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THE NATURAL DISASTER OF MARCH 1987 IN ECUADOR AND ITS IMPACT ON SOCIAL AND ECONOMIC DEVELOPMENT

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CONTENTS

SUMMARY

On 5 March 1987 a major natural disaster took place in Ecuador as a result of a series of earthquakes whose epicentres were located in the north-east of the country. The earthquakes caused direct damage to buildings in urban and rural areas in the provinces of Pichincha, Imbarura and Carchi, where the cities of Quito and Ibarra are situated. They also caused huge landslides and floods in sparsely-populated rural areas in Napo Province.

Although it will probably never be possible to establish the exact number of deaths, approximately 1 000 people lost their lives. More than 5 000 people had to be evacuated from the disaster area and re-housed in temporary shelters. Some 3 000 dwellings were completely destroyed and a further 12 500 need to be repaired. Several hospitals and health centres were also affected. In addition, the water supply and drainage systems were damaged, as well as a number of educational establishments.

More than 40 kilometres of the trans-Ecuadorian oil pipeline used to transport oil from the Amazon region to the refineries and export centres on the Pacific coast and the highway connecting the eastern Provinces with the rest of the country, were destroyed by floods. Moreover, agricultural production was affected by the erosion of arable land by landslides, while the floods carried away thousands of head of livestock and covered grazing land with sediment.

Direct damage to the country's social and economic infrastructure has been set at US$ 185 million. Indirect damage, which includes extremely heavy losses by the petroleum-exporting sector, together with the high costs which will be incurred in order to satisfy domestic demand for energy, in addition to production losses in the agricultural sector, have been estimated at US$ 815 million. Consequently, the disaster represents a total cost of US$ 1 billion.

The disaster has had harsh consequences on the welfare of the population directly affected --some 400 000 people. It should be kept in mind that the brunt of the disaster was borne by population groups living in rural and marginal urban areas in a number of provinces where unemployment levels and rates of illiteracy are high and where the provision of basic social services --health, sanitation and education-- is limited. In addition, approximately 75 000 people living in the Amazon region were isolated from the rest of the country. Essential supplies needed by this population must be transported by air and it has been impossible to bring their products to the markets. These circumstances could spark off a spontaneous migration of the population to

cities where basic services are already overburdened and where job opportunities are extremely limited.

Under normal circumstances an economy such as that of Ecuador would have been capable of absorbing the direct consequences of the disaster. However, in 1986, mainly as a result of the fall in the prices of oil, gross domestic product grew by less than 1.7%, a fiscal deficit of some US$ 42 million was run up and the trade surplus fell. At the beginning of 1987 the government was even obliged to temporarily suspend payment of its external debt with private banks.

The disaster brought about a considerable fall in Ecuador's production and export capacity. A projection of the performance of the main macroeconomic variables in 1987 reveals the following likely consequences: a fall of 3% in gross domestic product; a rise of US$ 900 million in the current account deficit; and a fiscal deficit of US$ 500 million.

It is clear that in spite of its desire to do so, the country does not at the present time possess the capacity to deal with the problems arising from the disaster and carry out the necessary reconstruction, while at the same time meeting its international commitments.

This document, which has been drawn up by ECIAC at the request of the Government of Ecuador, provides an independent and objective appraisal of the situation following the disaster, together with the repercussions thereof on the population affected as well as on the performance of the national economy. Moreover, it identifies those areas and issues of greatest importance wherein international technical and economic co-operation will need to play a vital role in meeting the requirements of rehabilitation and reconstruction resulting from the disaster.

INTRODUCTION

1. Background

The countries of Latin America and the Caribbean are very often ravaged by natural disasters of various kinds and of varying intensity. The havoc wreaked by such disasters in the region includes losses to the tune of US$ 1.2 billion per year and on the average they claim about 5 600 lives per year. These damages gravely undermine the living conditions of the people in the countries and impede any national efforts to achieve sustained economic growth.1/

On 5 March 1987, a natural disaster of tremendous proportions occurred in Ecuador and was caused by a series of earthquakes whose epicentre lay in the north-east of the country. This disaster adversely affected the living conditions of the low-income population nucleus, as houses and basic services were destroyed. Even worse, it damaged the transportation infrastructure of vital sectors of the economy, crippling its export capacity and foreign exchange earnings.

Although the damage caused by the disaster is enormous, in normal circumstances it might have been absorbed by an economy the size of Ecuador's. But the country's economic position had begun to deteriorate in 1986, largely because of difficulties in the external sector, due to the sharp fall in the international prices of oil, a product which generates a high percentage of the country's foreign exchange. Even before the disaster, the government had been compelled to suspend interest payments temporarily on a part of its external debt.

As a result of this unfavourable situation, in addition to the indirect effects of the disaster, which were caused primarily by the temporary suspension of oil production the country will be unable by itself, to meet its reconstruction needs. Ecuador will therefore need co-operation from the international community to overcome the problems created by the disaster and enable the country to continue pursuing its development plans and thus pave the way for it to meet its international obligations.

In this connection, it is important to point out that international co-operation to Ecuador has been swift and generous in meeting the most urgent needs and undertaking immediate rehabilitation work. In fact, on this occasion, international solidarity, especially from Latin America, has been remarkable.

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Emergency assistance has been particularly generous, and very important co-operation has been received from some countries to enable Ecuador to temporarily meet its energy needs and to build alternative routes for transporting energy and other types of products.

2. Purpose of the report

This report, which was prepared at the specific request of the Government of Ecuador, seeks to establish guidelines for the work of the national authorities and for international community co-operation during the rehabilitation and reconstruction stages. The report identifies the economic and social sectors that have been most severely damaged by the natural disaster and which should, therefore, receive priority attention during the stages following the emergency.

The priority topics and areas have been determined according to a quantitative and systematic assessment of all the direct and indirect damages caused by the disaster and its repercussions on the living conditions of the disaster victims and on the economic development of the country.

At a later stage, the government will have to draw up and submit specific rehabilitation and reconstruction programmes and projects, which taking the subjects and the areas of action outlined here as the frame of reference, could be submitted for consideration by the international community.

3. The mission

This document was prepared on the basis of the work of a United Nations interinstitutional and interdisciplinary mission, which was organized and headed by ECLAC, at the request of the Government of Ecuador. The mission comprised experts in the different subjects included in the assignment and with experience of similar events, who were made available by ECLAC and other United Nations agencies and institutions.

The mission received financial and logistical support for its work from the United Nations Development Programme (UNDP). The staff of the United Nations Centre for Human Settlements (UNCHS) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) also participated directly. Valuable contributions were also made by the representatives of the Pan-American Health Organization (PAHO/WHO) and the World Food Programme (WFP), in Ecuador, and from the experts of national projects, financed by UNDP and executed by the United Nations Fund for Population Activities (UNFPA), the United Nations Industrial Development Organization (UNIDO), and the Department of Technical Co-operation for Development (DTCD) and the United Nations Centre for Human Settlements (UNCHS).

The mission also made contact with the representatives and experts from a number of multilateral organizations --such as the Inter-American Development Bank (IDB) and the Organization of American States (OAS)-- and bilateral assistance agencies and co-ordinated its activities with them.

The mission, which visited Ecuador from 21 to 31 March, met and consulted often with the relevant State and private agencies. It gathered the information and documentation available on the conditions prevailing before the disaster and on the impact of the disaster. The mission made on-the-spot visits so as to gain first-hand knowledge of the effects of the natural phenomena which caused the tragedy in the first place and on the basis of that knowledge, to make some assessments of its own.

This document is therefore the result of an independent and objective evaluation of the disaster's impact. In making this assessment the mission sought to identify rehabilitation and reconstruction priorities.

I. DESCRIPTION OF THE PHENOMENON AND ITS OVERALL EFFECTS

A. Origin and characteristics of the natural phenomenon

1. The natural disaster which devastated Ecuador in early March, 1987 began with two very severe earthquakes which were followed by a series of events which inflicted considerable damage on the population and seriously affected the economy.

2. The first earthquake occurred at 8:54 P.M. on 5 March and measured 6.1 on the Richter scale; the second occurred at 11:10 P.M. the same day and measured 6.8. In both cases, the focal point, was located less than 10 kilometres deep and on both occasions the epicentre lay some 90 kilometres north-east of Quito (see map). Besides these two earthquakes, a succession of aftershocks of decreasing intensity occurred thereafter but only some of them were felt without the aid of instruments.

3. Although the earthquakes' epicentres were located near the Reventador volcano, an analysis of available scientific information —both instrumental and visual— proves that they were not of volcanic origin.2/ They were attributable rather to the release of energy which had been accumulated over a long period through interaction of the Nazca and South American plates.

4. The earthquakes of 5 March and the series of tremors which followed are not by any means a single and isolated event; and a study of the tectonic history of the zone shows that over the last 120 years, at least three catastrophes of comparable magnitude have taken place.3/ However, the population is not aware of how often these events may occur. This topic should be taken into account in order to mitigate the consequences of future earthquakes.4/

5. The earth tremors directly damaged dwellings and buildings as well as basic services, both in the areas immediately surrounding the epicentres and a very wide area located in the Pichincha, Imbabura and Carchi. Provinces including the cities of Quito and Ibarra, which lie to the west of the epicentres.

6. The earthquakes triggered huge landslides from the steep hillsides in an area some 100 square kilometres around the epicentres. In this area, unconsolidated materials which had been saturated by the previous days' rains were rapidly swept away to the lower reaches of the area, deeply eroding the hillsides and depositing huge quantities of mud, stones and trees in the riverbeds of the Amazon catchment area --in Napo Province-- and causing the damming up of some rivers.

7. These dams subsequently gave way, causing extraordinary floods in some of the rivers in the Amazon region; they breached their normal course and wrecked roads, bridges, oil pipelines and some human settlements. On reaching the valley planes they deposited huge amounts of material that had been dragged down, which in some cases was several metres deep.

8. The mud-flows and the swollen rivers altered the geography of the area to the east of the epicentre. However, the danger still remains that fresh landslides might cause similar damage in zones which have been spared so far.5/

9. In the region west of the epicentre, the earthquakes affected not only the scattered rural population, by damaging or destroying their houses and some services and production infrastructure works, but also several large urban centres such as Quito and Ibarra. In these cities there was damage to housing, educational and health infrastructure, water supply and sewage services and even the historical and cultural heritage. It should be remembered that Quito's historical centre is a part of mankind's heritage.

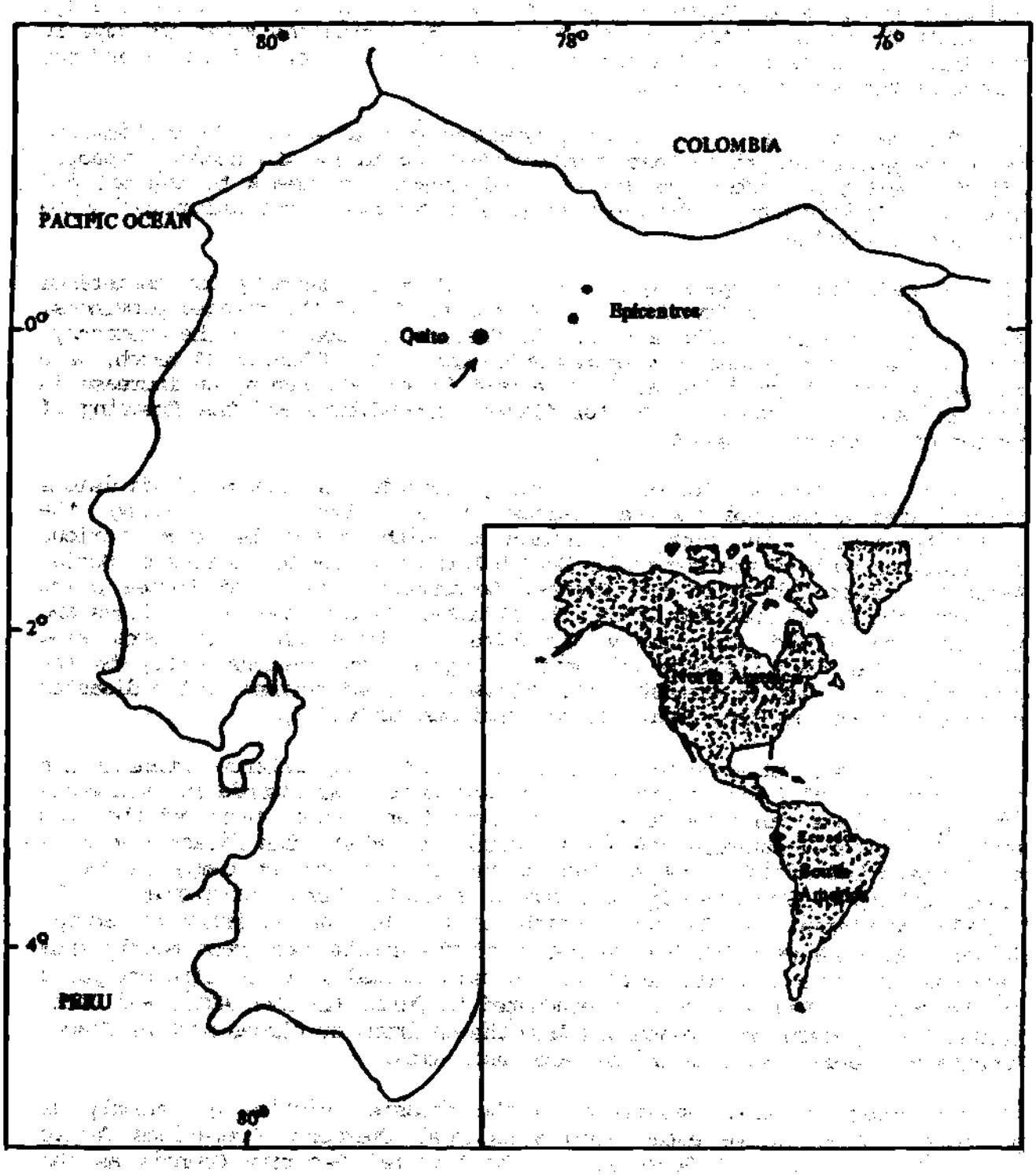
10. In the Amazon region lying east of the epicentre, the landslides and the swollen rivers demolished the dwellings of the scattered rural population, cut off many stretches of the only highway into the Amazon, several bridges and the trans-Ecuadorian oil pipeline, and affected crops and livestock.

11. Although the direct damage to houses, essential services and means of production of a rural and urban population of about 75 000 persons seriously jeopardized their welfare and reduced their income, the repercussions at the national level were very limited as noted below. The natural phenomenon, however, had other consequences which --although they were due to very localized damages in a small area-- affected the whole country and its entire population.

12. These indirect effects stem, on the one hand, from the fact that the only oil pipeline from the Amazon region to the sierra and the coast to meet the country's domestic and export energy requirements has been cut off. Some oil production has been suspended, oil has to be imported to prevent the country from grinding to a halt and a high percentage of the national exports and the foreign exchange earnings have been compromised. Furthermore, the only passable highway into the Amazon region has been cut, leaving the people there isolated. Serious difficulties are being encountered in transporting essential goods to them and they even face the risk of losing their produce.

Map

LOCATION OF THE EPICENTRES IN ECUADOR



Note: The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations

B. Emergency measures adopted

13. Since epicentres were located in areas close to the Reventador volcano, the initial impression was that the volcano had erupted. Some emergency plans had been drawn up beforehand to meet such an emergency. Because the site was difficult to reach and the population scattered, during the first few days it was difficult to ascertain the nature of the disaster which had struck and the extent of the damage thus caused.

14. The government's first emergency measures were to search for victims, to reach the people and areas that were isolated, to assess the number of people affected and then, after the disaster, to assess the damage to the oil and highway infrastructure. Officials in public agencies assigned priority to emergency activities.

15. In addition to appealing to the international community for assistance and collaboration in alleviating the serious plight of the ravaged provinces, the government also adopted a number of measures to deal with the emergency. High on the list of economic measures which came into effect on 13 March, were the suspension of the external debt payment to private banks, an increase in fuel prices, an austerity plan for fiscal expenditure and the freezing of prices of 20 essential goods.

16. The Civil Defence Authority, working through its provincial divisions co-ordinated assistance to the disaster victims. From the beginning, the Authority worked in close collaboration with officials from various institutions such as the Provincial Health Authority, the Ministries of Social Welfare, Public Education and Sports, Government, the Armed Forces Joint Command, the Ecuadorian Red Cross, the National Police, the Yellow Cross and the National Child and Family Institute. Students and volunteers also assisted. The Civil Defence Authority delegated the responsibility to the provincial units and co-ordinated the delivery of food rations to the disaster victims with the National Staple Foods Institute (EMPROVIT).

17. One of the first measures co-ordinated by the Civil Defence Authority was the evacuation of families and disaster victims who were wandering aimlessly looking for less dangerous areas. The Quito Town Council prepared the John Paul II shelter located in the Tejar sector to receive the disaster victims and transported around 1 000 of them there; it also set up camps in Baeza, Borja and Chaco. Subsequently, the people evacuated were transported to the Machala settlement in Conocoto, which is run by the Ministry of Social Welfare. As time went by, the residents of the shelter who came mostly from Napo and Pichincha gradually left and resumed a normal life in different parts of the country. People were also evacuated to Quito via Lago Agrio and Coca. Around 3 000 persons were evacuated from the environs of places such as Chaco, Reventador, Baeza Viejo, Santa Rosa and Santa Rita.

18. In order to send assistance to the disaster victims as quickly as possible, the Executive established a National Emergency Operations Centre (COEN) with the General Secretary of the National Security Council as the Co-ordinator-in-chief and composed of the Ministers of State and the Director of the National Civil Defence Authority. The COEN became the agency for channelling assistance to the earthquake victims.

19. The COEN defined three disaster areas:

a) The major disaster area, extending from Baeza to Lago Agrio, which suffered the greatest loss in terms of human life and infrastructure;

b) The lesser disaster area, including the north of Pichincha province and Carchi and Imbabura Provinces; and

c) The area of affected persons, which was so called because supplies were completely cut off when the land route between the Amazon region and the mountains was destroyed.

20. The National Civil Defence Authority was given responsibility for the first two areas and the National Mobilization Authority, responsibility for the third one. The COEN drew up a three-stage national emergency plan. The first or evacuation stage is considered complete. The second or settlement stage, is now underway; and the third or reconstruction stage, is a gradual process which is expected to last several months.

21. In the areas which are under the Civil Defence Authority's responsibility some of the services offered have included providing supplies, shelter and communication; evacuation; establishing camps; arranging transport and distributing essential food items and medicines by means of airlifts and by land. Money and assistance in kind have been channelled to Civil Defence provincial units and community councils. An emergency telecommunications network was also started and medical and health care for the disaster victims was increased. Up to 21 March, the Civil Defence Authority estimated that the cost of assistance to the disaster victims charged to its own budget stood at 22 million sucres. In the area placed under the responsibility of the National Mobilization Authority, where supplies were cut off, supply centres were established at Lago Agrio and Coca, which serve as bases for the airlifts and river transport. The Ministry of Agriculture, through the National Enterprise for Product Storage and Marketing (ENAC) and EMPROVIT, also supplied and transported essential goods to the area.

22. As land communications were cut off, the Ecuadorian Air Force and the Army's Specialized Air Wing began to operate an airlift in the major disaster areas. This airlift has been absolutely vital in providing transport and in evacuating people and moving supplies, medicines and essential goods to the Amazon region. Each aircraft made three or four flights a day, and connected with six helicopters which overflew the area from Lago Agrio bringing assistance to the disaster victims. This airlift combined with river transport, has made it possible to send assistance to the areas most severely hit by the disaster. Some countries have even sent planes to assist in the airlift. However, the COEN feels that if the supply shortage continues, greater efforts must be made to bring help to some 75 000 inhabitants of the Amazon region, most of whom are scattered in areas which are difficult to reach.

23. On 20 March the State Controller-General published a final decree giving instructions on the management of the material and financial resources and on the provision of services to the disaster victims. This decree establishes a Civil Defence Contingency Fund, consisting of budget allocations for

emergencies, with transfers from the National Emergency Funds, donations and assistance whether from within or outside the country and any other resource intended for the emergency or for reconstruction. The order lays down a complete set of rules for administering all of the fund's resources. In addition to establishing these rules, the order, stated that during the reconstruction stage, priority should be given to repairing the oil pipeline, oil pumping stations, the parallel highway, schools, hospital services and private housing.

24. The official agencies also took other measures, such as creating a loan scheme for home rehabilitation and reconstruction, channelled through the National Housing Board and the Ecuadorian Housing Bank, and the settlers' resettlement programme. Under this programme, the Ecuadorian Agrarian Reform and Settlement Institute (IERAC) will finance the infrastructure for dividing up unused State land in Napo province into 600 fifty-hectare holdings. The Ministries and institutions in all sectors, including health, education, housing, social welfare, communications, energy and agriculture, have redoubled their efforts to meet the emergency by tackling the most urgent problems and preparing programmes for the rehabilitation and reconstruction phases.

25. National solidarity with the disaster victims and foreign assistance and co-operation have both been extraordinarily generous. Aid has been flowing in from all corners of Ecuador, in the form of money, foodstuffs, essential goods, clothing, voluntary services, etc. In the majority of cases, the aid has been channelled through multiple aid institutions and committees of solidarity with the disaster victims. The radio and television campaigns have been particularly effective in collecting money and contributions. So have public drives and contributions from the staff of public and private institutions.

26. Many religious and voluntary institutions have stepped up their efforts during the emergency and have organized themselves to obtain resources which will enable them to take part in the rehabilitation and reconstruction programmes. Just to give one example of the efficiency of the community and humanitarian aid at the national level, the Aid Committee for the earthquake victims advised that the television campaign had brought more than 350 million sucres worth of contributions in money and in kind.

27. International assistance and co-operation were received from many countries during the very early days. Over 22 non-governmental agencies throughout the world also contributed generously in money, kind and services. Colombia, Mexico, Nigeria, the United States of America and Venezuela have helped to meet the country's energy needs, to rehabilitate and reconstruct the oil pipeline and highway infrastructure, and to fulfil a part of the country's crude oil export commitments. Institutions such as the Red Cross have done a fine job and have collaborated in channelling the funds and contributions from the countries.

28. The United Nations system has contributed substantially with personnel services and financial support from its agencies. For example, the Office of the United Nations Disaster Relief Co-ordinator (UNDRO) quickly evaluated the emergency needs and co-ordinated the flow of international aid to Ecuador. The

Organization of American States (OAS), the Inter-American Development Bank, the World Bank, the European Economic Community and bilateral assistance organizations have also collaborated.

29. Aid from governments and from international and non-governmental organizations, contributions channelled through the Red Cross, and contributions from the United Nations emergency system —excluding the special aid from the countries to the energy sector— at 26 April 1987 exceeded US$ 8 million.

30. In summary, the government and people of Ecuador have made a laudable effort to meet the emergency needs and international co-operation, both bilateral and multilateral, has been a valuable and timely complement to that effort during the difficulties that had to be surmounted immediately after the disaster.

II. ASSESSMENT OF DAMAGE

A. Overview

31. An estimate of the earthquake damage throughout the country is given below, in order to ascertain the extent of the damage and identify the sectors most severely hit, so that they can receive priority attention immediately after the emergency.

32. The estimate given here is not strictly accurate because it was made a few days after the disaster when very little information was available. However, accuracy had to be sacrificed in order to provide appropriate guidelines as quickly as possible for the work of the national authorities and any aid which may come from the international community, during the rehabilitation and reconstruction phases which must begin as soon as possible.

33. The information available when these estimates were made was incomplete. It was provided both by authorized government sources and by private agencies with recognized authority and by experts from international and bilateral organizations. In some cases too, the information was complemented by field data obtained by the ECLAC mission. It is felt, that while the estimates have their limitations, they will be able to convey the order of magnitude of the damages and as stated before, can reliably be used for the orientation purposes previously referred to.

34. Using a methodology that was developed on the basis of many similar cases, an estimate of the direct damages caused by the earthquake was made and in all cases, these estimates were calculated as the cost of replacing the property destroyed and repairing the property damaged. Indirect costs were also estimated such as crops which could not be reaped because of direct damages and the increased costs which would have to be incurred or the lower income earned in providing certain services.

35. As a rule, the figures for damage were calculated in the national currency and then converted to dollars at the rate of 150 sucres to the

dollar. The figures for oil and oil products were calculated directly in dollars at expected international trading prices.

B. Social infrastructure

1. Health

36. The buildings and equipment of health establishments, located in the areas most affected by the disaster, suffered considerable damage. These were mainly hospital and health centres as well as administrative buildings located in urban areas, which belong both to public sector agencies and to religious institutions and community associations. A total of 23 buildings in this sector were damaged by the earthquakes.

37. Damage to the buildings of the Ecuadorian Institute of Social Security, both in urban and rural areas, was minimal. However, the buildings owned by the Ministry of Health were seriously damaged, since these were older structures whose replacement in some cases was already envisaged in the plans of the sector; their construction will now have to be brought forward. A number of non-governmental health establishments situated in the eastern region also sustained damages.

38. Direct damage to these buildings, including the cost of replacing equipment and furniture, was estimated on the basis of a list of damages prepared for each establishment and the current unit costs. Total damage is calculated to be 100 million sucres (US$ 0.66 million), of which 98% represents damage to public sector installations 6/ (see table 1).

39. The drinking water supply and sewage systems were damaged by the earthquakes, particularly in small urban and rural communities, whereas those in the cities of Quito and Ibarra were only slightly damaged. The most common forms of damage were the partial or total destruction of the water-intake systems, treatment works, main and distribution pipelines, as well as connections to homes; there were blockages of some sewage systems and inspection chambers in urban areas. The supply of water had to be cut off or temporarily restricted in a number of cases; after a few days, however, services were almost normal after emergency repair works were undertaken, excepting some localities in province of Napo where difficulties were still being experienced.

40. The cost of repairing direct damage to water supply and sewage systems was estimated at 192.5 million sucres (US$ 1.3 million). This figure was calculated on the basis of a list of damage submitted by the institutions of the sector and on current unit costs. It is estimated that of this amount, 78% represents damage in urban areas and the remaining 22% damage to rural systems serving scattered populations (see table 1).

Table 1

ECUADOR: DAMAGE TO SOCIAL INFRASTRUCTURE

(In millions of sucres)

Sector, subsector	Damage			Imported component a/
	Total	Direct	Indirect	
Total	4 525	4 525	-	403
Health	293	293	-	15
Hospitals and health centres	100	100	-	7
Drinking water and sewage systems	193	193	-	8
Education	1 133	1 133	-	334
Housing	3 099	3 099	-	54

Source: ECLAC estimates based on official figures.

a/ Value of components that will have to be imported in the absence of national production.

41. The potential earnings lost as a result of the interruption of services due to the damage was not taken into account since only a small sum is involved. The higher costs of supplying water of proper quality to some localities in the east have been tabulated under the heading of emergency expenses.

2. Education

42. Damage to the educational infrastructure was particularly serious in urban areas where there were school buildings with very old structures or dwelling houses that had been adapted to serve as school buildings.

43. In the provinces of Pichincha, Imbabura and Carchi there was partial damage to walls, roofs and interior installations and some structural damage; some establishments, however, will have to be replaced by new buildings. In the eastern region, several educational establishments were completely destroyed and these will have to be replaced.

44. In order not to interrupt the school year it has been necessary to organize two or even three shifts in some of the establishments that were not affected, thus rendering the task of teaching more difficult.

45. Direct damage in this sector was estimated at 1 133 million sucres (US$ 7.6 million). Of this amount, 76% represents damage to educational establishments in urban areas, while the remaining 24% represents damage to schools in rural areas. It should be noted that the greatest damage (97%) was

sustained by public sector establishments. The rehabilitation and reconstruction of the infrastructure in this sector will affect the balance of payments of the country since an amount of 334 million sucres will be required to import laboratory equipment which is not produced locally (see table 1).

3. Housing

46. The earthquakes damaged or destroyed an estimated total of 15 475 housing units in the urban (44%) and rural (56%) sectors. It is estimated that one fifth of the total (3 042 units) will have to be completely rebuilt, while the remaining 12 433 units will require some type of repair.

47. Most of the rural and urban dwelling houses that were damaged in the interior of the country were constructed from "tapia" (walls of clay) or adobe and had been in need of repair. These had been constructed using methods and materials that could not stand up to the tremors. In the eastern region, wooden houses that were in poor condition or poorly constructed were damaged. In Quito, 1 000 dwelling houses in the central area, which were also in need of some repair before the disaster, sustained damage.

48. The cost of repairing or rebuilding the houses was estimated on the basis of the number and characteristics of the damaged or destroyed units and the current unit costs for repairing or rebuilding, at 3 006 million sucres (US$ 20 million).7/

49. Damage to the furniture in the damaged houses was estimated at 10% of the value of the typical inventory for the various types of dwellings. This amounted to an additional 93 million sucres (US$ 0.6 million), which raises the total damage in the sector to 3 099 million sucres (see table 1).

C. Economic infrastructure

1. Transport

50. The landslides caused by the earthquakes and the ensuing river floods caused direct damage to the road infrastructure and to vehicles, thus creating serious problems of the isolation of the important agricultural area located around Lago Agrio.

51. More specifically, a 45 kilometre stretch of the highway linking Baeza with Lago Agrio was cut between El Salado and Río Dashiño. Several bridges with a combined length of over 600 linear metres were also washed away and destroyed. In addition, there was considerable damage to the network of main highways and to feeder roads in the eastern region. A large number of trucks and vehicles were destroyed or damaged by the flood waters.

52. The landslides considerably modified the geography of the region and the possibility exists that such phenomena may occur again in future. It will therefore be necessary to give careful consideration to changing the alignment of the highway and the location of bridges. The precise cost of such

modifications can only be determined later. Nonetheless, the value of the stretch of highway and the bridges that were destroyed is 1 800 million sucres (US$ 12 million) (see table 2).

53. The direct cost of repairing 614 kilometres of the main highway system and a still to be determined combined length of feeder roads in the eastern region has been estimated at 914 million sucres 8/ (US$ 6.1 million).

54. The cost of replacing the vehicles that were destroyed or damaged by the landslides has been calculated at 43 million sucres (US$ 0.3 million) in direct damage.

55. Finally, the railway line between Ibarra and San Lorenzo was damaged by the earthquakes and service was interrupted for five days. The direct cost of repairing it will be 5 million sucres; the indirect cost in terms of the loss of potential earnings by the company was minimal and has not been taken into account.

56. The damage described so far has also had various indirect effects and costs arising from the need to use alternative routes and means of transport in order to prevent the eastern region from being cut off and to rehabilitate the trans-Ecuadorian oil pipeline.

57. While the reconstruction of the destroyed roadway between El Salado and Río Dashiño is being planned and undertaken, various alternative means need to be found to transport goods and people from and to the eastern region. In this regard, the most economic alternative is the opening up of an alternative road —including a stretch of pilot road between Baeza and the eastern region— with an alignment south of the damaged highway,9/ for which an investment of 657 million sucres (US$ 4.4 million) is required (see table 2).

58. During the construction of this alternative roadway of the most rudimentary type (pilot road), which is estimated to take four months, people and goods will have to be transported by air and by river, giving rise to an indirect cost —attributable to the disaster— that is estimated at 945 million sucres (US$ 6.3 million) (see table 2).

59. It is hoped that the construction of the pilot road over the alternative route will permit the movement of goods and people referred to above, although the transport of heavy goods will create certain problems. The cost of transporting such goods and people will, however, be higher than on the original Baeza-Lago Agrio stretch since the new road will be longer and of lesser quality. This higher cost is estimated to be 150 million sucres (US$ 1 million) over a period of one year, which constitutes an indirect cost attributable to the disaster.

60. On the other hand, although it has been pointed out that the definitive reconstruction of the stretch of highway between El Salado and Río Dashiño will not be undertaken until the new alignment is determined, it is essential to rebuild as quickly as possible the oil and gas pipelines that run parallel to it following an almost identical alignment. For this, it will be necessary to build a rudimentary road and construct a number of Bailey-type bridges to enable the machinery and piping to be brought in. The estimated cost of this

Table 2

ECUADOR: DAMAGE TO ECONOMIC INFRASTRUCTURE

(In millions of sucres)

Sector, subsector	Damage			Imported component a/
	Total	Direct	Indirect	
Total	6 196	3 290	2 996	2 868
Transport	5 724	2 762	2 962	2 541
Baeza-Lago Agrio highway	1 800	1 800	-	- b/
Highway and feeder road systems	914	914	-	518
Vehicles	43	43	-	41
Railway network	5	5	-	-
Baeza-Coca alternative route	657	-	657	538
Air transport for four months	945	-	945	567
Higher transport costs	150	-	150	-
Pilot road for building of oil pipeline	1 110	-	1 110	877
Electricity	572	528	44	327
Production infrastructure	20	20	-	-
Lines and substations	19	19	-	-
Worksites for two projects	489	489	-	327
Higher generating costs	44	-	44	-

Source: ECLAC estimates, based on official figures.

a/ Cost of components that will have to be imported in absence of national production.

b/ The imported component is not indicated since rebuilding will be undertaken at a later date.

will be 1 110 million sucres (US$ 7.4 million), which will be entered as an indirect cost.

61. In short, the disaster resulted in direct costs in the sector of 2 762 million sucres (US$ 18.4 million); these costs, in turn, led to a series of indirect costs estimated at 2 862 million sucres more (US$ 19 million). The total estimated cost of the damage is therefore 5 624 million sucres (US$ 37.5 million), which, moreover, will adversely affect the country's balance of payments since the reconstruction process will require imports worth 2 541 million sucres (US$ 16.9 million) (see table 2).

2. Telecommunications

62. The earthquakes and landslides caused no damage to the telecommunications system. However, the disaster highlighted the need to provide a number of rural communities with adequate telecommunications systems which they currently lack.10/

3. Electricity

63. The earthquakes, landslides and floods caused damage to a number of power generating plants, the transmission lines of the national grid system, and to the work sites of two hydroelectric plants currently under construction. Moreover, they had indirect consequences since it became necessary to temporarily suspend electricity services in some cities and to replace the energy generated in hydroelectric plants by energy produced in thermal plants, while the cost of power generation in some thermal plants was increased owing to the higher cost of transporting fuel oil.

64. The direct costs of the disaster have been estimated at 528 million sucres (US$ 3.5 million), which includes the cost of repairing damaged generating plants and transmission systems (39 million) and the cost of repairing and rebuilding two construction sites (489 million) 11/ (see table 2).

65. The indirect costs have been estimated at 44 million sucres (US$ 0.3 million) and include overruns in the budgeted costs of ongoing projects (6 million), higher generating costs of producing electricity in thermal plants (7.5 million), the higher cost of fuel oil used in the thermal plants (30 million), and the loss in potential earnings of the enterprise as a result of the interruption of the service in Quito (0.5 million) (see table 2).

66. Thus, the total cost of repairing the damage caused by the disaster to the electricity sector has been estimated at 572 million sucres (US$ 3.8 million). This will have an adverse effect on the country's balance of payments estimated at 327 million sucres (US$ 2.2 million), since it will be necessary to import some materials and equipment which are not produced in the country (see table 2).

D. Productive sectors

67. The disaster caused direct damage to the productive infrastructure and resulted in considerable indirect costs owing to the reduction or suspension of production and the consequent financial losses.

1. Agriculture and livestock sector

68. Losses in the agriculture and livestock sector include erosion and silting of farmlands and pasture, loss of livestock, damage to the infrastructure of the sector --particularly to irrigation systems--; reduced production of some goods for domestic consumption and for export owing to the temporary abandonment of land by farmers or the temporary interruption of transport services between the affected areas and the centres of consumption; and the cost of financing emergency crops.

69. In the agricultural sector, damage to the capital stock includes the erosion or silting up of about 400 hectares of land devoted to various crops; sundry damages in six public irrigation districts and in one private system covering an area of approximately 15 700 hectares, damage to other infrastructural works in the sector; and the loss of perishable products in storehouses. This direct cost has been estimated at 180 million sucres (US$ 1.2 million) 12/ (see table 3).

70. Damage was caused to seasonal crops and to permanent plantations whose products were about to be harvested or were being harvested, among which, in order of decreasing importance, were coffee, African palm, corn and beans, green oranges and others. The shortfall in the crop of each one of these has been estimated, taking into account a period of one month of partial abandonment by farmers and a further period of three months during which the roads linking the Amazonian region to Quito and other centres of consumption or export will be impassable. These indirect costs are calculated at 1 063 million sucres (US$ 7.1 million) (see table 3).

71. It is estimated that the National Development Bank will not be able to recover loans in the amount of approximately 600 million sucres (US$ 4 million), extended to farmers whose crops have been reduced. This loss will be accounted for in chapter III, under public sector finances. In addition, it was necessary to provide financing to undertake emergency crop programmes in some regions, at a cost of 390 million sucres (US$ 2.6 million).

72. In the livestock sector damage took the form of the loss of 3 000 head of cattle and the erosion or silting up of approximately 2 500 hectares of pasture land in the eastern region. This damage was estimated at 155 million sucres (US$ 1 million) (see table 3).

73. In addition, there will be a drop in milk sales in the eastern region since the product cannot be brought to the market on account of the temporary blockage of the access roads for an estimated period of four months. This represents indirect damage resulting in losses of 5.8 million sucres.

Table 3

ECUADOR: DAMAGE IN THE AGRICULTURE AND LIVESTOCK SECTOR

(In millions of sucres)

Sector, subsector and headings	Damage			Import/ export component a/
	Total	Direct	Indirect	
Total	1 794	335	1 459	731
Agricultural sector	1 633	180	1 453	731
Losses of capital	180	180	-	-
- Eroded/silted lands (400 hectares)	40	40	-	-
- Infraestructure including irrigation works	127	127	-	-
- Products in storage	13	13	-	5
Production losses (through abandonment or lack of access)	1 063	-	1 063	726
- Coffee (20 000 hectares)	781	-	751	726
- African palm	140	-	140	-
- Corn, beans	95	-	95	-
- Green oranges	67	-	67	-
- Other products	10	-	10	-
Emergency crop programmes	390	-	390	-
Livestock sector	161	155	6	-
Losses of capital	155	155	-	-
- 3 000 head of cattle	105	105	-	-
- Lost/silted up pasture land (2 500 hectares)	50	50	-	-
Losses from reduced milk production owing to lack of access	6	-	6	-

Source: ECLAC, based on figures provided by the Ministry of Agriculture and other sources.

a/ Import or export requirements which cannot be met.

74. The total damage to the agriculture and livestock sector therefore amounts to 1 794 million sucres (US$ 12 million) of which 335 million (19%) represent direct costs and 1 459 million (81%) indirect costs (see table 3).

75. The above figures represent only a small fraction of the product of the sector for the country as a whole; however, they represent substantial losses of earnings for the individual producers in question. These losses in production also result in losses or adverse consequences for the balance-of-payments situation of the country --which will be taken into account in the macroeconomic balance in chapter III-- since exports of coffee will be reduced and it may become necessary to import vegetable oil to make up for lost national production.

2. Hydrocarbons

76. The landslides and river floods cut the trans-Ecuadorian oil pipeline which links the oil-producing area of Lago Agrio with the refinery and export terminal at Balao in Esmeraldas and which ran alongside the highway between Baeza and Lago Agrio. This interrupted the flow of crude oil from the eastern region, which accounts for 99.6% of national output. No damage has been detected in the production wells in the Lago Agrio oil field; however, when production resumes, a number of problems may arise which are now impossible to foresee.

77. A 33-kilometre stretch of the 26-inch diameter oil pipeline, between El Salado and Río Dashiño, suffered interruptions. The civil engineering works in the pumping station at El Salado were affected; however, the pumping equipment seems capable of being repaired. A similar stretch of the 6-inch gas pipeline between Shushufindi and Quito, which runs parallel to the oil pipeline and the highway, was also cut; an additional 12 kilometres of different stretches of the same gas pipeline were also destroyed. Finally, there was damage to a 1 000-metre stretch of the 10-inch lines from Campo Bermejo, and to accessory works located near the Aguarico river.

78. The direct cost of rebuilding the pipelines and related works, and of the estimated 100 000 barrels of oil that was spilled on account of the rupturing of the pipeline, is estimated to be 18 250 million sucres (US$ 120 million). Repair work is expected to take four months, which means that operations might be resumed between 10 and 15 August of this year. It should be mentioned that, in view of the urgent need to restore the flow of oil, and after briefly studying various alternatives, the government decided to rebuild the oil pipeline virtually along its original route, thus avoiding greater delays and larger investments.13/ The possibility exists, however, that unexpected problems may arise during construction, which may extend the construction period before operations can be resumed and increase the cost of the works.

79. Although the direct costs of the damage to the oil pipeline are themselves relatively high, the cost of the indirect damage is several times greater and has serious repercussions on the economic activity of the country as a whole. These indirect costs include the loss of income from oil exports, and the higher costs of satisfying domestic demand for petroleum products.

80. During the period from 5 March --when the oil pipeline was damaged-- and 15 August, the domestic demand for oil products will be met from two sources. The first is by means of a Venezuelan loan of five million barrels of crude oil (three million barrels) and reconstituted crude (two million), whose equivalent in crude oil from the Oriente oil fields will have to be returned to Venezuela within a period of 180 days from the resumption of exports from Ecuador,14/ as well as by the purchase of refined oil products (1.1 million). The second is Ecuadorian crude oil from the Oriente oil fields which will be transported to the Colombian port of Tumaco using and extending the Colombian trans-Andean oil pipeline. This involves the construction of 32 kilometres of pipeline in Ecuadorian territory and a further 11 kilometres in Colombian territory. From Tumaco, 50 000 barrels a day of Ecuadorian crude oil will be transported in tankers to the Ecuadorian refineries in the Santa Elena Peninsula.

81. There are additional problems concerning the domestic supply of energy. Firstly, owing to the rupture of the Shushufindi-Quito gas pipeline it will be necessary to pay higher costs for the supply of liquid gas to Quito, since alternative routes and means will have to be found. Secondly, meeting the demand for products in the eastern region --where the existing refinery has a limited capacity-- will entail higher transport costs.15/

82. The indirect costs of the disaster as regards the supply of domestic requirements of oil products, until repairs to the oil and gas pipelines are completed, have been estimated at 13 526 million sucres (US$ 90 million). This includes the investment in the alternative oil pipeline to Colombia, the transportation costs of the borrowed Venezuelan crude and the Ecuadorian crude to be transported via the alternative route through Colombia, the value of the replacement crude, the higher transport costs of liquid gas, and the higher transport costs of oil products to the eastern region (see table 4).

83. Exports of crude oil have had to be suspended until the oil pipeline can be made operational again. Meanwhile, a loan of 7.5 million barrels from Venezuela and another of 10 000 barrels per day from Nigeria has been obtained. This will be enough to meet a part of the export commitments. The Venezuelan loan is repayable within 210 days from the date of resumption of exports from Ecuador, and it will have to be returned to the port of origin (Curacao). No details were available concerning the conditions of the loan from Nigeria, but from all indications these will be similar to the Venezuelan loan.

84. It is estimated that, with these loans, Ecuador will be able to spread the effect of the reduction of oil exports over a period of almost 12 months --that is, up to March of 1988-- instead of a period of only four months. Assuming that it will be possible to restore production to pre-disaster levels, it may be possible to attain an export volume of 62 000 barrels per day --after discounting the crude to be repaid-- in 1987 and about 85 000 barrels per day in 1988. Comparing these volumes with the projections that had been made prior to the disaster, and based on a projected price of US$ 16.5 per barrel, losses from the interruption of crude exports will amount to US$ 643 million (96 405 million sucres) up to March 1988. This represents roughly half of the projected oil sales income prior to the earthquake. Moreover, the transport of the crude between Ecuador and the point of origin of the borrowed oil will cost an additional US$ 19.6 million (2 940 million sucres). Thus the total indirect cost of the reduction of oil exports is estimated at US$ 662 million (99 345 million sucres) (see table 4).

Table 4

ECUADOR: DAMAGE IN THE HYDROCARBON SECTOR

(In millions of sucres)

Heading	Damage			Import/ export component a/
	Total	Direct	Indirect	
Total	133 263	18 250	115 013	122 340
Reconstruction of pipelines and pumping stations and cost of spilt crude oil	18 250	18 250	-	9 900
Increased cost to supply domestic demand	13 526	-	13 526	13 095
Investment in oil pipeline to Colombia	2 558	-	2 558	...
Higher transportation costs	2 353	-	2 353	...
Cost of replacement crude	8 184	-	8 184	...
Higher transportation costs for liquid gas	131	-	131	-
Higher costs for transporting oil products to the eastern region	300	-	300	-
Lost export earnings	99 345	-	99 345	99 345
Export shortfall	96 405	-	96 405	96 405
Cost of transporting borrowed oil	2 940	-	2 940	2 940
Loss of expected earnings	2 142		2 142	
From reduced gasoline consumption	791	-	791	-
From reduction in quantity of crude refined	1 351	-	1 351	-

Source: ECLAC, on the basis of official information.

a/ Import needs or reduction in exports.

85. In addition to the indirect losses mentioned above, account must be taken of the loss in earnings suffered by the State Oil Corporation of Ecuador (CEPE) as a result in the drop in consumption, particularly of gasoline, and the fact that the refineries (private and CEPE refineries) will process smaller amounts of crude. This additional indirect cost of the disaster is estimated at 2 142 million sucres (US$ 14 million) (see table 4).

86. In summary, the total cost of the damage to the hydrocarbon sector is estimated to be 133 263 million sucres (US$ 888 million). Of this amount, 18 250 million sucres (14%) are attributable to direct material damage, and the remaining 115 000 million (86%) to indirect costs as a result of lost production, higher supply costs and the losses of earnings suffered by enterprises in the sector. Moreover, the damage will adversely affect the country's balance of payments, since certain products will have to be imported and there will be a drop in crude oil exports of US$ 815 million.

87. The figures given above are based on a rather tight construction schedule, which may well be upset by delays. In such an event, losses of export income and the higher costs of supplying the domestic demand would increase at a rate of US$ 4 to US$ 5 million per day. On the other hand, if the production capacity of the oil field could be increased to 300 000 barrels per day 16/ --which is the amount that could be transported via the oil pipeline that will already have been repaired and by the alternative Colombian pipeline-- between September 1987 and March 1988 it would be possible to earn approximately US$ 52 million in foreign exchange or almost 8% of the estimated losses.

3. Industry and commerce

88. With the exception of the oil industry --the damage to which was described under the hydrocarbon sector-- no industry was directly affected by the disaster. There will, however, be minor indirect effects on the sector as a result of the increase in fuel prices and the reduced availability of raw materials from the agricultural sector. In any case, the effects on this sector attributable to the disaster will not be significant.

89. In the case of commerce, the indirect effects of the earthquake are mainly the possible increases in the sale prices of some agricultural products, on account both of reduced production and speculation.

E. Other damage

1. Public and private buildings

90. Many urban buildings with several storeys occupied by public services and private offices suffered minor damage of different kinds which included fissures in their masonry and in other non-structural parts. In spite of this it was not necessary to interrupt the business conducted in them.

91. A global estimate of this indicates direct costs damage totalling US$ 450 million sucres (US$ 3 million), 70% of which relates to the public sector.17/

2. Historical and cultural heritage

92. The earthquakes seriously affected the country's historical and cultural heritage, especially in Pichincha and Imbabura provinces. In Quito (a city which UNESCO declared to be part of mankind's cultural heritage), some 15 particularly significant monuments were affected in varying degrees. In the city of Ibarra (regarded as a national historical centre), a number of churches and other monuments suffered total or partial collapse. Many churches built in the rural sector during and after the colonial period were also damaged.

93. The tremors caused damage to structural components, such as domes, arches and columns, as well as to the masonry of monuments. The disaster also showed up the precarious structural condition in which some monuments had been since before the quakes.

94. A provisional estimate puts the direct cost of rehabilitation and reconstruction of the historical and cultural heritage at 1 082 million sucres (US$ 7.2 million). Ninety per cent (982 million sucres) of this amount pertains to damage in urban centres, while the remaining 150 million sucres relate to damage in rural areas.

95. In order to learn to the present state of some monuments which were not visibly affected and decide how they should be repaired or restored so as to avoid damage from further earthquakes, it will be necessary to incur expenditure of 50 million sucres (US$ 0.3 million), which is regarded as an indirect cost.

96. The aforementioned damage to the historical and cultural heritage will also have an adverse effect on tourism, since a sizeable portion of the foreign tourist attractions has been damaged or destroyed.

3. Emergency expenses

97. It is estimated that emergency assistance to the victims of the disaster and some immediate rehabilitation, including the provision of temporary housing and food, occupied a period of four weeks following the earthquakes. In addition it is calculated that it will be necessary to continue providing means for transporting persons and goods between Quito and the eastern region by air and river for a period of close to four months until land communications can be re-established.

98. The cost of the emergency tasks (excluding the air and river transport cost mentioned above, which is included in the transport sector) is provisionally estimated at some 2.7 billion sucres (US$ 18 million). This has been financed from the budget of government institutions, from private local donations, and from foreign donations in cash and kind (international assistance).

4. Environment

99. The disaster had an adverse impact on the environment of the region affected. Not only was the plant cover of several thousands of hectares of grassland and farmland, lost as a result of landslides, but for a period of several years the land destroyed will remain unproductive. In addition, the river courses have been modified and partially obstructed, which may cause further damage in the future.

100. The spill of some 100 000 barrels of petroleum which took place when the pipeline was cut had an even more prejudicial effect. The oil found its way into the natural drainage system, killing fish —which is eaten by the people in the area— and even polluting rivers in neighbouring countries.

101. Although the effects described above are well known, for the time being it is impossible to assess the damage in monetary terms. It will be necessary to make an in-depth analysis before it will be possible even to estimate the cost of neutralizing the most immediate effects of the disaster.

F. Summary of damage

102. Although the estimates given above are of a provisional nature, because it has not been possible to gather sufficiently reliable information in the very short period since the disaster, it is possible to provide a figure showing the order of magnitude of the damage caused by the disaster, and to identify the sectors which were most seriously affected and will therefore require priority attention in terms of rehabilitation and reconstruction. Any information which can be collected later would permit the figures and conclusions presented here to be corrected.

103. It is estimated that the total losses amount to about 150 billion sucres, or US$ 1 billion (see table 5). Approximately 18% of this amount (27.7 billion sucres) pertains to direct damage to the country's capital assets, while the remaining 82% (122.2 billion sucres) relates to indirect costs representing primarily production losses.

104. In regard to direct damage, and in order of decreasing importance, the most affected were the infrastructure of productive sectors (66% of the total), mainly in the hydrocarbon sector; social infrastructure, including housing, educational centres and health facilities (16%); road transport and electric power infrastructures (12%); and damage to the historical and cultural heritage (5%). The indirect costs of the disaster, on the other hand, affected primarily the productive sectors (95% of the total) and the road transport systems and emergency expenditures (2.5% each) (see table 5).

105. An analysis of the foregoing figures indicates that although the natural disaster in Ecuador caused relatively light direct damage to the country's infrastructure, it resulted in very high indirect costs, including reductions in the production of oil for export, higher costs for the domestic supply of petroleum derivatives, and reductions in agricultural production.18/

Table 5

ECUADOR: SUMMARY OF DAMAGE CAUSED BY THE DISASTER

Sectors, subsector	Damage (in millions of sucres)			Damage (in millions of dollars)			Effect on balance of payments a/
	Total	Direct	Indirect	Total	Direct	Indirect	
Total	150 160	27 932	122 228	1 001.07	186.21	814.85	834
Social infrastructure	4 525	4 525	-	30.17	30.17	-	3
Health	293	293	-	1.95	1.95	-	
Education	1 133	1 133	-	7.55	7.55	-	
Housing	3 099	3 099	-	20.67	20.67	-	
Economic infrastructure	6 296	3 290	3 006	41.97	21.93	20.04	19
Transport	5 724	2 762	2 962	38.16	18.41	19.75	
Electricity	572	528	44	3.81	3.52	0.29	
Productive sectors	135 057	18 585	116 472	900.38	123.90	776.48	821
Agriculture	1 794	335	1 459	11.96	2.23	9.73	5
Hydrocarbons	133 263	18 250	115 013	888.42	121.67	766.75	816
Other sectors	4 282	1 532	2 750	28.54	10.21	18.33	(9)
Public and private buildings	450	450	-	3.00	3.00	-	-
Historical heritage	1 132	1 082	50	7.54	7.21	0.33	-
Emergency expenses	2 700	-	2 700	18.00	-	18.00	(9)

Source: ECLAC, calculated on the basis of official data.

a/ Value of imports which it will be necessary to carry out or of exports which cannot be made.

106. In order to obtain a better idea of the magnitude of the disaster, it should be borne in mind, on the one hand, that the direct damage to capital assets amounts to 28 billion sucres, which represents 15% of the gross product of the construction sector; in other words, reconstruction would require the equivalent of two months' complete devotion by the country's construction sector. On the other hand, the indirect costs of the disaster (122.2 billion sucres) amount to the equivalent of 7% of the gross domestic product, or the value of nearly one month's production throughout the country. A comparison of the indirect costs with the value of the country's exports is even more impressive, since the former represent 33% of the latter.

107. It may be noted that the value of the direct damage caused by the disaster might be partially offset by insurance and reinsurance payments in respect of the infrastructure affected. However, according to the provisional information available at the time the present assessment was made, the amount of insurance held appears to be very low, so that the value of the direct damage will have to be regarded as a net cost for the country.

108. It should be stressed that the cost of the indirect losses suffered on this occasion has to a large extent been cushioned by the generous loans of petroleum made by Venezuela and Nigeria, which have made it possible to distribute the burden over a longer period than that required to repair the pipeline. This act of solidarity is an excellent example of international co-operation in time of disaster and of economic co-operation among developing countries in general.

109. In conclusion, it is essential to point out that the value of the damage referred to above is expressed in terms of the cost of replacing the goods affected and the production lost. However, the amount which must be invested in the reconstruction will certainly be higher, since the disaster has made it necessary to replace infrastructure whose useful life had already been exceeded, and to extend the coverage of some basic services in the Amazon region, which is indeed very deficient. In addition, inflation will surely increase costs during the reconstruction period, and it may be necessary to relocate some works in areas not so prone to earthquakes, which will cause their cost to escalate.

110. Finally, it should be noted that this disaster makes it clear that the system for conveying petroleum and the system of road communications between the Amazonian region and the Sierra in Ecuador is very vulnerable in that only one route is available.

III. EFFECTS ON ECONOMIC AND SOCIAL DEVELOPMENT

111. In this chapter an analysis is made of the effects of the earthquake on the living conditions of the people affected by it and on the country's economic development. This must necessarily be a provisional analysis in view of the shortage of information; however, it is believed that the data available make it possible to identify the most outstanding problems which have arisen and must be solved.

A. Effects on living conditions

112. There follows a description of the basic characteristics of the population affected by the disaster, the damage and inconveniences suffered by various sectors of the population, and the effects on their living conditions.

1. Socio-demographic features of the provinces affected

113. Table 6 contains indicators which provide information on the living conditions in the provinces most affected by the quakes. Although each of them have their own individual characteristics, when the indicators are considered in combination, four major features which determine the living conditions of the population are thrown into relief. These features include the highly rural nature of the provincial populations, with the exception of the population of Pichincha; the changes which are taking place in the structure of their economic activities; the marked urban-rural imbalance shown in the indicators relating to quality of life and the magnitude of population migration.

114. The three provinces, whose population is predominantly rural, are leaders in the production of various food crops and commodities for agro-industry. However, in the more recent past, all three provinces showed a rate of urban growth significantly higher than that for rural growth and consequently a relative drop in their rural population and what is at times a disproportionate growth in their urban centres. In short, although the provinces are still predominantly rural, the process of urban development has accelerated in all of them, so that employment, education, health and housing problems are becoming more severe in many urban centres in the provinces.

115. The process of urban development is also partially responsible for the major changes which have been taking place in the structure of the economically active population. In the period between the censuses of 1974 and 1982, the active members of the population declined in all the provinces as a result, primarily, of the significant increase in students in the inactive sector. The share of agricultural workers in the active members of the rural sector experienced a general decline. With regard to the active members of the urban sector, the share of women, persons engaged in services and self-employed increased, while the proportion of white-collar workers and wage-earners decreased. Not all these changes in the structure of the active population, are, however, favourable.

116. In the period between the censuses, important progress was made in improving the living conditions of the population. Such advances have, however, not been enough to mitigate the huge imbalances in both urban and rural areas. In all the provinces affected, infant and maternal mortality are high --higher than the national average-- and significantly higher in the

Table 6

ECUADOR: SOCIO-DEMOGRAPHIC INDICATORS IN THE PROVINCES AFFECTED BY THE EARTHQUAKE

Indicators	Province			
	Carchi	Imbabura	Pichincha	Napo
Population				
Population of province	127 779	247 287	1 382 125	115 110
Percentage share in population of country	1.6	3.1	17.1	1.4
Percentage share of rural population	62.3	62.7	29.6	82.6
Annual growth rate (1974-1982)	0.7	1.6	4.3	8.0
Masculinity ratio	98	96	97	118
Dependency ratio	93	88	71.5	97
Economically active population (EAP)				
Population 12 years of age and over	83 362	164 143	955 478	69 048
EAP (among those 12 years of age and over)	36 665	71 074	450 986	33 281
Urban employment rate (%)	95.1	95.4	96.8	90.8
Rural employment rate (%)	97.1	96.4	96.4	95.8
Urban unemployment rate (%)	4.9	4.6	3.2	9.2
Rural unemployment rate (%)	2.9	3.6	3.6	4.2
% of EAP in agriculture	49.6	38.7	13.4	55.5
% of EAP in commerce, restaurants and hotels	6.8	8.1	13.8	13.0
% of EAP in services	21.2	18.8	31.1	20.1
% of wage-earning employees in urban EAP	47.9	50.1	69.7	58.9
% of wage-earning employees in rural EAP	32.7	36.1	53.9	43.3
% of urban EAP self-employed	34.9	31.4	18.3	23.3
% of rural EAP self-employed	40.7	43.3	29.9	38.5
Schooling				
% of illiteracy among urban men	3.4	5.0	2.7	3.8
% of illiteracy among urban women	8.2	10.2	6.4	8.7
% of illiteracy among rural men	11.0	27.4	14.0	14.6
% of illiteracy among rural women	19.0	43.5	24.9	26.3
% of people with 3 years of schooling or less (urban)	25.8	27.2	20.9	27.6
% of people with 3 years of schooling or less (rural)	47.0	61.9	47.3	50.2
Housing				
% of unoccupied dwellings (urban)	2.7	3.0	3.1	6.9
% of unoccupied dwellings (rural)	12.6	10.0	10.2	14.3
Average number of occupants per dwelling (urban)	5.0	4.8	4.6	4.4
Average number of occupants per dwelling (rural)		5.1	5.2	5.7
% of shacks, shanties, huts and other makeshift shelters in total number of urban dwellings	31.6	14.8	12.0	11.2
% of shacks, shelters, huts and other makeshift shelters in total number of rural dwellings		55.6	36.2	46.8
% of dwellings not connected to electric power service (urban)	5.1	6.8	4.1	19.5
% of dwellings not connected to electric power service (rural)	50.1	62.7	49.1	88.9
% of dwellings linked to public water supply (urban)	-	94.0	89.1	40.0
% of dwellings linked to public water supply (rural)	-	46.2	38.1	8.2
% of dwellings supplied from wells or roof collectors (rural)		20.2	23.7	39.8
% of dwellings with no sanitary facilities (urban)	18.2	17.3	5.7	19.1
% of dwellings with no sanitary facilities (rural)	77.9	80.1	64.6	81.8
% without any system of waste-water elimination (urban)	13.4	19.8	10.2	48.2
% without any system of wastewater elimination (rural)	80.4	85.7	82.7	90.8
% of dwellings with no independent kitchen (urban)	16.4	20.1	23.6	39.3
% of dwellings with no independent kitchen (rural)	15.5	36.7	23.2	28.9
% of dwellings using kerex or cooking fuel (urban)	41.3	79.6	89.1	74.3
% of dwellings using kerex or cooking fuel (rural)	10.2	18.5	40.6	15.1
Migration				
Balance of migration, 1974	-20 140	-18 855	180 135	15 852
Balance of migration, 1982	-36 580	-29 420	326 607	37 742

Source: Instituto Nacional de Estadística y Censos (INEC): Censos de población y vivienda, 1982.

rural areas. As for illiteracy, it is always higher in rural areas and in addition is more prevalent among women, regardless of whether they reside in urban or rural areas.

117. Housing is the area in which the precarious situation of the rural sector can be seen most clearly. Although the number of homes supplied with services grew significantly during the period between the censuses, it was the urban sector which benefited the most. The rising share of unoccupied dwellings in the rural sector is proof of the magnitude of the migratory process and of the relative decline in the rural population. This situation is compounded by the fact that many rural dwellings are old. In all the provinces, a considerable percentage of the rural dwellings consist of shacks, huts and other types of makeshift shelters. Close to half the number of rural dwellings are of this kind, which has made them all the more susceptible to natural disasters.

118. As for the coverage and quality of services --a decisive matter if the lower-income population is to be liberated from poverty--, they are one more indication of the inadequacy of living conditions in the rural sector. Between 50% and 90% of the rural population in the provinces has no access to electric power service; between 54% and 92% are not supplied with drinking water; there are no sanitary disposal services in 75% to 90% of rural dwellings. Although gas has been increasingly substituting kerosene (kerex) or gasoline as a source of cooking energy in the urban sectors, wood and coal predominate in the rural sectors. In short, even prior to the earthquakes, most housing was--particularly in the rural sectors-- of a makeshift nature and vulnerable to the action of natural phenomena.

119. The four provinces have been and still are a source of large population movements over their borders. These migrations, in addition to urban-rural migration within these provinces, have been contributing factors in the serious deterioration of the quality of life in some urban centres. When large numbers of people move into places where no provision has been made for them, the demand for goods and services cannot be met, the available resources are overused, the inadequacies gradually begin to be felt and the quality of life deteriorates.

120. This brief description of the living conditions of the population of the provinces affected prior to the recent earthquakes shows that social problems existed, in both the urban and the rural sectors, which were bound to become more severe.

2. Effects on the population

121. The earthquakes were experienced with some intensity by two million people, 60% of whom live in rural parishes. Official estimates put the number of victims at close to 1 000, including an undetermined number of missing persons. The wounded were attended to in aid centres located in the four provinces most seriously affected. The fact that the number of victims was small by comparison with the magnitude of the disaster and the size of the population affected, is explained in particular by the dispersion of the population in the localities most seriously affected.

122. There were basically two types of effects on the population most severely affected. In Pichincha, Imbabura and Carchi, the destruction was concentrated in the housing and basic services sectors, with the resulting sense of anxiety and lack of protection among the most seriously affected population. In the larger cities, some buildings collapsed, walls were cracked and old historical monuments suffered considerable damage. In some rural parishes, many dwellings, in particular the oldest buildings constructed with unsuitable materials and techniques or built on high-risk sites, were seriously damaged, and some collapsed. In Napo, moreover, in addition to the considerable damage suffered by the basic infrastructure, the bursting of temporary dams and the landslides had serious repercussions on the population engaged in agriculture and stockbreeding. Damage was experienced in particular by groups of recent settlers who saw their small settlements wiped out and lost some of their crops and livestock.

123. Thus, four categories of people suffered from the disaster and will require different sorts of attention as part of the rehabilitation and reconstruction effort: a) a majority of peasants and a minority of generally poor inhabitants of urban sectors in the Andean region whose dwellings were seriously damaged; b) settlers and people employed on their own account in the Amazonian area who are suffering the consequences of the destruction of access roads, crop and livestock losses and the interruption of trade; c) a scattered group of people, most of them rural, and predominantly from Napo and Pastaza in the Oriente, made up of indigenous persons and settlers who may experience gradual deterioration in their already precarious living conditions if their difficulties with regard to access, trade and commerce continue; and d) isolated groups of people living outside the areas where the earthquakes were felt with the greatest intensity, who are temporarily experiencing difficulties due to secondary effects. This is true, for instance, of labourers and contractors in the Lago Agrio oil-belt, others who are temporarily isolated in the areas drained by the rivers of Amazonia and some indigenous groups.

124. An estimate of the people most affected by the earthquakes is provided in table 7. In order to provide a better illustration of the extent of the damage, the population has been classified into two categories, one for the severely affected and the other for the intensely affected. The first category covers urban and rural settlements which, because they were close to the epicentres, were more severely affected than other areas and experienced greater damage. The second group which comprises the intensely affected population (with the exception of that in the city of Quito), is made up of the inhabitants of urban and rural localities in areas where the quakes were intensely felt but damage is comparatively less severe.19/

125. Close to half a million inhabitants were affected. Two-thirds of them live in rural parishes and the remaining third in urban localities or on their periphery. The severely affected population numbers over 66 000 people and the intensely affected category amounts to 400 000.

126. The population groups most intensely affected by the earthquakes include indigenous groups in rural sectors. Their dwellings, in particular,

Table 7

ECUADOR: POPULATION SEVERELY OR INTENSELY AFFECTED BY THE DISASTER BY CANTON AND AREA a/

Province/Canton	Population in:		Total number of people	
	Urban areas and periphery	Rural parishes	Severely affected	Intensely affected
CARCHI				
Montufar				
Intensely affected		17 883		17 883
IMBABURA				
Ibarra				
Severely affected		4 082	4 082	
Intensely affected	69 948	33 084		103 032
Antonio Ante				
Intensely affected	14 621	11 768		26 389
Cotachi				
Intensely affected	10 659	8 447		19 106
Otavalo				
Intensely affected	28 826	34 334		63 160
Pimampiro				
Severely affected		4 593	4 593	
Intensely affected	8 158	1 514		9 672
PICHINCHA				
Cayambe				
Severely affected	21 504	18 286	39 790	
Intensely affected	-	2 351		2 351
Pedro Moncayo				
Severely affected	5 193	4 965	10 158	
Intensely affected	-	4 574		4 574
Quito (rural parishes only)				
Intensely affected		147 879		147 879
NAPO				
Quijos				
Severely affected	942	6 199	7 141	
Intensely affected	-	1 754		1 754
Sucumbios				
Severely affected		318	318	
Intensely affected	210	2 967		3 177
Total	160 061	304 998	66 082	398 977
Number of people affected (severely or intensely): 465 059				
Rural/urban distribution (%)	34.4	65.6		
Most affected population (%)			14.2	85.8
Severely affected population, by area (%)	41.8 (27 639)	58.2 (38 443)		
Intensely affected population, by area (%)	33.2 (132 422)	66.8 (266 555)		

Source: ECLAC, on the basis of the 1982 Census and other official data.

a/ Refers to people directly affected by the earthquakes and landslides. Does not include over 75 000 people in the Province of Napo who are cut off owing to the severing of the highway between the Oriente and the Sierra.

have suffered serious deterioration. Table 8 contains a preliminary estimate of the indigenous population groups which have suffered.

127. In short, the disaster has aggravated a situation in which the urban and rural sectors were already experiencing a number of problems and living precariously. This is shown by indicators of conditions in the housing sector and of access to services in the rural areas, and the urban problems due to the accelerated population growth.

B. Effects on economic development

1. Economic position in 1986

128. The economy of Ecuador scarcely grew in 1986. The 50% drop in petroleum prices caused earnings from exports of hydrocarbons to fall by US$ 950 million, total receipts being 49% lower than in 1985. This had profound repercussions on the balance of payments and on public sector income, which resulted in the adoption of a number of economic policy measures designed to bring the economy into line with the difficult conditions which prevailed.

129. The gross domestic product showed a feeble increase of 1.7% in spite of the increase in the volume of crude oil and petroleum derivatives produced (5.4%) and the excellent results shown by agriculture, which helped to raise the value of non-petroleum exports by 23%. In 1984 and 1985, the global product had risen by close to 4% and had some impact on the per capita product, which had been so seriously affected in 1982-1983; in 1986 the per capita product again experienced a slight decline of slightly over 1% (see table 9).

130. Activities other than agriculture (including fishing), the petroleum industry and mining, showed little dynamism. Manufacturing, which had seen its value added fall by 5% since 1983, remained virtually stagnant in 1986, under the impact of financial and tariffs problems and credit and domestic market restrictions. Construction experienced similar problems, suffering in particular from the contraction of the domestic demand, resulting in a drop of 2% in this sector.

131. Fixed gross investment fell by close to 7% in 1986, and consumption (measured in constant prices) remained virtually stagnant. The modest increase in gross domestic product was accompanied by a slight decrease in the volume of imports. External demand was the only indicator to show a significant increase --close to 7% in volume terms.

132. The increase shown by the money supply was small (20% from December to December and 24% as between annual averages). The annual average variation in domestic prices amounted to 23%, and the December-to-December variation, to slightly over 27%. On the other hand, the volume of credit transactions by the Central Bank rose by only 9.3% between the end of 1985 and the end of 1986, and, within those transactions, credit to the private sector fell by 28%.

Table 8

ECUADOR: RURAL INDIGENOUS POPULATION GROUPS AFFECTED

Location	Ethnic Group	Number of people affected
Imbabura/Pimampiro		
San Pablo del Lago	Otavalos	5 120
Pichincha/Cayambe	Otavalos and Cayambis	14 405
Pedro Moncayo	Cayambis	9 215
Napo/Quijos	Quichuas	8 200
Lago Agrio	Quichuas	55
Total		36 955

Source: CONFENIAE, Ministry of Agriculture and Livestock, Ministry of Social Welfare.

Table 9

ECUADOR: ECONOMIC INDICATORS

	1984	1985	1986	1987 (Estimate) a/
GDP (Billions of sucres)	805.7	1 147.9	1 436.0	1 920.0
(Millions of US dollars)	11 348	12 477	11 487	11 990
Population (thousands of inhabitants)	9 115	9 378	9 648	9 926
Per capita GDP (in US dollars)	1 265	1 330	1 191	1 208
		Growth rates		
Real GDP	4.0	3.0	1.7	2.8
Per capita GDP	1.6	0.9	-1.1	-0.1
Domestic prices December to December	25.1	24.4	27.3	32.0
Domestic prices (annual average var.)	31.2	28.0	23.0	30.0
Money (year end)	42.2	23.8	20.1	
		Billions of sucres		
Current government income	99.9	189.5	186.8	258.9
Income from petroleum	46.8	114.9	73.6	114.7
Percentage of total	46.8	60.2	39.4	44.3
Total spending	106.7	167.5	227.9	272.8
Fiscal deficit	-6.8	+22.0	-41.1	-13.9
Fiscal deficit/GDP (%)	-0.8	+1.9	-2.9	-0.7
Fiscal deficit/GDP b/ (%)	-2.1	+0.9	-4.0	-2.3
Exchange rate c/ (sucres per dollar)	71	92	145	165
		Millions of US dollars		
Value of exports of goods	2 620	2 905	2 186	2 370
Petroleum exports	1 835	1 927	983	1 140
Percentage of total	70	66	45	48
Value of imports of goods	1 567	1 723	1 665	1 745
Balance	1 053	1 182	521	625
Trade balance	855	967	280	350
Balance on current account	-268	-109	-690	-390
Balance on capital account	187	136	638	-
Variation in net internal reserves	-58	23	-52 d/	-
External debt (year end)	6 949	6 440	8 159	8 669
Disbursements	470	723	1 019	900
Amortization payments	211	232	300	390
Interest payments	819	762	697	570

Source: ECLAC, on the basis of official data.

a/ Prior to the earthquakes.

b/ Amortization payments included in spending.

c/ Exchange weighted by external trade.

d/ In accordance with data contained in International Financial Statistics, published by the International Monetary Fund (IMF), international reserves declined by US$ 144 million between the end of 1985 and the end of 1986.

133. In August 1986, the monetary authority decreed the free negotiation of interest rates. In addition, all external transactions of the private sector were transferred to the free exchange market, a move which favoured exports and raised the cost of imports. Nevertheless, the price of the dollar on the free market remained high between April and August (in June it amounted to 170 sucres per dollar) but fell to 145 sucres during the rest of the year.

134. While exports of crude petroleum and fuel oil dropped from US$ 1 930 million in 1985 to US$ 980 million in 1986, exports of other commodities rose from US$ 980 million to US$ 1 200 million in the latter year, which was, however, not enough to keep total exports of goods from falling by nearly 25%.

135. In 1986 106.6 million barrels of oil were produced, an average of 292 000 barrels per day, 4% higher than the 1985 production. 71.4 million barrels were exported at a price which declined throughout the year and which amounted to only US$ 12.75 per barrel on average, less than half the average selling price in 1985 (US$ 25.85 per barrel). The large increase in the volume of fuel oil exports (40%) proved insufficient to offset the decline in its prices.

136. Noteworthy among other exports were sales of shrimps which increased by 58% in volume and rose in value from US$ 157 million in 1985 to US$ 288 million in 1986; coffee exports, which rose by more than US$ 100 million (57%), both as a result of increases in volume (35%) and in price (16%). Exports of bananas also rose significantly (20%). In contrast, sales of cocoa beans and processed cocoa products declined as did sales of other sea products.

137. As far as imports of goods are concerned, they declined by 3.4%, although a slight increase in volume occurred. It is estimated that the unit value of imports probably fell by approximately 5% in 1986, while that of exports probably fell by 30%, thereby bringing about a deterioration of some 26% in the terms of trade.

138. Besides a marked decline in the value of purchases of fuels and lubricants, which may be accounted for by the drop in prices, sharp increases occurred in imports of construction material and transport equipment during the year. Purchases of capital goods for industry also increased, while purchases of inputs and capital goods for agriculture fell, as did imports of consumer durables.

139. The export and import trade in goods left a surplus of US$ 520 million, US$ 660 million lower than the previous year. If real services are added, the trade surplus fell from around US$ 970 million in 1985 to only US$ 280 million last year.

140. In contrast, net payment of factor services fell. Interest payments on the external debt declined, as a result of the fall in interest rates and transfers of profits abroad were probably lower. All in all, the current account deficit which had been US$ 110 million in 1985, rose to US$ 690 million in 1986.

141. Although it was several times higher than in 1985, net capital inflow (of around US$ 640 million) was inadequate to finance the current account deficit, and it proved necessary to utilize international reserves to the tune of US$ 52 million.

142. During the year US$ 980 million of foreign loans were disbursed and US$ 300 million were paid in amortization, together with around US$ 700 million in interest payments.20/ Of the disbursements, more than half were provided by international organizations, some 30% by private banks, and 11% by governments. At the end of the year the external debt reached US$ 8.16 billion and the servicing thereof represented 30% of income from exports of goods and services.

143. As far as the financial position of the State budget was concerned, total expenditure increased by 36% in 1986 while income fell by 1.4%, as a result of which the 22 billion sucres surplus earned in 1984 was turned into a 41 billion deficit, equivalent to almost 3% of gross domestic product. The fall in government income was exclusively due to the shrinkage in petroleum income as a result of the fall in prices and the consequent decline in the value of exports. Government income deriving from the exploitation, export and consumption of hydrocarbons fell by 35% in 1986, while traditional income rose by 50%.

2. Impact of and prospects following the disaster

144. Until 5 March, forecasts for 1987 showed a certain improvement in the economic situation as a result of higher levels of production in sectors which had fallen behind during previous years, such as manufacturing industry, construction and services. Moreover, the increased oil prices held out a promise of higher income from exports of hydrocarbons, which would be buttressed by other major export products. This scenario would have reduced the balance-of-payments disequilibrium as well as improving the state of the government coffers and stimulating economic activity in general. In addition a substantial reduction in the government deficit was expected together with the stirring of a revival in domestic demand and, in particular, capital formation.

145. As a result of the March earthquakes these expectations underwent a total turnaround. The earthquakes caused damage to the petroleum industry —the rupture of the oil pipeline— which paralyzed the production and export of crude oil, thereby cutting off the country's main source of funds.

a) Impact on the global product

146. In 1987 domestic product had been expected to grow by 2.8%, a similar rate to the growth of population. In the aftermath of the disaster, it has been calculated that product will fall by 2.7%, thereby signifying a 5.4% drop in per capita product.21/

147. The fall in product was exclusively due to the 37% drop in the value added by the petroleum sector. The fall in production of crude oil and

by-products, together with the increased production and sales costs faced by enterprises, account for this fall in the sector's product.

148. The growth rate of agriculture will also be slightly lower than the one which had been forecast prior to the earthquake (4 and 3.8%) as a result of the relatively slight damage which affected agriculture in the eastern region. Losses were also suffered by trade as a result of the interruption in communications with the eastern region and the impossibility of marketing production. However, it has not been possible to quantify these losses. On the other hand, sectors such as construction, and --to a lesser extent-- the manufacturing industry, will benefit from the reconstruction, a fact which is reflected in the rise in their expected product (see table 10).

b) Impact on the balance of payments

149. It has been calculated that exports of crude oil and by-products will fall by US$ 554 million, which must be subtracted from the projected exports for 1987 (US$ 2.37 billion). In addition it will be necessary to import approximately a further US$ 135 million worth of goods, on account of increased imports of fuels to supply the domestic market as well as building material and capital goods required to repair the damage caused by the earthquakes. The services required by these increased imports will also rise by US$ 20 million, together with the increased cost in foreign exchange incurred in transporting Venezuelan, Nigerian and Peruvian oil.

150. Consequently, rather than rising by 8.4% as had been projected at the beginning of the year, exports of goods will shrink by US$ 370 million (17%) and imports will rise by US$ 215 million (13%), as a result of the new requirements arising from the disaster (see table 11).

151. The trade balance will suffer a US$ 440 million deficit while the current account deficit --which it had been hoped to reduce from US$ 690 million in 1986 to US$ 390 million in 1987-- will in fact rise to US$ 890 million at the close of the year, despite the fact that interest payments on the external debt are expected to fall as a result of the postponement of servicing of the debt with commercial banks.

c) Impact on government income and expenditure

152. On account of the reduction in the production of crude oil and by-products, and as a result of the slump in exports together with the decline in domestic fuel consumption, it has been estimated that the government's regular income will fall by 2.3 billion sucres and income from oil by 49 billion. Consequently, current income, which prior to the earthquakes was expected to attain 258.9 billion sucres, will decline to 207.6 billion on account of the disaster.

153. For the same reason, total expenditure will increase by 9.3 billion sucres. The 272.8 billion sucres budgeted at the beginning of the year will rise to 282.1 billion on account of the increased expenditure which will be directly incurred by the government as a result of the emergency and as part of reconstruction costs.

Table 10

ECUADOR: GROSS DOMESTIC PRODUCT

(Growth rates) a/

	1986	1987 Forecast	
		Prior to the earthquake	Following the earthquake
Petroleum industry	4.0	0.4	-37.2
Remaining sectors	1.3	3.2	3.2
Agriculture	5.0	4.0	3.8
Mining	5.0	4.0	4.0
Manufacturing industry b/	0.5	3.4	3.6
Construction	-2.0	2.5	2.9
Basic services	2.3	3.1	3.0
Commerce and financial institutions	0.6	3.2	3.2
Government services	0.2	2.5	2.5
Other sectors	2.4	2.5	2.5
Total	1.7	2.8	-2.7

Source: ECLAC, on the basis of official data.
a/ Variation in gross domestic product at constant prices.
b/ Petroleum refining is included in the petroleum industry.

154. In view of the lower income and increased expenditure, the fiscal deficit of 13.9 billion which had been estimated prior to 5 March will rise to 74.5 billion sucres.

155. If the impact on income of the increase in the domestic selling price of some fuels decreed in March were taken into account (an increase of 80% in the case of gasoline), total income would rise to 221 billion sucres. In addition, if the amount of interest on the external debt —whose payment is to be postponed— were subtracted from expenditure, total expenditure would decline to 259.6 billion sucres and the deficit would fall to 38.6 billion sucres (see table 12).

156. To sum up, it may be said that the disaster will have the following consequences on the main macroeconomic variables: a 2.7% decline —rather than an increase— in the gross domestic product in 1987, together with a corresponding 5.4% drop in the per capita product, which implies a significant setback in development; an increase of more than 200 million in the current account deficit of the trade balance, rather than a decline as had been forecast prior to the disaster; and a pronounced increase in the government deficit as a result of the shrinkage in income and the increase in expenditure on account of the emergency and reconstruction. This will occur in circumstances in which the Ecuadorian economy had already been severely affected during the previous year.

Table 11

ECUADOR: BALANCE OF PAYMENTS

(Millions of dollars)

	1985	1986	1987 Forecast	
			Prior to the earthquake	After the earthquake
Balance on current account	-109	-690	-390	-890
Trade balance	967	280	350	-440
Exports of goods and services	3 235	2 450	2 645	2 010
Goods fob	2 905	2 186	2 370	1 816
Transport and insurance	145)	)		
Travel	125)	264)	275	194
Others	60			
Imports of goods and services	2 268	2 170	2 295	2 450
Goods fob	1 723	1 665	1 745	1 880
Transport and insurance	240)	)		
Travel	167)	505)	550	570
Others	138			
Factor services	-1 076	-970	-740	-450
Profits	-120	-100	-95	-50
Interest received	26)	-800)	-570	-330
Interest paid	-872)			
Others	-110	-70	-75	-70
Balance on capital account	136	638	390	...
Transfer payments	25	45	45	
Direct investment	60	80	85	
Long-term capital	419	680	-	
Loans disbursed	1 753	1 983	900	
Amortization payments	-1 334	-1 303	-390	
Short-term capital	-283	-		
Loans disbursed	-	-	-	
Amortization payments	-	-	-	
Errors and omissions	-85	-	-	
Global balance	-23	+52 a/	-	
Variation in reserves (- indicates an increase)	-23	+52 a/	-	
Monetary gold	-			
Special drawing rights	28			
IMF reserve position	-			
Foreign currency assets	-79			
Use made of IMF credit	84			

Source: ECLAC, on the basis of official data.

a/ Differs from the information published by the International Monetary Fund in International Financial Statistics, March 1987. According to this source, the decline in reserves amounted to US$ 144 million between the end of 1985 and the end of 1986.

Table 12

ECUADOR: GENERAL GOVERNMENT BUDGET

(Billions of sucres)

	1986	1987 forecast		
		Prior to the earthquake	After the earthquake	
I. Current income	186.8	258.9	207.6	(223.0)
Traditional income	186.7	144.1	141.8	
From petroleum	73.6	114.7	65.7	
Transfer payments	4.5	0.1	0.1	
II. Total expenditure	227.9	272.8	281.1	(259.6)
Current	186.6	214.7	216.8	
Operating expenditure	151.8	165.3	167.4	
Interest payments	34.8	49.4	49.4	
Capital expenditure	41.2	58.1	65.3	
III. Deficit	-41.1	-13.9	-74.4	(-36.6) a/
IV. Financing	33.7	6.8		
Net domestic credit	6.4	4.4		
Disbursements and issue	14.5	16.8		
Amortization	-8.1	-12.4		
Net external credit	20.7	-11.2		
Disbursements	29.0	6.6		
Amortization payments	-8.3	-17.8		
Use of cash balance	6.4			
Unfinanced differences	7.4	20.7		

Source: ECLAC, on the basis of official data.

a/ In calculating the government's income from petroleum, the impact of the rise in the prices of some fuels was not taken into account. Nor was expenditure reduced by the 23.6 billion sucres owed to private international banks whose payment has been postponed. If these items are taken into account the deficit shrinks to US$ 38.6 billion.

IV. CO-OPERATION FROM THE INTERNATIONAL COMMUNITY

A. Introduction

157. As has been pointed out in previous chapters, the natural disaster which occurred on 5 March 1987 caused considerable direct damage together with an aftermath of losses which will be felt throughout the remainder of the year and during part of 1988.

158. In addition to cutting short the lives of a large number of Ecuadorian citizens, the disaster worsened the living conditions of the population in the zones affected by the earthquakes and landslides which, unfortunately, are also those where the country's lowest income strata live. In addition, the disaster caused serious damage to the country's capital stock, brought about huge losses in production --mainly in oil-- and obliged the government to incur increased expenditure to provide goods and a number of services. This has had adverse effects on the major national macroeconomic variables as a result of the drop in the growth of gross domestic product, the increase in expenditure and the decline in government income together with the rise in the balance-of-payments deficit resulting from the shrinkage of exports.

159. The country will be obliged to incur unforeseen expenditure in order to rehabilitate and replace, rather than increase, its capital stock, which involves considerably higher replacement costs than the initial value of the damaged or destroyed stock. Moreover, the capacity of the national economy --which was already experiencing serious difficulties, principally in the external sector-- to finance such expenditure will of necessity be reduced at least during this and the coming year. Mention should also be made of the unpostponable need to initiate as soon as possible a programme of rehabilitation and reconstruction, as any delay could lead to spontaneous migrations of population towards urban areas and to other social problems, the cost of which would be considerable in economic and political terms.

160. Consequently, international co-operation for rehabilitation and reconstruction is vital if Ecuador is --in the first instance-- to make good the damage and losses resulting from the disaster and --secondly-- to restore its capacity to meet its international commitments.

B. Purpose and characteristics of co-operation

161. Once the damage and the social and economic consequences of the disaster have been identified and analysed, it is possible to pinpoint the following principal objectives for the co-operation from the international community in rehabilitation and reconstruction:

a) To restore --and even improve-- the living conditions of the population directly affected by the disaster;
b) To restore national production and export capacities, mainly in the hydrocarbon sector; and
c) To restore the country's capacity to achieve adequate economic growth and to meet its external commitments.

162. The Ecuadorian Government will require fresh external financing in the amount of US$ 1 billion between 1987 and 1989 in order to offset the damage caused by the disaster.

163. In view of the characteristics of the problems to be solved,22/ and the situation which existed previously in respect of national debt payment capacity, it will be necessary for the fresh funds to be granted on extremely favourable terms, with regard to repayment period, period of grace and rates of interest.

164. The problems which the government will inevitably face as a result of the disaster undoubtedly give grounds for implementing a programme or plan of direct financial support. Moreover, external loans should be granted on extremely flexible terms with regard to the requirements for local counterpart funds.

165. International credit institutions should be prepared to set aside traditional procedures for requesting and granting loans, as the tasks of rehabilitation and reconstruction will need to be carried out rapidly to avoid greater social problems. An excellent partial solution would be the reorientation for reconstruction purposes of the unused part of loans already granted.

C. Fields of action which should be supported by the international community

166. It is not necessary to await the preparation of complete programmes of rehabilitation and reconstruction in order to indicate the principal areas of action which require immediate international co-operation. The diagnosis set out in this document clearly identifies the issues, sectors and geographical areas which should be given priority in rehabilitation and reconstruction. Moreover the Ecuadorian Government is redoubling its efforts to prepare concrete requests for funds for specific projects which will undoubtedly fall within this framework.

167. A number of suggestions relating to the areas of international co-operation which deserve priority are indicated below. They are divided into the traditional stages of rehabilitation and reconstruction, on the assumption that the emergency phase has been completed. It should nevertheless be pointed out that the activities included in these stages do not necessarily follow a strict chronological order, and that in many cases it will be necessary to tackle them in a systematic and complementary fashion.

168. Co-operation in respect of rehabilitation only differs from that involved in reconstruction in so far as it has to be carried out within a period of up to six months, while reconstruction can be spread over two to three years.

1. Financial co-operation

169. During the rehabilitation stage, areas of financial co-operation linked to sectors which require support as a result of the disaster have been

identified. A summary of these is given in table 13 and they are briefly described below.

170. First of all, the public sector will require support in respect of the balance of payments in order to solve short-term problems. For example, in accordance with the provisions of the Santo Domingo Agreement, the central banks of the signatory countries could place deposits with the Central Bank of Ecuador in order to provide temporary relief from the foreign exchange shortage. In addition, in specific cases of bilateral trade agreements those countries with quarterly or half yearly balances in their favour could postpone collection of these sums for a further period. Moreover, the governments of the developed countries could support the requests made by Ecuador to their private banks in respect of renegotiations on its external debt.

171. Secondly, with regard to the health sector, funds on suitable terms will be necessary to repair the water supply and sanitary drainage systems which were damaged.

172. Thirdly, once the relevant technical studies have been carried out, financial support will be necessary for implementing the resettlement programme in the eastern region.

173. Fourthly, as far as transport is concerned, funds will be necessary to build the pilot road between Hollín and Coca so as to provide a land link between the eastern areas and the Sierra. Bailey-type bridges are also required to complete the section of road between Hollín and Coca and to set up an emergency stock. Earthmoving machinery and equipment is also required to carry out repairs to secondary and feeder roads.

174. Moreover, it is necessary to provide funding to carry out immediate repairs to the structures which make up the cultural and historical heritage in the cities of Quito and Ibarra.

175. Finally, financial support is vital to ensure agricultural production in the disaster areas.

176. As far as the reconstruction stage is concerned —which could be begun immediately as pointed out above— six sectors require financial co-operation (see table 13).

177. The health sector requires funds for the reconstruction of the hospitals and health centres which were destroyed in urban areas, as well as for the construction of rural health centres in the Amazon region to make up for the shortcomings revealed by the disaster.

178. The reconstruction of public and private schools in both urban and rural areas also requires financing on favourable terms.

Table 13

POSSIBLE AREAS OF INTERNATIONAL CO-OPERATION WITH ECUADOR FOLLOWING THE NATURAL DISASTER

Stages and sectors	Financial co-operation		Technical co-operation	
	Proposed activity	Possible sources of co-operation	Proposed activity	Possible sources of co-operation
I. Stage of rehabilitation				
1. Public sector	As provided for in the Santo Domingo Agreement, transfer of deposits to the Central Bank of Ecuador for temporary balance-of-payments support	Latin American governments	Co-operation through the transfer to Ecuador of information on successful renegotiations of the external debt	CEPAL SELA UNDP Latin American governments
	Postponement of the quarterly or half-yearly collection of balances owed by Ecuador under bilateral trade agreements	Latin American governments		
	Support for Ecuadorian requests and arguments in renegotiating the external debt with the private banks of developed countries	Governments of developed countries		
2. Health sector	Rehabilitation of water supply and drainage systems	IDB IBRD Governments	Disease-monitoring programme in the disaster area	PAHO/WHO Governments
3. Housing and human settlements	Resettlement programme in the eastern area	IDB IBRD Governments	Studies to define the characteristics of the resettlement programme in the eastern region	FAO Governments

Table 13 (cont. 1)

Stages and sectors	Financial co-operation		Technical co-operation	
	Proposed activity	Possible sources of co-operation	Proposed activity	Possible sources of co-operation
			Extension programme for the rehabilitation and reconstruction of rural housing with earthquake-resistant characteristics, using indigenous materials and appropriate technologies	UNCHS UNDP Governments
			Design of credit mechanisms for the rehabilitation and reconstruction of low-cost housing	UNCHS UNDP Governments
			Strengthening the capacity of the National Housing Board to administer rural housing credit	UNCHS UNDP
			Definition of a legal framework for the restoration of the central area of Quito	UNCHS UNDP UNESCO
			Improvement of the capacity of Quito Municipal Council to restore and preserve the historic centre	UNCHS UNDP UNESCO
			Seismic-risk analysis for some human settlements --such as Baeza-- in order to determine whether it is necessary to relocate them	UNCHS UNDP UNDRO

Table 13 (cont. 2)

Stages and sectors	Financial co-operation		Technical co-operation	
	Proposed activity	Possible sources of co-operation	Proposed activity	Possible sources of co-operation
4. Transport and telecommunications	Construction of pilot road between Nalín and Coca	IDB Governments	Promotion and demonstration of the use of wooden bridges for short spans and limited loads	UNIDO UNDP
	Donation and installation of Bailey-type bridges on the Nalín-Coca road and to constitute an emergency reserve	Governments	Survey of possible new landslides and recommendations for the stabilization of slopes in the Amazon and coastal regions	IDB Governments
	Donation of earth-moving machinery and equipment to work on feeder and secondary roads	Governments		
5. Hydrocarbons			Assistance with bringing the Lago Agrio oil field into operation	Governments
			Analysis of the availability of petroleum and by-products for domestic consumption, during the period of returning the borrowed products	DTCD UNDP
6. Buildings			Review of the building-design code to ensure earthquake-proof construction	IDB OAS UNDP UNESCO Governments

Table 13 (cont. 3)

Stages and sectors	Financial co-operation		Technical co-operation	
	Proposed activity	Possible sources of co-operation	Proposed activity	Possible sources of co-operation
7. Cultural and historical heritage	Rehabilitation of structures forming the historic heritage in Quito and Ibarra	UNESCO Governments	Detailed survey of the state of ancient monuments to which damage is not evident	UNESCO Governments
8. Agriculture and industry	Financing for agricultural production and replacement of livestock	IDB IBRD IFAD Governments	Assistance with the use of high-acid content African palm oil	FAO UNIDO UNDP
9. Environment			Assessment of the environmental impact of the disaster and recommendations for restoring pre-disaster conditions	ECLAC UNEP Governments
II. Reconstruction stage				
1. Health	Reconstruction of, and provision of equipment for, hospitals and health centres in urban areas	IDB IBRD Governments	Formulation of emergency disaster plans for the rehabilitation and reconstruction of water-supply and sewerage systems	PAHO/WHO Governments
	Construction of rural health centres in the Amazon region	IDB Governments		
2. Education	Reconstruction of classrooms in urban and rural areas	IDB IBRD UNESCO Governments	Disaster preparedness education in schools	OAS Governments
3. Housing and human settlements	Reconstruction of housing in urban areas	IDB IBRD Governments		

Table 13 (cont. 4)

Stages and sectors	Financial co-operation		Technical co-operation	
	Proposed activity	Possible sources of co-operation	Proposed activity	Possible sources of co-operation
	Reconstruction of housing in the historic centre of Quito	IDB IBRD Governments		
	Reconstruction of housing in rural areas, using appropriate materials and technologies	IBRD Governments		
4. Transport and telecommunications	Installation of telecommunications networks in the Amazon region	IDB IBRD CAF Governments	Field surveys and design for the reconstruction of the highway between Baeza and Lago Agrio	IDB IBRD Governments
	Definitive reconstruction of the Baeza-Lago Agrio highway	IDB CAF	Study of the optimum location of highways, bridges and railways throughout the country, taking into consideration the risk of disasters	IDB UNDP Governments
5. Electricity			Hydrological studies to restore records which were lost for two hydroelectric projects	WMO UNDP Governments
6. Hydrocarbons			Studies to determine alternative routes for the gas and oil pipelines, in order to eliminate or lessen their present vulnerability	UNDP Governments
			Studies on the expansion of the production capacity of the Lago Agrio oil field, taking into account the increased crude-oil transport capacity resulting from the construction of the oil pipeline through Colombia	IBRD CAF Governments

Table 13 (cont.5)

Stages and sectors	Financial co-operation		Technical co-operation	
	Proposed activity	Possible sources of co-operation	Proposed activity	Possible sources of co-operation
			Review of the domestic price policy for hydrocarbon by-products in order to optimize their use	ECLAC UNDP Governments
7. Buildings	Reconstruction of reform centres	IDB Governments		
8. Cultural heritage			Support for the establishment of an integrated national system for the restoration and conservation of the historic and cultural heritage	UNCHS UNESCO Governments
9. Regional development			Studies relating to regional development in the Amazon region, to design programmes to make up for deficiencies affecting social sectors, only based on the migratory characteristics or trends of the population	ECLAC/ILPES FAO OAS UNEP UNFPA Governments
10. Disaster preparedness and prevention	Establishment of systems for hydrological, meteorological and vulcanological forecasting and monitoring	OAS WMO UNDP UNESCO Governments	Strengthening of the organizational capacity of the civil defence system to face emergencies	UNDP Governments
			Preparation of risk maps relating to natural disasters	OAS UNDRO Governments

Table 13 (concl.)

Stages and sectors	Financial co-operation		Technical co-operation	
	Proposed activity	Possible sources of co-operation	Proposed activity	Possible sources of co-operation
11. Economic planning			Adaptation of economic development plans to take into account the rehabilitation and reconstruction plans following the disaster	ECLAC/ILPES IDCD UNDP
12. Rural development			Drawing up development plans for the rural areas affected, in order to overcome the deficiencies prior to, as well as those resulting from the disaster	FAO UNDP Governments

179. As far as housing is concerned, three different programmes aimed at different beneficiaries require different types of financial support: the reconstruction of housing in the rural sector, in which the victims require extremely soft credit; the reconstruction of 1 000 dwellings of particular worth in the historical centre of Quito; and finally, the reconstruction of low-cost urban dwellings in the rest of the area affected by the disaster.

180. With regard to the transport and communications sector, funding will be necessary for the definitive reconstruction of the highway between Baeza and Lago Agrio, and to set up telecommunications systems in the Amazon region to provide services for isolated communities.

181. Funds will be necessary for the reconstruction of three social rehabilitation centres located in Quito.

182. Finally, funds will be necessary to set up or improve systems and networks for forecasting and monitoring hydrological and meteorological as well as volcanological and tectonic phenomena.

2. Technical co-operation

183. In order to ensure that the above investments are successful and, in some cases, to decide upon the best way of carrying them out, specialized technical co-operation is vital (see table 13).

184. During the rehabilitation stage, the Ecuadorian public sector could benefit from a regular flow of information on the experience of other countries in the region in their renegotiation of their external debt, in order to support the steps being undertaken by Ecuador.

185. As far as the health sector is concerned, technical co-operation will be necessary to carry out the epidemic monitoring programme recently begun in the eastern region of the country.

186. In regard to housing and human settlements, many areas could benefit from international technical co-operation. These include technical studies to define all the details of the resettlement programme in the eastern region; extension schemes to encourage the use of indigenous materials and appropriate technology for the construction of rural dwellings capable of withstanding earthquakes; the design of credit mechanisms for rehabilitation and reconstruction of low-cost dwellings; improving the institutional structure of the National Housing Board in order to administer credit for rural housing; the development of a legal framework for the restoration of the historical centre of Quito; improving the capacity of the Quito Municipal Council to restore and conserve its historical centre; and finally, seismic-risk analysis in a number of cities such as Baeza to determine whether it would be desirable to relocate them on safer sites.

187. In the transport sector, assistance is required in detecting potential future landslides and in drawing up measures to stabilize slopes in both the Amazon and coastal regions. In addition, it would be necessary to continue to

promote and demonstrate the use of wooden bridges for short spans and limited loads.

188. The hydrocarbon sector might require assistance to bring the Lago Agrio oil fields into operation and to solve any unforeseen problems which might arise in this respect. It would also be necessary to assess the availability of petroleum and petroleum products for domestic consumption during the repayment period of the petroleum loan.

189. Assistance is also required to review the design and construction codes and standards for earthquake-resistant buildings.

190. In the historical centre of Quito, international co-operation will be required to assess the state of ancient monuments in which the earthquake damage is not evident.

191. In the agro-industrial sector, co-operation is required in connection with the use of highly acidic African palm oil.

192. Assistance is required to determine the effect of the disaster on the environment and to put forward recommendations for environmental protection.

193. During the reconstruction stage, co-operation will be necessary to draw up plans for emergency rehabilitation and reconstruction of the water supply and drainage networks. Similarly, support will be required for an educational campaign to be carried out in schools on how to face all types of disaster.

194. The transport sector will need technical co-operation to carry out field surveys and to design the reconstruction of the highway between Baeza and Lago Agrio. Assistance will also be required in determining the optimum location for highways, railways and bridges throughout the country, taking into account the risk of their being affected by all types of disasters.

195. Assistance will also be required to carry out hydrological and meteorological studies to restore the records which were lost as a result of the destruction of the camps and stations of two hydroelectric projects.

196. The hydrocarbon sector requires technical co-operation in order to carry out studies to lessen or eliminate existing risks and to define alternative routes for the oil and gas pipelines; studies on the expansion of the production capacity of the Lago Agrio oil field, taking advantage of the increased crude-oil transport capacity available through Colombia; and reassessment and updating of the domestic price policy for petroleum by-products.

197. It will also be desirable to provide support to establish a definitive and integrated national system for restoring and preserving the historical and cultural heritage, taking advantage of the ad hoc committee set up as a result of the disaster.

198. Technical co-operation would be extremely important for the execution of a study and integral regional development plan in the Amazon region to provide a solution to existing social deficiencies, based upon the population's migratory trends.

199. Assistance will be necessary in order to strengthen the organizational and operational capacity of the civil defence system to face emergencies arising out of all types of disasters. It will also be necessary to provide support for drawing up maps showing the risks of all types of natural disaster throughout the country.

200. Finally it will be necessary to continue to provide co-operation in order to adjust economic development plans to incorporate the rehabilitation and reconstruction following the disaster.

201. Co-operation will also be necessary to prepare development plans for the rural areas affected, in order to overcome the shortcomings which existed prior to the disaster as well as its consequences.

202. Finally, in view of the landslides and floods which have affected large areas of the coastal provinces as a result of recent heavy rainfall, it will be necessary to carry out an assessment of the damage resulting therefrom, to analyse its economic and social repercussions, and to draw up rehabilitation and reconstruction programmes and projects.

Notes

1/ See R. Jovel, Economic and social consequences of recent major natural disasters in Latin America and the Caribbean, International Seminar on Regional Development Planning for Disaster Prevention, Nagoya, Japan, 1986.

2/ It should be borne in mind in this connection that three days' seismographic recordings at the volcano show that 99.5% of the earthquakes were of tectonic origin, whereas only the remaining 0.5% were of volcanic origin and could be ascribed to the normal activity of the volcano. Furthermore, visual inspection of the volcano showed no unusual activity.

3/ In 1955 an earthquake which registered 6.7 on the Richter scale whose origin could have been identical to that of 5 March 1987 occurred in the same area; as at that time the area was uninhabited the damage caused was not very significant. According to some researchers the earthquake which ravaged Ibarra in 1868 may have originated in the same fault.

4/ Before the earthquakes of 5 March 1987, the government was in the process of preparing emergency plans in case the Reventador volcano erupted.

5/ In fact, many places where there are large volumes of unconsolidated material about to slide have been identified. It will not take new earthquakes to cause this; the rainfall which is expected in the next months would be enough.

6/ This estimate differs from the investment requirements for reconstruction —860 million sucres— submitted by the authorities of the health sector. This is due to the fact that they include the cost of building the new hospital in Tulcán that had been provided for in the regular investment budget whose implementation is now being brought forward instead of

repairing the existing installations. Moreover, this figure also includes the cost of extending the capacity of other medical centres, and the construction of a number of rural health centres in areas where there were none. All of this represents a legitimate need which, however, cannot be costed as being attributable to the disaster.

7/ The unit housing repair costs adopted were 300 000 sucres for the historical centre of Quito, 150 000 sucres for the remaining urban area, and 70 000 sucres for dwellings in rural areas. The costs of rebuilding were 1 200 000 sucres for dwellings in urban areas, and 180 000 sucres for those in rural areas.

8/ Note that these damages refer exclusively to those caused by the earthquakes and landslides; they do not include damage which is normally caused by rain in the region.

9/ There is also the possibility of using another alternative route through the north of the country and the south of Colombia, using the Pan-American highway and third class roads in Colombia. This idea was rejected because of the greater distance involved and the fact that it would be necessary to use barges over a stretch of almost 10 kilometres on a frontier river (San Miguel) where there is no bridge linking the two countries.

10/ This will require an investment of 600 million sucres (US$ 4 million) which cannot be considered as a direct or indirect cost of the disaster, but which represents a legitimate need for the development and well-being of the population in the affected area.

11/ It should be noted that in one of these work sites the network of hydrometric stations was also destroyed and the hydrological records for the project were lost.

12/ These estimates were compiled on the basis of information provided by the Ministry of Agriculture, as well as information included in the document prepared by the OAS, entitled Evolución de impactos del sismo del pasado 5 de marzo de 1987, Quito, 1987.

13/ The permanent reconstruction of the oil pipeline can only be decided after alternative routes are studied and one is selected where the pipeline would be most secure in the event of disasters of any sort.

14/ This requires that Ecuador pay the cost of transporting the crude from and to Curacao, and that it repay the loan with crude from the eastern region at a higher exchange ratio, on account of the different characteristics of the crudes involved.

15/ Early in April, the Government of Ecuador received and accepted in principle a generous offer of the Government of Peru to provide a loan of oil products to meet the needs of this region. This loan would subsequently be repaid with Ecuadorian crude oil. Ecuador will pay the cost of transport.

16/ This calls for an increase of about 10% over the pre-earthquake production level, which is considered feasible. Increased production will undoubtedly require increased investments in wells, spread over a longer term.

17/ This includes damage to social rehabilitation centres. The government has, however, decided to advance the date of construction of new buildings (previously scheduled for future years) instead of repairing old structures. Thus, the investment requirements submitted by the government are higher than the cost imputed to the disaster in this document.

18/ In this sense, the disaster was atypical by comparison with other great catastrophes which have occurred recently in Latin America and the Caribbean. In general, disasters caused by geological phenomena have resulted in substantial damage to infrastructure and relatively mild damage in the area

of production; as a general rule, disasters of meteorological origin, such as floods and droughts, cause more damage in the realm of production, especially agricultural production. See Economic and social consequences of recent major natural disasters in Latin America and the Caribbean., op.cit.

19/ The figures shown do not include 75 000 inhabitants of the Province of Napo who have been cut off as an indirect consequence of the severing of the road between the Oriente and the Sierra.

20/ The figures for the sums disbursed and amortization payments given in the balance of payments include approximately one billion refinanced dollars.

21/ This downturn in the product is similar to that which occurred in 1983 as a result of an earlier natural disaster caused by floods. See the ECIAC document, the Natural Disasters of 1982-1983 in Bolivia, Ecuador and Peru, (E/CEPAL/G.1274), 1984.

22/ It should be borne in mind that a significant proportion of the final users of these funds belong to the rural sector and their repayment capacity is extremely limited, as they are engaged in what is virtually subsistence agriculture.