



SUSTAINABLE DEVELOPMENT UNIT ■ LATIN AMERICA AND THE CARIBBEAN

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

Belize



THE WORLD BANK



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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)^a

1. Bangladesh
3. Dominican Republic
5. Haiti
8. El Salvador
9. Honduras
10. Guatemala
12. Costa Rica
17. Nicaragua
26. Ecuador
28. Colombia
37. Peru
47. Montserrat
55. Mexico
- 61. BELIZE**
63. United States
96. Thailand

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



Belize City is especially vulnerable to flood damage due to its very low-lying land and exposed position on the coast.

Natural Disasters from 1990 - 2008^b

Affected People

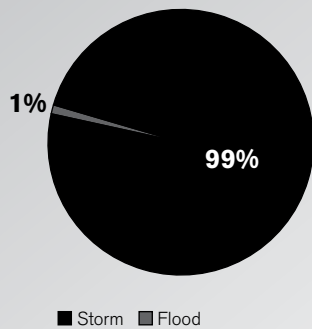
Disaster	Date	Affected (Number of People)
Storm	2000	62,570
Storm	1998	60,000
Flood	2008	38,000
Storm	2001	20,000
Storm	2007	20,954
Storm	2008	10,000
Flood	1995	2,600
Extreme Temp.	1990	0
Flood	1990	0
Storm	2001	0

Economic Damages

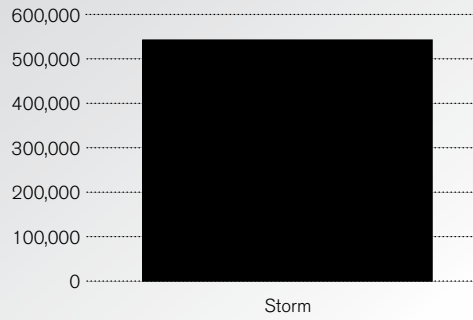
Disaster	Date	Cost (US\$ x 1,000)
Storm	2000	277,460
Storm	2001	250,000
Storm	2007	14,847
Flood	2008	9,697
Extreme Temp.	1990	2,250
Flood	1990	2,200
Flood	1995	500
Storm	1998	50
Storm	2001	0
Storm	2005	0

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=18>. Source data from EM-DAT. Data displayed does not imply national endorsement.

DISASTER RISK PROFILE

Belize is the 61st highest exposed country to relative mortality risk from multiple hazards in the world, according to the Natural Disaster Hotspot study by the World Bank¹, and 8th ranked country from 167 for climate risk.² Located in one of the most active hurricane areas of the world, Belize's population of only 300,000 is hit by a major storm on average every three years, over 50 times since records began in 1871. Between 1935 and 2005, 11 hurricanes killed an average of 168 people per event, injuring 52 and causing an average annual loss of US\$5.5 million (in constant US\$ of 2000) to its economy of approximately US\$1 billion GDP.

Hurricanes and tropical storms are the principal hazards affecting Belize, causing severe losses from wind damage and flooding due to storm surge and heavy rainfall. Recently, hurricanes Keith (2000), and Iris (2001) caused some of the worst damage ever, reaching 45% (US\$280 million) and 25% of GDP, respectively.³ Government expenditures associated with increased costs for emergency reconstruction due to these events were approximately US\$50 million, covering three fiscal cycles. The government of Belize has argued that these spending increases for reconstruction led to large fiscal deficits and debt accumulations that in 2006 required a restructuring operation for public debt.

Belize City is especially vulnerable to flood damage due to its very low-lying land and exposed position on the coast. The city has been frequently affected by hurricanes. In 1931, Belize City was devastated by an unnamed hurricane reaching Category 3, which resulted in 2,000 deaths from among the town's population of 16,000. The city was again impacted in 1961 when Hurricane Hattie caused the greatest financial cost (US\$413 million (USD 2007)) from a natural disaster in Belize to date.

This spurred the Government to build a new capital at Belmopan, 50 miles inland, and to encourage the relocation of the main population center. This move, although widely commended, remains incomplete. The risk in Belize City therefore remains and it is estimated that the city faces a 10% chance of hurricane storm wind speeds between 178km/h-209 km/h during a ten-year period.

The country faces some minor seismic and tsunami risk as Belize is close to the boundary of three tectonic plates with earthquake risk concentrated in the southern part of the country. There are no records of very major earthquake activity; however, there are minor earth tremors and a significant seismic event is not impossible. There are no active volcanoes in Belize, however, the submarine volcano Kick'em-Jenny, located 8 km north of Grenada has demonstrated frequent eruptions that breach the surface and generate tsunamis around 2 m high that can affect the coast of Belize. Kick'em-Jenny first erupted in 1939 and there have been eleven subsequent eruptions since, the most recent in 2001.

The population across the country is vulnerable because of the relative lack of transport and flood protection infrastructure; high levels of poverty; concentration of urban centers in low-lying coastal areas; high levels of linguistic and cultural diversity; and poor access to information and health care. Productive sectors are also vulnerable, especially agriculture in the north and the south, which is affected by flooding; and tourism, based in coastal areas and affected by wind hazards. Belize's long, low-lying coastline accommodates approximately 45% of its total population in densely populated urban areas such as Belize City (approximately 20.5% of total population). These coastal urban centers represent some of the country's most vulnerable to storm events as they lie approximately one to two feet below sea level.

¹ Dilley et al. (2005). Table 1.2.

² Belize's annual average losses from weather events during 1990-2008 equal 3.94% of GDP/year (Harmeling 2009).

³ Economic impact of disaster usually includes direct costs, such as infrastructure damage, crops, housing and indirect losses, such as reduced tax revenues, increased state expenditures and market instability. See EM-DAT (2009).

Climate Change and Global Warming

Climate change is also a significant threat to Belize as it is expected to alter the hazard dynamics that affect competitiveness of productive sectors. The United Nations Framework Convention on Climate Change (UNFCCC) recognizes that Belize is one of those countries most vulnerable to the adverse impacts of climate change due to: (i) its long, low-lying coastline; (ii) its over 1,060 small islands; (iii) its second-longest barrier reef in the world and 17,276 km² of forest cover, each of which support fragile ecosystems; and (iv) the fact that it is very prone to natural disasters, especially hurricanes.

Storm hazards are expected to become stronger and develop more rapidly, greater variations in precipitation are predicted to affect droughts and floods, and rising sea levels to threaten much of Belize's low-lying territories. The past events of coral bleaching and mortality are symptomatic of the impacts of climatic events on biodiversity and ecosystem function. Most infrastructure and settlements are located on the coastal plains and on low-lying Cayes of the country. Projected sea level rises and extreme weather events are expected to jeopardize the country's coastal tourism, fisheries and aquaculture industries, and agriculture base, as well as undermine availability of water resources.

Belize was 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 Belize was ranked 9th with losses of 4.86% GDP, and 38th for the decade with GDP losses of 3.94%.⁴ 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.⁵

Climate Change models⁶ have predicted that Belize 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.⁷ 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.⁸ Probable climate change impacts in Belize include higher temperatures, higher storm intensities and, possibly, more frequent El Niño-Southern Oscillation (ENSO)⁹ events, exacerbating existing health, social and economic challenges affecting Belize.

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",¹⁰ the impact of sea level rise and intensified storm surges in Latin America and the Caribbean will be high. Data available for Belize shows an increase of 26.93% - with 56.15% of the coastal population exposed and potential losses of coastal GDP projected to exceed 61.14%.

⁴ Harmeling (2009). Table 5.

⁵ McLymont-Lafayette (2009).

⁶ 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).

⁷ Chen et al. (2008).

⁸ Giannini et al. (2002).

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

¹⁰ Dasgupta et al. (2009).

Belize's first National Communication on Climate Change (NCCC)¹¹ was released in 2002.

It comments that coastline erosion is already considered a major concern, noting that it is inevitable that accelerated sea level rise would exacerbate the rate of erosion and possibly destroy all existing beaches within this new century. Research undertaken under a US Country Studies Program vulnerability assessment reveals that a 4 cm rise in sea level over the next 25 years would have a low impact. A 50 cm rise would claim over half the existing beaches, while a 100 cm rise in 100 years would destroy over 90% of these beaches. Regarding inundation, approximately 60% of coastal areas are already inundated. Considering that most of the mainland coastline between the existing communities is wetland-dominated, a one-meter rise in sea level would transform the wetlands to lakes. Dry land within a few meters of high tide levels would provide potential areas for new wetland formation.

DISASTER RISK MANAGEMENT FRAMEWORK

The Disaster Preparedness and Response Act (2000¹², revised in 2003)¹³ is the primary legislation governing DRM in Belize. The Act established the National Emergency Management Organization (NEMO) as a Department of Government, headed by a National Emergency Coordinator. It assigns broad responsibilities for "coordinating the general policy of the government related to the mitigation of, preparedness for, response to and recovery from emergencies and disasters". The Act is skewed toward preparedness and response and is silent on risk transfer. The Governor-General may, by Proclamation

which shall be published in the Official Gazette, declare that a state of public emergency exists.¹⁴

The Belize Building Act of 2003 (amended in 2005) provides for the regulation of building operations, including building standards in the country.¹⁵

The Land Utilization Act (revised in 2000) provides for the subdivision and utilization of land; and for the National Emergency Coordinator (NEC) to be a member of the Land Subdivision and Utilization Authority.

The Environmental Protection Act assigns to the Department of the Environment the authority to conduct its own environmental impact assessment where deemed necessary, and to approve environmental impact assessments subject to consultation with the NEC. This provision enables the NEC to incorporate disaster risk considerations into the project cycle.

The Coastal Zone Management Act of 1999 mandates the Coastal Zone Management Authority and Institute to address cross-sectoral sustainable development of coastal resources.

The Insurance Act (No. 11 of 2004) makes provisions for domestic insurers and to strengthen the regulatory framework for the insurance industry. The Act provides for risk coverage for government and private sector-financed infrastructure, up to the duration of the mortgage.

The Reconstruction and Development Corporation Act facilitated the relocation in 1970 of the Government's main administrative center from Belize City to Belmopan, following damage from Hurricane Hattie in 1961. The Act has not

¹¹ Ministry of Natural Resources, the Environment, Commerce and Industry, Belize (2002).

¹² OAS-DSD (2000a).

¹³ OAS-DSD (2003).

¹⁴ OAS-DSD (1981b).

¹⁵ The Belize Building Act supersedes the Housing and Town Planning Act, which regulated development in Belize City and Belmopan only.

been applied since, and has no current functioning administering unit.

The National Emergency Management Organisation is the recognized national coordinating and implementing entity for DRM. NEMO comprises the Cabinet, with the Prime Minister as the Chairperson, the Cabinet Secretary, as Secretary, the NEMO Secretariat and the 13 Operational Committees and nine District and Special Committees.

The policy framework relating to disaster risk management in Belize is fragmented, with several sectoral policies but no overarching policy in place as a more comprehensive measure. The most comprehensive attempt to date is Belize's National Hazard Mitigation Policy (2004), prepared through a concerted effort by the Government of Belize, the Caribbean Disaster Emergency Response Agency (CDERA) and the Caribbean Development Bank (CDB) to provide an integrated approach to hazard risk management and sustainable development, at national, sectoral and community levels. The policy is seen as an important benchmark for stakeholder cooperation and forms the national platform for addressing hazard reduction issues within a broader national development framework. The 2004 policy aims to integrate hazard risk reduction into national development processes and national institutional strengthening for disaster risk reduction.

Public sector agency organization and legislative frameworks mainly support the emergency management cycle, and suffer disparities in addressing comprehensive risk management. While advances have been made in managing disasters, including adoption of policy on hazard mitigation, a greater focus is now required in mainstreaming risk management into sector planning and building a culture of ex ante prevention through risk reduction.

ACTIVITIES UNDER THE HYOGO FRAMEWORK FOR ACTION

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

A 10-year National Hazard Mitigation Plan to implement the Policy was adopted in 2007. The Plan emphasizes a multi-sectoral, integrated and coordinated approach to hazard mitigation. Several other key national policy documents explicitly promote the integration of DRM into the planning process. For example, the National Coastal Zone Management strategy emphasizes cross-sectoral coastal area planning and development; and includes confronting coastal vulnerability as a component of a strategic objective to support planned development. Few other national or sectoral policies or strategies explicitly integrate either hazard mitigation or DRM.

The government is working with UNDP on the Strengthening of Disaster Preparedness and Emergency Response Capacity project, intended to: "assist the country of Belize in the strengthening of its framework for disaster co-ordination as well as the strengthening of national capacities allowing for effective disaster preparedness, risk reduction and emergency response." The project focuses on strengthening both human resources and government structures, and technical instruments for proper disaster planning and management in the country. In response to the national need for holistic planning the project firstly proposes the collation, revision, updating and possible consolidation of existing sectoral disaster management plans into a comprehensive National Disaster Management Plan.

NEMO is improving its information management with UNDP financing for an information manager



Ambergris Caye Island, Belize

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position and to support effective planning and response with the establishment of the DevInfo and DesInventar databases. These contribute to the identification, assessment and monitoring of disaster risk and enhancement of early warning.

HFA Priority #2: Disaster risk assessment and monitoring

The Global Risk Identification Programme's (GRIP) Risk Assessment Package is being supported in Belize by UNDP. The GRIP Risk Assessment Package allows national entities to improve their capacities for disaster risk reduction by facilitating access to improved risk information. As part of this activity the La Red methodology and software for recording disaster events DesInventar is being rolled out in Belize during 2010. This activity includes

software packages, training and data entry to establish a geo-referenced record of subnational disaster events that can support the identification of risk areas and guide a more specific assessment under GRIP.

Belize is participating in the Central American Probabilistic Risk Assessment (CAPRA) platform.¹⁶ CAPRA, supported by CEPREDENAC, UN ISDR, IADB, and the World Bank, will establish a reference methodology for probabilistic risk assessment in Belize as well as a risk information platform. The initiative also seeks to train local users in use of open-source risk models and to facilitate a comprehensive understanding of risk and risk management. Such models will build on the databases and IT infrastructure being built in NEMO through the UNDP project and can use the historical information in DesInventar. The outputs of CAPRA represent high-quality quantitative risk metrics and risk maps for various hazards at the return periods of interest. The

¹⁶ <http://ecapra.org>.

platform architecture is modular and open-source, intended to adjust to national systems, complement related project and data sources, and bring a common language to prior risk estimates in Belize. Applications of the platform are tailored to the institution and sector of interest and can include scenarios of modeled damage for emergency planning or estimates of annual loss in infrastructure for specific hazards to risk estimates resulting from climate change scenario analysis. CAPRA has set in motion a process of risk evaluation and understanding in Belize across sectors and is guided by a National CAPRA Committee established within the national Disaster Council and chaired by NEMO. The national committee meets regularly to discuss standards, data needs, synergies with related projects and to express their training and application needs as they adopt increasingly more modules of the platform. To date the CAPRA initiative remains modest in Belize, focused on addressing existing needs and capacities; however, the underlying foundation in IT, data and staff capacity being established by the government of Belize opens great potential to build ever more powerful risk evaluations and monitoring systems.

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

An innovative system of Indicators of Risk and Risk Management is being developed for Belize, financed by the Inter-American Development Bank as part of the CAPRA project. These indicators are already established in 16 Latin American and Caribbean countries and are useful for both national policy formulation and country comparisons as well as subnational awareness raising, monitoring of progress and risk management resource allocation. They cover the consequences of major disaster impacts (Disaster Deficit index), local small-scale and frequent events

(Local disaster index), community's vulnerability (Prevalent Vulnerability index) and risk management (Risk Management index). The local disaster index will be developed from and complement the data established by the DesInventar historical disaster losses record.

International Federation of Red Cross (IFRC) is assisting vulnerable communities with a methodology for community Vulnerability and Capacity Assessments (VCA). This tool is expected to be employed in the community contingency planning exercises and with UNDP/GEF Small Grant support will allow for contingency planning utilizing this methodology in three Northern villages.

The government of Greece and UNDP are supporting the transfer of LIDAR technology to be used in addressing a long-standing sub-regional concern of the Small Island Developing States of the Caribbean of inadequate available maps for coastal development, hazard and mitigation planning. At present, Belize, like most of its Caribbean counterparts, utilizes maps of 10-meter contours rather than the required 0.5- or 1-meter interval contour maps required for true determination of storm surge and coastal vulnerabilities. This action will be undertaken in conjunction with the regional Caribbean Community Climate Change Center (CCCCC) headquartered in Belmopan city. Present funding only covers construction of the LiDAR instrument by the CCCCC but not the aerial campaigns to acquire the baseline data or the processing and analysis work required to use the information to derive improved risk and climate impact models. Such high-quality high-resolution datasets, when established, present a valuable opportunity for technological leapfrogging in many sectors as the most sophisticated models can be used to generate very detailed and accurate risk information for application in environmental management, marine conservation, coastal erosion, reef assessment, storm surge modelling, hurricane planning and cost benefit analysis of coastal hazard mitigation.

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

A Central Building Authority was recently established to administer the Belize Building Act of 2003 and provide for the regulation of building operations, including building standards in the country. The provisions in the Act for monitoring and enforcement are limited.¹⁷

The Caribbean Disaster Emergency Management Agency (CDEMA), through its piloted Caribbean Hazard Mitigation Capacity Building Programme (CHAMP), is assisting Belize in the development of national capacities allowing for the reduction of national vulnerabilities to the effects of natural hazards. Under this project the national and local governments will work with engineers and local contractors in the development of adequate building codes and will provide training in hurricane-resistant buildings.

A watershed floods management project is supported by the Japan International Cooperation Agency to improve management of the Belize River Watershed. The initiative is the first step in the establishment of an early warning system for communities along the Mopan and Belize Rivers.

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

NEMO is focused on improving capacity for preparedness, emergency management and response. The 2009 work program activities for NEMO focus on: i) improved communication and alerting system; ii) improved preparedness,

mitigation and response capabilities; iii) emergency plans being tested and updated; iv) strengthened district offices; v) shelter management; and vi) capacity building and support.

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

Belize is currently benefiting from the USAID OFDA regional preparedness programme. The initiative focuses on the training of trainers as a means of transferring knowledge to local instructors, ensuring a multiplication of project impact. Training areas offered to Belizean stakeholders include introductory damage assessment and shelter management. USAID is also teaming with the Ministry of Education in the developing of a school safety program.

Risk transfer and financial protection is in its initial stages in Belize. The country has not articulated a national strategy for financing of disaster risk and there is no requirement of insurance of public or private sector infrastructure and property beyond the financing period. Approximately 50% of the housing stock is underinsured, and the vast majority of low-income housing is either uninsured or uninsurable. The Caribbean Catastrophe Risk Insurance Facility (CCRIF) is a regional parametric insurance scheme with an annual premium of US\$500,000 for Belize. This instrument is not well understood by the public or within the government. At its inception it covered only windstorm hazards and had only one national trigger point (Belize City). Thus, in 2007 when Hurricane Dean struck north of Corozal, it failed to trigger a payout. Subsequently the CCRIF has explored additional attachment points and the possibility of flood insurance for Belize.

Vulnerability assessments of the health sector infrastructure have been carried out recently. The Karl Heusner Memorial Hospital in Belize City

¹⁷ National Hazard Mitigation Plan of Belize, 2006.

was assessed in November 2000. More recently in February 2010, this same hospital along with Orange Walk Regional Hospital were assessed using the PAHO/WHO hospital safety index.¹⁸ 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 intervention actions to increase the hospital's safety in case of disasters. The recommendations addressed structural, non-

structural and functional aspects of the facility. Two other regional hospitals are scheduled to be assessed in 2010.

Belize Electricity Company Limited (BECOL) has developed a sister initiative to the JICA project in which it will support the improvement of the early warning system along the Macal River. The Macal River plays host to BECOL's three hydroelectric generating facilities and is a tributary of the Belize River.

KEY DONOR ENGAGEMENTS

Existing Projects with Donors and International Financial Institutions	UN, Donor, IFI Cooperation (where possible)	Allocated Budget and Period (US\$)	HFA Activity Area(s)
Strengthening National Capacity for Disaster Risk Management BCPR	UNDP	1 million 2009-2012	1, 2, 3, 4, 5
Central American Probabilistic Risk Assessment in Belize	IDB	330,000 2006-2011	1, 2, 3
Update of DesInventar Database	UNDP	N/A 2009-2012	2
Watersheds Floods Management Project	JICA	N/A 2003-2009	3, 4
Indicators of Risk and Risk Management	IDB	60,000 2009	1,2
Caribbean Risk Initiative	UNDP	2.1million 2004-2010	1, 2, 3
Support for the Implementation of an Integrated DRM Plan	IDB	400,000 2009-2011	
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	
Risk Evaluation and Indicators of Disaster Risk and Risk Management for Belize, El Salvador and Guatemala	IDB, WB	1 million 2008-2010	
Feasibility Study, Expansion of Water and Sewerage Facilities	CDB	250,000 2007	4
Natural Disaster Management – Emergency Relief Hurricane Dean	CDB	100,000 2007	5
Feasibility Study and Detailed Designs for River Valley Water Supply Systems	CDB	149,000 2007	4
NDM Bridge Rehabilitation –Tropical Storm Arthur	CDB	4,300,000 2008	4
NDM Immediate Response Loan – Tropical Storm Arthur	CDB	500,000 2008	4
NDM Emergency Relief – Tropical Storm Arthur	CDB	20,000 2008	5

¹⁸ http://new.paho.org/disasters/index.php?option=com_content&task=view&id=964&Itemid=911.



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Special thanks and appreciation are extended to the partners who support GFDRR's work to protect livelihood and improve lives: ACP Secretariat, Australia, Bangladesh, Belgium, Brazil, Canada, Colombia, Denmark, European Commission, Finland, France, Germany, Haiti, India, International Federation of Red Cross and Red Crescent Societies, Ireland, Italy, Japan, Luxembourg, Malawi, Mexico, the Netherlands, New Zealand, Norway, Saudi Arabia, Senegal, South Africa, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom, United Nations Development Programme, United States, UN International Strategy for Disaster Reduction, Vietnam, the World Bank, and Yemen.