St. Vincent and the Grenadines is one of the most hazard prone countries in the Eastern Caribbean. Over the past two years the country has experienced four episodes of flooding. Three major weather systems in the past four years cost the country in excess of 560 million EC dollar and twelve (12) lives. These statistics do not speak to constant threat of volcanic eruptions, infectious diseases, plant pathogens, international trade regimes, global climate change and global economic uncertainties. The islands vulnerability is compounded by its geography, geology and narrow economic base. For St. Vincent and the Grenadines therefore, Disaster Risk Reduction is an imperative.

The conceptual framework for DRR in SVG therefore, while confirming to the edict of the international agendas as delineated by the Hyogo Framework for Action and the Yokohama Strategy, must therefore be about building capacities to enable Vincentians to live with these varying hazards and build resilience to hazards. Building resilience must not be a phrase in an agreed text, it must be inherent in the culture of the people; the way they build, farming practices and day to day activities and livelihoods.

This country profile is designed to ascertain the state of preparedness of St. Vincent and the Grenadines to hazards and disasters, identify and analyse its coping strategies which will determine appropriate intervention and location spatially, temporarily and socially. The profile examines both people and the environment with the view to identify priority interventions that will minimize vulnerabilities and disaster risks throughout the country thus avoiding or limiting the adverse impacts of hazards, within the broad context of sustainable development.

The profile examines the international and regional context in which SVG is required to reduce disaster risk. It looks at the country's commitment to supporting multilateral environmental agreements at the same time being true to its regional and sub-regional obligations. In this regional context, attention is paid to the role of Caribbean Disaster Management Agency (CDEMA) as the CARICOM vehicle for DRR in the member states.

In examining the legal and institutional framework, SVG emerged as an evolving state with its few national policy documents well-grounded and effective. More work is needed in the preparation of a national environmental policy, a comprehensive disaster management plan and a risk registry. These documents are necessary as instruments to safeguard the general public against less scrupulous enterprises – land traders, builders and insurance companies.



In analysing the risk and determining priorities for action, the CP captured the work of agencies such as the Physical Planning Unit, the Ministry of Housing and the Ministry of Transport and Works. Central to the entire exercise is the ubiquitous but stretched National Emergency Management Organization (NEMO). While the Ministries are producing maps, assessing damage and loss and supporting infrastructure development, NEMO is busy doing preparedness training across the island. This training is well supported by the National Red Cross using international financial support. So while there is no CDM, risk registry and only limited legal basis for DRR, there is a plethora of good will, and better than average skilled volunteers willing to assist.

Moving SVG from its current state to its post 2015 vision will require dedicated financing from national government through its line ministries, support from international partners, a cadre of trained competent technicians and an education programme to support the effort. DRR education while almost absent from the class room should not be confined there but spread nationwide through an improved DRR communication system.

DRR for SVG is not only about saving lives and livelihood, but about building resilience to hazards. Unfortunately the average Vincentian is not sufficiently involved in their own welfare. There is a great reliance on the state and this makes it almost impossible to see the herculean effort of NEMO. Recounting their recent experiences a number of workers and volunteers complained that 'people' were the most difficult element in the equation.



2. Acronyms

ACS	Association of Caribbean States
AIC	Aviation-induced clouds
AOSIS	Alliance of Small Island States
APD	Air Passenger Duty
API	Annual Parasite Indices
AR4	Fourth Assessment Report
ARI	Acute Respiratory Infections
BAU	Business as usual
CAD	Caribbean Application Document
CAREC	Caribbean Epidemiology Centre
CARICOM	Caribbean Community
CCCCC	Caribbean Community Climate Change Centre
CDEMA	Caribbean Disaster Emergency Management Agency
CDM	Clean Development Mechanism (in the context of energy and emissions)
CDM	Comprehensive Disaster Management
CEHI	Caribbean Environmental Health Institute
CELOS	Centre for Agricultural Research
CEMP	Comprehensive Emergency Management Plan
CERMES	Centre for Resource Management & Environmental Studies
CITES	Convention on International Trade in Endangered Species
COP	Conference of Parties
CPA	Country Poverty Assessment
CRED	Centre for Research on the Epidemiology of Disasters
CROSQ	Caribbean Regional Organisation for Standards and Quality
CTO	Caribbean Tourism Organization



CUBiC ----- Caribbean Uniform Building Code

DANA ----- Damage Assessment and Needs Analysis

DFID ----- Department for International Development

DIPECHO-----European Union Disaster Preparedness Programme

DJF ----- December, January, February

DMC ----- Disaster Management Committee

DRM ----- Disaster Risk Management

DRR----- Disaster Risk Reduction

EbA ----- Ecosystem-based Adaptation

ECE ----- Energy Conservation & Efficiency

ECHO-----European Community Humanitarian Office

ECLAC ----- United Nations Economic Commission for Latin America and the Caribbean

EIA ----- Environmental Impact Assessment

ENSO ----- El Niño Southern Oscillation

EOC ----- Emergency Operations Centre

ETS----- Emission Trading Scheme (European Union)

EU----- European Union

EWS ----- Early Warning System

FAO ----- Food and Agriculture Organisation

GCM ----- General Circulation Models

GDP ----- Gross Domestic Product

GGCA ----- Global Gender and Climate Alliance

GGHE ----- General Government Expenditure on Health

GHG ----- Greenhouse gas

GOS ----- Government of St. Vincent and the Grenadines

HFA ----- Hyogo Framework for Action

IAASTD----- International Assessment Agriculture Knowledge, Science &



Technology for Development

IATA	International Air Transport Association
ICC	International Code Council
IICA	Inter-American Institute for Cooperation on Agriculture
ICOADS	International Comprehensive Ocean Atmosphere Data Set
ICZM	Integrated Coastal Zone Management
IDB	Inter American Development Bank
IEA	International Energy Agency
IFRC	International Federation of Red Cross and Red Crescent Societies
IICA	Inter-American Institute for Cooperation on Agriculture
IMF	International Monetary Fund
INSMET	Meteorological Institute of the Republic of Cuba
IPCC	Intergovernmental Panel on Climate Change
IRs	Intermediate Results
ISCCP	International Satellite Cloud Climatology Project
ISDR	International Strategy for Disaster Reduction
ITCZ	Inter-Tropical Convergence Zone
ITTA	International Tropical Timber Agreement
IUCN	International Union for Conservation of Nature
IWCAM	Integrating Watershed and Coastal Areas Management
IWRM	Integrated Water Resources Management
IVM	Integrated Vector Management
JJA	Seasonal period including June, July, August
MAM	Seasonal period including March, April, May
MCMH	Milton Cato Memorial Hospital
MDGs	Millennium Development Goals
MDP	Multi-Annual Development Plans
MEA	Multilateral Environmental Agreement



MSY -----	Maximum Sustained Yield
MUMA -----	Multi-use Management Area
NARENA -----	Natural & Environment Assessment Department
NBS -----	National Biodiversity Strategy
NEMO -----	National Emergency Management Organization
NGOs -----	Non-Governmental Organisations
OE -----	Operating Entities
OECD -----	Organisation for Economic Co-Operation & Development
OFDA -----	Office of US Foreign Disaster Assistance
PAHO -----	Pan-American Health Organization
POPs -----	Persistent Organic Pollutant
RDVRP -----	Regional Disaster Vulnerability Reduction Project
RCM -----	Regional Climate Model
REDD -----	Reducing Emissions from Deforestation and Forest Degradation
RDT -----	Rapid Diagnostic Testing
RNAT -----	Rapid Needs Assessment Team
RPP -----	Readiness Preparation Proposal
SIDS -----	Small Island Developing States
SLR -----	Sea Level Rise
SON -----	Seasonal period including September, October November
SST -----	Sea Surface Temperature
STZC -----	Sustainable Tourism Zone of the Caribbean
TEDs -----	Turtle Excluder Devices
TISP -----	The Infrastructure Security Partnership
UNCCDD -----	United Nations Convention to Combat Desertification & Land Degradation
UNDP -----	United Nations Development Programme
UNEP -----	United Nations Environment Programme



UNESCO ----- United Nations Educational, Scientific & Cultural Organisation

UNFCCC ----- United Nations Framework Convention on Climate Change

UNFPA ----- United Nations Population Fund

UNIFEM ----- United Nations Development Fund for Women

UNISDR----- United Nations Office for Disaster Risk Reduction

UNWTO ----- United Nations World Tourism Organisation

UV ----- Ultra Violet

VAT ----- Value Added Tax

WEF ----- World Economic Forum

WHO ----- World Health Organization

WLA ----- Hydraulic Research Division Suriname

WMO ----- World Meteorological Organisation

3. International and Regional Disaster Risk Reduction Context

3.1. International Context

The development of St. Vincent and the Grenadines country profile is being supported by the UNISDR, an agency created in December 1999 as part of the UN Secretariat with the purpose of ensuring the implementation of the International Strategy for Disaster Reduction. The organization coordinates international efforts in DRR and guide, monitor as well as report regularly on the progress of the implementation of the Hyogo Framework for Action. The Hyogo Framework for Action (HFA) is the guiding document in strengthening and building international cooperation to ensure that disaster risk reduction is seen as a foundation pillar for sound national and international development agendas. Through their biennial Global Platform on disaster risk reduction, UNISDR advances risk reduction policies and support the establishment of regional, national and thematic platforms.

The international context for DRR is enshrined in the DRR global strategies and platforms such as the Yokohama Strategy and Plan of Action for a Safer World, the

Hyogo Framework for Action (HFA) 2005–2015: Building the Resilience of Nations and Communities to Disasters¹, among others. 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. The HFA is also the reference framework for DRR public policy.

The international and regional context for DRR is also anchored in global agreements such as the Johannesburg Declaration, the Mauritius Strategy for Implementation (MSI) of Agenda 21, the Barbados Program of Action (BPOA), the Millennium Declaration and the Millennium Development Goals which are driving development aid and development agendas worldwide. The Panama Declaration on Disasters places an obligation on Ministries of Education in Latin America and the Caribbean to reduce disaster risk in the education sector while the Pan-American Health Organization is bridging the gap between environmental performance, hazard resilience and disaster risk reduction by climate proofing health facilities. The smart hospital initiative is a first time initiative undertaken in the region with the support of the Department for International Development and the Pan American Health Organization. In St. Vincent, the

¹<http://www.unisdr.org/hfa>



Georgetown Smart Hospital was officially opened on Saturday, 7th September 2013 as the Government continues to provide improved health care facilities to nationals.

Small island developing States (SIDS) are particularly vulnerable to natural as well as environmental disasters and have a limited capacity to respond to and recover from disasters. Global Climate Change (GCC) has been recognised as one such hazard and is a major threat to the sustainable development of the Caribbean. While small island developing States are among those that contribute least to global climate change and sea-level rise, they are among those that would suffer most from the adverse effects of such phenomena and could in some cases become uninhabitable. Therefore, they are among those particularly vulnerable States that need assistance under the United Nations Framework Convention on Climate Change, including adaptation measures and mitigation efforts².

St. Vincent and the Grenadines is signatory to a number of international conventions that directly support disaster risk reduction. These include *inter alia* the Basel Convention on Trans-boundary Movement of Hazardous Waste, the Rotterdam Convention on Prior Informed Consent for movement of certain hazards and chemical and the Stockholm Convention on Persistent Organic Pollutants.

3.2. Regional Context

In 2001, the Caribbean Community (CARICOM) adopted a Strategy and Results Framework for Comprehensive Disaster Management (CDM). This initiative was led by the Caribbean Disaster Emergency Management Agency (CDEMA), CARICOM proposed to focus its programming around critical actions needed to advance implementation of the five (5) Intermediate Results (IRs) of the 2001 CDM Strategy and Framework, which itself was also explicitly connected to the Barbados Programme of Action. Following review and participatory discussion the following thematic areas were selected for priority attention within CARICOM over the 2005-2015 period:

- ☐ Hazard mapping and vulnerability assessment
- ☐ Flood prevention and management

²BPOA

³[http://www.cdema.org/index.php?option=com_joomdoc&view=](http://www.cdema.org/index.php?option=com_joomdoc&view=Managing%20Disaster%20with%20Preparedness)Managing Disaster with Preparedness.



- ☐ Community disaster planning
- ☐ Early warning systems
- ☐ Climate change
- ☐ Knowledge enhancement

Building Resilience of nations and communities to hazard impacts was determined as the overall focus for the Caribbean region.

The regional framework for achieving resilience to Climate Change (2009-2014) also establishes the direction for the continued building of resilience to the impacts of global climate change (GCC) by CARICOM states. The Framework builds on the significant contributions of the Caribbean Community Climate Change Centre initiatives namely the Caribbean Planning for Adaptation to Climate Change (CPACC), Adaptation to Climate Change in the Caribbean (ACCC), Mainstreaming Adaptation to Climate Change (MACC) and the Special Program on Adaptation to Climate Change (SPACC).

At the sub-regional level, St. Vincent and the Grenadines is committed to the St. Georges Declaration (SGD) of Principles for Environmental Sustainability in the OECS 2001. This commitment requires, among other actions, urgent attention to establishing effective structures for stakeholder collaboration at every level, creating the institutional and legal frameworks required for effective environmental management, and building the capacity of SVG to monitor environmental impacts and trends in the status of natural resources and ecosystems. The National Environmental Management Strategy (NEMS), the implementation and monitoring tool for the SGD, places the focus on hazard risk management as a key element and embodies all other related policies, plans, programmes and strategies, including those developed under international and regional agreements.

3.3. **National DRR Context**

The National Emergency Management Organization (NEMO), in the Ministry of National Security, Air and Sea Port Development is the primary agency for the coordination of DRR activities in SVG. The organization is affiliated to CDEMA, CCCCC, CPHA and the Caribbean Institute of Meteorology and Hydrology.

The National Emergency Management Organization (NEMO) was established in 2002 with responsibility for national disaster management in SVG (NEMO, 2005). Various pieces of legislation governs the operations of NEMO, including the National Emergency and Disaster management Act, 15, 2006, The Emergency Powers Act 45, 1970 and the Natural Disaster Relief Act, 1947.

The National Emergency Council, chaired by the Prime Minister, has overall responsibility for Disaster Management. This group consists of Ministers of Government of key agencies, and NGOs, the private sector and other specialist groups, See Figure 1.

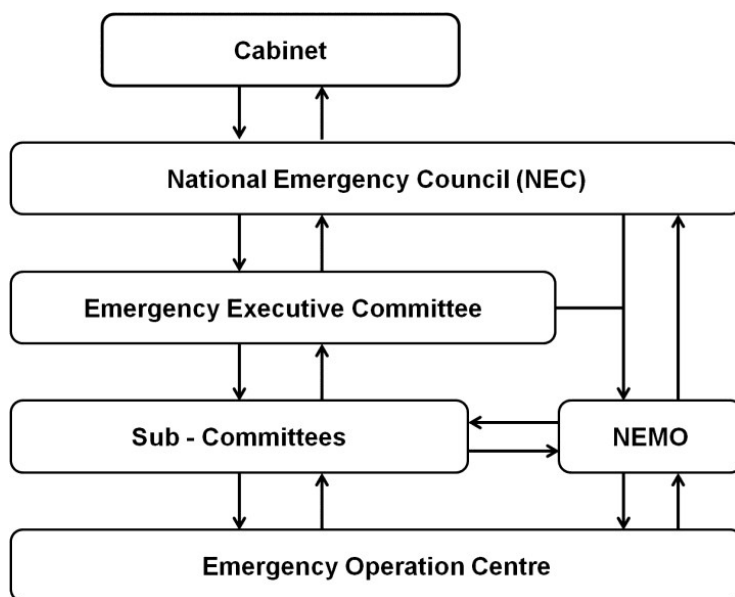


Figure 1. Organisation Structure of NEMO

The Emergency Executive Committee (EEC) is chaired by the Director of NEMO and consists of representatives from ministries and other key stakeholders, grouped into 10 national sub-committees with specific responsibilities. The EEC is responsible for the activities of the sub-committees as well as the policies and plans of the National Executive Committee.

The 10 sub committees include:-

1. Rehabilitation and reconstruction
2. Shelter and Shelter Management
3. Public information and education
4. Emergency supplies
5. Emergency communication
6. Transport and road clearance
7. Damage and needs assessment



8. Health services and

9. Voluntary services

10. Search and Rescue Source: NEMO 2005

The National Disaster Plan (2005) consists of the hurricane plan, the volcano evacuation plan, the flood response plans and various forms and guidelines. The plan also outlines the roles and responsibilities of the various groups which make up the organization. These include the National Emergency Council, the Emergency Executive Committee, the National Sub-Committees and District and Community Disaster Committees. The day to operations are conducted the National Emergency Management Office. The Disaster office and EOC was constructed in 2005 with funding from the World Bank.

Disaster Management at the local level is undertaken by 13 district disaster committees and a number of community disaster groups and community organizations. The coordination of the various groups and other disaster management activities are done NEMO Secretariat. The emergency office is staffed by a director, other technical and supporting staff. The office has responsibility for implementing the policy and strategies of the organization.

National hazard and vulnerability studies conducted in St Vincent and the Grenadines include:-

- Island wide flood risk assessment in 2006.

- Coastal vulnerability assessment of the eastern and southern coastline in 2007.

- Kingstown and Arnos Vale drainage studies to reduce flooding in flood prone areas (these areas still flood regularly, in particular, Arnos Vale where the airport is located which can result in the closure of the airport).

- The development of volcanic hazard maps which are used regularly in training and exercises.

- Landslide and slope mitigation for slope stabilization in two communities.

DRR Activities undertaken by NEMO include the following which received support from UNDP, these activities were part of the NEMO work programme for 2008 – 2012 (Contreras, 2014)⁴:-

⁴ Contreras, ArturoLópez-Portillo (2014) Evaluation Of UNDP Disaster Risk Reduction Support In St. Vincent And The Grenadines 2008-2012.United Nations Development Programme Barbados and the OECS.

Public Education and Awareness (PEA).
Disaster Preparedness and Planning at the Community Level.
Training and Workshops.
Community Disaster Planning.
Search and Rescue. (SAR).
Early Warning and Communication Systems for Communities.
Emergency Operations Centre (EOC) Management.
To Review and Develop Plans for various Hazards and Facilities.
Slope Stabilization Project.
Safety Program initiated by all Public Buildings, catering to Multi-hazards including Earthquakes and Fires
Establishment of Community Emergency Response Teams (CERTS)
Sustained Public Education Programmes aimed at increasing Public Awareness on DRR.
To support the International Strategy for Disaster Reduction (ISDR).
Mass Casualty Management (MCM).

4. NATIONAL CONTEXT

4.1. Physical Environment

4.1.1. Geographic Location

St. Vincent and the Grenadines is an archipelagic State that forms part of the Windward Island in the Southern part of the Caribbean. Located at 13° 15'N and 61° 15'W, it is surrounded by St Lucia to the North, Barbados to the East and Grenada to the South. The state covers a total land area of approximately 150.3 square miles (388 sq. km.) and a larger marine area including a shallow coastal shelf encompassing an area of approximately 690 square miles. The capital, Kingstown, is located on St. Vincent - commonly referred to as the mainland. This main island is the largest and most populated and is located to the extreme north of the archipelago. It is roughly elliptical in shape with its greatest length 18 miles (29 km) north to south and its greatest width 11 miles (17.7 km) west to east, with a land area of 133 sq. miles. The Grenadines cover a total land area of 16.5 sq. miles (44 sq. km), and stretch a distance of 45 miles to the southwest of St. Vincent toward Grenada to latitude 12° 30' (Figure 2). The land area of the Northern Grenadines totals 9 sq. miles, and the Southern Grenadines 7.5 sq. miles.



Figure 2. Location of St. Vincent and the Grenadines

4.1.2. Physiography

The main topographical feature of St. Vincent is a backbone of volcanic mountains that stretch much of its length and rise northwards to an elevation of approximately 4,084 feet above mean sea level at La Soufriere, the highest point on the island and where a volcano is located. Further south are Richmond Peak (3,523 feet), Mount Brisbane (3,058 feet), Grand Bonhomme (3,181 feet), Petit Bonhomme (2,481 feet), and Mount St. Andrew (2,413 feet). These are all part of the axial range which divides the island longitudinally into two nearly equal parts which are further subdivided by lateral spurs radiating outwards to the windward and leeward coasts.

Highly dissected ridges and valleys extending down to the edge of the water characterize the topography on the leeward side. The spurs are steep and the valleys

deep and narrow. This side of the island is indented with numerous deep embayments, which provide safe harbours and offer potential for port development. On the windward side the relief is more gently rolling, with an almost straight coastline with less high cliffs and shaped by the continuous erosional forces of waves energised by the Northeast Trade winds. The more gently undulating foothills on this windward side enclose shallow valleys which occasionally merge in to extensive coastal plains.

The Grenadines are lower-lying, with the highest point being Mount Taboi on Union Island which rises to 1,000 feet above sea level. The second highest point is on the island of Canouan at Mount Royal which is 877 feet high.

4.1.3. **Climate**

The country is characterized by humid tropical climate, with relatively constant temperatures throughout the year. The average yearly temperature is 26.7° C (81° F), due to the moderating influences of the ever-present trade winds. The coolest months are between November and February. The diurnal range is about 3 ° C to 5 ° C and widest in the drier months on account of cool nights.

Most of the rainfall occurs on the windward side of the island due to orographic uplift, though generally it tends to occur in a concentric pattern from about 1700mm at the coast increasing inwards towards the central mountain range to about 7000mm. On the mainland, intensity decreases from North to South and from the windward side of the island to the leeward. Evapotranspiration is 1270mm a year on average along the coast, decreasing progressively with altitude.

Rainfall is significantly lower in the Grenadines. The average annual rainfall for those islands which have meteorological stations - Bequia, Union and Canouan - is about 1245mm. The wettest months are June to November when the monthly average is 152mm. The driest period is from February to April during which the average monthly rainfall is slightly more than 25mm.

During the drier months (mid-December to mid-May) higher than normal atmospheric pressure results in dryness and drought conditions in coastal areas and in the Grenadines. The period from mid-May to mid-December is characterised by tropical waves, depressions and hurricanes. Hurricanes are perennial hazards related to the atmospheric conditions of the region during this wetter period.

4.2. Socio-Economic Context

4.2.1. Population and Demographics

The Population policy for the country is aimed at improving the quality of life and standard of living of citizens. It recognises the interrelatedness of population needs with development, poverty, and environmental degradation. The control of the population growth rate has also been recognised as very critical to improving quality of life in the State, in light of the very limited resources. Family planning techniques and other forms of public education programmes are some of the tools used to try to achieve these objectives. In 1996, it was suggested that an average annual growth rate of 0.7% should be targeted. And this was to be achieved through a reduction of the total fertility rate to 2.4 and a decrease of teen fertility by 50% by the year 2000. Preliminary figures from the 2001 Population and Housing Census show that the annual growth rate was 0.13% - 0.57% less than the target suggested in 1996. This meant that the State was well on its way to realizing its population growth objectives; and if this trend continued, a smaller population growth rate can be targeted to produce even better results by 2021.

The draft 2012 Population and Housing Census Report puts the population of St. Vincent and the Grenadines at 109,188. This represented a 0.89% increase since the 2001 Population and Housing Census. The sex ratio is approximately 1:1 female to male (55,353 to 55,835). This represents an annual increase of 81 persons per year between 2001 and 2012. Six of the 13 census districts have shown positive growth since 2001. The greatest increase is in the Calliaqua and the Stubbs to Kingstown census divisions with increase of 7% and 5.8 % respectively.

According to the 2001 Census, approximately 48 percent (47,749 persons) of the total population of the country resides in the south central area of mainland St. Vincent which covers an area of approximately 20.1 sq. miles or 13.4 % of the total land area of the country.

The crude birth rate dropped from 29.9 per 1,000 population in 1991 to 24.3 in 2001, and the death rate from 7.0 to 6.1 over the same period. The rate of natural increase therefore fell from 22.9 to 18.2 per 1,000 head of population.

The population is comprised mainly of individual of African descent, Mixed and Caribs which represents 72.8 percent, 20 percent and 3.6 percent, respectively.⁵ Other groups present are the East Indians, whites, Syrians and Portuguese.

⁵ Statistical Office (2001)

The official language is English, but some residents also speak French patois. The main religions are Protestant (75%: Anglican 47%, Methodist 28%), Roman Catholic (13%), Other (12%) (Hindu, Seventh Day Adventist, other Protestant).

4.2.2. **The Economy**

The economy of St. Vincent and the Grenadines is open, and based upon a very limited range of activities with a significant degree of export market concentration. Despite the constraints faced by economies such as ours, the government is committed to reducing poverty, increasing the standard of living and accelerating the rate of growth. The rate of economic growth continues to be positive despite the challenges faced by the main productive sectors. Real Gross Domestic Product (GDP) increased at an average annual rate of 1.3 percent during the 1997 to 2001 period, and was estimated at EC\$1.07 billion in 2000. This relatively low rate of growth can be attributed mainly to the contraction in the Agriculture and Construction sectors.

In 2001, the economy of St. Vincent and the Grenadines registered real growth of 1.8 percent. Thereafter, the economy continued to realise positive real growth up to 2008, with 2005 being the lowest (2.8%) and 2003 being the highest (7.6%). The performance in 2003 was influenced by a positive spill-off from the liberalisation of the telecommunications sector as well as activities in the hotel and restaurant and construction sectors. There was another peak in 2006 (6.0%), fuelled by activities in the Financial Intermediation, Communication, Hotels and Restaurants, Government Services, Wholesale and Retail Trade, Transportation and Construction sectors.

In 2008, St. Vincent and the Grenadines was affected by the global economic fallout. As a result, there was negative growth of 0.6%. Several sectors were adversely affected, resulting in declines. These included Construction (10.3%), Hotels and Restaurants (5.5%) and Agriculture (4.1%). Despite the adverse economic climate, some sectors still managed to post growth. These are Public Administration, Defence and Compulsory Social Security (8.0 %), Private Household Employment (9.4%), Wholesale and Retail Trade (3.9%), Communications (1.8%), Mining and Quarrying (5.1%), Real Estate and Housing (2.1%) and Health and Social Work (5.4%). The economic turmoil continued into 2009 as the economy experienced negative growth of 2.3% (Figure 3). The major contributors to the contraction were Hotels and Restaurants which declined by 22.1% and Construction which declined by 8.3%. Manufacturing as well as Mining and Quarrying also experienced significant declines of 8.6 and 8.3%, respectively. Notwithstanding the prevailing economic conditions, some sectors posted positive growth. These included Financial Intermediation (1.4%), Health and Social Work (4.6%) and Agriculture (15.2%).

4.2.3. Poverty and Unemployment

Although there is relatively high unemployment especially among school leavers, extreme poverty is more an anomaly than a Vincentian phenomenon. This is due in part to the social dynamics where people look out for their neighbours and there are several churches and voluntary organizations giving aid to indigent persons.

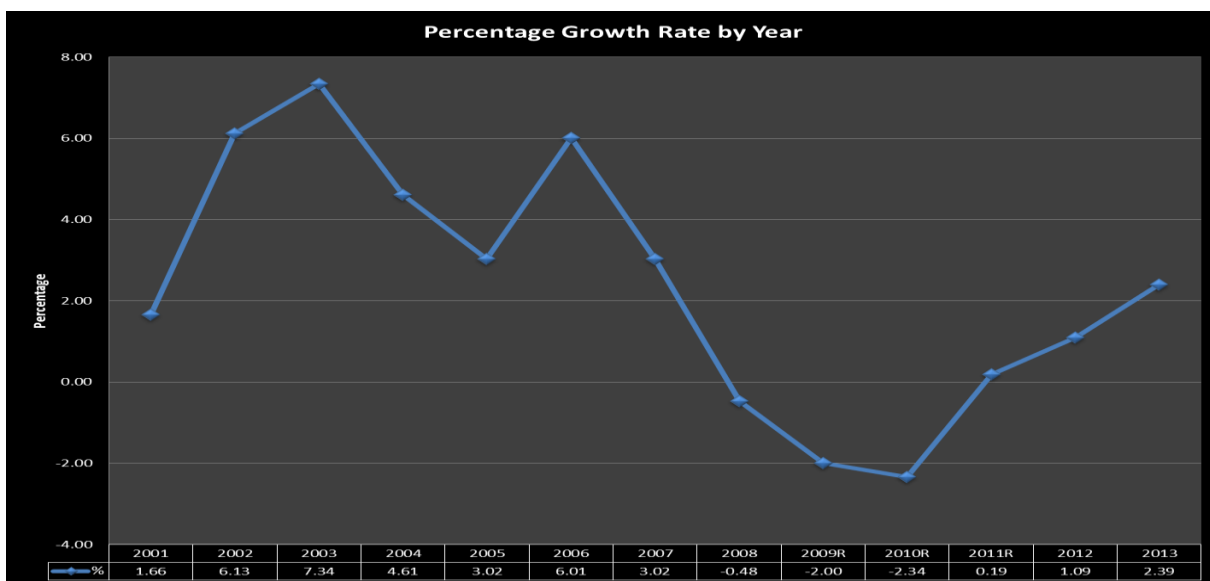


Figure 3. . Real GDP growth Rate 2001 to 2013 (source statistical office)

St. Vincent and the Grenadines' economy has traditionally been agriculturally-based. However, several developments on the international front, including the World Trade Organization's trading agreements and reduction in trade preferences, have adversely affected small primary producers seeking diversification and transformation of the economy (Kairi 2009). Over the past decade, the Government of St. Vincent and the Grenadines, developed an interim Poverty Reduction Strategy Paper, and expended significant sums of money on programmes aimed at poverty reduction. According to Kairi Consultants in their Country Poverty Assessment 2007/2008 Report, there is clear evidence that St. Vincent and the Grenadines has pursued pro-poor policies that have produced programmes and activities that have benefited the poor significantly. As a result of these and other initiatives there has been a reduction in abject poverty and improvements in living conditions. The Assessment revealed that the Poverty Headcount Index stood at 30.2 percent, down from 37.5 percent in 1996, while the Gini coefficient fell from 0.56 in 1996 to 0.41 in 2008, suggesting an improvement in income equality. The indigence level moved from 25.7 percent in 1996 to 2.9 percent in 2008. However, although considerable progress has been made with respect to the reduction of abject poverty, the vulnerability levels remain a great cause for concern (refer to SVG

National Economic and Social Development Plan – 2013 to 2025). In 2008, the vulnerability level stood at 48.2%, with the rural and banana farming population identified as being at high risk and needing particular poverty reduction strategies.

4.3. **Governance Structure**

According to the NESDP, as a critical issue underpinning economic development, political stability is an important factor in attracting foreign direct investment and sustaining a reliable, transparent environment for doing business. The following positive factors characterise St. Vincent's political environment:

- St. Vincent and the Grenadines has a democratic political system which is based on free and fair elections.
- A stable political climate.
- An extensive bundle of fundamental rights and freedoms enforced through an independent court system.
- Further to this, and as a complement to political stability, the legal justice system provides the enabling framework for good governance and a secure business environment. The following factors indicate the breadth of the legal provisions in St. Vincent and the Grenadines:
 - Membership in an integrated OECS legal system known for efficiency, transparency, and reliability.
 - An independent and sound judicial system.

St. Vincent and the Grenadines attained its independence from Britain in 1979. Since then, it has developed closer linkages with the other Windward Islands and some of the islands of the Lesser Antilles which comprise the Organization of Eastern Caribbean States (OECS). Through the OECS, Saint Vincent and the Grenadines has developed a common currency and a shared system for the administration of justice. It is in the process of developing a common approach in other areas, such as education, telecommunications, health and environmental management. The country has a multi-party system in place and elections are constitutionally due every five years.

4.3.1. **Political Structure and Organization**

St. Vincent and the Grenadines is a parliamentary democracy within the Commonwealth of Nations and has a constitutional monarchy whereby executive power is vested in the British monarch, represented locally by a Governor-General who appoints a prime minister and cabinet of ministers. Control of the government rests with the prime minister and the cabinet. The country gained independence from Great Britain on 27th October, 1979.

The country is divided politically and administratively into six parishes. Five parishes (Charlotte, Saint Andrew, Saint David, Saint George, Saint Patrick) are on the island of Saint Vincent and the sixth is made up of islands of the Grenadines.

4.3.1.1. **Executive Branch**

The executive authority of Saint Vincent is vested in her Majesty, the Queen. This authority may be exercised on behalf of Her Majesty by the Governor-General. The Prime Minister is appointed by the Governor-General, and the Governor-General appoints a Representative who appears likely to command the support of the majority of the Representatives. The Governor-General holds the power to remove the Prime Minister from office if a resolution of no-confidence in the Government is passed by the House and the Prime Minister does not within three days either resign from his office or advise the Governor-General to dissolve Parliament.

In accordance with advice given by the Prime Minister, the Governor-General appoints members of the House to the office of Minister. Not more than two Ministers of the Cabinet may be appointed from among the senators. The Cabinet consists of the Prime Minister and the other Ministers, and its functions are to advise the Governor-General in the government of the country. The Cabinet is collectively responsible to the House for any advice given to the Governor-General or any action in the execution of office. The Prime Minister has power over the appointment of the following authorities or persons:

- The Deputy Governor-General, on his advice;
- Four senators are appointed and removed on his advice;
- one member of the Constituency Boundaries Commission is appointed on his advice;
- The size and membership of the Cabinet and the allocation of portfolios to Ministers and their removal is determined by the Prime Minister;
- The Chairman and all members of the Public Service Commission and the Police Service Commission are appointed by the Governor-General on his advice. However, he has to consult with the Civil Service Association and the Police Welfare Association respectively; and the Leader of the Opposition on the appointment of Members other than the Chairman, before tendering advice to the Governor-General.
- One member of the Public Service Board of Appeal, on his advice.

The Prime Minister initiates the process for the removal from office of members of the Public Service Commission and the Police Service Commission. Furthermore, the Prime Minister has veto power over the appointment of all public officers to whom section 79 of the constitution applies (e.g. Secretary to the Cabinet, Permanent



Secretaries and Heads of departments of Government). There is no limit on the number of terms a Prime Minister may serve.

The Governor-General appoints a Leader of the Opposition.

The current Chief of State is Queen Elizabeth II (since February 06, 1952). The Governor General and Prime Minister are Sir Frederick Nathaniel Ballantyne (since September 02, 2002) and Dr. Ralph E. Gonsalves (since March 29, 2001).

4.3.1.2. **Legislative Branch**

The House of Assembly of St. Vincent and the Grenadines consists of 21 members. There are 15 elected representatives - one for each of the country's constituencies. Representatives are elected by secret ballots under the simple plurality system, i.e. 'first-past-the-post system'. In addition to the representatives there are six senators; four of the senators are appointed by the Governor-General acting on the advice of the Prime Minister, and two are appointed by the Governor-General acting in accordance with the advice of the Leader of the Opposition. A senator's appointment may be revoked by the Governor-General if his dismissal is ordered by the person on whose advice he was appointed, that is to say, either by the Prime Minister or by the Leader of the Opposition.

Parliament continues for five years from the date of the first sitting of the House after dissolution. It is, however, provided that the Governor-General may refuse to dissolve Parliament.

4.3.1.3. **Judiciary Branch**

The judiciary consists of lower courts and a High Court, with appeal to the Eastern Caribbean Court of Appeal and final appeal to the Privy Council in the United Kingdom.

Saint Vincent and the Grenadines is a member of the Organization of Eastern Caribbean States (OECS), a group of six countries and three territories with a common jurisdiction. The structure and organization of justice sector institutions are therefore quite similar throughout the OECS member states and unified in regard to the judicial branch. The Eastern Caribbean Supreme Court was established in 1967 by the West Indies Associated States Supreme Court Order No. 223 of 1967. It is a superior court of record for six Member States and three Territories. The Eastern Caribbean Supreme Court has unlimited jurisdiction in the Member States, in accordance with the respective Supreme Court Acts. Section 17 of the Courts Order empowers the Chief Justice and two judges of the Supreme Court, selected by the Chief Justice, to make rules of court for regulating the practice and procedure of the Court of Appeal and the High Court.



The four member Court of Appeal is itinerant and sits in each Member Territory to hear appeals. The Court of Appeal hears appeals from the decisions of the High Court and Magistrates' Courts in Member Territory in both civil and criminal matters. Each Member Territory has its own High Court. There are thirteen High Court Judges who are assigned as resident Judges in the various member states. National legislation confers rule-making authority on the Chief Justice in relation to matters outside the Court of Appeal and the High Court.

The Judicial Committee of the Privy Council serves as the highest court of appeal for several independent countries that were formerly part of the British Empire, the UK overseas territories, and the British crown dependencies. However, the Caribbean Court of Justice is a nascent regional judicial body intended to replace the Judicial Committee of the Privy Council.

The 'Agreement Establishing the Caribbean Court of Justice' was initially signed on 14 January 2001, and the Revised Agreement Establishing the Caribbean Court of Justice Trust Fund entered into force on 27 January 2004 on signature by ten of the CARICOM Member States. The Caribbean Court of Justice is based in Port of Spain, Trinidad.

5. St. Vincent and the Grenadines' Legal, Normative and Institutional Disaster Risk Reduction Profile

5.1. Legal Framework

St. Vincent and the Grenadines rank among the most vulnerable countries in the world yet disaster risk reduction is not a central theme in its legislative plans. There is not a comprehensive disaster management strategy but the constitution makes provision for a state of emergency to allow the country to focus on the threats or outcomes of natural or anthropogenic hazards. This provision does not speak to preparedness or risk mitigation which are central themes in a disaster management strategy but these elements are addressed in The National Emergency and Disaster Management Act # 15 of 2006.

5.1.1. Constitution

St. Vincent and the Grenadines Constitution of 1979, Sections 14, 17 and 72 of the Constitution states that 'the Governor General may, by proclamation which shall be published in the Official Gazette, declare that a state of emergency exists'. According to Section 17(2) a proclamation shall not be effective unless it contains a declaration that the Governor-General is satisfied- a). that a public emergency has arisen as a result to the imminence of a state of war between Saint Vincent and a foreign state; b). that a public emergency has arisen as a result of the occurrence of any volcanic eruption, earthquake, hurricane, flood, fire, outbreak of pestilence or of infectious disease, or other calamity whether similar to the foregoing or not; or c). that action has been taken, or is immediately threatened by any person, of such a nature and on so extensive a scale, as to be likely to endanger the public safety or to deprive the community or any substantial portion of the community of supplies or services essential to life'. Section 17 also sets out the procedure regarding lapse, revocation and extension. A declaration made during the sitting of the House lapses within a week from the date of publication, and according to Section 17 (8) any provision that a declaration of emergency shall lapse or cease to be in force at any particular time is without prejudice to the making of a further such declaration whether before or after that time. The declaration is revoked in like manner as it is made, that is, by proclamation published in the Gazette.

Irrespective of whether a former declaration has lapsed or been revoked, section 17(8) provides for a subsequent declaration to be made. Section 18(2) defines a period of public emergency to mean any period during which- a). Her Majesty is at war; or b). a declaration of emergency is in force under section 17 of (the) Constitution

5.1.2. Laws and legally binding provisions

Emergency Powers Act, Chp. 274 (Rev.)

This Act is supplementary to Section 17 of the Constitution which speaks to the power to declare an emergency. Section 3 of this Act empowers the Governor General to make regulations touching and concerning several aspects of governance such as communications and transport, utilities and imposition of curfews. It provides a non-exhaustive list of the powers of the Governor General who is the primary government official constitutionally authorized to declare a state of emergency. It illustrates that the power wielded by the Governor General and by extension the Executive during a formally declared period of emergency is far-reaching. The declaration of a state of emergency therefore elicits the exercise of certain powers as statutorily ordained. The Emergency Powers Act is useful in its expression of the scope of the Governor General's powers and responsibilities.

The National Emergency Management Organization Act # 15 of 2006 authorizes NEMO to declare an *area of disaster* after consultation with the Physical Planning Department. This act does not infringe on civil liabilities but allows NEMO to restrict activities that will impinge on the smooth and speedy execution of their response work.

Outside of the Emergency Powers Act there are other national legislations of importance to the DRR framework. The list includes the Town and Country Planning Act, Forest Conservation Act, the National Ocean Policy, the Central Water and Sewerage Act and the Environmental management Act. Given the links between DRR and physical development, it is imperative that these legislations be seen as the risk reduction elements of development and not as impediments to the process.

5.2. Normative framework

5.2.1. Normative Instruments for Disaster Risk Reduction: Technical and Political Decision Making

National Emergency Management Organization Act, No. 15 of 2006

Part 1 of this Act defines a disaster as 'an actual or imminent situation, whether natural or otherwise, which requires a significant and coordinated response and is caused by an occurrence such as volcanic eruption, earthquake, hurricane, flood, tidal wave, landslide, fire or epidemic and which causes or threatens to cause widespread loss or damage to property, widespread loss of human life, injury or illness to human beings, or damage to or degradation of the environment, but excluding events occasioned by war or military confrontation'. The definition is quite comprehensive and coincides



essentially with the situations expressed in section 17 (3) of the Constitution but it precludes a military confrontation. The Act imposes an obligation on the Director of the National Emergency Organization (NEMO) upon consultation with the National

Emergency Council to prepare an annual report on the exercise of the functions of NEMO. The report is required to include a Disaster Management Policy Review related to disaster management in the State. This report is to be submitted to the Minister responsible for disaster management and then to the House of Assembly for approval.

If approved, it is then published. The Act distinguishes between a disaster and an emergency defining the latter to mean —'an adverse event that can be taken care of by local community resources', thus on a smaller scale to a disaster. Nonetheless, Section 3(2) of the NEMO Act underscores the linkage between the Governor General's constitutional power to declare a state of emergency and that of the Minister's power to declare a disaster. It provides that, —where a period of emergency exists, the National Emergency Management Organization and any other person or body exercising powers and functions under this Act may, if it is required by the Governor- General, exercise such powers and functions as the Governor-General may permit.

Part 5 underscores the need for effective communication between the Director of NEMO and various Permanent Secretaries and heads of government departments through liaison officers.

Section 26(2) in particular emphasizes the importance of ensuring that the lines of communications are clear and that funds allocated for disaster management are managed well and made readily available. This section allows for the involvement of persons, bodies or organizations that is presumed to be a worthwhile alliance. Part 6 23 concerns the designation of vulnerable areas and highlights the involvement of the Planning Board by virtue of Section 7 (1) (b) of the Town and Country Planning Act in disaster management.

5.2.2. **Public Policies.**

In 2003, the Caribbean Development Bank (CDB) and the Caribbean Disaster Emergency Management Agency (CDEMA), formerly CDERA, produced the National Hazard Mitigation Policy. The National policy is currently in its draft form awaiting the

parliamentary consent. Disaster risk reduction through development policy and planning is still in its early development (SPCR, 2011).

5.3. Institutional framework

5.3.1. Organization of the National System and Mechanisms

National Emergency Management Organization (NEMO)

NEMO is a Government department in the Ministry of National Security, Air and Sea Port Development whose chief responsibility is that of —coordinating disaster management in the state. NEMO is responsible for preparing the National Response Plan. The National Emergency Council, the National Emergency Executive Committee and District Disaster Management Committees are the key organs of NEMO (See Figure 1). These supplementary centres are indeed the hub through which all activities in response to disaster and disaster alerts are channelled.

NEMO's mandate is comprehensive and its activities varied. The agency coordinates the input of both government and non-governmental agencies and department into the DRR process. NEMO operates as a local initiative enabling a degree of self-sufficiency to address local concerns of individuals, organisations and ministries with financial support from the Government through funds appropriated annually. Undoubtedly, regional and international networking with relevant agencies and organization is part of holistic disaster management machinery.

The National Emergency Council

This Council represents the pooling of resources from a wide cross section of high-level Government officials in the state and is chaired by the Prime Minister. The composition of the council includes:

- The Deputy Prime Minister;
- The Attorney General; the Director General of Finance and Planning;
- The Director of the National Emergency Management Organisation;
- The Commissioner of Police.
- The Ministers responsible for –
 - disaster management,
 - national security,
 - works,
 - housing,



telecommunications,
health and the environment,
social development or mobilization,
energy;

The National Emergency Executive Committee

This body exercises a supervisory role over sub committees established concerning matters such as public information, training and education, damage and needs assessment, transport and road clearance, emergency shelters and shelter management, emergency supplies, health services, emergency telecommunications, search and rescue (land and sea), rehabilitation and reconstruction and voluntary services. The members of these sub committees are listed in the Saint Vincent and the Grenadines National Response Plan which is a document required by the NEMO Act to be prepared by NEMO. Overall, the Executive Committee is obligated to report to the Council whose authority exceeds it. The Executive Committee is chaired by the Director of NEMO with the Permanent Secretary in the Ministry of National Security responsible for disaster management as Deputy Chairperson.

District Disaster Management Committees

These Committees are chaired by the designated District Coordinator and is comprised of as many persons as are necessary for it to function efficiently. There is a measure of flexibility in terms of its membership and as such the membership is reliant on the scale of disaster or emergency involved.

5.3.2. National Plans and their Implementation

In 2005, the National Disaster Plan was revised. The plan establishes that upon the declaration of a disaster or imminent threat thereof, the National Emergency Operations Centre shall be activated, under the direction of the Prime Minister, by the Disaster Coordinator or designate. The National Disaster Coordinator or designate shall assume full responsibility for the NEOC and shall be responsible for the coordination of all response and relief activities as identified under the Disaster Management Act of the Laws of St. Vincent and the Grenadines.

In carrying out his responsibilities the NDC shall advise the Prime Minister, on a daily basis, of all actions undertaken or planned. The latest version of the National Disaster Plan emphasizes the role of NEMO stating that in the context of the plan, Disaster Preparedness means preparing the community to react promptly to save lives and protect property if the island is impacted by a disaster or major emergency of any kind.



In this regard, the role of the National Emergency Management Organisation is that of providing training for the various agencies involved in disaster management. The functions of the National Emergency Organisation, as specified in this plan, can be divided into six categories:

Training: The identification of skills necessary to implement a national disaster management programme and the sourcing of the necessary trainers to prepare and conduct the relevant training.

Informing: The development and dissemination of information packages to enhance the capability of individuals, government entities and the private sector to cope with emergencies.

Warning: The analysis and forecasting of the nature of potential hazards.

Coordinating: The development and implementation of systems to coordinate the work of the various agencies involved in disaster preparedness, response, and rehabilitation, and the enabling of resources to be effectively applied during and after a disaster.

Warehousing: The provision and maintenance of extraordinary resources and stocks to meet emergency needs, and

Evaluating: Conducting an annual review of the agency's performance and designing measures to improve its performance.

6. The State of Disaster Risk in St. Vincent and the Grenadines

This section presents disaster risk for St Vincent and the Grenadines including hazards, vulnerabilities and capacities. Disaster risk is defined as “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” (UNISDR, 2009)⁶.

The information on disaster risk for SVG emanates from a wide range of sources including, archival materials, disaster databases such as CRED EMDAT, newspapers, situation reports, government reports, INGO and NGO reports including Red Cross, USAID, UNDP, UNECLAC, National Disaster reports, poverty assessments and journal articles.

St. Vincent and the Grenadines like many other SIDS in the Caribbean share certain inherent vulnerabilities which hinder their ability to achieve developmental goals. The vulnerabilities include; smallness, remoteness, geographical dispersion, vulnerability to natural hazards, the fragility of their ecosystems, constraints on transport and communication, isolation from markets, exogenous economic and financial shocks, limited internal market, lack of natural resources, limited fresh water supplies, heavy dependence on imports and limited commodities among others (UWICED, 2002).

6.1. Historical Disasters Analysis

At present there is no formal cataloguing of disasters for St Vincent and the Grenadines, however, efforts are underway to populate the DesInventar database making it usable by the end of 2014. Various records have however been compiled which informs this documentation. The records will need to be updated regularly as SVG faces annual impact from hazards.

This section presents the main hazards and frequency of occurrence for St Vincent and the Grenadines focusing on 1900 to 2013. All the information required for detailed assessments are not always readily available especially for earlier records, this limits the level of analysis that can be undertaken with the available data.

The main hazards to have affected SVG in the past include hurricanes and storms, earthquakes, volcanic eruptions, drought, floods, fires landslides and various other

⁶UNISDR (2009) “UNISDR terminology on Disaster Risk Reduction”. Geneva, Switzerland.

threats including oil spills, pest and diseases. Tropical Storms and hurricanes have been responsible for most of the devastation that have occurred in St Vincent and the Grenadines, See Table 1. This is supported by database such as CRED/EMDAT, although the criteria of such databases do not always reflect the real disaster in Small States like SVG. SVG has been affected by 14 hurricanes and storms between 1900 and 2013. Hurricane Janet in 1955 is responsible for the single largest number of people killed in such events, 122 people. The hurricane also damaged crops and coastal roads. Hurricanes and storms have also severely affected the housing sector in St Vincent and the Grenadines including the impact of Hurricane Lilli in 2002 and Ivan in 2004, each of which affected over 700 houses. Hurricane Emily in 2005 affected over 500 houses and hurricane Tomas in 2011 affected about 1,200 houses.

Type Of Events	Years Of Occurrence	Number Of Events	Loss Of Lives
Earthquake	1928, 1939, 1946, 1953, 1997	5	0
Flood	1977, 1986, 1987, 1992, 2011, 2013, 2014	7	3 in 1992
Hurricanes and storms	1916, 1955, 1967, 1974, 1979, 1980, 1986, 1987, 1999, 2002, 2004, 2005, 2007, 2008, 2010,	15	122 in 1955, 2 in 1967, 4 in 2002, 1 in 2008, 9 in 2010.
Volcanic eruption	1902, 1971, 1979	3	1600 in 1902
Drought	1970 – 1975, 2009-2010	2	0

Table 1: Summary of major events impacting St. Vincent and the Grenadines 1900 to 2013

The most costly hazard events in St Vincent and the Grenadines (SVG) resulted from Hurricane Tomas in 2010, which cost about EC\$130 million and the 2013 flood in December 2013 which resulted in damage and losses of US\$ 108.4 mil or (EC\$291.4 million). The cost of the 2013 flood is equivalent to 15% of the country's gross domestic product (GDP), (GOVSVG, 2014)

Hurricane Tomas resulted in disaster areas being declared on the North Eastern side of the island including Park Hill, Chester Cottage, Sandy Bay and Byera and on the North Western side including Chateaubelair, Coulls Hill, Spring Village and Fitz Hughes.

The hurricane injured 2 persons injured, affected about 6100, damaged 1200 homes and destroyed about 20 houses. Damage was also done to schools, community centres and other facilities. The agricultural sector experienced widespread damage especially to bananas and plantains destroying almost 98% in the affected areas. Tree crops and

vegetables were also severely affected. Damage was done to water, telecommunications and electricity.

SVG also experienced a rainstorm in April 2011 about six months after Hurricane Tomas which caused severe flooding, landslides and the destruction of several bridges in some of the same areas affected by the hurricane. This disaster cost about EC\$84 million.

There is an active volcano in SVG which last erupted in 1979. Although only two persons are known to have died from the event, it created island-wide impact. Over 20,000 inhabitants from the north of the island had to be evacuated and were displaced for months. There was also widespread damage to agriculture. Table 2 provides a summary of past eruptions.

Year	Volcano	Nature of Disaster (costs in year 2000 dollars) *
1718	Soufriere (St. Vincent)	Major explosive eruption. Unknown number of casualties amongst indigenous Caribs.
1812	Soufriere (St. Vincent)	Major explosive eruption. About 80 deaths. Considerable damage to the sugar industry. Economic cost unknown.
1902	Soufriere (St. Vincent)	Major explosive eruption. About 1600 deaths. Considerable damage to the sugar industry. Economic cost estimated at US\$200,000,000.
1971	Soufriere (St. Vincent)	2000 affected 10,000 evacuated, 40% decline in agricultural output after eruption.
1979	Soufriere (St. Vincent)	Moderate explosive eruption. No casualties, 20 000 evacuated. Extensive agricultural and overall economic losses of about US\$100,000,000

Table 2: Summary of the eruption of La Soufriere, SVG, Adapted from Seismic Research Centre (n.d.)⁷

⁷Seismic Research Centre (n.d.) "Volcanic Activity in the Eastern Caribbean" University of the West Indies: St. Augustine, Trinidad and Tobago. Online. Available at: <http://www.uwiseismic.com/General.aspx?id=19> Accessed: 12 March 2012.

The trend of disasters impacting SVG is similar to the global disaster trend of a decrease in the loss of lives but an increase in the cost and loss to the state as well as an increase in the number of persons affected, therefore increasing vulnerability.

6.2. Hazards / Threats

The Island State of SVG is one of the youngest Antillean volcanic islands on the edge of Eastern Caribbean Island Arc. This location on a subduction zone makes SVG prone to earthquake and volcanic hazards. La Soufriere an active volcano and the underwater volcano Kick em Jenny constitutes permanent threats to SVG.

In addition, SVG is geographically located 13 ° 15' N and 61° 12' W which places the state in the Atlantic hurricane belt. The island state is vulnerable to weather extremes including rainstorms and drought. Landslides, particularly on Mainland St. Vincent, are a significant hazard and the risk increases during the rainy season. Coastal flooding is a major concern particularly relating to storm surges and high wave action. The Grenadines are more susceptible to drought, as there are no rivers; rain water harvesting is the main source of water in these islands. The 2009 – 2010 periods was considered the worse dry spell or drought in the last decade, with the country declaring a drought alert. As a result a mandate was issued by Cabinet early in 2010 to form a drought alert task force to address drought management.

Climate variability is likely to exacerbate the risk caused by meteorological hazards especially as it relates to settlements close to the sea and rivers. Approximately 41.6 per cent of the population of SVG is exposed to two or more hazards (GFDRR, 2010). In addition, the mountainous nature of the island has led to construction on slopes or along narrow coastal plains susceptible to hazards.

Apart from these natural events, the multi-island state lies in a major shipping channel making it vulnerable to the impacts of marine disasters such as oil spills. Other potential disasters include chemical spills, major transportation accidents (land, sea and air), oil fires, civil strife and epidemics (NEMO, 2005)⁸. The following section describes the range of hazards to which SVG is at risk.

⁸ NEMO (2005) "St Vincent and the Grenadines National Disaster Plan". Kingstown: St Vincent and the Grenadines.

6.3. Hazard Background Information

6.3.1. Natural Hazards: Geological

The main geological hazards to which SVG is exposed include; earthquakes, volcanic activity, landslide and tsunamis. SVG is part of the Eastern Caribbean Island arc which is located on a convergent plate boundary where subduction occurs triggering volcanic and seismic activity.

6.3.1.1. Volcanic Eruptions – La Soufriere

La Soufriere a strata-volcano is the only active volcano on mainland St. Vincent. The volcano rises to a height of about 4,048 feet (1,234 metres) and has an open summit crater 1.6 km in diameter.

The historical record of La Soufriere indicates eruptions occurred in 1718, 1812, 1902, 1971 and 1979. The 1812 eruption caused about 80 deaths while the 1902 eruption caused about 1600 deaths. The eruptions have caused damage and lost to farming and properties. In the 1979 eruption no one was killed directly, but about 20,000 people were evacuated from the northern part of the island.

La Soufriere is likely to erupt in the future with either quiet effusive or violent explosive eruptions (Robertson, 2005)⁹. The accompanying hazards from an eruption could include pyroclastic flow and surges, ash fall, mud flows, and ballistic projectiles in addition to secondary hazards such as flooding, fires and possibly tsunamis.

The eruption of La Soufriere volcano will significantly affect communities in the north especially in the red and orange zones, See Figure 4. Members of these communities will need to evacuate. Volcanic ash is hazardous to people, animals, crops, properties and vehicles. Volcanic ash can also affect drinking water and air quality. Agriculture is the primary livelihood activity in the high risk communities and will be severely affected in the aftermath of an eruption.

⁹Robertson, Richard (2005) Seismic Research Unit, The University of the West Indies, Trinidad and Tobago.

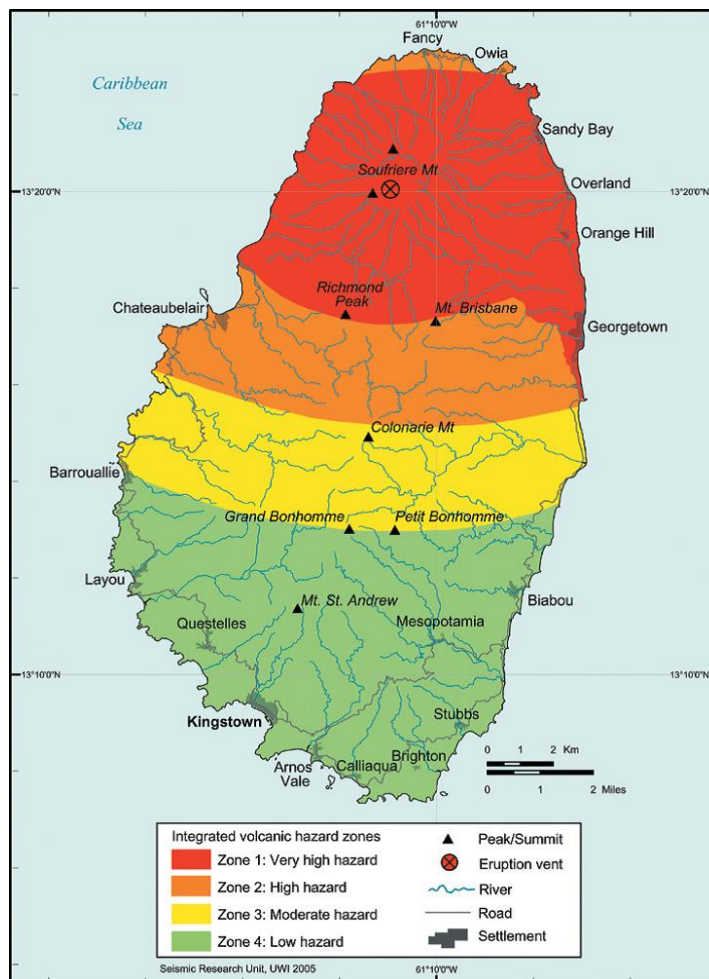


Figure 4. Volcanic Risk Zones for SVG

6.3.1.2. Earthquakes

Earthquakes can be either tectonic or volcanic, both of which can affect islands in the Eastern Caribbean. The historical records of the Caribbean indicate that every island in the Caribbean is within 200 km of the largest earthquake events to have occurred in the past, See Figure 5. Each year, the Eastern Caribbean experiences about 1200 earthquakes greater than magnitude 2.0. It is also estimated that the region will experience at least one magnitude 6 earthquake every 3 – 5 years. It is also estimated that the earthquake zone where SVG is located could experience earthquakes of level VII in Mercalli intensity scale for a return period of 50 years, which would imply damage

to some construction and different signs of movement (OAS, USAID/OFDA, 2002)¹⁰. This means that based on the Modified Mercalli Scale for poorly build structures will be considerable damaged and persons will feel and observe the effects for an earthquake of this scale.

The most recent significant earthquake experienced in SVG magnitude 7.3 earthquake which occurred on 29th November 2007 around 3:00 p.m., in the Caribbean Region. The epicentre was off the north coast of Martinique and tremors were felt from Puerto Rico to Guyana. Damage was recorded in Dominica, St Vincent, Martinique, Guadeloupe and Barbados (SRC, 2007). Since then there have been the devastating earthquakes in Haiti in 2010 which left about 222,750 people dead and 300,572 injured, 105,000 homes completely destroyed and 208,000 seriously damaged (Government of Haiti, 2010). The level of risk and vulnerability will vary from island to island but the threat of earthquake exists for all islands in the Caribbean Region.

The potential consequences of an earthquake differ from those of other hazards because of its unique characteristics which include ground shaking and induced ground failures.

6.3.1.1. **Ground Shaking**

The potential severity of ground shaking and its consequential impact on buildings and life-lines depend on several factors. These factors include magnitude of the earthquake at the epicenter (point of origin), the distance and the type of materials through which an earthquake travels. The characteristics of the ground on which affected structures are located, the quality or structure of the building, adherence to building codes as well as the duration of the shaking are other contributing factors which would determine the destructiveness of an earthquake.

6.3.1.2. **Induced Ground Failures**

Ground shaking could trigger landslides or rock falls, and could cause liquefaction which, in turn, could result in casualties or damage to structures.

¹⁰ OAS, USAID/OFDA (2002) Caribbean Disaster Mitigation Project. Online. Available at: <http://www.oas.org/CDMP/document/seismap/>

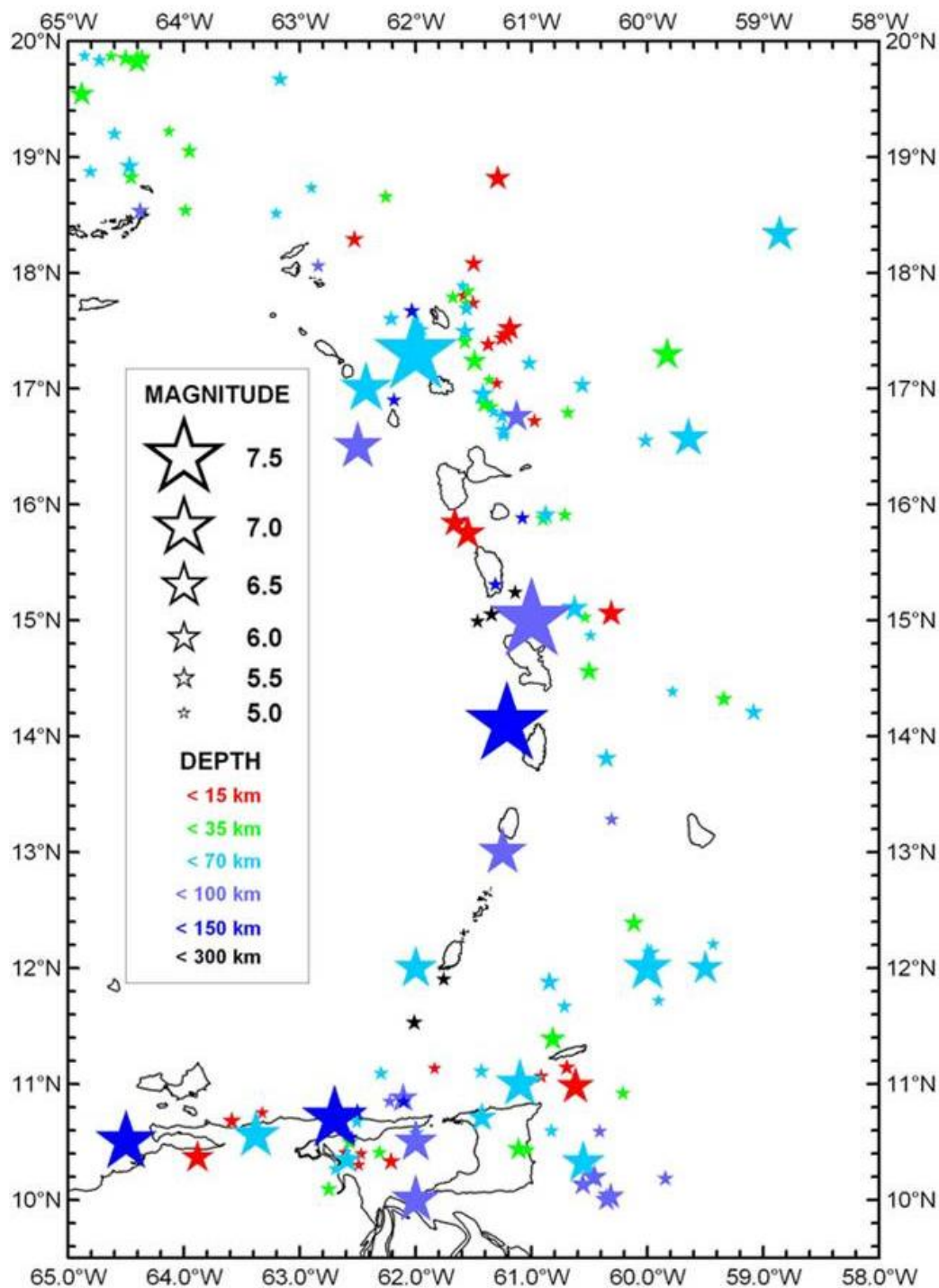


Figure 5. Eastern Caribbean Epicentres 1900 – 2005 (magnitudes 5.0 and above)

6.3.1.3. **Tsunami**

A tsunami is an ocean wave that is generated by a sudden disturbance of the ocean floor that displaces a large amount of water. Tsunamis are not always a 'single wave' event, with subsequent waves often being larger than the first.

Tsunamis can occur as a result of volcanic eruption, earthquake, or landslides. The most likely cause is from earthquakes of magnitude 6.5 or more. The kick em Jenny under water volcano located 9 km off Grenada has caused small tsunamis in the past (1939 and 1955) and has the potential to cause tsunamis in the future. It is estimated that over the last 500 years over 10 tsunamis have occurred in the Eastern Caribbean resulting in about 350 deaths from only four (4) of these events.

It is estimated that Caribbean tsunamis may achieve speeds of 500-600km/h, even rising to 800km/h, depending on the depth of the water. Tsunamis generated in the Caribbean can reach multiple islands over a short time span. Presently, there is no Caribbean Tsunami warning centre, advisories and updates are provided from the Pacific Tsunami Warning Centre based in Hawaii. The NEMO has the responsibility to disseminate tsunami information and warnings and is in the process of finalizing the tsunami protocols for St. Vincent and the Grenadines.

6.3.2. **Natural Hazards: Hydro meteorological Hazards**

SVG has a tropical marine climate regulated by the NE trade winds. There is little variation in temperature, which ranges from about 26 °C to 32 °C, with a small diurnal range of about 3° Celsius. Rainfall is high and falls mainly between June and December with an annual average from 60 to 150 inches. The rainy season coincides with the Atlantic Hurricane Season from 1st June to 30th November annually. There is a dry season, which usually extends from January to May.

The Hydro meteorological hazards to which SVG is exposed include tropical storms and hurricanes, storm surges, floods and drought. Floods are considered the most frequent hydro-meteorological hazard occurring both during and outside the rainy season but hurricanes are most likely to result in devastation (CARICOM Secretariat 2003). SVG's location at the lower end of the hurricane belt suggest that it is less likely to have a direct hit from hurricanes in comparison to islands at higher latitudes, however, the presence of a system in the region can have a devastating impact on the state as occurred in past events. Climate variability is contributing to increase frequency and severity of hydro meteorological events. The variability in the climatic system is also likely to continue to increase as it is driven by human activities. SVG is already experiencing some of the effects of climate variability through damage from severe and

extreme weather events as well as incremental changes in temperature and rainfall pattern.

Climate modeling projections for SVG predicts

- An increase in the average atmospheric temperature

- Reduce average annual rainfall

- Increased Sea Surface Temperature (SST)

- The potential for an increase in the intensity of tropical storms (CARIBSAVE, 2012).

This has implications for tourism, agriculture and food security as well as the well being of people who depend on these sectors for a living both directly and indirectly. In the Grenadines a reduction in average annual rainfall will impact the availability of water as they depend on rain water harvesting for their supply.

The Meteorological Service at the E. T Joshua Air Port issues weather advisory using information from the Barbados Meteorological Office; the Central Water and Sewerage Authority has rain gauges in every sector of the island and the Ministry of Agriculture maintains a functional set of stream gauges and meteorological stations on the island. These units all need to be automated and integrated to maximize their efficiency and provide more accurate and reliable precipitation data for decision making. The foregoing initiatives provide a good starting point for an EWS but demand good cooperation and a strong information sharing arrangement. The system for monitoring hydro meteorological stations must be automated to allow for real time update and exchange of data in order that the early warning system can be meaningful and effective.

6.3.3. **Anthropogenic/Man-made Hazards**

Anthropogenic or man-made hazards are triggered by human actions, faulty human systems or negligence. This includes socio-natural hazards such as the settlement of high risk areas and poor quality housing and social services. It also includes technological hazards such as oil spills, transport accidents (sea, air and land) and explosions. Other man-made hazards include land degradation, deforestation and fires.

SVG is characterized by a steep rugged interior and a narrow coastal plain about 5 m above sea level and less than 5km from the high water mark. This topography is highly vulnerable as the mountainous areas are prone to landslides and the coastal areas to flooding, storm surges and other coastal hazards. In addition, the narrow coastal plain is densely populated and is where most of the critical infrastructure, investment and

development are concentrated. As such the losses from disasters can be quite significant for SVG and the cost of recovery high.

The housing stock consists of a combination of formal housing some of higher building standards than others and informal settlements with houses of lower building standard and often not built with the approval of the Physical Planning Authority. The history of disaster for SVG shows that housing is one of the sectors that have been severely affected. This includes over 500 damaged by hurricane Emily 2005, 18 completely destroyed, over 700 houses damaged by hurricane Ivan 2004, 56 completely destroyed, over 600 damaged by Tropical Storm Lili 2002, 24 completely destroyed and even high figures for more recent events such as Hurricane Tomas in 2010 as stated earlier.

Anthropogenic or manmade hazards are exacerbated by factors such as poverty, unemployment and limited livelihood opportunities especially in rural farming communities. In addition, the global economic slump will contribute to a decrease in revenue from tourism and agriculture and will reduce remittances. Remittances contributed over 25 percent to GDP in 2006 but decreased to 13 percent in 2008 (Ministry of Finance and Planning¹¹, 2008; UNDP, 2010¹²). A decline in revenue from agriculture and tourism have plunged people further into poverty and limits the ability of families to provide their basic needs of food shelter and clothing. Climate change will also contribute to the increase risk of ill health in the population.

6.3.4. **Emergencies affecting Public Health and Safety**

St Vincent and the Grenadines health care system consist of 6 public hospitals(one in Kingstown and 5 rural), 3 private hospitals, 39 outpatient clinics and a mental health centre, 1 geriatric facility and 6 private nursing homes¹³.

Vector borne diseases that threaten the health sector include dengue, leptospirosis, malaria and recently chikungunya. The cases of dengue have increased from less than 20 cases in 2007 to over 200 in 2010. Twenty cases of pandemic influenza (H1N1)

¹¹ Ministry of Finance and Planning (2008) St Vincent and the Grenadines Country Poverty Assessment 2007 - 2008: Living conditions in a Caribbean Small Island Developing State. Kingstown, St. Vincent and the Grenadines.

¹² UNDP (2008) Social implications of the Global Economic Crisis in Caribbean Small Island Developing States: 2008 – 2009. St. Vincent and the Grenadines Country Report. Online. Available at:

¹³ PAHO (2012) Health in the Americas: Country Volume. Online. Available at: <http://www.paho.org/www.paho.org/healthintheamericas>. Accessed 2 September 2014.

were reported in 2009. It has been shown that dengue fever transmission is altered by increases in temperature and rainfall. In SVG, there was an average of ten (10) cases per year for the last decade with 58% of cases occurring in 2010. This may be due to either drought conditions between October 2009 and January 2010 or episodes of high precipitation such as severe floods in April 2010 or Hurricane Tomas in October 2010. Definitive statements can only be made with monthly data.

Leptospirosis is endemic with poor disposal habits and improper disposal Infrastructure contributing to conditions that encourage the proliferation of rats in the country. In addition to the direct threat of injury or death from a particular natural disaster such as floods, physical and capital damage to health facilities may also arise. Displacement of persons and loss of shelter are important because of the associated mental and physical impacts. Increasing temperatures can result in heat stress; heat wave events have been found to be associated with short-term increases in mortality globally as well as morbidity related to heat exhaustion and dehydration.

The potential effects of climate change on public health can be direct or indirect. Direct effects include those associated with extreme weather events such as heat stress, changes in precipitation, sea-level rise and natural disasters; indirect effects are associated with changes in ecosystems and various sectors such as water, agriculture and the wider economy. The acquisition of an infection can have consequences for persons visiting a destination which can significantly affect the economies of Small Island Developing States (SIDS) because of a loss of reputation and avoidance of these destinations by tourists.

6.4. **Vulnerability**

UNISDR (2009) defines vulnerability as “the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard”. The uniqueness of islands has given rise to a globally recognised group, SIDS which has special conditions of vulnerability that threatens their sustainable development.

SVG as a SIDS face many of the vulnerabilities synonymous with other countries in this special category. SVG (389 sq.km/150 sq. mi) is a multiple Island State which consist of mainland of St Vincent (344 sq.km/133 sq. mi), and over 30 islands and cays of the Grenadines (45 sq.km/17 sq. mi). The population of St Vincent and the Grenadines is estimated at 109 991 people (Statistical Office, 2012). The largest concentration of people is located in the capital Kingstown and its suburbs combined then in Calliaqua. As noted earlier, about 41.6 per cent of the population is exposed to two or more hazards (GFDRR, 2010).

Vulnerable settlements include a number of informal settlements with dwellings constructed haphazardly without proper building regulations (GFDRR, 2010). In addition, the mountainous nature of SVG has led to construction on slopes or along the narrow coastal plains. The economy of the island is highly dependent on both agricultural production and tourism. Agriculture is dominated by banana production, most of which is exported to the UK. Other crops include arrowroot, root crops, fruits and vegetables which are mainly sold in local and regional markets. Tourism is a growing sector and provides a means of economic gain, but also faces many challenges.

While there is no single measure for assessing vulnerability various tools and assessment criteria have used. These include the Vulnerability Assessment Benchmarking Tool (BTool) for the OECS, the CDEMA Disaster Management (CDM) Audit, the HFA Monitor and the Economic Vulnerability Index developed by the Caribbean Development. Boruff and cutter (1993) did a comparative analysis of the vulnerability of Barbados and SVG which highlights aspects of physical and social vulnerability in arriving at overall vulnerability.

The BTool has been used to assess vulnerability based on six components including risk identification, risk mitigation, risk transfer, disaster preparedness, emergency response and rehabilitation and reconstruction. National assessments have been conducted since the launch of the tool. However, it is not clear to what degree the results of the assessments inform decision-making. Conducting assessment with the tool requires multi-stakeholder partnerships and inter-agency collaboration for it to be effective. SVG is vulnerable to face disasters from a combination of natural and man-made phenomena and the attenuation of physical, social, economic, environmental and political factors and processes that increase the susceptibility and exposure of a community to hazards.

Economic vulnerability refers “the exposure of an economy to exogenous shocks, arising out of economic openness” (Briguglio et al. 2009)¹⁴. SIDS economic limitations result from a combination of their smallness, geographical dispersion and remoteness as well as their dependence on a narrow range of crops and services. These income sources are subject to international trade liberalisation and unstable market conditions,

¹⁴Briguglio, Lino, Gordon Cordina, Nadia Farrugia, and Stephanie Vella (2009) "Economic vulnerability and resilience: concepts and measurements." *Oxford Development Studies* 37 (3) 229-247.

which affect prices and production. The domestic markets of these states are also often too small to support economies of scale and the volume of exports is limited, this result in high transportation costs and limited competitiveness (UWICED, 2002).

The Economy of SVG is largely agricultural based and monoculture depending mainly on bananas. This crop is subject to the vagaries of international trade agreements and competition from Latin American Producers who can produce at a lower cost of production. The agricultural sector is also susceptible to extended periods of drought, unevenly distributed rainfall and natural hazards. In April 2011, heavy rainfall caused landslides and river flooding in the north eastern section of Saint Vincent. The majority of the damage was in the Georgetown area one of the main agricultural zones on the island. There was significant damage to crops and loss of livestock in the area.

Hurricane Tomas, 2010 also wreaked havoc on the agricultural sector with estimated damage of EC \$35 million. The major losses were recorded in banana and plantain production. Agricultural production is also affected by a reduction in levels during dry spells or drought. Drought alerts were issued for the Eastern Caribbean from October 2009 to January 2010. The affected area stretched from Dominica to Guyana which experienced moderate to extremely dry conditions over the four months (Farrell, Trotman and Cox, 2010¹⁵). In Saint Lucia, Barbados, St Vincent and the Grenadines and Grenada water levels dropped and States had to limit the availability of water and impose water restriction for the public during the peak of the dry season. The drought resulted in an increase in bush fires, reduction in hydroelectric power and affected agriculture (Farrell, Trotman and Cox, 2010).

While there is a growing service sector dependent on tourism, telemarketing and a small off short financial sector, these are also highly vulnerable to external shocks and the impact of hazards. The role of the tourism sector has increased significantly over the last few years as the agricultural sector declined. The sector now contributes a greater proportion to national development with direct investment and ancillary development in support service sectors (Government of St. Vincent and the Grenadines, 2011)¹⁶. While tourism, banking and other financial services are contributing more and more to the economy of SVG they also increase the vulnerability of the State as they are dependent on the stability of the developed world economy.

¹⁵Farrell, D., Trotman, A. and Cox, C. (2010) Drought early warning and risk reduction: A case study of the Caribbean drought of 2009 – 2010. Geneva, Switzerland: UNISDR.

¹⁶ Government of St. Vincent and the Grenadines (2011) Hurricane Tomas Emergency Recovery Project: Environmental Assessment. Central Planning: Kingstown.

Social vulnerability is generally used to encompass all aspects of a society including gender, age, disability, employment status, education, livelihoods, family structure and including the characteristics and experiences of communities and individuals. Some groups in a society are more vulnerable than others including, children, women, persons with disabilities and the elderly in particular men.

A study on the state of the word's children found that children are highly vulnerable and that the major reason is food security which is linked to poverty followed by the chronic illness of a parent. (UNICEF, 2006)¹⁷. Other factors which contributed to the vulnerability of children include child abuse in particular sexual abuse, having disabilities and illnesses such as HIV/Aids and involvement in crime and use and trade in illegal drugs.

Boruff and Cutter (2007) in a comparative vulnerability assessment of St Vincent and Barbados concluded that the areas with the greatest social vulnerability are in the coastal lowlands. The areas with the highest level of social vulnerability were identified as Sandy Bay, Barrouallie, Kingstown and Layou. Sandy Bay was identified as the area with the lowest levels of development and employment. In Barrouallie and Layou the high levels of vulnerability was attributed to the large number of young, retired and or disabled persons in these areas.

High population density on small islands is a factor which exacerbates vulnerability. Areas of higher population density in SVG include Kingstown and low lying coastal villages throughout the State, particularly vulnerable to the effects of storm surge. Smaller islands tend to have more development and settlement along the coast suggesting that more are at risk to natural hazards (Ferdinand, 2013). People who cannot afford to settle along the coast opt for hillsides, often squatting on government lands without the necessary regulations and guidance to support such developments. People who occupy lands illegally often do not use building codes (Manuel-Navarrette, Gómez and Gallopín, 2007). Some squatters encroach on forest reserves such as the King's Hill Forest in St Vincent contributing to deforestation and land degradation which increases vulnerability in surrounding communities.

The disproportionate vulnerability of small island states to natural hazards was demonstrated by Briguglio (1993) who, combining data on export dependence, insularity and remoteness and proneness to natural disaster, concluded that nine out of the ten most vulnerable states were islands.

¹⁷ UNICEF (2007) A study of Child Vulnerability in Barbados, St. Lucia and St. Vincent and the Grenadines. UNICEF: Barbados.



Boruff and Cutter (2003) supports other research which indicate that high physical vulnerability exist along the coastal reaches of the island, with heightened susceptibility in those areas where flood-prone waters interact with storm surges. High physical vulnerability exists also exist in the north-central portion of the island exacerbated by high landslide susceptibility and the close proximity to La Soufriere. Along the west-central coast is also highly vulnerable in particular to landslides and fires.

Critical facilities in SVG are highly vulnerable especially due to the dominance of one urban settlement with most of the essential services. Kingstown and its suburbs have been identified as storm surge hotspots by a coastal vulnerability study, see Figure 6.

The situation is compounded by a lack of proper land use planning and zoning as well as insufficient enforcement of building codes and regulations. When critical facilities are damaged their services are often delayed until repairs can be completed. Other areas along the western coastline of St. Vincent have been identified as coastal erosion hotspots. In these areas many homes have already been relocated from the coast but many still need to be relocated to reduce risk.

The proportional impact of disasters on small islands such as SVG is usually great since a single event can destroy the already limited critical facilities including airport, hospital, ports and jetties. The fishing industry is also vulnerable as boats have been destroyed in the past by storm surge, leaving fisher folks with limited options and the government with the cost of assisting the fisher folks.

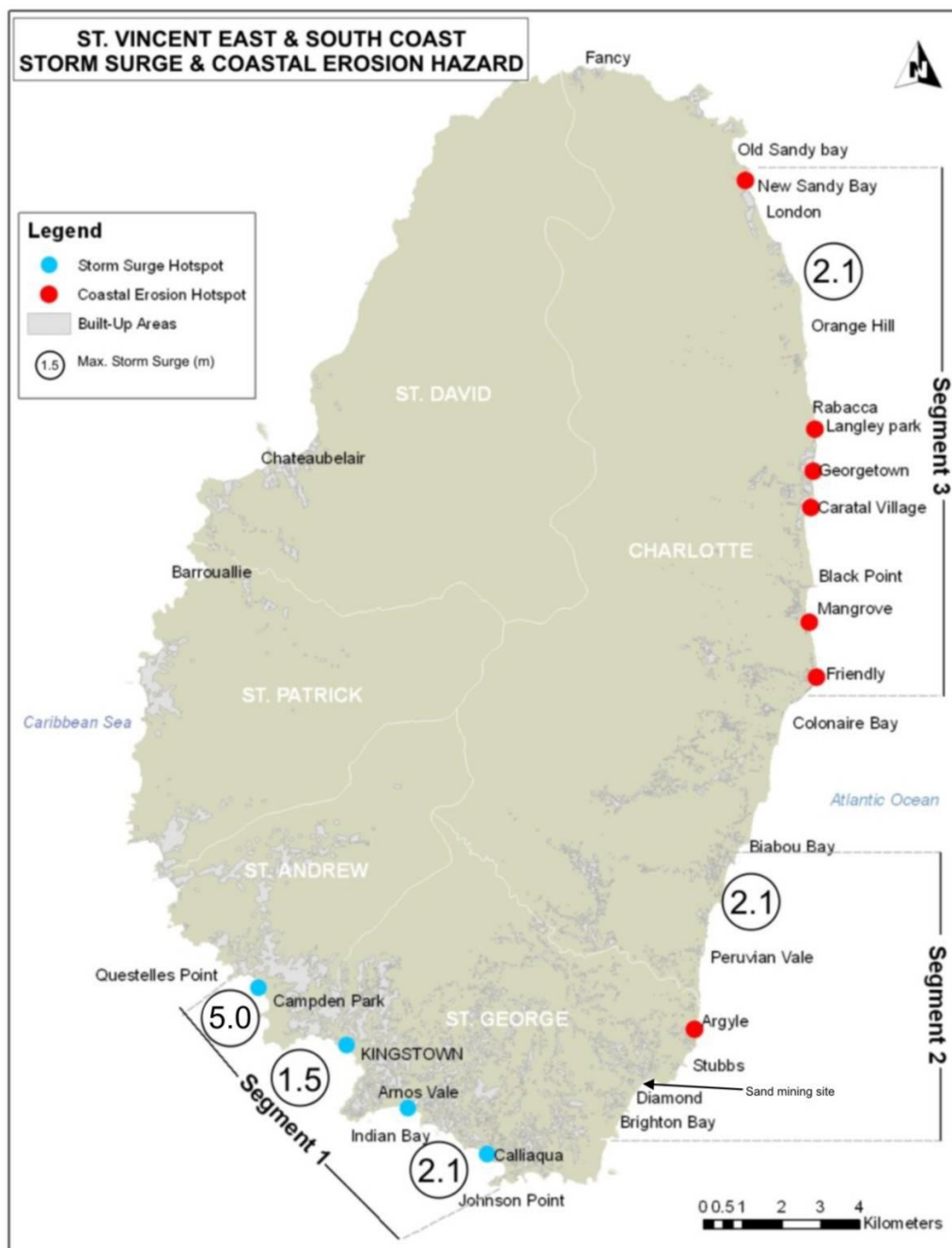


Figure 6. Storm Surge and Coastal Erosion Hotspots, (USAID, 2007¹⁸).

¹⁸USAID (2007) St. Vincent Coastal Vulnerability Assessment: Final Report. Environmental Solutions Ltd, Jamaica.

6.5. Capacities

Capacity is defined as “the combination of all the strength, attributes and resources available within a community, society or organization that can be used to achieve agreed goals (UNISDR, 2009). Therefore to reduce risk to disasters, the existing capacities must be assessed to identify gaps and seek out opportunities to build and develop capacities. This includes capacity at the individual, organizational, sectoral and societal levels.

Disaster Management in SVG before 2001 was based on response to natural hazards such as hurricanes and storms. A part-time disaster coordinator was assigned to a person who already had a portfolio in a government department. There were some level of preparations for hurricanes but long-term disaster risk reduction was limited. There was no budget or additional staff to support the operations. When the country was threatened or impacted by natural hazards, the government, people and organizations responded to get the country back in operation.

A regional mechanism has been in place since 1981 with the aim of supporting what was then disaster preparedness for Caribbean member states of the Unit. In 2001 after consultation with multiple stakeholders, CDERA adopted a strategy and results framework for Comprehensive Disaster Management (CDM) in the Caribbean region. This programme and structure evolved over the years to provide better guidance and support for member countries. There is now a more proactive approach stimulated by the UN Decade of DR, increasing disasters and the implication of changing climate. Therefore, on September 1, 2009, CDERA underwent transformation to CDEMA with the aim of undertaking a holistic approach to reducing risks through the (CDM) framework.

The main functions of CDEMA as spelt out in the document ‘Managing Disaster with Preparedness’¹⁹ are:

- mobilizing 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;

¹⁹

Managing Disaster With Preparedness;
http://www.cdema.org/index.php?option=com_content&view=article&id=358&Itemid=120

securing, coordinating and providing to interested inter-governmental and nongovernmental organizations 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; and
coordinating the establishment, enhancement and maintenance of adequate emergency disaster response capabilities among the Participating States.

The CDM approach was adopted in SVG since 2001 as a commitment from the government to enhance disaster management.

Organizations involved in disaster management in SVG:-

- | | |
|---|--|
| 1. Barrouallie Over 35 Club | 17. IMPACT 2000 – Park Hill |
| 2. Bequia Disaster Committee | 18. Kingstown Disaster Management Committee |
| 3. Biabou Disaster Committee | 19. Kingstown Motor Cycle Association |
| 4. Brighton Disaster Committee | 20. Layou Disaster Group |
| 5. Calliaqua Disaster Management Committee | 21. Marriaqua Disaster Committee |
| 6. Canouan Disaster Committee | 22. Mayreau Disaster Group |
| 7. Chateaubelair Disaster Group | 23. Mustique Company |
| 8. Choppins Community Organization | 24. Owia Disaster Committee |
| 9. Colonarie Youth Culture Organization | 25. Questelles Disaster Management Committee |
| 10. Dauphine/ Gomea Disaster Management Group | 26. RELCO |
| 11. Fancy Disaster Committee | 27. ROHCO |
| 12. Fitz Hughes Disaster Group | 28. Sandy Bay Disaster Committee |
| 13. FRIENDS of SDA - Belmont | 29. South Rivers Disaster Group |
| 14. Georgetown Disaster Committee | 30. Spring Village Disaster Committee |
| 15. Green Garden GEMS –Peters Hope | 31. Troumaca Disaster Committee |
| 16. Greggs Emergency Management Organization (GEMORG) | 32. Union Island Disaster Preparedness Committee |



33. LIONS Clubs

34. SVG Cadet Force

35. Rotary Clubs

36. National Congress of Women

37. Amateur Radio Club

38. Radio Rainbow League

39. Ministry of National mobilization, Social Development, Family, Gender Affairs, Persons with Disabilities and Youth.

Agency	Type of Intervention	Capacity – HR, Finance, Networks	Challenge/Need	Post 2015 Vision
NEMO	Coordinate disaster response; train country teams.	Networks, finance, technical competence, warehousing	Small staff, limited financial resource	Safer more resilient communities in St. Vincent and the Grenadines enabled by a comprehensive approach to disaster management to reduce loss of lives and the cost associated with hazard.
Red Cross	Rescue, Training, Humanitarian support	HR, finance, networks	Project preparation for international support	VCA done for all communities in SVG and functional disaster preparedness groups present
Police	Security, fire fighting, traffic control, search and rescue.	HR, limited supplies, legal authority,	Technical training for all officers, inadequate equipment.	All officers trained in DRR and search and rescue.
Coast Guard	Search and rescue at sea; fire fighting at sea, security	HR, Ships,	Bigger and faster vessels	Effective surface equipment and less encroachment
VINLEC	Vegetation Management - Clearing power lines, restoring electricity.	Technical competence, built in redundancies, equipment, network with CARELEC.	Moving heavy equipment on the leeward highway, persons neglecting their duty to clean and prune their trees, internal communications	Continuous simulation with partner agencies. Geothermal energy become a reality

CWSA & SWMU	HR, Providing and protecting water resource	Technical equipment competence,	Frequent loss of water mains due to landslides.	Relocation of vulnerable water lines
Cadets	Man power	HR, some technical skills	Members are dispersed and no coordination system	Headquarters with equipment and communication system
BRAGSA	Provide equipment operators	heavy and Equipment, HR	Demands for equipment can be overwhelming	Adequate Human Resource and Technical Competences to meet the demands
Ministry of Health	First aid, ambulance service, hospital service, health clearance	Hospitals and Clinics, HR, finance,	SOP not known in some departments. Simulations and drills rare	Safe area to contain disease threats. Designated DRR specialist. Smart hospitals
Maritime Affairs	Coordinate maritime issues,	Networks		Policies approved and supported by resources
Seventh Day Adventist	Humanitarian support	HR (church in every district), finance	No communication from NEMO; transportation	An effective communication and transport system connecting respondents
RRT	Humanitarian support, first aid.	Transport, HR, Networks	Not known nationally	An effective communication system for NEMO.
Radio Rainbow League	Communication support (CB radio), assist in search and rescue.	HR, Radio handsets, Networks	No home base, lack of funding, absence of a transport system	A fully manned home based office with adequate satellite outreach, effective transport system

Table 3. Some disaster support agencies; capacity, challenge and vision.

7. Disaster Risk Analysis in St. Vincent

Section 6 of this report addresses vulnerability and delineated the hazards to which SVG is exposed. In this section risk conditions are examined and criteria for analyzing and prioritization of these risks are presented.

Over the last decade, SVG has invested significant sums in the development of disaster risk reduction activities focusing on disaster preparedness and response. The development of disaster plans, public education and awareness programs and the establishment of a functional National Emergency Management Organization in 2002 are outputs of this effort. The Regional Disaster Vulnerability Reduction Project launched December 2010 shows the country's continued commitment to DRR. This project is aimed at improving national capacity to evaluate and integrate national hazards and climate change risks reduction into the national development policy and decision making process.

In St. Vincent and the Grenadines there is no risk registry. The closest resemblance to such an instrument is a record of recent disasters compiled by NEMO. This record narrates the events without the use of any analytical tools. Indicators of disaster risk are also absent largely because of the prevailing characteristics; factors of scale, frequency and social consequences are not fully or accurately captured.

In the absence of a national risk register or a comprehensive conceptual framework for evaluating disaster risk, it is difficult to develop formal proposals for intervention. The consequences of inaction leave social, economic and physical casualties. Insurance premiums for disaster risk continue to rise and some clients are refused insurance yet many vulnerable persons do not strive for risk reduction. Housing construction continues in known slippage zones and on steep slopes along water courses. Against this background, the government has built over 350 low income homes in the last ten years moving people to safer housing zones.

Government has mandated key agencies (Ministry of Transport, Works, Urban Development and Local Government, the Ministry of Finance and NEMO) to conduct Damage and Loss Assessment (DALA) immediately following national disasters with a view to analyze and better understand disaster risk and to devise appropriate interventions.

7.1. Definition of Analytical Criteria and Methodology

The methodology employed for arriving at criteria for analyzing disaster risk involved a) a review of the literature that speaks to national vulnerability as it relates to loss of lives, physical infrastructure and livelihoods b) consultations with communities and c) focus



group discussions with Ministries of Government and first response agencies. The information gleaned from these efforts was examined as overlays to determine priorities for action. Additionally, the UNISDR 'Criteria Identifying Key Actions for DRR Planning in Latin America and the Caribbean, 2014' was used during the validation workshop. The workshop findings (Table A, Appendix 1) demonstrated strong congruence with the information generated from the other efforts mentioned.

The literature records seventeen (17) deaths on mainland St. Vincent between 2002 and December 2013 due to landslides and floods. Twelve of the deaths occurred during the December 2013 floods. There are no accurate figures for infrastructure and agricultural damage and loss of livelihoods during this period. Estimates from NEMO's record show EC\$566 million in loss from three events: Tomas in 2010, rains/floods in April 2011 and rains/floods in December 2013, see Table 4.

The consultation with the communities consisted of a set of structured questions aimed at determining the content and adequacy of the community preparedness programs. The level of preparedness is one element of the risk reduction package that contains some measurable indicators such as knowledge of exit routes, transportation for disabled and aged persons, and systems for early warning/alerts /communicating danger. Table 5 captures some responses from the discussions highlighting the absence of exit routes and shortage of equipment to respond to hazards.

Date	Event	Impact	Death	Cost in Millions EC\$
2008	Hurricane Omar – Storm Surge	30 boats destroyed Damage along coastline	Nil	5
2010	Drought	Several months without rainfall, water rationing and numerous bush fires	Nil	Not Available
2010	Hurricane Tomas	28% of the population was affected, including 5% severely, over 1200 in shelters Forestry & agriculture were significantly impacted – both to crops and infrastructure Infrastructure was also affected with flooding and landslides	Nil	133 10.5% GDP
2011	April - Rainfall	Torrential rainfall affected the NE of the country resulting in severe flooding, landslides, damage to roads and bridges, disruption of water supply and displaced 56 families	Nil	100
2013	December- Rainfall	12 Deaths, five hundred persons displaced, extensive damage to infrastructure	12	330

Table 4. Hydro- Met Hazard 2008-2013 (Source NEMO)

Name of Community	Which hazard are you most concerned about?	Are there Disaster Preparedness or other support groups present?	Are the groups trained? By Whom?	Are there hazard Maps for your area? Are exit routes Known?	Does the community have Equipment and Supplies?
Owia	Hurricane, Volcanic eruption storm surge	Preparedness group dormant	No training	No maps. There are alternative routes but not known to all	Limited supplies
Sandy Bay	Hurricane, volcanic eruption, Storm surge	Active community group.	Training done by Red Cross	No maps. No Known alternative routes.	Limited supplies
Georgetown	Floods, hurricane, Storm surge	A disaster preparedness group is now starting	Training done by NEMO	No maps. There are other routes but they flood also.	No supplies
Chateaubelair	Landslides, volcanic eruption, hurricanes	Red Cross; Police youth club	Training done by Red cross	Exit route known	No equipment
Troumaca	Hurricanes, landslides, volcanic	Diabetic and hypertensive group	No training in disaster	No emergency exit route identified.	No equipment



	eruption		preparedness		
Rose Hall	Landslides, Hurricane, volcanic eruption	Disaster management group	No training	No exit route known	No equipment

Table 5. Samples of Community responses from North Windward and North Leeward

The volcanic hazard map (Fig. 5) divides the island into zones according to exposure to volcanic hazards. The areas most prone to volcanic impacts are zones 1 and 2 to the north of the island. These areas had the greatest negative impact from rain storm and floods in 2010, 2012 and 2013. This is also the area with lowest economic activity and highest incidences of poverty. St. Vincent and the Grenadines Country Poverty Assessment for 2007-8 states that George Town and Sandy Bay collectively accounts for 9% of the population but 16.5% of the poor followed by Chateaubelair and Colonarie; these are the poorest census districts in the country.

7.2. Definition of Risk Scenarios

There is no existing overarching risk scenario for SVG but a number of initiatives have been undertaken that can lend support to the formulation of scenarios. These include Landslide Hazard Maps (De Graff 1988), Volcanic Hazard Zones for St. Vincent (Robinson 2005), Climate Model Scenarios for SVG (Govt. of SVG, Second national Communication), and Island Wide Flood Risk Assessment 2006 (DNL consultants). The Physical Planning GIS Unit in the Ministry of Housing, Informal Human Settlement, Physical Planning, Lands and surveys has generated storm surge maps for different return periods. A GIS overlay of these hazard maps provides a good basis for the generation of a risk rating scenario. The composite map (Figure 7) is also a good reference.

Climate Scenario: In the preparation of the Second National Communication on Climate Change, SVG used an ensemble of 15 Global Circulation Models to develop its Climate Model Scenarios. The model represents future climate, rainfall and temperature characteristic (Box1 and 2) for SVG through the end of the century under a high, medium and low greenhouse gas emission scenario. One inherent drawback of this model is the coarse resolution relative to the scale of required information. The size of SVG precludes it being physically represented in the GCMs so that there is need for downscaling techniques to provide more detailed and precise information for SVG. However, the additional information that would be provided by the downscaling techniques does not devalue the information provided by the GCMs especially since SVG's climate is driven by large scale phenomenon and that the downscaling techniques themselves are derived from GCMs.

Geo-spatial scenarios: Figure 9 highlights the areas of St. Vincent vulnerable to storm surge and the possible extent of erosion for 10, 25, 50 and 100 years return period. Figure 10 is a land slide hazard map that builds upon the work of De Graff 1988.

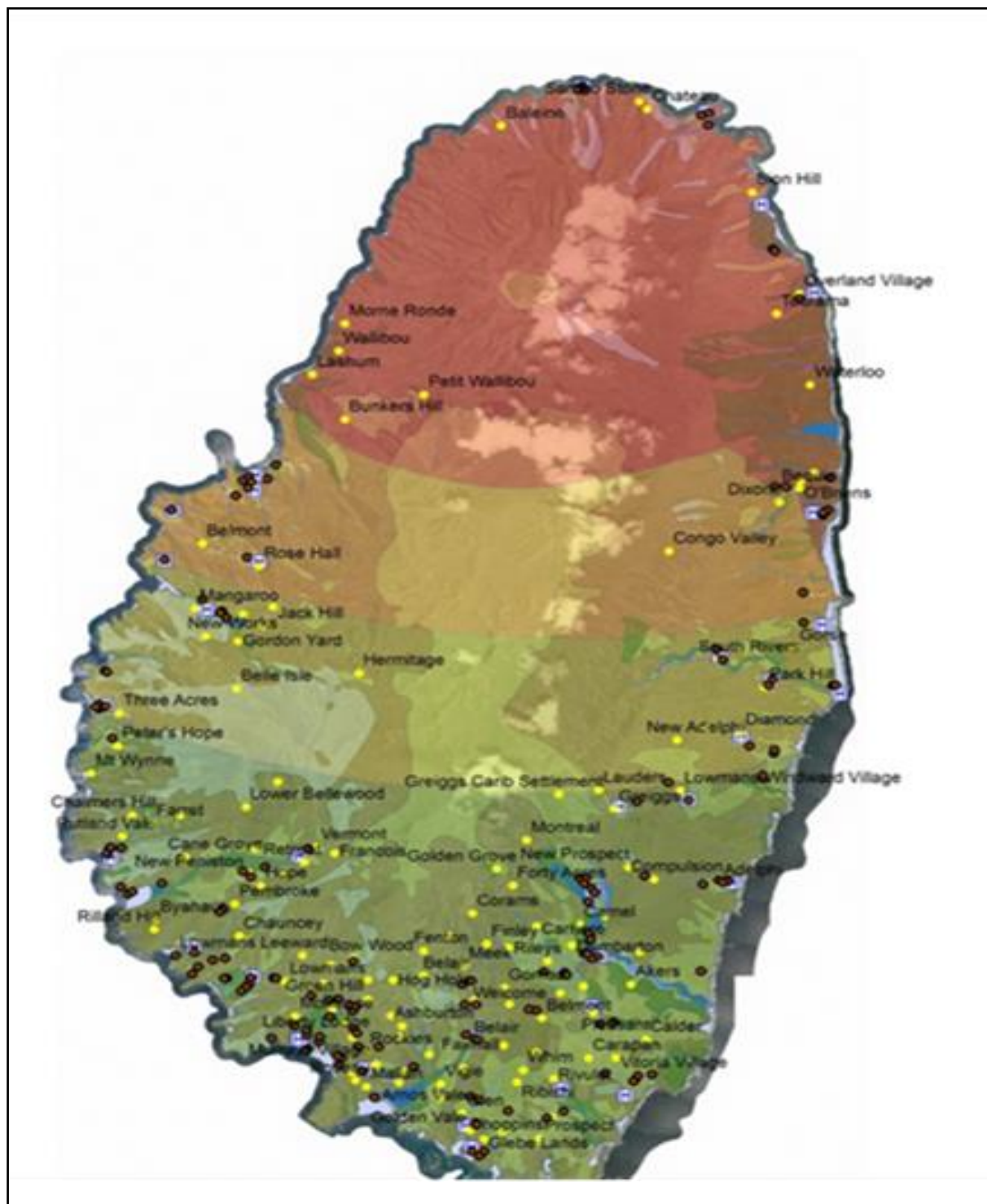


Figure 7. Composite Hazard Map of St. Vincent

Rainfall

Most current models and ensemble point to a drying throughout the year ranging between 10 and 22% annually by 2090.

Note the significance for water availability

Box1. Rainfall Scenario

Temperature

Mean temperature in SVG is expected to increase markedly over the next century on an average of 0 -1.5⁰C per decade.

Under a high emission scenario, GCM project maximum increase of up to 4⁰ C by the end of the century

Box 2. Temperature Scenario

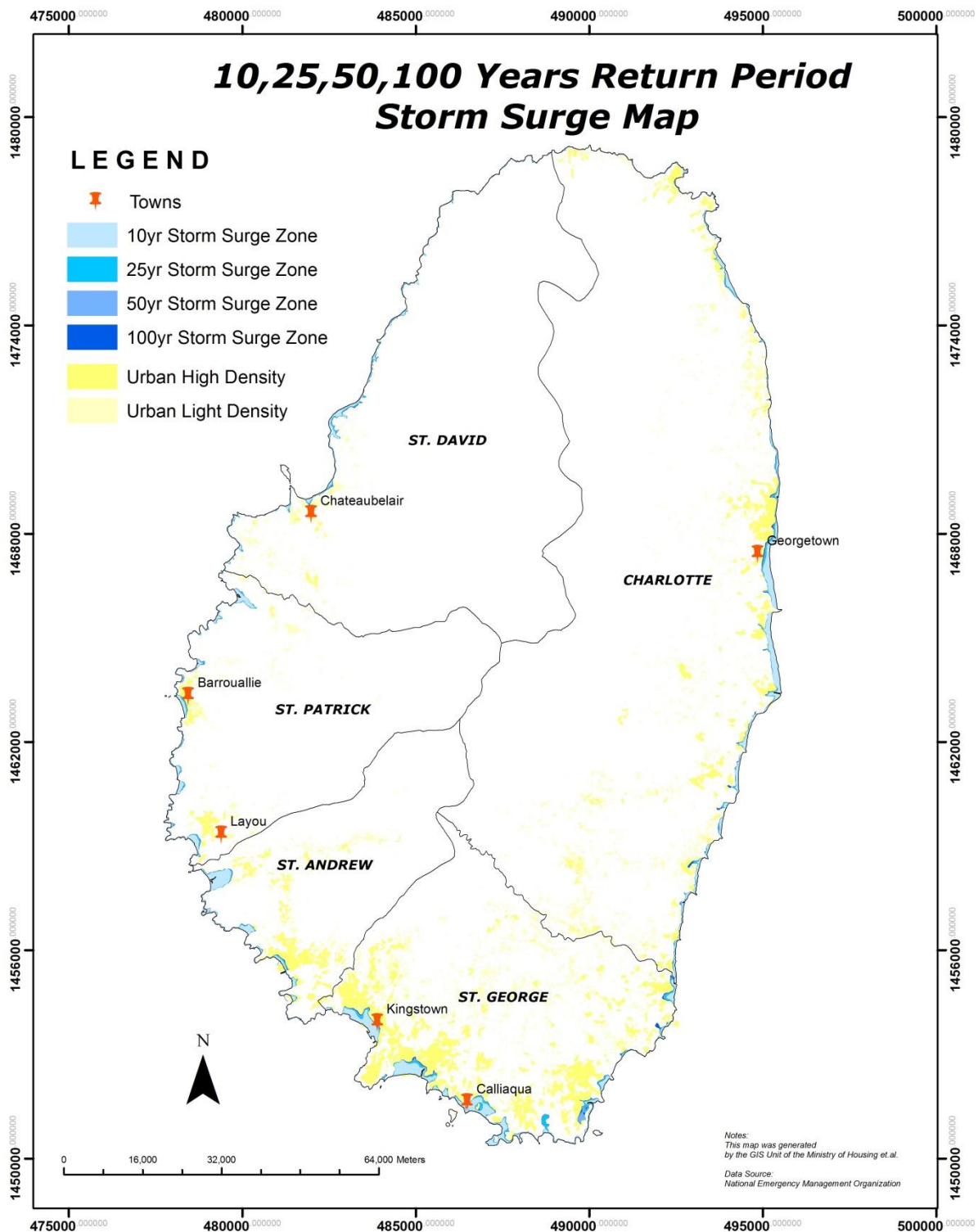


Figure 8. Storm Surge Hazard Map

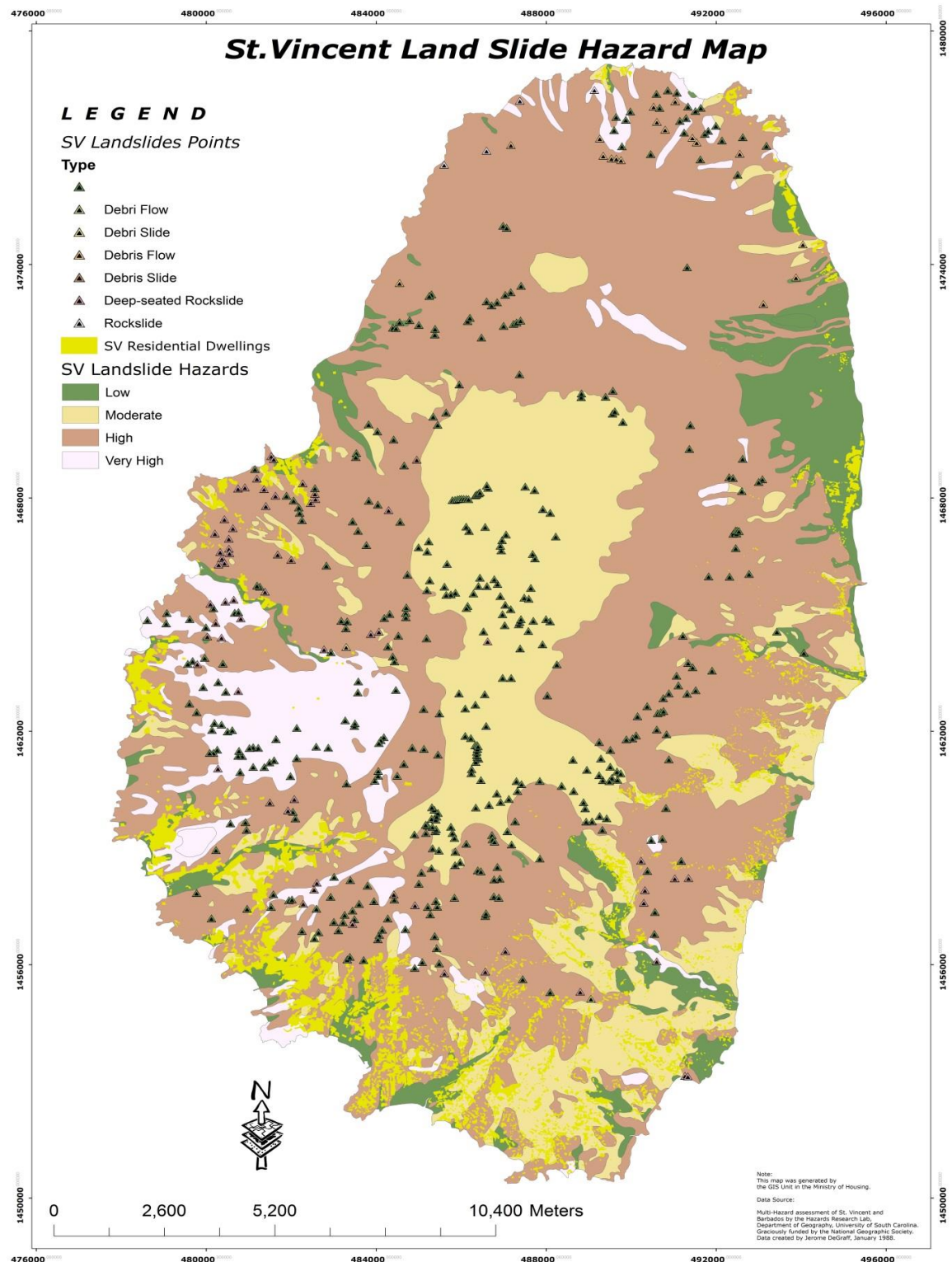


Figure 9. Landslide Hazard Map

7.3. **Prioritization of risk scenarios and areas for intervention**

The geology and geography of St. Vincent and the Grenadines expose the island state to some natural hazards that have become cultural realities and to which there is a heightened level of awareness, a medium to high level of preparedness and consequently are high on the priority chart as far as Vincentians are concerned (Table 6 and Appendix 1).

The volcanic eruption of April 1979 is still vivid in the minds of some Vincentians thirty (30) years after the event. The social and economic scars are still visible – abandoned and ruined homes, migrant families settled abroad, farmers have become urban workers.

Twenty years ago, hurricane announcements came in June at the beginning of the hurricane season. Today, such announcements are part of the disaster preparedness program that is almost a permanent fixture in the media and community programming. Disaster preparedness is mentioned in most development initiatives and project documents, yet, there is no clear development policy regarding DRR. It is clear that DRR is not being given the priority and resources it deserves. It is well known that countries that develop policy, legislative and institutional frameworks for disaster risk reduction and that are able to develop and track progress through specific and measurable indicators have greater capacity to manage risks and to achieve widespread consensus for engagement in and compliance with disaster risk reduction measures. It is therefore not surprising that SVG has limited capacity to manage risk.

The tool, 'Criteria to Identify Key Actions for DRR Planning in Latin America and the Caribbean' provide some guidance in prioritizing risk scenarios where mechanisms for coordination and regulatory frameworks were unclear. Appendix 1 and the Matrix below which lists categories of hazards, economic impact, social impact and environmental impact for the period 2002 to 2014 evolved from the prioritization effort. Separate and apart from this effort, the government has identified some priority areas for intervention including, *inter alia*, restoration and re-engineering of river crossings including bridges and foot paths, slope stabilization in Central and North Windward and North Leeward, coastal sea defense to the north east and river training in Arnos vale (RDVRP 2013).

Hazard	Economic Impact	Social Impact	Environmental impact	Priority Rating
Hydro-Meteorological Hurricanes/ tropical storms Floods Land slides Storm Surges Droughts	560 Million in 4 years	12 dead, 2000 families displaced. Livelihood for 10,000 people destroyed.	Farm lands and river banks washed away. Sedimentation of the marine environment	High
Geological Volcanic eruptions Earthquakes (Land Slides) Tsunamis	1979 Banana earnings disrupted for 4 month	20,000 persons displaced	Entire island covered with ash.	High
Technological * Fires Spills Dumping Biochemical				
Biological Threats of -H1N1, - Swine flu -Plants/Crops Diseases Pink mealy bug and mango seed weevil,	Loss of employment opportunities Loss of interisland trade in fruits and root crops. Loss of inter-	Stress to travelers and their relatives caused by fear Loss of livelihood and interisland trade benefits. Loss of income.	Not known Soil and water pollution following treatment.	Low

Hazard	Economic Impact	Social Impact	Environmental impact	Priority Rating
Moko disease, Black Sigatoka.	regional trade.	Loss of investment and employment	Contamination of fruit crop and humans from plant treatment	High
	Loss of banana income			High

Table 6. Priority rating for selected Hazards.

*The vacant boxes for technological hazard do not imply that all is well. Some respondents point to the oil storage area in Arnos Vale in the middle of a housing community as a serious threat.

8. Strategic Direction for Disaster Risk Reduction in SVG

The Conceptual Framework for the development of SVG as stated in the National Economic and Social Development Plan 2013-2025 is the 'Re-engineering of Economic Growth: (thus) Improving the quality of Life for all Vincentians'. This plan has five Goals including "Improving Physical Infrastructure and Preserving the Environment". The framework speaks to a sustainable and resilient development path that relies on 'a technologically advanced work-force'.

From meetings and interviews conducted with a wide cross section of Vincentians, the need to improve the physical infrastructure and preserve the environment surfaced as a major concern. The stakeholders were concerned that there are not enough trained persons on the ground in the communities. There is therefore an urgent need to strengthen the operational capacities of the government institutions and the existing community organisations. The community training effort of NEMO and the Red Cross needs to be accelerated and expanded to improving response capabilities and risk management at the community and district levels.

8.1. Hazard, Vulnerability and Risk Mapping

There are some recent hazard maps prepared for St. Vincent but none for the Grenadines. The maps of St. Vincent include Storm surge maps with various return periods, land slide maps, a volcanic hazard, flood risk maps with infrastructural assessment and some engineering designs.

Although most of the hazard prone vulnerable areas of the island are known by the Physical Planning Department, there is an absence of community hazard maps that delineate hazard zones, safe areas, escape routes and shelters. Vulnerability studies have been done for a few communities but there is an absence of a national community vulnerability assessment tool.

Given the frequency of flooding in St. Vincent over the past five years, there is a need to re-examine major water ways in relation to housing and other infrastructure. Any study commissioned for this purpose must start with the compiling of the most relevant historical disasters in the country including impact and damage done for each one. It is crucial to demarcate the main floodplains through an analysis of the historical rainfall and the potential flows and peak flood that would result. In urban zones, the quality and state of the drain network must be included since these contribute greatly to the creation of flash floods.

Studies done during the preparation of the Second National Communication to the UNFCCC highlight some risk relating to climate variability and change (See Box 1 and 2). Records on Kick 'em Jenny tell of tsunamis in the Grenadines but while there is a preliminary tsunami hazard map for St. Vincent there is none for the Grenadines.

Over the past ten years there has been a concerted effort by government to construct safe housing. The 2007-08 country poverty assessment reported >80% of Vincentian houses in good condition with the less satisfactory houses being those built before 1980. However, the emphasis must now be on the location of existing houses in light of the aforementioned scenarios. Many existing private houses are in the path of water or too close to the water course. There is an urgent need to examine housing with a view to relocate extremely vulnerable people.

8.2. Strengthening Capacities

The frequency and intensity with which hazards have impacting St. Vincent and the Grenadines over the past ten years have caught the attention of decision makers. In 2002 a National Emergency Management Organization (NEMO) was set up and legitimized by the National Emergency and Disaster Management Act of 2006. The NEMO is mandated to provide training for the various agencies involved in disaster management. Training in this regard includes the identification of skills necessary to implement a national disaster management programme and the sourcing of the necessary trainers to prepare and conduct the relevant training. This package includes information dissemination, warning, coordination, warehousing and evaluation. The organization can be seen in all these areas nationally; they train staff in government departments as well as community organizations, they can be heard and seen on all media forms warning, coordination and training, they lead in the execution of damage and loss assessment (DALA) and in warehousing. The Government will be constructing six (6) satellite warehouses in St. Vincent and the Grenadines to provide communities with basic equipment and tools to respond and coordinate emergencies at the community level. These will be constructed in Sandy Bay, Rose Hall, Mesopotamia, Georgetown, Bequia and Union Island, and funded under the RDVRP.

There are two big capacity challenges facing this organization: 1) Human resource 2) Financial resources. These challenges are being addressed in small ways but may be too slowly to be effective. While human resource is critical in addressing disaster risk, it must be supported by adequate financing.

There is a growing cadre of volunteers among the population but they lack the technological skill referenced in the NESDP. Non-government organizations (NGOs), faith based organizations and government departments are all requesting training.

Military, and Para-military, and civil society organizations are responding to the call for national involvement. While these responses provide human resource (number of persons) they do not necessarily provide the required technical competences. The Ministry of Transport, Urban Development and Local Government is unable to find adequate local technical help (even to buy) following disasters. The CWSA and VINLEC have adequate technical capacity and benefit from being members of regional networks that share resources after disasters.

Noting that only 5 of the 52 agencies interviewed (government and non-government) had designated disaster or emergency budgets, the shortage of equipment and supplies can be explained. While only 5 of the 20 government agencies interviewed have formal business continuity plans, 18 know what is expected in a disaster or emergency.

The greatest capacity deficiency in SVG as it relates to reducing disaster risk is at the community level. The Ministry of National Mobilization complains of failure of people to respond to warnings and the instability of organized community groups. The Ministry responsible for Housing, Informal Human Settlements, Lands and Surveys and Physical Planning meanwhile struggles with squatting in vulnerable areas prone to landslides and flooding. There is therefore a need for structured and continuous training for community organizers and organizations to make disaster risk reduction a life style. A heavy focus on DRR is required in the education system since meaningful change takes time to be realized.

8.3. **Training in EOC Management**

Several institutions, including NEMO, indicated a need for strengthened capacities and resources to facilitate the timely activation of the National Emergency Operation Centre. Previous experiences show that it is still necessary to improve many relevant aspects of emergency management. It has been suggested that an investigation of previous documented emergencies be carried out to identify the aspects that require an improvement in procedures, protocols, and equipment. Ideally, the best way to evaluate an EOC's capacity would be through simulation.

The running of the incident command centre and the restoration system have worked but there is a need to refine elements of these operations through simulations and table top drills

8.4. **Early Warning Systems**

It has been prioritized that the three hazards that carry the greatest interest for the country are flooding, volcanic eruption and landslides. Addressing flooding does not only include the improvement of hurricane monitoring capacities through on-line

systems (for example www.nhc.noaa.gov/) but also the installation of additional meteorological stations and upgrading of the existing station thus improving the country's capacity and ability for real time parameter monitoring. In parallel with this, there is need to strengthen NEMO's communication system. Consideration should be given to establishing an island wide alert system through television, radio and SMS text messages.

With the ever present threat of volcanic eruptions, it is necessary that information on the condition of the volcano, reaches all levels of the National System, to function as a real time early warning system and allow some lead time for evacuation when required.

There is a standard early warning system for hurricanes that has worked well over the years. The system is graded going from a watch, to and advisory to a warning with accompanying alerts – sirens, church bells and lowering of flags. A similar early warning system is needed for floods which occur frequently without hurricanes.

8.5. The Country Profile Process

The preparation of the Country Profile for the 8th DIPECHO Action Plan was a first step in the preparation of a document that would delineate the Vincentian contour relating to disaster risk reduction. It is envisaged that this document support the development of national development strategies that integrate DRR and improve the communication of DRR tools and initiatives.

The process of development of Country Profile started with the Red Cross, then NEMO with the support of DIPECHO and the UNISDR. NEMO is committed to the Country Profile development and views it also as an excellent communication tool. In this 2014 process, a private consultant was contracted to undertake the document review. The process involved two community consultations, interviews and group discussions with the Ministries of Government, Private Sector Agencies, Non- government Organizations and Civil Society Organizations. A validation workshop was then convened to review the draft document.

The validation workshop pointed to the absence of the banking sector, the legal fraternity, the petroleum companies and main telecommunication networks.

9. Conclusions and Recommendations

The initial effort in the preparation of this country profile was promoted and financed by ECHO through the regional DIPECHO VIII project of the Consortium constituted by the International Federation of Red Cross and Red Crescent Societies, Finnish Red Cross, French Red Cross and Netherlands Red Cross. This initial effort set the stage for the development of a country profile that is participatory and inclusive in design and intent. This Country Profile reflects all the institutional and operational aspects, and the strategic and priorities currently employed in Disaster Risk Reduction in St. Vincent and the Grenadines.

As the timeframe set for the Hyogo Framework for Action draws towards its end, it is time to consider how St. Vincent and the Grenadines and indeed the world will view DRR in the post 2015 period. One thing is certain; scaling back efforts even in the face of economic difficulties is not an option. Reducing disaster risk is a big economic earner for vulnerable countries like St. Vincent and the Grenadines. The post 2015 period must therefore be characterized by:

- Greater partnerships at all levels. In a globalized world, sustainable development is impossible without genuine partnerships at all levels. There is need for more private sector partnership with government to raise local capital in support of sustainable development²⁰.
- St. Vincent and the Grenadines First National Communication to the UNFCCC points to the fact that the country is a net carbon sink, contributing almost zero to the pool of global greenhouse gas but already experiencing the negative impacts of climate change. SVG should therefore make an aggressive push to access funds from the Green Climate Fund to address Climate Change issues including DRR in the country given the preponderance of floods experienced over the last five years that are attributed to climate change. This fund is expected to raise US\$100 billion by 2020²¹.
- A greater sense of urgency to Mainstream Disaster Risk Reduction into the Education Sector in St. Vincent and the Grenadines. Developing a culture of DRR requires more than an occasional workshop by NEMO.

²⁰Ministry of Health Wellness and the Environment, July 2013. Third international conference on Small Island Developing States – national Report.

²¹http://en.wikipedia.org/wiki/Green_Climate_Fund

Education is the only sure answer to the malaise displayed by some citizens after a hazard warning has been given. Moreover, the education institution is the best vehicle for dissemination of information regarding disaster risk.

- The education program should include a flood and drain management component since flooding in many areas has been attributed to blocked drains and water ways. There is need for a radical flood education intervention that builds the kind of technical competence required for the building of a resilient nation.
- Greater investment in building resilience in the housing sector instead of repair. This is cheaper and more sustainable with greater long term economic benefit.
- Decisive efforts to develop greater preparedness in communities making them adaptable and resilient. The effort should include the compilation of community atlases with hazard risk maps, response strategies, designated agency and costing given the available data on landslides, flood and volcanic activities. This would allow donors like small grants to address elements of a large project working from the community level. Low cost interventions are attractive to international organizations interested in supporting countries bilaterally in the search for sustainable development interventions.

Consultation with communities, the private sector, the public sector and civil society organizations yielded the following recommendations.

- Promote a consultative process for the updating and expanding of the Country Profile with a greater number of institutional, government and non-government actors to have more representative results. The Country Profile should include priorities at all levels, across all sectors and thematic areas, with guidelines for implementation.
- Future versions of the Country Profile should include more analytical data that can be used by decision makers.
- Conduct a resource mapping exercise which identifies all actors and organizations working on risk reduction themes, a list of initiatives and programs in effect or planned and a detailed inventory of tools, publications and bibliographical material concerning DRR.
- Include in future versions of the Country Profile the priorities and needs that are expressed at the local level of the most vulnerable population; organized structures at the community level should also be included. The

consensus about the need to strengthen and improve response capacities at the local level is generalized and therefore the opinion and comments from the local level is missing from the Profile.

- Conduct a social vulnerability assessment with specific focus on crosscutting themes such as the elderly, disabled, gender, children and returning residents.
- Perform a systematic detailed prioritization of the themes and topics that deserve greater attention and resource investment.
- Promoting DRR in the national educational content, vulnerability reduction in health and educational sectors, and the strengthening of the emergency communication capacities are recurring themes that warrant immediate attention.
- Integration of DRR into the curriculum of schools and teacher education programs.
- Through increased emphasis and resources promote the forming, training and equipping of the Community Emergency Response Teams (CERTs) in the communities with higher levels of risk. However, a longevity strategy needs to be devised; a number of communities once had thriving groups that are now defunct.
- The establishment of a risk register containing specific risk scenarios for the most relevant threats for the country (hurricanes, floods, storm surges and earthquakes). This effort must incorporate the capacities of the thematic specialist for each phenomenon. The register should also contain specific recommendations for the reduction of such risks.
- Family emergency plans structure should be included in the community preparedness plans.
- Old, tried and proven concepts of DRR such as the use of head drains in farming and construction, need to be fully integrated into the development agenda and the relevant curriculum of tertiary educational institutions.
- Enforcement of the building codes and regulations in particular relevant to the occupation of high risk areas.
- Reforestation needs to be addressed on a large scale; slope stabilization in vulnerable areas especially along river banks and streams should be high priority.



10. APPENDIX 1

Questions	Level of address	Priority level	Recommendations
APPARENT AND IMMEDIATE RECOGNIZABLE SIGNS OF HAZARDS OF EXPOSURE.			
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. 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.	Immediate action - Short term: 2- 3 years to be accomplished	
2. In the territorial areas selected, are there geo-referenced and territorially	Existing information but there is no detailed information for hazards impacted for a specific area in a usable form. The	Medium term: more than 3 years	



Questions	Level of address	Priority level	Recommendations
disaggregated records of frequent impacts of hazards related to seasonal events (droughts, floods or landslides)?	existence of this type of information is essential to improve the quality of decision-making.		
3. In selected territorial areas, are there studies and action plans on multi-hazard or trans-border 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 multi-hazard, trans-border hazards, but studies and scenarios are on-going for climate change. There are some action plans for hurricanes, draft action plans for tsunamis, and hazards are	Immediate action : Short term	



Questions	Level of address	Priority level	Recommendations
	identified.		
DRIVERS OF RISK IN THE COUNTRY AND THEIR CONFIGURATION			
4. In the selected areas, what are the characteristics of environmental degradation in areas with historical impacts or influenced by hazards?	<p>Environmental degradation can be severe but using management measures that will reduce the negative impacts and interaction with hazards (decreased exposure and vulnerability), or environmental degradation is not severe and its interaction does not generate increased exposure and vulnerability:</p> <p>There are records of impacts of hazards previously and presently. Environmental degradation contributed to floods. This should be</p>		Enforcement needs to be dealt with, should be nationally led as opposed to mandated.



Questions	Level of address	Priority level	Recommendations
	<p>prioritized.</p> <p>Also there are management measures in place but there should be enforcement and monitoring but the impact can still be severe.</p>		
<p>5. What is the composition of the population in terms of their socio-economic conditions and their exposure to hazards in the selected area?</p>	<p>The socio economic indicators selected are low for 20 % to 50 % of exposed populations.</p> <p>It would be higher than 50% if views are directed to informal settlements such as "Pole Yard", but generally the population would be 20 – 50%</p> <p>Poverty, health and education. Health and education that are accessible but not</p>	<p>long term.</p>	<p>Livelihood of low income persons, require attention</p> <p>Large scale infrastructural development.</p> <p>Awareness, Employment Sensitization</p> <p>Relocation of informal settlements</p>



Questions	Level of address	Priority level	Recommendations
	<p>accessed.</p> <p>Housing, socialization should aid in conclusion.</p> <p>Quality of housing is a major challenge.</p> <p>The entire country is exposed to landslides and those who have low income are more vulnerable/exposed.</p>		
<p>6. In the selected territorial area, what are the essential conditions and access to services, and which are exposed to hazards?</p>	<p>In some cases, essential services are becoming less vulnerable to hazards.</p> <p>Less than 20% of the population are without access to essential services, however, there are efforts to improve</p>	<p>VINLEC – rebuilding structures than can be resistant or less vulnerable to hazards, consider the water sheds and drainage</p>	<p>Should always be improving infrastructural facilities.</p>



Questions	Level of address	Priority level	Recommendations
	access to the health centers for the entire population.	systems, whereby they can know how to manage and regulate Electricity. Short to long term action.	
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	Short to long term addressing	Need for monitoring and enforcement. Need room for strengthening



Questions	Level of address	Priority level	Recommendations
	Management and Environmental Management.		
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) without planning processes or control with an increasing trend towards (unsafe) squatting in hazard-prone urban and suburban areas subject. Regulations and monitoring mechanisms are only partially implemented.	Short to long term addressing	Remove persons from squatting and unsafe areas – there are efforts to do such. Regulations and monitoring are to be implemented. There are problems with enforcement, so enforcement needs to be properly implemented.
CURRENT CAPACITIES FOR RISK MANAGEMENT			
9. Are there capacities and decentralized	Institutional response structures are present but lack plans, their	Medium term (5 years) involving training and	Coordination of decentralized system.



Questions	Level of address	Priority level	Recommendations
structures for emergency and disaster response appropriate for existing hazards in the selected area?	<p>capacity is limited to certain institutions but not integrated into the system.</p> <p>NEMO is the central place for emergency events where other institutions work alongside NEMO but there are others who work without the knowledge of NEMO. However some agencies have decentralized structures such as Ministry of Health but not coordinated with NEMO.</p>	capacity building.	<p>Several things in place but need to be implement and manage emergency and disaster response</p> <p>There is always a need for improved communication</p>
10. Mechanisms for coordination of local governments (consortia,	There are limited coordination of mechanisms of local governments in place for DRM and Environmental	There are district communities under NEMO, but District	<p>Within local Governments should be a place for DRM</p> <p>Rejuvenate and strengthen district</p>



Questions	Level of address	Priority level	Recommendations
associations and commonwealths) based on basins, ecosystems productivity, etc. are in place in the selected area?	Management. eg; Grenadines still have local Government.	Councils are beyond NEMO. Short to medium term response Community level action: Sandy Bay and Fancy are in operation Grenadines needs rejuvenating	communities with strengthening, building and training A lot of mobilization at the community district levels - training required District communities needs revision, there have been efforts to incorporate NGOs in this system. Social Dynamics
11. What are the conditions of the resources for preparedness and emergency or disaster	There are legal frameworks in place that enable the allocation or reallocation of resources once a disaster or emergency has occurred; there are issues in the system but, there is access to resources is	Short to medium term	Improvements should be made at the ministry level: Strengthening Public-Private partnerships Formalizing Partnerships



Questions	Level of address	Priority level	Recommendations
response/ management of relevant governments in the selected territorial areas? (Processes may be implemented by the central government)	streamlined in some form or administrative processes are not totally ineffective.		
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	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	Short to long term	No national system early warning system, there however needs to be: Funding for additional equipment Communication between agencies such as MET office and



Questions	Level of address	Priority level	Recommendations
about hazard conditions in the selected area?	<p>of warning or appropriate and timely information.</p> <p>There is electronics in placed for timely dissemination, unlikely cases of some not having TV's or radio stations breaking down, no cell phone signals for some hazards.</p> <p>The national EWs would be completed by end of January for multi-hazards.</p> <p>RDS – UNDP funding 80% of the radio system about 500. Three stations interrupt NBC, Garifuna and SVGBC.</p> <p>Can be accessed, but limited levels of accessibility due to interferences. It will be</p>		NEMO. The EWs can help to develop the communication island wide.



Questions	Level of address	Priority level	Recommendations
	used for national hazards siren systems to be integrated.		
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.	Document in place, but needs to be immediately implemented. Short to medium term	There is the need to include climate change. There is lacking in the DRM, always room for improvement.
14. What are the	There are inter-agency	Short to Medium term	Need for simulation exercises on a regular



Questions	Level of address	Priority level	Recommendations
<p>characteristics and conditions of inter-agency structures (platforms, management committees, coordination meetings, etc.) for coordination and decision-making in the selected area?</p>	<p>structures (NEMO) linked to form a coordination and participation system, platform or entities with sound institutional capacities and ongoing operations.</p>		<p>basis, this can be used to aware persons of their roles so they can be prepared.</p> <p>Simulation exercises should start at the ministry level before conducting simulation exercises at the national level.</p> <p>Need for the flexibility of DRM process.</p> <p>Improvement of connectivity and coordination, so the flexibility of the system can be across the board and not leaving out protocols.</p>



Questions	Level of address	Priority level	Recommendations
<p>15. What are the characteristics of the sectoral capacity (regulation, technical and resources) in the selected area?</p> <p>(Sectoral is understood as the ministries, public companies, institutions, etc.)</p>	<p>There are some sectoral institutions with internally assigned Risk Management responsibilities and specific planning but limited in terms of DRM as an comprehensive process of territorial development or focused primarily on the to disasters or emergencies.</p> <p>VINLEC and Forestry have something in placed but not comprehensive, would be comprehensive when the EWs is in place.</p>	Short term	<p>There should be designated persons for DRM in each sector (some sectors already completed that)</p> <p>Need for primary and secondary representatives for DRM in each ministry.</p> <p>Continuing capacity building for DRM plans.</p> <p>Poor culture of preparedness, always place our responsibility on others.</p> <p>CDM to be institutionalized.</p>
<p>16. What are the characteristics of the legal bodies for the</p>	<p>Legal framework exists, but is it practical?</p> <p>There are legal bodies</p>	Short to medium term	<p>Legal framework to be strengthened.</p>



Questions	Level of address	Priority level	Recommendations
deconcentration of DRM towards territorial governments?	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. Clubs and other NGO's don't come to NEMO.		
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	There are scenarios about the impacts of climate change, but they are not fully coordinated or integrated into the risk management strategies.	There is already coordination between VINLEC and CWSA in relation to their hydro plants. Also CIMH does	CWSA can put a system in place to sustain water during drought. Need for awareness, continuous updating of the document, awareness should start



Questions	Level of address	Priority level	Recommendations
selected area?		three (3) month's forecast for drought; CWSA is a part of this so they get updates and take measures to counteract with drought. Short to medium term	in schools.
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 some are mechanisms for risk trend analysis (a risk trend analysis was done for floods), but they are not linked to the development analysis and observatories. However, we are reactive when something happens. There's no	Short to medium term.	Ensure DRR is integrated into sectoral plans.



Questions	Level of address	Priority level	Recommendations
	<p>communication of the information about the mechanisms but work is being done in Silos.</p> <p>More rains outside of the hurricane season, longer dry period which results in changes in agriculture production.</p>		



11. REFERENCES

Boruff, B. J. and S. L. Cutter (2007). "The environmental vulnerability of Caribbean island nations." *Geographical Review* 97(1):932-942.

Briguglio, Lino, Gordon Cordina, Nadia Farrugia, and Stephanie Vella (2009) "Economic vulnerability and resilience: concepts and measurements." *Oxford Development Studies* 37 (3) 229-247.

CARIBSAVE (2012) CARIBSAVE Climate Change Risk Profile for St. Vincent and the Grenadines: Summary Document. CARIBSAVE: Barbados.

CaribInvest (West Indies) Limited, 2012. Diagnostic and Analytical Review of Environmental Governance Systems in St. Vincent and the Grenadines. CARICOM Trade and Competitiveness Project (A-32281), Component 300 — Sub-Component the Environment.

CARICOM Secretariat (2003) The Caribbean Environment in Figures 2002 [online] Available from <<http://www.caricomstats.org/Environpub.htm>> [14 October 2004]

CDEMA (2009) From CDERA to CDEMA: The Caribbean Disaster Emergency Management Agency. CDEMA: Barbados.

Central Planning Unit. St. Vincent and the Grenadines Draft National Physical Development Plan - 2001 – 2021. Unpublished Report.

Contreras, Arturo López-Portillo (2014) Evaluation Of UNDP Disaster Risk Reduction Support In St. Vincent And The Grenadines 2008-2012. United Nations Development Programme Barbados and the OECS.

Culzac-Wilson, L., 2003. St. Vincent and the Grenadines: Report to the Regional Consultation on SIDS Specific Issues.

Department of Economic and Social Affairs (DESA), 2004. Saint Vincent and the Grenadines Public Administration Country Profile. Division for Public Administration and Development Management, United Nations.

Farrell, D., Trotman, A. and Cox, C. (2010) Drought early warning and risk reduction: A case study of the Caribbean drought of 2009 – 2010. Geneva, Switzerland: UNISDR.



Ferdinand, I., O'Brien, G., O'Keefe and Jayawickrama, J. (2013) 'The double bind of poverty and community disaster risk reduction: A case study from the Caribbean', International Journal of Disaster Risk Reduction, 2, pp. 84 – 94.

GFDRR (2014) Rapid Damage and Loss Assessment (DaLA) December 24-25, 2013 Floods. A report by the Government of Saint Vincent and the Grenadines, January 16, 2014.

GFDRR (2010) Disaster Risk Management in Latin American and Caribbean Region. Washington DC. GFDRR; World Bank.

Government of Haiti (2010) Direction de la Protection Civile, Government of Haiti.

Government of St. Vincent and the Grenadines, 2013. National Economic and Social Development Plan 2013 -2025.

Government of St. Vincent and the Grenadines (2011) Hurricane Tomas Emergency Recovery Project: Environmental Assessment. Central Planning: Kingstown.

Locke, Justin; Rodrigues, Marco; Pandey, Bishwa; Meier, Gerald; Charles, Keren. (2014) Rapid Damage and Loss Assessment (DaLA) : December 24-25, 2013 floods - a report by the Government of Saint Vincent and the Grenadines. Washington DC; World Bank Group. Online. Available at: <http://documents.worldbank.org/curated/en/2014/01/18892616/rapid-damage-loss-assessment-dala-december-24-25-2013-floods-report-government-saint-vincent-grenadines>.

Manuel-Navarrette, Gómez and Gallopín, (2007) 'Syndromes of sustainability of development for assessing the vulnerability of coupled human-environmental systems. The case of hydro-meteorological disasters in Central America and the Caribbean', Global Environmental Change, 17 (2), pp. 207-217.

Ministry of Finance and Planning (2008) St Vincent and the Grenadines Country Poverty Assessment 2007 - 2008: Living conditions in a Caribbean Small Island Developing State. Kingstown, St. Vincent and the Grenadines.

Ministry of Health, Wellness and the Environment, 2013. National Report for St. Vincent and the Grenadines. Third International Conference on Small Island Developing States.

<http://www.unisdr.org/hfa>

http://www.cdema.org/index.php?option=com_joomdoc&view= Managing Disaster with Preparedness.



NEMO (2005) “St Vincent and the Grenadines National Disaster Plan”. Kingstown: St Vincent and the Grenadines.

OAS, USAID/OFDA (2002) Caribbean Disaster Mitigation Project. Online. Available at: <http://www.oas.org/CDMP/document/seismap/>.

PAHO (2012) Health in the Americas: Country Volume. Online. Available at: <http://www.paho.org/www.paho.org/healthintheamericas>. Accessed: 2 September 2014.

Robertson, Richard (2005) Seismic Research Unit, The University of the West Indies, Trinidad and Tobago.

Seismic Research Centre (n.d.) “Volcanic Activity in the Eastern Caribbean” University of the West Indies: St. Augustine, Trinidad and Tobago. Online. Available at: <http://www.uwiseismic.com/General.aspx?id=19> Accessed: 12 March 2012.

Seismic Research Unit (SRU) (2007) Earthquake off the coast of Martinique. SRU: University of the West Indies, St. Augustine, Trinidad and Tobago.

St. Vincent and the Grenadines Country Report. Online. Available at:

PAHO (2012) Health in the Americas: Country Volume. Online. Available at: <http://www.paho.org/www.paho.org/healthintheamericas>. Accessed 2 September 2014.

UNDP (2008) Social implications of the Global Economic Crisis in Caribbean Small Island Developing States: 2008 – 2009.

UNICEF (2007) A study of Child Vulnerability in Barbados, St. Lucia and St. Vincent and the Grenadines. UNICEF: Barbados.

UNISDR (2009) “UNISDR terminology on Disaster Risk Reduction”. Geneva, Switzerland.

USAID (2007) St. Vincent Coastal Vulnerability Assessment: Final Report. Environmental Solutions Ltd, Jamaica.

UWICED (2002) The growing vulnerability of SIDS: report prepared for the UNDP Capacity 21 project. Mona, Kingstown: UWICED.