HURRICANES:
CASE STUDIES IN
DISASTER MANAGEMENT

Prepared by
Jeremy Collymore, Regional Coordinator
Caribbean Disaster Emergency Response Agency (CDERA)

for the
Caribbean Studies Association Meeting 98

St John’s, Antigua and Barbuda
May 26 - 30, 1998
1.0 NATURAL HAZARDS IN THE CARIBBEAN

It has been stated that the Caribbean region is exposed to three of the worst kinds of natural hazards; hurricanes, volcanic eruptions and earthquakes (Tomblin, 1984). Loss of life resulting from the impacts of hazards runs into the thousands whilst property losses and other damages have reached billions of dollars at present day values. Almost every city in the region has been devastated in the last 300 years.

In the period 1910 - 1930, north Atlantic hurricanes averaged 3.5 per year which increased to an average of 6.0 per year between 1944 and 1980. Since 1960 a slight decrease in frequency has been observed but intensities and magnitude have increased significantly. Some of the severest hurricanes of the century have been experienced in this period and include, David, Frederick, Gilbert and Andrew. In the 110 years between 1871 and 1980, 119 hurricanes traversed the eastern Caribbean. In that same period there have been years when as many as four hurricanes (1925) and five storms (1916, 1988, 1995) traversed the region (Granger, 1988).

Earthquakes in Jamaica (1692, 1907) in Antigua and Barbuda (1974) and volcanic eruptions in St Vincent (1812, 1902, and 1979) also resulted in loss of life, extensive damage to property and disruption of key productive sectors. In more recent times the disharmony between human use systems and natural systems has resulted in repeated flooding in Jamaica (1979, 1984, 1985, 1986, and 1988), Barbados (1970, 1984, 1986, and 1988) and Trinidad (1988, 1993) just to give a few instances. Drought as evidenced in St Vincent in the 1970s and Antigua and Barbuda in the 1980s is another indicator of the need for integration of environmental considerations in our development planning process.
In addition to the "natural" hazards referred to above, the development aspirations of the region have increased the potential for technological emergencies such as oil spills, aircraft crashes and chemical spills.

Whilst we are ever conscious of the hurricane hazard, inadequate attention is given to the seismic and volcanic hazards. The Seismic Unit has advised that there are approximately 25 volcanic centers which are taught to be potentially active and on whose flanks more than 250,000 persons presently live.

2.0 ECONOMIC IMPACT OF DISASTERS IN THE CARIBBEAN

Whatever the source of data, there is an undeniable reality that the economic development in the Caribbean has been derailed by the impact of hazards on our societies. The summary of the events presented below only serves to highlight a situation which becomes potentially larger with increased urbanization and general development.

2.1 Hurricane David: Dominica 1979

Hurricane David struck Dominica on August 29, 1979, seriously damaging 50 per cent of the island's housing stock of 16,000 houses; 2,000 of which were completely destroyed. Approximately two-thirds (2/3) of the island's 80,000 population was left homeless.

Nearly all the school buildings were badly damaged requiring an estimated EC $6M (US$2.2) to rebuild or repair 64 schools. The Princess Margaret Hospital in the capital Roseau, lost roof sheets from almost all of its buildings. The main port in Woodbridge Bay was badly damaged and required a major reconstruction effort estimated to have cost EC$10.8M (US$4).

A comparison of selected economic indicators showed that the impact of Hurricane David was felt in the island's economy for many years after the event. Up to 1983, agriculture and fishing had not regained the share of gross domestic product they held in 1978. Exports declined drastically in 1979, whilst GDP per capita in 1979, 1980 fell to approximately 20% below the 1978 level.
All sectors were seriously affected though agriculture and infrastructure was much more so. Estimated costs of reconstruction was estimated to be EC$64.3M (US$23.8M)

2.2 Hurricane Allen: Saint Lucia 1980

On August 4, 1980, Hurricane Allen passed 40 miles off the southern tip of Saint Lucia. Winds of between 75 mph and 105 mph lashed the entire island. Six persons died as a result of the hurricane and an estimated 9,600 were displaced. Some 1,576 houses were damaged, of which 577 were totally destroyed or non-repairable (Hurricane Supplement, Weekend Voice, May 1982).

Crops losses were particularly heavy, estimated at EC $69M (US $25.5M). 90 per cent of the island's banana crop which generally accounts for 80 per cent of the island's annual agriculture output was destroyed (Hammerton et al., 1984). Consequently, there was a decline in agriculture's contribution to gross domestic product from 15 per cent in 1979 to 12 per cent in 1980 and 9 per cent in 1981. The growth of the island's GDP fell from 3.7 per cent in 1979 to 0.8 per cent in 1980 and did not attain the 1979 level of growth until 1983. The total damage was estimated by the Central Planning Unit as US$87M.

2.3 Flooding: Jamaica 1986

Flooding is becoming an increasing hazardous phenomenon in the region. Though its impact in the region has not always been as spectacular as that of hurricanes, it has been accounting for loss of life, economic disruption and social dislocation. The "June rains" which affected Jamaica in 1986 provided a lucid example of the destructive potential of this hazard.

The agricultural sector was severely impacted by this event. Island-wide damage to the sector was estimated at J $124M (US $24.5). Damage was done to 17,600 acres of crops valued at J $116M (US $21.1). Livestock losses which included chicken and fish were estimated at J$7.6M (US$1.4).
Infrastructure was extensively damaged. Over 300 roads were damaged or blocked with an estimated cost of re-opening and rehabilitating put at J $18.1M (US $3.3). Fifteen bridges were affected and needed a conservative J $7.0M (US $1.0) to restore them to normal condition.

2.4 Hurricane Hugo

Hurricane Hugo affected five OECS Member and Associate member states; from Dominica in the south, with the full fury of the hurricane descending on Montserrat and to a lesser extent the British Virgin Islands to the north. Within the broad range were St Kitts and Nevis and Antigua and Barbuda. All these OECS states had recently been experiencing high rates of economic growth and good longer term (1980-1988) growth rates.

The high growth rates were attributed to growth in tourism in all the economies with the exception of Dominica and St Kitts and Nevis which depended on a combination of agriculture and tourism. Hurricane Hugo resulted in severe economic damage to all these economies in 1989.

Preliminary damage assessments (UNDP) indicated that damage to the region's productive sectors and infrastructure was in excess of EC$856.9M (US$317.4)

If housing was included, it would result in increasing the total value of the damage appreciably, probably by about 30 per cent to over EC$1.114 billion (US$412M).

Although the rehabilitation requirements could not accurately be assessed in a two month period, preliminary estimates of these requirements, excluding housing, amounted to about EC$410M (US$158).
These estimates of requirements were made for a one-year period and were designed to reactivate the productive sectors of agriculture and fisheries and to replace or repair damaged infrastructure. They therefore exclude a considerable proportion of the costs of the hurricane impact on economic growth and development.

2.5 *Tropical Storm Debby: St Lucia 1994*

There is persistent tendency to gauge the impact of a disaster on a community by the extent of physical disruption. When the physical infrastructure is restored or repaired normalcy is proclaimed.

The passage of Tropical Storm Debby over Saint Lucia provides a contemporary example of the economic significance of risk management as part of resource management in small island developing states.

An assessment of the economic impact of "Debby" on St Lucia is contained in a report entitled "St Lucia: Post Debby Reconstruction Program". In the report prepared with the assistance from a joint World Bank/CDB/OECS mission, it has been projected that because of the Storm's adverse impact on agriculture the real GDP growth in 1994 will be nil or negligible compared with the pre-storm IMF projection of 3%.

Unemployment was expected to increase in the short term as a result of the displacement of farmers, farm labourers and some slow down in economic activity.

It is also projected that the consolidated public sector current revenues will fall by EC $35 million during the 1995 financial year while current expenditure will rise by EC $9 million. At the same time the capital account deficit is projected to deteriorate from 22% to 28% as a result of EC $71 million additional capital expenditure needed to rehabilitate the physical and social infrastructure to resume sustainable growth. The overall deficit could also rise significantly.
3.0 ACTIONS IN DISHARMONY WITH ENVIRONMENT

The brief scenarios presented above are not intended to cause any despondency. Rather, the intention is to highlight the substantial social and economic costs which the society is forced to undergo because of indifference, in decision-making forums, to environmental considerations and the lack of any clearly formulated environmental management programmes.

Several development activities in the region aimed at meeting the socio-economic aspirations of our people are placing them at great risk.

A few examples are offered here:

• Efforts by the Government of Jamaica to expand its lucrative Blue Mountain coffee crop has resulted in the decimation of the forest cover (Eyre, 1988) and a notable increase in soil erosion (McGregor et al., 1985). The increase in both flooding and drought in the Liguanea Plains is in part attributable to this activity.

• In Barbados, the modernization of some farming practices has resulted in the destruction of soil retaining barriers, the filling up of natural water retention sources, reduced infiltration and increased runoff (Collymore and Griffith, 1989; Cumberbatch, 1988). The result has been an increase in downstream flooding (Collymore and Griffith, 1989).

• Higher banana prices and a crop insurance scheme have resulted in farmers in Saint Lucia using less damage susceptibility reduction practices. Because of the opportunity for increased earnings from bananas, farmers are now encroaching on marginal production areas, thus increasing the susceptibility to damage (Collymore, 1988).
• Much of the housing design and construction in the region seem to ignore the ever present wind hazard. An examination of failed dwellings revealed that most of those badly damaged have lightweight roofing (26 gauge, galvanized or bitumen fibre) on relatively shallow pitches (15% or less) and a long span. The vernacular dwellings, which generally fare better even when lighter roof structures are used, are constructed with a high pitch (40%) gable or hipped roofs and short span. Yet, modern builders continue to use the light structures without recognizing the need for more careful detailing of the structural systems (Wason, 1984).

4.0 RESPONSE EXPERIENCE - PREPAREDNESS LESSONS

The 1995 response operations, at both the national and regional levels, provided clear indicators as to the kind of preparedness issues that have to be tackled if we are to advance our operational capabilities.

4.1 Political Leadership

Sound national response is influenced by the extent to which political leaders are familiar with the existing arrangements and are prepared to allow them to work.

In addition, the country must ensure that there is a central focal point for determining priorities of response needs and utilization of resources.

Every effort should be made to discourage or avoid uncoordinated ministry or department focussed actions in the first seven critical post-event days.

4.2 Status of National Disaster Plans

Many national disaster plans have not been exposed to sanctioning mechanisms. Consequently its authority and the responsibilities assigned to lead and support response agencies are opened to question.
There is a need to review the status of National Disaster Plans and more importantly to ensure that the agencies assigned responsibilities are in a position to execute them.

It is expected that the British Overseas Development Administration funded "Disaster Legislation Project" being executed by CDERA will provide some capacity in this area but ultimately the status of disaster plans and disaster management on the whole will be a reflection of the political commitment towards this agenda.

4.3 Post-Impact Actions

Our observations confirm earlier findings that inadequate consideration is given in national response planning to post event tasks. The disaster response management procedures must include recovery and reconstruction coordination.

Reconstruction and recovery activities must be informed by the following:

A. In a post-impact situation critical fiscal, human and physical resources will need to be rationalized if duplication and replication are to be avoided and efficiency in resource is to be achieved.

B. The need to avoid re-establishing known vulnerabilities.

4.4 Relief Distribution

There is too much evidence of efforts to design distribution mechanisms in the midst of the response effort.

This is one area in which transparency and integrity are essential. Donor perception of shortcomings in transparency and integrity will significantly constrain either their benevolence or their flexibility in providing relief assistance.
Every effort must be made to involve voluntary and social organizations in the needs assessment and relief distribution efforts. Involvement of clubs such as the Rotary, Lions, Kiwanis’s and social organizations such as the church and workers’ unions in the post disaster activities is inevitable. Consequently, we must ensure that their involvement is coordinated.

4.5 Shelter Management

The traditional routine of seeing Shelter Management as simply naming a school or church building as a Hurricane Shelter at the beginning of June each year has been exposed as inadequate.

Shelter Management must be informed by a national policy that addresses the following:

A. Facility identification, evaluation and preparation.

B. Operations procedures focussed on opening, manning, feeding and sanitation.

C. Training of managers and support staff.

Our recent experiences have highlighted the need to reconsider:

I. The identification of shelters

II. The naming of Shelter Managers

6.0 ISSUES AND RECOMMENDATIONS FOR CONSIDERATION

6.1 General

The information provided above highlights the hazardousness of the Caribbean Small Island environment.
The problem that would have to be addressed in risk mitigation and implementation relates to the operational rules of administrative agencies that superficially treat or neglect disasters altogether.

Undoubtedly, the epistemology which underlies planning practice in the region and which imbibes the notion of rational behaviour can be problematic. Scientists are inclined to feel that risks need only to be made clear to policy makers for appropriate action to occur. They are quickly learning, however, that well-developed and logically consistent presentations are not always adopted.

A comprehensive approach to development planning is needed to effect mitigation implementation. It is clear that this process involves a diversity of affected publics, and links mitigation directly into the planning process.

Within this framework, hazard risks can be evaluated just as economic and other factors are. Effective risk mitigation planning must take place before the event. Only then can community participation and education of policy makers be effective.

**Issue 1**

Institutionalized disaster training and research in the region is unstructured and uncoordinated. Every effort must be made to utilize existing educational and vocational institutions to generate the culture necessary for the support and pursuit of the strategies of disaster reduction and resource sustainability.

**Issue #1 - Recommendations**

i. Require appropriate elements of the disaster management agenda be incorporated into the curricula of administrators, doctors, lawyers, police professionals, teachers, insurance personnel and in the school environment.
**Issue 2**

Calls for improvement in the preparation for and management of hazards associated with human-use systems have been repeatedly made in many fora. That they need to be made again highlights the need for more resources to be directed for the follow-up of recommendations and programme implementation.

To achieve this, there will be the need for regular and sustained interagency consultation on programme planning to maximize the limited available resources. Agency territoriality must be de-emphasized and the needs of the constituencies to be served given paramounty.

**Issue #2 - Recommendations**

i. Review of intra and inter agency dynamics to include an analysis of the decision making infrastructure in the public service.

ii. Island states and territories in the region must take a longer term comprehensive and integrated approach to risk mitigation.

iii. There is a need to identify a management strategy to balance current action with losses from future disaster events.

iv. Mitigation activities to reduce the long-term risk to human life and property from natural and technological hazards must include land use regulation, building and safety codes and disaster insurance programmes.

**Issue #3 - Recommendations**
The ideal of any emergent hazard management system is to anticipate rather than suffer consequences to rapidly reduce the hazard or ameliorate the consequences where indicated, and to do so with a minimum burden on social resources and opportunities foregone.

There can be little that, in the region, the challenges of nature and technology, in increasing the exposure of our people to risk, pose a dilemma for governments, which seek the fullest protection for their property.

i. An initial element of any comprehensive hazard management programme for developing islands must be the establishment of an inter-agency coordinating institution.

ii. Existing disaster/emergency coordinating bodies could be upgraded with physical, manpower and legal resources to perform this role.

iii. A detailed assessment of the social and economic impact of both technological and natural hazards on our productive centers is critical. This is necessary to guide the application of hazard mitigation regulations in future development plans.

iv. Pre-planning for post disaster reconstruction is needed to ensure that an effective and rapid recovery occurs within the framework of the re-establishment of strong socio-economic systems.

6.2 Issues Central to Rehabilitation Assistance Resulting from the 1995 Events
6.2.1 Need for Flexible Reconstruction Assistance

Given the impact on critical economic centers of the island states by the recent events, there is a need for development financing agencies and institutions to consider how they can better plan, programme and deliver time sensitive reconstruction assistance.

In this regard, there is a need to review the following areas:

i. Alternatives available for flexible funding and programming;

ii. Application of regular development assistance programming and implementing procedures to deliver reconstruction assistance;

iii. The possibility of varying the application of standard procurement rules to obtain specified commodities;

iv. How time critical reconstruction components can be given high priority in delivery of reconstruction assistance;

6.2.2 Addressing Building Construction and Design Issues

A new approach to disaster management involving improvement of both human and environmental conditions and the interactions between people and environment.

Technical measures alone such as building regulations are inadequate if the attention of the most vulnerable is not considered also.

I subscribe to the view that major disaster problems are essentially unsolved development problems - housing quality, land use, regional capital and finance capacity.
The following recommendations are therefore offered for consideration and support.

i. Develop and publish guidelines for retrofitting partially damaged structures for critical disaster types;

ii. Execute audit of damage profiles and prepare results for distribution to the diversity of affected publics involved in design, construction, repair and ownership of buildings;

iii. Allocate a percentage of disaster assistance to institutional capacity building and mitigation.

iv. Enhance self-help and local coping mechanisms.

v. Develop improved procedures for assessing and categorizing structures and infrastructure according to the degree of damage and mitigation potential.

vi. Examine the conditions attached to reconstruction assistance to ensure that they are clear, can be executed by the benefitting agency.

7.0 GRASPING OPPORTUNITIES FOR MITIGATION

Major national disasters provide political and financial opportunities for reducing future vulnerability if long and short term policy commitments to loss reduction are made at all levels of government and the lessons learnt from these and past events are applied in rebuilding and reoccupation of the hazard areas.

Most governments lack legislation or incentives for mitigation. Post event mitigation policies for repair and rebuilding are absent.
8.0 GOING BEYOND EVENT FOCUSED RESPONSE

A review of the political, professional and public statements following disasters in the Caribbean in the last two decades highlight the rampant difference between articulation of concern and commitment to action.

There is no doubt that since 1979, when Hurricanes Frederick and David struck Dominica and the Mount Soufriere Volcano erupted in St. Vincent that some progress has been made at institutionalizing national and regional preparedness and response mechanisms.

However, there is little evidence to suggest the commitment to or implementation of national or agency policies to institutionalize disaster prevention or loss reduction. Consequently at this time, we are still repeating calls for legislation and enforcement of building codes.

There is a need for us to ensure that our concern for the sustainability of our economic agenda transcends the event and is incorporated into our programming.

Reconstruction and rehabilitation assistance cannot and should not be separated from pre-disaster preparedness planning. To achieve this, the integration of hazard considerations into long-term economic and land use patterns is essential.
REFERENCES


Hurricane Supplement, Weekend Voice, May 1982


