



SUSTAINABLE DEVELOPMENT UNIT ■ LATIN AMERICA AND THE CARIBBEAN

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

## **St. Kitts and Nevis**



THE WORLD BANK



# **GFDRR**

Global Facility for Disaster Reduction and Recovery



**COUNTRIES AT HIGH ECONOMIC RISK FROM MULTIPLE HAZARDS**

(Top 33 based on GDP with 3 or more hazards)<sup>a</sup>

1. Taiwan, China
2. Dominican Republic
3. Jamaica
4. El Salvador
5. Guatemala
8. Costa Rica
10. Colombia
12. Chile
15. Barbados
18. Ecuador
20. Peru
- 21. ST. KITTS & NEVIS**
24. Honduras
27. Mexico
32. Bolivia

<sup>a</sup> Dilley et al. (2005). Table 7.2.

**The revision of the National Disaster 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.**



# SAINT KITTS AND NEVIS

## Natural Disasters from 1984 - 1999<sup>b</sup>

### Affected People

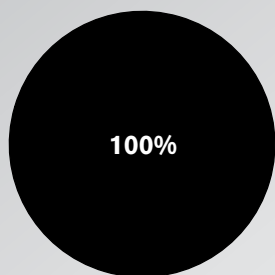
Disaster	Date	Affected (Number of People)
Storm	1998	10,000
Storm	1995	1,800
Storm	1989	1,300
Storm	1999	1,180
Storm	1984	0
Flood	1987	0
Storm	1990	0

### Economic Damages

Disaster	Date	Cost (US\$ x 1,000)
Storm	1998	400,000
Storm	1995	197,000
Storm	1989	46,286
Storm	1999	41,400
Flood	1987	500
Storm	1984	0
Storm	1990	0

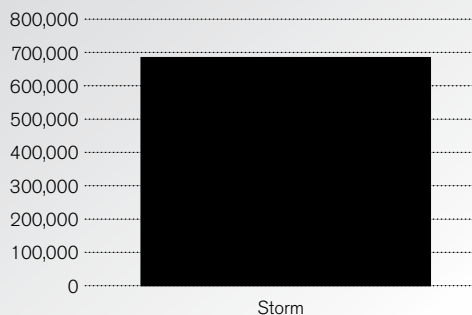
## Statistics by Disaster Type<sup>b</sup>

Population Affected by Disaster Type



■ Storm

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



<sup>b</sup> UN (2009). <http://www.preventionweb.net/english/countries/statistics/?cid=144>. Source data from EM-DAT. Data displayed does not imply national endorsement.

## DISASTER RISK PROFILE

**St. Kitts and Nevis are located in the Leeward Island chain of the Caribbean at approximately 17° 15' N latitude, and 62° 40' W longitude.** The larger of the two islands is St. Kitts, with a land area of approximately 168 km<sup>2</sup> measuring approximately 29 km north-south by 8 km along the east-west axis. Nevis, the smaller of the two islands, is located some 3 km south of St. Kitts and covers an area of approximately 93 km<sup>2</sup>. The island is roughly circular measuring approximately 8 by 10 km. Both Nevis and St. Kitts are of volcanic origin and both islands have active volcanic centers.

**The combined population of St. Kitts and Nevis is estimated at approximately 50,000 with approximately 35,000 persons on St. Kitts and 12,000 on Nevis.** As is the case with most of the Caribbean islands, the economy of St. Kitts and Nevis is dominated by the service industry (including tourism) which represents some 69% of GDP. This is followed by industry which contributes an estimated 28% of GDP. Agriculture is estimated at 3% GDP.

**In 1998, Hurricane Georges, a Category 3 storm<sup>1</sup>, hit St. Kitts and Nevis and was among the most devastating storms experienced in the region.** Damage to St. Kitts was extensive, with lesser impact to Nevis. In total, Georges caused an estimated US\$445 million in damages including damages to some 80% of the housing stock. There was extensive damage to electric power infrastructure and the impact on tourism was felt for some time after the storm. Most recently, in 2008, Hurricane Omar passed some 150 km east of the islands as a Category 4 storm, causing significant damage to coastal infrastructure from wind and storm surge. Since 1950, 16 named storms have passed within 100 km of the islands.

**A single storm event can directly impact the**

**entire country.** The principal hazard event affecting St. Kitts and Nevis is the potential for hurricanes and tropical storms. High winds and rainfall are the major risk factors. Much of the islands' construction is relegated to urban centers where there is little protection from the direct impacts of wind forces. In flood-prone areas, prolonged rainfall coupled with storm surge conditions are the principal causes however impacts are generally limited as these areas are comparatively few given the islands' topography.

**Saint Kitts and Nevis is identified among the world's top 60 countries exposed to risk of mortality from 2 or more hazards.** An estimated 39.1% of the population of St. Kitts and Nevis is considered at risk. Additionally, St. Kitts and Nevis is among the top 40 countries with significant economic risks from 2 or more hazards as a percentage of GDP. GDP risk is estimated at 64.9%.<sup>2</sup>

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## Geological Hazards

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**Both Nevis and St. Kitts are of volcanic origin and both islands have active volcanic centers.** Hot springs and fumaroles are active in both locations. Mt. Liamuiga, located on the northern end of St. Kitts, is an active volcano with an elevation of approximately 1155 m. The island of Nevis is the volcanic slopes of Mount Nevis. The peak is centrally located on the island at an elevation of approximately 984 m. Both volcanoes are active, as evidenced by continuing hot spring and fumarolic activity. Information relating to the eruption history of volcanoes in St. Kitts and Nevis is incomplete and not all eruption types result in a lasting geologic record. Eruptions in recorded history are unsubstantiated but are noted in anecdotal accounts from 1642 and 1843. Both describe perceived eruption activity. Geologic studies have suggested an eruption cycle of 2,000 years for Mt. Liamuiga on

<sup>1</sup> Saffir-Simpson Scale.

<sup>2</sup> Dilley et al. (2005). Table 7.2b and Table 1.2.

St. Kitts. For Nevis, there are not sufficient data to suggest an eruption cycle.

**St. Kitts and Nevis is regularly exposed to low-level earthquake activity related to shallow origins associated with the volcanic centers.**

Large earthquakes are uncommon but owing to the proximity of plate boundaries, are a possibility for St. Kitts and Nevis. Most recently, the 7.3-magnitude earthquake off the coast of Martinique in November 2007 was felt throughout the region. Based on engineering risk assessments, the hazard posed by earthquake for St. Kitts and Nevis is significant and should be considered a factor in building construction. St. Kitts and Nevis is located in seismic zone 3, on a 0-4 scale<sup>3</sup> indicating that seismic risk ranges from moderate to substantial.

**Regional tsunami risk is generally associated with the potential effects of an eruption of Kick'em-Jenny located approximately 500 km south of St. Kitts and Nevis.** However, given the proximity to active plate boundaries and the volcanic centers located in the region, there exists a risk associated with tsunami to St. Kitts and Nevis.

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## Floods and Landslides

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**Flood risk in St. Kitts and Nevis is largely associated with storm surge in low-lying coastal areas.** Flash flooding from mountain streams coupled with storm surge events presents the greatest risk. Effects are generally localized to communities located in the coastal margins or along stream passages. These are usually coastal fishing villages located where access to the sea is open as much of the islands' coast is marked by cliff formations. Additionally, tourism and port facilities owing to their access to the sea are particularly susceptible to surge events.

**Landslides are a risk in areas where slope and soil stability present appropriate conditions.**

The risk is limited, however, owing to St. Kitts and Nevis' geology and in particular, the topography of St. Kitts. Unlike other islands in the region, slope instability in inhabited areas is not a major risk-producing factor but is increased with heavy rainfall and saturated soil conditions. Agricultural risks from flooding largely stem from poor site drainage and are usually associated with prolonged periods of heavy rainfall.

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## Determinants of Vulnerability to Adverse Natural Events in St. Kitts and Nevis

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**Perhaps the most significant factor contributing to the vulnerability of St. Kitts and Nevis is the tendency toward urbanization and the exposed nature of urban centers to impacts from wind damage.** Mixed construction with enforcement challenges contribute to the vulnerability of the islands' population to adverse natural events.

**Much of St. Kitts and Nevis' tourism development is in the coastal zone.** With beach areas and coastal access as a major tourism resource, infrastructure supporting these activities is necessarily located in zones of increased risk from hurricane and storm surge impacts.

**Two ports and two airports service St Kitts and Nevis.** Basseterre is the container port for the islands. Bradshaw International serves as the airport for St. Kitts and Newcastle for Nevis.

**The Pogson Medical Center was recently constructed in Sandy Point, St. Kitts,** and is one of two 24-hour Urgent Care Centers.

<sup>3</sup> 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.

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## Climate Change and Global Warming

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**St. Kitts and Nevis 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. Kitts and Nevis was ranked 104th with losses of 0.02% GDP, and 74th for the decade with GDP losses of 7.80%.<sup>4</sup> 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.<sup>5</sup>

**Climate change models<sup>6</sup> have predicted that St. Kitts and Nevis 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.<sup>7</sup>** 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.<sup>8</sup> Probable climate change impacts in St. Kitts and Nevis include higher temperatures, higher storm intensities and, possibly, more frequent El Niño-Southern Oscillation (ENSO)<sup>9</sup> events, exacerbating existing health, social and economic challenges affecting the country.

**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**

**in coastal zones and low-lying areas.** According to the World Bank's study, "Sea Level Rise and Storm Surges",<sup>10</sup> 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. Kitts and Nevis, 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

**Disaster management in St. Kitts and Nevis is managed through the National Emergency Management Agency (NEMA).** Originally established in 1995, its mandate was strengthened with the passage of the Disaster Management Act of 1998 which provides the legal framework for NEMA operations.

**NEMA functions as a disaster response and planning agency and works through a series of committee structures.** On St. Kitts, The National Disaster Committee (NDC) composed of relevant national ministers and ranking government officials, private sector, and non-governmental organizations, serves as the coordinating body between the office of the Prime Minister and Cabinet. It is chaired by the Prime Minister. The National Disaster Executive (NDE) reports to the NDC and oversees the operational aspects of the NEMA program.

**NEMA implements policies and programs in planning, preparedness and disaster response**

<sup>4</sup> Harmeling (2009). Table 5.

<sup>5</sup> McLymont-Lafayette (2009).

<sup>6</sup> 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).

<sup>7</sup> Chen et al. (2008).

<sup>8</sup> Giannini et al. (2002).

<sup>9</sup> El Niño-Southern Oscillation; commonly referred to as simply El Niño, a global coupled ocean-atmosphere phenomenon.

<sup>10</sup> Dasgupta et al. (2009).

**and coordinates their activities at the local level in conjunction with the District Disaster Committees and respective sub-committees.**

The Governor-General may by proclamation declare that a state of emergency exists in Saint Christopher and Nevis.<sup>11</sup> On Nevis, NEMA collaborates with the Nevis Disaster Management Office who reports to the Nevis Island Disaster Committee, the Nevis Island Administration and the office of the Premier. The office coordinates local activities in conjunction with the District Disaster Committees and respective sub-committees.

**Disaster management activities are managed in accordance with the current Disaster Management Plan, authorized in 1999.** A National Disaster Mitigation policy and plan was produced in 2001. In accordance with the plan, disaster planning and response is organized through district and local committees. NEMA works with the local and district committees to develop response capacity and contingency plans for execution during a disaster event. Additionally, NEMA has been active in the development of a national shelter system which has resulted in the construction and improvements to national shelter facilities.

**During a disaster NEMA serves as the national coordinating body for disaster response, reporting to the office of the Prime Minister.** Line agencies, such as the national police, government ministries, and agencies such as the airport authority and port authority, conduct their activities in accordance with the responsibilities assigned under the plan and under the authorities of their respective enabling legislation. During a disaster NEMA reports through the Office of the Prime Minister and locally in Nevis through the office of the Primer.

## ACTIVITIES UNDER THE HYOGO FRAMEWORK FOR ACTION

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

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**NEMA maintains a staff of 6 persons including professional and support staff.** NEMA is housed in a disaster-hardened office facility and maintains a warehouse to pre-position various supplies. NEMA is yet to construct satellite storage facilities at the community level. Additionally, NEMA currently lacks GIS support and is actively seeking to develop that capability within the organization.

**Disaster risk reduction through development policy and planning is still in its early development and national policy currently does not yet mandate DRM as a development objective.** However, NEMA is working to formally advance the concept of Comprehensive Disaster Management as a stated objective.

### **HFA Priority #2: Disaster risk assessment and monitoring**

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**Comprehensive hazard mapping studies have been completed in St. Kitts and Nevis.** These maps focus on volcanic, hurricane and flood risks. Base mapping is relatively complete and includes

<sup>11</sup> OAS-DSD (1983).

topographic studies including the development of digital elevation models. Maps include Volcanic, storm surge, wind, wave, and inland flooding hazards. Base maps have also been prepared to include geology, soils, land use, vegetation, population, roads, rivers and rainfall. Maps are maintained at the Physical Planning Unit on St. Kitts. Maps have been produced at a 1:20,000 scale which have limited applicability at local scales. Vulnerability studies have been completed for government buildings and in particular schools.<sup>12</sup>

**Meteorological monitoring and early warning services are provided through the National Meteorological service.** This office assesses storm potential and regularly issues bulletins used by the public and NEMA to prepare for storm events. The office coordinates with the U.S. National Oceanic and Atmospheric Administration for forecasting support and weather satellite imagery access. NEMA assists in coordinating the distribution of these warnings and provides public preparedness advice.

**Seismic monitoring is accomplished through the University of the West Indies Seismic Research Center (UWI-SMC).** A total of eight monitoring stations have been installed in St. Kitts and Nevis by the UWI Seismic Research Center, including one seismograph located at Mt. Liamuiga and seven GPS stations to monitor deformation. The UWI-SMC regularly analyzes data and provides notification to NEMA as conditions warrant. Of particular interest is crustal deformation and the occurrence of earthquake swarms which may indicate elevated volcanic activity.

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

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**NEMA promotes an active campaign of training and public information through press releases**

**and workshops.** Thematic workshops are scheduled as needed and have included, for example, shelter management and post-disaster damage assessment. Additionally, NEMA issues an annual public address at the beginning of each hurricane season and provides regular public service announcements to promote public awareness and disaster preparedness. Disaster preparedness has not yet been integrated into the formal educational curriculum.

**NEMA meets regularly with the Disaster Mitigation Council to coordinate disaster information transfer among the national ministries.** During these meetings, NEMA promotes and follows disaster risk reduction activities undertaken by various line ministries. All Ministries are represented on the council.

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

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**A building code was adopted in St. Kitts and Nevis and its implementation was formalized under the Development Control and Planning Act #14/2000.** While new construction for public buildings is monitored for code compliance, private constructions are variously monitored for compliance. Eligibility requirements for mortgages and private insurance are likely factors driving improvements to construction design and promoting compliance with the national code.

**While progress is being made in DRM, it is largely in the form of public education.** Risk mapping has been completed but building code enforcement still has limitations. To date no formal national legislation for the disaster risk reduction is in place apart from the contributions of the national building code.

<sup>12</sup> CDERA (2003e).



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

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**The revision of the National Disaster 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.** Since Hurricane Georges, disaster preparedness and awareness has improved. Citizens react when informed of impending storm events and are more aware of the seriousness of preparing for possible events.

**Certain critical facilities are protected to a greater degree.** An emergency operations center has been constructed and warehousing of disaster response supplies is maintained through NEMA. Schools and shelters have been retrofitted to a degree to improve resilience.

**The tourism sector, a major contributor to the St. Kitts and Nevis economy, is largely insured by commercial underwriters.** Other sectors, such as agriculture, transport, and housing, remain relatively vulnerable. Regarding public sector risks, St. Kitts and Nevis is a subscriber to the Caribbean Catastrophic Risk Insurance Facility (CCRIF).<sup>13</sup> This offers short-term liquidity in the event that the policy is triggered.

### **KEY DONOR ENGAGEMENTS**

**Outside the CCRIF there are currently no donor or international financial institution engagements in disaster risk management in Saint Kitts and Nevis.**

<sup>13</sup> 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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