



SUSTAINABLE DEVELOPMENT UNIT ■ LATIN AMERICA AND THE CARIBBEAN

Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes

St. Vincent and the Grenadines



THE WORLD BANK



GFDRR
Global Facility for Disaster Reduction and Recovery



COUNTRIES AT RELATIVELY HIGH MORTALITY RISK FROM MULTIPLE HAZARDS

(Top 96 based on population with 2 or more hazards)^a

1. Bangladesh
2. Nepal
3. Dominican Republic
4. Burundi
5. Haiti
10. Guatemala
13. Trinidad and Tobago
20. Niger
37. Peru

54. SAINT VINCENT AND THE GRENADINES

55. Mexico
57. St. Kitts and Nevis
61. Belize
63. United States
78. Bolivia
96. Thailand

^a Dilley et al. (2005). Table 1.2.



Under the structure of the National Disaster Management Plan, government ministries, business and non-governmental organizations actively cooperate in the area of disaster management.

SAINT VINCENT AND THE GRENADINES

Natural Disasters from 1980 - 2005^b

Affected People

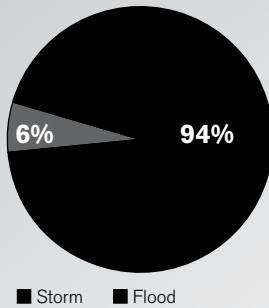
Disaster	Date	Affected (Number of People)
Storm	1980	20,50
Storm	2004	1,004
Flood	1987	1,000
Storm	2005	530
Storm	1987	208
Flood	1992	200
Flood	1986	152
Storm	1999	100
Storm	2002	0

Economic Damages

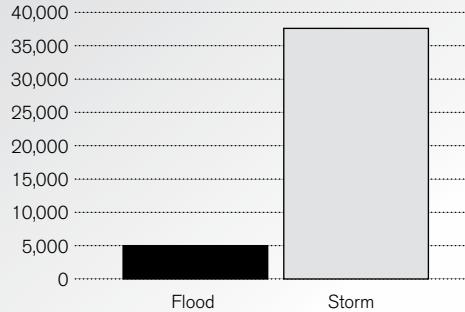
Disaster	Date	Cost (US\$ x 1,000)
Storm	1980	16,300
Storm	2002	11,000
Storm	1987	5,300
Flood	1987	5,000
Storm	2004	5,000
Flood	1986	0
Flood	1992	0
Storm	1999	0
Storm	2005	0

Statistics by Disaster Type^b

Population Affected by Disaster Type



Economic Damages / Disaster Type (1000s US\$)



^b UN (2009). <http://www.preventionweb.net/english/countries/statistics/?cid=146>. Source data from EM-DAT. Data displayed does not imply national endorsement.

DISASTER RISK PROFILE

Saint Vincent and the Grenadines (SVG) comprises some 32 islands and cays, the largest being St. Vincent, followed by Bequia, Mustique, Canouan, Union Island and others. The population on SVG is approximately 104,000. The largest of the islands, St. Vincent, is approximately 29 km north to south and 17.7 km wide on the east-west axis. It covers some 344 km². In contrast, Bequia, the next largest island, covers some 18 km², with the remaining islands each covering 8 km² or less. All the major islands are of volcanic origin. Island topography is typically deeply dissected with steep slopes tending toward island centers.

Multiple hazards impact SVG and the most common threat is the potential for hurricanes and tropical storms. High winds and rainfall coupled with the islands' mountainous topography are the principal risk factors. Much of the islands' construction occurs on steep slopes often exceeding 45 degrees. There is little protection from the direct impacts of wind forces and prolonged rainfall promotes slope destabilization. Informal constructions are at greatest risk as they do not benefit from adequate engineering.

The island group is located in the southern portion of the Atlantic Hurricane belt and suffered some damages from Hurricane Ivan in 2004. Since 1900, St. Vincent has been hit by 8 named storms, the strongest being Hurricane Allen (Category 4), which passed between St. Lucia and St. Vincent in 1980. Prior to that, Hurricane Hazel, a Category 1 storm passed some 38 km south of St. Vincent in 1954. These Islands were also severely affected by Hurricane Lenny in 1999, a Category 4 storm.¹ Lenny passed the Eastern Caribbean as a tropical storm reaching hurricane strength as it approached the Virgin Islands. Exceptionally strong waves produced by Lenny caused

damages regionally and throughout the Windward Islands of the Caribbean.

St. Vincent and the Grenadines experience rainy and dry seasons and are variously vulnerable to drought, landslides and coastal flooding. Landslides, particularly on the larger islands, are a significant hazard and the risk is increased during the seasonal rains. Coastal flooding is a major concern particularly relating to storm surge and high wave action. The Grenadines are more susceptible to drought, as there are no rivers and rain water harvesting is their main source of water. Additionally, 2009-2010 has seen one of the worse dry spells or droughts in the last decade, with the country declaring a drought alert in March and mandated to form a drought alert task force by the Cabinet.

The active volcano La Soufriere, located on the north end of St. Vincent is another risk factor, posing threats from shallow earthquake and eruption events. It is an active volcano rising some 1,234 meters and has erupted in historical times. Direct impacts are generally limited to the Island of St. Vincent; however, potential ash fall can threaten the neighboring islands.

Economic risks are related to the country's dependence on agriculture and services sector (largely tourism). These two sectors are responsible for approximately 11 and 64 percent of the country's GDP, respectively.

Some 41.6% of the population of Saint Vincent and the Grenadines (SVG) is exposed to risk of mortality from 2 or more hazards. This places SVG among the top 60 countries with relatively high mortality risks. Additionally, economic risks from 2 or more hazards as a percentage of GDP are similarly estimated at 41.6%.²

¹ Saffir-Simpson Scale.

² Dilley et al. (2005). Table 7.2b and Table 1.2.

Geological Hazards

The country is exposed to low-to-moderate seismic risk (seismic zone 2 on a 0-4 scale³). Its location along the eastern margin of the Caribbean plate exposes the islands to seismic and/or tectonic activity. Additionally, SVG is particularly vulnerable to shallow seismic activity from one of the more active volcanoes in the eastern Caribbean, La Soufrière, located on the northern portion of St. Vincent.

La Soufrière has erupted five times in recorded history beginning with the eruption of 1712, the largest recorded being the eruption of 1979.

In 1902, the second largest eruption occurred with devastating results. Over 1,500 people lost their lives from a combination of volcanic forces including flood, lahar, and exposure to superheated gasses known as nuee ardente.

Tsunami risk is generally associated with the potential effects of an eruption of the volcano Kick-'em-Jenny located some 100 km to the south off the coast of Grenada. The 1939 eruption reports indicate that a 2-meter tsunami was generated. Given the proximity of the volcano to inhabited lands, should a tsunami be generated, travel times will be rapid and afford little opportunity for warning.

Floods and Landslides

Flash flooding from mountain streams coupled with storm surge events present the greatest risk from flooding. Effects are generally limited to communities located in the coastal margins along stream passages. These are usually coastal fishing villages located where access to the sea is open, as much of the island's coast is marked by cliff formations. While bay and harbor areas are particularly

at risk, storm surge and wave action pose a particular risk to the eastern side of St. Vincent where the coast is exposed to potentially very long fetch waves. The east coast road, a principal route linking the east and west sides of the island, was constructed very near the coastal margin and is vulnerable to wave action and storm surge.

SVG is vulnerable to landslides resulting from the combination of its volcanic geomorphology and steep terrain. As is the case with similar islands, road cuts and building constructions on steep slopes contribute to landslide potential and there is little flat land available for construction. Structures built without adequate design or quality control are at greatest risk. Landslides are usually associated with periods of prolonged rainfall as occurs during the rainy season from May to November. As recently as 2008, heavy rains provoked over 25 landslides in SVG resulting in 1 death and the activation of search and rescue operations.

Determinants of Vulnerability to Adverse Natural Events in St. Vincent

Areas of higher population density, such as Kingstown and villages located along the west coast of St. Vincent, as well as coastal low-lying villages throughout the islands, are particularly vulnerable to the effects of storm surge. New construction, particularly in relation to tourism, continues with little attention to natural hazard risk or with little formal land use planning on some of the smaller islands. Construction codes exist but are not evenly applied. Informal settlement continues to occur and vulnerabilities associated with these activities are greatest as settlements tend to be located in areas of increased risk without benefit of engineering support.

³ SEOC (Structural Engineers Association of California) zone system. Zone 2 corresponds to a Z factor of 0.500 as defined under CUBiC 1985. Values obtained from Gibbs (1999), Appendix 1, Table 3.

One container port serves the SVG islands. It is located in the capital Kingstown, on the island of St. Vincent. It is the principal deepwater port and the access point for international trade and commerce. A single airport is located on the leeward side of St. Vincent but does not have adequate runway to accept commercial jets. Canouan and Bequia support small air strips. A larger airport capable of handling larger aircrafts is planned to be located on the windward side of St. Vincent. Air transport currently is managed through a regional service network and the larger islands in SVG support modest runway capacity.

Marinas and related business activities are at particular risk from storm surge and wave impacts. Sailing is an important element of the tourism economy and occurs in virtually every bay that can accommodate these activities. The fishing industry, largely artisanal, is also at significant risk from surge and wave actions.

Power generation, drinking water, and international port services are generally concentrated in a limited number of facilities with few alternatives. As is the case with most island states, critical infrastructure is particularly at risk as alternative services are limited. When these facilities are damaged, services are lost until repairs can be completed.

The health infrastructure is comprised of 39 health centers and 8 hospitals.⁴ The Milton Cato Memorial Hospital (MCMH) in Kingstown is the only general hospital in St. Vincent and the Grenadines and is the main acute referral healthcare facility in the country.

Climate Change and Global Warming

St. Vincent and the Grenadines were cited in the Germanwatch 2010 Global Climate Change Risk Index. The 2010 Climate Risk Index is based on figures from 2008 and is also an analysis of the worldwide data collection on losses caused by weather-related events during 1998–2008. In 2008 St. Vincent and the Grenadines were ranked 72nd with losses of 0.17% GDP, and 89th for the decade with GDP losses of 0.43%.⁵ Two factors were cited: the impact of global warming on rising sea levels which increase the risk of storm surges, and secondly the increase in the strength of hurricanes.⁶

Climate change models⁷ have predicted that St. Vincent and the Grenadines will undergo a warming and drying trend and is expected to endure more frequent heat waves and droughts, rainfalls with increased intensity, and rising sea levels as predicted for the rest of the Caribbean consistent with the projected global median.⁸ It is known that inter-annual climate variability of either the Pacific or Atlantic explains a significant amount of the total variance in rainfall in the Caribbean and Central America.⁹ Probable climate change impacts in St. Vincent include higher temperatures, higher storm intensities and, possibly, more frequent El Niño-Southern Oscillation (ENSO)¹⁰ events, exacerbating existing health, social and economic challenges affecting St. Vincent and the Grenadines.

Changes in sea surface temperature as a result of climate variability could increase the intensity of cyclones and heighten storm surges, which in turn will cause more damaging flood conditions

⁴ PAHO (2007).

⁵ Harmeling (2009). Table 5.

⁶ McLymont-Lafayette (2009).

⁷ Hadley Centre Coupled Model, Version 2 (HADCM2), as reported in Mulligan (2003). Same modeling data as used by the Intergovernmental Panel on Climate Change (IPCC).

⁸ Chen et al. (2008).

⁹ Giannini et al. (2002).

¹⁰ El Niño-Southern Oscillation; commonly referred to as simply El Niño, a global coupled ocean-atmosphere phenomenon.

in coastal zones and low-lying areas. According to the World Bank's study, "Sea Level Rise and Storm Surges",¹¹ the impact of sea level rise and intensified storm surges in Latin America and the Caribbean will be high. While data is not available for St. Vincent and the Grenadines, data for Puerto Rico is showing an increase of 51.84% - with 53.81% of the coastal population exposed and potential losses of coastal GDP projected to exceed 52.71%.

DISASTER RISK MANAGEMENT FRAMEWORK

Enabling legislation has been established for disaster management in St. Vincent and the Grenadines. Disaster preparedness and emergency response in SVG is implemented under the authority of the National Emergency and Disaster Management Act No. 15 of 2006,¹² the Emergency Powers Act No. 45 of 1970, and the Natural Disaster (Relief) Act of 1947.

The National Emergency and Disaster Management Act establishes the disaster planning and response framework. This is executed through the National Emergency Management Organization (NEMO) which consists of the National Emergency Council, the National Emergency Executive Committee, and the District Disaster Management Committees. . The Governor-General may, by Proclamation which is then published in the Official Gazette, declare that a state of public emergency exists.¹³

The National Emergency Council is chaired by the Prime Minister and is composed of Ministers, permanent secretaries, district representatives and key ex-officio members from government agencies, corporations,

businesses and non-governmental organizations. The council functions to coordinate the development of national disaster policy and serves as the interagency focus during disaster events. The National Emergency Executive Committee monitors progress on national disaster policy implementation and provides the technical implementation supervision on behalf of the national council.

District Disaster committees function at the local level and operate to implement planning and disaster response operations in their respective districts. Additionally, local disaster committees have been organized to operate at the community level.

Disaster management activities are conducted in accordance with the National Disaster Response Plan (2005). This plan assigns planning, preparedness, and response activities to the various agencies and representatives and provides for the assignment of specific responsibilities among agencies during disaster response. Under the plan, response activities are managed by NEMO at the direction of the Prime Minister.

ACTIVITIES UNDER THE HYOGO FRAMEWORK FOR ACTION

Hyogo Framework for Action (HFA)
Priority #1: Policy, institutional capacity and consensus building for disaster risk management

National Emergency and Disaster Management Act No. 15 of 2006 established the National

¹¹ Dasgupta et al. (2009).

¹² OAS-DSD (2006b).

¹³ OAS-DSD (1979).

Emergency Management Organization, NEMO, and its operational authorities. Under the act, NEMO is the focal point for disaster planning and response in conjunction with national line ministries. During emergencies, NEMO reports directly to the office of the Prime Minister.

The National Disaster Plan has been developed and is operational. The plan assigns responsibilities for disaster response and planning among national ministries and private sector organizations, and provides specific plans for a variety of hazard profiles including hurricane, flood and volcanic activity. The plan provides a strong framework for committee participation at various levels including the participation of local emergency management committees.

A full-time core staff has been assigned to NEMO and an Emergency Operations Center has been constructed to house NEMO activities. Disaster response and planning in St. Vincent occurs at three basic levels. National committees composed of ministry representatives and representatives from core service sectors (transportation, communications, electric power and water services), whose functions include both planning and response, provide the management planning framework. District committees provide a mechanism for the decentralization of disaster response and planning, and local committees function at the community level.

Under the national system, line ministries are responsible for their respective functional areas during a disaster. These ministries have achieved varying readiness capabilities and work is proceeding in this area.

Disaster risk reduction through development policy and planning is still in its early development. The national policy currently does not yet mandate DRM as a development objective.

HFA Priority #2: Disaster risk assessment and monitoring

Progress in preparation of hazard maps is limited. Mapping and GIS capability is managed largely through the Ministry of Planning with some use in other ministries. NEMO supports limited GIS and mapping capacity. To date risk mapping in St. Vincent is limited. Volcanic risks have been mapped and some coastal vulnerability analysis has been completed. A limited number of base maps have been prepared in a GIS format and include roads, contours, rivers and coastline, and agricultural and urban land use. These are variously available through the Ministry of Planning and NEMO.¹⁴

Meteorological hazards are monitored by St. Vincent and the Grenadines Meteorological Service, which issues warnings. This is supported with information made available through the U.S. National Oceanic and Atmospheric Administration and the National Hurricane Center. NEMO assists in coordinating these warnings and provides public preparedness advice under a system prescribed under the national plan. Warnings are distributed through radio, television and loudspeaker broadcasts, as well as storm warning flags displayed at police stations. The Ministry of Agriculture maintains a system of stream gauges and meteorological stations on the island. These are not automated systems.

Seismic monitoring is provided regionally through the University of West Indies Seismic Research Centre and locally through the Soufrière Monitoring Unit under the Ministry of Agriculture. Apart from the regional monitoring network, the UWI Seismic Research Center supports a network of local monitoring stations located on the island of St. Vincent. A collection of five seismic stations coupled with eight GPS stations and dry tilt sites collect information that is transmitted to the Belmont Observatory. These stations

¹⁴ CDERA (2003f).

are maintained locally by the Soufrière Monitoring Unit under the Ministry of Agriculture. Data are relayed via internet to the UWI Seismic Research Center for analysis and reporting.

HFA Priority #3: Use knowledge, innovation and education to build a culture of safety and resilience at all levels

NEMO regularly sponsors risk-focused public awareness events and at the onset of each hurricane season, the Prime Minister has adopted the custom of issuing an annual public address. St. Vincent is regularly exposed to hazard events, particularly landslides, storm surge and coastal flooding. The last volcanic eruption in 1979 is still a relatively recent experience. As a result, the population is acutely aware of disaster-related risks and potential impacts. Efforts on the part of NEMO have continued to provide information and promote risk awareness through meetings, public campaigns and the introduction of disaster preparedness in the educational curriculum.

Under the structure of the National Disaster Management Plan, government ministries, business and non-governmental organizations actively cooperate in the area of disaster management. As most of these efforts are focused on preparedness and response, risk reduction through planning and risk avoidance strategies remains the next advancement to be achieved.

HFA Priority #4: Reduction of the underlying risk factors (reduction of exposure and vulnerability and increase of resilience)

Government-sponsored constructions and larger infrastructure investments generally include

resilient design; however, the practice is not employed on a widespread basis. Progress in risk reduction is still in the developing stages. The passage of the National Building Code legislation has provided the legal framework for advances in this area and regulations are to be issued during 2009; however, the integration of resilient practices and designs for vulnerability reduction are not yet mainstreamed.

Currently, a draft DRR plan has been prepared for the tourism sector and plans are underway to strengthen risk mapping as a first step in the development of DRR strategies. Apart from aspects addressed in the current building code, sector-based initiatives are being considered in the reduction of underlying risk factors.

Land use planning is currently not a factor for disaster risk reduction in St. Vincent. While some land use planning occurs, its translation into actual land use constraints based on risk reduction principles is limited.

HFA Priority #5: Disaster preparedness, recovery and reconstruction at national, regional, and local levels

NEMO has invested significantly in raising public awareness and citizens react when informed of impending storm events. As a result, they are more aware of the seriousness of preparing for possible events. The revision of the National Plan has imparted a greater level of organization to the preparedness and response process and disaster management is a priority at all levels of government.

SVG is a member of the regional Caribbean Disaster Emergency Management Agency (CDEMA).

St. Vincent's capacity to respond to a major disaster without major outside support will remain

limited for the foreseeable future. Risk reduction and improved insurance coverage will be key factors supporting reconstruction capacity. As to public sector risks, St. Vincent is a subscriber to the Caribbean Catastrophic Risk Insurance Facility.¹⁵ This offers some relief in the event that the policy is triggered.

The tourism sector, a major contributor to St. Vincent's economy, is largely insured by commercial underwriters. Other sectors, such as agriculture, transport, or housing remain relatively vulnerable.

Forty community disaster groups have been established. These groups have received training in damage assessment, shelter management, relief supplies management, first aid and related activities. Work continues to strengthen the emergency communications network at the local level with the

expansion of the national emergency HF radio system.

Risk reduction and improved insurance coverage will be key factors supporting reconstruction capacity.

Vulnerability assessments of the health sector infrastructure have been carried out recently.

The Milton Cato General Hospital, main healthcare facility in the country, was assessed in 1996, and more recently in 2008 using PAHO/WHO hospital safety index. The assessment provided an estimate of the hospital's capacity to continue providing services during and after a large-scale disaster or emergency and guided necessary interventions actions to increase the hospital's safety in case of disasters. The recommendations addressed structural, non-structural and functional aspects of the facility. Some of these recommendations have already been implemented.

KEY DONOR ENGAGEMENTS

Existing Projects with Donors and International Financial Institutions	Funding Agency / International Partners	Allocated Budget and Period (US\$)	HFA Activity Area(s)
Disaster Mitigation Project – Community Disaster Risk Reduction (Paget farm, Bequia)	UNDP / OECS Secretariat	71,000	4
Comprehensive Disaster Harmonized Implementation Program	CDEMA / CIDA / DFID		1
Caribbean Risk Management Initiative	UNDP	2.1 million 2004-2010	1, 2, 3
Enhancing Resilience to Reduce Vulnerability in the Caribbean	Government of Italy	4.5million 2009-2011	1, 2, 3, 4, 5
Mainstreaming DRM in the OECS countries	IDB	400,000 2008-2011	
Regional DRM Strategy for the Caribbean Tourism sector	IDB	800,000 2007-2009	
Regional Monitoring and Evaluation Framework for DRM in the Caribbean Tourism Sector	IDB	750,000 2009-2012	

¹⁵ The CCRIF is the first multi-country risk pool in the world, and is also the first insurance instrument to successfully develop a parametric policy backed by both traditional and capital markets. It is a regional insurance fund for Caribbean governments designed to limit the financial impact of catastrophic hurricanes and earthquakes to Caribbean governments by quickly providing financial liquidity when a policy is triggered.



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