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**THE TSUNAMI OF SEPTEMBER 1992 IN NICARAGUA  
AND ITS EFFECTS ON DEVELOPMENT**

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## SUMMARY

On 1 September 1992 an earthquake, registering 7.0 on the Richter scale, created a tsunami with waves of between eight and 15 metres high that struck more than 250 kilometres of Nicaragua's Pacific coast. The tsunami affected 26 towns located along the Pacific coast of Nicaragua. The waves killed 116 persons; another 63 have disappeared and 489 more suffered some type of trauma or injury.

Even though the amount of damage is relatively limited, this most recent disaster comes on the heels of the disaster that took place last April when the Cerro Negro volcano erupted, at a time when the country is just emerging from a more than decade-long economic crisis and in the midst of government efforts to stabilize and adjust the economy.

Overall, 40,500 persons were affected. Some 20,700 of those directly harmed by either losing their homes or having them damaged, or by temporally losing their means of production or income, were from among the very poor —with per capita incomes of less than US\$100 per year— mostly small fishermen or merchants, or wage-earners in the commercial or tourism sectors. Close to 2,800 persons who live in Managua and other urban centres were also affected by losing or having their summer homes on the coast damaged. Another 17,000 —mostly low-income people— who do not live in the affected area but who depend economically on commerce or services in that zone, saw their incomes from the sale of seafood or other basic products either reduced or temporally halted.

Total damage and losses caused by the tsunami are estimated at US\$25 million. The most affected sectors were housing (with 53% of the damage), commerce, tourism and fishing; the sectors of health care and education, drinking water supply, sanitary waste disposal and electricity services and port infrastructure suffered minor damage.

This new calamity once again laid bare the vulnerability of the poorest strata of the population to the effects of natural disasters and lowered their quality of life to a level from which it will be difficult for them to recover.

Although the direct and indirect damage caused by the tsunami made a tremendous impact on those affected and practically paralyzed local economic activity, its impact on the overall economy of the country was relatively limited and negligible in comparison with other variables that affected the country during the year.

Expenditures for rehabilitation and reconstruction in the affected area could have some effect on public finances, the stabilization of which is a key element in the present economic strategy of the Government. On the one hand, the Government's current expenditures could increase to the point of generating a current deficit of 5.6 million córdobas. This amount, however, is rather small and in no case would it affect the stabilization plan. On the other hand, outlays for reconstruction —should there be no

additional external resources— could widen the Government's financial gap by a total of 42.4 million córdobas, the equivalent of US\$8.5 million, over a period of two years. However, that is also a sum not overly difficult to manage, given the amount budgeted for capital expenditures and the sum of external aid pledged.

The impact of the tsunami on the external sector will also be very limited, since the rise in imports due to the reconstruction programme should not alter the equilibrium of the trade balance. Nor are prices expected to rise, given the relatively small weight of lost production in the country's total output.

Among the problems that should receive preferential attention during the rehabilitation and reconstruction programme are the provision of foodstuffs and basic health care to the affected population throughout the rehabilitation period and part of the reconstruction period; reconstruction and rehabilitation of dwellings; urgent acquisition of fishing boats, outboard motors, nets and other equipment needed by small fishermen to get back to work; rehabilitation and reactivation of commerce and tourism, and the protection of the population against future disasters.

The rehabilitation and reconstruction programme should allow for not only overcoming the effects of the disaster but also lead to a better use of the natural and human resources available along the whole Pacific coast.

It is indispensable that the international community increase its cooperation with Nicaragua, if the rehabilitation and reconstruction needs caused by the tsunami —added to those arising from the eruption of the Cerro Negro volcano— are to be met. Should this not happen, several thousand Nicaraguans affected by the disaster run the risk of being left without the aid they need to replace their very limited capital and means of production and income, or the Government may be forced to abandon its stabilization and adjustment programme, just when the results are beginning to be felt.

This study was made at the explicit request of the Government of Nicaragua. It presents an independent, objective and reliable analysis of the situation caused by the disaster, as well as its repercussions on the affected population and on the country's economic development. Finally, it offers guidelines for a rehabilitation and reconstruction programme and identifies specific projects for which the technical and financial cooperation of the international community is indispensable.

## I. INTRODUCTION

### 1. Background

#### a) General considerations

On 1 September 1992 an earthquake measuring 7.0 on the Richter scale unleashed a tsunami with waves of between 8 and 15 metres high that struck more than 250 kilometres of Nicaragua's Pacific coast. Infrastructure was damaged or destroyed in 26 towns located along the coast, home to some 40,000 people who were directly or indirectly affected by either losing or having their homes and means of production or income damaged.

The disaster affected a very vast geographical area and a population with very limited resources was the hardest hit. Even though the extent of the damage is relatively limited, this latest disaster comes after the eruption of the Cerro Negro volcano,<sup>1</sup> just when the country is emerging from a more than decade-long economic crisis, and in the midst of government efforts to stabilize and adjust the economy.<sup>2</sup>

This event should be seen within the context of a long series of natural disasters afflicting Nicaragua, whose aftereffects have never been completely overcome.<sup>3</sup> It also aggravates the setbacks caused by natural disasters on the economic and social development of Latin America and the Caribbean.<sup>4</sup>

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<sup>1</sup> See ECLAC, Economic impacts of the eruption of the Cerro Negro volcano in Nicaragua (LC/L.686/Rev.1; LC/MEX/L.187/Rev.1), Santiago, Chile and Mexico City, Mexico, May 1992.

<sup>2</sup> See ECLAC, Nicaragua: evolución económica durante 1991 (LC/MEX/R.349), Mexico City, May 1992.

<sup>3</sup> See ECLAC, Informe de los daños y repercusiones del terremoto de la ciudad de Managua en la economía nicaragüense (CEPAL/MEX/73/Nic.1), Mexico City, 1973; Nicaragua: the floods of May 1982 and their effects on the social and economic development (E/CEPAL/G.1206), Santiago, Chile, 1982; Damage caused by the hurricane Joan in Nicaragua. Its effects on economic development and living conditions, and requirements for rehabilitation and reconstruction (LC/G.1544), Santiago, Chile, 1988.

<sup>4</sup> It has been determined that in an average year natural disasters cause material and production losses valued at US\$1.5 billion and the loss of more than 6,000 human lives in the region. See Roberto Jovel, "Natural disasters and their economic and social impact", CEPAL Review, No. 38, Santiago, Chile, 1989.

In this context, the damage from this latest natural disaster cannot be handled exclusively by the Government of Nicaragua. It is indispensable that the international community support the Nicaraguan Government in this most recent crisis.

b) The purpose of this report

This report was prepared at the explicit request of the Government of Nicaragua. Its purpose is to present an objective assessment of the damage caused by the disaster and to provide guidelines for action by both the Nicaraguan Government and the international community in the rehabilitation and reconstruction stages now that the emergency stage is practically over.

The document includes a quantitative assessment of the damage to different sectors and geographical areas and its impact on national macroeconomic variables, using an ad hoc methodology developed by the Economic Commission for Latin America and the Caribbean (ECLAC) for this kind of analysis.<sup>5</sup>

The assessment identifies the social and economic sectors hardest hit by the disaster, which therefore require preferential attention during the rehabilitation and reconstruction phases.

The report ends by presenting concrete proposals for rehabilitation and reconstruction programmes and projects, which, once prepared in greater detail, can be presented to the international community for its consideration in order to channel its support.

c) The mission

Responding immediately to the emergency at the request of the Government, the United Nations system —coordinated by the Resident Representative of the United Nations Development Programme (UNDP), as the resident coordinator of the system in Nicaragua— organized an inter-agency mission comprised of staff members, experts and consultants specializing in a number of different fields.

The mission included personnel from ECLAC, the Office of the United Nations High Commissioner for Refugees (UNHCR), United Nations Centre for Human Settlements (HABITAT), Pan-American Health Organization (PAHO/WHO), Food and Agriculture Organization of the United Nations (FAO) and the Office of the United Nations Disaster Relief Coordinator (UNDRO). It also received support from experts assigned to national technical cooperation projects financed by UNDP and other multilateral and bilateral cooperation agencies.

The mission worked closely with Nicaraguan officials from different agencies of the central Government, autonomous institutions and the municipal governments of the affected communities. It held numerous meetings and conducted on-site inspections of the affected area to gather whatever information was available and to obtain background information on the disaster and its effects.

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<sup>5</sup> See ECLAC, Manual para la estimación de los efectos socioeconómicos de los desastres naturales, Santiago, Chile, 1991.

This document describes the work done by ECLAC personnel; it takes into consideration numerous sectoral or partial initiatives by other agencies in the United Nations system. It is the product of an independent study, which sought to assess the impact of the disaster as objectively as possible.

## 2. Description of the phenomenon and its overall effects

At 7:16 p.m. on 1 September 1992 an intense earthquake occurred which directly and indirectly affected the Pacific coast of Nicaragua.

The earthquake registered 7.0 on the Richter scale. Its epicenter was located at 11.8 degrees latitude north and 87.4 degrees longitude west; that is, some 120 kilometres west-southwest of the city of Managua (see map 1). The earthquake was caused by the interaction of the Cocos and Caribbean tectonic plates, and occurred within a seismic gap located along the intersection of those plates.<sup>6</sup> Several aftershocks of decreasing magnitude followed.

Owing to the relatively shallow depth of the epicenter and a subterranean landslide, the earthquake produced a tsunami of between 8 and 15 metres in height, which moved rapidly towards the coast, reaching it around 20 minutes later.<sup>7</sup>

Although the earthquake did not damage the infrastructure of the areas around the epicenter, perhaps due to its shallow depth, the tsunami affected virtually the whole Pacific coast of Nicaragua of approximately 250 kilometres. The intensity of the damage depended on the land form and on the specific characteristics of the infrastructure located along the coast (see map 1).

Given, on the one hand, the serious limitations of the seismological network in Nicaragua, which meant the phenomenon could not be foreseen and warnings to evacuate the area issued on time,<sup>8</sup> and on the other hand, the country's lack of experience with tsunamis,<sup>9</sup> the coastal population was unable to reach safety and numerous human lives were lost, especially among children and the elderly.

The waves damaged or destroyed numerous dwellings and commercial and tourist establishments and many small fishing boats. The homes belonged mainly to people engaged in small-scale fishing, commerce and domestic tourism, although summer homes and tourist establishments for people from other parts of the country were also damaged.

In this regard, there were two kinds of effects. The first was felt by a very low-income group who lost their modest dwellings and their only means of generating —already very low— income, namely their fishing boats and equipment, as well as poorly constructed buildings for commercial and tourist services.

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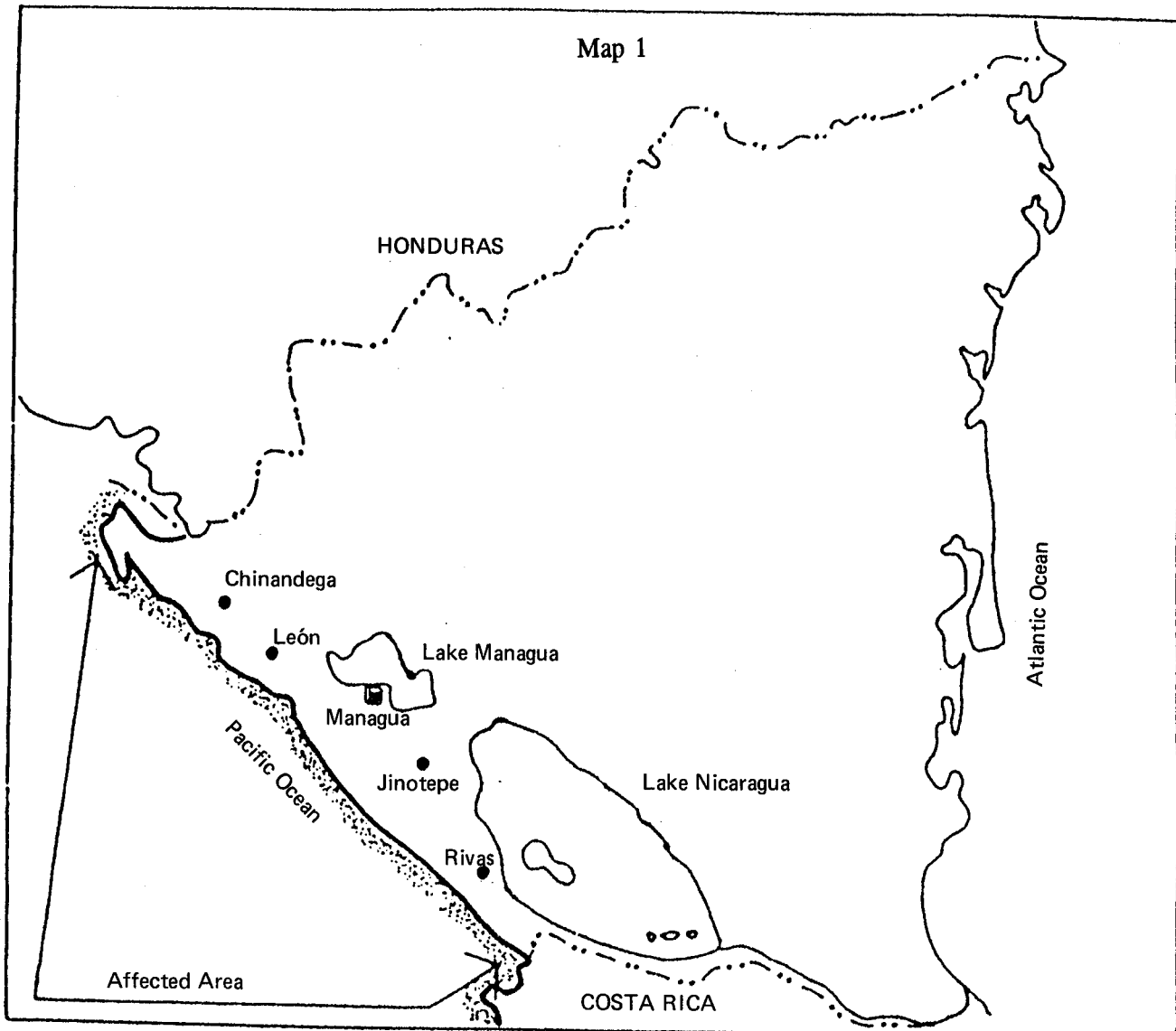
<sup>6</sup> Information provided by the National Earthquake Information Center of the United States, headquartered in Colorado, and by the Nicaraguan Institute of Territorial Studies (INETER).

<sup>7</sup> Verbal communication from the National Earthquake Information Center of the United States, 8 September 1992.

<sup>8</sup> At present, the Nicaraguan Institute of Territorial Studies (INETER) has only two seismographic stations that allow it to obtain seismological information in real time.

<sup>9</sup> According to INETER, there is no record of tsunamis having occurred in Nicaragua, at least not in the past 100 years.





Map 1  
**NICARAGUA**  
**LOCATION OF THE AREA AFFECTED BY**  
**THE TSUNAMI OF SEPTEMBER 1992**

*Note:* The boundaries given on this map are not necessarily approved or accepted by the United Nations.

The second corresponds to the impact on the vacation homes of higher-income persons who live outside the area most of the year and on commercial and tourist services in the affected area.

Damage to dwellings included the loss of the furniture and household goods of low-income families and that of summer homes. Drinking water and sanitary waste disposal systems were also destroyed or damaged. Open wells that supplied water to a large portion of the population were flooded, and drinking water supply systems and household intake connections, where they existed, were also destroyed. Latrines and septic tanks were inundated or stopped up and a sewage disposal system was damaged.

Since the tsunami hit in the evening, the fishing boats of many small-scale fishermen were either lost or seriously damaged onshore by the waves. Their motors and equipment were also either lost or damaged. Distribution centres —large and small— of fish and shellfish also suffered damage.

The waves also affected the infrastructure and furnishings of several tourist centres, including hotels of different sizes, serving both Nicaraguan and foreign tourists. Small commercial establishments located along the beaches were similarly affected.

Finally, the environment of the coastal area was altered. Thousands of new-born turtles were swept up by the waves inland from the beach, making it impossible for them to reach the sea. Tens of thousands of turtle eggs were destroyed. High salinity sea water was also dumped over a large area of coastal mangroves that served as spawning areas for several species of shellfish that need a lower salt content.

### 3. Main action undertaken during the emergency

Since the means to predict earthquakes and subsequent tsunami are lacking, actions to aid the population were undertaken only after the tsunami had taken place.

On the very night of 1 September, the Civil Defence force, with support from the army, launched operations to rescue, provide first aid and evacuate people to nearby hospitals and shelters.

The President of the Republic declared the Pacific coast an emergency area, appointed a national emergency committee presided over by herself and coordinated by her office, and designated specific functions to the different ministries that comprised the committee. That included instructing the Ministry of Finance to provide needed funds; the Ministry of the Interior to supervise the evacuation and treatment of the civilian population, in close coordination with the respective municipalities; the Ministry of Construction and Transport to assume responsibility for all the aspects related to moving those affected to temporary shelters and the transport of supplies; the Ministry of Health to provide the affected population with medical care and initiate preventive campaigns, and finally, the Ministry of External Cooperation to mobilize international cooperation to deal with the emergency.

At the same time, emergency committees were established, with the participation of local authorities and representatives from Civil Defence, the army, Ministry of Health, Red Cross, Nicaraguan Institute of Aqueducts and Sewerage and many non-governmental organizations.

Thirteen refugee centres were set up to temporarily house and feed those directly affected by the tsunami, taking in as many as 2,331 people at one peak time. Hospitals treated 352 persons with different

degrees of injuries. Seven centres were established to store and distribute supplies, located in strategic locations both within and outside the most affected area.

Drinking water, sewage disposal and electricity services were restored in areas where those systems had not been totally destroyed, and clean-up debris removal operations were begun. Drinking water was also trucked into those areas where water distribution networks could not be immediately repaired.

A programme was launched to prevent the outbreak of certain diseases such as malaria, diarrhoea, cholera, etc.

The Nicaraguan people responded to the emergency with donations of money, foodstuffs and clothing.

Different appeals were made to the international community for aid—in cash and in kind—needed to face the emergency and initiate the final stages of rehabilitation and reconstruction. Donors responded generously. By 16 September, donations and pledges totalled close to US\$10 million.

Although the Government, aided by the international community, successfully met emergency needs, the authorities have stated that they would like to launch as soon as possible programmes and projects to allow those affected to return to self-sufficiency and normality.

## II. DAMAGE ASSESSMENT

### 1. Introduction

Estimates of the damage caused by the tsunami were arrived at on the basis of incomplete information, since local authorities were still gathering data from the affected areas when the mission was in Nicaragua, and no attempt had been made as yet to estimate the losses and damage of certain sectors. The respective authorities should have all pertinent data in the near future, which will make it possible to further refine the results presented here.

At any rate, it was decided to make assessments on the basis of preliminary information, given the urgent need for guidelines in order to begin to definitively rehabilitate and reconstruct, even though that meant sacrificing some degree of precision in the results.

The information available, in any case, came from qualified sources, such as authorities from the central Government and affected municipalities and representatives of professional and trade associations. The mission also carried out on-site inspections, which made it possible to verify, supplement and adjust the information received.

Data thus obtained were processed using a methodology especially designed by ECLAC on the basis of experience acquired in many other similar situations.<sup>10</sup> That entailed calculating direct damage on the basis of the cost of replacing capital stock and inventories that had been totally destroyed<sup>11</sup> and the cost of repairing what had been only damaged. It also entailed calculating indirect damages from lost output in production and services sectors due to direct damage, and the higher outlays needed to return the affected zones to normal.

Results thus obtained give an idea of the magnitude of the damage and can be considered sufficiently reliable for purposes of planning and programming investments to be made during the rehabilitation and reconstruction period.

The value of the damage was estimated in local currency —at September 1992 prices— and converted into dollars at the rate of 5 córdobas to the dollar. For import or export items, values were expressed directly in dollars on the basis of international market prices.

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<sup>10</sup> See ECLAC, Manual para la estimación..., op. cit.

<sup>11</sup> Although it is recognized that the value of assets lost is less than their replacement cost, the latter is a truer reflection of the way in which the national economy will be affected by the rehabilitation and reconstruction programme called for by the disaster. Replacement also includes certain elements of improved technology for some items, such as higher- quality specifications for low-cost housing.

## 2. Population affected

The tsunami directly impacted 26 towns located along the Pacific coast of Nicaragua. The waves left 116 dead, 63 disappeared and another 489 suffering from some kind of trauma injury.

Overall, 40,500 people were affected. Some 20,700 of those directly harmed by either losing their homes or having them damaged, or by temporarily losing their means of production or income, were from among the very poor —whose per capita income was less than US\$100 per year— mostly small fishermen or merchants, or wage-earners in the commercial or tourism sectors. Close to 2,800 persons living permanently in Managua and other large cities were also affected when their summer homes on the coast were destroyed or damaged. Another 17,000 —mainly low-income people— who do not live in the most affected area but who are economically dependent on commerce or services in that area, saw their incomes from the sale of seafood or other basic products to urban centres affected by the tsunami either reduced or temporarily eliminated.

Most of the housing units affected belonged to poor people: 1,138 dwellings were totally destroyed, and another 2,200 suffered different degrees of damage. Close to 12,000 people were left with no income, since around 1,100 heads of families engaged in small-scale fishing lost their means of production, 400 restaurant owners either lost their establishments or saw them damaged, and the hotels and restaurants where some 600 employees worked also had infrastructure damaged or destroyed. Some 2,800 small merchants, truckers and sales agents who distribute fishery products or supply the area with different products also suffered income reductions.

This new calamity once again clearly revealed the vulnerability of the poorest strata of the population to natural disasters and lowered their quality of life to a level from which it will be difficult for them to recover. The Government, with the support of international cooperation, will have to focus on seeking solutions to this situation.

## 3. Social sectors

### a) Housing

The structures of the housing units in the directly impacted area did not resist the horizontal force of the waves —which acted both from the front and side, depending on the terrain— as they moved both onshore and back out to sea. As a result, a large number of homes either collapsed completely or were damaged, depending on the quality of their design, construction and location.

It is estimated that 1,138 structurally weak homes belonging to low-income people were totally destroyed, while another 2,200 units were between 20% and 40% damaged and need to be repaired. Moreover, 80 vacation homes —belonging to higher-income people who normally reside outside the area— were completely destroyed, and another 490 similar dwellings are in need of repair. All the units suffered serious losses of equipment and furnishings.

The direct damage to this sector was calculated on the basis of the cost of replacing the dwellings with small but better quality dwellings in order to provide those affected with safer, more dignified

housing, and of providing the vacation homes with indispensable structural reinforcement without altering their dimensions.

A 25 square-metre module, with another 18 square metres roofed over but open on the sides, was used for the reconstruction of low-cost housing. In order to estimate the cost of replacing lost furnishings and equipment, typical "packages" were defined for the different kinds of dwellings affected.

Direct damage to the sector was estimated at around 56.2 million córdobas. That includes 25.1 million for the total reconstruction of the 1,138 low-cost dwellings and 80 vacation homes; 22.6 million to repair damage to 2,200 low-cost dwellings and 490 vacation homes, and another 8.5 million to replace or repair furnishings and equipment. These figures include direct damage to commercial infrastructure, since business is usually run out of the homes themselves (see table 1).

Also estimated were the costs of relocating 228 low-cost homes and 80 vacation homes to secure sites, including the cost of buying property and providing essential services. This indirect cost was calculated at 8.4 million córdobas (see table 1).

Total damage to the sector, therefore, is 64.6 million córdobas.

#### b) Health

The year-round residents of the affected area were in a precarious situation with respect to health even before the tsunami took place. In urban areas, close to 22% of the population had no access to drinking water and 62% had no sewerage facilities. In rural areas, 79% of the population had no drinking water in their homes and 84% were without sanitary latrines. Also, solid wastes disposal was inadequate, since 25% of the garbage was not properly collected and virtually all the dumps were open-air. High morbidity rates existed for certain diseases, such as diarrhoea, malaria and dengue.<sup>12</sup>

The tsunami not only caused direct damage to the physical infrastructure of health-care facilities but also caused the population's health and hygiene indexes to deteriorate. The crowded conditions of the temporary shelters could also give rise to higher incidences of certain diseases.

Two health-care centres were completely destroyed and the infrastructure of 17 others was seriously damaged. Equipment was also affected in that same proportion. Direct damage to this sector, expressed as replacement and repair costs, is expected to be as high as 1,050,000 córdobas. The two centres that were destroyed will also have to be relocated to safer ground, entailing an indirect cost of another 50,000 córdobas.<sup>13</sup>

Health authorities consider it essential to take preventive measures for 50,000 people living in areas directly or indirectly affected by the earthquake, in order to prevent —or at least significantly reduce— the future incidence of diseases such as malaria, dengue, cholera and others of diarrhoeic origin. The cost

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<sup>12</sup> See Ministry of Health, Evaluación del impacto en el estado de salud de la población afectada por la marejada en la Costa del Pacífico el 1° de septiembre de 1992, Managua, Nicaragua, September 1992.

<sup>13</sup> Damage to water supply and sewage disposal systems is included in the section on services infrastructure.

of this indirect effect of the disaster, expressed in terms of the cost of preventive campaigns lasting 180 days, is estimated at 650,000 córdobas.

Thus, the total amount of damage to the health sector was estimated at 2,350,000 córdobas. Of that, 1,650,000 corresponds to direct damage and the rest to indirect damage or effects (see table 1).

c) Education

The tsunami destroyed two schools, each with three classrooms, and damaged another 24 classrooms. Furnishings and educational materials were also totally or partially destroyed.

Other educational centres were used as temporary shelters, causing some deterioration of their infrastructure. Naturally, classes were suspended during the emergency.

The cost of rebuilding and repairing those schools is estimated at 640,000 córdobas, and the replacement of furnishings and teaching materials at another 180,000 córdobas, bringing direct damage to 820,000 córdobas. A direct cost of 50,000 córdobas will also be incurred in order to relocate to more secure ground the two schools that were completely destroyed. Thus, total damage to the education sector was estimated at 870,000 córdobas (see table 1).

#### 4. Production and services sectors

a) Agriculture and livestock

The area most directly affected is not an agricultural zone, since it runs along the coastline. However, fruit trees around homes were damaged or destroyed, as were some nearby pastures.

Numerous domestic animals were also killed or disappeared, such as chickens and ducks, pigs, beasts of burden, dairy cows and their calves.

Direct damage to the capital stock of families throughout the area was estimated at 1,100,000 córdobas (see table 2).

b) Fishing

Industrial fishing —shrimp, lobsters and scale-fish— was not affected by the tsunami, since the boats were out at sea when the disaster struck. Small-scale fishermen, however, suffered considerable losses.

Small-scale fishermen bring in close to 60% of the volume of scale-fish caught along the Nicaraguan Pacific coast, which goes almost exclusively to meet domestic demand. They catch virtually all the species found along the coast and in streams, such as crabs, small shrimp, oysters and turtles.

Table 1

## DAMAGES AND LOSSES TO SOCIAL SECTORS

(Thousands of córdobas)

Sector and subsector	Estimated damages and losses			Imported component
	Total	Direct	Indirect	
Total	67 857	58 676	9 181	15 733
Housing	64 637	56 206	8 431	14 639
Low-cost housing	33 287	32 056	1 231	8 219
Reconstruction (1138)	17 070	17 070	1 231	4 579
Repairs (2200)	9 000	9 000	-	2 415
Furnishings	5 986	5 986	-	1 225
Vacation homes	31 350	24 150	7 200	6 420
Reconstruction (80)	15 200	8 000	7 200	2 000
Repairs (490)	13 600	13 600	-	3 400
Furnishings and equipment	2 550	2 550	-	1 020
Health	2 350	1 650	700	1 015
Reconstruction of health-care centres (2)	250	200	50	30
Repairs to health-care centres (17)	850	850	-	85
Furnishings and equipment	600	600	-	300
Preventive campaigns	650	-	650	600
Education	870	820	50	79
Reconstruction of classrooms (6)	350	300	50	45
Repairs to classrooms (24)	340	340	-	34
Furnishings and equipment	180	180	-	-

Source: ECLAC, on the basis of official figures and in-house estimates.



Table 2

## DAMAGES AND LOSSES IN PRODUCTION AND SERVICE SECTORS

(Thousands of córdobas)

Sector and subsector	Estimated damages and losses			Imported component
	Total	Direct	Indirect	
Total	47 242	19 144	28 098	5 060
Agriculture and livestock	1 100	1 100	-	-
Domestic animals	960	960	-	-
Fruit trees, pasture	140	140	-	-
Fishing	10 902	4 161	6 741	3 181
Boats	3 235	3 235	-	3 235
Boat motors	392	392	-	392
Equipment	534	534	-	267
Production loss	6 741	-	6 741	-706 <sup>a</sup>
Commerce	21 443	1 336	20 107	-1 126
Fishery products	13 482	-	13 482	-1 348
Retail sales	1 336	1 336	3 500	534
Supply to the area	3 125	-	3 125	-313
Tourism	13 797	12 547	1 250	2 999
Hotels and the like	1 816	1 816	125	417
Buildings	1 152	1 152	-	230
Furniture	257	257	-	13
Equipment	307	307	-	154
Stocks	100	100	-	20
Restaurants and bars	6 731	5 731	1 000	1 582
Buildings	1 670	1 670	-	334
Furniture	1 605	1 605	-	80
Equipment	2 256	2 256	-	1 128
Stocks	200	200	-	40
Tourist centres	5 125	5 000	125	1 000

Source: ECLAC, on the basis of official figures and in-house estimates.

<sup>a</sup> Equals the value of fuel and lubricants that will not have to be imported during the period when activities are paralysed.

To catch scale-fish, small-scale fishermen use wooden boats of between 5 and 8 metres in length powered by outboard motors, and nets and hand-lines as fishing tackle. They have no infrastructure to refrigerate, transport and distribute their catch. They sell it in port to distributors, local restaurants or small merchants.

These fishermen, when they finish their day's work, run their boats up on the beach and stow their motors and fishing gear in their homes. For that reason, more boats were destroyed or damaged than motors and gear.

It is estimated that some 214 boats were rendered unusable and another 36 were damaged but can be repaired; 49 outboard motors were completely ruined and another 30 damaged to varying degrees; 285 nets were ruined and 116 need to be repaired.<sup>14</sup> Direct damage to this sector was calculated at a replacement value of 4.2 million córdobas, 3.2 million of which is for replacement or repairs of boats,<sup>15</sup> 400,000 to repair or replace motors and 600,000 for fishing gear (see table 2).

There will also be indirect losses of catches during the time that fishermen are lacking boats and gear. This lucro cessans was estimated at 6.7 million córdobas and will affect fishing for six months from the date of the tsunami (see table 2).

Finally, although the topography of the coast and streams accessible to turtles and birds has been altered, it is estimated that those who are engaged in gathering those species have not suffered direct damage to their livelihood and that their income will not decline significantly, since they can quickly resume their normal activities.

### c) Tourism

The infrastructure of tourist services along the Pacific coast catering mainly to Nicaraguans—largely recent, informal and of low quality—was severely damaged.

It consisted mostly of small bars, restaurants and family-style lodging along the coast—some 200 multi-purpose small tourist establishments, since the owners and their families also lived there and served food and beverages throughout the year.<sup>16</sup> Thirty of them provided lodging.

There is also a first-class hotel in the area that largely escaped damage, as well as popular tourist centres operated by the Nicaraguan Institute for Tourism (INTURISMO), one of which suffered serious damage. In adjacent urban areas, there was also damage to infrastructure and electricity, water and drainage systems.

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<sup>14</sup> For further details on this point, see FAO, Evaluación preliminar de los daños causados a la pesca artesanal del litoral del Pacífico de Nicaragua por el maremoto ocurrido el 1 del septiembre de 1992, Managua, Nicaragua, September 1992.

<sup>15</sup> Boats are expected to be replaced by imported fiberglass vessels, entailing a significant technological advance and more efficient catches.

<sup>16</sup> There are also between 1,000 and 1,200 restaurants in the area that operate only during the busy season, between the end of the year and Holy Week. Since they work on a temporary basis, they were not open for business at the time of the tsunami and therefore suffered no losses.

Close to 75% of the small establishments mentioned were totally destroyed or so severely damaged that they had to be demolished. They were poorly constructed with little infrastructure, therefore most of the losses consisted of equipment, furnishings and other articles. Some 93% of the 200 units affected lost all of their equipment (refrigerators, freezers and coolers, stoves, ventilators or fans, etc.) and 90% lost all of their furniture (chairs, tables, etc.).

In the larger tourist centres, not only the hotel infrastructure itself, but also common areas and services and restaurants operated by licensees were damaged. It is estimated that 48 of 80 hotel rooms were affected, while all the restaurants were damaged to some extent.

Direct damage to hotels and guest-houses —located in INTURISMO centres and elsewhere along the coast— is estimated at 1.8 million córdobas, 1.2 million of which would correspond to the value of buildings destroyed or seriously damaged, 257,000 to loss of furniture, 307,000 to damaged or lost equipment, and another 100,000 to foodstuffs stored on the premises. Direct damage to restaurants, bars and ranchones (open areas roofed over) was estimated at 5.7 million córdobas, most of which was equipment (2.3 million), followed by the cost of the buildings (1.7 million), furnishings (1.6 million) and 100,000 in lost foodstuffs. Damage to infrastructure and common areas in the tourist centres was valued at 5 million córdobas. Thus, the total direct damage to the tourism sector was 12.6 million córdobas (see table 2).

Only a few of these centres have opened up again and are operating under highly precarious conditions. Although the tsunami took place during the off-season, the centres were unable to handle the usual massive flow of local visitors during the Independence Day holidays in mid-September. The estimated lucro cessans of these tourist establishments during the rehabilitation period will be around 1,250,000 córdobas (see table 2).

#### d) Commerce

Commercial activity in the area was virtually paralyzed during the period immediately following the disaster, since the population was involved in solving its more immediate problems. Once the initial period was over, commercial activity remained depressed because catches of fish were so drastically reduced. Many of the small intermediaries lost their refrigeration equipment and five commercial collection centres were damaged.

Direct damage to the commercial sector was estimated at 1,336,000 córdobas, counting only equipment and stock. Replacement or repair costs to damaged infrastructure were attributed to the housing sector, given the family style and location of these businesses.

The interruption of economic and commercial activity in the immediately affected area also had indirect effects on a much vaster area. The supply of certain industrial products declined —mostly foodstuffs and beverages— which will generate a lucro cessans in those activities. The interruption of most small-scale fishing along the coast affected the supply of fish and shellfish in Nicaragua's main cities, causing their prices to rise.

The amount of lucro cessans in the sector's activities in the entire affected area was estimated at 20.1 million córdobas (see table 2).

## 5. Infrastructure

The only infrastructure damaged was that of drinking water supply systems, sanitary waste disposal and electricity systems and ports. No other infrastructure was significantly affected by the tsunami.

### a) Drinking water and sanitation

In the directly affected area there are eight water-supply systems and one sewage disposal system. Six of the water-supply systems and the one sewerage system are run by the Nicaraguan Water Supply and Sewerage Institute (INAA) and two other public agencies, while the other two water supply systems are privately owned.

The main damage to the water supply systems consisted of broken pipes in the distribution network and connections to houses. Water sources were not affected since they are deep wells located inland where the waves did not reach. Some pipelines and manholes of the sanitary waste disposal system were damaged.

Also damaged were some 150 hand-dug shallow wells with poor sanitary conditions, which supplied water to many low-cost houses throughout the area. Damage to these wells ranged from the filtration of salt water to being completely clogged with sand and other material. Moreover, close to 2,250 sanitary latrines that provided sewage removal for the same number of homes were destroyed.

During the emergency stage, INAA urgently rehabilitated the urban water supply and sanitary sewage disposal systems and began—in cooperation with the Ministry of Construction and Transport—to bring drinking water in tankers to at least four of the communities affected.

The direct cost of the rehabilitation of the water supply and sewage disposal systems, cleaning and reconstruction of shallow wells, construction of sanitary latrines and septic tanks, and operations to supply emergency water is estimated at 1.7 million córdobas (see table 3).

These figures do not include the indirect cost of installing new water and sanitary sewage disposal systems or latrines in human settlements that will have to be relocated for the future security of their inhabitants, since those costs have already been included under the housing sector.

### b) Electricity

Electricity distribution systems were damaged in 13 urban areas, including fallen and broken lines, transformers, posts and public street lights.

These electricity distribution systems served very localized urban areas along the coastline affected by the tsunami, in which the crews of the Nicaraguan Energy Institute (INE) quickly restored service, except, of course, in those areas totally devastated by the tsunami.

The cost of rehabilitating and reconstructing the affected systems was estimated at 444,000 córdobas. Income lost due to the brief outage was expected to have little financial impact on INE (see table 3).

Table 3

## DAMAGE TO INFRASTRUCTURE

(Thousands of córdobas)

Sector and subsector	Estimated damages and losses			Imported component
	Total	Direct	Indirect	
Total	4 331	4 331		1 602.2
Drinking water and sewerage	1 721	1 721	-	95.2
Drinking water system	9	9		0.9
Dug wells	523	523		6.1
Sewerage systems	24	24		4.8
Latrines and septic tanks	1 128	1 128		56.4
Emergency supplies	37	37		7.0
Electricity	444	444	-	407.0
Distribution systems	444	444		407.0
Ports	2 166	2 166	-	1 100.0

Source: ECLAC, on the basis of official figures and in-house estimates.

These figures do not include the indirect cost of installing new electricity distribution systems in the human settlements needed to relocate people for their future security, since those costs —as in the case of drinking water and sewage disposal— were included under the housing sector as part of new urbanization.

c) Ports

The ports of San Juan del Sur, Sandino and Corinto suffered damage in their auxiliary infrastructure and equipment, with a rehabilitation or replacement cost estimated at 2,170,000 córdobas. Port operations, however, were not significantly affected.

## 6. Other damage

In addition to sectoral damage and losses described and calculated above, other losses of a more general nature took place. This category includes the expenditures needed to feed, treat and house evacuees in temporary shelters and cleaning up and removing debris from infrastructure that was destroyed.

Although many outlays during the emergency stage —such as those to repair water supply, sewage disposal and electricity systems— appear under sectoral damage, expenditures for Civil Defence, the Ministry of Construction and Transport and other central Government agencies should be entered in this category. Those outlays are estimated at 4,900,000 córdobas.

## 7. Summary of damages

Even though the estimates of sectoral damage described above are preliminary, since no completely reliable information is available, the magnitude of total damage caused by the tsunami can be quantified and the most affected sectors that require preferential attention in the rehabilitation and reconstruction programme can be identified. The information being gathered by the Nicaraguan authorities will make it possible to provide further details on the figures and results presented here.

The total amount of damage and losses caused by the tsunami are calculated at 124 million córdobas, the equivalent of US\$25 million (see table 4).

The following is a breakdown of damage by type of loss:

Type of damage	Percentage
Damage or destruction of capital stock:	66
Infrastructure	50
Furnishings, equipment, stocks	16
Losses in future production and <u>lucro cessans</u>	22
Relocation of human settlements and certain services	8
Emergency expenditures and preventive health campaigns	4
Total	100

The most affected sectors were housing, with 53% of the damage; commerce, with 18%; tourism, 12% and fishing, 9%. Emergency expenditures and damages to the health and education sectors, drinking water, sewage disposal and electricity services comprise the remaining 4% (see table 4).

Table 4

**SUMMARY OF DAMAGES AND LOSSES CAUSED  
BY THE 1992 TSUNAMI IN NICARAGUA**

(Thousands of córdobas)

Sector and subsector	Estimated damages and losses			Imported component <sup>a</sup>
	Total	Direct	Indirect	
Total	24 864	17 409	7 455	4 480
Social sectors	13 571	11 735	1 836	3 147
Housing	12 927	11 241	1 686	2 928
Health	470	330	140	203
Education	174	164	10	16
Production and services sectors	9 447	3 828	5 619	1 013
Agriculture	220	220	-	-
Fishing	2 180	832	1 348	779
Commerce	4 288	267 <sup>b</sup>	4 021	-141
Tourism	2 759	2 509	250	-332
Infrastructure	866	866	-	107
Drinking water and sewerage	344	344	-	600
Electricity	89	89	-	320
Ports	433	433	-	19
Emergency expenditures	980	980	-	81
				220

**Source:** ECLAC, on the basis of official figures and in-house estimates.

<sup>a</sup> Refers to items that will be imported and items that will not be exported because of the tsunami.

<sup>b</sup> Damage to commercial infrastructure was included under housing.

Even though these figures clearly identify the sectors needing priority attention in the rehabilitation and reconstruction phases, it should be mentioned that their relative weight can be distorted by the methodology used by the mission to calculate damages. Specifically, damage to commercial infrastructure and furnishings were calculated under housing, since most shops in the area were operated from their owners' homes. If they had been calculated separately, the damage to commerce and its share of total damage would have been greater. It would not, however, have changed the fact that housing was by far the sector most severely affected.

The total amount of damage caused by the tsunami is relatively small in comparison with that caused by previous natural disasters in Nicaragua.<sup>17</sup> Moreover, the damage from this disaster was distributed over a relatively large area.<sup>18</sup> Nevertheless, the serious human and social drama involved should not be underestimated, affecting as it does the poorest strata of the population, people who lost—totally or partially—the little capital stock they had and the makeshift means of production and generation of income. This latest disaster clearly confirms the need for society as a whole to take measures to prevent and mitigate the effects of similar tragedies in the future.

From the analysis presented here several kinds of problems can be identified that should receive preferential attention during the rehabilitation and reconstruction programme. The following are especially important:

- a) Provision of food and basic health care to the affected population throughout the period of rehabilitation and part of the reconstruction period;
- b) Immediate launching of a subprogramme to reconstruct and repair dwellings, under a system of food-for-work and some monetary compensation for those affected;
- c) Urgent acquisition of boats, outboard motors, nets and other equipment to put small-scale fishermen back to work as soon as possible;
- d) Execution of subprogrammes to rehabilitate and revive commerce and tourism, and
- e) Reduction of the population's vulnerability to disasters by establishing a national natural disaster prevention system.

The fourth chapter of this document provides guidelines for rehabilitation and reconstruction strategy, programmes and projects in order to respond to these problems through a unified and coherent approach to development with social equity for the inhabitants of the affected areas.

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<sup>17</sup> Damage caused by the 1972 earthquake in Managua came to US\$1,967 million and by Hurricane Joan in 1988 US\$840 million; both figures are expressed in 1988 dollars. The eruption of the Cerro Negro volcano in April 1922 caused US\$21 million in damages.

<sup>18</sup> It should also be pointed out here that the damage estimated by sector should not be compared with the cost of rehabilitation and reconstruction programmes and projects. Indeed, these can cost more, since they will include works or measures to improve the context in which the projects are carried out, and technological advances that do not necessarily correspond to replacement costs used to calculate damage.



### III. IMPACT ON DEVELOPMENT

This chapter briefly analyzes the expected impact of the tsunami on national economic development and the living conditions of the population affected by the disaster. This analysis, which complements the one done by ECLAC when the Cerro Negro volcano erupted,<sup>19</sup> is based on how the economy was expected to develop until the end of the year. It identifies the impact that the disaster will have on that development, as a first step in the search for solutions.

#### 1. The situation before the tsunami

At the beginning of 1992, Nicaragua was involved in an intense stabilization process launched by the new Government in order to correct the serious macroeconomic imbalances caused by various external and internal factors.

Among the external factors are deteriorating terms of trade, shrinking export markets, external economic blockade and the external debt crisis. Among the internal factors are the after-effects of more than a decade of warfare on productive capacity, savings and investment patterns, and even natural disasters that occurred during that period.

Nicaragua is the Central American country whose economic and social indicators registered the sharpest decline during the 1980s. In 1990, per capita output was 40% lower than it was 10 years earlier, standards of living had plummeted due to unemployment, almost 10% of the population was displaced, so that close to three-quarters of the population were living below the poverty line and 42% were living in conditions of extreme poverty.

The new administration that came into office in 1991 moved to consolidate the peace process in Nicaragua, promote economic and social consensus among its agents, and lay the foundation —through a macroeconomic stabilization and structural adjustment programme— to get back on the growth and development track.

The heterodox shock measures —stable exchange rates and price control— taken at that time is part of a broader strategy of structural adjustment. Steps to gradually advance in fiscal and credit austerity,

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<sup>19</sup> See ECLAC, Economic impact of the eruption of the Cerro Negro volcano in Nicaragua (LC/L.686/Rev.1; LC/MEX/L.187/Rev.1), Santiago, Chile and Mexico City, Mexico, May 1992.

trimming the size of the State, privatizations,<sup>20</sup> and external trade liberalization<sup>21</sup> and foreign investment, were presented as necessary to revitalize the economy on a more solid basis.

That adjustment and growth strategy was directly linked to efforts to obtain external resources, since domestic savings and the repatriation of national resources were insufficient to finance the process. Public expenditure was highly restricted, as was credit, causing productive activities to continue to contract somewhat in 1991 (-1%). This led to a higher rate of underutilization of manpower, added to depressed wages and more cuts in social expenditures. Incomes in the countryside dropped even further, as instability arising from frequent land seizures and the termination of credit subsidies for small producers had a negative effect on production. The informal sector absorbed new waves of unemployed who fell back on subsistence farming as part of their spontaneous survival strategy.

The international financial community supported the programme, disbursing US\$1,216 million in 1991 (US\$626 million mostly in bilateral donations and US\$590 million in loans, including refinancing arrangements). In September 1991, Nicaragua signed a stand-by agreement with the International Monetary Fund (IMF) and a structural adjustment agreement with the World Bank. That made it possible to finance the liberalization programme and the consequent expansion of imports and to replenish the rather scant international reserves. The revival of consumption that began in 1991 had been promoted by the Government using external resources, channelled through the Emergency Social Investment Fund (FISE), providing compensation for vulnerable groups hardest hit by the adjustment, including the Job Retraining Programme, financed by the United States Agency for International Development (AID).

That was not enough, however, to deal with the weakness of the production apparatus, since a basic premise of the adjustment programme was the need for fresh external resources to cover capital expenditures in the Government's budget. Among the stumbling blocks that prevent more efficient integration into the international economy are a general technological backwardness, insufficient supply of electric energy and serious deficiencies in transport and communications.

The economic take-off sought by current government policy is based on continuing the adjustment policy and, therefore, on stable prices and exchange rates, along with an increasing flow of resources from investment and cooperation that allow for overcoming the stumbling blocks without reopening fiscal and external gaps. Further stabilization was projected for 1992 with the reduction of the general value-added tax (VAT) from 15% to 10% and the lowering of fuel prices. Great importance was attached to the public investment programme for 1992, which was to be more than doubled, thanks to external resources. A less restrictive credit policy, based on greater savings, was to complement those measures. Exports were also expected to rise —mainly because of an increase in the coffee supply— so the economic forecast for 1992 was one of growth in the gross domestic product for the first time since 1983. That expansion was to be based chiefly on the sound performance of the agricultural sector in 1991/1992 and the reactivation of construction and commerce.

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<sup>20</sup> By the end of 1992, 25% of 350 State enterprises will be privatized. There are plans to privatize the rest in 1993.

<sup>21</sup> Changes in the tariff regime should lower the effective rate of protection to a range of between 10% and 60%, according to official estimates.

Forecasts at the beginning of the year, which did not take into account the possible effects of natural disasters, have been partially frustrated by various factors, mostly external, such as the drop in the price of cotton, but also domestic, e.g., the scarcity and high cost of credit.<sup>22</sup>

The adjustment programme might also face certain symptoms of instability in the short term. Seasonal factors in the third quarter —particularly in August and September— could lead to a slight rise in prices, affecting the stability and even the contraction achieved since the beginning of the programme in March 1991: the consumer price index fell by 6.3% between May 1991 and June 1992 and remained stable between January and August of 1992 (0.1% increase). The gap between the official and unofficial exchange rate, estimated at 11% in August, is ever widening.

Another element that could affect the fulfilment of commitments and goals agreed upon with financial agencies is the fact that the flow of investments and donations so far has been well below what was projected at the beginning of the year. More than US\$741 million was expected (US\$402 million in the donations and US\$339 million in loans). By June, US\$28 million in donations had been received (US\$15.2 million of which corresponded to the balance of donations pledged in 1991). Thus, the accumulated fiscal deficit up to August was already US\$65.4 million (327.1 million córdobas). Up till August, US\$149.3 million in loans (746 million córdobas) had been received. If these flows do not increase, a choice will have to be made between not meeting the goals set or introducing recessionary policies to adjust the trade gap by reducing imports, reducing public expenditures or raising taxes and tariffs. Moreover, there seems to be no way to ease credit restrictions.

## 2. The impact of the disaster on economic performance

Although the direct and indirect damage caused by the tsunami had a tremendous impact on the population affected and practically brought local economic activity to a standstill, its effect on the economy as a whole was relatively small and unimportant in comparison with other variables that affected the country during the year.

Special attention, however, should be devoted to the potential implications of expenditures to rehabilitate and reconstruct the area on public finances, the stabilization of which —as mentioned in the preceding section— is a key component of the current strategy of the Government.

### a) Economic activity

The respective authorities revised the outlook for the Nicaraguan economy at mid-year. After predicting a GDP growth rate of nearly 4.7% at the beginning of 1992, the figure was changed at mid-year to a maximum of 1.3%, mainly due to reduced cotton planting, a reduction of external funds for development and the scarcity of domestic credit.

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<sup>22</sup> In the case of cotton, producers had to greatly limit their production (which is estimated at less than 36,000 quintals in an area of close to 3,000 manzanas (one manzana = 0.7 hectare), which would lower their contribution to output by 37.3%. It is estimated that this decline in the agricultural sector will be offset by larger harvests of coffee, tobacco and soya (among export crops) and corn and other basic grains.

Within this frame of reference, estimated losses in productive activity caused by the tsunami could lower the growth rate to slightly less than 1% (see table 5). The biggest losses in GDP were in the home ownership category and, to a much lesser extent, small-scale fishing, commerce and tourism.

The aggregated value of home ownership could fall by less than half a percentage point (as opposed to the predicted growth by that same amount).

The revival of construction, however —owing to the rehabilitation and reconstruction programme that will have to be undertaken— could lead to growth in the construction sector during the last quarter of the year and extend into 1993 and part of 1994. Depending on the Government's financing capacity and investments, based on external resources obtained as aid or soft loans, this sector could revive economic activity in the area that was almost completely paralyzed after the tsunami.

Before the disaster, fishing was one of the areas in which, even as late as August, the Government hoped to achieve a growth rate —through different measures and investments— of more than 11%. Because of the tsunami, it is estimated that losses to small-scale fishing on the Pacific coast (scale-fish as well as shellfish and turtles), together with lower sales of these products on the national market, could adversely affect the evolution of the sector as a whole, slowing its activity to -1.3% for this year.<sup>23</sup>

Damage to primary activities —the combination of the negative effect on fishing and the lesser damage to agriculture (loss of domestic animals and fruit trees in small areas of the coast)— could lead to a GDP growth rate slightly lower than predicted (3.2% instead of 3.6%).

The impact of direct damage to tourism could entail a drop of nearly two percentage points in GDP. Sales of alcoholic beverages, tobacco, soft drinks and other foodstuffs purchased by tourist and commercial services in the area struck by the disaster will also drop. As a result the estimated effect on tertiary activities as a whole could lead to a growth rate of less than 1%, less than the 1.3% forecast in August.

The negative impact of the tsunami on the energy and drinking water sectors should be less than three-tenths of a percentage point and in the other sectors it should be negligible.

#### b) Public finances

Before the tsunami, the Government was honouring its commitment under the stabilization plan and structural adjustment programme to finance all current expenditures (estimated at 1,888.1 million gold córdobas) —see table 6— from current domestic income estimated at 1,886.5 million córdobas. Since external resources had not been received as quickly as expected, programmed investments (an estimated 692.3 million) were being postponed or only partially realized with the donations that were being received.

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<sup>23</sup> Depending on how quickly these fishermen can replace the equipment they need to operate normally, the impact could be less serious and, if the new equipment is technologically superior to what they had before and better marketing mechanisms are found, the sector could even expand slightly next year.

Given the reduction of productive and commercial activities due to the tsunami, tax revenues are expected to decline slightly (less than 1.7 million córdobas, which already includes lower local tax revenues in the disaster-struck area and lower VAT revenues owing to a drop in the sale of beverages and in other sales tax revenue).

Table 5

## NICARAGUA: EFFECT OF THE TSUNAMI ON THE GROSS DOMESTIC PRODUCT

	Millions of 1980 gold córdobas				Percentage variation 1992			
	1991	1992	1991					
	(revised)		After:					
	<sup>a</sup>	Cerro Negro	August <sup>a</sup>	Tsunami <sup>b</sup>	A	B	C	D
	A	B	C	D				
Gross domestic product	17 947	18 162	18 184	18 152	-0.7	1.2	1.3	1.1
Primary activities	4 311	4 820	4 465	4 448	-5.7	7.2	3.6	3.2
Agriculture	4 144	4 497	4 283	4 281	0.1	8.5	3.4	3.3
Fishing	116	118	130	115	1.0	1.2	11.8	-1.3
Secondary activities	4 864	4 552	4 837	4 850	4.2	-6.4	-0.8	-0.3
Construction	477	800	538	552	-13.9	25.8	12.9	15.8
Tertiary activities	8 772	8 990	8 883	8 854	-0.8	2.5	1.3	0.9
Commerce	3 158	3 180	3 205	3 185	-0.2	0.7	1.5	0.9
Tourism	104	120	120	118	27.1	15.2	15.2	13.4
General Government services	2 027	2 128	2 027	2 031	-4.5	5.0	-	0.2
Transport and communication	892	897	905	905	4.2	0.6	1.5	1.5
Energy and drinking water	581	617	610	608	4.2	6.3	5.0	4.7
Ownership of dwellings	757	757	762	753	0.8	-	0.6	-0.5
Other services	769	784	779	779	2.9	1.9	1.3	1.3

Source: ECLAC, based on official figures.

<sup>a</sup> Estimate of the Central Bank of Nicaragua.

<sup>b</sup> Taken from ECLAC, Economic impact of the eruption of the Cerro Negro volcano in Nicaragua (LC/L.636/Rev.1; LC/MEX/L.187/Rev.1), Santiago, Chile and Mexico City, Mexico, 20 May 1992.

On the expenditure side, the emergency response entailed extraordinary outlays from the regular budgets of different ministries and decentralized institutions; concretely, a total of 4.9 million córdobas was disbursed by the Ministry of Construction and Transport for debris removal; the National Staple Foods Agency (ENABAS) for the distribution of food and supplies to part of the affected population; the Ministry of Health (vaccinations, pills to chlorinate water, etc.), and the army for rescue and aid operations during the emergency.

The Government plans to cover all of these expenditures with external aid either already received or pledged in response to the disaster. However, in the immediate term, an unforeseen increase in the Government's current expenditures has been generated which, considering the above-mentioned reduction in revenues, could produce a current deficit of 5.6 million córdobas if not replaced. It is, however, a small sum and in no case would it affect the stabilization plan.

Nevertheless, expenditures for reconstruction could —if no additional resources are received— widen the Government's financial gap. Those expenditures are estimated at 42,434,000 córdobas, the equivalent of US\$8.5 million, to be disbursed over a two-year period (see table 6). That still does not seem to be an unmanageable amount, given the size of the capital expenditure budget.

c) The external sector

The tsunami will have very little impact on the external sector.

Imports will increase slightly more than predicted because of the disaster. Purchases abroad of materials, inputs and intermediate goods needed for reconstruction could reach US\$1.8 million during the rest of 1992 and US\$2.6 million in 1993 and 1994, which would bring the growth in imports this year to 16.8%, instead of 16.6% as predicted in August.

Given the decline in cotton production and less favourable prospects for the prices of certain export products, the predicted recovery of exports was revised at mid-year. Thus in August, moderate growth (1.5%) was predicted for sales abroad; which meant that they would not recover their already low level of 1990. The tsunami had no significant impact on the performance of exports. Foreign tourist income in the disaster-struck area, however, could fall by US\$3.6 million, as the number of overseas visitors declined due to the lack of accommodations and the fact that international media coverage of the event might somewhat discourage tourists from visiting the area. In any case, a loss of that nature is insignificant for the country's trade balance.

d) Price levels

Prices had remained stable up till August. They were predicted to rise slightly between then and the end of the year, due to seasonal factors related to the end of the harvests. The short-term repercussions of the decline in small-scale fishing slightly raised the prices of certain kinds of fish and shellfish in urban markets, mainly Managua, but that is not expected to turn into a prolonged inflationary trend. Similarly, the timely action of the Government and emergency aid from abroad averted any abnormal rise in prices in the affected area during the critical post-disaster days.

Table 6

**NICARAGUA: REPERCUSSIONS OF THE DISASTER ON  
PUBLIC FINANCES AND THE EXTERNAL SECTOR**

	1992					
	Before the disaster		After the	1993	1994	1995
	Until May <sup>a</sup>	Until August <sup>b</sup>	disaster <sup>c</sup>			
	(Thousands of gold córdobas)					
Public finances						
Current income	1 951 000	1 888 148	1 885 970			
Current expenditure	1 934 183	1 888 579	1 891 494			
Current balance	18 817	1 589	-5 524			
Emergency expenditures <sup>d</sup>	-	-	4 915	350		
Capital income	10 873	18 441	16 441			
Capital expenditure	592 719	692 339	711 754			
Capital deficit	581 846	675 898	895 313			
Increase in capital expenditure	27 500	99 620	46 915	52 000	14 019	6 500
Due to Cerro Negro	27 500	27 500	27 500	32 000	11 000	6 500
Due to the tsunami	-	-	19 415	20 000	3 019	
Percentage increase in capital expenditure compared to 1992	4.6	14.4	6.8	7.9	1.6	0.9
	(Thousands of dollars)					
External sector						
Goods exported	289 682	266 855	263 215			
Goods imported	700 979	771 958	773 827			
Trade balance	411 297	505 103	510 612			
Services exported	74.4	74.4	74.4			
Tourist services (Travel)	18.2	18.2	14.8			
Additional imports	1 479	1 479	3 348	3 100	1 211	-
Due to Cerro Negro	1 479	1 479	1 479	1 100	600	-
Due to the tsunami	-	-	1 869	2 000	611	-
Percentage increase in imports compared to 1992	0.2	0.2	0.4	0.4	0.2	-

**Source:** ECLAC, based on official figures.

<sup>a</sup> After the eruption of Cerro Negro.

<sup>b</sup> Forecast of the Ministry of Finance.

<sup>c</sup> Including the value of VAT that will not be collected on commerce and tourism and estimated lost tax revenues, by department: Rivas (54,000), Carazo (63,300), León (50,100).

<sup>d</sup> Additional and extraordinary outlays during the first two weeks: central Government (1,520,000 gold córdobas), Ministry of Health (700,000), ENABAS (1.1 million), Ministry of Construction and Transport (1.2 million) and Army and Civil Defence (395,000).

#### IV. REHABILITATION AND RECONSTRUCTION PROGRAMME AND REQUIREMENTS FOR INTERNATIONAL COOPERATION

##### 1. General aspects

Once the amount and sectoral breakdown of the damage caused by the tsunami and its potential effect on the performance of the country's economy have been ascertained, a rehabilitation and reconstruction programme can be formulated. This chapter presents guidelines for such a programme for the consideration and possible adoption by the Government of Nicaragua.

Chapter II concluded by identifying the types of problems that will have to be dealt with on a priority basis during the rehabilitation and reconstruction programme. These include: provision of foodstuffs and basic health care to the affected population throughout the rehabilitation period and part of the reconstruction period; reconstruction and repair of housing; urgent acquisition of boats, outboard motors, nets and other equipment needed to reinitiate small-scale fishing; rehabilitation and reactivation of commerce and tourism, and the reduction of the population's vulnerability to such disasters.

##### 2. The rehabilitation and reconstruction programme

The rehabilitation and reconstruction programme requires a strategy that would respond to the problems mentioned above through an integrated and coherent approach to modernizing the productive structure of the affected area that also ensures greater social equity in the development of its inhabitants.<sup>24</sup>

##### a) Objectives

The objectives of the programme should be:

- i) To rehabilitate and reconstruct the homes of those living in the disaster area; and
- ii) To change the area's productive base, with emphasis on small-scale fishing and tourist and commercial services.

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<sup>24</sup> The guidelines for changing production patterns with social equity can be used for this purpose, as recently presented by ECLAC in the document Social equity and changing production patterns: an integrated approach (LC/G.1701(SES.24/3) and Corr.1), Santiago, Chile, 1992.



The rehabilitation and reconstruction programmes should allow for not only overcoming the situation brought about by the disaster but also for making better use of the natural and human resources available along the whole Pacific coast.

b) Bases of the programme

What follows is a description of the concrete bases of the rehabilitation and reconstruction programme, which, in principle, should be carried out in two distinct but overlapping periods. The first period deals with problems that need to be resolved quickly; the second one —while it should also begin immediately— will address longer-term problems.

i) In the immediate term. This refers to a period of no more than six months from the date of the tsunami, during which the population should be resettled in basic housing and jobs that would generate income to finance its most urgent needs.

1) Provision of essential supplies. Included here is the provision to the affected population of foodstuffs and family "packages" containing the most essential household articles, and the continuation for six months of the disease prevention campaigns already initiated by the Ministry of Health.

2) Rehabilitation of housing. This heading includes the initial stages of rehabilitating and reconstructing damaged dwellings, which will be finished in the medium term but not before. It involves stocking and manufacturing essential building materials and elements, developing new sites to which certain settlements can be more safely relocated, rehabilitating some homes that were only partially damaged, and beginning a reconstruction programme as such.

An essential part of these actions should be a programme allowing those affected to build their own homes, including food-for-work and a certain minimum monetary compensation to facilitate the economic reactivation of the area.<sup>25</sup>

3) Rehabilitation of fishing. This includes restoring small-scale fishing capacity and the source of income of the region's fishermen. This entails acquiring boats, motors and equipment from abroad and offering them to affected fishermen through a programme of concessional financing from a special fund that could be administered by commercial banks.<sup>26</sup> It also includes the technical cooperation needed for fishermen to assimilate the technology of new fishing equipment and implements.

4) Rehabilitation of commerce. This includes rehabilitating shops and acquiring equipment and furnishings that were lost in the commercial establishments that were only damaged by the tsunami. This will be done by establishing programmes for bank financing, under suitable conditions, for affected merchants. The more definitive reconstruction of the sector's infrastructure can be concluded only in the medium term.

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<sup>25</sup> This scheme should also include those fishermen who did not lose their homes but are without income because their boats were destroyed.

<sup>26</sup> In this regard, the Government has expressed its willingness to designate one of the official banks for this purpose.

5) Rehabilitation of tourism. As in the case of commerce, this heading includes rehabilitating partially damaged establishments and replacing their respective equipment and furnishings, again through a scheme of bank financing under appropriate conditions. The tourist centres that were destroyed will be fully reconstructed and equipped in the medium term.

ii) In the medium term. This refers to a period expected to last around two years, which overlaps with the immediate term described above. It involves finalizing arrangements for the modernization of production with social equity in the disaster area.

1) Replacement and construction of housing. This involves —as mentioned above— concluding the tasks of replacing homes (construction and equipment) that were destroyed by the tsunami.

2) Development of trade. A network of assembling points will be established to collect the fishing catch. It will not only replace the one that was destroyed but will also establish a structure that will promote more efficient marketing and make it possible to prepare the catch for export.

Support will also be given to the establishment of groupings of small-scale fishermen in order to improve their productivity and their incomes by collectively marketing their products.

3) Development of tourism. Investments are to be made to replace lost infrastructure in the tourist centres, and to improve the tourist infrastructure in certain communities in the area with natural conditions, which, once urbanization is completed, can provide services that generate higher incomes for micro-enterprises and open up opportunities for larger enterprises. Technical cooperation and training will also be provided to small-scale tourism operators, so they can improve the quality and hygienic conditions of the services.

4) Environmental protection. The coastal species lost to the tsunami will have to be replaced and protected. Protective rows of fruit and other kinds of trees will be planted in a 10-kilometre strip along the coastline.

5) Natural disaster prevention. It is absolutely necessary to reconsider and put into practice as soon as possible the proposal —which was included in the rehabilitation and reconstruction programme after the eruption of Cerro Negro— to set up a national programme to prevent natural disasters of all kinds. This includes a decision by the Nicaraguan Government regarding the institutional aspects of prevention, as well as the acquisition of equipment for seismographic monitoring.

#### c) Strategy requirements

The disaster clearly exposed the poverty of the living and working conditions of the population in the affected area. The strategy of the rehabilitation and reconstruction programme should therefore seek to reconstruct and replace what was lost in such a way that more favourable conditions are generated for the economic, social and spatial development of the area.

The strategy contains three indispensable requirements for the successful implementation of the programme. The various rehabilitation and reconstruction projects must be compatible and coherent with one another; the different executing agencies must coordinate their efforts, and an ad hoc financing mechanism must be established.

i) Compatibility between the components of the programme. Close and absolutely coherent coordination has to be ensured between the different programme components and projects for construction, the restoration of production and marketing. None of the components should be conceived of nor executed in isolation from the rest. That is the only way to ensure that the projects meet the objectives and requirements of the strategy and avoid duplicating efforts or frustrating other initiatives.

ii) Inter-institutional coordination. The execution of the programme requires an effective inter-institutional coordination between two groups of agents. The first group is comprised of the different governmental and municipal units that will be responsible for rehabilitating, reconstructing and developing the area. They must coordinate their actions in order to coherently pursue the programme's objectives. The second group includes the grass-roots social organizations located on the coast, whose direct involvement will be essential to ensure the success of the programme. More specifically, it would be helpful to integrate all these actors into an inter-institutional committee for the rehabilitation and reconstruction of the area affected by the tsunami, which would report to a higher-level agency of the executive branch named for that purpose.

iii) Financial mechanism. Given the magnitude of the rehabilitation and reconstruction effort that has to be undertaken and the characteristics of the population involved —mostly people who have no credit rating because of their low income— the establishment of a special credit mechanism is essential. It should ensure that the financial resources needed for actual productive activities and technology transfer effectively reach a large number of people with low incomes. That would give them access to preferential credit and also ensure that the funds are recovered.

It would also be advisable for the institution in which this mechanism is created to set up a fund with its own independent accounting system in order to pool both national resources and external cooperation for rehabilitation and reconstruction. In order to achieve the degree of intersectoral and inter-institutional coordination required to operate the special fund, a credit committee for the rehabilitation of the Pacific coast area affected by the tsunami could be established,<sup>27</sup> which would evaluate both credit applicants and the projects they submit in order to ensure that the above-mentioned objectives are met.

### 3. International cooperation

Chapter III stated that the Government of Nicaragua is maintaining its fiscal budget in balance by financing current expenditures exclusively from current income and by limiting investments to the amount of external resources it manages to mobilize. It also pointed out that so far this year the execution of some programmes and investment projects has had to be postponed because of problems in the actual receipt or the flow of external financing.

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<sup>27</sup> This committee could be presided over by a bank official and be composed of another official from the same bank, representatives of the Ministry of Construction and Transport, Ministry of Finance, Ministry of Economic Affairs and Trade, Institute for Tourism and the Fishing Institute. Representatives of those grass-roots organizations active in transport, tourism and fishing could also participate. The credit committee could receive technical assistance from FAO and UNCHS, as well as from other international and national agencies.

In order to meet the rehabilitation and reconstruction needs arising from the tsunami—compounding those created by the eruption of Cerro Negro— the Government's investment requirements must increase not only this year but in the years to come. This means that the international community must increase its cooperation with Nicaragua. Otherwise, several thousand Nicaraguans affected by the disaster run the risk of being left without the aid they need to replace their very limited capital and means of production and income, or the Government may be forced to abandon its stabilization and adjustment programme, just when the results are already in sight.

International cooperation for rehabilitation and reconstruction should be provided in addition to—and not instead of— what was previously committed as support for normal development programmes and projects.

Another indispensable requirement is that international cooperation reach Nicaragua at the earliest possible date in order to initiate as soon as possible the most immediate tasks of rehabilitation and not delay the beginning of reconstruction.

By mid-September —two weeks after the tragedy took place— Nicaragua had received or had specific pledges of cash donations and easy-term cooperation for the emergency, rehabilitation and reconstruction totalling US\$10 million. In order to implement a good part of that, for rehabilitation and reconstruction, the donors required that specific projects be submitted.

This shows the willingness of the international community to help Nicaragua overcome this new disaster. Donors —multilateral and bilateral— should be flexible, however, as they have been in the case of other natural disasters, in their procedures to analyze and approve projects.

Likewise, cooperation earmarked to finance productive activities will have to be granted with soft interest rates and long-term repayment periods, so that those affected —who have very limited capacity to generate savings— can pay them with no difficulty.

It is also indispensable that some of the external cooperation be used to support the Nicaraguan Government in formulating the reconstruction programmes and projects that are urgently needed, as mentioned above.

The efficiency with which Nicaragua has faced this new emergency situation —a product of experience acquired from previous cases similar to this one and the decisiveness of the authorities— and the good performance so far of the stabilization and adjustment programme point to a successful mobilization of resources and execution of the rehabilitation and reconstruction programme. Nevertheless, it would be helpful if that capacity for execution were reinforced by technical cooperation resources from, for example, the special resources for disasters at the disposal of the United Nations Development Programme.

Tables 7 and 8 show the areas in which the technical and financial cooperation of the international community is needed.

Table 7

## NICARAGUA: LIST OF IMMEDIATE-TERM REHABILITATION PROJECTS

Programme	Proposed activities	National executing agency	Possible cooperation sources	Amount required (Thousands of US\$)
<b>1. <u>Basic supplies</u></b>				
a) Provision of foodstuffs (Sept. 1992-Feb.1993)	Provision of foodstuffs to population affected by partial or total loss of homes and fishermen who lost means of production	ENABAS	WFP, UNHCR and donor governments	...
b) Provision of family "packages" (Sept-Oct. 1992)	Provision of essential household articles to population that partially or totally lost their homes	ENABAS	...	...
c) Preventive health campaign (Sept. 1992-Feb. 1993)	Preventive medical care of more than 50,000 persons to reduce risks of epidemics	Ministry of Health	PAHO/WHO	...
<b>2. <u>Housing: Spatial and functional reorganization of coastal communities</u></b>				
a) Reorganization of affected communities (Oct.-Dec. 1992)	Design to improve the layout of affected communities for a better use of the coastal landscape and environment	INETER, MCT, INTURISMO and municipal governments	UNDP, UNCHS and donor governments	20
b) Production, stocking and distribution of construction materials (Oct.-Dec. 1993)	Production of local materials and their transport to affected communities	MCT	UNDP, UNCHS and donor governments	...
c) Urbanization and construction (Oct. 1992-Sept. 1993)	Urbanization of land, installation of drainage facilities, drinking water and construction of 220 dwellings on newly developed sites to be zoned for small restaurants and shops. Recreational and common areas are planned	MCT, INTURISMO and municipal governments	UNDP, UNCHS, CABEI and donor governments	260
d) Reconstruction of homes (Oct. 1992-Dec. 1993)	Repair or completion of 2,200 dwellings for the local population (to be carried over into the medium term)	MCT and municipal governments	UNDP, UNCHS, IDB and donor governments	1 800

Programme	Proposed activities	National executing agency	Possible cooperation sources	Amount required (Thousands of US\$)
<b>3. <u>Fishing: Reactivation of small-scale fishing in the area</u></b>  a) Replacement of equipment for small-scale fishing (Oct. 1992-Mar. 1993)  b) Technical assistance (Oct. 1992-Mar. 1993)	Acquisition and distribution of 400 fibreglass boats, 80 outboard motors and tackle  Provision to small-scale fishermen of technical assistance for fishing activities, boat handling and repairs	Credit committee, INPESCA, fishing cooperatives  INPESCA	FAO, UNDP, CABEI and donor governments  FAO	1 800  ...
<b>4. <u>Tourism: Reactivation of tourist services</u></b>  a) Reactivation of small restaurants (Oct. 1992-Feb. 1993)  b) Rehabilitation and preparation of licensee establishments in the Pochomil tourist centre (Oct. 1992-Feb. 1993)	Acquisition by owners of small restaurants in the affected area of necessary furnishings and equipment (refrigerators, tables, chairs, ventilators, etc.)  Rehabilitation of restaurants, damaged infrastructure of common areas and hotels in Pochomil. Replacement of lost equipment, furnishings and appliances	INTURISMO  INTURISMO	CABEI and donor governments  CABEI and donor governments	930  2 500
<b>5. <u>Commerce: Rehabilitation of small-scale commerce</u></b>  a) Reactivation of small-scale commerce (Oct. 1992-Mar. 1993)  b) Recovery of lost marketing capacity of small-scale fishing (Oct. 1992-Mar. 1993)	Replacement of the equipment, furnishings and stock of small-scale commerce  Installation of a collection centre and replacement of 80 refrigerators to small-scale merchants in the disaster area	Municipal governments in the affected areas  Credit committee, INPESCA and Ministry of Economic Affairs	CABEI and donor governments  FAO, UNDP and donor governments	370  250

Table 8

**NICARAGUA: LIST OF MEDIUM-TERM REHABILITATION  
RECONSTRUCTION AND DEVELOPMENT PROJECTS**

Programme	Proposed activities	National executing agency	Possible cooperation sources	Amount required (Thousands of US\$)
<b>1. <u>Housing</u></b>				
a) Reconstruction of homes (Oct. 1992-Dec. 1993)	Rehabilitation or completion of 2,220 homes belonging to the local population (from table 7)	MCT and municipal governments	UNDP, UNCHS, IDB and donor governments	1 800
b) Construction of new homes (Oct. 1992-Oct. 1995)	Construction of 1,138 homes for the local population of approximately 25 m <sup>2</sup> each	MCT and municipal governments	UNDP, UNCHS, IDB and donor governments	3 400
<b>2. <u>Fishing</u></b>				
a) Increase small-scale fishing capacity	Provision of 100 fibreglass boats, motors and equipment to 300 small-scale fishermen	INPESCA	FAO, UNDP, CABEI and donor governments	900
<b>3. <u>Tourism</u></b>				
a) Tourist centres (Mar. 1993-May 1996)	Construction of three tourist centres with 40-room hotel, 15 small restaurants and recreational areas	INTURISMO and private banks	IDB and CABEI	4 500
<b>4. <u>Commerce</u></b>				
a) Replacement of lost marketing capacity of small-scale fishing (Oct. 1992-Mar. 1993)	Installation of a collection centre and replacement of 80 refrigerators for small-scale merchants in the affected areas	Credit committee, INPESCA and Ministry of Economic Affairs	FAO, UNDP, CABEI and donor governments	250
b) Increase of collection capacity (Jan. 1993-Dec. 1995)	Installation of four collection centres with ice-making machines, coolers and other equipment	Credit committee and INPESCA	FAO, CABEI, UNDP	800

Programme	Proposed activities	National executing agency	Possible cooperation sources	Amount required (Thousands of US\$)
5. <u>Environmental protection</u>				
a) Conservation of coastal species and reforestation of areas needing protection (Jan. 1993-Dec. 1995)	Protection and replacement of certain species in the affected area, reseeded of forest cover and lost fruit trees and soil enrichment	IRENA	FAO, UNEP and donor governments	500
6. <u>Prevention</u>				
a) Modernization and extension of national seismographic monitoring network (1993)	Acquisition of seismographic monitoring equipment to extend and modernize the national network	INETER	UNDP and donor governments	...
b) National disaster-prevention system	Organization of the national system for the prevention of natural disasters of all types, including its scientific and operational arm	To be determined	UNDP	...