

## II. ASSESSMENT OF THE DAMAGE

This chapter contains an assessment of the damage caused by Hurricane Keith to the social (housing, education, health), infrastructure (energy, transport and communications, water and sewerage) and production sectors (agriculture, fisheries, tourism, industry and services), and to the environment. The assessment was carried out on the basis of information available during the mission and incorporates aspects that became known soon afterwards.

Direct damages or effects were assessed, i.e., to physical infrastructure and the country's capital reserves, and indirect damages or effects, such as lower production of goods and services and emergency outlays. Direct damages have been assessed on the basis of capital assets prior to the disaster; i.e., taking into account depreciation and normal use of capital goods.

In keeping with ECLAC methodology, the loss of crops, either about to be harvested or stored for distribution, is calculated as direct damage, and damages to inventories and production under way in the industrial sector are classified as direct costs.

The cost of rebuilding damaged assets has also been calculated where relevant. If the aim were to return to the situation prior to the hurricane, the value would be the same as the direct cost according to this methodology. However, for the purpose of a reconstruction programme, the assessment should also take into account the value of improved replacement, including disaster prevention and mitigation criteria, such as better technology and quality and more resistant structures. The country now has an opportunity to rebuild on sounder economic, social and environmental bases while simultaneously reducing its vulnerability to natural disasters.

The ECLAC mission interviewed representatives of the government, the private sector, international organizations, UNDP and other United Nations agencies, who frequently provided information and valuable suggestions for the preparation of this document.

The figures used in this chapter were calculated in local currency and in US dollars, based on the exchange rate of BZ\$2.00 per US dollar.

### 1. Social sectors

#### a) Housing

Some 3,000 houses have been so badly damaged by Hurricane Keith that they require complete replacement for families to be able to occupy them once again. This represent a little less than 10 per cent of the affected area's housing stock which was estimated in 1994 at 35,355 units. Of these the destroyed ones are almost two thousands. The most affected districts were Belize (namely in San Pedro and Caye Caulker) and Orange Walk. Table 13 indicates the breakdown by district.

Table 13

BELIZE: LOCATION AND NUMBER OF HOUSES AFFECTED BY  
HURRICANE KEITH

District	Number	Damaged houses (Cost of damages)	Lost houses (Reconstruction costs)
		Thousands of Belize dollars	
Total	1,988	21,725.3	46,735.3
San Pedro	406	10,280.0	12,670.0
Caye Caulker	275	6,625.0	9,625.0
Belize District (other than cayes)	65	2,761.0	3,490.0
Orange Walk	1,212	1,889.3	11,034.3
Cayo District	30	90.0	90.0
Corozal District	0	80.0	80.0
Other a/	...	...	9,746.0

Source: ECLAC, on the basis of official data.

a/ Damaged houses in the villages of More Tomorrow, Roaring Creek and Black man Eddy were not yet counted and, thus, not included here.

Many dwellings were either totally destroyed or suffered complete or partial roof damage, particularly in the coastal areas hit by hurricane-force winds. Others suffered damage as a result of flooding. In all cases there was severe losses in spite of the materials used.

Damages to house in Caye Caulker are expected to have some negative effect on the tourism sector as many of those home offered a tourist service of bed and breakfast. It was estimated that approximately 238 homes on the Cayes were completely destroyed while 558 needed roofs and other repairs.

The repairs and replacement to similar conditions (which appear in Table 14) have a value of BZ\$36 million. To this cost must be added the indirect costs of lost or increased rental costs, some looting that occurred and the replacement of lost furnishings and expenses generated in shelters while the homeless victims remained there.

It was reported than in many cases only the head of the household remained on the island while the rest of the family had left to stay with relatives on the mainland. As mentioned earlier, for the most part, persons preferred not to stay in temporary shelters, but to live with friends and family fortunate enough to have homes. Some hotels and property owners opened their doors to the homeless as well.

Table 14

## BELIZE: SUMMARY OF EFFECTS ON THE HOUSING SECTOR

	Thousands of Belize dollars
Total	68,620.8
<u>Direct effects: (a = i + ii)</u>	<u>68,460.6</u>
i. Reparation of damaged houses	21,725.3
ii. Replacement of lost houses	46,735.3
Imported component	14,020.6
<u>Indirect effects</u>	<u>160.2</u>

Source: ECLAC, on the basis of official data.

Reports indicated that the repairs to homes on the islands were very slow to commence. Lack of building materials and a plan that provided alternatives for securing financial assistance may have contributed to this.

It should be noted that the dwellings destroyed completely were generally made of flimsy materials and very precariously built. This poor quality of housing makes persons more vulnerable to hurricanes. Building codes are not adhered to as poor people build wood and thatched roof structures or wood and zinc roof structures without necessary approval. Timber blockhouses are also common. Many housing settlements are in flood prone or low lying districts increasing their vulnerability to the effects of a hurricane. It must be pointed, nevertheless, that reconstruction with some required improvements to reduce vulnerability is a larger figure, as can be seen in Table 15.

Table 15

## BELIZE: ESTIMATED RECONSTRUCTION COSTS

	Thousands of Belize dollars
Total	106,416.9
<u>Direct effects: (i + ii + iii)</u>	<u>93,470.6</u>
i. Reparation of damaged houses	36,989.3
ii. Replacement of lost houses	46,735.3
iii Cost of furnishings	9,746.0
Imported component	16,757.1
<u>Secondary effects (relocation)</u>	<u>12,946.3</u>

Source: ECLAC, on the basis of official data.

## **b) Education**

Damage to the education sector was considerable. Particularly hard hit were the schools that suffered damage to their roofs and to their structures due to flooding. Schools in Belize District, particularly the Cayes and Belize City suffered the most damage. Those located in Orange Walk and Cayo District suffered the next highest level of damage. In all some 51 schools, thirty-three at the primary and 18 at the secondary level were damaged both in rural and urban areas. (See Table 16.)

As a result of the hurricane over 2,000 children were unable to attend school for a period of at minimum two and a half weeks. The government attempted to get children back in school as quickly as possible. In some instances children were out for as many as four weeks in order to probably sanitise the facilities, particularly those in the Belize river valley, New River and the Rio Hondo which required flushing, cleaning and disinfecting before the classes could resume. This has a sense of urgency since education is critical for Belize as the recent literacy survey point to a functional literacy rate of only 42.5 per cent and the 1996 poverty assessment identifies a clear relationship between poverty and people's level of education.

The larger amount of total damage corresponds to direct costs; indirect costs were slightly lower (BZ\$810,000). Damage to infrastructure centred on semi-destroyed schools. Schools that were used as shelters also suffered damage in the vicinity of some BZ\$127,000. (See Table 17.) Most were vacated within two weeks of the disaster.

Schools lost newly created computer laboratories, desks, chairs and educational materials, all of which will set back the educational programme of the Ministry of Education which is geared to improving the quality of education offered to its population.

Three libraries, two located in Belize city, the Leo Bradely Library and the North Front Street Library, and one in Belmopan, the Belmopan Library, suffered damage as a result of the rains and flooding. The cost of repairs have been estimated at BZ\$102,000, to which should be added furnishings in the amount of BZ\$622,125.

Sporting facilities have suffered damage due not only to the hurricane but also as a result of their having been used as emergency distribution points and temporary deposits for diverse materials (electric cables, poles, etc.). Those most affected were located in Belize City, San Pedro on the Cayes, and in Orange Walk. The damage is estimated at BZ\$418,000. (See table 18.)

Table 19 summarises the direct and indirect costs of damages to the education sector. Reconstruction and reinforcement of existing structures in order to reduce vulnerability and exposure to risk associated with climatic phenomena could increase costs considerably. This figure will depend on the Government and communities decisions in respect of the mitigation process.

Table 16

## BELIZE: SCHOOLS DAMAGED BY HURRICANE KEITH

(Thousands of Belize dollars)

	District	Rural	Urban	Damages
Total				958.2
Belize District				556.9
All Saints School	Belize City		x	17.0
Buttonwood Bay Nazarene Primary School	Belize City		x	10.3
Central Christian Assembly	Belize City		x	27.3
Excelsior High School	Belize City		x	10.1
Fort George Education Center	Belize City		x	16.6
Gwen Lizarraga High School	Belize City		x	25.1
Ladyville Technical High School	Belize City	x		14.5
Lake -1 Community Center	Belize City		x	7.4
Nazarene High School	Belize City		x	96.3
Pallotti High School	Belize City		x	15.6
Queen Square Anglican School	Belize City		x	5.1
St. John's Primary	Belize City		x	20.1
St. John's Vianney	Belize City		x	1.8
St. Joseph School	Belize City		x	2.5
St. Martin de Porres, (BZE)	Belize City		x	9.1
St. Mary's/Queen's Square/ St. John's Anglican Schools (BZE)	Belize City		x	27.7
Wesley College	Belize City		x	3.0
Caye Caulker RC School	Caye Caulker	x		71.2
San Pedro Adventist	San Pedro	x		67.2
San Pedro High School	San Pedro	x		5.7
San Pedro RC School	San Pedro	x		53.0
San Pedro Seventh Day Adventist School	San Pedro	x		50.3
Corozal and orange walk				185.4
Caledonia School	Corozal	x		0.4
Sarteneja Kindergarten	Corozal	x		1.2
Sarteneja School	Corozal	x		15.0
Schools in the Corozal District	Corozal	x		123.9
OW Schools to date	Orange Walk	x		44.9
Other				215.8
Anglican Cathedral College			x	34.2
Canaan SDA High School			x	6.0
Center for Employment Training (BZE)			x	29.3
Edward P. Yorke High School			x	3.8
Grace Primary School			x	90.0
Maskall RC		x		4.0
Sadie Vernon High School			x	0.3
St. Catherine's Academy			x	44.1
St. Edmond Champion RC School			x	0.4
Stella Maris School			x	3.7

Source: ECLAC, on the basis of official data.

Table 17

## BELIZE: SCHOOLS DAMAGED FROM USE OF SHELTERS

	District	Rural	Urban	Damages (Thousands of BZ\$)
Total schools				127.1
San Pedro Roman Catholic School		x		53.0
Fort George Education Centre	Belize City		x	16.6
Queen Square Anglican School	Belize City		x	5.1
Salvation Army	Belize City		x	1.5
St. John's Middle & Upper School	Belize City		x	20.1
Buena Vista School	Corozal		x	1.2
Caledonia School	Corozal	x		0.4
Copper Bank	Corozal	x		0.2
Corozal Town Health Clinic	Corozal		x	0.4
Progreso School	Corozal	x		0.1
Ranchito School	Corozal	x		3.5
August Pine Ridge	Orange Walk	x		10.0
Fireburn School	Orange Walk		x	10.0
San Felipe School	Orange Walk	x		0.5
San Francisco School	Orange Walk		x	1.8
Yo Creek RWS	Orange Walk	x		2.8

Source: ECLAC, on the basis of official data.

Table 18

## BELIZE: DAMAGES TO SPORTING FACILITIES

(Thousands of Belize dollars)

	District	Rural	Urban	Damages
Sporting Facilities				418.9
MCC Grounds	Belize City		x	14.4
Roger Stadium	Belize City		x	32.3
National Sports Council Office	Belize City		x	3.7
City Center Sporting Facility	Belize City		x	223.1
National Stadium	Belize City		x	50.9
San Pedro Town Football Field	San Pedro	x		9.3
San Pedro Town New Football Field	San Pedro	x		31.0
San Pedro Town Basketball Court	San Pedro	x		13.0
San Pedro Town Five A Side Football Court	San Pedro	x		7.5
Norman Broaster Stadium (Cayo)	Cayo		x	2.5
People's Stadium (Orange Walk)	Orange Walk		x	31.3

Source: ECLAC, on the basis of official data.

Table 19

## BELIZE: SUMMARY OF EFFECTS ON THE EDUCATION SECTOR

	Thousands of Belize dollars
Total	3,038.3
<u>Direct effects:</u>	<u>2,289.1</u>
i. Reparation of schools (without improvement)	958.2
ii. Replacement of school materials and furnishings	810.0
iii. Damages to libraries	102.0
iv. Damages to sport facilities	418.9
Imported component a/	911.5
<u>Indirect effects:</u>	<u>749.2</u>
i. Cost of teachers during class suspension	622.1
ii. Damages for use as shelters	127.1

Source: ECLAC, on the basis of official data.

a/ Includes computers lost during the disaster.

### c) Health sector

i) Health infrastructure. The main damages to the health infrastructure were reported to the National Hospital (Karl Heusner Memorial Hospital) and the Central Medical Laboratory and several clinics in Belize City, Belize rural, San Pedro (Ambergris Caye), Corozal and Orange Walk districts. It is estimated that eleven health centers lost their three-month medical supplies and basic equipment.

The Karl Heusner Memorial Hospital is the national referral hospital in Belize (119 beds), receiving patients from the City and all the Districts as well as being the Accident and Emergency Centre for Belize City and the rest of the country. Immediately before and during Keith, some patients were discharged and sent home from the Hospital, and some were transferred to the District Hospitals in Belmopan and San Ignacio.

The Hospital, therefore, remained functional throughout the storm and this is undoubtedly a tribute to the determination and resilience of the staff as a large amount of water entered the buildings through the roof, windows and doors and also up through the floor. Fortunately no serious damage was reported to equipment, although the immediate and longer-term effects of the water seepage on the floor and ceiling tiles will undoubtedly be a problem.

The Central Medical Laboratory and Blood Bank is the only such facility in the country, and its main activity is the analysis of Safe Blood for transfusion. The hurricane affected the Safe Blood supply as all reagents, all blood units stock (50) and 100 per cent of supplies were lost due to electricity failure (the generator didn't work) and flooding.

Several pieces of furniture and equipment are malfunctioning or damaged following Hurricane Keith. Some of them are essential such as: the Blood Bank Unit (Refrigerator), the

ELISA washer (for HIV, hepatitis and dengue testing) and the autoclave, two large capacity storage refrigerators (bacteriology and chemistry), the Histo-center and two microscopes from the Histology/Cytology Department.

Minor water damage to ceilings, roofs, floors and workstations was reported on the three floors due to leaking and flooding, but damages need to be repaired to ensure correct function.

Availability of safe blood for transfusion is a major area of concern, since blood screening for HIV, hepatitis B and syphilis cannot be performed presently due to the lack of reagents and equipment. Therefore, the restoration of the Central Medical Laboratory and Blood Bank capacity for blood safety is an urgent matter.

ii) Epidemiological and environmental health issues. Water supply systems were greatly affected by Hurricane Keith. The islands and four districts were completely flooded resulting in dumpsites, sewer lagoons and excreta from latrines and septic tanks being washed into residential areas. This also caused contamination of wells used by the residents for drinking purposes. On the basis of available information, approximately 480 water wells were affected, representing a 10 per cent of the total of this kind of facility in the country. In addition, 1,140 excreta disposals were destroyed or partially affected by the hurricane, amounting to approximately 20 per cent.

The poor environmental conditions, poor personal hygiene, together with the unavailability of sufficient safe water also makes food safety a concern, since there is neither an inspection mechanism in place nor equipment to ensure safety standards. Food poisoning cases have already been reported. Due to the existing epidemiological situation, compounded by the environmental conditions and the disruption of public health and primary care services, the potential for outbreaks is high. Communities living in flooded areas are at particularly high risk of being affected by possible outbreaks or diseases such as dengue fever, typhoid, malaria, cholera, gastroenteritis, leptospirosis, Chagas and hepatitis A, which are already endemic in the country. Table 20 indicates the population at risk in the affected districts.

Table 20

BELIZE: POPULATION AT HIGH RISK OF HEALTH  
IMPAIRMENT

Total	72,092
Belize	35,314
Orange Walk	15,536
Corozal	15,419
Cayo	5,823

Source: PAHO/WHO.



Table 21 summarises the direct and indirect damages experienced in the health sector. Reconstruction costs and an indication of import components are included.

Table 21

## BELIZE SUMMARY OF DAMAGES TO THE HEALTH SECTOR

(Thousands of Belize dollars)

	Damage			Reconstruction costs	Imported components
	Total	Direct	Indirect		
Total	3,888.0	2,558.0	1,330.0	2,855.0	1,600.0
Partial or total destruction of health infrastructure	1,130.0	1,120.0	10.0	2,200.0 a/	
Loss equipment and furnishings	640.0	640.0			1,500.0
Health community education material	70.0		70.0		
Extra spending on drugs and medications	524.0	104.0	420.0	5.0	100.0
Vector control- environmental sanitation activities	674.0		674.0		
Increase cost of inpatient, outpatient and medical care	123.0		123.0		
Epidemiological surveillance	30.0		30.0		
Damages in rural water supply systems (wells, rain water vats)	157.0	157.0		250.0 a/	
Damages in rural sanitation systems (latrines)	537.0	537.0		400.0	
Psycho-social rehabilitation (consultancy and training materials)	3.0		3.0		

Source: PAHO/WHO different reports: "Preliminary Economic Impacts of Hurricane Keith", NEMO, Oct. 2000, *Situation Analysis of Rural Water Supply & Sanitation in Belize*, UNICEF, Ministry of Health, PAHO/WHO, 1995.

a/ Includes some minor improvements.

## **2. Damage in productive sectors**

This section includes estimates of damage to the agricultural, fisheries, tourism, and other productive and services sectors. The extremely severe weather conditions in the wake of Hurricane Keith caused serious disruptions to the country. Some were very brief namely the cuts in basic services that were quickly restored. Others will have more serious implications. The impact on tourism is broken into two aspects. Damages to the infrastructure, which will be repaired and replaced promptly, and the number of visitors, which may be adversely affected in the impending high season. It must be praised that the government and the private sector operators have joined efforts in launching a campaign to dispel a false perception that might affect them negatively. In the case of agriculture and fisheries the effects will be somewhat more lasting, given the seasonal nature of their production and the persevering negative physical conditions associated with slowly receding waters and mud deposits. Crops tend to be the most affected due to excess water, and crop damage depends on various factors, which are described below.

Apart from losses of infrastructure and capital goods (tractors, combine harvesters, etc.), direct damage in the farming sector includes lost harvests and stored produce. The effect of the hurricane on future farming output is considered indirect damage, whereas in the industrial sector (namely sugar processing, rice husking, citrus concentrate), inventories and goods in process affected by the hurricane are counted as direct damage.

### **a) Agriculture, livestock and fisheries sector**

As a result of Hurricane Keith, the agriculture sector experienced major losses. Sugar, citrus and rice crops were affected in the districts of Corozal, Orange Walk, Belize and Cayo. The Orange Walk District was affected the most, accounting for 35 per cent of total estimated losses. It was mainly damages to the sugar cane crop, which is the most important agricultural export commodity for the district and the country. The citrus industry – the second most important export crop – also experienced major losses in the Cayo District. In Blue Creek, which is the main producing area for rice, only 5 per cent of the crop could be harvested, the rest was lost due to the flooding.

Major losses in crops and livestock were experienced as a direct result of floods. In some areas water remained without draining for a significant period of time. During this period most commodities for national consumption were in production and reaching harvesting time. This has increased losses since harvesting could not be carried out in time. This will also affect national consumption and product availability to those who store their crop for home consumption. Rice and beans will have to be imported, in order to attain the necessary food supply for next year.

The livestock sector suffered minimal direct damages compared to total stocks. Major losses in this sector were linked to damage to pastures and to secondary effects resulting from stress and loss of weight in cattle and poultry.

The fisheries sector experienced significant damages especially in the reduction of expected catch, due to silt accumulation. Most affected are areas of lobster production. This is

expected to also reduce the annual catch for some time (up to three years), with the consequent negative impact on the income of the majority of fishermen.

The Ministry of Agriculture, Fisheries and Co-operatives (MAFC) reacted immediately by preparing a comprehensive and well-organised plan, which involved in providing inputs and other supplies to alleviate the present situation. At the same time an immediate plan of action was activated with the assistance of supporting agencies such as IICA, FAO, and the Regional Unit for Technical Assistance in Central America (RUTA, run by IICA and funded by the World Bank), to start the recovery of areas affected. Seed distribution, assistance in preparing loan applications, machinery services were the immediate steps taken by MAFC.

i) **Crop Analysis. Sugar Cane:** This commodity is a major contributor to the Belizean Economy involving approximately 9,000 farmers. Approximately 22 per cent of total expected production was lost mainly due to flooding along the Rio Hondo and New River. It is estimated that 24,281 hectares were flooded, production being lost in at least 2,835 hectares. A reduction of 15 per cent in yield is expected alongside an increase of transportation cost due to the present road situation. Additionally, some replanting will be necessary due to loss of rootstock under extended period of flooding and reworking will also be needed to replace herbicide and fertilizer washed away and to eradicate new weed seeds most likely to germinate. Being the major commodity exported, these losses in production will not only have a significant effect on the socio-economic standard of the sugar-cane farmer, but will impact the overall economic performance for the period 2000-2001.

**Citrus:** Approximately 2,553 hectares of citrus were completely lost in the Cayo, Orange Walk, Belize and Stann Creek districts. A reduction of 5 per cent in production is estimated for the remaining planted surface. This will have, added to the decrease in the price of the product, a significant impact to the citrus farmer and the juice extraction industry as a whole. Losses resulted as a consequence of the excessive high winds that affected the coastal areas. Additionally, flooding in some areas prevented harvesting; therefore a loss in production was recorded. An increase of phytophthora disease is expected, so farmers will have to increase investment to prevent major losses in production.

**Papaw (Papaya):** A total of over BZ\$4.3 million were lost as a result of wind destruction mainly in the Corozal, Orange Walk and Cayo districts. This will decrease expected production by 15 per cent and impact negatively in the exports of this crop. The recuperation and future expansion of papaya plantations could generate major foreign exchange earnings, since CARICOM partners appreciate the quality of the Belizean product.

**Other export crops:** The Government of Belize has initiated a program to identify new commodities for the export market such as cowpeas, plantains, etc. Some of these crops suffered major losses, totalling approximately, BZ\$20 million. Promotion of these commodities in the CARICOM market is a potential area for future investments. It is also socially important because most farmers involved are very small in size but capable and ambitious.

**Rice:** This is a major domestic crop widely cultivated in the Orange Walk, Corozal and Belize districts. Major production is concentrated in the Mennonite Community of Blue Creek (in the Orange Walk District) where an intensive production system is carried out. Harvesting of rice

was about to start when the hurricane hit, flooding about 50 per cent of the rice area, part of which is still flooded after several weeks.

Corn: This is also a very important crop in the northern part of the country and is destined mainly for the production of cattle, poultry, pigs and sheep feed. Almost 70 per cent of the corn area was affected (10,994 hectares) with a total cost of BZ\$6.9 millions. It is estimated that in the preparation of feeds, another inputs can be used, in order to avoid imports until the next crop is available in October 2001.

Other crops were also damaged, but losses were not of a significant economic importance as a whole. Soybeans, plantains, beans, vegetables and root crops can be included among these less severely affected productions.

ii) **Livestock.** Major damage occurred in grazing lands. An area of 17,627 hectares remained under water for over 15 days. Most of the area damaged will have to be replanted, and in the meantime the cattle should be moved to other places to be fed until the new pastures will be ready to be used. The Government is already operating a plan to feed cattle using sugar cane that will not yield sugar since it was blown down by the wind. This cane is to be cut and chopped for animal consumption. This plan and similar initiatives should be considered for implementation while grazing lands and pastures recover. In order to reduce the pressure on the diminished feeding capacity, some cattle could be sold and sent to farmers in other areas of the country.

Commercial rearing of chickens was not significantly affected by the strong winds that accompany the hurricane, but some chicken held by small farmers, practically disappeared in the more severely affected areas. It is estimated that almost 40,000 chicken were lost during Keith.

iii) **Fisheries.** Lobster catching is the mainly affected activity in the fishing industry. Hurricane Keith came in the area in the middle of the fishing season (Jun 15 – Feb 15), with peaks in the last three months of the year. This not only affected the capture of lobster but also damaged the infrastructure and equipment required by the fishermen. Vessels, motors, piers, traps (cages), and in certain cases the fishermen's dwellings and limited storage facilities were destroyed.

Furthermore, in certain areas the sedimentation of sand, mud and debris over the fishing grounds has made it impossible to catch lobsters after the hurricane. The recovery of these areas is vital for fishermen. Unfortunately rehabilitation is constrained to the evolution of sea currents which will naturally restore fishing grounds by washing away the silt that was deposited by Keith. This natural process will take some time. Furthermore, water pollution by debris pushed lobsters out of the area: they migrated and fishermen will have to wait until they come back. In the meantime they are building and repairing the traps and restoring their infrastructure and gear. The MAFC has been giving these fishermen supplies, such as wood to assist them to recover.

Damage was not reported in shrimp production, most of which is done mainly in ponds which are located in the outskirts of the most severely hit districts. In the last five years shrimp production has increased at a very accelerated rate. Exports grew from BZ\$26 million in 1996 to

close to BZ\$46 million in 1999. This economic activity is expanding and it has a promising future and could partially compensate for the decline in lobster catch.

In addition to crops, animal and fishing resources affected some capital goods, machinery, farm equipment and inputs were damaged or lost during Keith. This includes a substantial amount of in-farm feeder roads. Table 22 summarises the direct and indirect effects on this important sector.

## **b) Tourism**

Damages caused by Keith are particularly harmful to the tourism sector since it is the most important economic activity in the Belizean economy. According to the World Tourism Organization (WTO) in 1996 it represented 14.3 per cent of GDP. It also constitutes the major export item of Belize, generating in 1998 revenues of US\$88 million and almost doubling the second export item (sugar).

Tourism has developed over the last decade as a dynamic sector, which is experiencing rapid growth (see Graph 5 below). Tourist arrivals have almost doubled, tourist infrastructure and tourist activities supply also expanded at a high rate.<sup>9</sup> A most important factor to be considered is that tourism products are related to Belizean culture and the country's natural resources endowment: tropical rain forest, living cultures, historic buildings and marine life.<sup>10</sup> Regarding country of origin, 70 per cent of visitors to Belize are from the United States and Canada and 23 per cent from Europe.

In terms of room revenue,<sup>11</sup> the most important areas of the country are Ambergris Caye (43.1 per cent of total room revenues), Belize District (23.6 per cent) and the Cayo District (10.7 per cent). The high season for tourism in Belize is from December to Easter.

i) Damage caused by Hurricane Keith. Direct damages. Sustained winds and storm surges brought by Hurricane Keith ravaged the northern Cayes of Belize, in particular Ambergris Caye, Caye Caulker, and Caye Chapel. (See Table 23.) Most of the hotels (62 in Ambergris Caye and 37 in Caye Caulker) and other tourist infrastructure and assets suffered damage with varying degrees of severity. Inland, fewer damages to the tourism sector were reported. An important Maya archaeological site, the ruins located in the Lamanai Nature Reserve reported damages caused by strong winds (fallen trees) and flooding. A crevice in the main pyramid structure damaged the cultural landmark.

<sup>9</sup> Between 1990 and 1999 the number of hotels increased from 210 to 390 and the number of rooms from 2,115 to 3,963. (BTB.)

<sup>10</sup> In a survey conducted in 1997, marine attractions were rated as the highest motivating factor for visitors to Belize. (BTB.)

<sup>11</sup> BTB receives 7 per cent tax based on the sale of hotel rooms.

Table 22

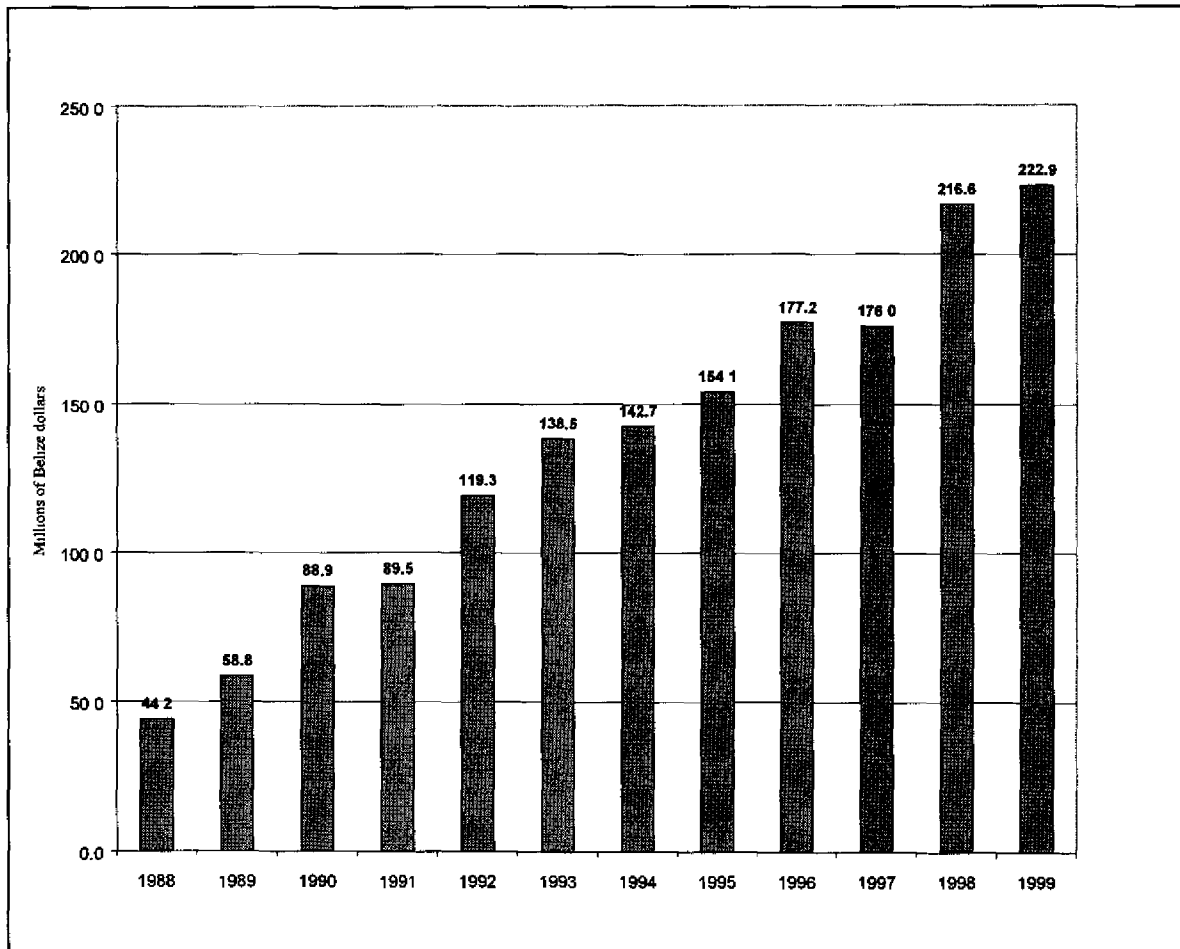
## BELIZE: SUMMARY OF DAMAGES TO THE AGRICULTURE SECTOR

	Total area (Ha)	Affected area (Ha)	Loss of production (t)	Damages (thousands of BZ\$)		
				Direct	Indirect	Total
Grand total	113,370	37,690	266,982	77,469.0	46,889.1	124,358.1
Export crops	49,961	6,434	272,264	20,693.6	31,244.4	51,938.0
Sugar	24,281	3,800	187,800	7,843.9	23,285.3	31,129.2
Citrus	25,528	2,553	81,891	8,023.8	5,976.2	14,000.0
Papaya (papaw)	49	42	2,376	4,294.8	1,775.9	6,070.7
Habanero pepper	22	19	188	331.2	207.0	538.2
Cotton	81	20	9	200.0	0	200.0
Domestic consumption						
crops	21,272	14,594	42,010	20,456.9	4,821.2	25,278.1
Rice	2,837	2,439	8,199	4,699.5	2,164.4	6,863.9
Corn	15,827	10,994	18,485	6,927.6	0	6,927.6
Soybeans	279	184	372	270.6	219.0	489.6
Plantain	490	375	11,067	2,927.8	2,437.8	5,365.6
Beans	182	87	97	156.5	0	156.5
Other fruits	1,342	294	1,451	1,522.9	0	1,522.9
Vegetables	250	180	2,107	3,792.9	0	3,792.9
Root crops	65	41	232	159.1	0	159.1
Livestock (heads/meat)	554,122	38,077	173	14,560.5	4,507.3	19,067.8
Cattle	52,060	288	78	181.1	4,507.3	4,688.4
Pigs	19,000	130	35	24.0	0	24.0
Poultry	479,000	37,635	58	121.1	0	121.1
Horses	3,000	15	-	7.5	0	7.5
Buffaloes	62	2	1.0	1.6	0	1.6
Sheep/goats	1,000	7	0.2	2.4	0	2.4
Pastures (Has.)	42,136	17,627	-	14,222.8	0	14,222.8
Fisheries	-	-	198	9,554.3	6,205.9	15,760.2
Lobster	-	-	100	4,831.5	4,941.3	9,772.8
Conch	-	-	72	1,197.7	1,077.9	2,275.6
Other fish products	-	-	26	167.9	186.7	354.6
Fishing equipment, materials, infrastructure				3,357.2		3,357.2
Beekeeping (Hives/honey)	800	612	37	107.1	110.1	217.2
Capital goods (excluding fisheries)				12,096.6	0	12,096.6
Machinery				148.0	0	148.0
Infrastructure a/				11,689.0	0	11,689.0
Equipment & materials				259.6	0	259.6

Source: ECLAC, on the basis of official data

a/ Mostly in farm feeder roads and some storage facilities. Lost housing in farms is also included.

Graph 5

**BELIZE: TOURIST EXPENDITURE, 1998-1999**

Source: Belize Tourism Board (BTB).

Table 23

BELIZE: DIRECT DAMAGES IN TOURISM  
(Ambergris Caye/San Pedro, Caye Caulker, Caye Chapel)

	(Thousands of BZ\$)
Total	124,094.0
1. Hotel buildings (including furniture, equipment, damage golf course) a/	84,000.0
2. Gift shops a/	10,000.0
3. Restaurants a/	11,800.0
4. Landscaping b/	2,560.0
5. Piers/marinas c/	1,134.0
6. Seawalls + backshore d/	10,400.0
7. Tourist related boats (140) a/	4,200.0

Source: ECLAC on the basis of official data.

a/ From information provided by the Belize Tourism Board (BTB) and insurance claims.

b/ Based on interviews in San Pedro; approximately BZ\$2,000 per room (1,278 rooms in both Cayes).

c/ Based on dock replacement cost in Mata Chica; BZ\$700 per meter; considering 905 of 45 piers in San Pedro and 15 in Caye Caulker damaged and an average 30 m per pier needing reparation.

d/ It includes BZ\$ 10 million in Caye Chapel for 2,880 m of shoreline and BZ\$0.4 million in Caye Caulker at the split (110 m).

The following damages were reported in the northern Cayes:

- Two hotels in Caye Caulker and one in Ambergris Caye were completely destroyed and several suffered structural damages.
- A great share of hotels suffered roof damages, usually leading to interior damages (ceilings and room furniture).
- Damages to equipment (water pumps, water heaters, washing machines, air conditioners)
- Landscaping damages: losses of trees and ornamental plants, litter.
- Damages to gift shops and restaurants.
- Damages to the golf course of Caye Chapel.
- Piers partially or totally destroyed.
- Seawalls destroyed in Caye Chapel and Caye Caulker.
- Property lost by beach erosion (included in environment damage assessment).
- Losses of boats mainly devoted to tourism activities.

Indirect damages. Indirect damages attempt to capture those losses for Belizean economy related to the drop of tourist arrivals: <sup>12</sup>

- Lost occupancy in hotels (Ambergris Caye and Caye Caulker are considered).
- Drop in tourist expenditure (including meals & drinks, local transport, entertainment, shopping and other).
- Departure taxes lost.

<sup>12</sup> According to BTB there are no losses from cruise ships; neither it has been detected drop in room rates.



Other indirect costs related with tourist sector in the form of additional expenditures are the following:

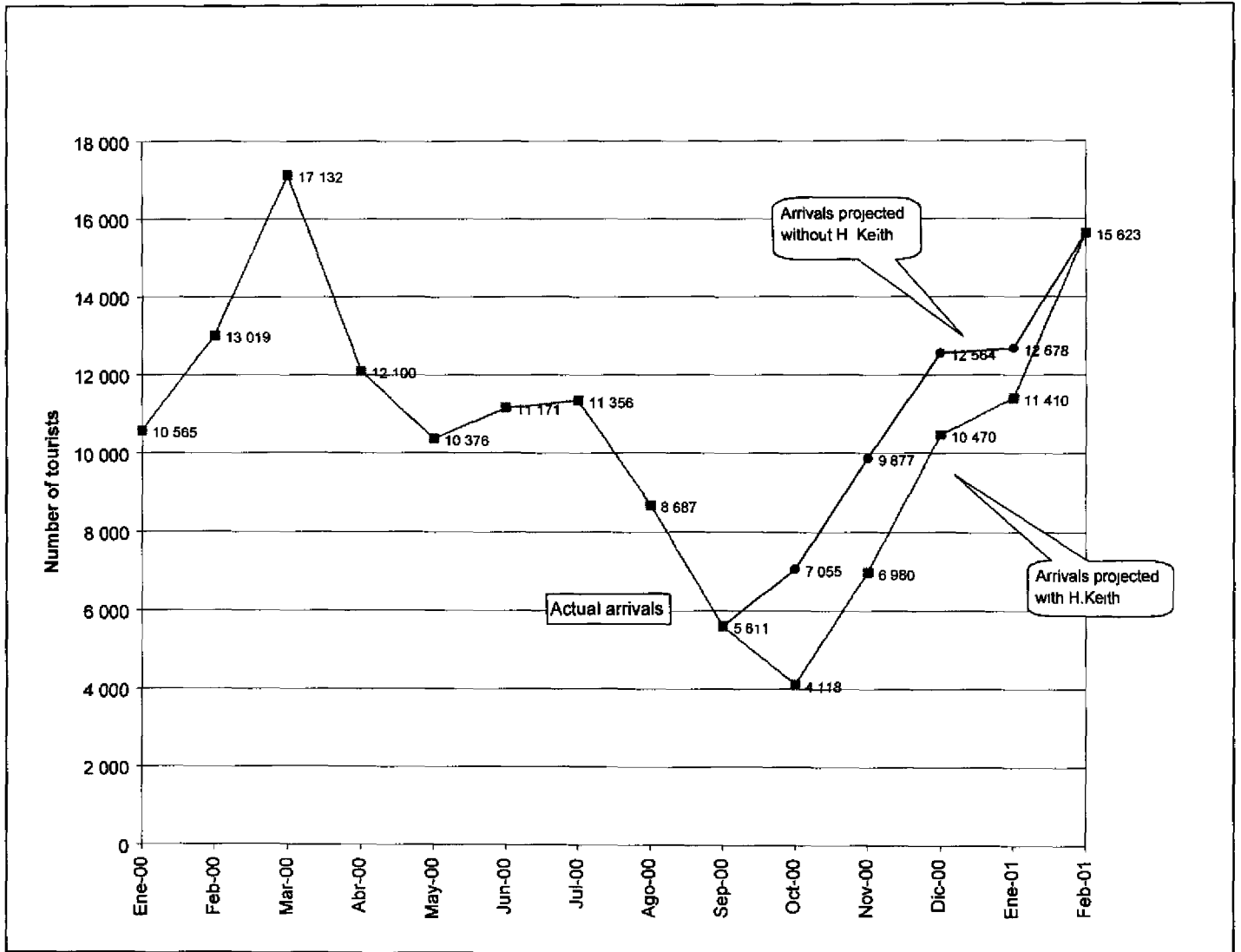
- Additional efforts in tourist promotion to counterbalance sensationalised information of the international media. BTB reacted rapidly to the negative publicity and re-allocated funds to increase marketing efforts in response to Keith. A budget of BZ\$1.2 million is being spend on this extra effort, in addition to the total marketing budget for the biennium 2000-2001 of BZ\$4.6 million.
- Lack of energy supply in the Cayes caused a number of hotels to invest in generators to face the tourism high season.

Until October, when Hurricane Keith hit Belize, tourist arrivals through the main airport (Phillip Goldson International) were reaching record numbers. For the first ten months of the year arrivals were 20 per cent higher than for the same period in 1999.

Graph 6 and Table 24 illustrate the effect of the estimated drop of tourist arrivals after the hurricane. The projected figures are based on the following considerations:

1. If Hurricane Keith would not have occurred, tourist arrivals in the period October 2000 to February 2001 would be 20 per cent higher than in the same period of the last year (the same trend as in the first ten months).
2. BTB considers that Hurricane Mitch affected tourist arrivals to Belize from October 1998 to February 1999. It is assumed that the negative publicity is significantly less in the case of Hurricane Keith. The assumption made here is that tourist arrivals will be affected up to January 2001.
3. Regarding arrivals projected after Hurricane Keith, the figure of October 2000 has been taken from BTB; in November there is information on the six first days (a projection of this month has been based in this information). It is considered that in December tourist arrivals will reach the same figure than in 1999; and that in January 2001 tourist arrivals will be 90 per cent of the figure projected without Hurricane Keith.

**Graph 6**  
**BELIZE: PROJECTED TOURIST ARRIVALS 2000-2001**



Source: Belize Tourism Board (BTB) and own estimations.

Table 24

## BELIZE: PROJECTED DROP IN TOURIST ARRIVALS

Month	Tourist arrivals international airport		Drop of tourist arrivals		
	Total	Without Keith	With Keith	By air	By land and sea a/
Total	15,027			9,196	5,831
October 2000	4,799	7,055	4,118 b/	2,937	1,862
November 2000	4,734	9,877	6,980	2,897	1,837
December 2000	3,422	12,564	10,470	2,094	1,328
January 2001	2,072	12,678	11,410	1,268	804
February 2001		15,623	15,623		

Source: ECLAC.

a/ In 1999, tourist arrivals by air represented 61.2 per cent of total tourist arrivals.

b/ Actual figure.

Since most of the damages suffered were in Ambergris Caye and Caye Caulker, it has been assumed that tourist arrivals will drop in proportion to the number of beds in each island,<sup>13</sup> that is 74.3 per cent in Ambergris Caye and 25.7 per cent in Caye Caulker. Table 25 summarises the estimated indirect damages for the tourism sector.

The estimated drop in visitor arrivals plus the calculations made of direct and indirect damages in tourism do not only cause a drop in the sector and the national economy's activity, but also in the balance of payments, where the sector has a significant influence. Table 26 summarises all direct and indirect damages as well as of their impact in the external sector. Indirect damages impact international trade mainly as service exports lost. In the case of direct damages many of the reconstruction items (cement, equipment, furniture, engines, zinc roofs, etc.) are imported. The local component of the reconstruction process is basically local wood and labour.

### c) Industry and commerce

The damages caused by Hurricane Keith in industry and trade were less severe than in agriculture and tourism. Manufacturing comprises some 13 percent of GDP while commerce accounts for about 21 percent.

The manufacture of agro-industrial products will be adversely affected by the losses in agricultural production and by difficulties in transporting produce to the factories. This had been the case in the sugar and rice mills and citrus processing plants. In the case of citrus, the effect on the manufacturing sector has been a loss in the production of concentrate. The 2000 production of sugar has not been significantly affected adversely, although the next crop and production cycle

<sup>13</sup> In Ambergris Caye the average room rate is the highest of the country. According to the information provided by BTB, due to damages, the available room stock is only 15 per cent during October, 28 per cent during November, 65 per cent during December and 82 per cent in January.

of sugar extending to 2001 will feel the effects of the canes lying in flooded fields for long periods to the detriment of their sucrose content as indicated in the agricultural sector section.

Table 25

## BELIZE: INDIRECT DAMAGES IN TOURISM

(Thousands of Belize dollars)

	October	November	December	January	Total
Total					36,298.9
1 Loss of occupancy in hotels a/					15,633.4
Ambergris Caye b/	4,545.5	4,484.0	3,241.3	1,962.6	14,233.3
Caye Caulker	447.1	441.1	318.8	193.1	1,400.1
2 Tourism services consumption lost c/					19,107.5
Meals & drinks	1,997.1	1,970.0	1,424.0	862.2	6,253.4
Local transport	1,331.4	1,313.3	949.4	574.8	4,168.9
Entertainment	1,331.4	1,313.3	949.4	574.8	4,168.9
Shopping	887.6	875.6	632.9	383.2	2,779.3
Other expenditure	554.7	547.2	395.6	239.5	1,737.0
3 Departure tax revenue lost d/					484.4
Airport tax					367.8
Other					116.6
4 Additional cost of providing energy e/					1,073.5

Source: ECLAC estimates.

a/ Average length stay in Belize is 7.1 days per tourist (source: BTB).

b/ Average room rates in Ambergris Caye and Caye Caulker were BZ\$179.48 and BZ\$51.12 respectively in 1999 (source: BTB).

c/ A visitor expenditure survey carried out in 1997 by the BTB showed the following distribution by category: accommodation (45 per cent); meals and drinks (18 per cent), local transport (12 per cent), entertainment (12 per cent); shopping (8 per cent) and other expenditure (5 per cent).

d/ Departure tax by air: US\$20 and other than by air: US\$10.

e/ Cost per room was calculated at BZ\$2,700 (considering 6 KVA per room at BZ\$450 per KVA); a 20 per cent of rooms in Caye Caulker and Ambergris were estimated to carry out the investment.

Table 26

## BELIZE SUMMARY OF DIRECT AND INDIRECT DAMAGES

(Thousands of Belize dollars)

	Total	Impact in international trade
Total	160,393.0	115,284.0
Direct damage a/	124,094.0	79,100.0
Indirect damage	36,299.0	36,299.0

Source: ECLAC.

a/ Includes some minor improvements in buildings, piers and marines

Activities in the Corozal Free zone suffered minimal negative impact. Minor dislocations in production led to indirect damage resulting from loss of business for a period of three days. There were damages to the timber-processing sector in the Orange Walk District, affecting inventory, machinery and some buildings. More importantly, the agroindustrial sector will suffer losses derived from crop production damages. Additionally, commercial activities – mostly in the two main Cayes Caulker and Ambergris – suffered not only a drop in their normal business, but losses in stock and inventory, as reported by insurance claims. See Tables 27 and 28.

Table 27

## BELIZE: SUMMARY OF DAMAGES IN INDUSTRY AND COMMERCE

(Thousands of BZ\$)

	Total damage	Direct	Indirect	Impact on international trade
Total industry	45,829.6	30,659.6	15,170.0	41,165.0
Free trade zone	128.0	60.0	68.0	50.0
Timber processing	3,205.0	2,925.0	280.0	-
Agroindustry commerce	41,115.0	26,293.0	14,822.0	41,115.0
(loss of stock and inventory	1,381.6	1,381.6	-	-

Source: ECLAC.