



Agence canadienne de  
développement international

Canadian International  
Development Agency

# THE 2004 HURRICANE SEASON IN THE CARIBBEAN A REVIEW OF DISASTER PREPAREDNESS AND RESPONSE ARRANGEMENTS

*Prepared as part of the CIDA Ivan Project  
Funded by the Canadian International Development Agency*

## TABLE OF CONTENTS

<b>Executive Summary .....</b>	<b>04</b>
<b>SECTION 1: SUMMARY REVIEW OF THE 2004 HURRICANE SEASON ....</b>	<b>11</b>
Impact on Bahamas	
Impact on Cayman Islands	
Impact on Grenada	
Impact on Jamaica	
<b>SECTION 2: REVIEW OF EARLY WARNING SYSTEMS .....</b>	<b>14</b>
Lessons learned	
Recommendations	
<b>SECTION 3: COORDINATION ARRANGEMENTS .....</b>	<b>20</b>
National Level	
Regional Level	
International Level	
Lessons Learned	
Recommendations	
<b>SECTION 4: DISASTER RELIEF OPERATIONS .....</b>	<b>23</b>
National Level	
Regional Level	
Lessons Learned	
Recommendations	
<b>SECTION 5: DAMAGE ASSESSMENT .....</b>	<b>29</b>
Micro Level Assessment	
Macro Level Assessments	
Limitations of the Reports	
Lessons Learned	
Recommendations	
<b>SECTION 6: RECOVERY AND RECONSTRUCTION .....</b>	<b>32</b>
Lessons Learned	
Recommendations	
<b>SECTION 7: SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>37</b>
<b>TEXT BOXES AND TABLES</b>	
Text Box 1:	Comprehensive Disaster Management (CDM)
Text Box 2:	The Role and Function of CDERA
Text Box 3:	Best Practice – Inclusion of Project Profiles in Damage Assessment Reports
Table 1:	Summary of Lessons Learned and Recommendations

## ACRONYMS

<b>CARDI</b>	Caribbean Agriculture Research Development Institute
<b>CAREC</b>	Caribbean Epidemiology Centre
<b>CARICOM</b>	Caribbean Community
<b>CARILEC</b>	Caribbean Electric Utility Services Corporation
<b>CDERA</b>	Caribbean Disaster Emergency Response Agency
<b>CDRU</b>	Caribbean Disaster Response Unit
<b>CDM</b>	Comprehensive Disaster Management
<b>CIDA</b>	Canadian International Development Agency
<b>CTO</b>	Caribbean Tourism Organization
<b>CUBiC</b>	Caribbean Uniform Building Code
<b>DFID</b>	British Department for International Development
<b>ECDG</b>	Eastern Caribbean Donor Group
<b>EU</b>	European Union
<b>FACT</b>	Field Assessment and Coordination Teams
<b>FAO</b>	Food and Agriculture Organization
<b>IFRCRCS</b>	International Federation of the Red Cross and Red Crescent Societies
<b>JICA</b>	Japanese International Cooperation Agency
<b>NEMOT</b>	National Emergency Management of Overseas Territories
<b>NDP</b>	National Disaster Plan
<b>NGO</b>	Non Governmental Organization
<b>OAS</b>	Organization of American States
<b>OCHA</b>	UN Office of Coordination of Humanitarian Affairs
<b>OECS</b>	Organization of Eastern Caribbean States
<b>PADRU</b>	Pan American Disaster Response Unit
<b>PAHO</b>	Pan American Health Organization
<b>PED</b>	Emergency Preparedness and Disaster Relief Programme of PAHO
<b>RIT</b>	Regional Intervention Teams
<b>RNAT</b>	Rapid Needs Assessment Teams
<b>RSS</b>	Regional Security System
<b>RRM</b>	Regional Response Mechanism
<b>SOP</b>	Standard Operating Procedure
<b>SUMA</b>	Humanitarian Supply Management System
<b>UNDP</b>	United Nations Development Programme
<b>UNDAC</b>	United Nations Disaster Assessment Team
<b>UNECLAC</b>	United Nations Commission for Latin America and the Caribbean
<b>UNICEF</b>	United Nations Children's Fund
<b>UNIFEM</b>	United Nations Fund for Women
<b>UNFPA</b>	United Nations Fund for Population Activities
<b>UNDP/SRO</b>	UNDP Sub-regional Office for Barbados and the OECS
<b>USAID</b>	United States Agency for International Development
<b>USAID/OFDA</b>	Office of Foreign Disaster Assistance of USAID
<b>UWI</b>	University of the West Indies

## EXECUTIVE SUMMARY

The 2004 Hurricane Season was one of the most active seasons on record. Between July and September, there were 14 weather systems with winds ranging from 50km/hr to 275km/hr. Seven (7) of these systems were Hurricanes (Alex, Charley, Danielle, Frances, Ivan, Jeanne and Carl) which together resulted in the loss of 49 lives and approximately US\$2 billion in damage in Caribbean Disaster Emergency Response Agency (CDERA) Participating States, most notably, The Bahamas, Cayman Islands, Grenada and Jamaica. The most intense and damaging system of the Season was Hurricane Ivan which attained Category 5 Status (on the Saffir-Simpson Scale) and which killed 16 people and damaged 90% of homes in Grenada.

The number, intensity and rapid succession of the extreme weather systems severely tested the coping capacity of national and regional disaster preparedness and response agencies and Governments and exposed the vulnerability of Caribbean countries to natural disasters.

Against this background, CDERA with the support of the Canadian International Development Agency (CIDA) and the National Emergency Managers of Overseas Territories (NEMOT) has embarked on a comprehensive review of national and regional contingency planning arrangements under its Regional Response Mechanism (RRM). The review is to provide a framework for capturing and sharing the outcomes of a series of evaluations and consultations across the region that focused on the 2004 experience. The review process also involves operational assessments and consultations at the Agency, Sector, National and Regional levels over a three-month period commencing in November 2004.

### Objectives of the Paper

This Paper provides a summary of the findings, conclusions and recommendations contained in the select studies that have been undertaken at the national, regional and international level between November 2004 and March 2005. The objective of the Paper is to document and share experiences and lessons that can inform CDERA's Comprehensive Disaster Management (CDM) Programme.

### Structure of the Paper

The Paper is structured in seven (7) Sections. In each section, except the last, an attempt is made to extract the lessons learned and recommendations for improvement in the respective thematic areas.

For purposes of context, **Section 1** provides a brief summary of the 2004 Hurricane Season which has been described as one of the most active seasons on record. The total economic impact of the damage suffered by Caribbean Disaster Emergency Response Agency (CDERA) Participating States, (most notably The Bahamas, Cayman Islands, Grenada and Jamaica) is estimated at US\$3.4 billion.

**Section 2** reviews the timeliness, adequacy and effectiveness of Early Warning Systems (EWS) employed by meteorological and disaster management agencies. It was found that generally EWS' were reasonably prompt and effective and that adequate and timely information was given on the progress of potential destructive weather systems. However, it is recommended that CDERA States should urgently address the data gaps caused by the lack of equipment and other constraints and which restricts the availability of information for more precise analysis of local conditions.

## Recommendations

The recommendations from this Section are as follows:

- the business community in the Caribbean should ensure that adequate stocks of building supplies are on-hand to enable citizens to protect their properties;
- the business community should be more integrally involved in disaster management;
- legislation should be considered that would allow emergency personnel to forcibly evacuate citizens from at-risk areas.
- EWS' at the community/parish levels should be strengthened to include information as to what communities should expect and what they can do to reduce vulnerability and risk;
- evacuation planning should be incorporated in security concerns;
- lines of supervision between central and parish authorities should be clearly defined.

**Section 3** assesses the effectiveness of emergency response coordination at the national, regional and international levels. Problems were found to exist in the coordination arrangements at the national level and to a lesser extent at the regional level. Arrangements in The Bahamas and the Cayman Islands were found to be satisfactory. However this section concludes that while considerable resources and effort have been expended by CDERA and its development partners on building the disaster preparedness and response capacity of its member states, and while disaster management policies have been adopted by nearly all countries, in many cases, these policies were found not to have been tested and/or operationalized resulting in ineffective, inefficient responses, duplication of effort, lapses in communications and generally reduced resilience of the economies and societies of some of the affected countries. While international coordination arrangements brought quick relief to the affected islands, the need for better coordination of the deployment of assessment teams by international relief agencies was also identified.

## Recommendations

The recommendations from this section are as follows

- adequate support personnel should be made available to manage operations at Ports of Entry;
- CDRU's Ops Order and Standard Operating Procedures (SPS) should be updated to clearly indicate all possible tasks to be undertaken by the CDRU including its humanitarian role and support function to the NEOCs;
- The equipment and support material supplied to CDRU upon its deployment should be reviewed and augmented;
- A permanent CDRU desk be established at CDERA;
- A photographer should be included in the CDRU team to provide a visual record for future reference and for use in training exercises.

**Section 4** reviews the reach and impact and relief policies and operations including donations and distribution systems. With the exception of the Bahamas and the Cayman Islands, relief management operations in the affected islands did not conform to the provisions of National Plans. Relief operations in Grenada and to a lesser extent Jamaica were problematic as reflected in: ineffective interagency coordination; inadequate security; ineffective public information and media response; lack of secure warehousing at the community level; poor pre-positioning of resources, personnel and food; and unsatisfactory, post-disaster distribution of relief items.

## Recommendations

It has been recommended that CDERA Participating States should:

- develop a clear appreciation of and place a stronger focus on potential hazards, their causative factors and the necessary prevention/mitigation measures;
- strengthen central disaster management and emergency operations;
- define clearer lines of command to minimize suffering and to provide prompt response to national and community needs;
- enshrine in law, the roles and responsibilities of all disaster management agencies;
- mandate all Government Ministries and agencies to develop disaster management plans which should include damage assessment and recovery components;
- execute regular disaster simulation exercises in an integrated manner;
- revamp data collection and management systems;
- establish or strengthen, as appropriate emergency planning processes;
- establish a permanent, minimal initial response capacity
- establish or strengthen as appropriate, a permanent capacity for assessing vulnerability and risk, writing disaster scenarios and coordinating, monitoring and supervising emergency planning, training and simulation exercises;
- devise and implement a public education strategy to support disaster management at the community level.

**Section 5** reviews the methodology and conduct of social, economic and environmental assessments of the damages done by the Hurricanes at the micro level (by the countries) and at the macro level (by multidisciplinary teams deployed by regional and international agencies). This section of the Paper confirms many of the arguments and findings in the literature regarding the extreme vulnerability of Small Island Developing States to internal and external shocks, especially those shocks induced by natural disasters. This is aptly reflected in the severe dislocation and disruption of the economic and social development of all the affected islands, but more especially in Grenada.

Notwithstanding some limitations with the methodology applied during the assessments, the Paper found that the Assessments were fairly comprehensive and fulfilled their core purpose of providing the affected Governments and their Development Partners with a sector by sector assessment of the damage suffered and the scope of recovery and rehabilitation efforts that are needed. However, apart from Grenada, it is not clear how the Reports were received and/used in the Governments in the other affected islands. Such feedback would help to inform efforts at refining the Assessment methodology and the format in which the Report is presented.

## Recommendations

It is recommended that the international community should work with CDERA and its Participating States to:

- improve land use and urban planning capacity, including the review of building codes and standards and the regularization of informal settlements;
- introduce hurricane safety provisions in the rebuilding process;
- establish a process that will identify a series of projects with the potential to generate national income, foreign exchange and rapid employment;
- ensure that long term development assistance reduces the destructive impact of future extreme weather events;
- accelerate and expand training of personnel especially at the community level in conducting comprehensive damage assessments;

- review and strengthen UNECLAC's Damage Assessment Methodology;
- agree on a programme of training of assessors as well as protocols for activation and deployment of assessment teams;
- promote the conduct of assessments by trained, in-country personnel so as to reduce the cost and time taken in mobilizing and deploying external personnel;
- implement a programme to generate appropriate base-line data, especially on the Informal Sector.

**Section 6** reviews the rehabilitation and reconstruction challenges and imperatives facing the affected countries in seeking to reduce the direct and indirect losses caused by the disasters while reducing the vulnerability of the islands to future extreme weather events. The wisdom of this dual focus is borne out by the results of several reviews of the impact of the 2004 Hurricane Season on the worst affected islands in the Caribbean, which point to the need for Governments to adopt a longer-term, developmental approach to reconstruction and recovery efforts.

### **Recommendations**

In this Section, Governments are encouraged to:

- strengthen their physical planning and development control arrangements;
- revise the provisions of the Caribbean Uniform Building Code (CUBiC) especially those related to wind resistance of building structures;
- invest in environmental protection; and
- make their economies and societies less vulnerable and more resilient to the effects of natural disasters.

# MAIN PAPER

## **SECTION 1: SUMMARY OF THE ECONOMIC AND SOCIAL IMPACTS OF 2004 HURRICANE SEASON**

The 2004 Hurricane Season was one of the most active seasons on record. Between July and September, there were 14 weather systems with winds ranging from 50km/hr to 275km/hr. Two of these systems were Tropical Depressions (1 and 10); five (5) were Tropical Storms (Bonnie, Earl, Gaston, Hermine and Lisa); and seven (7) were Hurricanes (Alex, Charley, Danielle, Frances, Ivan, Jeanne and Carl) which together resulted in the loss of 49 lives and approximately US\$2 billion in damage. The total economic impact of the damage suffered by Caribbean Disaster Emergency Response Agency (CDERA) Participating States (most notably The Bahamas, Cayman Islands, Grenada and Jamaica) is estimated at US\$3.4 billion<sup>1</sup>.

### **Impact on the Bahamas**

The Bahamas was impacted by two successive Hurricanes namely Frances and Jeanne between September 3 and 20, 2004. The winds from Frances and the rains from Jeanne affected the entire island chain, more especially Mayaguana, Long Island, San Salvador, Run Cay, Cat Island, Eleuthera, New Providence, the Berry Islands, Abaco and Grand Bahama. The recovery from Frances had hardly begun when Jeanne made landfall affecting the same areas as its predecessor. Hurricane Frances caused the death of 2 persons. The two systems damaged over 3800 homes and forced the evacuation of 2500 (mainly in Grand Bahama) to emergency shelters. Total damage and losses is estimated at US\$381.54, led by the productive sectors (US\$154.92); infrastructure (US\$104.40 million); and the social sector (US\$98.87 million).

### **Impact of Hurricane Ivan on Cayman Islands, Grenada and Jamaica**

The most intense and damaging system of the Season was Hurricane Ivan which has been categorized as the most powerful Hurricane to hit the Caribbean in a decade, having attained Category 5 Status (on the Saffir-Simpson Scale).

#### ***Impact on the Cayman Islands***

In the Cayman Islands, 2 persons were killed and 402 persons were injured during the passage of Hurricane Ivan. Nearly 6000 persons (17% of the population) mainly on Grand Cayman were temporarily displaced and had to be accommodated in Shelters. All inhabitants experienced the loss of electricity, water and access to telecommunications for some period following the disaster. The Islands' productive sectors (Tourism, Agriculture, Fisheries, Livestock and Financial Services) were affected to varying degrees by a combination of storm surge, wind and flooding. The total financial impact of Hurricane Ivan on the Cayman Island is estimated at CI\$2,860 million; 83% (CI\$2,370 million) represents damage to economic and social assets and 17% represents losses of production and revenues as well as increased cost in the production of services<sup>2</sup>.

#### ***Impact on Grenada***

---

<sup>1</sup> CDERA Participating States are: Anguilla, Antigua and Barbuda, Commonwealth of the Bahamas, Barbados, Belize, British Virgin Islands, Dominica, Grenada, Guyana, Jamaica, Montserrat, St. Kitts and Nevis, Saint Lucia, St. Vincent and the Grenadines, Trinidad and Tobago and Turks and Caicos Islands.

<sup>2</sup> The figures quoted in this paragraph were extracted from the ECLAC/UNDP/Government of the Cayman Islands Report entitled: The Impact of Hurricane Ivan in the Cayman Islands.- December 2004

Hurricane Ivan's impact on Grenada's society and economy was almost comprehensive. The major areas of damage are itemized as follows:

- 28,000 homes or 89% of the country's housing stock of 31,122 houses were damaged, of <sup>3</sup>which 10,000 or 38% were badly damaged and would require complete replacement at a total estimated cost of EC\$1,380 million;
- 30,481 students affected by damage to schools and skills training institutions estimated to cost between EC\$196 to \$215 million;
- damage to hospitals, health centres and other health care institutions estimated at EC\$11 million;
- direct and indirect damage to agriculture, livestock, crops, fisheries, propagation units, nurseries and irrigation facilities estimated at EC\$55 million and EC\$46 million respectively;
- direct losses to tourism establishments estimated at EC\$167 million; and
- damage to 75% of buildings and stocks in the manufacturing sector.

Prior to the passage of Hurricane Ivan, Grenada's economy was projected to grow by 4.7% in 2004 and at an average rate of 5% between 2005 and 2007. This growth was supposed to have been driven by developments in agriculture, construction and tourism. The fiscal operation of Central Government was estimated to result in a current account surplus of EC\$17 million or 13% of GDP. However, with the passage of Hurricane Ivan, economic activity is projected to decline by approximately – 1.4% in 2004, resulting in an overall impact of 6% of GDP growth, reflecting a contraction in tourism and the halt in production of traditional crops, such as nutmeg, cocoa and citrus which directly and indirectly, absorbed nearly 31,000 workers. As a result, a significant increase in unemployment (which normally averages 14%) is inevitable.

Effectively, Hurricane Ivan left Grenada with vastly reduced means of generating foreign exchange, jobs and/or national income in the short-term to medium term. In 2004, the fiscal position of Central Government is expected to deteriorate from a surplus of EC\$ 17 million to a deficit of EC\$54 million or 4.5% of GDP, reflecting a fall-off in revenue particularly from taxes on international trade and business transactions. The growth in capital expenditure, including outlays for rehabilitation and reconstruction is projected to widen the overall fiscal deficit (after grants) to approximately 12% of GDP<sup>4</sup>.

### ***Impact on Jamaica***

The total impact of Hurricane Ivan on Jamaica has been estimated at US\$595 million, of which 63% or US\$354 million represents damage to physical assets and the remaining 37% representing indirect losses or changes in economic flows<sup>5</sup>. The productive sectors of the economy were the most affected in one way or another, while infrastructure suffered a comparatively lower impact. The single most affected sector was housing which sustained 31% of the total damage and losses, followed by agriculture and livestock and transport. Prior to the passage of Hurricane Ivan, the Jamaican economy was expected to grow by 2.6% on the back of growth in the mining, tourism and manufacturing sectors. However, following the disaster growth is expected to slow to 1.9%.

The number, intensity and rapid succession of the extreme weather systems severely tested the capacity of national and regional disaster preparedness and response agencies and Governments and exposed the vulnerability of Caribbean countries to natural disasters.

---

<sup>3</sup> The information provided in this sub-section was extracted from a Report entitled Grenada: Macro Socio-Economic Assessment of the Damages caused by Hurricane Ivan – September 7, 2004 prepared by the OECS in collaboration with the ECCB, and ECLAC.

<sup>4</sup> The figures on the damage suffered by Grenada are extracted from a report prepared by the OECS Secretariat and UNECLAC entitled: Grenada: Macro Socio-economic Assessment of the Damages Caused by Hurricane Ivan – September 2004

<sup>5</sup> The figures quoted in this paragraph were extracted from the ECLAC/PIOJ/UNDP Report entitled: Assessment of the Socio-economic and Environmental Impact of Hurricane Ivan on Jamaica.

## SECTION 2: EARLY WARNING SYSTEMS

The meteorological services in the affected countries served as the principal source of early warning information in relation to hydro-meteorological conditions, wind, oceanic, cyclonic and all other atmospheric conditions and activity. Well-developed and tested protocols exist for communication of meteorological information to the public and disaster relief agencies. The Meteorological Offices in all countries are connected to a global network linked to the National US National Oceanographic and Atmospheric Agency (NOAA) and are equipped with VSAT through which meteorological data is received and analyzed. Regional cooperation also forms an important responsibility of the meteorological service including through the Caribbean Institute of Meteorology and Hydrology, and the regional meetings of the World Meteorological Organization (UNDP, 2004).

All Meteorological Offices follow Standard Operating Procedures (SOPs) which define early “alert” “watch” and “warning” protocols used at various points in the approach of a weather system. These protocols and procedures were rigidly observed in all the islands. A total of 21 news items and 45 alerts were issued in the Bahamas. It has been observed (in the case of Grenada) that the SOPs do not specify differences in the type, category, magnitude and possible consequence of a weather system and thus do not enable the public to gain a clear appreciation of an impending threat (Portillo Contreras/ CDERA, 2004).

Gaps in meteorological data exist in many CDERA Participating States due to a lack of equipment and other constraints which restrict the information needed for more precise analysis of local conditions. This is especially acute in Grenada where there is virtually no early warning capacity and very limited communication capacity. In all the countries, there is, in general, need for additional measurements of temperature, precipitation, oceanic conditions and other parameters so as to provide a more comprehensive understanding of present conditions and changes in climate.

### Lessons Learned

*Lesson 1: EWS' should form an integral part of risk management initiatives*

The major lesson from the review of EWS' in the stricken islands is that while such systems can help to save lives, they are far more effective when accompanied by mitigation measures that are taken long in advance. Ideally, such measures should include natural hazard assessment, vulnerability assessment and risk assessment.

*Lesson 2: Enhanced Cooperation is needed between the public and disaster management agencies*

The main purpose of EWS' is to give timely information to the public and to national disaster management agencies to permit appropriate action to be taken to protect life and property. While generally information about the progress of weather systems is regularly provided, attention should also be given to information that could: (a) promote cooperation between the public and disaster management authorities; and (b) improve the ability of communities to respond to natural disasters. Such a focus would be consistent with the Comprehensive Disaster Management (CDM) approach which has been the subject of a CDERA/UNDP Project and which goes beyond the formation or strengthening of Disaster Preparedness Committees, to include other imperatives such as developing and promoting systems for monitoring known hazards, establishing community-based warning systems, emergency and evacuation plans and emergency routes and the formulating educational programmes for public officials and professionals.

### Text Box 1: Comprehensive Disaster Management (CDM)

CDM focuses on all cycles of all hazards and involves all sectors of the society. At the core of the CDM is a well-informed and aware public. Activities to achieve full compliance with CDM are at the heart of CDERA operations and include:

- training for disaster management personnel;
- developing model training courses with products;
- institutional strengthening for disaster management organizations;
- developing model disaster legislation for adaptation and adoption by CDERA PS';
- developing model policies and guidelines for use in emergencies
- contingency planning;
- mobilizing resources for strengthening disaster management programmes in PS';
- improving emergency telecommunications and warning systems;
- developing disaster information and communications systems;
- increasing public education and awareness; and
- establishing a dynamic CDERA website for information dissemination.

A CDERA/UNDP/USAID, CDM project was completed in 2004. The project sought to reduce vulnerability to loss of life and property damage in the Caribbean by embedding CDM as a viable strategy for disaster management; by strengthening CDERA to effectively implement CDM at the regional level; and by building support for CDM at the national level. The outputs of the project included; (a) a review of the Agreement establishing CDERA; (b) the development of a Strategic Plan for CDERA for the period 2004-2007; (c) the strengthening of CDERA's financial and administrative systems; and (d) recommendations for strengthening national disaster management organizations in Barbados and Grenada.

The UNDP is also assisting CDERA PS' through the implementation of a Caribbean Risk Management Initiative (CRMI) which aims to manage and reduce the risks associated with natural, environmental and technological hazards, particularly within the larger context of global climate change. The expected outputs include the development and or strengthening of integrated cross-cultural, risk management and adaptation of knowledge networks; a cadre of climate risk management personnel and risk reduction and climate change adaptation tools.

### *Lesson 3: EWS' must be continuously reviewed and tested*

The location of Meteorological Services at airports in all Caribbean countries and the problems experienced in Grenada, including the inadvertent closure of the Point Salines International Airport (where Grenada's Meteorological Services is based) 24 hours before the island was hit by Hurricane Ivan and the loss of communications links with national emergency relief agencies highlights the need for meteorological agencies to review their disaster management plans to ensure uninterrupted service before, during and after the passage of a weather system.

### **Recommendations**

The purpose of EWS' could be defeated if, despite the dissemination of early warnings, people are either unable to obtain the building supplies they need to protect their homes; or are reluctant to act on instructions to move to safer ground or into shelters. These scenarios point to the need for:

- the business community in the Caribbean to ensure that adequate stocks of building supplies are available to enable citizens to protect their property;
- the business community to be more integrally involved in disaster management;
- legislation that would allow emergency personnel to forcibly evacuate citizens from at-risk areas.
- strengthening of EWS' at the community/parish levels to include information as to what communities should expect and what they can do to reduce vulnerability and risk;
- incorporating evacuation planning in security concerns ;
- defining lines of supervision between central and parish authorities.

## SECTION 3: EMERGENCY RESPONSE COORDINATION

### National Level Arrangements

Apart from Grenada, emergency response arrangements at the national level were satisfactory. The relief effort was greatly facilitated by the substantial and timely support that was provided by regional and international governments and development partners, to all the affected countries but more especially to the victims in Grenada.

Emergency relief in the Bahamas was swift. Following the receipt of preliminary damage assessments, the Abaco and Grand Bahamas were quickly declared "Disaster Areas" thus allowing for the SOPs for such areas to be activated. Further, the Government re-activated the Disaster Relief and Recovery Fund Act of 1999 (which allows for funds to be directed to emergency relief) and signed four Orders of Exigency that allowed the duty free importation of goods and construction materials. Other CDERA Participating States may wish to consider adopting this legal framework.

Hurricane Ivan found the National Hurricane Committee in the Cayman Islands well prepared with designated shelters supervised by shelter wardens and a basis stock of supplies in place. Within 24 hours of the passage of the Ivan airport services had resumed and the major roads had been cleared allowing for thousand of tons of relief supplies to be received from citizens of neighbouring countries and international agencies.

Emergency actions in Jamaica were informed by the findings of aerial surveys and by the field reports provided by assessment teams led by the United Nations Disaster Assessment Team which was on the island even before the arrival of the hurricane. Emergency operations focused on the worst affected areas including Clarendon, St. Elizabeth and Westmoreland. Emergency assistance from Government and private sector sources flowed reasonably promptly to the affected areas. At the peak of the disaster, there were 1,000 families in shelters. One month later there were 310 persons left in shelters.

However, arrangements at the community level were generally unsatisfactory suggesting, among other things, that not enough attention is being given to comprehensive emergency preparedness especially in terms of the dissemination of public safety information and hazard awareness planning.

In Grenada and Cayman Islands, the first external emergency responses came from British Royal Navy Ships, Richmond and Wave Ruler (in Cayman Islands).

### Lessons Learnt

*Lesson 4: coping capacity of Disaster Management Organizations should be re-examined in the light of Grenada's experience.*

While the policy and institutional environment for disaster management in the Caribbean has improved over the two decades, and while many countries have invested heavily in strengthening their national emergency organizations, the 2004 Hurricane Season would have prompted many CDERA Participating States to reexamine the coping capacity of their national disaster management institutions, by inter alia: reviewing disaster legislation; adopting and or adapting CDERA's model mitigation policy and generally reassessing institutional arrangements particularly the adequacy of staffing.

*Lesson 5: Emergency Operations Centres should be housed in safe and secure facilities.*

A critical lesson provided by the situation in Grenada is that Governments should ensure that national emergency management agencies are located in facilities that are secure and fully-equipped and that are

capable of withstanding Category 5 Hurricanes. This lesson is supported by the fact that while the Emergency Operations Centre (EOC) in Grenada was activated fairly quickly, the damage suffered by the Centre in the early stages of the passage of the Hurricane forced the evacuation of personnel who searched in vain for a secure facility with adequate communications equipment. By the time the EOC was able to settle down nearly four days later, the situation had become almost irretrievable.

*Lesson 6: National Emergency Telecommunications Plans to be developed and routinely tested.*

The communications difficulties experienced in Grenada has highlighted the need for all CDERA PS' to develop National Emergency Telecommunications Plans. It is understood that such a Plan is being developed for Grenada through the CIDA/CIDA Ivan Project. It is proposed that Grenada's Plan be used as the template for the preparation of similar plans in other CDERA Participating States. The Plans should be tested regularly to reduce the possibility of failure in crisis situations. Satellite communications equipment should also be tested regularly to allow disaster management personnel to become familiar with the use of such equipment. Attention should also be given to the use of simple forms of communications technology such as megaphones.

*Lesson 7: The growth and development of HF Communications Operators and Groups of Operators should be Facilitated*

The critical role that HF communicators can play in post-disaster situations was reconfirmed following the destruction of conventional communications facilities in Grenada. HF operators served as a vital communications link between Grenada and the outside world and were particularly helpful in relaying information to Barbados for rebroadcast to the people of Grenada. While HF Radio Operators exist in every CDERA PS, Governments should (a) ensure that they are fully integrated into disaster management arrangements and (b) foster their growth and development through market and non-market incentives.

The critical support that was provided by radio stations in Barbados in keeping the people of Grenada informed of emergency response activities on the island and in maintaining contact between the outside world and Grenada has highlighted the need for the regional mass media to be given a formal role in disaster management efforts. The possibility of formalizing these roles within the framework of CDERA's Sub-Regional Focal Points should be actively explored. This would allow for radio stations in the focal point (island) to provide a back-up support in the event that radio transmission in any assigned country is interrupted.

## **Regional Level Arrangements**

The coordination of regional disaster response arrangements were ably executed by CDERA, which was active to varying degrees in all the islands. The focus of CDERA's support was on Grenada which required a Level 3 operational response in accordance with CDERA's Internal Contingency Plan and its Regional Coordination Plan<sup>6</sup>. While maintaining regular contact with all of the threatened and affected States, CDERA activated its RRM in Grenada as follows:

- National Disaster Coordinators (NDCs) and staff from Belize, British Virgin Islands (BVI), Montserrat, Saint Lucia, and Trinidad and Tobago were deployed to provide 75 person days of technical support to Grenada's EOC;
- An advance party of Rapid Needs Assessment Team was deployed to undertake a reconnaissance mission;

---

<sup>6</sup> A Level 3 Response requires full activation for disasters which overwhelm the capacity of the affected country to respond. In such instances, the RRM is activated. This includes the activation of the CDRU.

- The Caribbean Disaster Response Unit (CRDU) was deployed to establish and oversee relief management systems at ports-of entry;
- The Regional Security System (RSS) was deployed to assist in restoring law and order.

**Text Box 2: The Role and Function of the CDERA Coordinating Unit**

CDERA was established in 1991. Its main function is to make an immediate and coordinated response to any disastrous event affecting an PS once the State requests such assistance. CDERA's other functions include:

- Securing, collating and channeling to interested governmental and non-governmental organizations, comprehensive and reliable information on disasters affecting the region;
- Mitigating or eliminating as far as possible, the consequences of a disaster affecting a PS;
- Establishing and maintaining on a sustainable basis an adequate disaster response capability among PS';
- Mobilizing and coordinating disaster relief from Governmental and non-governmental organizations for the affected PS.

The work of the CDERA CU is supported by four Sub-Regional Focal Points: (i) Antigua and Barbuda (responsible for Anguilla, BVI, Montserrat and St. Kitts and Nevis); (ii) Barbados (responsible for Saint Lucia and St. Vincent and the Grenadines); Bahamas (responsible for Belize and Turks and Caicos); and Trinidad and Tobago (responsible for Grenada and Guyana).

The functions of a Focal Point include: acquiring and maintaining updated and comprehensive information of the facilities and services in each PS under its control; maintaining and testing on a regular basis communications with the CU; maintaining independent fuel and power supplies and ensure that the relevant physical facilities are in a condition to withstand a major disaster; and maintaining at the Focal Point in serviceable and operational working condition an equipment package containing essential items.

To effectively lead the championing of CDM, CDERA recognized the importance of reviewing its own capacity to lead the process and has developed its own Strategic Plan that makes it CDM-compliant. The Key Results Areas (KRAs) in the Strategic Plan are as follows: (a) resources enhanced; (b) systems of operations improved; (c) capacity of Participating States enhanced; (d) strategic partnerships expanded; and disaster loss reduction promoted.

The deployment of the Caribbean Disaster Relief Unit (CRDU) to Grenada took place over several days due to the communications difficulties and the unavailability of some members of the team<sup>7</sup>. The operations of the CRDU were severely affected by:

- limited, communications infrastructure;
- late delivery of back-up communications equipment;
- lack of personnel trained in the use of satellite phones;

<sup>7</sup> The CRDU is the operational arm of the RRM and comprises representatives from the military forces within CARICOM. Its main responsibility is to provide logistical support for the relief and effort and the dispatch of relief supplies.

- lack of transportation to move supplies from points of entry to warehouses;
- inadequacy of personnel to assist in loading and off-loading relief supplies;
- temporary unavailability of the central warehouse (which was being used by the RSS);
- inadequacy of central warehouse in terms of space and limited access/egress points;
- lack of clarity of the CDRU's role on the part of local agencies.

Additional support was provided by other regional organizations such as the Caribbean Electric Utility Services Corporation (CARILEC) which successfully coordinated the deployment of electricity restoration crews to all of the affected islands, in keeping with its Caribbean Hurricane Action Plan (CHAP).

Interventions in the Eastern Caribbean (notably in Grenada) were effectively coordinated by the UNDAC, and the Eastern Caribbean Donor Group (ECDG), within the context of CDERA's Regional Response Mechanism (RRM). The ECDG comprises donor agencies serving the Caribbean and is chaired by the UNDP Sub-regional Office for Barbados and the OECS. Through this office, the inputs of UN agencies, including UNICEF, UNIFEM, UNFPA, FAO and OCHA were facilitated. At the request of the UNDP/SRO, the UN deployed an UNDAC team to assist with agency coordination and communications in Grenada. In addition to establishing an office in Grenada to support the reconstruction process, the UNDP also launched a "Flash Appeal" seeking to raise approximately US\$27million to fund transitional response/recovery activities for a 6 month period.

Perhaps the "highlight" of an otherwise depressing 2004 Hurricane Season was the tremendous outpouring of concern and support of Caribbean citizens and Governments, especially for the people of Grenada. Significant contributions of cash, clothing and building supplies were made by Caribbean citizens of all classes, associations and creeds who responded to the emergency relief effort in a disciplined way. The contribution of the air and marine transportation sectors in the Caribbean was also outstanding. Several non-Caribbean Governments were also gave poignant assistance to the relief, rehabilitation and reconstruction programme in the affected islands.

## Lessons Learned

### *Lesson 8: Core Staffing of the CDERA CU is inadequate for Level 3 Operations*

The number of CDERA Participating States that were affected during the 2004 Hurricane Season and the severity of the damages suffered by them, call into question the adequacy of the core staffing arrangements at the CDERA Coordinating Unit. It became clear that even with the best coordinating arrangements at the national level, there remained a significant amount of work for CDERA to do before, during and after the passage of Hurricanes. During the 2004 Season, it became necessary for CDERA to engage 14 non-core staff members from dedicated projects and programmes to ensure that sufficient information was provided to support humanitarian assistance.

During the preparation of CDERA's Strategic Plan, it was recognized that the responsibilities and functions of the CDERA Coordinating Unit to support the CDM would have to be expanded beyond response coordination.

### *Lesson 9: Disaster response capabilities not adequate to deal with worse case scenarios*

The Grenada situation in particular has highlighted the need for national, regional and international disaster response arrangements to be re-calibrated to take into account, "worst case scenarios" where the entire structure of governance, security and civil society in a country is devastated by a Hurricane, as was the case in Grenada. The implications of such a scenario for Governments and the international community would have to be carefully assessed.

For the moment however, it is clear that Governments would have to step up their disaster management initiatives within the context of the CDM approach that emphasizes the interlinking of risk reduction and development planning initiatives. Countries must be made less vulnerable and more resilient to natural disasters.

### **International Coordination Arrangements**

Several international organizations provided assistance to countries affected during the 2004 Hurricane Season, including the UNDP, the United Nations Disaster Assessment and Coordination Team (UNDAC), the International Federation of Red Cross and Red Crescent Societies (IFRC&RCS), PAHO, and USAID's Office of Foreign Disaster Assistance (USAID/OFDA).

The UNDAC played a critical role in establishing well-equipped, on-site Operations and Coordination Centre (OSOC) as well as in providing much-needed satellite phones, computers and Internet services to the EOC.

PAHO in collaboration with the Caribbean Epidemiological Centre (CAREC) assessed the Public Health needs in Grenada, Jamaica and the Bahamas. These two agencies also provided material, emergency communications equipment and technical assistance including relief supply management (SUMA) personnel to meet the identified needs in these countries.

The IFRC&RCS successfully deployed members of its Pan American Disaster Response Unit (PADRU), Field Assessment and Coordination Team (FACT) and Regional Intervention Team (RIT) respectively to Grenada, Bahamas and Jamaica during their initial response to these countries. Shipments of relief and emergency housing supplies and medical hygiene kits were also provided. In addition the IFRC&RCS raised US\$4.7million via an international appeal to support their relief operations in the region.

Significant support for the relief effort in the affected countries was also provided by several countries, international organizations and NGOs including, the Governments of Italy, France, Japan, South Africa and Venezuela, the Canadian International Development Agency (CIDA), the British Department for International Development (DFID/Caribbean), the Japanese International Cooperation Agency (JICA) the Organization of American States (OAS), OXFAM, the European Union (EU) and the World Bank.

### ***Lessons Learned***

*Lesson 10: There is scope for better coordination among international partners in conducting damage assessments*

The need for better coordination among development partners at the regional and international national level in post-disaster situations has been recognized, especially in Grenada where representatives from approximately 8 agencies visited the island within 8 weeks to conduct their own assessments. On each occasion, island personnel had to interrupt critical relief and rehabilitation work to accommodate these representatives. At the same time, development partner representatives have emphasized the importance of receiving updates on the use of resources pledged or provided to them directly or indirectly. While it is recognized that such information should be routinely generated as part of the normal Relief Management effort, an agreement would need to be reached with the development partners on the format and detail of the reporting that is practical in a post-disaster situation.

## Recommendations

Based on the findings and lessons learned in this section, it is recommended that CDERA PS<sup>1</sup> should:

- take concrete steps to strengthen the capacity of disaster management agencies at the community level;
- ensure that national emergency management agencies are located in facilities that are secure and fully-equipped and that are capable of withstanding Category 5 Hurricanes;
- assess the adequacy of CDERA's core staffing in light of the heavy demands made on the agency during the 2004 Hurricane Season;
- develop National Telecommunications Plans as part of Crisis Communications Strategies;
- agree with international development partners a protocol for the conduct of damage assessments by the agencies;
- accelerate the implementation of disaster management initiatives within the context of a comprehensive disaster management approach (CDM) that emphasizes the interlinking of risk reduction and development planning initiatives.

## **SECTION 4: DISASTER RELIEF OPERATIONS**

All countries have National Disaster Management Plans that are informed by Model Policies and Guidelines developed by CDERA. The Plans are supported by legislation and define sub-plans and primary, secondary and support responsibilities. However, relief management operations in the affected islands did not always conform to the provisions of these Plans.

In The Bahamas, relief operations were quickly enforced with the focus on the northern islands of Abaco and Grand Bahamas which sustained substantial damage from Hurricanes Frances and Jeanne. Prior to the arrival of the weather systems, the Government had established formal mechanisms to channel assistance from public, private and NGOs. Within days of the passage of the Hurricanes, the SUMA was put in place and a central command centre and field distribution centres were established. Reports indicate that the distribution of supplies was efficiently handled and were demand-driven in terms of identifying the community needs and organizing the distribution of consigned materials from the central warehouse to the affected areas in the family of islands.

Relief operations in the Cayman Islands were generally satisfactory. Private sector participation in the relief effort was high. Hotels that were minimally damaged accommodated local and external relief workers supplied water to affected districts and supplemented external assistance from British Royal Navy vessels.

In Grenada, weaknesses were observed in victim registration and needs identification which affected the targeted provision of relief supplies to victims and gave credence to suggestions of lack of transparency and favouritism in the provision of relief supplies. For at least 3 days following the passage of Hurricane Ivan, there was no clear record of the supplies that had arrived and where they had been sent. The absence of the results of a damage and needs assessment supports the view that that some supplies that were dispatched to affected communities did not reach victims in greatest need.

Relief operations in Grenada were also heavily compromised by the scale and intensity of the damage caused by Hurricane Ivan which severely disrupted communications and transportation, and immobilized critical social and economic infrastructure. The British Atlantic Patrol Vessel "HMS Richmond" facilitated early contact with CDERA which mobilized its RNAT and Caribbean Disaster Relief Unit (CDRU) to the stricken island within 48 hours of the passage of the Hurricane. CDERA also provided 75 person days of technical support to the EOC, utilizing personnel from the British Virgin Islands, Jamaica, Belize, Montserrat, Trinidad and Tobago and Saint Lucia. In addition, personnel from the Regional Security System (RSS) supported by their counterparts from Guyana and Trinidad and Tobago (Defence Force) provided security and humanitarian response support.

Relief operations in Grenada were also affected by the lack of security. The early breakdown in law and order necessitated that a curfew be imposed. While this helped to bring the looting under control, it also hampered the operations of relief personnel including those supporting the CDRU who had to leave work early enough to arrive home before a nightly curfew. This meant that the airports and seaports had to be closed down despite the fact that there was still a significant amount of relief items to be transferred to the central warehouse.

The non-responsiveness of Grenada's security forces following the passage of Hurricane Ivan compromised the security of relief supplies as well as the security of managers and staff at warehouses and distribution depots. However, beyond this, the breakdown of law and order, though totally unexpected, has highlighted the need for Governments and the private sector in the CDERA Participating States to take full responsibility for providing total security as part of their national, contingency planning measures. The role of the RSS in this regard will need to be carefully considered. Ideally, the use of the RSS should be considered only as a back-up arrangement.

In Jamaica, on-the-ground distribution was affected by poor communication and by infrequent meetings among key stakeholders at the community/Parish level. Many relief agencies were not sufficiently seized of their respective roles. Another major issue was the inability of the Ministry of Finance to identify and make money available to support the early stages of the relief effort. In some Parishes, NGOs provided critical interim financial support until official funding was received. However, funding shortages were experienced from time to time resulting in the late payments to distributors and late release of critical supplies. The situation was complicated by the fact that established procedures for interaction between Political Representatives and relief management agencies were not followed, especially those relating to purchasing and procurement of relief supplies. Representatives were either unaware of the established procedures or refused to observe them.

Other common failings of relief management in Grenada and Jamaica include:

- ineffective interagency coordination;
- absence of strong leadership, especially at the community level;
- ineffective public information and media response;
- lack of secure warehousing at the community level;
- poor pre-positioning of resources, personnel and food;
- unsatisfactory, post-disaster, distribution of relief items.

## Lessons Learned

*Lesson 11: disaster relief operations at the community/parish level are weak and ineffective*

From reports from the various affected islands, it is clear that more time and resources will need to be invested in improving post-disaster relief operations, especially at the community level, in areas such as the preparation of lifelines or critical facilities for emergency response, training, disaster rehearsals and the identification and allocation of external resources. Ideally, relief measures should be supported by cost-effective, mitigation measures.

*Lesson 12: Interruptions of government operations in post-disaster situations can be reduced or averted*

The situation in Grenada has highlighted the very critical issue of ensuring continuity of government operations in post-disaster, emergency situations. With predictions for more active and intense hurricane seasons over the next decade, Governments would need to seriously consider purpose-built, wind-resistant buildings (“Command Centres”) that are fully equipped with state-of-the-art communications and other relevant equipment and supplies and that can allow the business of government to continue.

*Lesson 13: Critical facilities not built and located to withstand Category 5 hurricanes*

The damage to critical social infrastructure on Grenada, notably to the main hospital and the Prison has reinforced the need for CDERA Participating States to carefully consider the location and design of such facilities to ensure they can survive Category 5 Hurricanes. This can best be approached through a Critical Facilities Mapping (CFM) exercise<sup>8</sup>. The vulnerability of new critical facilities needed to support development can be reduced by avoiding hazardous areas, designing for resistance or operating with minimal exposure. Strategies for existing critical facilities should include relocation, strengthening, retrofitting, revising operations and adopting emergency preparedness, response and recovery

---

<sup>8</sup> The term “critical facilities” is used to include all man-made structures or other improvements which because of their function, size, service area, or uniqueness have the potential to cause serious bodily harm, extensive property damage or disruption of vital socio-economic activities if they are destroyed, damaged, or if their services are repeatedly interrupted.

programmes. The international community should assist CDERA governments to begin implementation of such a programme before the commencement of the 2005 Hurricane Season.

### **Supplies Management**

Supplies management operations in several of the affected islands functioned reasonably well, except in Grenada (where it was unsatisfactory) and in Jamaica where temporary problems were experienced. Operations in Grenada were affected by the late arrival of SUMA teams and by the shortage of equipment. It has been proposed that:

- (a) the SUMA teams could be of more effective and immediate assistance to stricken islands if they are deployed together with teams from the CDRU;
- (b) CDRU personnel should also be trained in supply management Supplies;
- (c) National Supply Management teams are established to allow for quicker deployment at critical points in the supply network.

### **Recommendations**

The 2004 Hurricane Season also highlighted the need for CDERA and its Participating States to:

- develop a clear appreciation of and place a stronger focus on potential hazards, their causative factors and the necessary prevention/mitigation measures;
- strengthen central disaster management emergency operations;
- define clearer lines of command to ensure minimization of suffering and prompt response to national and community needs;
- enshrine in law, the roles and responsibilities of all disaster management agencies;
- mandate all Government Ministries and agencies to develop disaster management plans which should include damage assessment and recovery components;
- execute regular disaster simulation exercises in an integrated manner;
- revamp systems of data collection and management
- establish or strengthen emergency planning processes
- establish a permanent, minimal initial response capacity
- establish or strengthen as appropriate, a permanent capacity for assessing vulnerability and risk, writing disaster scenarios and coordinating, monitoring and supervising emergency planning, training and simulation exercises
- devise and implement a public education strategy to support disaster management at the community level.
- provide adequate support personnel to manage operations at Ports of Entry;
- update CDRU's Ops Order and Standard Operating Procedures (SPS) to clearly indicate all possible tasks to be undertaken by the CDRU including its humanitarian role and support function to the NEOC and detail the job descriptions for all staff positions;
- review and augment the equipment and support material supplied to the CDRU upon its deployment;
- establish a permanent CDRU desk at the CDERA CU
- include a photographer in the CDRU team to provide a visual record for future reference and for use in training exercises.

## SECTION 5: DAMAGE ASSESSMENT

Damage assessments in all the affected countries were done at two levels: (i) at the macro level, by multidisciplinary teams deployed by regional agencies and (ii) at the micro level by specialist teams drawn from government agencies and supported by regional agencies.

### Micro-Level Assessments

Micro level assessments were plagued by the following key weaknesses:

- lack of effective coordination, communication and collaboration;
- lack of consistency and standardization in assessment methodologies and procedures;
- lack of trained and competent assessors;
- absence of timely aerial photography;
- lack of baseline data; and
- inadequate, information dissemination.

These weaknesses are sufficiently pervasive in all the affected islands to warrant the establishment or strengthening, as appropriate, of an organized and adequately-resourced, institutional framework for damage assessment, with clear plans and procedures.

### Macro Level Assessments

Macro-level Assessments of the impact of Hurricanes Frances, Ivan and Jeanne on The Bahamas, Cayman Islands, Grenada, and Jamaica, were conducted using the methodology formulated by UN-ECLAC and refined to suit the needs of Small Island Developing States by the Organization's Regional Headquarters for the Caribbean. The Reports have formed the basis for targeted efforts at recovery and rehabilitation by Governments in the affected countries and development partners in the affected regions. The Reports are also intended to be utilized as the basis for incorporating disaster preparedness, planning and mitigation into the development planning apparatus of the country and into the consciousness of the people of the country (OECS, 2004).

The Reports provide a sector by sector analysis of the direct and indirect impact of the hurricanes, from which an overall damage assessment is then computed. The overall computation of damage also includes:

- (a) a detailed macro-economic assessment of the situation prior to the disaster;
- (b) the projected macro-economic performance without the disaster; and
- (c) the estimated economic performance as a result of both the direct and indirect costs associated with the disaster.

Sectors are grouped into four categories namely: *social* (including housing, health and education); *Productive* (including agriculture, manufacturing, wholesale and retail, and tourism); *infrastructural* (including electricity, water and sewerage, telecommunications, roads and drainage, coastal infrastructure, seaports and airports). The Environment dimension includes the impact of damage on watersheds, water quality and coastal resources, ecosystem and habitat damage and implications for solid waste management, deemed an important factor given the high volume of debris that must be collected following the passage of extreme weather events.

The Reports conclude with a presentation of guidelines for the design and implementation of a rehabilitation and reconstruction programme.

Generally, the Reports confirm many of the arguments and findings in the literature regarding the extreme vulnerability of Small Island Developing States to internal and external shocks, especially those shocks induced by natural disasters. This is aptly reflected in the severe dislocation and disruption of the economic and social development of all the affected islands, but more especially Grenada.

### ***Limitations of the Reports***

Various weaknesses have been identified in the way in which the macro assessments were conducted. The authors of the Grenada Assessment Report acknowledge that the methodological approach used to compute macro-economic effects does not allow for a comprehensive analysis of effects in an all-encompassing way. Hence, the authors point out that the Report does not remove the need to undertake detailed, socio-economic assessments of social safety nets that will be required to inter alia, provide shelter and livelihoods for those whose losses are complete (OECS, 2004).

This observation also applies to the analysis of the direct and indirect impact of damages to the productive sector, especially tourism and agriculture. Future assessments should acknowledge that the vulnerability of these sectors is not confined to their own capital stock and should include other damage to roads, utilities, airports, harbours, shopping centres, warehousing facilities, supermarkets, irrigation infrastructure, planting material, soil quality etc. The temporary demise of these strategic sectors can set in train undesirable trends such as urban growth and rural exodus since they can result in overcrowding of peripheral urban areas and in the process increase the probability of disasters in these areas.

Other acknowledged weaknesses include the absence of any quantitative analysis of the impacts of the hurricanes on the informal sector and their linkages to the formal sector, as well as the absence of quantification of damage to environmental assets. The absence of the former is attributed to the lack of benchmark figures with respect to those operating in the informal sector.

The authors of the Cayman Islands Report have called for stronger emphasis to be placed on the cross-cutting theme of disaster and risk management in the face of that country' exposure and vulnerability to natural disasters.

#### **Text Box 3: Best Practice - Inclusion of Project Profiles in Post-Disaster Assessment Reports**

The inclusion of project outlines in the Grenada Assessment Report is a useful feature that is worthy of consideration as "best practice" in the conduct of post-disaster assessments. The inclusion of this feature was influenced by the fact that the magnitude of the losses in Grenada far exceeds that country's ability to address reconstruction needs on its own, particularly if the aim is also to reduce the impact of similar events in the future. It is understood that the outlines enabled development partners to quickly identify immediate and longer-term reconstruction and rehabilitation initiatives that fall within their areas of competence. Such project outlines can also help Governments in identifying and appraising projects for inclusion in their public sector investment programmes.

### **Lessons Learned**

*Lesson 14: Investments in disaster preparedness reduces vulnerability to natural disasters and increases the resilience of societies and economies.*

The assessment reports confirmed that generally sectors are useful units of analysis for examining hazard assessment and vulnerability reduction issues and can reveal previously unrecognized linkages between development, risk and disaster management (OAS, 1991). Those countries with appropriate disaster preparedness and emergency response arrangements suffered far less damage than those with poor preparedness and response arrangements. The Reports acknowledge that these findings give added impetus to CDERA Participating States to develop and implement comprehensive risk management strategies so as to reduce their vulnerability and increase their resilience to hurricane-induced disasters.

The assessments also confirm that disaster management agencies face considerable challenges in promoting mitigation activities. At the macro level, policy directives for disaster risk tend to be articulated only during or after disaster events or periods, and relate primarily to crisis management measures. It has been determined that the failure of development policy to draw on hazard and/or environmental evaluation tools or approaches in the majority of CDERA Participating States is exacerbating the vulnerability of these countries to disaster risk. This is seen, for example, in the generally unplanned and arbitrary allocation of land for residential and commercial development with only limited attention placed on land capability and level of exposure to disaster risks and hazards (UNDP, 2004).

*Lesson 15: Strong political will is critical to vulnerability reduction and resilience building*

However, it is questionable whether the will exists at the public and private sector level, to mitigate hurricane risk in the Caribbean. There are numerous examples of continuous disregard of the risk of hurricanes and associated hazards in the region with hotel complexes built with inadequate setbacks from high-water marks and cruise ship facilities built to the same design standard and in the same location and alignment even after repeated damage by storm surges and wave action.

*Lesson 16: Failure to recognize that economic, social and environmental systems are naturally integrated, can increase vulnerability to natural disasters*

A major lesson from the 2004 Hurricane Season in the Caribbean is that because social, economic and ecological systems are intimately linked, negative shifts in any of these systems, whether as a result of internal or external shocks can render countries more vulnerable and can lead to a loss of resilience, thus negatively impacting sustainable development. It is also clear that failure to anticipate shocks can lead to partial solutions that do not take account of the natural integration between social, environmental and economic processes and ignore the returns from resilient solutions.

*Lesson 17: Patterns of physical and spatial development must be carefully assessed*

All the reports recognize that the sustainability of the present patterns of physical and spatial settlements will have to be reassessed in order to prepare the affected countries to move from prevention of unexpected events, to adaptation to ever-increasing damage in a business-as-usual scenario.

*Lesson 18: inadequate insurance and reinsurance severely weakens resilience to natural disasters*

A recurring observation in all the reports is that the ability of the affected countries to rebuild and return to a path of growth and development is severely constrained by the lack of appropriate insurance and reinsurance, limited institutional response and by the lack of appropriate preventative policies and programmes.

The reports also point to the fact that while most of the hurricane-induced damages occurred in the private sector, insurance coverage of business losses and incremental operational costs in many of the islands are grossly inadequate leaving Governments with the full burden of:

- assisting the vulnerable segments of the population;
- mobilizing the workforce;
- importing the necessary building materials and components;
- restoring damaged infrastructure; and
- accessing enough resources to replace income lost from the disruption of economic activity and to finance the capital programmes.

Inevitably, Governments have been forced to borrow heavily to implement their short and long term redevelopment programmes. In situations where countries are able to source the funds to resume normal economic activity, they must still face the prospect of further damage from hurricanes which could further retard their redevelopment.

Many utility companies in the Caribbean are not adequately insured. Only some electric utilities are self insured. Even in cases where utility companies are able to quickly restore service, consideration must sometimes be given (especially in the case of Grenada where the economy was badly affected and where unemployment has increased following the passage of Hurricane Ivan) to the ability of consumers to resume payments for services.

*Lesson 19: the enforcement roles of disaster management agencies is not adequately captured in national legislation*

While in some countries legislation and policies have been introduced to provide for the coordination and management roles of the disaster response entity, regulations now need to be developed and resources made available for enforcement.

*Lesson 20: A stronger focus on long term disaster management efforts is required.*

There is also the need to ensure that technical resources at disaster response entities, including risk assessment data and other information relevant to mitigation against disasters are utilized in relation to decision-making on developments in disaster-prone areas. At present, the technical capabilities of these entities are primarily directed towards the management and coordination of disaster events with only limited resources for addressing longer-term disaster mitigation efforts. Given the long-term likely impacts of climate change, this situation has to be changed (ibid, 2004).

*Lesson 21: Improved building standards and enforcement of building codes reduces a country's vulnerability and builds its resilience to natural disasters.*

One area that is emphasized in all the Reports is the need for improved physical planning and zoning regimes, particularly relating to building standards, and environmental protection, including beach and coastal preservation. A clear conclusion from several of the assessments is that in countries such as Cayman Islands with improved building standards and effective code enforcement, only moderate damage to building structures was recorded, thus affirming the need for CDERA Participating States to inter alia, review and revise the basic, reference wind speeds for structural design purposes in the Caribbean. As well, the need for greater inspection and enforcement of wind resistant design and construction standards is strongly recognized. It has been recommended that urgent steps should be

taken by the various statutory bodies in the Caribbean to revise the Caribbean Uniform Building Code (CUBIC) to bring it in line with the wind load provisions of the ASCE 7-02<sup>9</sup>.

Lesson 22: *Sound environmental planning and environmental protection reduces vulnerability and increases resilience to natural disasters*

The merits of sound environmental protection measures and the invaluable role of forests, trees and other vegetation was borne out by the extent of the loss of life and property caused by flooding, mudslides and landslides in Haiti compared to the Dominican Republic. Whereas the two countries received the same amounts of rainfall and were exposed to hurricane force winds of similar intensity, the damage in Haiti where forest cover has been considerably denuded was far more extensive than in the Dominican Republic where forest cover is relatively intact.

Lesson 23: *The speed with which a country can bounce back from the effects of a disaster depends on the speed with which utilities can be restored.*

The speed with which countries can bounce back from the effects of natural disasters is heavily dependent on the speed with which utility services can be restored. Typically, the energy sector suffered the following impacts from the Hurricanes:

- loss of infrastructure and associated investment losses;
- loss of income from forgone energy sales;
- effect on the production of goods and services and associated losses from employment income;
- loss of foreign exchange;
- negative impact on the quality of life.

There are conflicting views as to whether the costs of underground electricity networks can be justified against the benefits. Various studies, for example, in the Cayman Islands suggest that the former far exceeds the latter. Further detailed study of the cost and benefits of such a network is required within the broader context of the benefits to the wider society and economy and the national income and foreign exchange that is lost following disasters.

## **Recommendations**

The experience from the 2004 Hurricane Season has reaffirmed the need for extensive training of personnel especially at the community level in conducting comprehensive damage assessment. In this regard, it is recommended that UNECLAC consult with other regional institutions such as the CDERA, Caribbean Development Bank (CDB), CARILEC, the Caribbean Agriculture Research and Development Institute (CARDI), the Caribbean Tourism Organization and the OECS and CARICOM Secretariats and the University of the West Indies (UWI), to review the Damage Assessment Methodology; and to agree on a programme of training of assessors, as well as protocols for activation and deployment for assessment teams. Ideally, assessments should, as far as practicable be undertaken by trained, in-country personnel. This would reduce the cost of mobilizing and deploying external personnel. In addition, a programme for the generation of appropriate base-line data, especially on the Informal Sector should also be agreed.

The following recommendations contained in the Macro-economic and Social Assessment for Grenada are repeated in the reports on other affected countries:

---

<sup>9</sup> Report on Special Once Day Conference on the 2004 Hurricane Season – Implications for Structural Practice in the Caribbean – February 2005

- increased support for land use and urban planning including the review of building codes and standards and the regularization of informal settlements;
- the provision of technical assistance in introducing hurricane safety provisions in the rebuilding process;
- support for the establishment of a process that will identify a series of projects with the potential to generate national income, foreign exchange and rapid employment.

Caribbean Electric Utility Services Corporation (CARILEC), Caribbean electric utility companies should:

- prepare robust but adaptable disaster management plans that prepare for worse case scenarios;
- establish clear restoration policies with the full involvement of all key stakeholders and test these Plans;
- retro-fit infrastructure based on an assessment of future risks;
- accelerate the installation of underground transmission systems in areas of high risk;
- ensure that corporate disaster plans are integrated into national disaster plans
- arrange self-insurance and/or explore joint insurance; and
- conduct critical analysis of operations, power and connection systems

## SECTION 6: REHABILITATION AND RECONSTRUCTION

### Rehabilitation

Rehabilitation in all of the affected countries focused on normalizing the living conditions of victims in the worst affected communities while attempting to reactivate economic activity at the national level. The documentation reveals that rehabilitation efforts tended to peak in the first week following an event with most victims eager to return to their homes by the second week. Generally, rehabilitation included the following:

- provision of food and water and medical attention;
- control and prevention of communicable diseases;
- restoration of utility services and sanitation services;
- assistance with housing repair;
- rehabilitation of social and economic infrastructure.

All of the assessment reports noted the social impact of the hurricanes especially on women and children, with women carrying the heaviest burden for family care and care for the elderly in the post-disaster phase of relief. One report revealed a range of negative social impacts including anecdotal reports of domestic violence and gambling among men; depression and suicidal thoughts among women, and severe psychological trauma especially among children. While mindful of the need to protect the mental health of victims, this could only have been tackled after disaster relief operations had been fully addressed.

### Lessons Learned

*Lesson 24: development assistance should aim to reduce the vulnerability of social and economic infrastructure to natural disasters*

There is a strong recognition that while rehabilitation needs to be fast-tracked, rebuilding homes and businesses in high-risk areas such as flood plains and exposed hillsides will not help to build resilience but only deepen the vulnerability of the society and economy to future extreme weather events. International development partners are encouraged to work with the affected countries in helping to ensure that long term development assistance reduces the destructive impact of extreme weather events on the country.

### Reconstruction

The main aim of reconstruction efforts is to reduce the direct and indirect losses caused by the disasters while reducing the vulnerability of the islands to future extreme weather events. The wisdom of this dual focus is borne out by the results of several reviews of the impact of the 2004 Hurricane Season on the worst affected islands in the Caribbean, which point to the need for Governments to adopt a longer-term, developmental approach to reconstruction and recovery efforts. The consensus is that the Caribbean region is in the throes of an active hurricane cycle that tends to last 25-35 years. Thus, it is projected that the region will most likely continue to see active tropical seasons and increased landfall probability for the next 10-20 years.

Many of the reconstruction projects recommended in the Assessment Reports emphasize:

- the provision of small grants and soft loans facilities to victims to rebuild their livelihoods;
- the retrofitting of schools and other public buildings used as hurricane shelters to withstand stronger and more violent hurricanes;
- the construction of model starter homes that conform to approved building standards;

- the acceleration of hazard mapping and risk management interventions
- Existing laws should be enforced e.g setbacks requirements for coastal developments in enforced would obviate knee-jerk reaction which is the norm;
- Procedures for coordination of emergency reconstruction should be built into national disaster plans.

However, an equally pressing need that is implied in some of the Assessment Reports and explicitly stated in others is for Caribbean Governments to reduce their economic, social, economic and environmental vulnerability and thus increase their resilience to natural disasters. Invariably, a country's ability to bounce back from any internal or external shocks, including natural disasters is dependent on the degree of resilience that is built into that country's economy and society through development policies and programmes that are clearly formulated with resilience in mind.

## Recommendations

Reducing the vulnerability and increasing the resilience of Caribbean economies and societies can best be achieved if development planners and managers in the public and private sectors consciously consider the vulnerability of their sectors to hazardous events by assessing inter alia<sup>10</sup>:

- what hazards threaten which sectors and/or services?
- What are the weak links?
- How much damage can be done how would the damage affect sector investment, income, employment and foreign currency earnings?
- What is the impact of losing x service in y region for z days?
- What investment in mitigation would resolve the problem? What is the cost/benefit of that investment? (OAS, 1991).

The CDB through the Caribbean Disaster Mitigation Project (CDMP) has been supporting the efforts of countries at addressing these issues by inter alia, improving community preparedness, undertaking hazard assessments, risk mapping and vulnerability audits of lifeline infrastructure, employing hazard-resistant building practices, and linking property insurance to the quality of construction.

Reference has already been made to the absence of innovative instruments for risk transfer and reduction that could lower the cost of insurance and reinsurance premiums while expanding the insurance market. While the thinness of national insurance markets is recognized as a major challenge to establishing affordable insurance, it has also been recognized that these challenges can be overcome through pooled insurance and/or reinsurance mechanisms.

Economic resilience building also calls for the design and implementation of policies and programmes that increase economic diversification and social cohesion in Caribbean countries. Essentially, Governments must seek to make the best use of hurricane-free years by pursuing economic and social development policies that involves:

- enhancing the capacity, efficiency and responsiveness of the public sector;
- increasing the diversity and volume of exports;
- removing rigidities in labour markets to allow for greater flexibility and efficiency in the deployment of and rewards for labour;
- stimulating productivity, efficiency and investment;

---

<sup>10</sup> vulnerability in the context of natural hazards, includes such things as the ability of structures to withstand the forces of a hazardous event, the extent to which a community possesses the means to organize itself to prepare for and deal with emergencies, the extent to which a country's economy depends on a single product or service that is easily affected by the disaster and the degree of centralization of public decision-making (Wilches-Chaux 1989).

- promoting the sustained development and transfer of the knowledge and skills demanded by a modern economy;
- making the private sector the primary engine of growth;
- maintaining low rates of inflation and price stability;
- maintaining exchange rate stability;
- creating an adequate and predictive legislative environment; and
- fostering social cohesion and safeguarding the environment.

Quite apart from improving the international competitiveness of the economies of Caribbean countries, and building their economic resilience, these measures should make countries affected by natural disasters less reliant on external assistance and enable them to make a larger contribution to post-disaster rehabilitation and reconstruction efforts. It will also reduce the need for the Governments to resort to borrowing and other measures that only increase their economic social and environmental vulnerability.

## SECTION 7: SUMMARY OF LESSONS LEARNED AND RECOMMENDATIONS

A summary of lessons learned and recommendations distilled from the review process are captured in Table 1 below.

**Table 1: Summary of Lessons Learned and Recommendations**

Thematic Area	Lessons Learned	Recommendations
<b>Early Warning Systems</b>	EWS' should be an integral part of risk assessment and disaster management	<ol style="list-style-type: none"> <li>1. EWS' should be continuously reviewed and tested</li> <li>2. Involve the business community in disaster management;</li> <li>3. Require the business community to ensure that adequate stocks of building supplies are available to enable citizens to adequately protect their properties;</li> <li>4. Legislation should be considered to allow emergency personnel to forcibly evacuate citizens from at-risk areas.</li> <li>5. Strengthen EWS' at the community levels to include information as to what communities should expect and what they can do to reduce vulnerability and risk</li> <li>6. Incorporate evacuation planning as part of security arrangements;</li> <li>7. Establish clear lines of supervision between central and parish authorities.</li> </ol>
<b>Emergency Response Coordination</b>	<p>coping capacity of disaster management organizations should be re-examined in the light of Grenada's experience.</p> <p>Emergency Operations Centres must be housed in safe and secure facilities</p> <p>The growth and development of HF Communications Groups and Operators should be Facilitated</p> <p>Core Staffing of the CDERA CU is inadequate for Level 3 Operations Disaster response capabilities not adequate to deal with worse case scenarios</p>	<ol style="list-style-type: none"> <li>8. Undertake management audit of DMOs against worst case scenarios</li> <li>9. Take concrete steps to strengthen the capacity of disaster management agencies at the community level;</li> <li>10. Ensure that national emergency management agencies are located in facilities that are secure and fully-equipped and that are capable of withstanding Category 5 Hurricanes;</li> <li>11. Use market and non-market incentives to promote the growth and development of HF operators</li> <li>12. assess the adequacy of CDERA's core staffing in light of the heavy demands made on the agency during the 2004 Hurricane Season;</li> </ol>

Thematic Area	Lessons Learned	Recommendations
	<p>National Emergency Telecommunications Plans absent or not routinely tested</p> <p>Poor coordination of disaster assessments by international agencies</p>	<p>13. Develop National Telecommunications Plans as part of Crisis Communications Strategies;</p> <p>14. Agree with international development partners a protocol for the conduct of damage assessments by the agencies;</p> <p>15. Accelerate the implementation of disaster management initiatives within the context of a CDM approach.</p>
<b>Disaster Relief Operations</b>	<p>disaster relief operations at the community/parish level are weak and ineffective</p> <p>Interruptions of government operations in post-disaster situations can be reduced or averted</p> <p>Critical facilities not built and located to withstand Category 5 hurricanes</p>	<p>16. Strengthen the capacity of community-based disaster management agencies</p> <p>17. Define clearer lines of command to ensure minimization of suffering and prompt response to national and community needs</p> <p>18. Devise and implement a public education strategy to support disaster management at the community level</p> <p>19. Develop a clear appreciation of and place a stronger focus on potential hazards, their causative factors and the necessary prevention/mitigation measures;</p> <p>20. Strengthen the facilities housing central disaster management emergency operations;</p> <p>21. Map critical facilities at national level</p> <p>22. Enshrine in law, the roles and responsibilities of all disaster management agencies;</p> <p>23. Mandate all Government Ministries and agencies to develop disaster management plans which should include damage assessment and recovery components</p> <p>24. Execute regular disaster management simulation exercises in an integrated manner</p> <p>25. Revamp systems of data collection and management</p> <p>25. Establish or strengthen emergency planning processes</p> <p>26. Establish a permanent, minimal initial response capacity at the national level</p> <p>27. Establish or strengthen as appropriate, a permanent capacity for assessing vulnerability and risk, writing</p>

Thematic Area	Lessons Learned	Recommendations
		<p>disaster scenarios and coordinating, monitoring and supervising emergency planning, training and simulation exercises</p> <p>28. Adequate support personnel be made available to manage operations at Ports of Entry;</p> <p>29. Update CDRU's Ops Order and Standard Operating Procedures (SOPs) to clearly indicate all possible tasks to be undertaken by the CDRU including its humanitarian role and support function to the NEOC and detail job descriptions for all staff positions;</p> <p>30. Review and augment the equipment and support material supplied to CDRU upon its deployment</p> <p>31. Examine the establishment of a permanent CDRU desk be established at CDERA</p> <p>32. Consider the inclusion of a photographer in the CDRU team to provide a visual record for future reference and for use in training exercises.</p>
<p><b>Damage Assessments</b></p>	<p>There is scope for better coordination among international partners in conducting damage assessments</p> <p>Investments in disaster preparedness reduces vulnerability to natural disasters and increases the resilience of societies and economies</p> <p>Political Will is critical to vulnerability reduction and resilience building</p> <p>Failure to recognize that economic, social and environmental systems are</p>	<p>33. Agree a protocol among international development partners to govern the conduct of damage assessments</p> <p>34. Personnel at the community level should be trained in conducting comprehensive damage assessments</p> <p>35. UNECLAC should consult with other regional institutions in reviewing its Damage Assessment Methodology</p> <p>36. Protocols to guide the activation and deployment for assessment teams should be developed.</p> <p>37. Technical assistance should be provided to infuse hurricane safety provisions in the rebuilding process;</p> <p>38. A project identification process should be developed to produce projects that can rapidly generate income, foreign exchange and employment in post disaster situations.</p> <p>39. Practice sound environmental planning and environmental protection so as reduce vulnerability and increase resilience to natural disasters</p>

Thematic Area	Lessons Learned	Recommendations
	<p>naturally integrated, can increase vulnerability to natural disasters</p> <p>Patterns of physical and spatial development must be carefully assessed</p> <p>Improved building standards and enforcement of building codes reduces a country's vulnerability and builds its resilience to natural disasters</p> <p>Inadequate insurance and reinsurance severely weakens resilience to natural disasters</p> <p>The enforcement roles of disaster management agencies is not adequately captured in national legislation</p> <p>A stronger focus on long term disaster management efforts is required</p> <p>The speed with which a country can bounce back from the effects of a disaster depends on the speed with which utilities can be restored.</p>	<p>40. Increased support should be provided for land use and urban planning reviews including the review of building codes and standards and the regularization of informal settlements</p> <p>41. Review and implement the recommendations of the CARICOM working Party on Insurance and Reinsurance</p> <p>42. Review and strengthen the enforcement roles of disaster management agencies</p> <p>43. Undertake a cost benefit analysis of underground electricity networks</p>
<p><b>Rehabilitation and Reconstruction</b></p>	<p>Vulnerability reduction and resilience enhancement requires careful attention to the vulnerability of social and economic sectors to hazardous events</p> <p>Economic resilience building requires policies and programmes that increase economic diversification and social cohesion.</p>	<p>44. Implement economic resilience and social cohesion building measures</p> <p>45. Development assistance should aim to reduce the vulnerability of social and economic infrastructure to natural disasters</p>

## DOCUMENTS REVIEWED

1. CARILEC (2005) Results of Tropical Storm Conference, February 2005
2. CDERA (2004) Summary of Impact of 2004 Hurricanes on CDERA Participating States: Response Actions, Recovery and Rehabilitation Needs
3. CDERA (2004) Report of the Caribbean Disaster Relief Unit (CDRU) Review Meeting
4. CDERA (2005) Survey on the Status of Disaster Preparedness of the Disaster Management Organizations in Grenada
5. CDERA (2005) Hurricane Ivan – Jamaica: An assessment of the National Response- Final Report
5. ECLAC (2004) Hurricane Season 2004 in the Caribbean: Some Facts, Figures and Preliminary Conclusions and Lessons Learned
6. ECLAC/UNDP The Impact of Hurricane Ivan in the Cayman Islands
7. ECLAC/UNDP Assessment of the Socio-economic and Environmental Impact of Hurricane Ivan on Jamaica Hurricane Ivan
8. ECLAC (2004) Hurricanes Frances and Jeanne in 2004: Their Impact in the Commonwealth of the Bahamas Preliminary Version
9. ISE (2005) Report on the Conference of the 2004 Hurricane Season: Implications for Structural NEngineering Practice in the Caribbean Building in Risk Management and Vulnerability Reduction in the Caribbean Islands of Antigua and Barbuda, Barbados, Cuba, Dominica, and Grenada, UNDP, Bureau for Latin America and the Caribbean July 2004
10. OAS (1991) Primer on Natural hazard Management in Integrated Regional Development Planning – OAS Department of Regional Development and Environment and USAID/OFDA - 1991
11. OECS (2004) Grenada: Macro-Socio-Economic Assessment of the Damages Caused by Hurricane Ivan