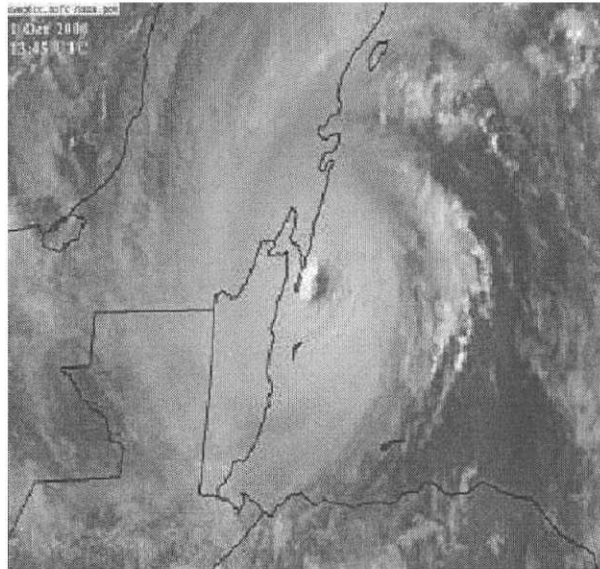


Graph 3

**THE WESTERN EYEWALL OF HURRICANE KEITH OVER  
AMBERGRIS CAYE, BELIZE**



**b) Impacts on cayes and mainland**

The impacts of this hurricane varied considerably, depending on the location considered. At the keys (particularly Ambergris Caye and Caye Caulker or Cayo Hicaco), there was extensive damage from high winds, rainfall and storm surge on the leeward side of these islands. As a result of this, roofs were removed and extensive damage to property occurred. Because of the rapid intensification of this system from a tropical storm to a hurricane, there was limited time to carry out an effective evacuation from Ambergris Caye to the mainland. Graphs 2 through 5 indicates the general areas most severely affected by wind, rain and flooding, in the Belize, Cayo and Orange Walk districts.

On the mainland, the majority of the damage was confined to areas north of Dangriga. Extensive flooding was experienced, with roads being cut off and rivers subsequently flooding their banks. Belize City, for example, was cut off from access to or egress from it, as both main roads leading away from this city were under water. Further north, the road to Orange Walk Town was accessible only to trucks, busses and SUVs, as floodwaters cut off the main roadway. North of this town, there was extensive flooding of areas adjacent to the Rio Hondo, which resulted in loss of sugar cane crops and some livestock. In general, the damage on the mainland was restricted to some wind damage and extensive flood damage and hindrance in low-lying areas.

Table 5

BELIZE: RAINFALL DISTRIBUTION ASSOCIATED WITH HURRICANE KEITH <sup>6</sup>

(Millimetres)

Station	Friday Sep. 29	Saturday Sep. 30	Sunday Oct. 1	Monday Oct. 2	Tuesday Oct. 3	Total mm	Total ins
PSWGIA	22.4	136.6	472.5	178.4		809.90	32.67
LA Milpa				Flooded			
Libertad	54.1	101.1	34.4	0.0		189.6	7.46
Towerhill	40.2	63.3	54.0	46.0		203.5	8.01
Central Farm	68.2	16.3	44.2	135.6	0.3	264.6	10.41
Belmopan	33.6	20.5	88.4	186.2		328.7	12.94
Barton Creek	33.3	0.0	11.0	30.0	0.0	74.3	2.92
Chaa Creek		27.5	38.6	100.4	0.0	166.5	6.56
Baldy Beacon	25.9						
La Democracia				Flooded			
Belize Zoo	1.8	34.5	233.5	197.2	1.2	468.2	18.43
Hcl3							
Melinda	17.0	103.6	47.9	3.2	0.0	171.7	6.56
Middlesex	24.5	15.3	124.8	89.4	0.0	254.0	10.00
Pomona			114.3	50.0	0.0	164.3	6.47
Mayan King	11.0	10.0	47.1	23.0		91.1	3.59
Flores Farm							
Savannah	3.6	11.2	33.2	10.2	3.3	61.5	2.42
Bigfalls	3.7	2.3	120.1	13.9	2.0	142.0	5.59
Pgagstat	0.2	0.2	17.7	25.8	3.4	47.3	1.87
Blue Creek							
Spanish Lookout	72.2	14.8	37.0	120.1	6.2	250.3	9.85
Las Cuevas							
Rum Point							
Consejo							
St Johns College	57.7	33.5		535.9	0	627.1	24.69
Gallon Jug1						205.7	8.1
Gallon Jug2						208.3	8.2
Gallon Jug3						208.3	8.2
Gallon Jug4						243.8	9.6

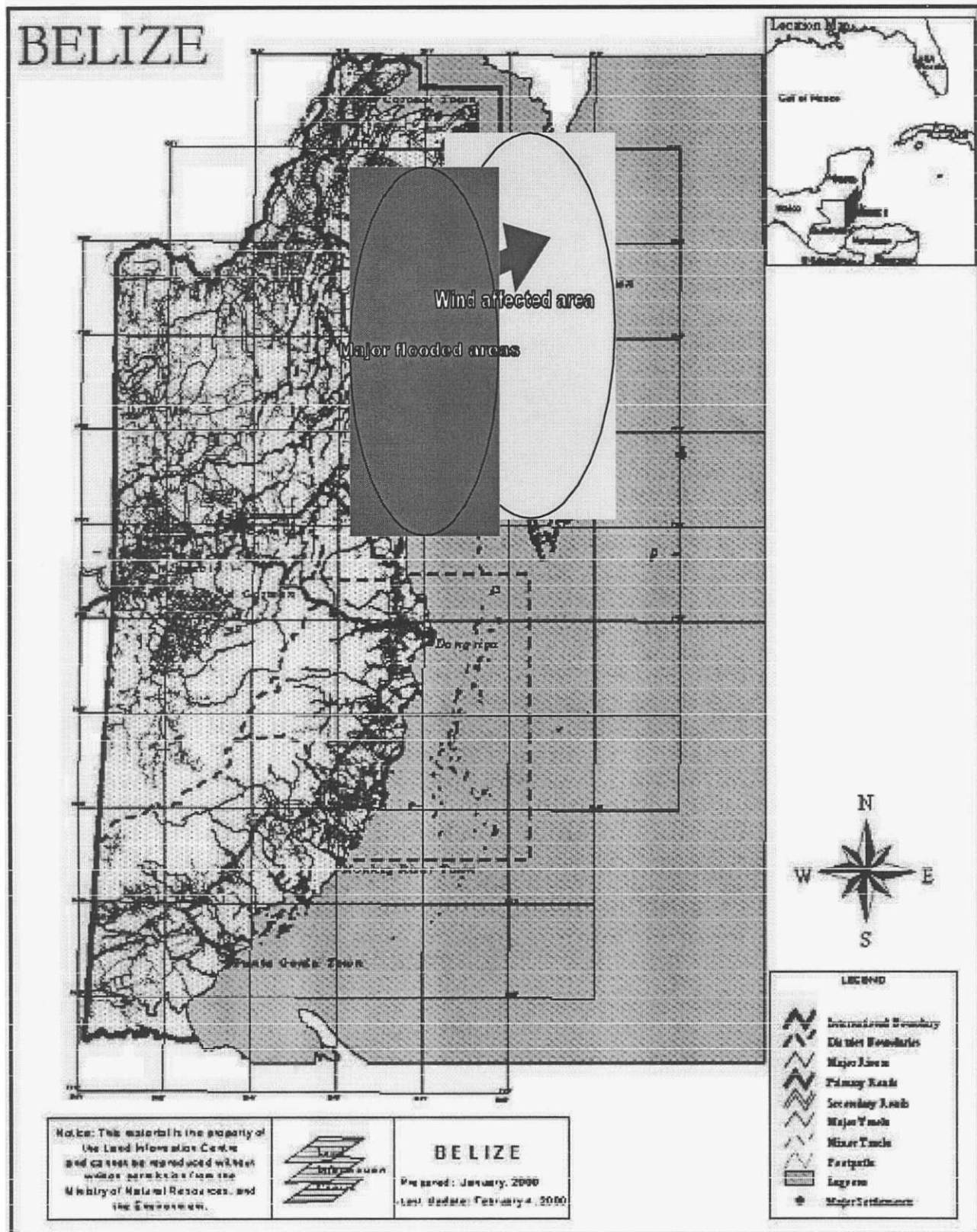
Source: ECLAC, on the basis of official data.

This hurricane clearly highlighted the areas of the country that are presently very vulnerable to extreme flooding. The lessons learnt from this experience must therefore be incorporated into the planning and decision making process.

<sup>6</sup> Period: 9:00 am – 9:00 am, 29/9/2000 – 3/10/2000.

Graph 4

## LOCATIONS OF MAJOR IMPACT OF HURRICANE KEITH IN BELIZE



### 3. Population affected

Of the four districts that were affected by Hurricane Keith, (Orange Walk, Cayo, Belize District, and Corozal) with a total population of over 125,000, more than 57,400 were affected. This represents 46 per cent of the inhabitants of these districts and 23 per cent of the national population. (See Table 6.)<sup>7</sup> Worst hit were the people who lived on the Cayes, namely Ambergris and Caye Caulker, as all their inhabitants were affected.

Table 6

BELIZE: ESTIMATED AFFECTED POPULATION DUE TO HURRICANE KEITH a/

As of 11 October 2000

Location	Total population as per census 2000	Total population as per PHI or key informant	Affected population
Total of affected districts	125,535	...	57,403
Belize District	62,729	...	27,308
Caye Caulker	742	1,300	279
San Pedro	4,499	10,000	3,000
Belize City	49,059	N/A	14,717
Rest of Belize District	8,429	9,415	9,303
Orange Walk District	26,244	17,988	14,126
Orange Walk Town	13,483	10,410	2,435
Rest of District	12,761	7,578	11,691
Corozal District	26,748	23,788	11,356
Cayo District	9,814	3,107	4,613

Source: ECLAC on the basis of official data.

a/ Utilizing Census 2000 information, except for the islands (Caye Caulker and Ambergris Caye) and villages not listed in the census report.

b/ Estimate, 20 per cent of persons living in flooded areas.

More than 5,000 persons were evacuated and 3,279 made homeless. Thirteen thousand persons were isolated due to the flooding and more than 57 thousand were affected due to the heavy rains and flooding. Ten lost their lives. PAHO/WHO reported that some 72,000 persons were at high risk of health impairment. (See Table 7.) This will aggravate a pre-existing deficit in sanitary conditions. Approximately 40 per cent of the urban and 80 per cent of the rural population did not have access to the public sanitation system before the hurricane.

<sup>7</sup> According to the 2000 Census, Belize has a population of 240,204 and has a 2.7 per cent growth rate. Belize is said to have the highest growth rate in the Caribbean. Fifty two per cent of the population lives in rural areas of the country and approximately 65 per cent of the population is under 25 years of age and 40 per cent of the population is under 14 years of age.

Table 7

## BELIZE: LIVING CONDITIONS OF AFFECTED POPULATION

Location	Living in flooded areas	Living in flooded houses a/	Living in shelters	Homeless	Displaced	Isolated	At high risk of health impairment
Total of affected districts	62,651	9,370	65	3,279	5,335	13,460	72,092
Belize District	24,029	4,863		3,279	3,279	4,555	35,314
Caye Caulker				279	279		1,300
San Pedro				3,000	3,000		10,000
Belize City	14,717	2,943					14,711
Rest of Belize District	9,303	1,920	0	0	0	4,555	9,303
Orange Walk District	13,673	2,732	65		2,056	7,509	15,536
Orange Walk Town	2435	487			420		2,855
Rest of District	11,393	2,245	65	0	1,636	7,509	12,681
Corozal District	19,126	610				1396	15,419
Cayo District	5,823	1,165					5,823

Source: ECLAC on the basis of official data.

a/ Estimates based on number of houses flooded. Assuming an average of 5 inhabitants/household based on census data.

Presumably this will have an undermining effect on the welfare of the most vulnerable households since in the four districts which were affected by the Hurricane, as many as 20 to 30 per cent of the households have been defined as poor. 26 to 40 per cent of the population have been defined as living below the poverty line by the 1996 poverty assessment survey. At the national level, 25 per cent of households and 33 per cent of individuals were found to be poor and 9.6 per cent of households and 13.4 per cent of individuals were considered to be extremely poor or indigent. It was noted that their level of expenditure was not enough to enable them to satisfy their basic food requirements.

Female heads of households comprise anywhere from a low of 25 per cent in Cayo, of the poor households, to a high of 38.5 per cent in Orange Walk. This percentage is higher than the national average. Women head Twenty-two percent of households. Cayo was one of the districts in the country, which had been defined as comprising the second highest indigent population in the country. Although there is no disaggregated data on the effect of the disaster on the female population, prevalent social conditions lead to believe that their vulnerability has increased. The UNDP Human Development Report for 2000, for Belize (soon to be published) notes that the female unemployment rate is approximately 20 per cent, which is almost twice the national rate, which stood at 12.8 per cent. The gender unemployment gap widened from 7.5 per cent in 1996 to 11.2 per cent in 1999. More than one quarter of the labour force work in the informal sector. Additionally, almost 30 per cent of everborns are to mothers under twenty. A study undertaken

on childbearing patterns among the young in Belize notes that 17 per cent of 21-24 year old had “not one or two but three or more children”.

It was reported to the mission that in the case of San Pedro the teenage pregnancy rate is above the national average. It was also pointed out that the migration factor has been so prevalent over the recent years that nowadays only one out of four of the inhabitants in the island are native “sanpedranos”.

Migration plays an important factor in the demographics of the country. While large numbers of young educated Belizeans emigrate to the United States and elsewhere, incoming migrants from neighbouring Central America have been making Belize their home. The United Nations High Commissioner for Refugees (UNHCR) estimates that during the past decade some 29,000 refugees have migrated to Belize, comprising 14 per cent of the population. At the aftermath of Hurricane Mitch that struck Central America severely in 1998, migration out of the most severely affected areas increased substantially and it is apparent some of that flow reached Belize. After Keith there seems to be no major migratory effect out of the country. To the contrary, inasmuch as the reconstruction process might increase the demand for labour force, there could be an attraction effect from neighbouring countries to provide workers to fill this need. This will only continue an ongoing process that has defined Belize’s demographic profile over the years.

In Corozal and Orange Walk there is a large dependence on agriculture and fishing. In the Belize District workers are distributed in construction, wholesale/retail and manufacturing and miscellaneous activities. Tourism is the lifeblood of the Cayes. In the country 52 per cent of the population live in rural areas and approximately 65 per cent of the population is under 25 years of age and 40 per cent is under 14 years of age.

As mentioned above, low-income groups are among the most affected. Some factors will increase their risks after Keith. First, the economic activities will experience a temporary setback, particularly in respect of some artisan activities like fishing, lobster capture. Agricultural subsistence farmers will require resources to recuperate and employment in the larger farms will be affected while the flooding persists. This problem will continue for several weeks still since natural drainage in the low-lying areas of the flood planes will be very slow given the small incline to the sea. This also entails that some health risks associated with stagnant waters will persist for a while. In the cayes the dynamics of the recuperation of the tourism sector has generated a temporary demand for labour force while the momentarily reduced flow of tourists has been compensated – in employment terms – by the self-help and community reconstruction undertaken in the small island communities.

Secondly, due to the characteristics of the cayes and the limited sanitary infrastructure’s coverage of rural areas and the islands, the health risks will persist unless specific actions are taken. Morbidity (and eventually mortality) levels resulting from this situation could be affected in the short term. Additionally in the affected areas there is a limited coverage of the water distribution network. The floods and silt deposited could affect provision of drinking (or at least safe) water supplies from local wells. Given the amount of debris as a result of the hurricane, particularly in the areas affected by wind, a proper waste disposal and garbage handling seem to be in order. The existing systems are not capable of processing the amount that has resulted since

most are open dumps or flow into the neighbouring lagoons with the inevitable consequence of decomposition and pollution. The hurricane highlighted the fragility of infrastructure to remedy these deficiencies, which was built in the same high-risk areas. Floods and the rain affected many latrines and water mains.

Finally, lack information may increase the risks faced by the affected population. Some communities have traditional ways of dealing with disasters, based on previous experiences. Since Belize had not suffered a similar event in some years, some local communities were inadequately prepared to face a situation such as that caused by Keith.<sup>8</sup>

#### **a) Vulnerability of women and children**

Poverty and environmental deterioration increase the risks stemming from natural disasters, and women and children are usually the most affected. The destruction of their homes, worse health conditions and loss of jobs and crops has a direct effect on their living conditions. Children are exposed to higher health risks, which can even lead to death; greater economic risks, as their education might be short by their need to enter the labour market at an early age, and greater psychosocial risks, since they are highly sensitive to changes in their surroundings. Women face greater challenges in the day-to-day running of their homes, as the task of organizing family resources becomes all the more difficult. Pregnant and nursing mothers suffer the effects of their deteriorated environment (particularly affecting their nutrition), which places them at great risk of contracting lethal diseases.

According to available data – which does not give gender disaggregated information – almost 5,000 houses were affected, directly causing harming almost 11,300 children through the loss of their houses, being displaced, having their family dislocated, living temporarily in shelters and interrupting their normal school and play routines. (See Table 8.)

#### **b) Psycho-social trauma rehabilitation**

Disasters affect people in different ways, however, the psycho-social impact of a hurricane on the family and especially children often remains invisible in disaster assessment studies. Yet, disaster situations may mean loss of loved ones including relatives, friends and neighbours; it may also mean loss of property, furnishings and cherished belongings. Sometimes it means starting over with a new home or business.

Although only ten people died, the emotional effects of material loss and social and family disruption may show up immediately or may surface many months later. It is important to remember that a disaster of any size will cause unusual and unwanted stress in those attempting to reconstruct their lives. In the aftermath of Hurricane Keith, trauma rehabilitation was only

<sup>8</sup> At the national level, though, it must be noted the country had recently adopted a new disaster management plan (revised after the scare caused by Hurricane Mitch). This revised plan came into force in April 1999 and strengthens the National Emergency Management Organization (NEMO).

conducted on an ad-hoc basis by regular health staff who was mainly focusing on the physical effects of the emergency. It was, however, the first time in Belize that trauma was addressed.

Table 8

**BELIZE: FAMILIES AND CHILDREN AFFECTED BY HURRICANE KEITH**

(Number)

Area	Families affected	Household members	Adults	Children
Total	4,872	22,863	11,566	11,297
Belize Old Northern	326	1,321	594	727
Belize River Valley	155	712	320	392
Belize Central	132	598	270	328
Belize City	1,168	4,762	1,843	2,919
San Pedro	1,145	5,622	3,155	2,467
Caye Caulker	45	231	138	93
Orange Walk	1,085	5,051	2,273	2,778
Corozal	816	4,566	2,973	1,593

Source: ECLAC on the basis of official data.

Dealing with the consequences of the hurricane does not merely involve rebuilding destroyed social infrastructure, but also stepping up social and productive investment to address the vulnerability of low-income groups, so as not to leave them as exposed as they were prior to the hurricane.

#### **4. Emergency actions**

##### **a) Government actions**

The Government of Belize declared the Preliminary Phase during the early hours of 30 September, and by 9:00 am that day had declared Phase III or Red II, in compliance with the Disaster Management Plan developed in 1999 after Hurricane Keith hit the Central American region. A Hurricane Warning was declared for northern Belize, meanwhile the government of Mexico had posted hurricane warning for the coast of Yucatan from Cabo Catoche to the Border with Belize. This became necessary as Keith intensified and kept drifting on a westerly track towards Belize's northern coastal waters. By 6:00 pm minimal tropical storm force winds were already spreading over northern coastal areas of Belize.



Given the rapid development of Hurricane Keith from a tropical depression to a category 4 hurricane evacuation orders were not issued to the residents of Belize City nor the two Cayes that were severely affected. However, on Sunday, 1 October 2000, transportation was made available free of cost to those persons in Belize City who felt insecure in their homes and wished to seek shelter inland, namely in Belmopan and San Ignacio. Residents of some settlements along the coastline of the Corozal District were advised to seek higher ground.

Throughout the approach and passing of the hurricane the NEMO issued reports of the storm's progress and advisories to the citizens of Belize. Special concern was expressed regarding the boarding up of their homes, provided information on transportation and shelters, and generally keeping the population abreast of what was happening throughout the country. The Food and Material Committee estimated initially that it would cost US\$820,000 to feed those in need (19,151 individuals on a declining basis) for the four-month period during which they will not be able to sustain themselves. Current figures are somewhat larger. Even before the hurricane emergency advisory was lifted (the "all clear" announcement by the Government) BZ\$49,091 had been spent in food supplies. Government has budgeted food provisions for a period extending from 4 to 16 weeks in some areas, which will imply an expenditure of over 1.8 million Belize dollars (see Table 9).

Table 9

## BELIZE: COST OF FOOD EMERGENCY

District	Total cost (Thousands of BZ\$)	Population to be fed (number)
Total	1,844.6	11,202
Orange Walk (between 4 and 6 weeks, according to local conditions)	856.5	5,472
Corozal (3 weeks in average: from 2 to 7 depending on community needs)	103.5	2,673
Belize (16 weeks in average)	831.9	2,420
Cayo (1-2 weeks in most cases, except for one community that will receive 8 weeks supplies)	45.5	637
Stann Creek	7.4	...

Source: ECLAC, on the basis of official data.

a/ At a cost of BZ\$ 2.00 per person per day for a period that varies in each district and community according to needs. Rate of exchange is BZ\$ 2 per US dollar.

The Ministry of Health (MOH) in collaboration with PAHO/WHO conducted a Rapid Health Assessment in a timely and systematic manner. The information collected was used to guide the decision making process of the MOH in relation to the relief and mitigation phase, and to guide the request for external assistance.

Given the evidence on the importance of psycho-social counselling during and after an emergency situation, this is the first time that a proposal was put forth to have a psycho-social component as part of emergency and rehabilitation efforts in Belize. Table 10 shows no breakdown between the number of people who visited health services and the number of people seen informally by health personnel. Trauma management was also only conducted in Belize district. The type of problems addressed is exemplified in Table 11.

On the other hand, in order to handle the emergency a number of regularly provided counselling services were interrupted by the hurricane (including family violence casework, child protective services and community counselling centre). Thus, to the emergency costs indicated in Table 12 should be added the loss of services not provided, which are estimated to total BZ\$57,643.33.

Table 10

BELIZE. PSYCHO-SOCIAL/TRAUMA REHABILITATION IN THE AFTERMATH  
OF HURRICANE KEITH

	Sex	Age	District	Total
Number of persons who visited health services	36 women 25 men	16-65 years	Belize District (Caye Caulker* & San Pedro)	61 adults a/
Number of persons seen due to trauma	No disaggregated data	No disaggregated data		
Number of days worked on trauma management	3 females 1 male	-	Belize District (Caye Caulker & San Pedro)	5 days x 5 staff = 25 man days

Source: ECLAC on the basis of official data.

a/ Caye Caulker also reported 18 new patients and two new ones seeking psycho-social services, in addition to the ones reported in the table above.

Human relief services provided to affected population by government staff and volunteers during the emergency in terms of social attention, counselling and others and the contribution of the Defence Forces were instrumental in alleviating some of the more traumatic effects and tending to the basic need during the emergency. Table 12 details some of the expenses incurred.

Table 11

## BELIZE: TYPES OF TRAUMA MANAGEMENT PROGRAMMES CONDUCTED

Group Trauma management counselling (with persons over age 30 in one shelter with a population of 130)
Conflict resolution counselling meetings
Support group meetings for psychiatric, medical and social worker staff
Public service announcements for stress and crisis management
Individual and family counselling; stress management.

Source: ECLAC.

Table 12

BELIZE: EMERGENCY COSTS AFTER  
HURRICANE KEITH

Services	Cost (Thousands of BZ\$)
Human and Development Staff	84.3
Social Workers	113.6
Counselling in institutions	33.6
<u>Sub Total Cost</u>	<u>231.5</u>
Belize Defence Force	146.0
<u>Total</u>	<u>377.5</u>

Source: ECLAC, on the basis of official data.

**b) International cooperation**

The United Nations Disaster Response Team (Belize), chaired by the PAHO/WHO responded to the emergency in an organised manner according to their disaster plan. The plan was activated by the Chairperson, who is the Country Representative of PAHO/WHO, on Friday, 29 September 2000 at 4:00 p.m. during a joint meeting of the three agencies. The UN Emergency Operation Centre (UNEOC) was established according to the plan at the UN House in Belmopan on Sunday morning. Throughout the passing of the hurricane, the chair of the UN Disaster Response Committee was in direct contact with NEMO and its committees to get information on

national needs. NEMO was informed at an early stage on what type of assistance the UN Agencies could offer and the UN Committee made all initial contacts in preparation to respond quickly at the behest of the Government of Belize. Regular contact was maintained with the UN Agencies' Headquarters and Regional Offices.

The official request for assistance came from the Government of Belize on Tuesday, 3 October 2000. At that time the first meeting of the Foreign Affairs Committee took place and was attended by representatives of the three UN Agencies in Belize. No assessment of damages and needs had been conducted at that point. The UNEOC was officially closed on Thursday morning, 2 November 2000.

The UN System has coordinated the donation of hundreds of thousands of dollars in emergency supplies to NEMO and non-governmental organizations (NGOs) in Belize. Over 11 Situation Reports have been issued by the UN Office for the Coordination of Humanitarian Affairs and by 2 November UNDP, UNICEF and PAHO/WHO had completed a "Compilation of Damage and Needs Assessments, Response and Rehabilitation Plans in connection with Hurricane Keith".

Total foreign assistance received – as reported by PAHO's SUMA and the Government of Belize – amounts to a total of BZ\$5,175,734.

The international financial institutions activated their emergency response mechanisms in case of disasters. A World Bank Mission was in the country to assess the road and infrastructure situation in order to reorient its available resources for Belize and study the possibility of providing additional funds. The IDB approved an emergency loan for US\$20 million to assist following Hurricane Keith. This was done through the Emergency Reconstruction Facility the Bank operates for such purposes.