The University
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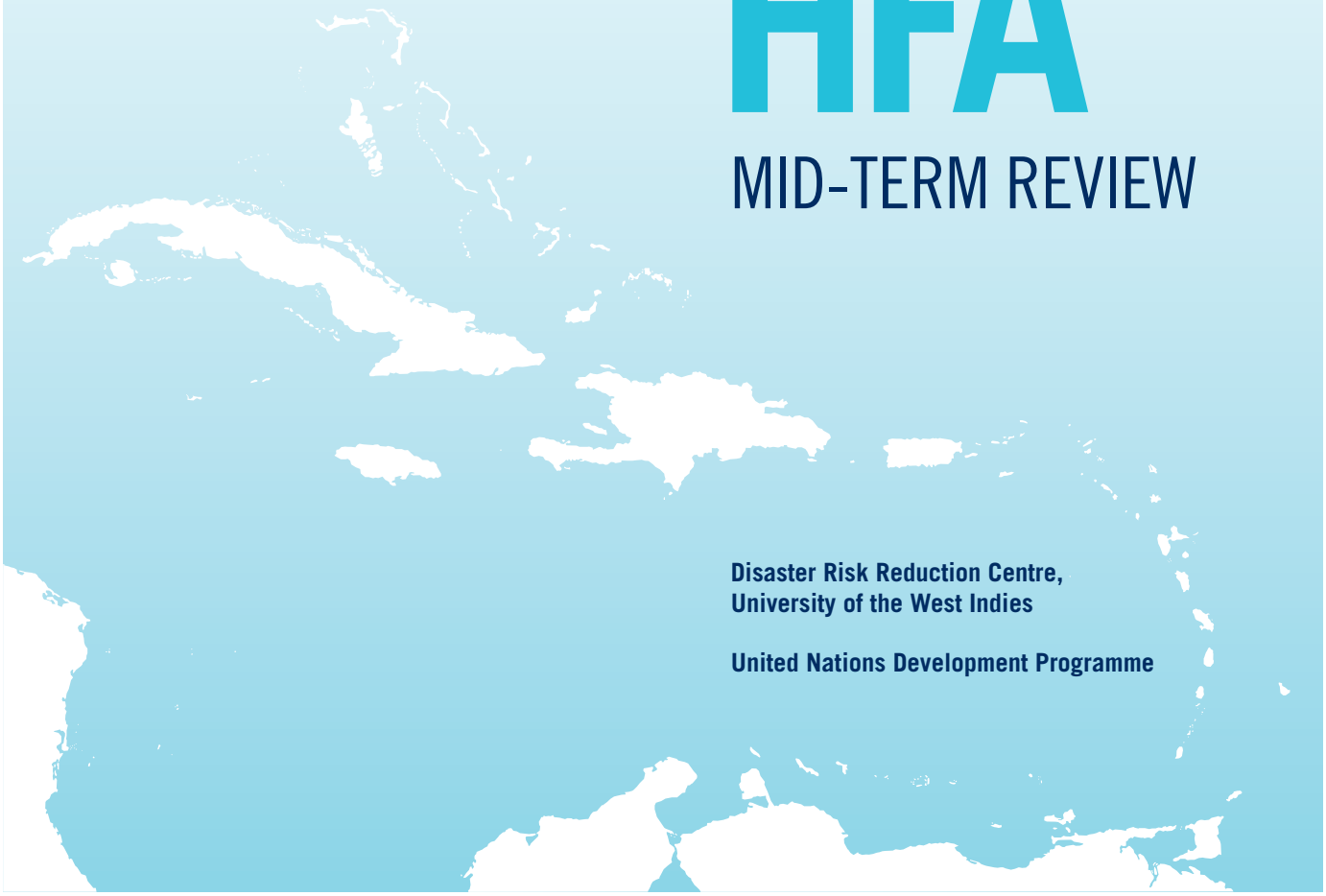
UNDP

CARIBBEAN IMPLEMENTATION OF THE HYOGO FRAMEWORK FOR ACTION

HFA

MID-TERM REVIEW



Disaster Risk Reduction Centre,
University of the West Indies

United Nations Development Programme

Author
Dr. Barbara Carby

Study Coordination
Mr. Ian King
Mr. Marlon Clarke

Study Support
Mr. Ronald Jackson

Publication Coordination
Ms. Jacinda Fairholm

Publication Design
Mr. Edgar Cuesta

Translation
Mr. Angel Milan

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ACCC	Adaptation to Climate Change in the Caribbean Project
BCPR	Bureau of Crisis Prevention and Recovery
CAREC	Caribbean Epidemiology Centre
CARICOM	Caribbean Community
CBDM	Community-Based Disaster Management
CCCCC	Caribbean Community Climate Change Centre
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CDB	Caribbean Development Bank
CDEMA	Caribbean Disaster and Emergency Management Agency
CDERA	Caribbean Disaster Emergency Response Agency
CDM	Comprehensive Disaster Management
CDMP	Caribbean Disaster Mitigation Project
CERO	Central Emergency Relief Organisation (what country?)
CHAMP	Caribbean Hazard Mitigation Capacity Building Programme
CPACCP	Caribbean Planning for Adaptation to Climate Change Project
CIMH	Caribbean Institute of Meteorology and Hydrology
CRED	Centre for Research on the Epidemiology of Disasters
CRMI	Caribbean Risk Management Initiative
CROSQ	CARICOM Regional Organisation for Standards and Quality
CUBiC	Caribbean Uniform Building Code
DDM	Department for Disaster Management, Virgin Islands
DMFC	Disaster Mitigation Facility for the Caribbean
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DRRC	Disaster Risk Reduction Centre, UWI
EIAs	Environmental Impact Assessments
EM-DAT	Emergency Events Database
EWPs	Early Warning Points
GDP	Gross Domestic Product
GIS	Geographic Information System
HFA	Hyogo Framework for Action
HMCI	Hazard Management Cayman Islands
IDB	Inter-American Development Bank
IDNDR	International Decade for Natural Disaster Reduction
IPCC	International Panel on Climate Change
JSN	Jamaica Seismograph Network
MACC	Mainstreaming and Adaptation to Climate Change
NDC	National Disaster Committee (country?)
NDCs	National Disaster Coordinators
NEPO	National Emergency Planning Organisation, Dominica
NGOs	Non-Governmental Organisation
NIDS	National Integrated Development Strategy
NWA	National Works Agency

OAS	Organisation of American States
ODIPERC	Office of Disaster Preparedness and Emergency Relief Coordination, Jamaica
ODM	Office of Disaster Management, Dominica
ODPEM	Office of Disaster Preparedness and Emergency Management, Jamaica
OECS	Organisation of Eastern Caribbean States
PAHO	Pan-American Health Organisation
PCDPP	Pan-Caribbean Disaster Preparedness Project
PCDPPP	Pan-Caribbean Disaster Preparedness and Prevention Project
PFA	Priority for Action
RBLAC	Regional Bureau for Latin America and the Caribbean
RRMCs	Risk Reduction Management Centres, Cuba
SPACC	Special Program on Adaptation to Climate Change UK United Kingdom
SRFP	Sub-Regional Focal Point
UN	United Nations
UNICEF	United Nations Children's Fund
UNDP	United Nations Development Programme
UNDRO	United Nations Disaster Relief Organisation
UNECLAC	United Nations Economic Commission for Latin America and the Caribbean
UNEP	United Nations Environment Programme
UNISDR	United Nations International Strategy for Disaster Reduction
USAID/OFDA	United States Agency for International Development/ Office of Foreign Disaster Assistance
UWI	University of the West Indies
WCDR	World Conference on Disaster Reduction
WHO	World Health Organisation
WMO	World Meteorological Organisation
WRA	Water Resources Authority

Introduction and acknowledgments

The Caribbean Risk Management Initiative (CRMI) was launched in 2004 by the UNDP's Bureau for Crisis Prevention and Recovery, as a knowledge network designed to build capacity across the Caribbean region for the management of climate–related risk. With the acceleration of global climate change and – given the vulnerability of Caribbean countries –, the increasing risk experienced by the Caribbean to a range of natural, environmental and technological hazards remains one of the region's most critical unresolved development problems. The first phase of the CRMI concluded at the end of 2010. The second phase has commenced in 2011 and will build on the foundation laid by Phase One.

The CRMI provides a platform for coordinating knowledge and experience transfer on risk management throughout the Caribbean, across language groups and cultures, so that the way forward can be charted by sharing lessons relevant to the region. The CRMI is also an advocate for the mainstreaming of disaster risk reduction through the provision of tools and methodologies, and for creating space for discussion regarding the challenges faced in the Caribbean. In this latter respect, both this report and the CRMI support to Caribbean countries to enable national Hyogo Framework for Action (HFA) reporting are consistent with the project's overall objectives.

This report evolved from the initiative of Mr. Ronald Jackson, the Director General of the Jamaican Office for Disaster Preparedness and Emergency Management, to share the Caribbean experience in mainstreaming disaster risk reduction as a contribution to the mid–term evaluation of the HFA. Mr. Jackson also participated in the definition and review of the study and has presented the draft final for discussion at the Executive Committee of the HFA Mid–Term Review.

Dr. Barbara Carby, the Director of the University of the West Indies Disaster Risk Reduction Centre, took on the challenge of conducting this review in a relatively short time. Special appreciation is extended to Dr Carby and her colleagues Ms Kerry Ann Morris and Prof. Jacob Opadeyi of the UWI for their contribution to the research.

The DRR focal points and partners in the countries of study were also very receptive to this initiative. In addition to Mr. Jackson in Jamaica, other individuals who facilitated the study included:

- Ms Sharleen DaBreo, Director, Department of Disaster Management, Virgin Islands UK
- Mr. McCleary Frederick and Mr. Simon Boxall, Hazard Management, Cayman Islands
- Deputy Governor Donovan Ebanks and Deputy Chief Secretary Franz Manderson, the Cayman Islands
- Col. Jose Betancourt, Col. Hector Esplugas and Lic. Jorge Peguero, Joint Staff of National Civil Defence, Cuba
- Los Palacios, Pinar del Rio, Cuba and the staff of the Municipal Risk Reduction Management Centre

- Mr. Nathanael Isaacs, National Disaster Coordinator, Office of Disaster Management, Dominica
- Representatives from the following organisations also participated in discussions in Jamaica: DFID, National Works Agency, Ministry of Finance and Planning, Planning Institute of Jamaica, UNDP.

This report has been possible thanks to the support of the Spain–UNDP Trust Fund "Towards an integrated and inclusive development in Latin America and the Caribbean".

Finally, appreciation must also be extended to the UNDP family: Mr. Marlon Clarke, consultant to the DRR programme at UNDP Barbados and the OECS for logistical and overall support; Ms. Jacinda Fairholm, the Program Manager for CRMI Phase One at UNDP Cuba for coordination of the Cuban study visit as well as the report translation and publication; Mr. Edgar Cuesta for designing the final document and to Mr. Angel Milán, for translation.

Ian King

CRMI (Phase I) Project Manager
DRR Programme Manager
UNDP Barbados and the OECS

Executive summary

The United Nations International Strategy for Disaster Reduction (UNISDR) has begun its global mid–term review of the international adoption and implementation of the Hyogo Framework for Action (HFA). In order to contribute to this global review, the United Nations Development Programme (UNDP) has undertaken a review of HFA implementation in Cuba, Dominica, Jamaica, the Virgin Islands (UK) and the Cayman Islands. The study was completed using desk top reviews of available reports and interviews with disaster management officials in the countries.

The geology, tectonic setting, location and topography of Caribbean countries expose them to a variety of hazards; poor land use and environmental management practices often exacerbate the effects of these hazards. The region is at threat from tropical cyclone activity, floods, volcanic and seismic activities, droughts and bush fires, in addition to transportation and industrial accidents and epidemiological threats. The report is focused on natural hazards. Over the last 30 years there has been an increasing trend of loss of life and damage from hazards. Analyses conducted by the United Nations Economic Commission for Latin America and the Caribbean (UNECLAC) show that hurricanes have caused approximately US$5.7 billion in damage. In 2004, a year in which seven countries were affected by hurricanes, there was approximately US$2 billion in damages. Significantly, for two of those countries, the Cayman Islands and Grenada, losses were more than 100% of each country's gross domestic product (GDP).

Although meteorological hazards cause most deaths and damages, geological hazards have also caused significant loss of life and dislocation. The 2010 Haiti earthquake resulted in casualties estimated at over 230,000; the Montserrat volcanic eruption of 1995 killed 19 persons, destroyed the capital and has left more than half of the country uninhabitable.

The recognition of the vulnerability of the region led to several initiatives at both national and regional levels designed to reduce this vulnerability. These date back to the 1980s and include the establishment of regional and national institutional and legislative frameworks as well as the development of programmes to initially address preparedness and response and, subsequently, mitigation, prevention and recovery. The existing disaster risk management (DRM) approaches provided a platform for the HFA and the regional Comprehensive Disaster Management (CDM) strategy.

The countries in the study have not implemented the HFA in its strictest sense. These countries were already engaged in DRM programmes and therefore adapted the HFA to these on–going programmes. This adaptation of the HFA has a synergistis effect on the ongoing efforts to successfully pursue disaster risk management. Despite this it was found that the elements of the HFA, as outlined in the Priorities for Action (PFA), could be identified within the countries' DRM programmes. The report therefore reviews the status of the PFAs by country.

The findings of the review show that progress has been made in areas of hazard mapping and its application to development planning, monitoring and warning systems and preparedness, development of institutional and legal frameworks, community–based disaster management (CBDM) programmes, public education and information dissemination, and recognition of the importance of forecasting of climate change effects to Disaster Risk Management (DRM).

However, there is much work to be done in the areas of risk transfer, especially at the community level. This includes use of quantitative methods for promotion of risk reduction such as cost benefit analyses, development of country–specific indicators for vulnerability and risk, development of databases, and sharing of data and information, and full integration of disaster risk reduction into national development planning, especially within sectors of the economy.

The drivers of success were strong institutional and legal frameworks, continuity of approaches at both national and regional levels, and national disaster management offices that champion DRM with emphasis on disaster risk reduction (DRR).

The obstacles to success were weak institutional and legal frameworks, inadequate resources, inconsistency in political commitment, and weak enforcement regimes.

1 Hyogo Framework For Action (HFA)

1.1 BACKGROUND

The world has witnessed a steady increase in disaster events, which have resulted in significant socio–economic losses in impacted countries. For instance, hurricane Ivan, which passed south of Jamaica on September 11, 2004, resulted in US$595 million in overall socio-economic damages and losses (UNECLAC et al 2004a). Figure 1 below shows the breakdown of these losses by sector as a result of Hurricane Ivan's impact.

SECTOR AND SUBSECTOR	DAMAGE AND LOSSES			SECTOR	
	Total	Direct	Indirect	Public	Private
TOTAL	**36,886.3**	**23,182.2**	**13,704.1**	**9,605.8**	**27,180.5**
SOCIAL SECTORS	**13,684.6**	**12,943.3**	**741.3**	**2,520.7**	**11,163.9**
Housing	11,163.9	10,474.8	689.1		11,163.9
Education and culture	806.9	794.9	12.0	806.9	
Health	758.4	718.2	40.2	758.4	
Public buildings	955.4	955.4		955.4	
PRODUCTIVE SECTORS	**13,375.6**	**4,133.3**	**9,242.3**	**312.1**	**13,063.5**
Agriculture and livestock	8,550.0	3,407.0	5,143.0		8,550.0
Food processing	2,204.9	210.0	1,994.9	312.1	1,892.8
Mining	1,030.0	50.0	980.0		1,030.0
Tourism	1,590.7	466.3	1,124.4		1,590.7
INFRASTRUCTURE	**6,987.9**	**3,545.0**	**3,442.9**	**4,117.5**	**2,770.4**
Electricity	1,397.9	589.0	808.9	279.6	1,118.3
Water supply and sanitation	678.7	190.4	488.3	578.7	
Transport	3,255.9	2,460.0	795.9	3,199.1	56.8
Telecommunications	1,535.3	198.6	1,336.7		1,535.3
Airports	120.1	107.0	13.1	60.1	60.0
ENVIRONMENT	**2,560.6**	**2,560.6**		**2,560.6**	
EMERGENCY EXPENDITURES	**277.6**		**277.6**	**94.9**	**182.7**

Figure 1: Summary of damage and losses caused by Hurricane Ivan in Jamaica. *Source: UNECLAC et al (2004a)*

Additionally, as noted in the 2009 Global Assessment Report (UN 2009), disaster risk is increasing globally for most hazards. For instance, it is estimated that "global flood mortality risk increased by 13% between 1990 and 2007, while economic loss risk increased by 33%" (UN 2009, p. 10). There is therefore an international need to systematically reduce disaster risks, a need that was recognised at both the 1994 and the 2005 World Conferences on Disaster Reduction (WCDR).

At the WCDR, held between January 18 and 22, 2005, three weeks after the Indian Ocean tsunami disaster on December 26, 2004, the Member States of the United Nations (UN) identified and adopted five priority components in its 10 year action plan towards a comprehensive framework for disaster risk reduction (DRR). This plan was adopted as the "Hyogo Framework for Action, 2005–2015: Building the Resilience of Nations and Communities to Disasters" (UNISDR 2005a).

The WCDR, with the stark reality of the extreme losses in life and property associated with the recent tsunami disaster as a backdrop to this international disaster reduction gathering, successfully placed

DRR at the centre of national, regional and global political agendas. This is captured in declaration No. 4 of the Hyogo Declaration (UNISDR 2005a, p. 2-3):

> *"We affirm that States have the primary responsibility to protect the people and property on their territory from hazards, and thus, it is vital to give high priority to disaster risk reduction in national policy, consistent with their capacities and the resources available to them."*

The Hyogo Framework for Action (HFA), adopted by the 148 Member States of the UN, including several Caribbean states, is now the key global instrument for guiding implementation of DRR within all levels of society. Its overarching goal is to build the resilience of nations and communities to disasters through the substantive reduction of disaster losses in lives and within the social, economic and environmental assets of communities and countries by 2015 (UNISDR 2007). The HFA recognises that disasters result when hazards such as earthquakes and hurricanes interact with physical, social, economic and environmental vulnerabilities. The framework adopts a sustainable development approach to DRR, taking into consideration the underlying risk drivers that impact on the levels of disaster vulnerability within a country.

This sustainable development approach to DRR was first introduced at the global level by the United Nations International Decade for Natural Disaster Reduction (IDNDR), 1990–1999. However, by the first half of the Decade dissatisfaction emerged over the IDNDR's techno–centric, scientific and top–down approach to reducing natural disaster impacts (Wisner, Blaikie, Cannon and Davis 2003). At its mid–decade review meeting from May 23–27, 1994 in Yokohama, Japan, the "Yokohama Message" highlighted the need to incorporate socio–economic aspects as integral components of effective disaster reduction. The resulting Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation and its Plan of Action (*Yokohama Strategy)*, adopted at the meeting affirmed the following, among others (UNISDR 1994):

> *"Disaster prevention, mitigation, preparedness and relief are four elements which contribute to and gain from the implementation of sustainable development policies. These elements, along with environmental protection and sustainable development, are closely interrelated. Therefore, nations should incorporate them in their development plans and ensure efficient follow–up measures at the community, national, subregional, and international levels."*

Among its five objectives, the WCDR 2005 was convened "to conclude and report on the review of the Yokohama Strategy and its Plan of Action, with a view to updating the guiding framework on disaster reduction for the twenty–first century" (UNISDR 2005a, p. 3). The meeting resolved to pursue the following outcome for the next ten years: "The substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries" (UNISDR 2005a, p. 3). The resulting framework of action adopted by the UN Member states became known as the Hyogo Framework for Action, 2005–2015.

1.2 HFA PRIORITIES FOR ACTION

Within the framework are five priorities for action:

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation

2. Identify, assess and monitor disaster risks and enhance early warning
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels
4. Reduce the underlying risk factors
5. Strengthen disaster preparedness for effective response at all levels

1.3 COMPREHENSIVE DISASTER MANAGEMENT (CDM) AND THE HYOGO FRAMEWORK FOR ACTION (HFA)

Prior to the adoption and implementation of HFA within the Caribbean, the anglophone islands of the region, led by the CARICOM regional disaster management agency, the Caribbean Disaster and Emergency Management Agency (CDEMA), had adopted the Comprehensive Disaster Management (CDM) approach in 2001. This strategy and results framework was adopted to link development decision–making and planning initiatives to a comprehensive disaster management approach, i.e., taking a sustainable development approach to disaster risk management (DRM). This approach is therefore consistent with global thinking; as noted in the 2009 Global Assessment Report on Disaster Risk Reduction (UNISDR 2009, p. 5), disaster risk is configured over time "through a complex interaction between development processes that generate conditions of exposure, vulnerability and hazard."

The following are the five intermediate results identified by the CDM 2001 framework:

1. Stronger regional and national institutions promote CDM
2. Research and training support CDM
3. Regional institutions and donors incorporate CDM in their own programs and promote CDM to their national members/clients
4. Preparedness, response and mitigation capability is enhanced and integrated
5. Hazard information is incorporated into development planning and decision–making

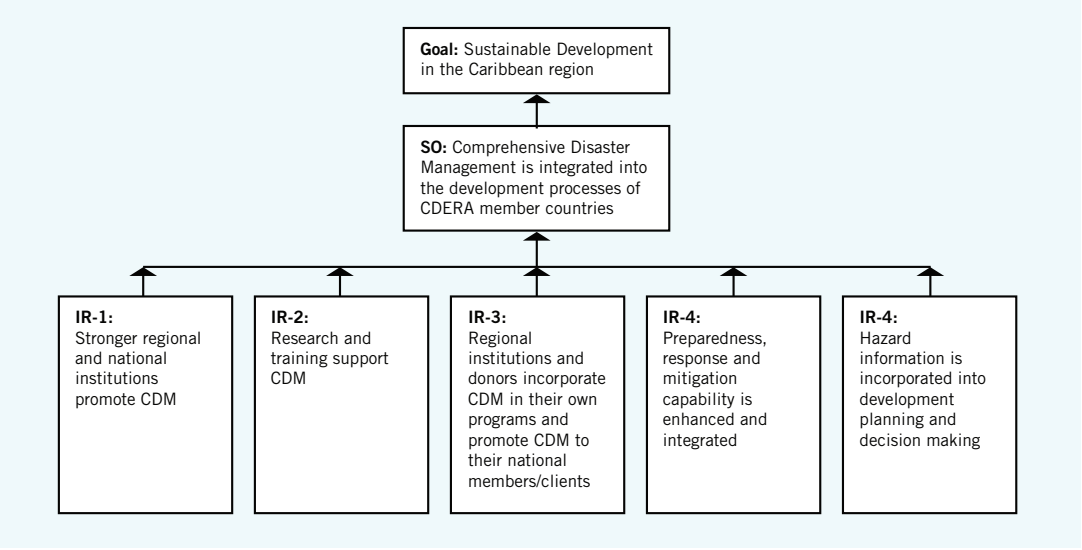

Figure 2: CDM 2001 Results Framework. *Source: Bisek, Jones and Ornstein 2001*

These were re–articulated in 2007 in the enhanced CDM strategy to reflect its overall purpose (CDEMA 2007, p. 14): "To strengthen regional, national and community level capacity for mitigation, management, and coordinated response to natural and technological hazards, and the effects of climate change."

The enhanced CDM strategy consists of the following four outcomes:

1. Enhanced institutional support for CDM Program implementation at national and regional levels
2. An effective mechanism and programme for management and sharing of CDM knowledge is established and utilized for decision making
3. Disaster Risk Management has been mainstreamed at national levels and incorporated into key sectors of national economies e.g. tourism, agriculture, infrastructure, planning, health, etc.
4. Community resilience has been enhanced in CDEMA[1] states/territories to reduce risk and to respond to the adverse effects of climate variability and change and disasters

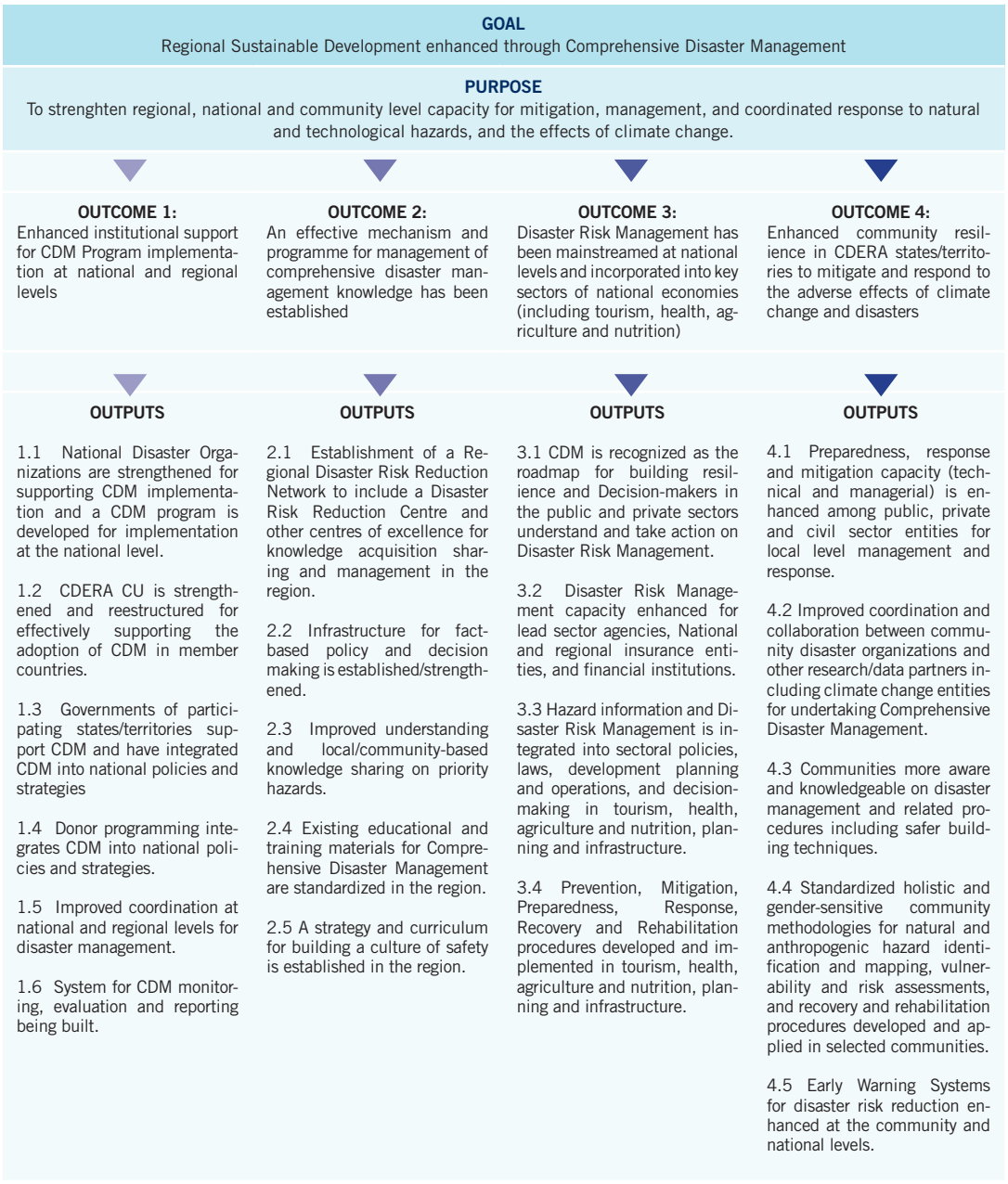

Figure 3: Enhanced CDM Framework. *Source: CDEMA (2007, p. 18)*

1 The Caribbean Disaster and Emergency Response Agency (CDERA) is now the Caribbean Disaster and Emergency Management Agency (CDEMA).

It is significant to note the synergies between the CDM approach and the HFA, with the former affirming the need, as expressed in the HFA, to build the resilience of nations and communities to hazard impacts.

	ENHANCED COMPREHENSIVE DISASTER MANAGEMENT (CDM) OUTCOMES	HYOGO FRAMEWORK FOR ACTION (HFA) PRIORITIES FOR ACTION
1.	Enhanced institutional support for CDM Program implementation at national and regional levels.	Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.
2.	An effective mechanism and programme for management and sharing of CDM knowledge is established and utilized for decision making.	Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
3.	Disaster Risk Management has been mainstreamed at national levels and incorporated into key sectors of national economies e.g. tourism, agriculture, infrastructure, planning, health, etc.	Reduce the underlying risk factors.
4.	Community resilience has been enhanced in CDERA states/ territories to reduce risk and to respond to the adverse effects of climate variability and change and disasters.	Identify, assess and monitor disaster risks and enhance early warning.

Table 1: The four enhanced CDM outcomes and the five HFA Priorities for Action

CDEMA mapped the HFA Priorities for Action and CDM Indicators to demonstrate the compatibility between these two frameworks. The table above is adapted from CDEMA's work.

2 Caribbean Hyogo Framework for Action mid-term review

2.1 BACKGROUND

The Disaster Risk Reduction Centre (DRRC) was contracted by the United Nations Development Programme (UNDP) to conduct a mid–term review of the implementation of the Hyogo Framework for Action (HFA) within the Caribbean, specifically examining the adoption and implementation of the HFA within the Cayman Islands, Cuba, Dominica, Jamaica and the Virgin Islands (UK).

The mid–term review became necessary as the United Nations International Strategy for Disaster Reduction (UNISDR) began its mid–term review of the international adoption and implementation of the HFA. This activity is accommodated within the HFA, which states that the "implementation of [the] Framework for Action for the period 2005–2015 ... be appropriately reviewed" (UNISDR 2005a, p. 14), thus mandating the UNISDR to "prepare periodic reviews on progress towards achieving the objectives and priorities of this Framework for Action" (UNISDR 2005, p. 18).

To this end, paragraph 30(g) of the HFA (UNISDR 2005a, p. 15) recommends that states should endeavour to:

> *"Develop procedures for reviewing national progress against this Framework for Action, which should include systems for cost benefit analysis, and ongoing monitoring and assessment of vulnerability and risk..."*

The following strategic questions define the scope of the UNISDR's international mid–term review of the adoption, and progress of HFA implementation, 2005-2010:

1. What is the overall progress on HFA implementation and what are the prospects, on prevailing trend, for achieving the desired outcome of a "substantial reduction in losses"?
2. What have countries done to progress HFA and what do national authorities and other stakeholders consider as their big achievements, major constraints, and main lessons learnt?
3. What have been the promoters and barriers to investment in disaster risk reduction and how can funding be placed on a more predictable and sustained footing?
4. What adjusting or strengthening is needed of the international architecture including the roles of ISDR institutional partners, to help accelerate HFA implementation?
5. What adjustment of directions and priorities are needed to take up new opportunities for disaster risk reduction in relation to climate change and any other emerging issues?
6. What types of key deliverables would make the biggest impact during the remaining period of HFA, and what key policy and strategic orientations should be taken up as we move towards and beyond 2015?

It is within this global context that the UNDP has initiated the mid-term review of the Caribbean's adoption and implementation of the HFA.

2.2 SCOPE OF THE DISASTER RISK REDUCTION CENTRE'S REVIEW

The main objective of the Disaster Risk Reduction Centre's (DRRC) mid–term review is to provide a critical analysis of the Caribbean's implementation of the HFA since its adoption in 2005 using the Cayman Islands, Cuba, Dominica, Jamaica and the Virgin Islands (UK) as selected Caribbean countries. Jamaica, Cuba and the Virgin Islands (UK) have for some time adopted a comprehensive approach to their disaster risk management programme. Dominica, as with several of the smaller countries of the Eastern Caribbean, has found adoption of a comprehensive approach as promoted by the HFA and CDM frameworks very challenging, while the Cayman Islands' programme is newly established in 2006.

The mid–term review takes a retrospective examination of the period 2005 to 2010, which will inform continued implementation through 2015, while also incorporating pre–2005 initiatives and programmes, which were important to the development of disaster risk management (DRM) in the countries.

This analysis has:

- Evaluated important factors for any progress made and successes achieved, including historical, institutional, technical and financial considerations
- Documented where challenges and obstacles have been encountered, identified the nature of these challenges/obstacles, and evaluated efforts to overcome them
- Documented any evidence or examples of investment in DRR, investment in mitigation after a hazard event or disaster, and evaluated the costs against benefits of such investments
- Identified synergistic relationships between the HFA and the CDM approach
- Identified examples of horizontal technical cooperation/skills transfers
- Based on findings from above, identified lessons learned and made recommendations/suggest a blueprint for implementation of the HFA in the context of the Caribbean

The Caribbean review should help to answer some of the questions being posed by the wider HFA mid–term review and will help to garner lessons to be learned for the implementation of HFA and CDM. The results of the review may also inform HFA implementation outside of the Caribbean.

2.3 METHODOLOGY AND GUIDING PRINCIPLES

The methodology used included:

1. Desktop reviews of HFA implementation in selected Caribbean countries using HFA National Progress Reports and a review of the Cuban Risk Reduction Management Centres.
2. Interviews with representatives of the national disaster organisations in the Cayman Islands, Cuba, Dominica, Jamaica and the Virgin Islands. A set of questions was formulated to guide these discussions (see Annex Six).

The guiding principle of the report is objectivity. The views of those interviewed were faithfully recorded. Every effort was made to avoid speculation. Conclusions are drawn based on the discussions, and do not reflect the personal opinion of the writer.

2.4 LIMITATIONS

Some requested information was not received in time for the completion of the report. For the purposes of the report, "Caribbean" is used in a very restricted sense. The report covers only selected Caribbean island territories, as time did not permit using a wider selection of countries. The countries include three CDEMA participating states (Dominica, Jamaica and the Virgin Islands (UK)), and two non-participating states (the Cayman Islands and Cuba).

Figure 4: Map of the Caribbean showing selected Caribbean countries for the Caribbean HFA Mid-Term Review

2.5 STRUCTURE OF THE REPORT

The report reviews the background to the HFA. It then reviews the vulnerability of the wider Caribbean to hazards, the goals of the HFA and the regional CDM strategy. A discussion of the findings is also done followed by conclusions and recommendations. The experiences of the selected Caribbean countries in the adoption and implementation of the HFA and CDM strategy are documented in the Annex One to Five.

3 Caribbean natural hazards analysis

3.1 EXPERIENCE OF AND VULNERABILITY TO NATURAL HAZARDS

The Caribbean countries and territories are located from Suriname, just 2° above the equator, to the Bahamas, whose northward extension is roughly 5° north of the Tropic of Cancer, the same latitudinal extent that provides the conditions of warm, moist air and clockwise Coriolis Force required for the formation of tropical depressions, storms and hurricanes; and from Belize to the west at 89° longitude to Barbados in the Eastern Caribbean located at 59° W longitude. The islands in the Eastern Caribbean, arranged in a distinct arc, mark the leading edge of the Caribbean plate to the east, while the islands of the Greater Antilles mark its northern edge. This tectonic setting adds seismic, tsunamigenic and volcanic hazards to the region. This broad geographic extent of the Caribbean provides the environment for a number of natural hazards, that either cannot be avoided or whose effects cannot easily be prevented.

The region is highly prone to natural hazards. The major climatic hazards of the region are strong winds and heavy rains associated with the annual formation of tropical depressions, storms and hurricanes, often giving rise to floods. Storm surges often linked to the passage of storms and hurricanes result in coastal flooding. Guyana, though not in the hurricane path, experiences heavy rains that can result in inland and coastal flooding and occasional, yet severe, drought that may be influenced by El Nino. Other territories, in particular those that have limestone formations, often suffer droughts during the dry season.

Figure 5: Ash fall from the Soufrière Hills volcano in Montserrat

Volcanic eruptions are added concerns for the islands of the Lesser Antilles. Soufrière Hills in Montserrat is the region's longest erupting volcano, starting in 1995 and continuing to the present. This caused the displacement and emigration of more than half of the population, and relocation of the capital and residential areas to the north of the island.

The active submarine volcano, Kick 'em Jenny, off the northwest coast of Grenada poses the threat of tsunamis whose effects are likely to be felt throughout the eastern Caribbean. Tectonic and volcanic earthquakes are a common occurrence in the Caribbean region having magnitudes ranging from 3 to 7+ on the Richter scale. The threat of sea level rise related to global climate change is an additional hazard that Caribbean territories must plan for. Coastal erosion slowly yet inexorably threatens the human and economic activities of the heavily populated coastal zones of Caribbean territories.

Landslides, debris flows, and rock falls are triggered by heavy rains. Territories that possess steep and rugged topography, such as Dominica, Jamaica and St Lucia are particularly prone to landslides, which are often exacerbated by road cuttings and land clearance for settlement or agriculture.

On–shore and off–shore oil spills, transport of nuclear waste in Caribbean waters, storage and transport of hazardous chemicals, and toxic release of chemicals are some of the major technological hazards Caribbean countries are likely to face. Overall, the Caribbean region is prone to climatic, tectonic, and technological hazards.

3.2 CARIBBEAN HAZARD PROFILE

3.2.1 Hydro-meteorological hazards:

Most of the Caribbean islands lie within the North Atlantic hurricane belt and have all been impacted by hurricanes and tropical storms directly or indirectly. On average, at least one major hurricane and numerous tropical storms cross the Caribbean each year. Within the Caribbean region, individual countries have incurred losses from a single hurricane event exceeding annual GDP. In the 60–year period between 1942 and 2002, 20,000 persons lost their lives in the Caribbean due to hurricanes; 6,379 deaths ascribed to hurricanes over the period 1980 to 2009 (EM-DAT 2010).

Figure 6: Devastation caused by Hurricane Ivan in Grenada in 2004. *(UNDP Photo/Rebecca Arias)*

According to a 2004 UNECLAC report, the impact of hurricanes on the Caribbean countries in the last three decades has been manifested in losses and damage estimated at US$5.7 billion. Approximately 79% of this amount consisted of direct damage to infrastructure and capital assets.

Flooding is one of the most common natural hazards in the region overall and the most widespread hazard occurring within the CDEMA participating states, with approximately 88% of countries experiencing flooding events in the five–year period preceding 2001 (Government of Barbados 2005). Floods include both coastal and river or land floods. Coastal flooding related to storm surge is a major threat to all the countries (UNECLAC 2004b). Some islands, such as Haiti and Trinidad and Tobago are affected by river floods and flash floods at least once per year. These are often associated with rainfall events of high intensity or great duration, tropical storms and hurricanes.

Droughts in the Caribbean are often associated with the El Nino phenomenon (Government of Barbados 2005).

3.2.2 Geological hazards:

The Caribbean is also part of an active seismic region. According to the UWI Seismic Research Unit, the Eastern Caribbean is a seismically active area with hundreds of earthquakes occurring in and around the region each year. Additionally, the region, particularly the Lesser Antilles, is the site of considerable volcanic activity (Ahmad 2007). Several Caribbean islands are volcanic in origin, for example, Montserrat, Martinique, Guadeloupe, the U.S. Virgin Islands, St. Kitts, Nevis, Grenada, St. Lucia, Dominica and St. Vincent and the Grenadines. Active volcanoes exist on the islands of Montserrat, Dominica, St. Lucia, St. Vincent & the Grenadines, and off the coast of Grenada (UNECLAC 2004b): within the last century, Montserrat, Martinique and St. Vincent have been affected by volcanic eruptions.

Tsunamis, although currently not thought of as a major threat, are possible due to the region's seismicity as well from distant sources. In the past 500 years, there have been at least ten earthquake-generated tsunamis in the Caribbean. These occurred in Haiti, Guadelope, Puerto Rico, the Dominican Republic and the U.S Virgin Islands and killed a total of approximately 350 people.

Landslides are particularly common in islands such as Jamaica, Dominica, St Lucia and the northern areas of Trinidad due to the nature of soils, topography and human activity; mudslides have occurred in Haiti due at least in part, to deforestation.

3.2.3 Man–made hazards:

Although this review focuses on natural hazards, the Caribbean is also exposed to man–made hazards. Disasters triggered by environmental and industrial incidents pose a potential threat (USAID 2008). Increasing industrialization and trans-Caribbean transportation has exposed the region to technological or man–made hazards including industrial fires, chemical and oil spills and aircraft, shipping and hazardous materials accidents. Oil spills have occurred in Trinidad and Tobago and Jamaica and mining accidents in Guyana. Forest fires associated with the dry season and drought conditions occur in countries such as Trinidad and Tobago and Jamaica and Belize, but are the result of human intervention, usually for land clearing purposes. Several countries in the region such as Haiti are also vulnerable to civil unrest and associated humanitarian consequences (USAID 2008).

Emerging threats in the last decade also include hazards related to climate change, global warming and sea level rise, which, on account of the inherent vulnerabilities of small island states, are now a matter of serious concern (UNECLAC 2004). According to the International Panel on Climate Change (IPCC, 2001) small islands are among the countries that will be most seriously impacted by climate change.

3.3 EXAMPLES OF DISASTERS IN THE CARIBBEAN

The toll of natural disasters in the Caribbean has been considerable with the region sustaining massive human and economic losses. In 2004 alone, major natural disasters struck seven Caribbean countries, causing upwards of US$2 billion in property damage and direct losses (Clayton 2005). Overall, the financial cost of natural disasters in the Latin American and Caribbean regions has risen from US$700 million per annum two decades ago, to more than US$3.3 billion per annum (OAS 2005).

Country	Event	Date	Economic Impact (US$M)	Economic Impact (as % of GDP)	Affected Population
Bahamas	Hurricanes Frances & Jeanne	Sep. 2-5 & 25, 2004	381	7.3	2 deaths* over 8,000 affected*
Cayman Islands	Hurricane Paloma	Nov. 8, 2008	154.4	7.4	0 deaths 2,483 persons affected
Cayman Islands	Hurricane Ivan	Sep. 11, 2004	3,432	138.0	2 deaths 35,189 affected
Grenada	Hurricane Ivan	Sep. 7, 2004	889	212.0	28 deaths 81,553 affected

* Both figures associated with Hurricane Frances

Table 2: Examples of major disasters in the Caribbean (2004-2010)

Country	Event	Date	Economic Impact (US$M)	Economic Impact (as % of GDP)	Affected Population
Haiti	Hurricanes Fay, Gustav, Hannah & Ike	Aug. 16-Sep. 8, 2008	897	14.6	793 deaths 844,500 affected
	Earthquake**	Jan. 12, 2010			Over 230,000 deaths 1.3 million displaced Over 300,000 injured
Jamaica	Hurricane Ivan	Sep. 10, 2004	595	8	17 deaths 369,685 affected
Saint Lucia	Hurricane Dean	Aug. 16-17, 2007	18.8	2.5	0 deaths 23,167 affected
Suriname	Flood	May 2006	41	2.3	0 deaths 48,351 affected

Table 2 (continued): Examples of major disasters in the Caribbean (2004-2010)

Cropper (2004) suggests that the Caribbean's sensitivity to hazards can be understood by citing some examples of such historical events in the Caribbean, characterizing the nature and extent of the impacts, and noting the level and distribution of costs, direct and indirect. Some examples are included below:

- In terms of disaster occurrence, 2004 was a very busy year. The region was subjected to one of the worst hurricane seasons in its history in terms of the number and severity of storms (OAS 2005), the number of casualties, and rapid succession of the events. Caribbean countries have suffered losses approaching and exceeding the annual gross domestic product (GDP) from a single hurricane event. According to a report prepared by the Economic Commission for Latin America and the Caribbean (UNECLAC 2005) on behalf of the Organisation of Eastern Caribbean States (OECS 2004) the damage from Hurricane Ivan was estimated at more than 100 percent of Grenada's GDP. 28 people perished and most of the infrastructure, including electricity and communication systems, as well as 90 percent of all buildings, suffered structural damage from Hurricane Ivan (UNEP 2005). In Haiti, over 2,000 people lost their lives. The southern coasts of Jamaica and the islands of the Bahamas were also badly hit. In addition, several other islands sustained lesser but nevertheless significant damage to buildings and infrastructure.
- Cuba also endured multiple hits in 2008 due to Hurricanes Fay and Gustav (August), Ike (September) and Paloma (November). Figures available from the Ministry of Foreign Affairs (MINREX) (http://embacu.cubaminrex.cu) indicate that Gustav alone resulted in loss and damage in the housing and infrastructure, agriculture, forestry, power and water services sectors, among others, estimated at $5billion USD. In the 2008 season, 3,179,846 persons were evacuated; 7 lives were lost in total. The low loss of life is a testament to Cuba's level of preparedness and organisation.
- The 2005 Atlantic hurricane season was also one of the busiest on record. By mid–July 2005, Hurricanes Arlene, Bret, Cindy, Dennis and Emily killed more than 150 people, destroyed almost 30,000 homes and caused over US$45 billion in damage.
- In 2008, four storms hit Haiti in succession causing fatal mudslides, widespread flooding and resulting in massive losses. The damage, which amounted to over 5% of the country's GDP, was estimated at over $1 billion, up till then, the costliest natural disaster in Haitian history. Approximately 800,000 people were affected — 8 percent of Haiti's total population. The hurricanes also destroyed 22,702 homes and damaged another 84,625. 70% of

Haiti's crops were wiped out by flood, which led to the deaths of many children due to malnutrition in the months post–disaster. Over the last two decades, loss in Haiti due to flooding is estimated at US$5 billion.

Figure 7: Flooding in Haiti in 2008. *(UN Photo/Marco Dormino)*

- Cuba also endured multiple hits in 2008 due to Hurricanes Fay and Gustav (August), Ike (September) and Paloma (November). Figures available from the Ministry of Foreign Affairs (MINREX) indicate that Gustav alone resulted in loss and damage in the housing and infrastructure, agriculture, forestry, power and water services sectors, among others, estimated at $5billion USD. In the 2008 season, 3,179,846 persons were evacuated; 7 lives were lost in total. The low loss of life is a testament to Cuba's level of preparedness and organisation.
- In Trinidad flood is one of the major hazards affecting the country every year during all seasons (Canisius and Nancy 2009, Ramroop 2005). In recent years the number of flood occurrences has increased throughout the country, exacerbated by indiscriminate dumping into streams, improper or illegal hillside land development and agricultural practices (Water Resources Authority 2001). Individuals inhabiting flood prone areas often experience financial losses due to the property damage. Trinidad's estimated damage of flood events in 1993, 2002 and 2006 are US$580,000, US$3,300,000 and US$2,500,000 respectively (Water Resources Authority 2001).
- Many Caribbean islands are prone to landslides. The North Coast Road in the Northern Range of Trinidad experiences some of the largest landslides and is subjected to repeated failures (Wharton 1994). In 1981, water lines were severed by landslides in St Vincent, affecting water supply for nearly 40% of the population and in 1986, landslides damaged pipelines to hydroelectric generating stations, reducing the total electrical generating capacity of St. Vincent by 36% until repairs could be made (DeGraff et al. 1989). Between 1925 and 1986, 25 people in Dominica lost their lives to landslides in five separate events. The average annual cost of landslide investigation, repair, and maintenance in the larger islands of Trinidad and Tobago is $1.26 million and $0.96 million respectively. Degraff et al (1989) estimated that in an average year, the cost of repairing landslide damage to roads throughout the Caribbean amounted to US$15 million.
- Dominica, Jamaica and St. Lucia all suffered severe landslides during the 2010 hurricane season. These were triggered by intense rainfall associated with Tropical Storm Nicole and Hurricane Tomas.
- Although there are considerable variations in the level of activity, no island in the region is completely free from the threat of earthquakes. The most recent example of a large earthquake in the region occurred in Haiti. On January 12, 2010, a 7.0 earthquake struck, killing approximately 230,000 persons, and rendering a further 600,000 homeless. The quake resulted in massive damage to buildings and other infrastructure. Losses and the total cost of the disaster at the time of this writing are still being tallied. Other notable events include the 1692 earthquake in Jamaica which killed 2,000 persons and destroyed 90% of the then capital, Port Royal, and another event in 1907 which destroyed the capital, Kingston. A large

quake (magnitude 7.5) struck Puerto Rico in October 1918, killing more than 100 people and sending a tsunami as high as 20 feet ashore (UWI Seismic Research Centre 2009).

- In the past 500 years there have been ten confirmed earthquake–generated tsunamis in the Caribbean Basin with four causing fatalities. An estimated 350 people in the Caribbean were killed by these events (UWI Seismic Research Centre 2009). The north–eastern Caribbean region near Puerto Rico and Hispaniola is more susceptible to tsunamis. There are no historical records of destructive tsunami impacts in the southern region, though the submarine volcano Kick'em-Jenny located nine kilometres north of Grenada will pose a potential tsunami risk once it reaches shallow enough depths.

From top to bottom:

Figure 8: Satellite image showing the aftermath of a 7.0-magnitude quake that impacted Haiti on January 12, 2010. *(BBC Photo)*

Figure 9: Haitian presidential palace severely damaged by quake. *(UN Photo/Logan Abassi)*

Figure 10: Downtown Port-au-Prince ravaged by quake. *(UN Photo/Logan Abassi)*

- The Caribbean has many volcanoes and has suffered the consequences of volcanic eruption on several occasions. Volcanic eruptions have twice completely destroyed the capital of an Eastern Caribbean island — St. Pierre, Martinique in 1902 and Plymouth, Montserrat in 1997. Of note is that while property destruction levels from severe hurricanes generally range from 10–25%, property destruction levels (and by extension, casualties) in the Eastern Caribbean caused by volcanic eruptions approach 100% in the most severely affected areas. The only appropriate preventative action that can be taken is a total evacuation of the areas likely to be affected. Mt. Pele completely destroyed the town of St. Pierre in Martinique in 1902, killing about 30,000 people. One of the most notable recent events occurred on July 17, 1995, when the Soufriere Hills volcano in Montserrat began erupting. Two years later, the volcano had made most of the island uninhabitable. The capital Plymouth was completely destroyed and approximately 20 people died. Severe economic and social disruption resulted in more than half the population leaving. Economic costs have been estimated to be in excess of US$500 million. The 1902 eruption of the Soufriere volcano in St Vincent resulted in the deaths of 1,565 people and extensive damage to surrounding agricultural areas.

- One of the region's most memorable technological disasters was the August 1995 gold mine disaster at Omai in Guyana, which was declared an environmental disaster by the then president, Cheddi Jagan. An earth dam holding back waste at the Omai gold mine burst, disgorging 3 million cubic metres of cyanide–laced water into a tributary of the River Essequibo, which runs the length of the country. While no human deaths were reported, the river ecosystem, on which many native communities rely for fish and drinking water, was badly contaminated.

3.4 DISASTER TRENDS IN THE CARIBBEAN

The previous section established that the impact of disaster has been substantial in the region. This section analyzes trends in disaster occurrence and impact, which provides some clues about future risk in the region. Graphs and charts are based on data from the *Centre for Research on the Epidemiology of Disasters* (CRED) Emergency Events Database (EM-DAT 2010), and include consideration of both recorded natural and technological disasters for the Caribbean [1].

The following major trends were found with respect to disasters in the Caribbean:

- Figure 11 shows a general increase in the frequency (recorded numbers) of both natural and technological hazards over the last three decades from 1980-2009.

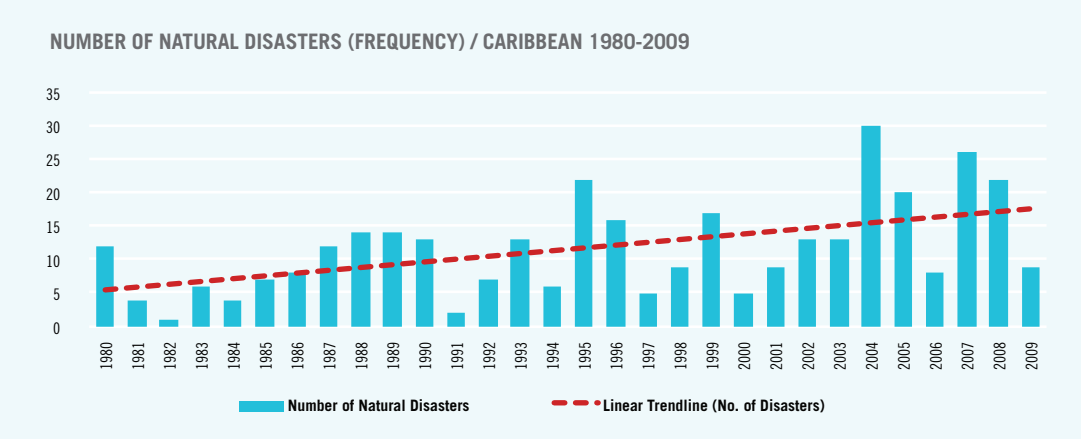

Figure 11: Frequency of disasters in the Caribbean (1980-2009). *Source: EM-DAT 2010*

- The intensity of a disaster is reflected by its impact on people, specifically the total affected, total deaths and cost of the disaster. Overall the total recorded number of people affected by disasters (natural and technological) has increased over three decades (Figure 12). In 2001 the total number of people affected reached a peak at over 5 million, with over 1 million recorded for both 2004 and 2005.

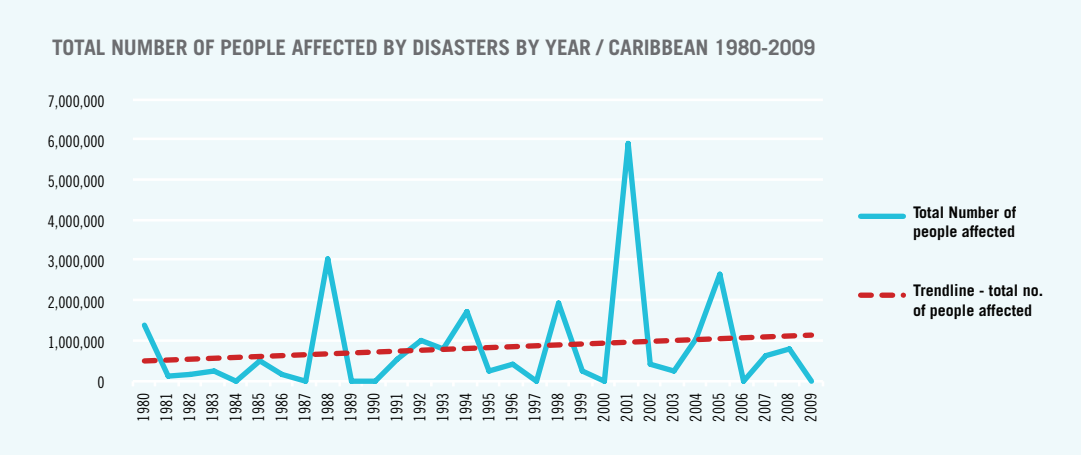

Figure 12: Total numbers of people affected by disasters in the Caribbean (1980-2009). *Source: EM-DAT 2010*

1 Charts and graphs are generated from recorded events only, which may create discrepancies; general major trends can still be deciphered

- The total number of recorded deaths has also increased over the period, with the most deaths from disasters (natural and technological) peaking in the last decade; 2004 accounted for over 6000 deaths (Figure 13). This coincides with one of the worst hurricane seasons experienced in the Caribbean.

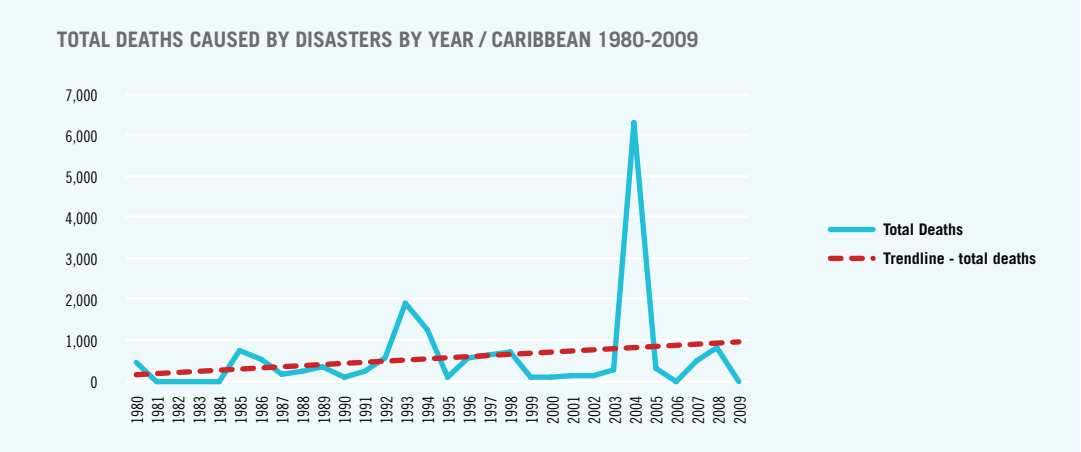

Figure 13: Total numbers of recorded deaths in the Caribbean due to disaster (1980-2009). *Source: EM-DAT 2010*

- Figure 14 show that there was also an increase in total estimated damage costs in the Caribbean over the last three decades. Most of these costs were incurred over the last decade and a half.

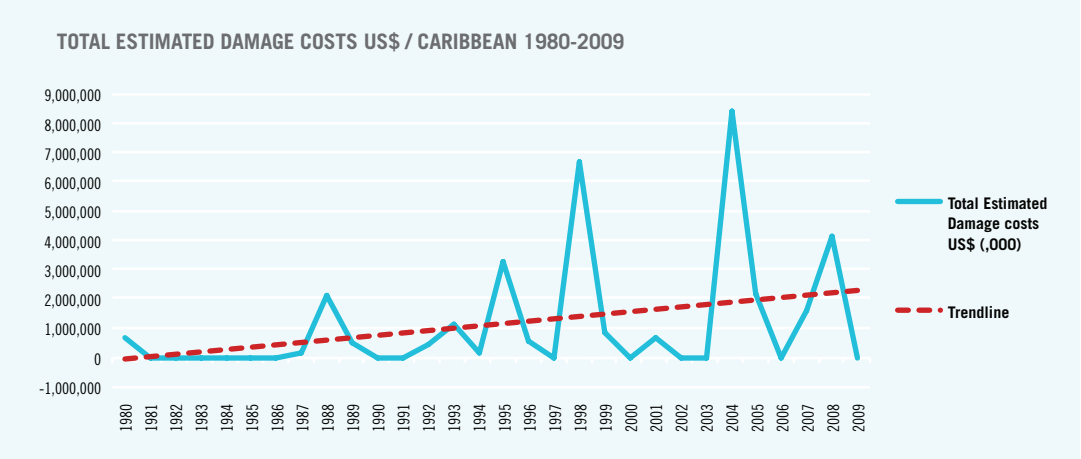

Figure 14: Total estimated damage costs US$ in the Caribbean due to disaster (1980-2009). *Source: EM-DAT 2010*

- As observed in Figure 15 (next page), the majority of disasters in the Caribbean in the last three decades have been of hydro–meteorological origin (approximately 70%), the most common of these being hurricanes and tropical storms followed by floods (Charvériat 2001; UNEP 2003). Mining and oil spill accidents represent the main human–caused disasters in the Latin American and Caribbean region combined (GEO–LAC 2003). However, it is noted the Caribbean by itself recorded a high number of transport accidents (17%) between 1980 and 2009 (Figure 15).

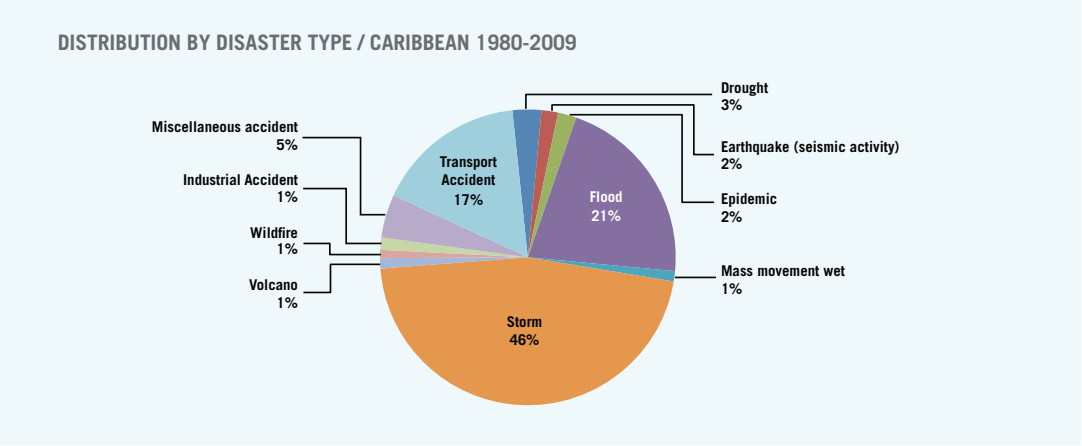

Figure 15: Distribution by disaster type in the Caribbean (1980-2009). *Source: EM-DAT 2010*

- The United Nations Environment Program (UNEP 2003) estimated that three–quarters of total human losses due to natural disasters in the region have a hydro–meteorological origin. They are also the most expensive disasters. Between 1980 and 2009, the total number of people affected, recorded deaths and total estimated damage costs have been attributed mainly to hurricanes/storms and floods. Industrial accidents affected more people and cost more in damage than any other kind of technological disaster recorded but transport accidents killed more people in comparison (Figures 16a, 16b and 16c).

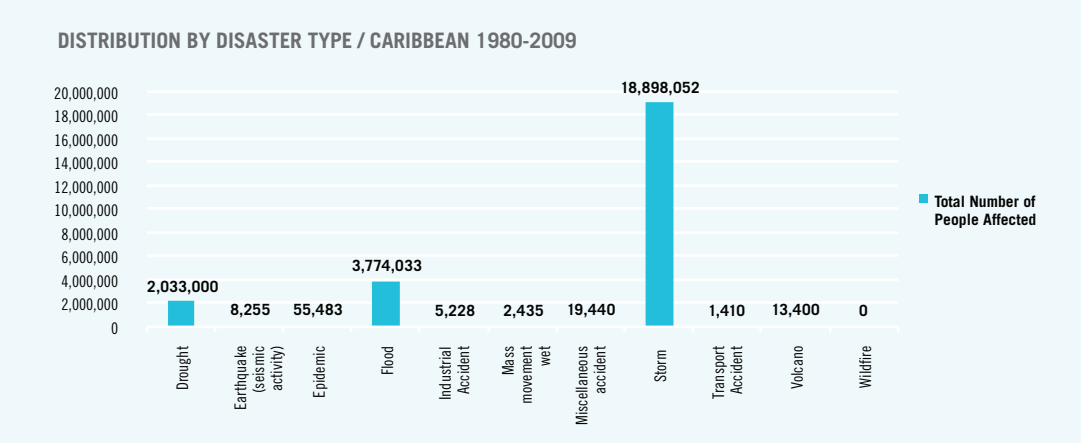

Figure 16a: Total number of people affected by different types of disaster in the Caribbean (1980-2009). *Source: EM-DAT 2010*

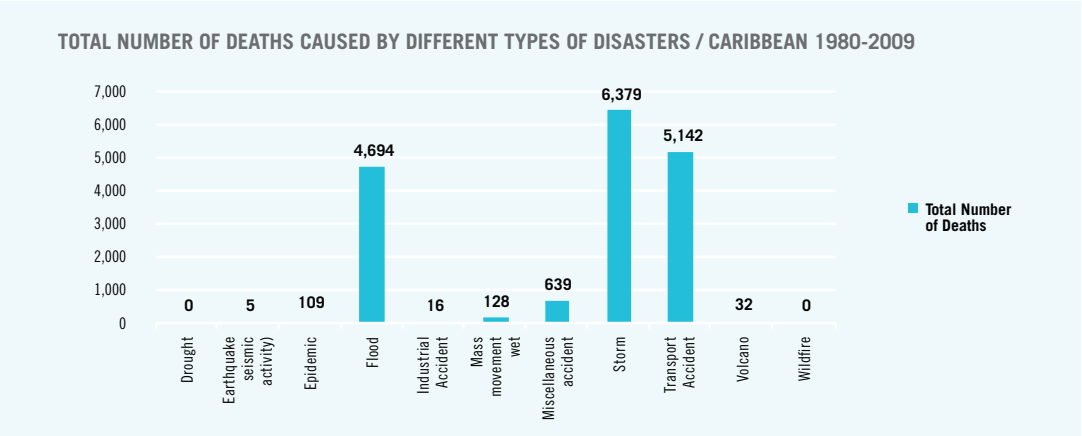

Figure 16b: Total number of deaths by different types of disaster in the Caribbean (1980-2009). *Source: EM-DAT 2010*

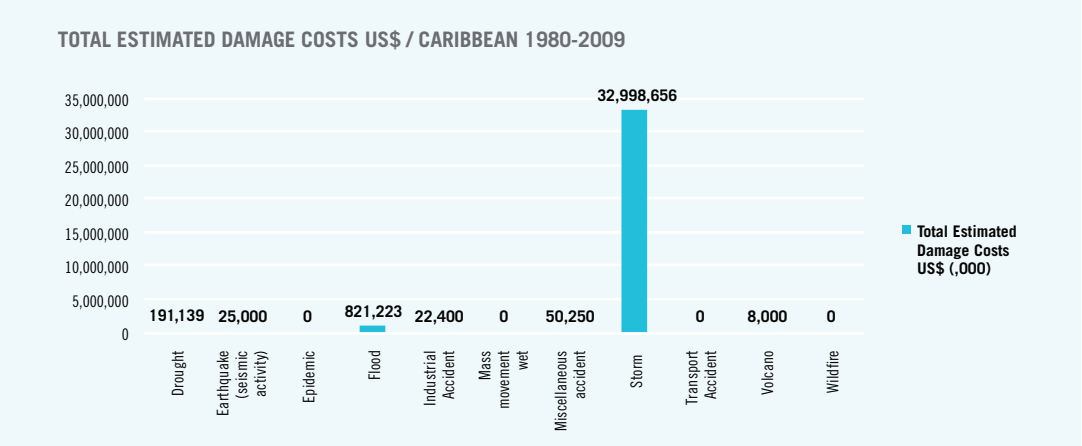

Figure 16c: Total estimated damage costs US$ for different types of disaster in the Caribbean (1980-2009). *Source: EM-DAT 2010*

It is often found that poor groups are most seriously and likely to be affected due to their precarious locations, poor housing, no insurance cover, land based livelihoods and few options (Cropper 2004).

The number of fatalities per year does not seem to follow a pattern based on the number of disaster events but appears, on the contrary, to be driven by the nature of single disaster episodes, in terms of hazard type, magnitude, and degree of vulnerability of the affected environment. (Charvériat 2001). Some phenomena such as earthquakes are deadly not due to their frequent occurrence, but due to a tendency to have a very high ratio of fatalities per event. Given their higher rate of occurrence in the region, floods and windstorms still end up ranking highly as the cause of disaster–related fatalities in the region, although the 2010 earthquake in Haiti will skew the trend.

3.5 THE CARIBBEAN'S PRE-HFA EXPERIENCE

In 1981 the Pan–Caribbean Disaster Preparedness and Prevention Project (PCDPPP) was established to spearhead a regional effort to improve disaster preparedness in the Caribbean. The project had its headquarters in Antigua, and was supported by the United Nations Disaster Relief Organisation (UNDRO), the Caribbean Community (CARICOM), the Pan–American Health Organisation/World Health Organisation (PAHO/WHO) and the Red Cross as well as Canada, the United Kingdom and the European Economic Community. Initially conceived as a short term project, it eventually ran for nearly ten years, adding prevention to its mandate and it became the Pan–Caribbean Disaster Preparedness and Prevention Project (PCDPPP). The project did much to raise the awareness of countries in the region to the importance of preparedness and prevention, where previously response and relief had been emphasised.

In 1991, the heads of government of CARICOM, recognising the necessity of a permanent regional entity to continue the work started by the PCDPPP, established a regional agency, the Caribbean Disaster Emergency Response Agency (CDERA). With headquarters in Barbados, CDERA's mandate was to:

- Provide coordinated emergency relief to affected member states
- Act as a clearing house for reliable information on the effects of a disaster to governments, donors and NGOs
- Coordinate and mobilize disaster relief for affected states
- Promote establishment of sustainable disaster response capabilities among countries
- Improve the level of preparedness of member states

Over the 19 years since its inception, CDERA has been responsible for implementing numerous projects related to training, preparedness, contingency plans and national emergency operations centre management, as well as development of model legislation and policies.

In September 2009, CDERA became the Caribbean Disaster Emergency Management Agency (CDEMA), more accurately reflecting its expanded mandate, which had evolved to include mitigation and recovery.

It is worthy of note that the national disaster office in Jamaica predated the PCDPPP. In 1980 the government of Jamaica established the Office of Disaster Preparedness and Emergency Relief Coordination (ODIPERC) in response to devastating floods in the western section of the country in 1979. Despite its name, the ODIPERC's mandate was comprehensive; it included a unit for mitigation, research and planning in its organizational structure and thus effectively facilitated a disaster risk management approach to the country's national programme. In the mid–1980s the UNDP and World Meteorological Organisation (WMO), in conjunction with ODIPERC, started the Flood Plain Mapping Project. Under this project flood hazard maps for several rivers in Jamaica were produced, a community component was also included, leading to the establishment of the first community flood warning systems in the region. Skills transfer under the project was effective; the methodologies developed and used as part of that project are still being used by the country's Water Resources Authority (WRA) in its flood mapping and flood warning system programme.

Jamaica also developed disaster management legislation, which set out arrangements for all aspects of the disaster management cycle in the country.

Barbados, also early off the mark, established an organisation for emergency relief in 1971, which was later to become the Central Emergency Relief Organisation (CERO).

The Civil Defence System in Cuba dates back some 47 years; it was established as a result of the 1963 Hurricane Flora, which caused some 1,200 deaths, and high, though unrecorded economic impact. One early decision was to develop a plan for control of hydro-meteorological hazards, including construction of dams for water control. There are now some 269 dams and reservoirs which assist in flood control in Cuba. Over the ensuing years, the authorities undertook a policy dedicated to protecting the population and the economy from the impact of hazards, and embarked on a programme of building local capacity in disaster management. In the 1990's, Cuba strengthened its legal framework for protection to include social and economic achievements; in 1997 the focus on disaster risk reduction was incorporated. The validity of this approach is evident. Between 1998 and 2008, Cuba was struck by more than 20 tropical storms, of which 14 became hurricanes. During this time period, 11 million people were evacuated. Damage to infrastructure was considerable, with more than one million houses affected and estimated economic losses of 18 billion dollars, yet only 35 lives were lost. The Civil Defense System is the result of 47 years of committed, intense and continuous effort.

No historical review would be complete without mention of the Pan-American Health Organisation's (PAHO) early work in the region. In 1977, the Ministers of Health of the Western Hemisphere instructed PAHO/WHO to establish a regional programme in disaster preparedness for the health sector. This led to many disaster preparedness initiatives run by PAHO/WHO. Although aimed primarily at the health sector, PAHO's interventions included other disaster management professionals. In the mid-1980s PAHO refocused its programme to include safety of health facilities and promotion of mitigation policies.

PAHO has also been instrumental in training engineers in safer building techniques for hospitals, as well as a cadre of disaster risk management professionals through its Leadership Seminars.

3.5.1 Examples of international and regional partner support to Disaster Risk Management in the region

International and regional partners have provided strong support to CDEMA as well as to individual countries throughout the last three decades. Mention has already been made of their role in establishment of the PCDPPP and their support to national and regional programmes. Further examples are given below.

3.5.1.1 Caribbean Development Bank (CDB)

www.caribank.org

Since 1974, the Caribbean Development Bank (CDB) has responded to requests from its member countries for post–disaster rehabilitation assistance. The bank's Project Services Division is responsible for leading and coordinating its disaster risk management as well as climate change, environment, gender, governance, regional public goods, procurement and social development work programmes. Between 2002 and 2006 the bank established a Disaster Mitigation Facility for the Caribbean (DMFC) project, with support from the United States Agency for International Development/Office of Foreign Disaster Assistance (USAID/OFDA), to mainstream disaster risk management within its operations and within the development planning processes in borrowing member countries. Recently, the CDB was one of the main sponsors of CDEMA's 5th annual Comprehensive Disaster Management (CDM) Conference held from December 6-10, 2010 in Montego Bay, Jamaica.

3.5.1.2 CDB - Caribbean Uniform Building Code (CUBiC):

The Caribbean Uniform Building Code (CUBiC) was produced by a group of Caribbean engineers in 1985, to provide appropriate building standards for the Caribbean region (DaCosta 1985). The development of CUBiC was partially–funded from a CDB-approved grant of US$60,000 to CARICOM in 1982. CUBIC was used mainly in the Eastern Caribbean countries, but was never implemented as a regional building code. Nevertheless it was useful for many islands which were unable to develop national codes.

3.5.1.3 Organisation of American States (OAS) Caribbean Disaster Mitigation Project (CDMP)

www.oas.org/CDMP/

The Caribbean Disaster Mitigation Project (CDMP) was a major joint initiative of the Organisation of American States (OAS) and USAID/OFDA. The project was implemented between September 1993 and December 1999 by the OAS and national and regional partners (OAS 2001). The overall objective of the CDMP was the adoption of disaster mitigation and preparedness techniques, technologies and practices by the public and private sectors in targeted communities in the Caribbean. The project's activities were implemented along the following themes: community–based preparedness, hazard assessment and mapping, hazard–resistant building practices, vulnerability and risk audits for lifeline facilities, promotion of hazard mitigation within the property insurance industry, and incorporation of hazard mitigation into post–disaster recovery. The following countries participated: Antigua and Barbuda, the Bahamas, Barbados, Belize, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines. One of the major activities of the project was the undertaking of coastal storm hazard

assessments in Antigua and Barbuda, Belize, Jamaica, and the Eastern Caribbean while a multi–hazard assessment (landslides, earthquakes and coastal storms) was undertaken in Jamaica. This project was a major step toward introducing the concepts of mitigation/risk reduction as well as multi–hazard mapping and its application to development planning in the region.

3.5.1.4 CDEMA - Caribbean Hazard Mitigation Capacity Building Programme (CHAMP):

www.cdera.org/projects/champ/

The Caribbean Hazard Mitigation Capacity Building Programme (CHAMP) was a three–year project funded by the Canadian International Development Agency (CIDA) and implemented by CDERA (now CDEMA). Implemented between 2002 and 2005, the project sought "to enhance the regional capacity to reduce vulnerability to the effects of natural hazards ... through the development of national hazard mitigation policies and implementation programmes, the promotion of the wider use of hazard information in development decisions and the strengthening of safer building practices" (CDEMA 2010). This project was able to continue the promotion of mitigation as initiated under the CDMP. It also supported institutional strengthening for smaller islands and encouraged establishment of fulltime national disaster coordinators.

3.5.1.5 Pan-American Health Organisation (PAHO):

new.paho.org

The Pan–American Health Organisation (PAHO) has a long history of disaster risk management work within the region's health and disaster management sectors. Following the devastation of the 2004 Atlantic hurricane season, the PAHO/WHO 45th Directing Council resolved "To urge Member States to adopt 'Hospitals Safe from Disasters' as a national risk reduction policy, set the goal that all new hospitals are built with a level of protection that better guarantees their remaining functional in disaster situations, and implement appropriate mitigation measures to reinforce existing health facilities, particularly those providing primary care" (PAHO/WHO 2004, p. 2). In terms of the mitigation aspect of PAHO's work, emphasis is placed on protecting health services from the risk of disasters by building the capacity of their member countries to assess the safety of their health facilities using the hospital safety index. In terms of preparedness, PAHO provides their member countries with support to develop plans, conduct drills and simulation exercises and to improve response to mass casualty incidents, epidemics and other health–related hazards. PAHO has also funded wind hazard maps for the region, and developed software for managing post–disaster relief supplies in order to increase accountability and efficiency.

3.5.1.6 UNDP's Caribbean Risk Management Initiative (CRMI)

www.undp.org.cu/crmi/

The Caribbean Risk Management Initiative (CRMI) was launched in 2004 by the United Nations Development Programme's (UNDP's) Bureau of Crisis Prevention and Recovery (BCPR) and the Regional Bureau for Latin America and the Caribbean (RBLAC). CRMI acts as a knowledge network, facilitated by its website, to build the region's capacity to mitigate and manage disaster risks. The initiative also aims to strengthen the region's capacity to adapt to climate change. The CRMI has been one of the main sponsors of the CDEMA annual CDM Conference which bring together a variety of DRM stakeholders to discuss issues and share experiences. CRMI also supports south–south cooperation through a regional pilot replication project of the Risk Reduction Management Centres and an inter–regional knowledge sharing project between the Caribbean and the Pacific.

3.5.1.7 Caribbean Community Climate Change Centre (CCCCC)

www.caribbeanclimate.bz

The Caribbean Community Climate Change Centre (CCCCC) began its operations in August 2005. Its main role is to coordinate the region's response to climate change and functions as the key point of climate change information, especially with regards to the region's response to managing and adapting to climate change in the Caribbean, as well as functioning as the executing agency for projects related to climate change in the Caribbean (CCCCC 2010). Some of these include:

- Caribbean Planning for Adaptation to Climate Change Project (CPACC) – 1997 to 2001
- Adaptation to Climate Change in the Caribbean Project (ACCC) – 2001 to 2004
- Mainstreaming and Adaptation to Climate Change (MACC) – 2004 to 2007
- Special Program on Adaptation to Climate Change (SPACC) – February 1, 2007 to January 31, 2011

3.5.1.8 UWI - Disaster Risk Reduction Centre (DRRC)

www.uwi.edu/drrc/default.aspx

The Disaster Risk Reduction (DRRC), a research centre with headquarters at the University of the West Indies (UWI), Mona campus, was launched on July 26, 2006. The DRRC complements the work of the CDEMA and provides the necessary institutional mechanism for harnessing UWI's capacity to develop and implement training, research, advisory and outreach services to enhance disaster mitigation and management in the Caribbean region (DRRC 2006).

3.5.1.9 CARIBSAVE

www.caribsave.org

CARIBSAVE, a regional not–for–profit company based in the Caribbean with headquarters in Barbados, is a partnership between the Caribbean Community Climate Change Centre (CCCCC) and the University of Oxford supported by multiple donors. Beginning in 2008, CARIBSAVE "addresses the impacts and challenges surrounding climate change, tourism, the environment, economic development and community livelihoods across the Caribbean Basin" (CARIBSAVE 2009, p. 1). Among its seven objectives, the partnership has identified sectoral and national vulnerability and adaptive capacity assessments and strategy development as one its focuses. Others include community–based adaptation, socio–economic and environmental policies and implementation, and the impacts of climate change on key sectors and their integral relationship to tourism in the Caribbean.

3.5.1.10 USAID's Office for Foreign Disaster Assistance (USAID/OFDA):

www.usaid.gov

The United States Agency for International Development's Office for Foreign Disaster Assistance (USAID/OFDA) has also been a long–time partner in DRM for the region. Some of its programmes include "Training of Trainers", which produced a cadre of trainers in disaster management across the islands, development of an Initial Damage Assessment methodology and training of communities in its use, production of model standard operating procedures for Emergency Operations Centres, as well as support for participation of disaster management professionals from the region in international workshops and conferences.

4 Summary of findings

The findings under the Priorities for Action (PFA) are summarised below.

4.1 PRIORITY FOR ACTION 1: ENSURE THAT DISASTER RISK REDUCTION IS A NATIONAL AND A LOCAL PRIORITY WITH A STRONG INSTITUTIONAL BASIS FOR IMPLEMENTATION

4.1.1 National institutions and legislative frameworks

The interviewed countries regarded a comprehensive approach to disaster risk management as a priority. Although the regional Comprehensive Disaster Management (CDM) framework is the guiding programme all countries are aware of and support the HFA.

All countries have a national structure and institutional arrangements for DRM. In general, the structure consists of a multi–sectoral national committee or council, and a government office charged with the responsibility for DRM.

In Cuba and Jamaica DRM has been decentralised to municipal and parish levels, with the local government authorities being assigned responsibility for local DRM programmes. The multi–island nature of the Virgin and Cayman Islands has resulted in some decentralisation of DRM responsibilities to the government officers in charge of the Sister Islands. Dominica has not decentralized its DRM structure.

DRM specific legislation exists in the Virgin Islands, Cuba and Jamaica. The Cayman Islands legislation is in draft form. Dominica has not so far developed DRM specific legislation and sees this lack of legislation as hindering effective implementation of both CDM and the HFA; the national disaster management office has no authority in law. The Virgin Islands, Cuba and Jamaica are in various stages of reviewing and amending legislation related to DRM and development planning.

The interviews suggest that the Virgin Islands, Cuba and Jamaica have been most successful at integrating risk reduction into development planning. In these countries, the national offices responsible for DRM are part of the development approval process, as are other technical agencies. Use of existing hazard maps is routine. In Jamaica field investigations are carried out for developments proposed in high risk areas. In the Cayman Islands the national disaster management office is not integrated into the development approval process, but the planning department includes basic hazard analysis in its review of development plans. In Dominica the process is not as formalised, as the national disaster office does not have the capacity for carrying out the required analyses, and is not one of the agencies which review development applications. Use of hazard maps to inform planning is not systematized in the review process.

Integration of DRM into sectors is most advanced in Cuba, where legislation dictates the level of cooperation and input required from all government agencies. In the Virgin Islands, the Cayman Islands and Jamaica, sectoral interests include a mix of public and private entities, so infusing DRM into the sectors is a more complex task. These countries have however started working with various sectors to develop programmes.

In Dominica, the national disaster management office has no programme specifically targeting sectoral interests.

4.1.2 Resources

All countries report resource constraints. In the larger countries, Cuba and Jamaica, the constraint is related more to financial than human resources, although in Jamaica staff turnover at the national disaster management office is seen as a limiting factor in the achievement of the goals of the DRM programme. Jamaica also saw a lack of full political commitment as being partially responsible for the level of resourcing of the national programme and enforcement of laws.

In the smaller countries there may not be the appropriately trained human resources in country to carry out some functions of the national DRM programmes. In the case of Dominica there is need for more technical personnel in the national disaster management office.

All countries have received support for DRM from International Donor Partners (IDPs), as well as regional organisations such as CDEMA, PAHO and the Organisation of American States (OAS). In the case of Cayman this support was less than for the other countries, as that country does not always meet the criteria for donor assistance. The CDEMA member states — the Virgin Islands, Jamaica and Dominica — have benefitted from several regional projects which have built institutional capacity, provided models for adaptation and use at national level and provided training for members of national disaster management organisations and their partners.

It was stated that the support received from IDPs and regional organisations has been very important in helping the national disaster management organisations to run their programmes, particularly in the context of inadequate national budgets.

4.1.3 Community participation

Cuba, Jamaica and the Virgin Islands have strong community based preparedness and DRM programmes which involve early warning, preparedness, community disaster plans and hazard assessments and basic response skills. The level of mobilisation of the population in Cuba is very high, with all major mass groups involved in the DRM programme. The Cayman Islands programme is much younger, but preparedness and response teams have been established in several communities, in an initiative shared with the Cayman Islands Red Cross.

Dominica does not have a community–based programme, but the community–based flood warning system being established under a CDEMA led project should act as a starting point for a national programme.

4.2 PRIORITY FOR ACTION 2: IDENTIFY, ASSESS AND MONITOR DISASTER RISKS AND EARLY WARNING

4.2.1 National and local risk assessments

The Caribbean has a long history of hazard mapping. All countries in the study have access to hazard mapping and vulnerability analysis studies, although to varying extents. Cuba has the most comprehensive programme, carried out as part of the work programme of technical agencies,

whereas the Virgin Islands and Jamaica have programmes which are closely related to externally funded projects. Dominica has no on–going hazard mapping programme, but maps for landslides, earthquakes, storm surge and volcanic activity have been produced under various projects. Lack of technical and technological capacity at the national disaster management office prevents it from fully utilising the maps. It should be noted however, that some of the maps are now almost 20 years old and are in need of updating.

Hazard maps available across the region include those for storm surge, riverine flooding, earthquakes — including seismic micro-zonation studies in Cuba — landslides, volcanoes and wind. The threat from tsunamis has received more attention since the Indian Ocean event, and Cuba is working on tsunami modeling. Modeling of a possible tsunami from the undersea volcano, Kick'em Jenny has also been done.

None of the countries in the study had developed specific indicators for vulnerability or risk. However a vulnerability assessment using a vulnerability baseline tool has been done in Dominica. Future applications of the tool will allow the country to measure its progress in addressing the identified vulnerabilities.

The Inter–American Development Bank's (IDB) system of indicators of disaster risk and disaster risk management has been applied to Jamaica. The October 2009 report states that these indicators show that DRM has had a "gradual advance" between 1990 and 2008 (IDB 2010).

4.2.2 Early Warning

The region benefits from a well–developed warning system for hurricanes and other meteorological hazards. Cuba and Jamaica have Doppler radars which, coupled with satellite imagery, have improved forecasting capability. In addition, Cuba operates a warning system for dam breaks and overtopping. The Cayman Islands government is in the process of acquiring a Dopplar radar for that country which will improve its forecasting capacity as well as improving regional coverage. Jamaica has a history of community–operated flood warning systems dating back to the 1980s. This programme is continuing. However some aspects of flood forecasting, especially for flash floods, remain problematic for Jamaica.

Drought forecasting is not widely developed; however Cuba has done some work in this area. It should be noted that the Caribbean Institute of Meteorology and Hydrology (CIMH) produces quarterly precipitation outlooks for the region.

A seismic monitoring network covers the entire region, although operated by different countries.

Cuba, Jamaica, the Virgin Islands and the Cayman Islands have seismographs networks on island. Dominica is part of the Eastern Caribbean network operated by the UWI Seismic Research Centre, which also monitors volcanic activity in the Eastern Caribbean.

Discussions have been initiated on a Caribbean tsunami warning system based on the regional earthquake monitoring network with inputs from the wider global network.

In all the countries the media is an important part of the warning system, and the electronic media in particular provides a means of reaching large numbers of persons in a short time span. In addition to electronic media, the Cayman Islands have had text services via cell phones for warning

for some years. All countries except Dominica also have real–time warning systems linked to the national disaster management office websites.

Warning systems are regularly tested as part of drills and simulation exercises.

4.2.3 Capacity

All countries except Cuba reported challenges in establishing adequate data bases as well as with systematic gathering of data. For Jamaica and the Cayman Islands there is a challenge with sharing data even among government organisations in the countries. For Dominica and the Virgin Islands, the challenge is adequate human resources to capture and maintain data bases, including post–disaster information.

There is exchange of data among countries in the region, particularly for earthquake monitoring and weather forecasting. Capacity building has taken place through South–South cooperation mechanisms such as between Cuba and Haiti for management of flooding, and between Jamaica and Trinidad and Tobago for development of flood warning systems. Across the region adequate capacity exists for hazard mapping, risk analyses and economic valuation; however the skills are spread across public and private sectors and academia, and tend to be concentrated in larger countries.

4.2.4 Regional and emerging risks

The emerging risk which has garnered the greatest attention and level of resources is climate change. The Caribbean Community (CARICOM) has established the Caribbean Community Climate Change Centre (CCCCC) which coordinates climate change mainstreaming and forecasting efforts for the region. Climate change modeling is done by the Climate Studies Group of the UWI at Mona. The region has already undertaken various projects to produce national communications on climate change, as well as mainstreaming climate change adaptation into national planning. The importance of the link between disaster risk reduction and climate change has been emphasised and is incorporated into several regional projects coordinated by CDEMA. Cuba is carrying out climate change studies and a modeling programme is also in progress, which includes developing drought management methodologies.

Management of the impacts of climate change was best articulated by Cuba which has already made a decision on relocation of coastal settlements, drought management and agricultural adaptation.

A regional response mechanism, which provides teams for response is coordinated by CDEMA for its participating states. The region is divided into sub–regions with a named focal point with responsibility for coordinating response for the sub–region. These focal points are Trinidad and Tobago, Barbados, Antigua and Jamaica. Presently, the capacity of the focal points to mount a sustained response is limited both from the perspective of human resources as well as materiel. A review of the focal points to identify weaknesses and address them is underway. Cuba and the Cayman Islands are not members of CDEMA. Cuba and the Cayman Islands support regional response efforts through bilateral arrangements. The Cayman Islands would be supported by response mechanisms available to the United Kingdom Overseas Territories such as technical advisors, including for DRR, and the Royal Navy Atlantic Patrol Taskforce vessels.

4.3 PRIORITY FOR ACTION 3: USE KNOWLEDGE, INNOVATION AND EDUCATION TO BUILD A CULTURE OF SAFETY AND RESILIENCE AT ALL LEVELS

4.3.1 Information management and exchange

All countries have public education and awareness as part of their national programmes. These programmes include information on precautionary measures for meteorological and geological hazards. Information is presented in a variety of forms — in hard copy as brochures and posters, as well as through electronic media, websites and DVDs. CDEMA has established a website, www.weready.org, which gives preparedness information on a number of hazards.

4.3.2 Education and training

In addition to public awareness, DRM training has been a priority in the region. Some training is organised as short courses and include courses such as damage and impact assessment, EOC management, search and rescue, shelter management and application of the Hospital Safety Index. Training is also offered to Community DRM groups by national disaster offices as well as NGOs such as the International Federation of the Red Cross through their national offices.

Some tertiary institutions include DRM as part of the academic programme. UWI offers a Masters course in DRM, and includes DRM in its undergraduate programme. In the Virgin Islands, the H. Lavity Stout College offers an Associate's Degree in disaster management, and in Cuba DRM is included in the curriculum at all levels of the education system. Regional universities offer postgraduate degrees in disaster management and related fields. Various aspects of hazards and their effects are included in subjects such as geography at high school level in the Caribbean Examinations Council syllabus.

4.3.3 Research

Research is being undertaken mainly through universities and government agencies, and covers a wide range of topics such as triggering mechanisms for landslides, climate variability, seismicity and plate tectonics and human behaviour.

None of the national disaster management offices reported a budget for research, but hazard–related data is collected by government agencies as part of ongoing monitoring and forecasting programmes, especially for meteorological hazards.

4.4 PRIORITY FOR ACTION 4: REDUCE THE UNDERLYING RISK FACTORS

4.4.1 Environment and natural resource management

All countries reported use of environmental impact assessments (EIA) for major development projects, but this is not mandatory in all countries. Hazard analysis is included in EIAs. Land use planning regulations exist, but are not necessarily enforced. The Virgin Islands and Cuba report an integrated approach to national development through national policy directives.

4.4.2 Social and economic development practices

Cuba has addressed issues of food security as part of their DRR programme. The other countries did not articulate a food security strategy as clearly, although the efforts in Jamaica to mainstream DRM into the agricultural sector could eventually result in better food security.

There has been some work towards the goal of hospitals safe from disaster. In Cuba hospitals have taken non–structural measures such as strapping down and attaching equipment to floors and walls. In the Cayman Islands, the government hospital has included vulnerability reduction as part of its work programme and uses an incremental approach to carry out vulnerability reduction activities. The national disaster management office in the Virgin Islands has engaged the health sector as part of the sectoral mainstreaming of disaster risk reduction. In Jamaica, the tourism, education and agriculture sectors have been engaged and are at various stages of developing DRM programmes. Jamaica has a well–established and effective health monitoring and surveillance programme, and the regional programme through the Caribbean Epidemiology Centre (CAREC) ensures regional monitoring and surveillance of health threats.

The Caribbean Catastrophe Risk Insurance Fund (CCRIF), a parametric insurance fund, provides coverage for several countries including Jamaica, the Cayman Islands and Dominica. The CCRIF provides a payout for damage related to certain levels of impact in return for an annual premium. These funds become available within days of impact without having to wait for damage assessments to be done, and provide money for immediate response and initial recovery needs.

In Cuba, the government assumes responsibility for recovery. Jamaica, the Cayman Islands and the Virgin Island all have contingency funds for recovery operations. Dominica does not have a dedicated fund for recovery.

The private sector is a part of all national committees, with the exception of Cuba. Highest engagement is in the Cayman Islands where there is a national sub–committee for ensuring economic continuity chaired by the private sector. In Jamaica, the private sector provides sponsorship for many national DRM activities. There are also partnerships between CDEMA and private sector organisations, particularly for response. Generally, however private sector investment in DRM and DRR is sporadic, with most resources being committed to preparedness and response.

4.4.3 Land use planning and other technical measures

A sub–regional building code CUBiC was developed in the 1980s–1990s for the Eastern Caribbean but is now in need of updating. Jamaica is in the process of updating its national building code after which it will be passed into law. Dominica uses CUBiC, but the code has not been passed into law; the Cayman Islands use the International Building Code as its guidance document. Cuba has an updated legal code.

Planning and zoning laws and/or development orders exist in all countries; however, in the case of Jamaica, a lack of enforcement has led to unregulated development in many high risk areas, often resulting in loss of life. Cuba also reported an increasing challenge in ensuring that high risk areas are not occupied by private individuals. All countries except Cuba reported that these laws and orders are in the process of being reviewed. It is expected that DRR elements will be fully incorporated into the revisions.

Systematic use of hazard maps and other data to inform the development approval process, and inclusion of the national disaster management office in the development approval process is present in all countries except Dominica and the Cayman Islands.

The area of risk transfer and risk sharing mechanisms is not well developed. The primary mechanism is insurance, but insurance coverage varies across countries. Some governments, such as the Jamaican government, do not insure all public assets. In some countries, again such as Jamaica, the cost of insurance has caused many householders not to insure their homes. Caribbean countries do not carry hazard specific insurance such as flood insurance and there are no government insurance schemes except for health insurance. The lack of risk transfer mechanisms is particularly burdensome for the poor and for small farmers as repeated hazard impacts deplete resources and increase the level of their vulnerability. The Cayman Islands credit a high level of insurance as one of the factors in its recovery from the impact of hurricane Ivan.

The recent development of the CCRIF has allowed access to funding for immediate response and initial recovery needs for member countries. However, as this is a parametric scheme, the possibility exists that a country could suffer repeated impacts below the trigger level, and therefore would not receive payments.

4.5 PRIORITY FOR ACTION 5: STRENGTHEN DISASTER PREPAREDNESS FOR EFFECTIVE RESPONSE AT ALL LEVELS

The region has had a long history of preparedness programmes dating back to the early 1980s. Preparedness has improved over the intervening decades. In general for the countries in the study, a good level of preparedness, including improved warning systems, has ensured that the number of deaths have been minimised, even as the frequency of disasters and the cost of damage and its economic impact have increased.

The CDEMA member states have benefitted from a regional coordinating mechanism for preparedness and response. CDEMA has developed an audit instrument for its member states which assists in identifying the level of preparedness of each participating country. CDEMA provides warnings as well as situation reports for all threats to the region. CDEMA has also organised training in crisis management, contingency planning, exercise development and a number of other areas related to preparedness and response. A system of sub–regional focal points divides the region into four areas with one country being named as a staging point for response. This system was activated for the Haiti response which saw Jamaica — the sub-regional focal point — mounting an initial response to Haiti within forty–eight hours of the earthquake. This response placed a severe burden on Jamaica, as the country had to find necessary personnel and supporting equipment and supplies without any support from CDEMA or CARICOM for several weeks.

PAHO provides training in mass casualty management and incident command systems.

All countries organise at least one exercise each year. Cuba's "Meteoro" is an annual simulation drill that engages the majority of population and all levels of the Civil Defense system. In Jamaica, the Virgin Islands and the Cayman Islands, earthquake drills are carried out in schools and businesses. In 2006, Jamaica organised an earthquake drill for the business district in the capital, in which more than one hundred companies participated. Dominica does not yet have a well–developed programme of drills and exercises.

All countries have a national disaster plan which sets out preparedness and response activities for potential threats. The Cayman Islands reported having addressed continuity of operations planning for the government and planning for economic continuity with the private sector.

4.6 CROSS-CUTTING THEMES

4.6.1 Gender

Gender considerations are not desegregated in the national DRM programmes of the countries in the study. All countries reported that special consideration is given to especially vulnerable persons, including children, the elderly, women and persons with disabilities. In general women are integrated into the disaster programmes and their level of participation is often greater than that of men. The observation was made that special efforts are necessary to encourage the participation of men in many of the community–based DRM programmes. Discussions did not reveal any deliberate differentiation of gender roles in DRM programming.

In Cuba the difficulties faced by single female heads of households has been recognised and special provisions have been made for leave with pay in circumstances where this may be required. In Jamaica some post–disaster projects included special assistance for female heads of households and single mothers.

In post–disaster situations, the vulnerability of women in shelters is recognised, and efforts are made to keep families together and to ensure the safety of women, children and the elderly.

4.6.2 Climate change

Climate change and its intersection with DRR has been the focus of regional projects which have been implemented under national as well as regional programmes. In addition, the CCCCC has coordinated several projects which have focused on development of national climate change communication studies, mainstreaming adaptation into national planning, development of sectoral strategies and public education programmes, as well as the downscaling of models for the region.

Cuba has adaptation plans for many of its sectors, including crop rotation and diversification, resettlement and drought management.

4.7 ELEMENTS OF SUCCESS

In reviewing the progress made by the Caribbean as exemplified by some of the countries in the study, a number of factors which contributed to successful implementation of DRM and by extension the HFA and CDM, can be identified. These are:

4.7.1 Regional leadership and consistency of approach:

The advent of the PCDPPP was important in building the capacity of the region particularly in preparedness and prevention. The continuity provided by the establishment of CDERA was important in ensuring that the momentum gained during the PCDPPP tenure was not lost. Stability in the CDERA leadership, including its Board of Directors, the National Disaster Coordinators, which caught the

vision of DRM, assisted in the expansion of CDERA's initial response and preparedness mandate to include mitigation and recovery aspects. This marked an important step in systemising DRM in the CDERA member states and the eventual development of the donor partners–supported CDM strategy. Outside of CDERA, regional organisations such as the OAS and PAHO and IDPs such as UNDP and USAID/OFDA provided crucial resources for DRM programming in Caribbean territories.

4.7.2 The global context

Global developments were also important. As the link between disasters and sound environmental management and sustainable development was more appreciated, DRM was integrated into related environment and sustainable development programmes such as Agenda 21, the Barbados Programme of Action and the Mauritius Strategy, all of which were acceded to by Caribbean countries. This assisted cross–sectoral awareness of DRM.

4.7.3 Cross-disciplinary linkages

Links between DRR and physical planning were established, as hazard maps became more available and countries came to appreciate their importance. The inclusion of hazard maps and, crucially, national disaster management offices in the development approval process were important steps in reducing exposure of new developments to hazards.

4.7.4 Analysis and quantification of impacts

Another major step forward was provided by the post–disaster economic impact assessments carried out by the UNECLAC within the last decade. These analyses demonstrated the devastating effect that disasters were having on the economies of the countries of the region and consequently on their development; importantly the figures got the attention of the political directorate in some islands. This eventually led to the establishment of the Caribbean Catastrophic Risk Insurance Facility (CCRIF).

4.7.5 Committed personnel

Although not explicitly articulated during interviews, it is clear that a strong belief by technocrats in the utility and necessity of the comprehensive approach embodied in DRM was important in championing DRM. Countries which successfully pursued this path were able to find a critical mass of persons which promoted DRM over time.

This included elected officials and was led by technocrats within the disaster office and in partner organisations. Cuba reported that the consistency of approach in the national DRM programme over several decades has been one of the major reasons for the success of the country's DRM programme. A similar situation is found in Jamaica and the Virgin Islands where the national programme has retained risk reduction as an important element over several years and throughout changes in leadership.

4.7.6 Strong national leadership

A strong and credible national office which champions DRM and is able to influence partners in the wider disaster management network is important.

4.7.7 Policy level support

Acceptance by some, even if not all of the policy directorate, of the necessity of a comprehensive approach is needed if progress is to be made and gains solidified.

4.7.8 Availability of technical skills

For Cuba and Jamaica in particular, available technical skills permitted development of multi–hazard maps and associated plans as well as geotechnical analyses. These were then used to sensitise local government and communities as well as to guide development planning.

4.7.9 Grasping opportunities

Many of the gains made in countries and the region have been triggered by extreme events. The Jamaican disaster management office was created after devastating floods; the Cayman Islands office was established after Hurricane Ivan. In Cuba, Hurricane Flora was a catalyst for improving legislative and institutional frameworks; the Indian Ocean tsunami triggered activities for development of a warning system for the Caribbean. CCRIF was established after the regional impact of the 2004 hurricane season. Although this is not an optimum or even desirable approach, it does show that progress can be made if the opportunities presented after a disaster are recognised, grasped and acted on.

4.8 OBSTACLES TO SUCCESS

4.8.1 Resources

The obstacle most mentioned is an inadequate level of resources, which underlies the inability to staff disaster management offices at appropriate levels of skilled personnel and to carry out the national programmes without donor assistance.

4.8.2 Lack of political will

Lack of enforcement of existing laws, resulting in situations such as development in risk areas and unregulated building which increases levels of exposure to natural hazards such as flooding, landslides and earthquakes, was also seen as an obstacle. It was said that the process of convincing the political directorate is slow. Although the importance of DRM is said to be understood, there is not a concomitant level of resource allocation for national DRM programmes. The allocation of resources is seen by the DRM practitioners as indicating a lack of commitment.

4.8.3 Lack of enforcement of laws

Lack of enforcement of existing laws results in situations such as development of high risk areas, and unregulated building, leading to a high level of exposure to natural hazards such as flooding, landslides and earthquakes, was also seen as an obstacle.

4.8.4 Changing a national culture

For Dominica, difficulty in changing the culture of the population from a focus on preparedness for hurricanes to a comprehensive all–hazards DRM approach was mentioned.

4.9 CONCLUSION

The work done during the 1980s established a platform that was to prove an ideal base for the introduction of the International Decade for Natural Disaster Reduction (IDNDR) in the 1990s, and, subsequently, CDM and HFA. Some islands such as Jamaica and Cuba had, during the sixties and seventies, started programmes which included preparedness and mitigation. The advent of the PCDPPP was important in building the capacity of the region particularly in preparedness and prevention. Regional organisations such as the OAS and PAHO and IDPs such as UNDP and USAID/OFDA provided crucial resources for DRM programming in Caribbean territories.

Consistency of approach in the national DRM programme over several decades has been one of the major reasons for the success of the programme in Cuba and Jamaica.

Global developments were also important in reinforcing and giving visibility to DRM efforts. As the links between disasters and sound environmental management and ultimately, sustainable development were more appreciated, DRM was integrated into related environment and sustainable development programmes such as Agenda 21, the Barbados Programme of Action and the Mauritius Strategy, all of which were acceded to by Caribbean countries.

The importance of links between DRR and physical planning was recognised and established, as hazard maps became more available and countries came to appreciate their importance. Another major step forward was provided by the post-disaster economic impact assessments carried out by the UNECLAC within the last decade. These analyses demonstrated the devastating effect that disasters were having on the economies of the countries of the region and consequently on their development, and importantly the losses got the attention of the political directorate in some islands. This eventually led to the establishment of the Caribbean Catastrophic Risk Insurance Facility (CCRIF).

The advent of HFA and the regional CDM strategy therefore found a region already familiar with, and for some islands, already practicing, the elements contained within the frameworks, such as preparedness, prevention, mitigation, response and recovery.

Hazard mapping, including development of community hazard maps was being practiced, early warning systems were established at national and community levels, and building codes and regulations as well as planning and zoning laws had been developed in some islands. For those countries in which the national disaster management offices had been trying to raise awareness of the necessity of these comprehensive approaches, international initiatives such as the International Decade for Natural Disaster Reduction, and the HFA and CDM frameworks provided the perfect support for their efforts.

There is no doubt that the region as a whole has made good progress in DRM. The implementation of the CDM strategy has provided the operational framework for programmes in the Virgin Islands, Dominica and Jamaica. In Cuba and the Cayman Islands, the principles of the HFA have incorporated into the national DRM programmes. All the countries recognise and accept the importance of the HFA as a global framework for adaptation to national programmes.

Jamaica views the HFA as a validation of the national disaster risk management programme as elements of the framework were already integrated within the national programme prior to Jamaica becoming a signatory to the HFA. For Jamaica it was not an issue of adopting the HFA but to examine

the CDM and HFA approaches, and assess what Jamaica was doing from a strategic perspective, as well as to analize any existing gaps. It was found that elements promoted in the HFA were already integrated within the national programme.

The Virgin Islands (UK) has linked the national programme to the principles, concepts and definitions of the HFA, and has adapted these to the regional CDM context and national goals. Cuba has adapted the HFA framework to their needs and has developed a comprehensive and integrated DRM programme. In the case of the Cayman Islands, the national DRM framework — initiated in 2006 — is modeled on the principles of the HFA. Dominica, although recognising the importance of both the HFA and CDM approaches, has not been able to implement these approaches as effectively as the other countries. Lack of a strong institutional and legal framework as well as human and financial constraints particularly in the national disaster management office has slowed the progress of DRM in this country.

The report shows that the selected countries, with the exception of the Cayman Islands, have not based their national DRM programmes on the HFA. This does not mean, however, that the Priority for Action (PFA) outlined in the Hyogo Framework are not being achieved. The CDM Strategy being used by CDEMA Participating States and Cuba's DRM programme include the elements of the PFAs, albeit articulated in a different way.

4.10 RECOMMENDATIONS

Despite the progress made, there are some important gaps which must be addressed as the HFA enters its second phase. The following recommendations are made to address the gaps identified.

4.10.1 Priority for Action 1

Ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation

All countries should ensure development of legislation and policies to support DRM and to give the national disaster management offices a legal mandate. Strong institutions with adequate numbers of technically competent staff are also necessary for a successful national DRM programme.

There is need for a systematic approach to integration of risk reduction into development policies and planning. Progress has been made in integrating DRR into physical planning, however integration into all aspects of national development planning such as poverty reduction, education and human settlements remains inconsistent. National disaster management offices should include this sectoral integration in their work programmes.

Lack of government commitment and/or political will was mentioned as a contributory factor in the lack of progress in DRM. It is critical that governments demonstrate the required level of commitment and political will to enforce laws and regulations and to provide resources for the national DRM programme. Visible support to the national disaster management offices from the political and policy levels is also important in building the credibility of these organisations.

National disaster management offices should consider developing awareness programmes which target elected officials and policy makers.

4.10.2 Priority for Action 2

Identify, assess and monitor disaster risks and enhance early warning

Development and updating of hazard–related data bases, hazard maps, risk and impact analyses should be financed through the national budget to ensure sustainability.

More quantitative approaches are required. Countries in the region should establish baseline data as well as indicators in order to measure progress being made in DRM. Indicators for risk and vulnerability should also be developed. In this regard the previous work on indicators by the Inter-American Development Bank (IDB) and the CDEMA baseline tool for vulnerability assessment could be useful. Calculations of probable maximum loss for various hazard scenarios should be done. These data could then inform cost benefit analyses for required mitigation measures.

National budgets for DRM should include provisions for instrumentation and data collection and analysis. Governments that support tertiary institutions should consider earmarking specific funds for research in DRM. Scientific and technical agencies require more budgetary allocations for instrumentation to allow better data collection including from space–based technologies.

There is need for standardization of the methodologies for hazard mapping and risk mapping as well as risk analysis across the region. In this regard, the standard for hazard mapping, vulnerability assessment and economic valuation, developed for the tourism industry, and which is being considered as a regional standard by the CARICOM Regional Organisation for Standards and Quality (CROSQ) should be widely disseminated once it is approved. Consideration should be given to adapting this standard for use at the national level.

There should be wider dissemination of hazard and risk maps, to include community groups involved in DRM.

4.10.3 Priority for Action 3

Use knowledge, innovation and education to build a culture of safety and resilience at all levels

There is need for better dissemination and sharing of data among agencies. The definition of responsibilities for data collection and sharing should be included in disaster management legislation.

So far, public access to hazard maps, vulnerability and risk analyses is limited. These tools, their use, utility and limitations should be included in public education programmes; it is desirable that they be fully accessible to the public in hard copy as well as electronically.

4.10.4 Priority for Action 4

Reduce the underlying risk factors

There is urgent need for improved monitoring and enforcement of existing laws which govern development and land use as well as environmental protection and management.

There are several projects in DRM in which climate change components have been included. However, there is need for clearly articulated national policies and legislation on climate change and management of the expected impacts of hazards due to climate change.

No examples of community risk transfer mechanisms were found during the study, yet there is much

effort being concentrated on community–based disaster management. These interventions need to include innovative methods for assisting communities to manage the economic consequences of disasters beyond the present methods of partial compensation for losses by the state.

The amounts spent on the various elements of the national DRM programmes should be disaggregated. Funds spent on risk reduction should be tracked so that the benefits accrued through reduced damage from a disaster can be calculated, thus strengthening the case for investing in mitigation and disaster risk reduction.

4.10.5 Priority for Action 5

Strengthen disaster preparedness for effective response at all levels

Additional efforts are needed in ensuring that all sectors are optimally prepared for the impact of hazards. There is need for continuity of operations plans at national and sectoral levels. Business continuity planning for the private sector needs to be introduced for the small business sector.

The current review of the CDEMA sub–regional focal points should include a review of their roles and responsibilities as well as their capacities. A mechanism for rapidly mobilizing support for the sub–regional focal point during response operations is needed. The role of CDEMA in coordinating this support as well as timeframes for mobilization and deployment of the support should be clearly stated in the operational orders.

4.10.6 International and Regional Development Partners

International and regional development partners have been intimately associated with the disaster risk management programmes in the region. Countries interviewed stated that they would like to see the partnerships among international development partners and countries continue.

The role of international development partners is seen as assisting with studies on definition of risk and gaps in national programming and development of monitoring and evaluation frameworks. It is also thought that IDPs should provide more focused funding to address country–specific gaps or needs.

Facilitation of south–south cooperation as well as support for greater application of space–based technology was also seen as a possible role for donor partners.

There was, however, a diverging opinion. One country stated that DRM is the responsibility of the government, and therefore the government should first decide that DRM is a priority then allocate the necessary resources for the national programme.

4.10.7 Cross–cutting Issues: Gender

The national DRM programmes do not include gender as a specific component. Whether this is due a lack of awareness or a perceived lack of need for focusing on gender is not clear. However there is need for some research into the reasons for the approaches which are taken. The findings would then inform national programmes, and permit development of country–specific gender approaches and programmes.

A Annexes

A1

ANNEX ONE

The Cayman Islands

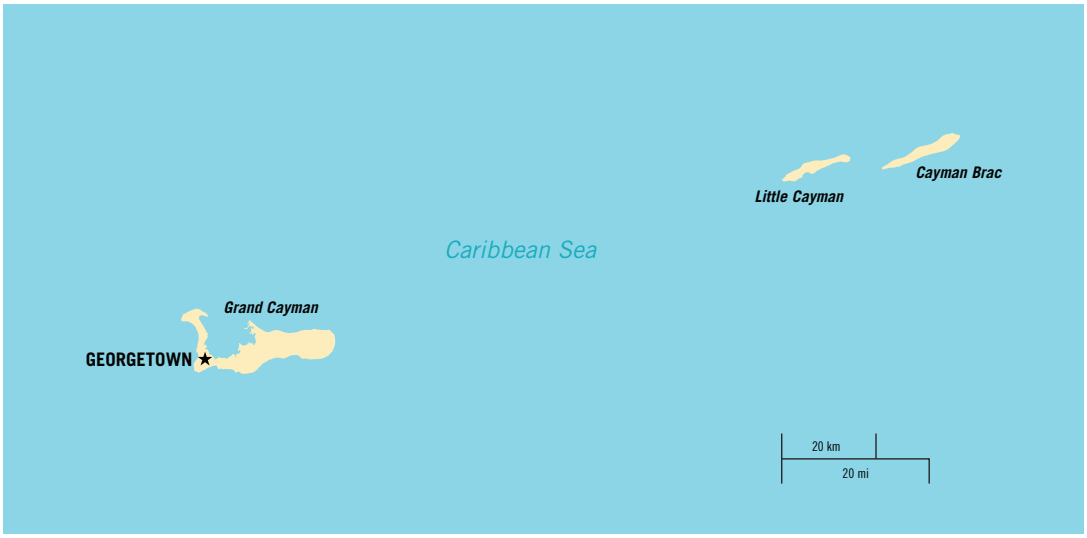

Figure 17: Map of The Cayman Islands. Source: openstreetmap.org

1. PRIORITY FOR ACTION 1

Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation

1.1 National institutions and legislative frameworks

The Cayman Islands DRR programme is aligned to the HFA. Its *A Strategic Framework for Disaster Risk Management* (HMCI 2006) cites the HFA as the guidance document for establishment of the national programme. The document sets out the vision, values, policy statements, goals, strategies and indicators for the elements of the national DRR programme. The document also allows for establishment of baseline data against which progress in achieving goals can be measured.

After the serious damage caused by Hurricane Ivan in 2004, the government decided that DRM was a priority and established a full–time national office, Hazard Management Cayman Islands (HMCI), to coordinate all DRM–related activities for multi–hazards. Prior to this, the National Hurricane Committee prepared the country for hurricanes. The heads of state and government as well as the leader of the Opposition sit on the multi–sectoral National Disaster Management Council.

There is no existing legislation specifically for DRM, but new DRM legislation has been drafted and is to be passed. The Development Plan is being revised and will incorporate DRR.

1.2 Resources

The national disaster management office has suffered from budget cut–backs in keeping with the country's financial situation. Some programme areas have therefore been reduced.

1.3 Community participation

The DRR programme includes the establishment of community–based teams; these are supported by the national disaster office as there is no local government structure in the Cayman Islands. The Cayman Islands Red Cross also participates in this programme.

2. PRIORITY FOR ACTION 2

Identify, assess and monitor disaster risks and enhance early warning

2.1 National and local risk assessments

The country has not yet systematically carried out hazard mapping. A vulnerability assessment study, which examined the vulnerability of critical facilities and other elements to various hazards, has been completed and will guide the country's DRR programme. There has also been some modeling of sea–level rise and storm surge effects on coastal areas. Flood–prone areas are being delineated.

2.2 Early warning

The forecasting and warning systems in the Cayman Islands have performed very well. It is worthy of note that despite the severity of the damage from Hurricane Ivan, no lives were lost.

The country is set to acquire a Doppler radar, which will significantly enhance its capability for weather forecasting.

Cayman has mapped and placed a value on all the buildings in the country, which, when coupled with modeling, will permit the quantification of projected impacts from storm surges and sea-level rise.

The country has just completed the installation of a state of the art seismic monitoring network, which will provide seismic data for Cayman as well as the wider Caribbean earthquake monitoring and tsunami warning systems.

The national disaster management office disseminates warnings, provides information on threats, preparedness and protection through commercial radio, television, the internet and text messages. Warning systems are test during exercise and drills.

2.3 Capacity

Data exchange among government agencies has proven to be a challenge in the past. There is no easily accessible centralised database on hazards and their potential impacts. The national disaster management office is working on the development of a hazards data base.

2.4 Regional and emerging risks

Cayman's regional contacts are within the UK Overseas Territories group. At present, there are no formal agreements for technical cooperation.

3. PRIORITY FOR ACTION 3

Use knowledge, innovation and education to build a culture of safety and resilience at all levels

3.1 Information management and exchange

With the installation of the seismic monitoring network, data will be made available to the University of Puerto Rico and the UWI Seismic Research Centre in Trinidad. These entities will assist with interpretation of the data as Cayman does not have a resident seismologist. Seismic data will also be made available for the Caribbean tsunami warning system.

Space–based technology is used mainly for forecasting and warning for meteorological hazards, with some application for initial mapping of damage and impact.

3.2 Education and training and public awareness

DRR is not incorporated into the school curriculum, but there is a programme that organizes school drills as well as conducts awareness-building presentations. There is also a wider public programme designed to heighten the sensibilities of the population to the threat of multiple hazards and to disseminate information on prevention, preparedness and mitigation. Anniversaries of events are used to focus attention on particular hazards.

4. PRIORITY FOR ACTION 4

Reduce the underlying risk factors

4.1 Environmental and natural resource management

Environmental Impact Assessments (EIAs) are not now required by law. The Development Plan authorises the Central Planning Authority to require EIAs for large developments, and the proposed National Conservation Bill would similarly empower the National Conservation Council to require EIAs. There is a draft environmental legislation that is currently waiting for approval and promulgation.

4.2 Social and economic development practices

The government hospitals include DRR activities in their budgets and have, over the years, carried out mitigation activities to reduce vulnerability of the hospitals. These include shuttering, installation of flood barriers, installation of fire monitoring and prevention systems and remote data back-up for all hospital records. It should be noted that, during Hurricane Ivan, the main government hospital sheltered over one thousand displaced persons while continuing to carry out its medical functions.

During the post Ivan recovery process there was a special effort made to ensure that the building code was adhered to in the reconstruction of buildings. Every reconstructed or repaired building was inspected before being issued a certificate of occupancy. Several public buildings were retrofitted for wind resistance.

The government insures its assets and contributes to the regional parametric insurance fund, the Caribbean Catastrophic Risk Insurance Facility (CCRIF). The government also maintains a national response and recovery fund, which is increased annually.

5. PRIORITY FOR ACTION 5

Strengthen disaster preparedness for effective response at all levels

There is considerable coordination of preparedness activities across sectors, including the private sector. The Economic Continuity Sub–Committee of the National Council is chaired by the President of the Chamber of Commerce and is responsible for fostering the public–private sector partnership in DRR. There is also a committee for continuity of government operations in addition to those for emergency relief, emergency medical care, and housing shelter, among others.

As the territory comprises the three islands (Grand Cayman, Cayman Brac, and Little Cayman), there is also coordination and communication among the three islands for preparedness and response. The country executes two annual exercises, one of which is a hurricane–related exercise that includes all members of the National Disaster Management Council, including the private sector, ports and airports. The other exercise would simulate medical emergencies, transportation accidents and hazardous materials releases for example.

The use of technology is incorporated into preparedness and response by use of satellite phones, satellite–based internet and a computer–based system for managing response to any crisis. This software allows wide access via the internet to the information on the response, including situation updates.

All emergency shelters have adequate emergency power and water supplies that can be monitored remotely, as well as hurricane shutters. There are standing arrangements with the private sector for provision of food and other supplies.

6. CROSS-CUTTING ISSUES

6.1 Gender

Gender issues are normally under the purview of the social services department, which retains this responsibility during emergencies. There is no specific gender programme within the DRM programme. However, there are special plans for the vulnerable population including the elderly, the homebound and pregnant and single mothers.

6.2 Climate Change

Climate change issues are being addressed as part of the regional programme. A multi–sectoral Climate Change Working Group has been established, a public awareness strategy has been formulated and a Climate Change Policy is being developed. Additionally a vulnerability and capacity assessment report has been conducted and modelling for sea level rise heights of 0.25m, 0.50m, 0.75m and 1m have been completed.

7. CHALLENGES

These include promulgation of legislation for environmental management, including making EIAs — ideally with hazard analyses — compulsory for all development projects.

It was mentioned that more emphasis needs to be placed on technological threats, including cyber–threats, as well as building public awareness to ensure that the population focus on all credible hazards rather than just on hurricanes.

The national disaster management office is of the view of that there is a need for more systematic integration of DRR and climate change considerations into national development planning, and that a comprehensive hazard mapping programme should be undertaken.

A2

ANNEX TWO

Cuba

Figure 18: Map of Cuba. Source: openstreetmap.org

1. PRIORITY FOR ACTION 1

Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation

1.1 National institutions and legislative frameworks

Cuba supports the HFA and the Cuban DRM programme incorporates its principles. In Cuba the Civil Defence is charged with the responsibility of protecting the population and economy from the impact of disasters. The strength of Cuba's disaster risk management (DRM) system lies in the integration of all public institutions as well as the population in the national disaster risk management programme.

The Civil Defense System was established in 1966; in 1994, it was legally defined as a state-run system whose main function is to safeguard the Cuban population and their social and economic achievements in face of any type of natural or other risks. This law established that the presidents of the provincial and municipal assemblies, who function as governors and mayors, are responsible for heading civil defence in their respective territories and implementing protective measures. In 1997 the approach was broadened to incorporate disaster risk reduction and in 2007 a decree was passed which states that all government institutions must harmonize their work programmes with and in support of the Civil Defence.

The institutional framework in Cuba supports disaster risk management. The Civil Defence System encompasses national as well as provincial and municipal levels where heads of local government are responsible for DRM. The organisational framework is also mass–based; organisations such as the Committee for Defence of the Revolution, Federation of Cuban Women and the

Communist Party all support and are involved in DRM. National policy clearly states that the first priority is safeguarding the population, followed by economic assets. So seriously is the responsibility taken, that whenever lives are lost in a disaster, the local authority must make a full report of the circumstances of the deaths to the higher authorities.

1.2 Resources

Cuba does have adequate human resources for the national DRM programme, however as with all countries interviewed, there could be greater budgetary allocations.

1.3 Community participation

In Cuba there is a high degree of community mobilisation for DRM. In addition to the groups described above, senior citizen groups also participate in the national preparedness programme. On the issuing of a warning by the authorities, volunteers from the community ensure that the residents are warned and organise evacuation from vulnerable areas and buildings.

The entire population is involved in the risk reduction effort. The high level of organisation of the society allows mobilization of large numbers of persons to help with data collection, community level mapping and evacuations.

2. PRIORITY FOR ACTION 2

Identify, assess and monitor disaster risks and enhance early warning

2.1 National and local risk assessments

All key government agencies carry out hazard mapping and risk analysis, the results of which are available to decision–makers. This includes at the local level where the Risk Reduction Management Centres (RRMCs) compile available hazard and vulnerability data for various sectors. This data is available to any municipal authority related to disaster management and, in face of a threat of any hazard, is made known to the population by the local media. The data is updated periodically by the agencies. The data base also includes historical impacts of hazards, including photographic records, which can be accessed by any authority in the municipality and other levels.

2.2 Early warning

Early warning systems are operated at national, provincial and community levels. At the national level institutions such as the National Cuban Meteorological Institute (INSMET) and the National Seismological Research Centre are responsible for monitoring, forecasting and warning. The local civil defence officials are responsible at the provincial level. At the community level early warning points (EWPs) staffed by volunteers ensure that the local population is warned about any threats being faced. Radio networks provide communication links between EWPs, vulnerable communities and the RRMCs. There are approximately one hundred local radio and television stations that are available to the Civil Defence System for public awareness and warning, at no cost.

The early warning system also includes warnings for flooding from dam–break or overspill, based on rainfall intensity levels.

2.3 Capacity

Cuba has the required human capacity and skills to carry out the national DRM programme. All technical and scientific agencies carry out research on hazards as part of their work programmes, and the country has developed models for climate change and tsunami impacts.

2.4 Regional and emerging risks

In planning for the effects of climate change on the agricultural sector, Cuba's adaptation strategies include moving to short cycle crops, increasing efficiency of irrigation systems and covered farming. The tsunami risk is being evaluated and a tsunami warning system is currently being established.

Cuba supports south–south cooperation. Prior to the 2010 earthquake, a team of Cuban scientists had visited Haiti to assist with a study on the effects of heavy rainfall. Cuba also exchanges seismic data with other Caribbean countries.

3. PRIORITY FOR ACTION 3

Use knowledge, innovation and education to build a culture of safety and resilience at all levels

3.1 Information management and exchange

One important aspect of the risk reduction programme in Cuba is the collection of a comprehensive range of data on social and economic conditions as well as hazards used to analyze vulnerability – including social vulnerability - and reduce risk. This is facilitated by a strong network of scientific and technical agencies which freely exchange data and information across the organisational and disciplinary boundaries. Cuba was the only country interviewed that did not mention data and access to data as a constraint in hazard and vulnerability mapping and assessments.

It is of note that Cuban disaster risk management officials regard the provision of health care, safe water and education as being an important element in reducing the vulnerability of the population.

3.2 Education and training

In Cuba disaster management information is included in the school curriculum from the third year onward to tertiary level. Regular drills are carried out. Through the RRMCs, information on vulnerability specific to the community is collected and disseminated to local authorities and the residents. This information is used by the authorities for physical and development planning as well as for DRM. The local media is an integral part of the public education programme and provides the necessary information to build public awareness.

Tertiary institutions offer training up to post–graduate level in various aspects of DRM and associated disciplines such as medicine and engineering.

3.3 Research

The scientific and technical agencies in Cuba are engaged in various types of research that support the national DRM programme. Cuba has done vulnerability studies on several natural hazards, including drought and floods. In the east of the country a project to improve monitoring of watersheds has been started. Instruments for recording rainfall, stream flow and water flow into dams have been installed. These data allow forecasting of flood conditions as well as conditions of the dams in relation to threats to the downstream population which is evacuated if the water levels in the dam exceed a certain level.

3.4 Public awareness

The Civil Defence System runs a year-round all–hazards public awareness programme. This includes posters, brochures videos and presentations to schools and communities. In addition popular culture is used to reinforce DRM messages. For example, messages on preparedness may be worked into the script of popular children's television programmes. Public awareness programs stressing preventative and precautionary measures are also developed for specific threats

The public awareness campaigns are periodically reviewed and studies undertaken to gauge the level of satisfaction of the public with the messages. Findings are used to adjust and refine the programmes.

4. PRIORITY FOR ACTION 4

Reduce the underlying risk factors

4.1 Environmental and natural resource management

For environmental and natural resource management, there is a national programme to reduce coastal vulnerability by the replanting of mangroves. This initiative is also part of the climate change adaptation programme. There is a policy for reforestation of inland areas. In addition, the environmental agency is carrying out a study on the possible impact of sea–level rise in 50–100 years.

4.2 Social and economic development practices

Issues of food security are integrated into the agriculture sector as well as adaptation to climate change. Drought has been extensively studies and vulnerability analyses conducted. The experiences of the most drought-prone regions have been documented and inserted into the Intense Drought Risk Reduction Plan. In addition, drought-resistant rice is being planted and banana plantations cultivation territory is being extended to decrease vulnerability. Methods of increasing irrigation efficiency and crops yields are also being studied in anticipation of climate change impacts.

4.3 Land–use planning and other technical measures

Cuba has established a National Commission for Compatibility, which ensures that all development is in keeping with the national policy for risk management. All development investment plans are reviewed and approved by the Civil Defence and the technical agencies charged with regulatory functions regarding the environment and land use. Additionally, there are high risk areas in which no development is permitted.

Urban planning is underpinned by mapping of vulnerable areas and use of hazard maps in order to reduce the vulnerability of human settlements.

5. PRIORITY FOR ACTION 5

Strengthen disaster preparedness for effective response at all levels

Cuba organizes the two-day Meteoro, an annual disaster simulation exercise. On the first day, government agencies go through their plans and roles. On the second day the agencies and the population are required to respond to the scenario presented. In 2010 the simulation involved an earthquake and tsunami. Meteor achieves several purposes:

- it allows the agencies and population to rehearse their response plans
- it identifies any gaps or areas of weakness that are then addressed
- it tests the effectiveness of the national public awareness programme, which is modified based on the feedback received

In keeping with the philosophy of safeguarding the population, portable water treatment plants and portable generators are available for post–disaster deployment in affected communities. Cuba's preparation also includes its animals, which are evacuated, transported, sheltered and maintained in case of threat.

6. CROSS-CUTTING ISSUES

6.1 Gender

Women are integrally involved in all DRM programmes. Women assist with drills and exercises and their roles are captured in all plans and procedures. For example, pregnant women are moved to hospitals when a hurricane threatens. A new addition to the labour law mandates that working female heads of households —with no family assistance— will be paid their entire salaries for up to three months if they have to take care of their children following a disastrous event. The DRM programme focuses also on other vulnerable groups, such as the aged, women and children, and the physically and mentally challenged populations.

6.2 Climate Change

The National Cuban Meteorological Institute is carrying out modeling and forecasting climate change impacts. Under the climate change programme, planning for relocation of coastal

communities is underway. Detailed studies of the drought hazard are also being conducted. Adaptation strategies for agriculture include planting more short cycle crops, moving to covered farming and more efficient use of water for irrigation.

7. CHALLENGES

Enforcement of zoning laws is seen as essential to continue reducing the level of risk faced by the population. There are instances of householders constructing or trying to construct houses in vulnerable areas where it is not legally permitted by local regulatory agencies.

As with all Caribbean countries, Cuba faces financial constraints, which slows the rate of implementation of the national DRR programme.

The long period since the last earthquake has resulted in a population with no recent experience of earthquakes. This was noted as a vulnerability factor.

8. FUTURE PLANS

For the future, Cuba will be placing more emphasis on its tsunami and climate change modeling programmes. Expansion of the RRMCs throughout the whole country is also planned through the country's own efforts and with the support of international cooperation actors. Establishment of more EWPs in vulnerable communities will also take place.

A3

ANNEX THREE

Dominica

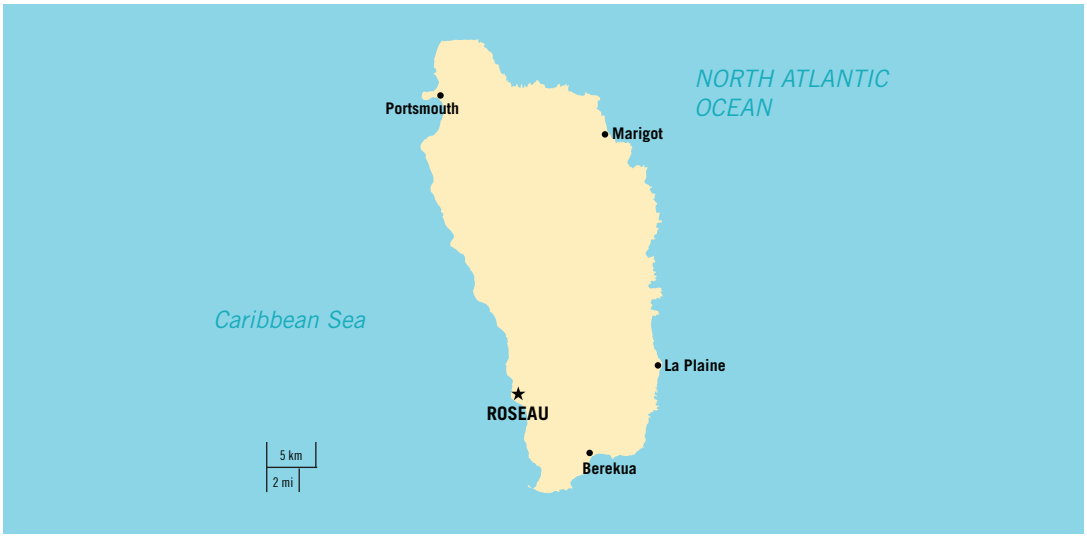

Figure 19: Map of Dominica. Source: openstreetmap.org

1. PRIORITY FOR ACTION 1

Ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation

1.1 National institutional and legislative frameworks

The Dominican Government has recognised the need for and importance of the HFA framework as a strategy for sustainable development. There is a full time national disaster management office — the Office of Disaster Management (ODM) — which is part of the multi–sectoral National Emergency Planning Organisation (NEPO) chaired by the Prime Minister. NEPO includes the public and private sectors as well as NGOs. It acts as the multi–agency focal point for operations. One constraint the national disaster management office faces is human resources, as only five persons are employed to manage the country's disaster risk management portfolio.

Some work has been done to revise the national disaster plan, however it has been delayed somewhat by the fact that the national disaster management office does not have the proper legislation in place to give it a legal mandate and the authority to ensure compliance to its requests. DRM–specific legislation is being drafted, but at the moment the national disaster management office and programme fall under the emergency powers act.

Disaster risk reduction (DRR) is stated as being a high priority by the national disaster management office, however there is no systematic incorporation of DRR into sustainable development policies and planning. The main hindrance is the fact that the country currently has no national policy and/or legislation that addresses DRR and that speaks specifically to the principles promoted by the HFA framework. As such there is no integrating framework for disaster risk management in Dominica.

This has resulted in a segmented approach to development planning, with each government sector working separate and apart from each other. Therefore, HFA has not informed or been integrated into national development planning within Dominica in a very effective or systematic way.

Enforcement of the building code falls under the purview of the Development Control Agency, but enforcement is not systematic. While elements of the HFA framework may exist in development planning in the country it cannot be truly attributed to a deliberate implementation of the principles of the HFA framework.

1.2 Resources

Dominica does not currently have the personnel required for full implementation of the HFA framework or the CDM programme. Training is needed in areas such as hazard analysis, hazard mapping, risk analysis and economic impact assessment.

2. PRIORITY FOR ACTION 2

Identify, assess and monitor disaster risks and enhance early warning

2.1 National and local risk assessments

There is no systematic hazard or risk mapping programme. Some hazard mapping has been done for DRM–related projects. Available hazard maps include those for landslide, volcanic activity, storm surge and seismic activity. Base maps showing topography and infrastructure elements in digital format are also available. There are no GIS trained staff in the national disaster management office, so the office cannot update or manipulate hazard maps.

2.2 Early warning

Weather monitoring, forecasting and warning services are provided by the Dominica Meteorological Service. Precautionary information is provided by the national disaster management office. Warnings for volcanic activity would be provided by the Seismic Research Centre, UWI.

A community-based flood warning system is being developed under a CDEMA project. This warning system will be operated by the community and will have links to the meteorological service and the disaster management office.

2.3 Vulnerability assessment

A vulnerability assessment was completed in 2006 using the Vulnerability Benchmarking Tool developed under a CDEMA project. It ranked Dominica sixth out of six countries within the Organization of Eastern Caribbean States (OECS) region in the risk transfer, mitigation, recovery and rehabilitation indices. Another assessment is scheduled; it would comparatively indicate progress made in reducing the level of vulnerability existing at the time of the first assessment.

2.4 Capacity

There is limited in–country capacity for forecasting natural and related hazards, climate modeling and forecasting. However, volcanic and seismic hazards monitoring and forecasting is carried out by the Seismic Research Centre, UWI in Trinidad, and the country would benefit from climate modeling and forecasting coordinated by the CCCCC.

3. PRIORITY FOR ACTION 3

Use knowledge, innovation and education to build a culture of safety and resilience at all level

3.1 Information management and exchange

Public information and awareness is the responsibility of the national disaster office which runs a year–round programme, including presentations to schools and communities. There are no programmes which target specific sectors; the information is hurricane–related. The country does have access to multi–hazard public awareness material produced by CDEMA. In addition, the Seismic Research Centre of the UWI provides educational material for the volcanic and seismic hazards.

Despite these constraints the Dominican Government, as a result of being a signatory to the HFA, does agree to the need and importance of the HFA as a developmental strategy to inform economic and social growth and mitigate against climate change; HFA is also a tool for strengthening the integration of DRR within the development process. The national disaster management office therefore tries to incorporate the CDM approach within its national work programme. To this extent, there have been national training initiatives in such areas as shelter management and damage assessment, in conjunction with regional partners such as CDEMA, and international NGOs.

4. PRIORITY FOR ACTION 4

Reduce the underlying risk factors

4.1 Environmental and natural resource management

There is a prescribed development approval process, but the national disaster management office is not included in that process.

4.2 Social and economic development practices

There is limited technical capacity to undertake the level of hazard mapping, vulnerability and risk analysis required to implement the HFA protocols, and there are also financial limitations that hinder the process.

There is no formalised DRR programme for the country. As a result, elements of DRR such as systematic use of hazard maps in development planning, inclusion of hazard analyses in environmental impact assessments and risk analyses are not systematically undertaken.

The Caribbean Uniform Building Code (CUBiC) was developed in the 1990s by the OECS for its member states. However, Dominica has not passed CUBiC into law, and no other legislated code exists. Enforcement of the code was also raised as an issue due to manpower constraints.

Dominica has completed its National Communication on Climate Change (2001) which reviewed its vulnerability to climate change and set out its national adaptation strategy. A project implemented by the CCCCC under the Global Environment Facility demonstrated pilot adaptation strategies though activities such as ecosystem preservation and creation of natural resource management plans. However, the interviews did not unearth concrete examples of integration of adaptation strategies into national development planning.

Government assets are not routinely insured, but Dominica is a member of CCRIF.

5. PRIORITY FOR ACTION 5

Strengthen disaster preparedness for effective response at all levels

The level of awareness of preparedness issues is based largely on the experience of the population; the national disaster management office is, for its part, promoting greater awareness of DRR in its outreach programmes. There is therefore some progress towards creating a culture of safety. Simulation exercises are done, although not with the regularity that the national disaster management office would like to see. Exercises have been done for mass casualty management, aircraft accident and influenza pandemics.

The national disaster management office, in an effort to increase the level and reach of its preparedness programme, is trying to establish a system of focal points within government as well as the private sector and NGOs. These focal points would liaise with the office and be responsible for preparedness activities within their organisations.

Dominica is a member of CDEMA, and as such would benefit from a response coordinated by the CDEMA Sub–Regional Focal Point (SRFP), Barbados. The country through the CDEMA mechanism has also benefitted from technical assistance from the UWI for assessments of landslide activity

The vulnerability of the main Hospital, the Princess Margaret hospital was assessed by PAHO using its Hospital Safety Index tool. The assessment provides information on the vulnerability of the facility and its capacity to continue operations after a disaster. It also provides recommendations for addressing weaknesses found. The assessment was also completed for other health care facilities in the country, and the recommendations are being implemented.

6. CONSTRAINTS

The national disaster management office, the Office of Disaster Management (ODM), identifies the following as the currently existing constraints that may inhibit starting or increasing investment in national disaster risk reduction within Dominica:

- Lack of the necessary legislative framework
- Insufficient Central Government support
- Insufficient or non–existent budgetary support for capacity and institutional building
- Insufficient coordination and cooperation among all sectors including government, private and civil society to inform the national developmental process, including insufficient research, data availability, collation, collection and analysis, sharing and management of information, as well as the development of common strategies
- Lack of communication and a communication platform, which is common to the strategies of the HFA framework
- No champion, an individual and/or Ministry to promote the adoption and implementation of the HFA framework in Dominica

A4

ANNEX FOUR

Jamaica

Figure 20: Map of Jamaica. Source: openstreetmap.org

1. PRIORITY FOR ACTION 1

Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation

1.1 National policy and legal framework for DRR

Jamaica's national disaster management structure is led by a key decision–making body called the National Disaster Committee (NDC). This Committee is chaired by the Prime Minister and facilitates the interaction of key development players towards progressing the country's disaster risk reduction and management programme[1].

The NDC comprises six sub–committees, namely:

1. Administration, finance and the public service
2. Damage assessment, recovery and rehabilitation
3. Emergency operations, communications and transport
4. Public information and education
5. Welfare/shelter and relief clearance
6. Health planning

The sub–committees produce and monitor mitigation, prevention and preparedness plans, while the Office of Disaster Preparedness and Emergency Management (ODPEM) implements these plans.

1 The National Disaster Committee (NDC) is Jamaica's national platform for disaster risk reduction; a nationally owned and led forum or committee for advocacy, coordination, analysis and advice on disaster risk reduction that is multi-sectoral in nature and involves the public, private and civil society.

The HFA focal point in Jamaica is ODPEM, the only government agency that exclusively provides disaster management functions in the country. The organization's (l.c) role is ensconced within the Disaster Preparedness and Emergency Management Act of 1993, which stipulates that "the principal objects of the Office shall be to advance disaster preparedness and emergency management measures in Jamaica by facilitating and coordinating the development and implementation of integrated disaster management systems." The agency is equipped to carry out the goals of the HFA, as ODPEM's functions include all aspects of DRR.

Efforts have begun to draft a new act and, if passed, will provide a strengthened framework for the encouragement and full integration of DRR in Jamaica. The act, once updated, will include issues such as mandatory evacuation and no build zones. Jamaica has also drafted a National Hazard Mitigation Policy, but the supporting Strategy and Action Plan are yet to be finalised. The policy was conceptualised within the context of the growing recognition and appreciation of the relationship between sustainable development and the social and economic costs of hazard and disaster impacts. The policy therefore provides a framework for integrating hazard mitigation into all other policies, programmes and plans at the national and community levels. The Policy will also guide the roles of the different national agencies and address the hazards before they become disasters.

1.2 Resources

While ODPEM recognises the need to develop and implement DRR plans and activities at all administrative levels, the organization faces the challenge of accessing the necessary resources to effectively implement these activities.

1.3 Community participation

Jamaica's national disaster management structure includes a community disaster management component at the third tier, referred to as the National Zonal Programme, which was implemented after Hurricane Gilbert in 1988. This programme, which ultimately supports the efforts at the national level[2], was implemented so that communities could manage internally for at least 72 hours until outside assistance could reach them following a disaster.

Communities across the island are divided into clusters called zones. A zone chairman monitors each zone and sends information on disasters or potential disasters to their respective Parish Disaster Committee[3]. In the event of a disaster the zones will be the first group to render assistance. Many communities within Jamaica's National Zonal Programme have been recipients of disaster–related training in first aid, shelter management and light search and rescue among other areas.

2 Jamaica's national disaster management programme has three tiers: the first tier is the national level, the second tier is the parish level, and the third tier is the community level. The latter comprises the national zonal programme.

3 The Parish Disaster Committee is a multi-agency organizing body that the ODPEM works through to effect emergency response at the local level.

2. PRIORITY FOR ACTION 2

Identify, assess and monitor disaster risks and enhance early warning

2.1 National and local risk assessments

Continous efforts are made at collecting hazard and vulnerability data and making it available through the production of damage assessment reports, annual incident reports, a national disaster catalogue and hazard maps prepared by the respective technical agencies. Under the national hazard mapping programme, which started in the 1980s, landslide, flood, storm surge and seismic hazard maps have been produced. These maps are available to national and municipal authorities and are incorporated into the development approval process. Efforts are currently underway to conduct risk assessments for key sectors such as agriculture and tourism.

2.2 Early warning

Doppler radar technology, complemented by satellite imagery, is utilised in the country's warning system for meteorological hazards.

Extensive work has been done in the establishment of community-based flood early warning systems in which trained flood early warning teams have been established along major river basins and waterways. Telemetric flood warning systems and community flood gauges are also in place to enhance the flood early warning systems.

The Jamaica Seismograph Network (JSN), operated by the University of the West Indies, monitors seismic activity and generates data following an earthquake. This data is then communicated to the relevant decision makers to respond accordingly.

Some work has been done on forecasting landslide activity from rainfall intensity data, but this application as not been integrated into the early warning system.

Jamaica is now a signatory to the Regional Tsunami Warning System.

2.3 Capacity

Jamaica has the human resources capacity to manage the national disaster management programme, however higher budgetary allocations are required.

2.4 Regional and emerging risks

Jamaica is one of sixteen participating states represented by CDEMA that adopted in 2001 a strategy and results framework for CDM. The goal was to link CDM to overall development decision-making and planning within the Caribbean. This was later rearticulated in 2007 as the enhanced CDM framework to better achieve the overarching goal of sustainable development in the Caribbean region.

Jamaica serves as CDEMA's Sub-Regional Focal Point (SRFP) for the Bahamas, Belize, Turks &

Caicos Islands, and Haiti. The SRFP is a key element of the CARICOM regional response system, and is designed to provide quick and immediate support in case of a disaster. The SRFPs also coordinate discussions among members and support south–south exchanges.

3. PRIORITY FOR ACTION 3

Use knowledge, innovation and education to build a culture of safety and resilience at all levels

3.1 Information management and exchange

Information on disaster risk and protection options is available to citizens in various forms, including website, print and audio-visual material. Lecture presentations and workshops as well as community training sessions are also carried out.

Cross–disciplinary dialogue is maintained through the sub–committees of the National Disaster Committee. These sub–committees include representatives from technical and scientific agencies, the private sector, NGOs and local authorities.

Geographic Information System (GIS) technology is used for hazard and risk mapping as well as compilation of post–impact assessment data. Computer-based flood hazard modeling is also done.

The national disaster management office — ODPEM — has been leading the initiative to mainstream disaster risk management within Jamaica's key sectors. Mainstreaming disaster risk management focuses on the strategic frameworks, sectoral strategies and policies pursued and implemented within institutional structures that address risks emanating from natural hazards. The organization began with the following key sectors: agriculture, tourism and education.

DRM has been included in the national policy on agriculture; a National Agricultural Disaster Risk Management Programme started in May 2008 against the backdrop of some US$46 million in losses following the passage of Hurricane Dean in 2007. This decision provided the necessary strategic and policy support needed by ODPEM to advance the mainstreaming of disaster risk management in this key sector.

ODPEM has also had some successes within the tourism sector where their efforts were complemented by a regional project, funded by the Inter-American Development Bank (IDB) and implemented by CDEMA, on integrating DRM within the tourism sector in the Caribbean. The project provided a methodology for establishing baseline data for the sector and the development of a risk management strategy and action plan for the tourism sector. The project also involved developing a standardized methodology for hazard mapping, vulnerability assessment and economic valuation of risk in the tourism sector.

3.2 Education and training

Disaster risk management is infused into the curriculum at secondary and tertiary levels, but it is not taught as an independent subject, rather, it is included in other subjects such as geography. At tertiary level through UWI, elements of DRM are taught as part of the undergraduate

programme, and an MSc in disaster management is offered. The University of Technology includes DRR in its undergraduate urban physical planning programme. Opportunities are also available for hazard related research as part of the MPhil. and Ph.D. programmes at UWI.

3.3 Research

In Jamaica, hazard–related research is pursued mainly through the regional university, UWI. Topics include climate change, flood risk mapping, earthquake zonation and hazard mapping. Government agencies also capture a range of data which can be used in support of the DRM programme.

3.4 Public awareness

Jamaica has a strong multi–hazard public awareness programme, which encompasses all segments of the society. The programme includes dissemination of information via print and electronic media as well as seminars, workshops and community meetings. The national disaster management agency also trains community teams as part of its community–based disaster management programme. In addition to its ongoing public awareness activities, anniversaries of past major events and disasters are used each year as a platform for increasing public awareness on the particular hazard.

ODPEM spearheaded efforts to streamline disaster risk management within the education sector but has met with some challenges that has slowed these efforts to date.

A schools safety and security policy has been developed by the Ministry of Education. Under a United Nations Children Fund (UNICEF), project schools have developed disaster management plans and teachers have been trained in plan development.

Progress has been made with the early childhood institutions. Disaster risk management is specifically mentioned in the policy on early childhood education, and many institutions have developed disaster management plans.

Earthquake and fire drills are regularly done in schools.

4. PRIORITY FOR ACTION 4

Reduce the underlying risk factors

4.1 Environmental and natural resource management

Jamaica has strong environmental management legislation which includes protection of national parks, both terrestrial and marine, compulsory environmental impact assessments (EIAs) for developments and control of waste and discharges. EIAs must include a hazard analysis component. A hillside development policy is now being developed to manage development of hilly regions in a more sustainable manner. There is close cooperation between the environment and DRM sectors. The major challenge in environmental management is enforcing the laws which are designed to protect the environment as well as the population.

4.2 Social and economic practices

Social safety nets are expanded after disasters. Affected population below a certain income level receives assistance from the government. In addition some assistance is given towards restarting livelihoods after a disaster. Some post–disaster projects have included specific support to female heads of households and single mothers.

Efforts are made to include disaster risk reduction in recovery by; a) relocation of vulnerable populations; and b) relocation sites are subject to approval by the technical agencies which carry out hazard analyses.

Households who are part of hurricane rehabilitation projects must include hurricane straps and appropriate roof design as conditions of receiving grants. This is partnered by training of artisans within the communities in hurricane resistant techniques.

4.3 Land-use planning and other technical measures

Disaster risk assessment is part of the development approval process. These assessments include use of available hazard and risk maps as well as site inspections. All local government authorities now employ physical planners who are sensitised to disaster risk reduction concepts and the use of hazard maps and data to guide development planning.

The national building code has been revised and is to be passed within the next year. The Development Orders, which set out regulations for development, are to be updated.

5. PRIORITY FOR ACTION 5

Strengthen disaster preparedness for effective response at all levels

A national disaster plan guides the management and response to hazard impacts. Sub–plans cover the following areas: earthquake response, fire management, oil spill, media and transport. These sub–plans also set out necessary mitigation activities. National simulation exercises are conducted to test these plans on a regular basis. In 2006 an earthquake drill was organised in the main financial district. Over 100 companies participated in the drill.

There is also an established National Disaster Fund, which is accessed to financially support the response activities in the event of a national disaster. Jamaica is also a subscriber to the regional parametric insurance fund, CCRIF.

Standard operating procedures govern national response activities to disaster events. After action reports are compiled concerning the lessons learnt after each national disaster event to inform future best practices.

ODPEM has also established a volunteers database to capture the contact information of all persons interested in volunteering in the national DRR programme. Volunteers are trained in areas relevant to the work of the disaster office and their services utilised whenever necessary

6. CROSS-CUTTING ISSUES

6.1 Gender

All DRM programmes ensure participation of women. However, in practice, special efforts have to be made to ensure the participation of men in the community programmes. Disaster plans include provisions for specially vulnerable populations, including mothers with young children, the elderly and persons with disabilities. In post–disaster situations consideration is given to the safety of women and children in shelters, and where possible family groups are kept together.

6.2 Climate Change

Work is underway to complete a draft climate change policy. Climate change considerations are now being included in all DRM programmes. In addition there is a special national thematic group which is responsible for integration of climate change in the DRM programme. The National Works Agency (NWA) is in the process of adjusting design specifications for drainage works to take into account the effects of climate change. In the agricultural sector, the DRM Unit of the Ministry of Agriculture is ensuring inclusion of climate change considerations in the ministry's work programmes.

7. CHALLENGES

ODPEM noted several challenges they have faced in their bid to streamline disaster risk management within the Jamaican government service.

- Staff attrition affects the process, as roles have to be reassigned and the requisite training to re–introduce core principles have to be (re)executed. Additionally, participation within some agencies/ministries is more aligned with a person than a post. This therefore affects the quality and continuity of participation.
- A major constraint in the hazard mapping programme is the fact that hazard mapping is project–driven. The budgets of the technical agencies do not permit a systematic programme of producing and revising the maps.
- Financial constraints are seen as a challenge at all levels — individual where persons often occupy high risk locations thus increasing their vulnerability, —local, where the municipal authorities cannot enforce laws and codes — and, national, where the DRM programme is highly dependent on project funding.
- Despite much progress in shifting the focus of the DRM programme to risk reduction, challenges remain in truly converting the political directorate to this way of thinking.

8. FUTURE PLANS

An important step for the immediate future is the use of more quantitative measures including establishment of baseline data, indicators and collection of more highly disaggregated data. Establishment of incentive driven schemes for risk reduction and development of community level risk transfer mechanisms are to be pursued.

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ANNEX FIVE

The Virgin Islands (UK)

Figure 21: Map of The Virgin Islands (UK). Source: openstreetmap.org

1. PRIORITY FOR ACTION 1

Ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation

1.1 National institutional and legislative frameworks

The national mechanism for DRR in the Virgin Islands (UK) includes a national disaster management office — the Department for Disaster Management (DDM) — as well as a National Disaster Management Council, which is responsible for the territory's disaster management programme. The council is divided into several sub–committees that focus on developing plans and procedures for implementing DRR within their areas of responsibility. There are also specific authorities and committees with responsibilities for implementing DRR such as the Planning Authority, Building Authority, Environmental Committee, and the Recovery Task Force. This mechanism is supported by liaison officers for public sector entities as well as the private sector. These officers interface with the national disaster office.

DRR is incorporated into the Government's manifesto as well as in development plans and policies; there is an established budget for DRR. Responsibility for DRR is also defined within the portfolios of the Heads of State and Government.

Budgetary support is seen as a key component of any institutional support and capacity building effort. The Virgin Islands has dedicated approximately 7% of its budget to the national DRR programme. Additionally, funding is dedicated to DRR activities within sectors. The government maintains a disaster fund into which it places funds every year from its recurrent expenditure.

Legislation, policies and frameworks addressing DRR have been put in place. There is the Disaster Management Act 2003, and the National Disaster Management Plan. A CDM policy is being developed, which is to clearly articulate the Government's commitment to DRR and the CDM framework in particular. The elements of the policy are linked to the HFA, and the policy is operationalized in the regional framework of CDM.

The Virgin Islands (UK) has articulated strategic goals for its CDM programme. Among these goals is having "disaster management plans fully integrated in the development and management cycle of projects and fully institutionalised within an efficient government structure grounded in community support and sustained by government support to make the Virgin Islands a regional model and centre of excellence for CDM" (DDM 2009).

Towards achievement of this goal, the CDM Strategy and Planning Framework and CDM Policy have been completed and approved by Cabinet; these provide for decentralization of responsibilities and capacities at all levels. The Policy and Strategy link into national development plans as well as the HFA and regional strategies. There is the belief at country level that the effectiveness of the HFA can be enhanced by the development of regulations to support the Disaster Management Act, as well as more effectiveness in mainstreaming DRR in some sectors, greater enforcement mechanisms and more scientific studies in local risk and vulnerability trends.

1.2 Resources

The national disaster management office indicates that there is adequate human resource capacity for implementation of most DRR activities within the country, but there is need for increased technological capacity and financial resources. Training of local personnel is required in the areas of hazard mapping and risk analysis.

1.3 Community Participation

There is a well–structured community preparedness programme in place in the Virgin Islands (UK). The country is divided into zones with Zonal Committees and a Zonal Coordinator responsible for each zone. These coordinators and committees work closely with the national disaster management office to identify vulnerable persons and identify resource needs as well as assuming the functions for response. Non–governmental organisations, churches and businesses are also incorporated into the community programme, contributing to the overall goal of reduction of loss of life and property from the effects of hazards.

2. PRIORITY FOR ACTION 2

Identify, assess and monitor disaster risks and enhance early warning

2.1 National and local risk assessments

The Virgin Islands (UK) has a process for the identification of hazards and risk called the Hazard Identification and Risk Assessment (HIRA) process, which involves the identification of hazards and assessment of risk facing the population and property. The collected data is used for continually assessing risk as well as damage and loss projections.

Additionally, the National Planning Act contains a requirement for environmental impact assessments (EIA) to contain hazard, vulnerability and risk assessments. The data collected here helps to inform the HIRA.

2.2 Early Warning

The Virgin Islands (UK) has no meteorological office; weather information is provided by the Antigua and Barbuda Meteorological Services. Services for provision of forecasting and warning services are privately contracted. There is a network of seismometers and strong motion instruments in place, with a formal agreement with the University of Puerto Rico to provide the technical skills required for interpretation and monitoring of the seismic data.

A national alert system and emergency telecommunications network ensures communications among the islands and emergency personnel as well as with the public. There are established memoranda of understanding with media houses for broadcast of warning messages. Guidance on how to act upon warnings is disseminated by the national disaster management office as part of its public awareness programme.

The Virgin Islands (UK) does not undertake scientific and technical research. Data gathered for hazard mapping and risk analyses would contribute to a national data base on hazards.

2.3 Regional and emerging risks

Regional cooperation on DRM is achieved through the CDM framework. This ensures alignment with the programme–based approach promoted by CDEMA and the CDM. Climate change issues are being addressed in the regional framework of projects being implemented under the Caribbean Community Climate Change Centre (CCCCC) and include mainstreaming adaptation to climate change

3. PRIORITY FOR ACTION 3

Use knowledge, innovation and education to build a culture of safety and resilience at all levels

3.1 Information management and exchange

The national disaster management office has developed a programme for dissemination of hazard related information through media campaigns aimed at various sectors, dissemination of printed material on hazards and their management and sensitisation of planners, engineers and builders to the need for mitigation measures to be integrated in development planning and construction.

3.2 Education and training

Hazard awareness is incorporated into the school curriculum and there is an associate's degree in disaster management offered at the tertiary institution, the H. Lavity Stout College. There has been special focus on improving school preparedness. The national disaster management office has provided assistance with contingency plan development, and training in fire safety and basic

first aid. Special publications have been developed for schools, such as the Geological Hazards Handbook for secondary schools and various workbooks and handbooks.

The Department for Disaster Management (DDM), as the national disaster management office, carries out training in areas such as safer building for building professionals. The Department also conducts training for medical professionals and heavy equipment operators, among others.

3.3 Research

There is no pure research but studies have been conducted by consultants on the seismic hazard, tsunami impact and quantitative risk assessment as part of the country's vulnerability and risk assessment programme.

3.4 Public awareness

There is a structured public awareness programme, which includes radio and television programmes, newspaper articles and information dissemination via the internet. During emergencies, the emphasis is on providing accurate, timely and useful information to the public.

4. PRIORITY FOR ACTION 4

Reduce the underlying risk factors

4.1 Environmental and natural resource management

There is emphasis on coordinating disaster management, environmental management and physical planning, hence the previously mentioned incorporation of hazard analyses into the EIA process. The national disaster management office is part of the development approval process, and the director of the office sits on the Planning Authority and the Environmental Management committee.

4.2 Social and economic development practices

Very little concrete progress has been made in terms of economic analyses. However, there have been discussions on the use of cost-benefit analyses for risk reduction projects as well as risk reduction incentive schemes. The national disaster office is working with the financial services sector to develop a sector–specific DRR policy.

In the post–disaster context, the country has ensured integration of DRR in recovery through the National Recovery Plan and Mitigation Strategy which is within the framework of the National Integrated Development Strategy (NIDS). One of the major objectives of recovery programmes is ensuring that existing vulnerability is reduced. A feedback mechanism exists whereby each major event and its recovery programme triggers a review of the NIDS and incorporation of additional mitigation measures where necessary.

4.3 Land–use planning and other technical measures

The regulations to the Planning Act are being adjusted to incorporate hazard mitigation requirements, and require hazard and vulnerability assessments as part of the environmental impact assessment (EIA) process. These actions will ensure DRR considerations during the development approval process.

Other examples of guiding frameworks are the Hazard Mitigation Policy, the Mitigation Development Planning Framework, the National Comprehensive Disaster Management Strategy and Programming Framework. These are aligned to the National Integrated Development Plan which seeks to ensure ecologically sustainable development practices.

5. PRIORITY FOR ACTION 5

Strengthen disaster preparedness for effective response at all levels

In the Virgin Islands (UK) there was a shift from hurricane preparedness to a comprehensive disaster management and multi–hazards approach first. This new approach received political support in 1979, and has continued since then. In this context, the National Disaster Management Plan is an multi–hazard plan, updated in 2008 and tested in 2009. It addresses the major threats to the country and is tested, along with associated procedures, through an annual full-scale exercise.

Each year the national disaster management office presents a report on the country's preparedness, as well as a Critical Infrastructure Review Report, to the government. Additionally, disaster risk reduction activities are listed as priority activities in the national CDM Policy and Strategy.

Most government ministries and departments have developed their contingency plans, as have schools and day care centres. There are plans to develop a schools safety programme, which would incorporate DRR.

The health sector has developed plans for major threats, including mass casualty and disease outbreak. These include the Health Disaster Management Policy, Strategy and Programme. The tourism and education sectors are working on the inclusion of disaster risk management in their programmes. In the physical planning sector, a hazard and vulnerability assessment process is integrated into the approval process and the Department of Disaster Management sits on the committee of the Planning Authority.

6. CROSS-CUTTING ISSUES

6.1 Gender

There are no gender specific procedures in the DRM programmes.

6.2 Climate Change

There is a national climate change focal point that has been focusing on policy and strategic development. The Virgin Islands (UK) is included in the activities of the CCCCC and participates in the regional projects.

7. CHALLENGES

The following are a few of the identified constraints that the Virgin Islands (UK) faces in the proper integration of DRR principles and practices, as advocated by the HFA:

- A need for better levels of preparedness in the private sector, which has maintained a hurricane–centric approach to its preparedness. The national disaster management office wishes to sensitise the private sector to the need for business continuity and recovery planning.
- Inadequate technical expertise for EIAs and hazard, vulnerability and risk assessments in the public and private sectors.
- Constrained financial resources resulting in hampered implementation of a cost benefit analysis for DRR as well as a risk reduction incentive scheme for the insurance and banking sectors.
- A hazard mapping programme that is highly dependent on the availability of external funding and requires updated data.
- Availability of data to inform risk assessments.
- Building code enforcement hampered by the limited number of trained personnel available.

8. FUTURE PLANS

For the future, the goal of the Virgin Islands (UK) is to enhance the integration of DRM in all sectors by:

- Training in business continuity planning
- Encouraging incentive–linked programmes for the financial and insurance sectors that reward home owners who invest in mitigation measures
- Offering incentives for businesses which invest in sustainable business practices
- Conducting cost benefit analyses for major mitigation projects initiated over the last 20 years
- Documenting savings from risk reduction investments

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ANNEX SIX

Interview Instrument

SECTION 1: HFA EXPECTED OUTCOME

(The substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries.)

1. To what extent has disaster risk management been incorporated into country X's key sectors? Examples of key sectors include agriculture, health and tourism.
2. Can you say, based on your experience, that the HFA has been an instrumental tool in reducing disaster losses since its adoption and implementation in country X?
3. If HFA has been an instrumental tool, what factors contributed to reducing disaster losses through the HFA implementation in country X?
4. If HFA has not been an instrumental tool, what factors do you think contributed to preventing the HFA from achieving its expected outcome in country X, i.e. reducing disaster losses?
5. Which elements of the HFA have not worked well in reducing disaster risk in country X?
6. What are the factors that prevented the effectiveness of those identified HFA element in reducing disaster losses in country X?

SECTION 2: HFA STRATEGIC GOALS

(1.– The more effective integration of disaster risk considerations into sustainable development policies, planning and programming at all levels, with a special emphasis on disaster prevention, mitigation, preparedness and vulnerability reduction; 2–. The development and strengthening of institutions, mechanisms and capacities at all levels, in particular at the community level, that can systematically contribute to building resilience to hazards; and 3.– The systematic incorporation of risk reduction approaches into the design and implementation of emergency preparedness, response and recovery programmes in the reconstruction of affected communities.)

7. To what extent has the HFA informed/been integrated into national development planning within country X? What are the organisational structures that support this integration?
8. What specific constraints currently exist that may inhibit starting or increasing investment in national disaster risk reduction within country X?
9. To what extent are HFA prescribed tasks and the information they generate considered in government decision–making processes?
10. What do you consider to be the main achievements and main lessons learnt as a result of adopting and implementing the HFA in country X?
11. How can funding be placed on a more predictable and sustained footing to encourage the further implementation of the HFA in country X?

SECTION 3: HFA PRIORITIES FOR ACTION

(1.– Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation; 2.– Identify, assess and monitor disaster risks and enhance early warning; 3.– Use knowledge, innovation and education to build a culture of safety and resilience at all levels;

4.– Reduce the underlying risk factors; 5. Strengthen disaster preparedness for effective response at all levels.)

12. What level of priority is assigned to DRR by the national government, the local government authorities and the national disaster office?
13. How has the central government in country X communicated HFA suggestions and commitments to the local government?
14. Are local governments empowered to implement appropriate disaster risk reduction plans? How?
15. To what extent can it be said that there is a culture of safety and resilience within the general public in country X?
16. If there is a culture of safety and resilience in country X, what are the main elements that contributed to creating such a culture and how long did it take for such a culture to develop?
17. If there is no such culture in country X, has the HFA informed any moves towards creating such a culture of safety and resilience at any level in country X? How has this been done so far?
18. To what extent has gender been considered and/or integrated within disaster risk reduction initiatives in country X?
19. To what extent has HFA been integrated within disaster risk reduction initiatives in country X, such as hazard mapping, risk analysis and public awareness initiatives?
20. To what extent has HFA informed any formal disaster risk reduction training initiatives in country X?
21. In your experience, does the HFA approach sufficiently encourage community participation and the utilization of local knowledge to reduce disaster risk?
22. Reports such as the Global Assessment Report have shown that HFA Priority Action 4, reducing the underlying risk factors, remains the most challenging area of HFA implementation. Based on your experience, how much progress has been made and what is the nature of the difficulties country X faces in implementing HFA Priority Action 4?
23. What adjusting or strengthening is needed internationally, including the roles of international development partners, to help accelerate HFA implementation in country X?
24. What kind of policy and programmatic linkages have proven to be helpful for the integration of DRR and climate change adaptation?

SECTION 4: THE WAY FORWARD

25. Does country X differentiate between CDM and HFA in its national disaster risk management programme?
26. In your opinion, can the HFA complement the CDM programme in the Caribbean? How can the two be combined in the best interest of the Caribbean's disaster risk reduction programme, and that of country X in particular?
27. What types of key deliverables would make the biggest impact during the remaining period of HFA implementation in country X?
28. What key policy and strategic orientations should be taken up as we move towards and beyond 2015?
29. How should climate change adaptation be integrated in the next five years of the HFA implementation?
30. What would be the most conducive institutional arrangements at the national level to realize stronger integration between DRR and climate change adaptation?

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The Caribbean Risk Management Initiative (CRMI) project is a knowledge network designed to promote best practices and build capacity in the region in the fields of risk management and climate change adaptation. CRMI aims to provide a platform for sharing the experiences and lessons learned between different sectors, languages and cultural groups across the Caribbean in order to facilitate improved disaster risk reduction. CRMI acknowledges the support of various donors such as: the Italian Ministry of the Environment, Land and Sea; Norway's Ministry of Foreign Affairs; Spain–UNDP Trust Fund; the UNDP's Gender Thematic Trust Fund (GTTF); and UNDP core funding from the Regional Bureau for Latin America and the Caribbean (RBLAC) and the Bureau for Crisis Prevention and Recovery (BCPR).