Contents

EXECUTIVE SUMMARY

Following the significant physical damage and economic losses that this country sustained as a result of Hurricane Keith, a request for this social, environmental and economic impact assessment was submitted to the Economic Commission for Latin America and the Caribbean (ECLAC) by the Prime Minister of Belize, Hon. Said Musa, on 12 October 2000. This appraisal considers the consequences of the Hurricane's passing over the northern half of this country and the outlying keys ("cayes") from 30 September to 1 October 2000.

The study undertakes a sector by sector analysis leading to an overall assessment of the damage; it appraises the macroeconomic and environmental effects and proposes some guidelines for rehabilitation and reconstruction programmes. To carry out this task full co-operation was received from national authorities, the Inter American Development Bank (IDB), the Inter American Institute for Cooperation on Agriculture (IICA), the United Nations Development Programme (UNDP) and other United Nations agencies. Officials and consultants of the Pan American Health Organization (PAHO/WHO) and of the United Nations Children's Fund (UNICEF) joined the mission. This assessment complements the Compilation of Damage and Needs Assessments, Response and Rehabilitation Plans in connection with Hurricane Keith prepared for the United Nations Disaster Assistance Coordinator (UNDAC) by UNDP, UNICEF and PAHO. The direct and indirect damage has been assessed in accordance with the methodology developed by ECLAC. The results are based on the mission's estimates; the study incorporates the information available and evidence collected in interviews and visits to affected locations.

It is ECLAC's and the Government of Belize intention to emphasise the need for a reconstruction process that reduces the country's vulnerability, is compatible with its development strategy and can be implemented within the government's and the private sector's absorption capacity. It is estimated that the magnitude of the losses exceeds the country's capacity to address reconstruction needs on its own, particularly if the aim is also to reduce the impact of similar events in the future, and therefore international cooperation is considered essential.

The Belize society and government face the opportunity of undertaking the reconstruction with renewed values and criteria, embarking on institutional, legal and structural reforms to reduce economic, social and environmental vulnerability. Just as Hurricane Hattie over forty years ago transformed Belizeans attitude toward hurricane threats and led to important relocation of public and administrative functions, Keith – following closely the footsteps of Mitch – could become an important instrument for a changed attitude to environmental and risk management. An important aspect of such reforms will be to strengthen the country's savings, investment and management capacity as part of the reconstruction.

Total damage is estimated at BZ$560.1 million (US$280 million), of which direct damage, estimated at BZ$423.3 million (US$211.6 million) constitutes about 75 per cent. Direct damages were valued at present value or replacement cost at current prices – whichever seemed

more appropriate for the specific sector. Indirect damages of BZ$136.8 million (US$68.4 million) were yielded on the basis of flows affected as the direct consequence of the disaster. Since some assumptions were necessary for these costs, the computed figure in some cases may underestimate the medium or long term impact in the Belizean economy. A summary table of the damages is as follows:

	Thousand of US dollars		
	Direct damage	Indirect damage	Total damage
Total	211,640.7	68,406.2	280,046.9
Social sector	36,653.9	1,119.7	37,773.6
Infrastructure	26,520.9	17,918.7	44,439.6
Economic sectors	116,111.2	49,179.0	165,290.2
Environment	24,525 5	0.0	24,525.5
Miscellaneous	5,241.5	188.8	5,430.2
Emergency expenditures	-	188.8	188.8
Foreign Assistance	2,587 9	0.0	2,587.9

Source: ECLAC

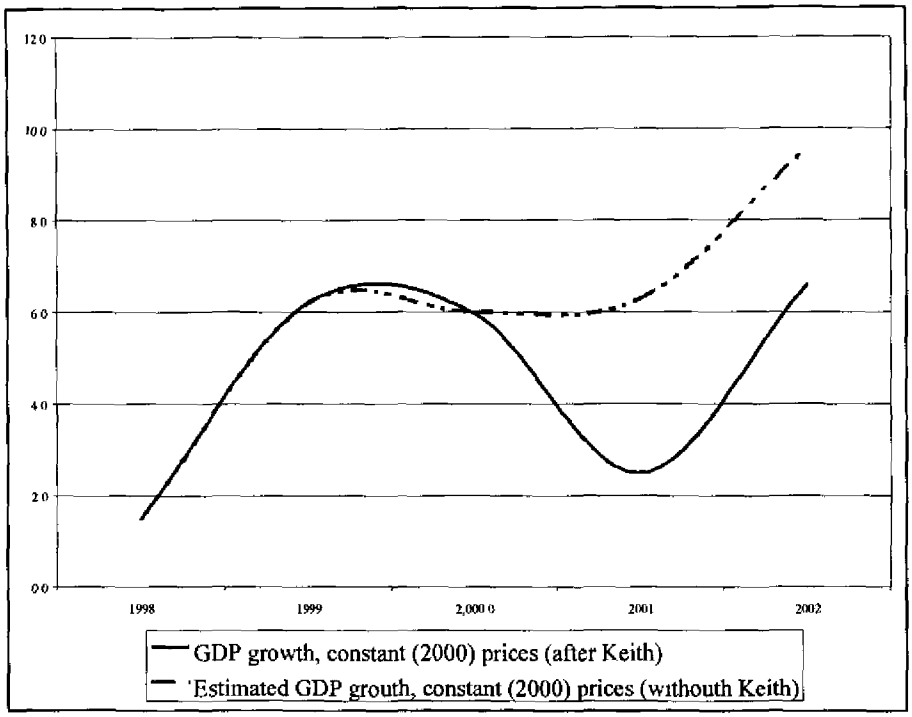
The summary data on direct and indirect damage indicates that the most affected sectors are the productive ones: tourism and agriculture represent over 47 per cent of the direct damage measured. Total damage to the economic sectors is estimated to be BZ$330.6 million, some 59 per cent of total damage estimated. Losses of infrastructure account for about 16 per cent of total damage. Their repair or replacement must be a priority as they perform a generator function to economic and social activity nation-wide.

Damage to the social sectors is almost as large as the damage to infrastructure and, considering that there tends to be some underestimate of the social effects, Keith had stronger negative consequences on societal variables than on physical ones. The most important social damage occurred in housing (over 12 per cent of total direct and indirect damages). Thus the urgency to face the challenge not only of replacing lost housing and other social infrastructure but to do so with new, more resilient criteria and giving full attention to risk reduction since – as Keith made apparent – Belizean society has a high level of exposed vulnerability.

The measure of Keith's effect in Belize may be very well be highlighted by pointing that direct damages (losses or damage to infrastructure) are equivalent to almost 93 per cent of the country's gross capital formation in 1999. Seen from another angle, Keith's indirect damage (negative impact on economic flows) is anticipated to be almost 46 per cent of the 1999 savings of Belizeans. Additionally, these reduced flows are equivalent to more than twelve percent of 1999's domestic consumption)

The extent in which the Belizean economy will suffer as a consequence of the passage of Keith is shown by the fact that its dynamism will be reduced more severely in 2001 than in the remainder of 2000 and it is expected that by 2002 it could regain its pre-disaster fast pace of

growth. Its impact in 2000 will reduce the estimated rate of growth by one percentage point (from a forecasted 6.9 to only 5.9). This will open a gap between the expected evolution of the economy as was being forecasted before Keith and the actual development patch that will ensue – having consequences at least till 2000, as is shown by the following graph:



The hurricane has no doubt set back the government's poverty alleviation strategy that had set a target on containment of the Central Government deficit to no more than 2 per cent of GDP. With the new estimate indicating a fiscal deficit of 3 per cent of GDP, the target of poverty alleviation may have moved somewhat, delaying its achievement. Any alternative strategy that keeps the attainment of the poverty alleviation date fixed at the previously targeted date will place the foreign exchange parity at risk.

Hurricane Keith has impacted macroeconomic performance in a number of ways. There has been a fall-off in economic activity as attested to by the loss of property, hours of work, the loss of business and the loss of crops. These have impacted negatively on livelihoods, although the impact has not had an even incidence over the population. As an example, the subsistence farmers in the Orange Walk district and the lobster fishermen operating on Ambergris Caye who, because of the loss of their crops and fishing gear, respectively, are unable to feed their families, merit some consideration for relief. Export earnings from fishing are expected to decline in 2001.

Exports and export earnings are estimated to have fallen as much damage was sustained in the tourism areas and in areas that cultivate export crops. Whereas there are no firm figures to quantify the extent of the phenomenon, indications are that the poorer households have been more adversely affected in terms of damage and displacement than other income groups in the population. The damage caused by the hurricane will also have implications on the import bill.

To the extent that direct damage will have to be repaired by reconstruction of houses and physical plant for which there is a high import content of materials, possibly of the order of 70 to 85 per cent of total cost of materials. On the other hand, to the extent that the damaged properties were insured, the settlement of insurance claims will result in capital inflows – a positive aspect of the country's balance of payments. Further, the reconstruction effort will result in increased activity in construction, which, in turn will create conditions for increased demand. The upsurge in construction activity may, however, require the importation of labour from adjacent countries.

The loss of tourist visitors, when combined with the estimates of direct and indirect damages to the sector will impact the balance of payments in the final three months of 2000 and into 2001. An estimated impact on international trade puts the import figure at BZ$115.3 million to be spread over the rest of 2000 and 2001.

With well-organized support from friendly donor countries pledging investments in strategic areas and with proper project sequencing, the balance of payments may be able to avoid the pressure that would otherwise be brought to bear on the exchange rate parity of the country.

As an addendum to the document the mission has prepared a list of project profiles, currently being developed and some already with some degree of advance or development. The purpose of these profiles is to provide basic information on their aims, scope, expected results, activities and tasks to be carried out, investment to be made, expected financing, and the special characteristics of each project.

The sectoral composition of the projects identified – in the amount of BZ$211.6 million (or US$105.8) is the following (in percentages):

Projects in social sectors	48.0
Health and sanitation	2.5
Education	1.4
Housing	44.1
Energy, water supply, sanitation and telecommunications	6.1
Transport subsector	15.8
Productive sectors	24.8
Agriculture	24.3
Tourism	0.5
Environmental management	5.3
Prevention and mitigation	0.0

On occasion an event like Keith – fortunately enough without major losses of lives as has recently occurred in other countries – opens the opportunity for a change of policy and a soul-searching effort to avoid preserving or aggravating presently negative trends. Certainly Keith represents an economic setback in some aspects but it may be just the kind of reminder needed to give a hard look to ongoing processes that may be rectified.

It will be important – on the basis of this occurrence – to set priorities and consider the time frame and the necessary changes to design, construction and land use regulations in keeping with the situation in each country. In any event, reconstruction should be carried out on the basis of a significant qualitative improvement over the previous circumstances.

PREFACE

This study was prepared for the Government of Belize, following the significant physical damage and economic losses that this country sustained as a result of Hurricane Keith, which struck part of the Central American region, Belize and Mexico. A request for this social, environmental and economic impact assessment was submitted to the Economic Commission for Latin America and the Caribbean (ECLAC) by the Prime Minister of Belize, Hon. Said Musa, on 12 October, 2000. This appraisal considers the consequences of the Hurricane's passing over the northern half of this country and the outlying keys ("cayes") from 30 September to 1 October 2000.

The study undertakes a sector by sector analysis leading to an overall assessment of the damage; it appraises the macroeconomic and environmental effects and proposes some guidelines for rehabilitation and reconstruction programmes. It complements other sector or partial assessments conducted by national and international institutions and financial and bilateral cooperation agencies. It is ECLAC's and the Government of Belize intention to emphasise the need for a reconstruction process that reduces the country's vulnerability, that is compatible with its development strategy and can be implemented within the government's and the private sector's absorption capacity.

National authorities, the Inter-American Development Bank (IDB), the Inter-American Institute for Cooperation on Agriculture (IICA), the United Nations Development Programme (UNDP) and other United Nations agencies, collaborated in the preparation of the study. Officials and consultants of the Pan American Health Organization (PAHO/WHO) and of the United Nations Children's Fund (UNICEF) joined the mission. This assessment complements the Compilation of Damage and Needs Assessments, Response and Rehabilitation Plans in connection with Hurricane Keith prepared for the United Nations Disaster Assistance Coordinator (UNDAC) by the United Nations Development Programme (UNDP), UNICEF and PAHO.

The direct and indirect damage has been assessed in accordance with the methodology developed by ECLAC. [1] The results are based on the mission's estimates; the study incorporates the information available and evidence collected in interviews and visits to affected locations. It is estimated that the magnitude of the losses exceeds the country's capacity to address reconstruction needs on its own, particularly if the aim is also to reduce the impact of similar events in the future, and therefore international cooperation is considered essential.

This appraisal is designed to provide the government and the international community with guidelines for setting national and regional priorities in rehabilitation and reconstruction programmes. An economic approach would be limited, and such programmes should therefore include actions of a more integral nature. Designed not only to face the economic, fiscal and external sector implications of the event but to alleviate the suffering of those segments of the

---

[1] ECLAC/IDNDR (1999), *Manual for Estimating the Socio-Economic Effects of Natural Disasters*, May.

population affected as well as the environmental and vulnerability implications of the event. Questions of improved physical planning, watershed and coastal management, early warning, emergency response and structural preparedness for evacuation and sheltering potentially affected population are seen as important considerations for the reconstruction process. Special attention and priority should be placed on including sustainability and increased-governance criteria in making social and productive investments, and on allocating resources to the reinforcement and retrofitting of vulnerable infrastructure, basic lifelines and services as part of the reconstruction strategy.

The Belize society and government face the opportunity of undertaking the reconstruction with renewed values and criteria, embarking on institutional, legal and structural reforms to reduce economic, social and environmental vulnerability. Just as Hurricane Hattie over forty years ago transformed Belizeans attitude toward hurricane threats and led to important relocation of public and administrative functions, Keith – following closely the footsteps of Mitch – could become an important instrument for a changed attitude to environmental and risk management. An important aspect of such reforms will be to strengthen the country's savings, investment and management capacity as part of the reconstruction.

I. BACKGROUND

Hurricane Keith evolved very rapidly from an area of disturbed weather that had persisted in the western Caribbean during the last week of September. Late in the hurricane season – as happened in recent years with Georges and Mitch in 1998 and Lenny in 1999 – on the morning of 29 September, the fifteenth tropical depression of the Atlantic Basin formed from a weak surface low just off the north-eastern coast of Honduras. In a period of barely 24 hours the depression had strengthened into a tropical storm and was named Keith, and by noon of 30 September was poised to strike the coast of the Yucatan Peninsula en Mexico, and or Northern Belize. Following an apparently erratic pattern, the by now hurricane-level Keith pursued a westward drift and stubbornly battered the outplaying keys ("cayes") and drenched the low-lying plains of Belize. This caused severe wind damage to the coastal tourist resorts and drenched a vast area of northern Belize with severe flooding that has persisted for over six weeks.

Natural disasters, whether climatic, seismic or volcanic, are frequent in the region. The scale of human and economic damages caused by natural disasters in Latin America and the Caribbean is staggering by any set of measurements. Some estimates put the affected (directly and indirectly) population at 150 million over the last 30 years. Between 1972 and 1999 alone the number of dead reached 108,000 and the total of those directly affected exceeded 12 million. [2]

The total damages covered by the assessments made by ECLAC between 1972 and 1999 amounts to more than 50 billion dollars. The true figure for human and material damages is much greater because ECLAC has only assessed damages when governments have asked it to, and because such assessments only cover a fraction of the disasters faced by the region.

The Caribbean is subject to meteorological (hurricanes, floods and droughts) and geophysical (earthquakes, landslides, volcanoes) hazards. Depending on the degree of vulnerability of given States/territories, exposure to hazards may result in natural disasters that, in small islands and countries such as these, can have devastating economic, social and environmental effects. [3]

Tropical hurricanes are the most frequent of the natural hazards that affect the region. The decade of the nineties was one of contrasts. Landsea [4] reported that the first half of the 1990s decade saw the least active four-year period in at least fifty years. However, in the second half of the decade, the region experienced an upsurge in the incidence of hurricanes. Indeed, Guy

---

[2] See ECLAC/IDB, A Matter Of Development: How To Reduce Vulnerability In The Face Of Natural Disasters, (LC/MEX/L.428),7 March 2000.

[3] The regional information and analysis was prepared by Erik Blommestein, ECLAC Subregional Headquarters for the Caribbean, October 2000.

[4] Landsea, C. W., N. Nicholls, W.M. Gray, L.A. Avila, 1996. Downward trends in the frequency of intense Atlantic hurricanes during the past five decades. Geophysical Research Letters 23:1697-1700; Landsea, Christopher, Roger A. Pielke, Alberto M. Mestas-Núñez and John A. Knaff. 1999. Atlantic basin hurricanes: Indices of climatic change. Climate Change, 42: 89-129.

Carpenter reported that 1999 saw the highest number of category 4 hurricanes since records began in 1886. In 1999, Hurricane Irene crossed western Cuba; hurricanes Dennis and Floyd and tropical storm Harvey made landfall in the Bahamas and in the Turks and Caicos Islands; and the northern Leeward Islands were exposed to hurricanes Jose and Lenny. Because of its unusual East to West track hurricane Lenny also caused damages in the Windward Islands.

The increased incidence may indicate that the region is undergoing a new cycle of heightened hurricane activity. This would follow the period of the 1970s to the middle of the 1990s, which was relatively quiet and from the 1920s to the 1960s, which was relatively active. This long-term cycle would be more important in its effects than any expected impacts of climate change, because its effects could affect development patterns faster and its outcomes would spread over at least the next decade. Furthermore, current research seems to indicate that neither the frequency nor the intensity of hurricanes will be very much influenced by climate change.

Hurricanes remain the major cause of loss of life due to natural disasters, with a death toll of 1,745 persons during the decade. In the insular Caribbean, the largest loss of life occurred in Haiti, caused by Hurricane Gordon in 1994 and in the Dominican Republic by Hurricane Georges in 1998. See Table 1.

Table 1

LOSS OF LIFE CAUSED BY NATURAL DISASTERS IN THE INSULAR CARIBBEAN AND BELIZE a/

Period	Loss of life			
	Total	Floods	Windstorms	Other
1990-1998	1 966	155	1 745	66
1980-1989	1 640	925	584	131
1970-1979	1 829	265	1 561	3
1964-1969	953	0	953	0
Total	6 388	1 345	4 843	200

Source: EM-DAT: The OFDA/CRED International Database, [5] Université Catholique de Louvain, Brussels, Belgium.

a/ For the Guyanas, there are no recorded deaths in the EM-DAT database.

Haiti with 2,598 deaths and the Dominican Republic with 1,862 fatalities over the period 1964 to 1998 account for almost 70 per cent of the death toll in the region. This is a reflection of social vulnerability caused by poverty, environmental degradation and in some instances insufficient or inadequate mitigation and risk reduction policies. This high degree of vulnerability was highlighted in 1994, when rainfall, associated with, then, tropical storm Gordon, caused floods and mudslides which resulted in 1,122 fatalities, even though the centre of Gordon did not

[5] To be included in the database, at least one the following criteria has to be satisfied: 10 or more people killed; 100 people reported affected; a call for international assistance or the declaration of a state of emergency.

pass over Haiti. The Dominican Republic and Haiti are not alone in this vulnerability, as many of the characteristics are shared with other low-income countries or with the poor in higher income countries.

Increasingly fatalities caused during the passage of tropical cyclones are not wind related but stem from secondary disasters like flood or landslides and mudslides. This highlights the role of environmental degradation and policy failures as major factors that account for the loss of life.

If population growth is taken into account, the data show that there has been only a slight reduction in the annual disaster death rate over the last 35 years.

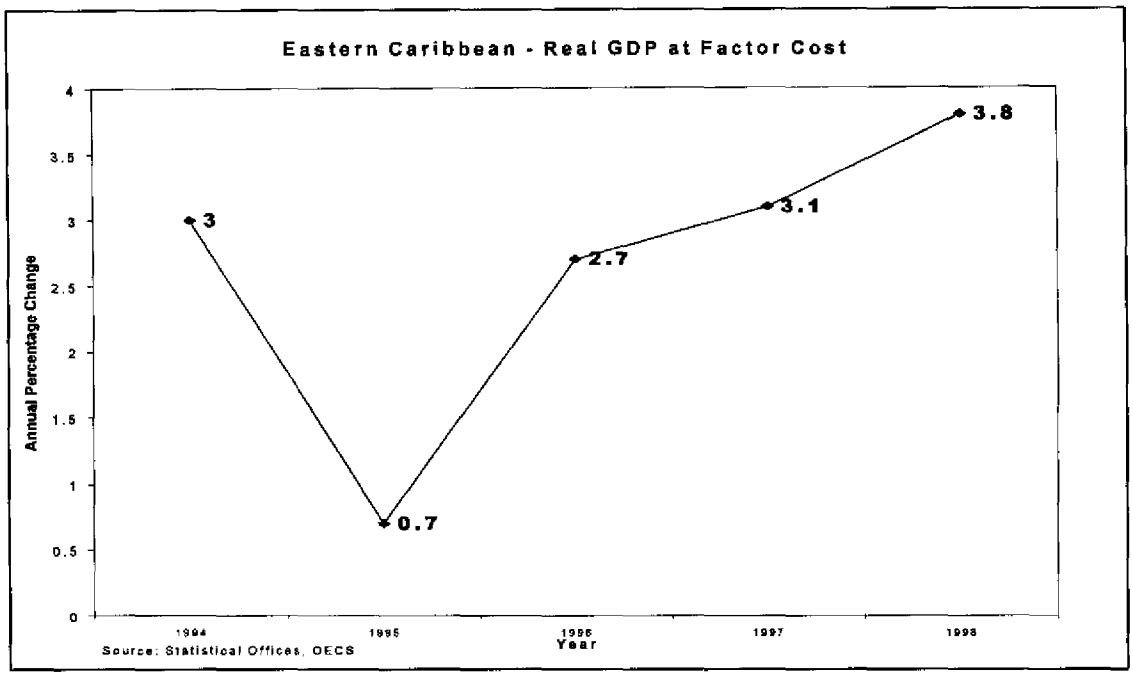
Clearly, even a small disaster, in terms of monetary damages can have major economic implications in a small country, even when larger countries may be susceptible to a larger number of disasters. However, during the second half of the decade, the small islands of the Northeastern Caribbean seemed to be particularly vulnerable.

Graph 1 illustrates the impact of the 1995 hurricane season on the economic performance of the Eastern Caribbean area. During 1995 hurricanes Marilyn and Luis and tropical storm Iris hit the Eastern Caribbean. The 1995 storm season caused a drop from 3.0 to 0.7 in the annual rate of growth of real gross domestic product (GDP) in the countries member of the Organization of Eastern Caribbean States (OECS), according to figures from the Eastern Caribbean Central Bank (ECCB). The impact on the individual countries was even more severe with Antigua and Barbuda and Anguilla experiencing a decline in the growth rate to -5.0 and -4.1 respectively. Tourism, agriculture and real estate and housing were the sectors most affected. In Anguilla tourist arrivals did not recover until 1997, while by 1999 Sint Maarten had still not recovered.

In a large continental or archipelagic country, the economic impacts on given sectors/areas can either be diluted or offset by robust growth in other areas. For example, Hurricane Floyd was classified as a category 4 hurricane when it struck the Family Islands in the Bahamas. Here, the impacts of the extensive damages on Eleuthera and Abaco were counteracted by a strong improvement in tourism in the other islands, notably in Nassau and Paradise Island. Coupled with reinsurance inflows and reconstruction activities, the result was a real economic growth of about 5.5 per cent. On the other hand, the IMF noted that the long-term economic impact of hurricanes Luis and Marilyn in Sint Maarten contributed to the continued economic malaise, which is facing the Netherlands Antilles.

In the Dominican Republic, hurricane Georges caused an estimated US$ 2.2 billion in economic damages in 1998. The sectors most affected were housing, with over 49,000, mostly low-income houses destroyed, tourism and agriculture. Nevertheless, the high buoyancy which characterized the economy in the second half of the decade, was maintained albeit, at an estimated loss of 1 percentage point of real GDP growth.

Graph 1



The volcanic eruptions in Montserrat have had catastrophic and cumulative consequences on the islands' economy, social fabric and its natural environment. Real GDP declined from EC$ 132.1 million in 1994 to EC$ 68.3 million in 1998. The GDP increase in 1990 was fuelled by a 60 per cent increase in construction, as compared with 1989. This increase more than compensated for the decrease in tourism, manufacturing and banking and insurance. The year thereafter and in 1992, most sectors returned to pre hurricane levels and the temporary boost of reconstruction activities was no longer felt in the economy. Crowards (1999) concluded that, although broad patterns could be observed in selected macro-economic variables, the considerable variation in individual events and country results made meaningful inter-country comparisons impossible. Table 2 sets out the broad patterns on selected economic variables in Caribbean countries.

The economic vulnerability of the region to natural hazards has been increased as a result of population growth, economic development, a focus on coastal tourism together with policy failures and environmental degradation. While economic development tends to reduce social vulnerability through improved housing, increased insurance and improved social welfare systems, it obviously increases the economic vulnerability because of the accumulation of wealth.

Caribbean environments have evolved in the presence of disasters. Arguably then, the region's natural systems depend on such disasters for ecosystem resilience and diversity. However, many of the region's ecosystems are significantly degraded, a process which continues. In such cases, additional stress caused by a disaster can result in damage that is irreparable. Ecosystem restoration may no longer be feasible and vulnerability may be reduced only by recourse to man-made investments etc. Marine and coastal degradation tend to aggravate

economic vulnerability through the increased exposure of coastal infrastructure to high energy wave action and storm surge because natural barriers such as mangroves, sand dunes or coral reefs have lost much of their protective functions.

Table 2

ECONOMIC IMPACTS FOLLOWING A NATURAL DISASTER

Variable	Year of event	Year after	Subsequent years
GDP	Immediate drop in GDP growth	Rise in GDP growth from reconstruction	Slow down in 2nd and 3rd year as boost subsides
Exports of goods	Reduction in rate of growth	Return to previous levels a/	Spillover to next year
Imports of goods	Considerable increase in rate of growth	Return to pre-disaster level	Further drop, possibly caused by reduced incomes
Tourist arrivals	Considerable drop	Some recovery	Recovery continued
Cruise ship arrivals	Considerable drop		
External debt	Increase in rate of growth	Drop of the rate of increase to below pre-disaster levels	

Source: Crowards, 1999.

a/ Depending on crop season, the reduction for agricultural exports, etc. may occur in the year following the disaster.

The cumulative impacts of environmental degradation increase social as well as economic vulnerability. The effect of terrestrial degradation, combined with policy failures, may very well be the increased loss of life as was experienced in Hispaniola following Gordon and Georges, or in Puerto Rico, following the floods and landslides in 1985.

Because of the concentration of economic activities in the coastal zone (e.g. tourism) the increased exposure of coastal infrastructure results in increased economic vulnerability. For example, the earlier quoted drop in real GDP growth rates in the Eastern Caribbean following the 1995 hurricane season was mostly caused by an 11.3 per cent contraction in the value added for hotels and restaurants. Likewise over 80 per cent of the economic damages in Anguilla following Hurricane Lenny are tourism related and a consequence of cumulative environmental degradation.

Responsibility for change pertains to both the public and private sector and largely stems from a corresponding failure to incorporate disaster prevention and mitigation measures. Policy failures can include the absence of a system whereby pre disaster information can be made available to the public. This was identified as a contributory factor for the high death toll in the Dominican Republic following Georges in 1998 and in Puerto Rico following the floods in 1985.

Policy failures might also relate to poor or corrupt building and construction practices resulting from the non-existence or non-compliance with building standards, or from the lack of incorporating risk into insurance rates. In view of the existence of high levels of environmental degradation and a correspondingly high level of economic vulnerability, the continuing policy of granting permission for the construction of hotels and residences in obviously high-risk environment is to be construed as an important policy failure.

The extent of the damage caused by Keith to the small economy of Belize – affecting its main foreign currency earning activities of tourism and agriculture – and the efforts required for the recovery point up the need for the country to receive cooperation from the international community. Its effects will be felt over the 2000 and 2001 period, affecting the economic outcome of both years, at least. Some of the reconstruction process will certainly extend beyond that, as projects will develop over the years and their completion and maturing process may take some time. This recuperation process involves the creation of a less vulnerable physical development strategy and a better preparation in the face of climatic phenomena that cyclically affect the country, that seem to have increasing force and less reliable patters and cause increasing economic and developmental losses. International funds will be needed to complement national efforts – both public and private – to carry out the reconstruction programme. The attached project profiles show the magnitude of the efforts involved and indicate the degree of urgency and the priorities to be set, with the participation of the international community

1. The mission

The Government of Belize, at the recommendation of the IDB and the World Bank, requested ECLAC's technical assistance to undertake a comprehensive damage assessment report in the aftermath of Hurricane Keith. After a preparatory mission ECLAC prepared the terms of reference for the study to be undertaken and convened a team of experts to carry out the evaluation mission. Funded by the Government through the emergency resources received from IDB, ECLAC completed the rapid evaluation included in this document.

The mission had the full support of the UNDP Resident Coordinator for Belize and received the full cooperation of the United Nations agencies and other international and regional organisations with offices in Belize. The work was carried out with the full cooperation of the national authorities and benefited from the preliminary assessments of damages prepared by the National Emergency Management Organization (NEMO) and the administrative and substantive support of the ministries of Economic Development and of Finance. The IDB and PAHO Representations in Belize provided office space for the mission and the local representatives of IICA and UNICEF also assisted the mission.

The mission visited Belize from 12 to 22 November 2000. The team included the following ECLAC officials, external consultants and officials of other international organisations who joined the team:

- Ishmael, Len, Director of ECLAC Subregional Headquarters for the Caribbean (Urban planning and overall development implications)
- Zapata-Marti, Ricardo, Mission co-ordinator
- Andersson, Bernt (PAHO)
- Budhram, Dowlat (IICA)
- Buescher, Gabriella (UNICEF)
- Busby , Lancelot (Macroeconomist)
- Ghisolfo, Francisco (Transport, communications and telecommunications and project formulation)
- Gómez, José Javier (Tourism and overall environmental aspects)
- Kambon, Asha (Social affairs, including housing)
- Mojica, Francisco (Basic Infrastructure and Services)
- Osorio, Claudio (PAHO)
- Pérez, Jose Miguel (IICA)
- Rojas, Ricardo (PAHO)
- Smith, David (Beach and coastal environmental assessment)
- Tapia, Antonio (Agriculture)

This document contains an independent assessment of the disaster, which sets forth the overall magnitude of direct and indirect damages and their effects on the behaviour of the economy as a whole. It is intended to assist in drawing up proposals for reconstruction priorities and needs, one of which should be the explicit incorporation of measures to reduce the country's high vulnerability to such disasters and increase Belize's sustainability for development.

2. Description of the phenomenon and its effects

The hurricane season in the northern hemisphere and the Atlantic Ocean (July to November) has been unusually long for the last three years – since 1998 – and caused enormous and cumulative devastation, loss of life, and economic, social and environmental damage in the Central American and the Caribbean. Data for the nineties appears in Table 3.

a) Storm description

Tropical Storm Keith began to intensify on 29 September 2000. Between Saturday 29 and Sunday 1, this system intensified from a tropical storm status to a category 4 hurricane. (Table 4 describes the Saffir-Simpson scale used to categorize hurricane's strength in terms of windforce and energy.) Over this period, central pressures dropped from 1 004 milibars (mb) to 942 mb, with a corresponding increase in sustained wind speed from 25 kilometres (km) to 115 km. During that period also, the hurricane remained almost stationary over the northern part of Belize, with the eye approximately over Ambergris Caye. A key feature of this hurricane was its rapid progression from a tropical depression to a category 1 hurricane in less than 24 hours and further rapid development to a category 4 hurricane in less than an additional 24 hours (see Graph 2).

Table 3

MAJOR TROPICAL STORM AND HURRICANES IN THE CARIBBEAN, 1990-1999

Year	Classification	Name	Area	Dates
1990	Tropical Storm	Arthur	Tobago/St. Vincent and the Grenadines	22-27 July
	Hurricane	Diana	Yucatan	3-7 August
	Tropical Storm	Fran	Trinidad	11-14 August
	Hurricane	Klaus	Virgin Islands	2-9 October
1991	Tropical Storm	Fabian	Cuba	14-15 October
	Hurricane	Caesar	Trinidad and Tobago/Netherlands Antilles	24-29 July
1992	Hurricane	Andrew	Bahamas	16-27 August
1993	Tropical Storm	Bret	Trinidad/ Belize	4-11 August
	Tropical Storm	Cindy	Martinique	14-17 August
1994	Tropical Storm	Debby	St. Lucia	9-11 September
	Tropical Storm	Gordon a/	Jamaica/Cuba/Bahamas	8-21 November
1995	Hurricane	Erin	Bahamas	31 July 6 August
	Hurricane	Iris	Leeward Islands	22 August 4 September
	Hurricane	Marilyn	Virgin Islands b/ Netherlands Antilles/Leeward Islands/Dominica/Puerto Rico	12 -22 September
	Hurricane	Luis	Leeward Islands c/ Netherlands Antilles	27 August 11 September
1996	Hurricane	Lili	Cuba/ Bahamas	14–27 October
1997		None		
1998	Hurricane	Georges	Leeward Islands/Netherlands Antilles/Puerto Rico/Dominican Republic/Haiti/Cuba	15 September 1 October
1999	Hurricane	Floyd	Bahamas	7-17 September
1999	Hurricane	Jose	Anguilla/Netherlands Antilles/Leeward Islands/British Virgin Islands	17-25 October
	Hurricane	Lenny	Netherlands Antilles/ Virgin Islands	13-27 November
	Hurricane	Irene	Cuba	13-19 October
	Hurricane	Dennis	Bahamas	24 August 7 September

Source: United States National Hurricane Centre.
a/ Haiti severely affected. Rain/Floods.
b/ US and British Virgin Islands
c/ Antigua and Barbuda, St. Barts, St. Maarten, Anguilla.

Table 4

SAFFIR-SIMPSON HURRICANE SCALE VALUES

S-S Category	Maximum sustained wind speed (km/h)	Minimum surface pressure (mb)	Storm surge (m)	Relative damage value
Tropical storm				
1	119-153	>980	1 0 to 1.7	1
2	154-177	979 to 965	1.8 to 2.6	10
3	178-209	964 to 945	2.7 to 3.8	50
4	210-249	944 to 920	3.9 to 5 6	250
5	> 249	< 920	> 5.6	500

Because it was nearly stationary, this hurricane resulted in a record amount of rainfall on Belize. It is estimated that approximately 815 mm of rainfall fell in a 72-hour period between Saturday, 29 September and Monday, 1 October (see Graphs 2 and 3). This was one of the most extreme rainfall events that have been experienced in Belize in recent memory. Graph 3 shows the stationary position of the hurricane on 1 October., 2000.

Graph 2

Hurricane Keith wind speed and central pressure