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ECUADOR: EVALUATION OF THE EFFECTS OF THE 1982/1983 FLOODS
ON ECONOMIC AND SOCIAL DEVELOPMENT

NOTE

This report contains estimates of the damage caused by the floods in Ecuador up to mid-February 1983. Subsequently, however, this country has suffered from further flooding, which has caused loss of human life and considerable material damage not covered or evaluated in this document.

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INTRODUCTION

The rate of growth of the Ecuadorian economy has been slowing down in the past four years, a trend which culminated in 1982 with a growth of about 2% in the gross domestic product, lower than that of the population.

This deterioration of the economic situation was largely due to the worsening of major, primarily external economic variables as a result of the current international economic situation. For the decline in exports -especially hydrocarbons- and the burdensome payment of interest on the debt raised the current account deficit in the balance of payments to US\$ 1 050 million and contributed to reducing international reserves by nearly US\$ 330 million, bringing the level of foreign exchange reserves by the end of the year down to approximately US\$ 300 million. Finally the servicing of the external debt -approximately US\$ 2 700 million- was equivalent to the total exports of goods and services of the country.

Within this depressive economic framework, on top of the anticipated slump in the petroleum market, there occurred at the end of 1982 and the beginning of this year a natural phenomenon with exceptional characteristics which affected one of the principal productive sectors -agriculture-, caused considerable damage to the physical and service infrastructure, and made living conditions -which were already precarious- even worse for a broad sector of the population located in the coastal region of the country.

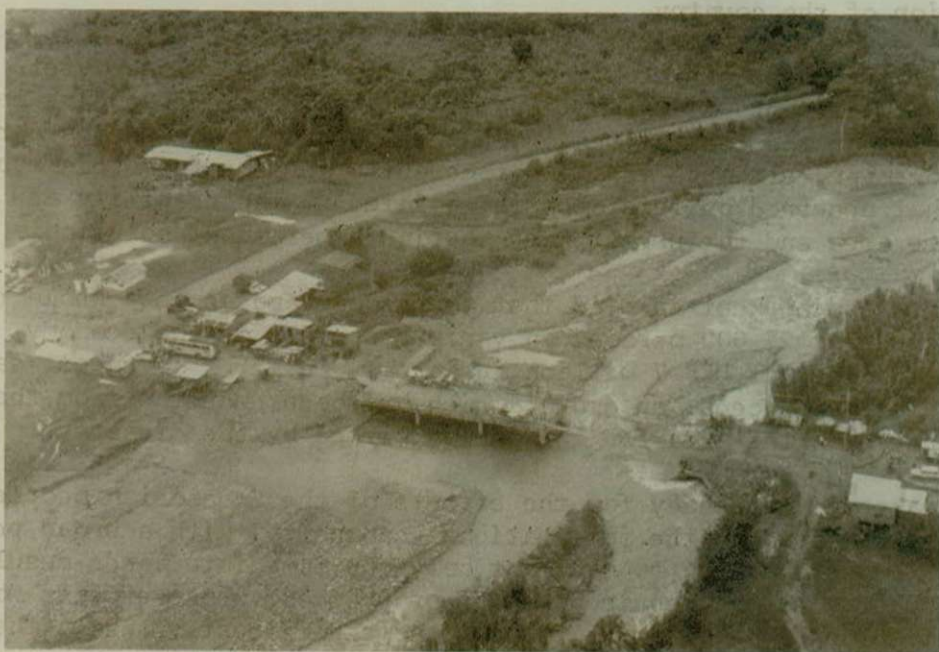
Partial estimates of the net damages caused by the floods yield a figure of nearly US\$ 165 million. At the national level, this damage appears relatively insignificant; for the coastal region, however, the damage is considerable and serious. Moreover, although the coast frequently suffers from this type of disaster, what occurred on this occasion pointed up the fragility and vulnerability of the entire area and the urgent need to find a permanent solution.

It must also be kept in mind that the flood damages as a whole resulted in the displacement of 27 000 persons in various sectors of the economy, corresponding to an estimated loss of US\$ 7 million in income, in terms of wages, salaries and profits of small producers, an amount which has been deducted from the national income generated in the area for the period marked by the disaster.

This makes it necessary for the efforts of the Ecuadorian people and government to be aided by the international community, with a broad programme of co-operation being drawn up to meet not only the immediate needs resulting from the disaster but also the requirements of programmes, whose effects would be obvious in the long run, in order to avoid or significantly lessen the effects of the natural phenomena which occur relatively frequently along the coast of Ecuador.

Full use of the abundant natural resources of Ecuador should enable the country to be economically self-sufficient, as well as to deal with this type of natural event.

/Damage to .



Damage to bridges and problems of transporting production.

/Floods and



Floods and transport problems in urban areas.

This provisional report, prepared by ECLA at the request of the Ecuadorian government, is intended to quantify the amount of the damage, point up the areas or sectors needing priority attention and, finally, provide guidelines for the international co-operation needed by the country. For its preparation, ECLA -in collaboration with ILPES and FAO- sent a group of experts who visited the country for three weeks, gathering and analysing basic information. In this, the ECLA mission had the close collaboration of the Ministries of Social Welfare, Agriculture and Public Works, the Secretariat for Integral Rural Development and many decentralized institutes and private agencies. It also had the full support of the United Nations Development Programme and other international organizations and bilateral or multilateral assistance agencies.

This co-operation included access to existing information on the facts about the floods and the Ecuadorian economy through documents, some of which are still in the process of preliminary or final preparation. This made it possible for the mission, with the restrictions and difficulties resulting from the emergency itself and the state in which some of the phenomena studied were found, to form a sufficiently clear idea of the facts and, with the aid of the national experts, to interpret them appropriately for the purposes of their study. The urgent nature of the tasks made it necessary to work so fast that it is now impossible to refer individually to all the sources consulted and all the contributions of information provided by the national and international technical bodies through their experts assigned to collaborate with the mission.

I. DESCRIPTION OF THE DISASTER AND IMMEDIATE ACTIONS TAKEN

1. Origin and characteristics of the disaster

The floods which took place in Ecuador beginning in December 1982 covered extensive regions of the coastal provinces of Los Ríos, Guayas, El Oro, Manabía and Esmeraldas (see figure 1).^{1/}

The climate of the coast of Ecuador and its neighbouring countries to the south is influenced by the position of the Humboldt current -which is cold and highly saline- in the South Pacific, by the seasonal north-south flow of the Inter-Tropical Convergency Zone (ITCZ), which is the equatorial zone where the principal air currents of the northern and southern hemispheres converge, and by the presence of a body of tropical water -warm and with low salinity- which remains nearly stationary to the north of the equator.

In a normal year, between May and November, the Humboldt current moves northward, impelled by the trade winds from the southeast; the ITCZ also runs north and keeps the body of tropical water mentioned above in a position located several degrees above the equator. All the above -due to the low temperature of the Humboldt current- causes the occurrence of air masses along the coast which, although they are saturated with humidity, result in only slight rainfall and fog.

/Figure 1

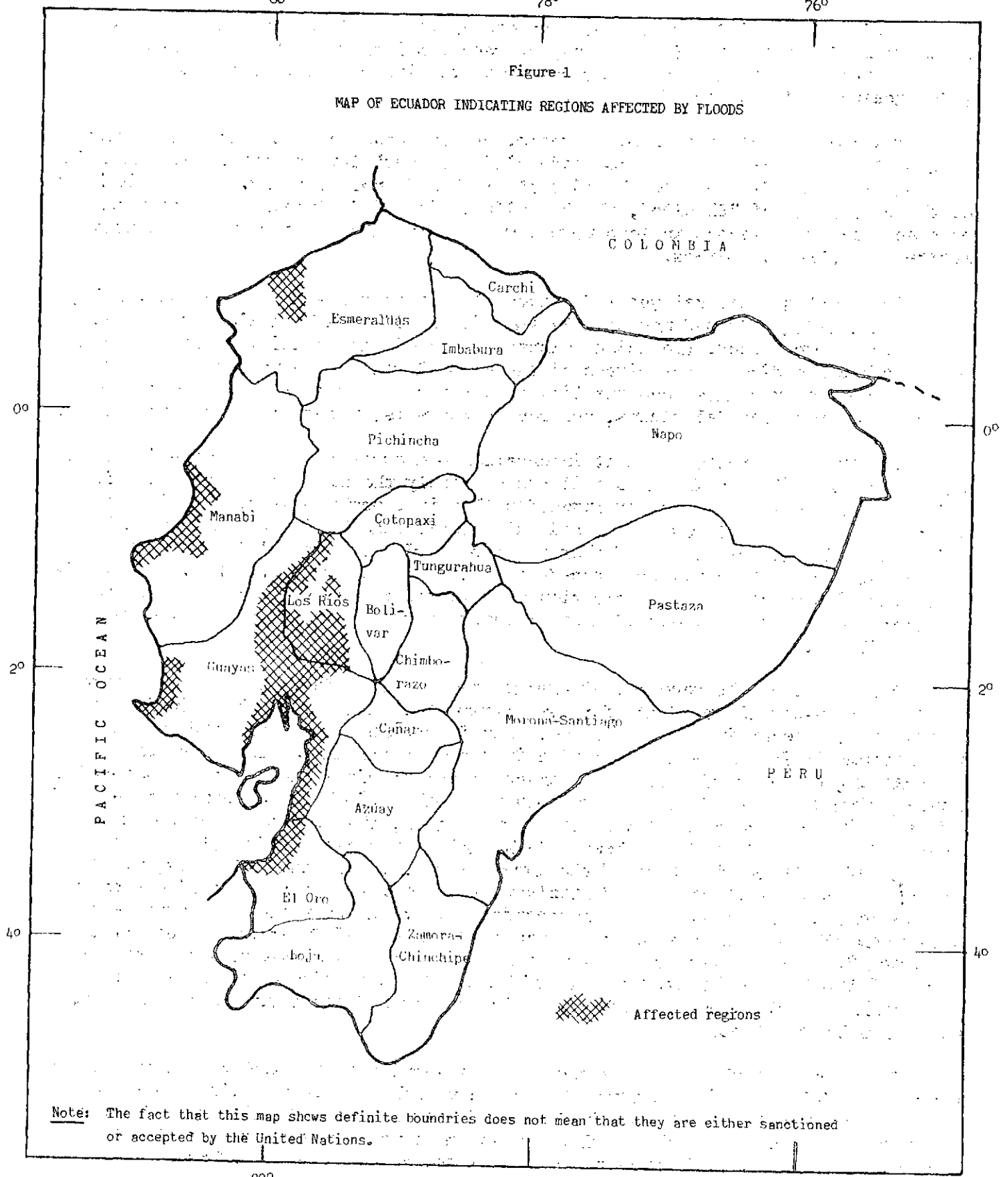
80°

78°

76°

Figure 1

MAP OF ECUADOR INDICATING REGIONS AFFECTED BY FLOODS



Note: The fact that this map shows definite boundaries does not mean that they are either sanctioned or accepted by the United Nations.

80°

78°

76°

/During the

During the period between December and April, the ITCZ moves towards the southern hemisphere, allowing the body of warm tropical water to move nearer the equator, and this is accompanied by strong convective movements which cause the rainy season on the coast of Ecuador.

Frequently there are abnormal years, meteorologically speaking, when because of the slackening of the southern trade winds the Humboldt current recedes and the mass of tropical air moves southward farther than in normal years.^{2/} This is known as the phenomenon of "El Niño", which manifests itself in intense and persistent rain and slight increases in temperature which cover the coast down to a southern latitude of about 5 degrees.

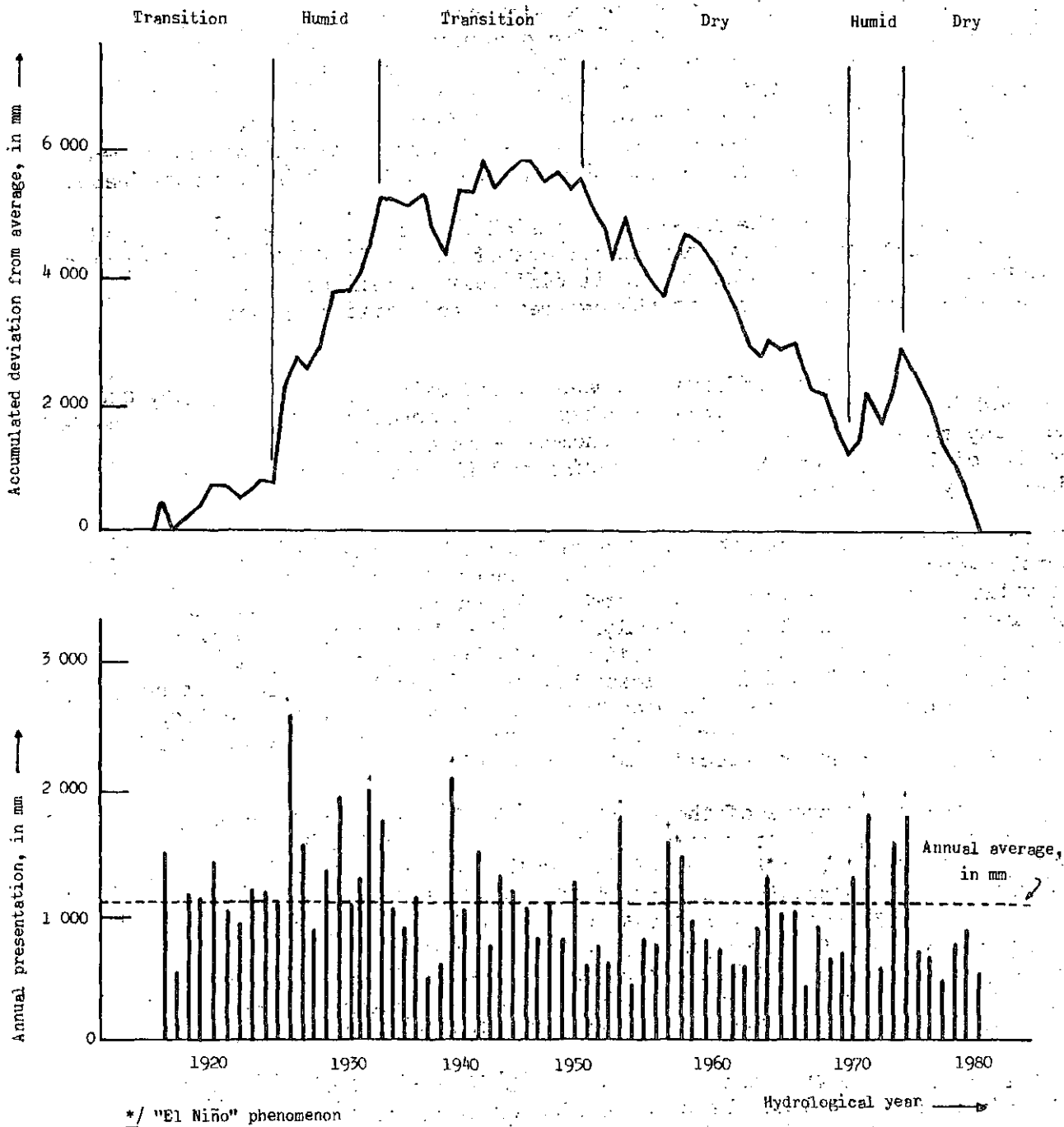
During these abnormal years in which El Niño occurs -such as in 1925, 1932, 1939, 1953, 1966, 1972 and now in 1982 (see figure 2)- the beginning of the rainy season may occur sooner, producing intense and persistent precipitation and causing considerable flooding of the rivers of the coastal zone. Due to the low altitude of some areas of the coast and the limited water capacity of some channels, the rivers flood the alluvial plains, destroying harvests, plantations and infrastructure.

The available meteorological information -on surface and altitude- indicates that in the 1982/1983 rainy season it was precisely the El Niño phenomenon which did occur, but with even greater intensity than in anomalous years on which data are available. An analysis of the rainfall statistics for Guayaquil shows that the rains began in October 1982, and that the amount of rain accumulated through the end of January has been without precedent in the past 100 years. Thus, despite the frequency with which floods occur along the coast, those of 1982/1983 would have produced damage even if protective works designed to counteract normal floods had been available.

Specifically, the sequence of events was the following. After six consecutive years of below-normal precipitation (see figure 2), during 1982 the rain in the coastal region began in October -rather than in December as usual- and continued above normal during November, resulting in ground saturation. In the second half of December, the intensity and persistence of the precipitation reached unprecedented levels, with some localities having daily rainfall equivalent to between one-fourth and one-third of the precipitation of a normal year; the rivers of the coast rose above critical levels and overflowed their banks, inundating adjacent land and cities. With the continuation of the same abnormal situation in January, the level of the rivers -with already considerably widened banks- continued to rise slowly and gradually. The flooded regions expanded, especially due to the simultaneous occurrence of the highest tides of the year at the end of December and January. Moreover, in some localities near the coast, there was an over-saturation of the ground of the higher slopes, and mud slides occurred, causing destruction along their path. Finally, heavy seas eroded the beaches and destroyed houses and other coastal infrastructure.

The fact that the rains occurred so much earlier than usual at the end of 1982 interfered with the task of harvesting some crops in the intermediate parts of the coast and prevented them in the lower-lying areas. In addition, the intensity of these rains and the resulting floods over extensive areas prevented the planting of the so-called "winter" harvest, leading to the danger that some basic products

Figure 2
ANALYSIS OF ANNUAL PRECIPITATION IN GUAYAQUIL, ECUADOR



/will be

will be in low supply during 1983. Moreover, since there had been six consecutive years of below-normal precipitation, many people had planted crops and even built their houses in the riverbeds or in low-lying areas.

It should also be noted that in the coastal provinces, especially in the lowest regions of Los Ríos, Guayas and El Oro provinces, not only is there no proper rain drainage system -natural or artificial- but also some highways and shrimp-raising tanks constructed in recent years blocked the free discharge of waters into the sea during the period of high precipitation and flooding of 1982/1983. It should also be recognized that the area now affected has suffered from many floods in the past and very little has been done to facilitate drainage.

In any case, although the low-lying areas of the provinces of Los Ríos and Guayas are flooded nearly every year, the floods of 1982/1983 destroyed or damaged the highways and secondary roads, making it difficult and expensive to transport agricultural and fishing products to the centres of consumption, processing and export.

The type and magnitude of damage caused by the rains, floods and heavy seas are described in detail in the following chapter. Nevertheless, it must be recalled that the rainy season -and the El Niño phenomenon- have not yet ended, and during what remains of February and March more rising and flooding may occur, and the total damage may increase.

It is also important to note that an analysis of the pluviometric records of the coastal region shows that after the El Niño phenomenon occurs, the following years normally have significantly lower precipitation than normal, with the resulting impact on agriculture. An analysis of the pluviometric data from Guayaquil indicates that there is a relatively high probability that the hydrological year 1983/1984 will have lower precipitation than normal. It has also been observed that in the years following the occurrence of El Niño the temperature of the water of the sea rises several degrees and its salinity decreases, with the result that the catch of some varieties of fish decreases.

Not all the consequences of the rains and floods have been negative, however. There are extensive areas located mainly in the provinces of Manabí and Guayas that for years could not be cultivated due to the absence of timely and sufficient rain, which have now accumulated enough moisture to allow for one or two harvests, and where the planting of some crops has begun.^{3/} It may also be anticipated that in the higher regions of the coast, at the foot of the mountains, the current relatively high humidity will make it possible to achieve greater yields from unirrigated crops. Moreover, on the medium term, the sediments deposited by the rivers which have overflowed will make the now flooded lands more fertile.

It is clear from an analysis of the available hydrometeorological information that the safety of the population and the agricultural production of the Ecuadorian coast depend on the construction of hydraulic infrastructure works and soil conservation and reforestation in the high and intermediate parts of the basins, designed to control or lessen the rising and flooding which so frequently cause this region to suffer.

2. Emergency actions taken

As soon as the size and seriousness of the damage were recognized, the Government of Ecuador adopted provisions to deal with it. By Presidential Decree 1411 of 28 December 1982, a state of emergency was declared in the provinces of Los Ríos and Guayas; Decree 1465 of 17 January 1983 did the same for those of El Oro, Manabí and Esmeraldas.

By the same Decree 1411, Provincial Civil Defence Boards were activated, headed by the provincial governors and co-ordinated by a national Board. It was also provided that the National Development Bank should establish a fund, in an initial amount of 500 million sucres,^{4/} to provide financial aid to affected farmers.

The Government also created an interministerial commission co-ordinated by the Ministry of Social Welfare, in which the Ministers of Agriculture, Public Works, Health and Finance participated, in order to collaborate in the obtaining and channelling of aid. The commission created four working subcommittees to deal with food policy and distribution of food, health and the environment, clothing and the formulation of employment projects. There is also a group in charge of providing emergency infrastructure and reconstructing the most important works.

In view of the magnitude of the disaster, the Government requested aid from the United Nations at the end of December. At the beginning of January a general call for international co-operation was made through the delegations of countries with which Ecuador maintains diplomatic, consular and trade relations. International assistance began to flow into Ecuador. The Office of the United Nations Disaster Relief Co-ordinator (UNDRO) sent a representative to help define priorities and thus be able to appeal to the international community. Available food in some projects of the World Food Programme (WFP) was redirected to the affected areas. In kind and cash contributions were made by other United Nations agencies (UNDP, FAO, WHO, etc.) and multilateral organizations. Friendly countries and non-governmental organizations made generous contributions to meet the needs of the victims, such as the convenient supplying of portable water-purifying plants by the local USAID agency and the contributions from the Government of Venezuela. Domestically, special emergency resources were made available, and private organizations took up voluntary collections to obtain additional funds, which were very valuable. These include the Special Flood Committee (CEPI), the Civil Defence Boards and the organization "Unidos Somos Más".

National non-governmental organizations set up the above-mentioned Special Flood Committee (CEPI) to centralize decisions and strategies of support, and to take actions -by means of a joint fund- geographically co-ordinated with the public sector and well defined, for providing food, medicines and employment projects.

/Despite the

Despite the above, there are still problems of a lack of sufficient co-ordination in attending to the needs of the victims and in the distribution of aid, probably resulting from some deficiencies in the civil defence law which allow for too much decentralization of authority. However, they are on the way to being solved thanks to the initiative of the Government in the face of these problems.5/

It would be useful to provide the system of Civil Defence Boards with some operative reinforcement in terms of communications equipment and preparation of the information dealt with. In view of past experience, in dealing with the disaster the Government should begin to organize an operative unit of strategic support for activities in the affected area to sort out the projects which need to receive international aid and to supervise the preparation of these projects. Among the ideas which should gradually become projects are the concerns of the peasants already manifested through their associations and detected in various ways by those who have studied the Ecuadorian agricultural sector.

/II. ESTIMATES

II. ESTIMATES ON THE EXTENT OF THE DAMAGE

1. Generalities

Presented below is a provisional assessment of the damage caused by the floods in the coastal region. The results are based both on information provided by the Ecuadorian authorities and private enterprises and by estimates made by ECLA after studying the affected areas.

It is essential to qualify beforehand the degree of precision of the evaluation. In the first place, and as mentioned in the previous chapter, the natural phenomenon which caused the disaster is still going on, and even greater flooding could occur. In the second place, it is not possible at this time to find out or estimate damages to resources or services which are still covered by water and mud. Finally, information is available only on the most direct damage from the phenomenon.

In many cases the evaluations are based on an estimate of the number of units lost or damaged, with a later estimate of approximate costs of replacement. In other cases it was only possible to make calculations based on the extension or estimated size of the damage in some services, whereas in others it was simply impossible to determine them, in view of the present situation in the affected zones.

An attempt was also made to estimate the income which will be lost because of the paralysation or setback of the activity of some productive sectors and services, as well as the additional costs that will have to be incurred for the provision of certain essential services.

It is felt that despite the provisional and partial nature of the damage estimates and the possibility that the floods will push them even higher, the results presented here provide an order of magnitude of the direct and indirect effects of the disaster, making it feasible to identify accurately the sectors and regions which must be attended to first. Nevertheless, it is considered indispensable to update the estimates of the damages presented in this document as soon as the rainy season has ended and the waters have reached normal level, possibly towards the end of April or beginning of May.6/

It should be pointed out that the figures given here on the extent of the damages differ from those presented initially by some government departments. This is because the first estimates by the government were made at the beginning or middle of January, when the phenomenon was at its worst, whereas the assessments by the mission were made at a later time, when the water had receded significantly and the recovery of some harvests which had been initially thought to be lost could be observed.

/2. Effects

2. Effects on the population and living conditions

The meteorological phenomenon, as mentioned, affected the five coastal provinces of Esmeraldas, Manabí, Los Ríos, Guayas and El Oro, which together comprise nearly 35% of the national territory and in which approximately half of the 8 million total inhabitants of the country are living.

The number of persons directly affected by the floods, who suffered the damage or loss of their houses or their crops which provided substance income, is estimated at 450 000. Of this figure, two-thirds corresponds to the marginal urban zones in cities such as Guayaquil, Babahoyo, Vinces and Daule, mainly. The remaining third is dispersed rural population.

Of the total figure above, approximately 200 000 persons -or 5% of the population of the provinces mentioned- were severely affected and had to be helped in various ways by the authorities. The most recent estimates of the number of families heavily affected by the disaster in the five coastal provinces are as follows:

<u>Province</u>	<u>Number of families</u>
Esmeraldas	3 300
Manabí.	1 800
Los Ríos	16 840
Guayas	11 160
El Oro	<u>1 500</u>
<u>Total</u>	<u>34 600</u>

Due to the nature of the disaster -slow flooding of the rivers- the population had time to reach safety and even take some belongings with them, and for this reason the number of victims was relatively low, with an estimate of about 50 human lives lost. Of these, one-third were due to the occurrence of local floods or avalanches in urban zones on high slopes.

Many families lost their homes completely, as can be seen below, while others were forced to abandon their homes because they were left incommunicado or because the homes were damaged. The latter were located in temporary shelters -educational facilities and other closed sites- organized by the Provincial Civil Defence Boards. A large fraction of the total number of families affected lost their means of subsistence because they were unable to harvest all they had planted, and they still cannot cultivate their land.

Of the rest of the persons affected, part were families who found themselves isolated in rural areas and did not want to abandon their homes for fear of losing their few belongings; the others were inhabitants of the suburbs of the cities, where the living conditions were already very poor before the disaster and which were now even worse because of the forming of pools of water in low-lying areas, contaminated with fecal material, decomposed bodies of animals or bodies washed

/from cemeteries.

from cemeteries. The lack of availability of clean water has devastated the population; enteric, respiratory and skin diseases have increased in number, especially affecting children.

This situation has resulted in a deterioration of both sources and levels of income for the most dispossessed population. Among the most affected are small rural landowners and day workers in rural areas, many of whom now have no work opportunities. In addition, the buying power of income has also dropped, since the difficulties in supply have caused a shortage of some foods and basic goods, with significant rises in prices in areas of the affected provinces.

Food needs have been met to some extent with the contributions made by public and private institutions and the aid of other countries and international organizations. Food rations have been distributed to 40 000 afflicted families. The rations are delivered every two weeks, and it is expected that they will be provided for a period of three months. The cost of the rations would mean expenditures of US\$ 5.1 million, of which it is expected that at least US\$ 2.3 million will be covered by international assistance. Civil Defence co-ordinates the programme, receiving co-operation in the distribution of food from EMPROVIT, the Emergency Flood Committee (CEPI), the Red Cross, the World Food Programme and other non-governmental organizations abroad.

In brief, the effects of the phenomena described have meant a significant deterioration in the living conditions of the affected population. The disaster caused by the floods and rains will have unforeseen consequences for thousands of families, who will find that their aspirations have been limited and their customs changed. This loss of quality of life felt by the population will last longer than the disaster itself, and its price, which cannot be quantified, is comparatively much higher than the quantifiable amounts of social damage.

3. Damage in the social sectors

Although the amount of material damage will be relatively low, the social sectors were severely affected by the meteorological phenomenon and high seas, with a notable deterioration of the already precarious living conditions in the coastal region.

(a) Housing

Although the housing in the region affected was constructed to withstand frequent floods, on piles several metres high, some of them were destroyed completely and many were partially damaged.

The houses were affected both by the strong currents in the rivers and by some floods which occurred in high-level urban areas, as well as by the action of high seas. Most of the destroyed or damaged houses were located in low-lying areas and even riverbeds or banks of rivers in which the water, because of the scarce rains of previous years, had slowed to a trickle.

/Although precise

Although precise information is not yet available in this respect, since the floods may still continue and since a special census was just begun on their consequences, it is estimated that approximately 2 750 homes were destroyed, 600 of which were in the urban area and the rest in rural areas. These were marginal or minimal housing located in the suburbs of cities such as Babahoyo and Guayaquil, among others, as well as in fishing centres on the Manabí coast. This total includes approximately 150 vacation homes also located on the coast of Manabí. The total cost of replacement in this category is estimated at US\$ 2.9 million.

Approximately 11 000 additional homes suffered partial damage from the water, 5 000 of which were in marginal urban areas and 6 000 in the dispersed rural population. The cost of repairing these homes is estimated at US\$ 1 350 million.

Finally, the household goods of the destroyed and partly damaged houses, which will need to be replaced because they were washed away by the water or damaged by immersion, will reach figures of nearly US\$ 650 000.

Total estimated damage for the sector would thus rise to US\$ 4.9 million (see table 1).

The Ecuadorian Housing Bank is about to undertake sites and services scheme in the suburbs of some cities and is initiating experimental programmes of minimal housing for the families who lost their homes in one of the provinces.

The natural disaster has clearly brought about the essential need to relocate many houses which had been built spontaneously in unsafe places, such as high slopes and low-lying areas in cities such as Guayaquil, Babahoyo and others, and even in the actual beds of rivers crossing or surrounding some cities. If they are not relocated, greater disasters may result from new rainfalls and flooding.

(b) Basic sanitation

The basic sanitation of the area affected by the meteorological phenomenon is in itself very limited even in times of normal precipitation. Drinking water systems do not reach the whole population, and in some urban areas which include a high percentage of the population, tank trucks are used to distribute water. Sewage systems exist only in the principal cities -such as Guayaquil and Babahoyo- and generally serve a small part of them, leaving the popular suburbs without facilities. In some urban areas there are septic tanks for the disposal of excreta, and in the rural areas part of the population uses latrines. In the urban areas the trash collection service is very deficient.

During the rainy season the situation becomes even more critical. Since there are no water drainage systems, collection of garbage is impossible, the sewers become obstructed, and the septic tanks and ditches frequently overflow, creating deplorable sanitary conditions.

In the abnormally rainy year 1982/1983, these sanitary conditions became even worse. Facilities for catching surface and underground water were affected, and leaks occurred in the networks of piping and distribution; this damage was repaired quickly and supply was reestablished, although with limitations in the number of

Table 1

ECUADOR: ESTIMATE OF DAMAGES TO SOCIAL SECTORS CAUSED BY FLOODS a/
(Millions of dollars)

Sector and category	Direct damages	Indirect effects	Import component
<u>Total</u>	<u>10.05</u>	<u>3.09</u>	<u>2.50</u>
<u>Housing</u>	<u>4.90</u>		<u>0.15</u>
Houses destroyed (2 750)	2.90	-	-
Houses damaged (11 000)	1.35	-	-
Household goods	0.65	-	0.15
<u>Basic sanitation</u>	<u>1.45</u>	-	<u>0.65</u>
Repair of aqueducts	1.45	-	0.65
Repair of sewage system <u>b/</u>	...	-	-
<u>Health</u>	<u>1.38</u>	<u>2.56</u>	<u>1.70</u>
Rehabilitation and replacement of infrastructure	1.38	-	0.35
Preventive health campaigns	-	2.56	1.35
<u>Education</u>	<u>2.32</u>	<u>0.53</u>	-
Replacement of destroyed centres	0.67	-	-
Reconstruction of damaged centres	0.94	-	-
Repair of schools	0.71	0.53	-

Source: ECLA estimates based on information provided by various government agencies.

a/ Until 15 February 1983.

b/ The damages cannot be estimated until the waters have completely receded.

/daily hours

daily hours of service and/or low pressure in the plumbing networks. In view of the damage suffered by the sewage system -as will be seen below- and the low pressure and/or leakage of plumbing systems for drinking water, serious contamination was produced which still persists in some populations.

In respect of the disposal of excreta, it should be noted that with the overflow of the rivers which had risen to the level of discharge of used water, and with the spread of the flood over the entire city, the sewage systems of some cities such as Babahoyo backed up, and the existing septic tanks in some cities also flooded and overflowed. As a result, used water covered the streets of these areas and contaminated the drinking water systems where there already existed low pressure and leaks, as mentioned. Bacteriological analyses of samples of stagnant water and water pouring out of the plumbing systems showed the existence of very high levels of fecal and total coliforms; thus, completely polluted water was being consumed, with the resulting health danger.

The systems of garbage collection and disposal in the cities of the affected area also suffered damage, especially in the suburbs. The high waters washed away the garbage from the sanitary depots and spread it about, helping to aggravate the environmental problem even further.

In the rural areas the latrines were flooded by the water and their overflow reached houses and sources of water supply, thus provoking a deplorable sanitary situation.

The El Guasmo area outside Guayaquil, deserves special mention. These are precarious settlements located in very low areas which do not have adequate systems of waste disposal. El Guasmo was totally flooded, and waste was spread everywhere, creating a serious environmental problem.

Fortunately these problems in El Guasmo have been solved, thanks to the construction of emergency drainage facilities. Also installed in Babahoyo and El Guasmo were portable water purification plants which helped attenuate the seriousness of the situation.

It is nearly impossible to quantify the basic sanitation damage at the time of writing of this report, since many of these systems -those of sewage especially- are still covered by water, a situation which is expected to continue at least two more months. Nevertheless it is possible to give indications of the anticipated order of magnitude of the damages.

First, it should be noted that the cost of the equipment and material which have made it possible to ensure an acceptable degree of potability of water and the temporary repair of aqueducts in Guayas and Los Ríos is estimated at US\$ 1 million. The repair of drinking water systems in the cities of the other affected provinces is calculated at an additional US\$ 450 000. As mentioned above, a quantification of the damages to the systems of sewerage and garbage disposal is not yet available because they are still covered by water. Nevertheless there is agreement that these damages are probably limited to the sedimentation of the facilities.

/The total

The total of the damages which have been able to be identified in this category would thus probably reach US\$ 1 450 million. Of this total, approximately US\$ 650 000 corresponds to equipment and material which would have to be imported -or which have been imported- because there is no local production (see table 1).

This section cannot be concluded without pointing out the urgent need to develop and carry out a medium- and long-term plan for the solution of the environmental sanitation problems in the affected area, thus ensuring the welfare of the population.

(c) Health

Direct damage to the health sector refers to the destruction or damage of infrastructure, equipment and medicine. An indirect effect is also produced which is derived from the need to spend more money for reducing morbidity, by undertaking or strengthening campaigns for the prevention of some illnesses.

The exact magnitude of the direct damage has not yet been the subject of a systematic evaluation on the part of the officials; this can only be done in a few months time, when the water level has completely receded. It is assumed, however, that the greatest damages will be concentrated in the subcentres and first aid posts located in the rural areas which were most flooded.

Estimates based on partial reports on the direct damage suffered by hospitals, health centres and first aid posts in the affected areas indicate that US\$ 1.4 million will be required to repair them. Of this amount, US\$ 650 000 would correspond to the rehabilitation of equipment, US\$ 450 000 to the repair of the hospital plant and US\$ 300 000 for the reconstruction and replacement of health subcentres and first aid posts.

The authorities have undertaken effective disease-prevention campaigns in all the affected provinces in order to avoid over-morbidity; as a result, not only has an outbreak of epidemic been avoided but also some morbidity indexes have been reduced. By advancing some budgetary expenditures and using international aid -from the International Red Cross and the WHO/PAHO among others- the provincial health organizations have strengthened vaccination programmes and have offered free medical attention to the victims of the floods. Special brigades have also been mobilized to provide first aid services by making house calls in the affected area, and sanitation projects have been initiated for fumigation and petrolization.

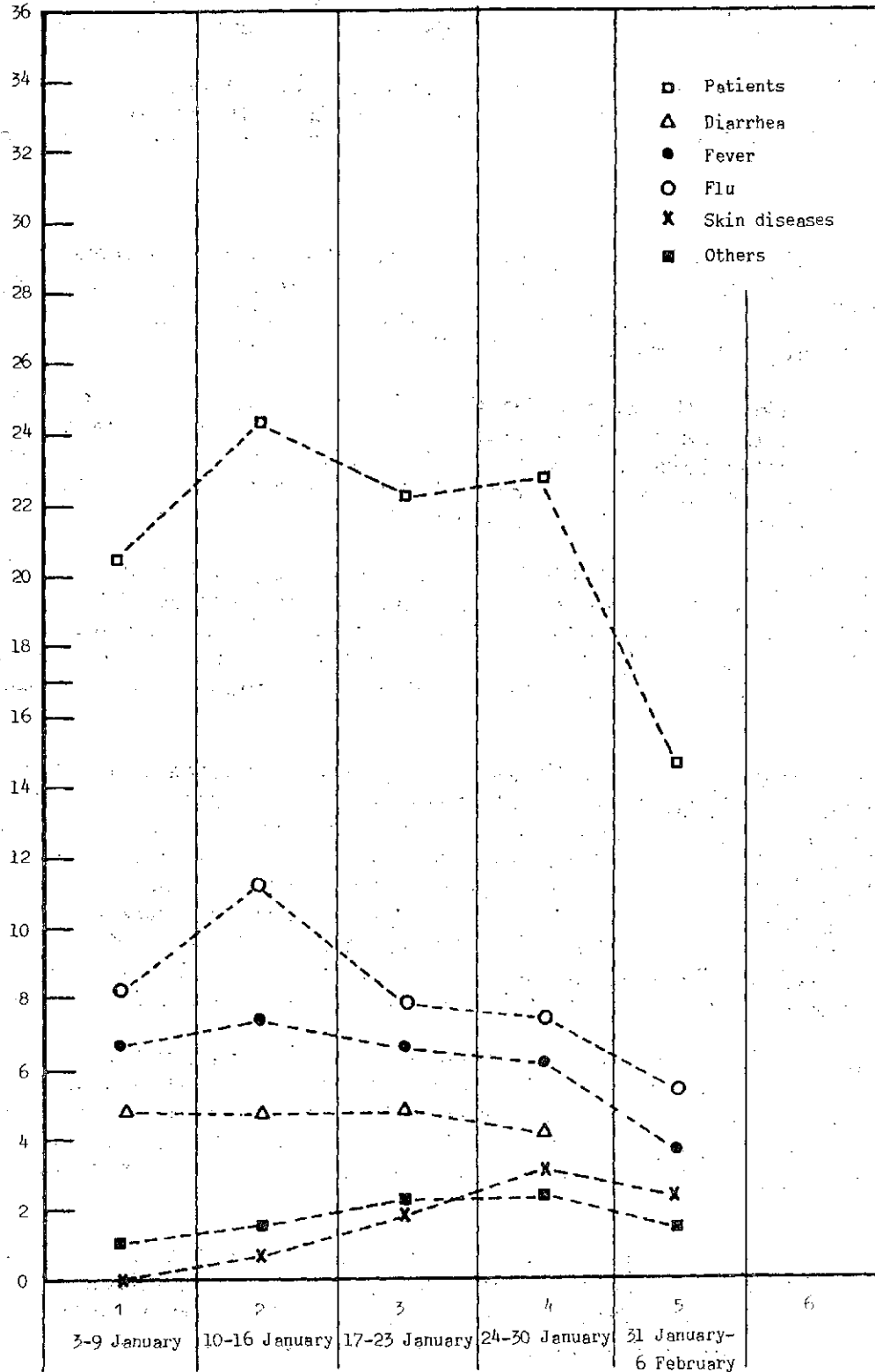
The effectiveness of such actions has been obvious, for example, in the positive evolution of existing morbidity in Guasmo, whose deplorable sanitary conditions have already been described (see figure 3). In areas such as Babahoyo, however, because of the terrible sanitary conditions described, the number of detected cases of conjunctivitis, typhoid fever, parasitosis and stomach ailments has increased.

Needs have been estimated for the costs of medicines, material for controlling sanitation, insecticides and contracting additional brigades of medical and sanitary personnel to keep the situation under control once the rainy season ends and the waters recede. These estimates are based on epidemiological data and the probable

Figure 3

MOBILITY SITUATION OBSERVED IN EL GUASMO, GUAYAQUIL

Number of patients per day



evolution of the most frequent illnesses during the next few months in the five most affected provinces, as well as in another four which also suffered damage to their sanitary facilities.

The indirect effects of the rain and floods have been calculated at US\$ 2.56 million. Of these, US\$ 1.6 million would be required to provide medicine, US\$ 445 000 for emergency hospital equipment and, finally, US\$ 500 000 to finance the equipment and personnel for additional brigades (see table 1).

In brief, the total cost of the direct and indirect effects of the floods will probably reach US\$ 3.9 million, of which it will be necessary to devote US\$ 1.7 million to purchasing equipment, materials and medicines from abroad. It should be noted that a high percentage of the required resources will have to be obtained before the waters recede, when the danger of even greater health problems will increase.

(d) Education

The meteorological phenomenon and its sequel of floods and high tides has so far occurred during a period which has not significantly affected the academic year on the coast.

The direct damage in this sector consists of the destruction of a large number of precariously built schools located in rural areas, and the partial damage of other educational centres, both urban and rural. In addition, there have been indirect effects from the need, on the one hand, to relocate many schools in safer areas and construct them under better conditions and, on the other hand, to repair the educational centres which have been used as provisional shelters for the victims.

In all, 223 schools have been affected in one way or another, as can be seen in table 2, and these must be rebuilt, relocated, repaired or refurbished. Of the US\$ 2.85 million allocated to this, it is estimated that US\$ 2.3 million will be used to repair direct damages, while the rest -US\$ 0.5 million- would correspond to indirect effects (see table 1).

There are also problems arising from the fact that, because the rainy season and the floods have not yet ended, the initiation of the reconstruction and the repair of schools will be difficult, and it may be necessary to postpone the beginning of the new school cycle until the refugees have been able to return to their places of origin, and the schools they are now occupying can be repaired.

In this respect there is a serious concern on the part of the authorities and many parents' committees, who are ready to collaborate with the repair and reconstruction work in the schools. It will undoubtedly be necessary to design and execute a very efficient programme in this area, with possible outside aid, to ensure the prompt and safe reinitiation of the 1983 school year in the coastal zone.

Table 2

ECUADOR: PRELIMINARY ASSESSMENT OF DAMAGES TO THE EDUCATIONAL SECTOR CAUSED BY FLOODS a/
(Thousands of dollars)

Province	Number of schools damaged	Total amount of damage	Type of damage					
			Repairs		Partial reconstruction		Replacement	
			Number of schools	Cost	Number of schools	Cost	Number of schools	Cost
Esmeraldas	29	303.0	12	47.7	17	255.4	-	-
Manabí	26	212.1	21	150.0	5	62.1	-	-
Guayas	28	219.7	24	144.5	4	75.2	-	-
El Oro	22	553.0	13	143.9	6	187.9	3	221.2
Los Ríos	49	454.5	49	454.5	-	-	-	-
Loja	60	694.8	34	281.2	13	119.7	13	293.9
Pichincha	8	253.0	4	13.6	4	239.4	-	-
Chimborazo	1	151.5	-	-	-	-	1	151.5
<u>Total</u>	<u>223</u>	<u>2 841.8</u>	<u>157</u>	<u>1 235.5</u>	<u>49</u>	<u>939.6</u>	<u>17</u>	<u>666.7</u>

Source: ECLA estimates based on information provided by DINACE.

a/ Until 15 February 1983.

(e) Employment and income

The employment situation in the provinces of the coast is essentially characterized by low rates of open unemployment, high rates of underemployment and low participation, both urban and rural, of women and youth.

At the time of the occurrence of the present meteorological phenomenon, it was estimated that open unemployment in the group of five provinces was 4.1%. This figure was 5.3% in the urban sector and 2.6% in the rural sector. For men in the urban sector the rate rose to 6%, according to estimates based on 1982 census data.

(i) The situation in the rural area. Estimates have been made on the apparent unemployment resulting from the floods, from which it can be deduced that the most critical month was December and that the situation has apparently improved considerably since then, due to the recovery of agricultural activities.

The number of unemployed months estimated for the main crops is shown below:

Month	Crops			
	Rice	Soya	Sugar cane	Bananas
October	-	770	1 310	920
November	2 680	1 150	1 960	1 380
December	20 430	1 920	3 260	2 300
January	9 730	-	-	-
February	5 290	-	-	-

This indicates that as a result of the floods there was an accumulated total of 53 100 unemployed-months, which combined with an average pay of US\$ 3.65 per day, would represent a loss of US\$ 4.8 million in income for the labour factor in the rural areas.

Using the same figures, it has been calculated that present open unemployment includes about 8 200 persons. If it is assumed that these are not replaced by underemployment activities, open unemployment in the rural areas has probably risen from 2.6 to 4.0%.

(ii) Situation in the urban area. By working out the structure by branches of activity in the most affected marginal urban suburbs, it has been possible to estimate additional open unemployment probably caused by the floods by mid-February. This increase would be as follows for the five provinces:

<u>Branch of activity</u>	<u>Additional unemployment</u>
Fishing	3 400
Industry	1 200
Artisanal	1 600
Transport	2 300
Services and commerce	10 600
<u>Total</u>	<u>19 100</u>

/The above

The above figures show that urban open unemployment in the affected provinces has risen from 5.3% to 8.2%. Bearing in mind that the greater proportion of informal activities and the resulting underemployment are found in services and trade, it is very probable that the latter figure is really lower, due to the easy replacement of these activities. This indicates that urban open unemployment does not exceed 7.5% of the economically active population at the writing of this report.

Based on the above figures, the estimate of labour factor income losses in the urban areas amounts to US\$ 2.1 million. Account has been taken in this estimate of the duration of average unemployment by branch of activity affected and differential wages.

In brief, it may be said that for the total area affected, without considering replacement of activities by underemployment, open unemployment has risen from 4.1% to 6.3%, and the income losses of the labour factor could reach the sum of US\$ 6.9 million. In order to estimate the damage, however, these figures are included in the losses of the productive sectors, although they do indicate the order of magnitude of the income not received by workers in the affected region.

In any case, it is expected that the current rates of urban unemployment will return to their levels previous to the disaster as soon as rehabilitation and reconstruction activities and projects are initiated, and agricultural production recovers.

(f) Summary of the social sectors

The total cost of material damages to the social sectors caused by the floods and rains is around US\$ 13.1 million, of which US\$ 2.5 million refers to foreign exchange for importing material and equipment unavailable in the country.

Although this cost may be considered low, especially in comparison with that of the other sectors, the damages have considerably aggravated living conditions -already deplorable- for a large number of Ecuadorians. The attention to these needs thus acquires a great sense of urgency, and co-operation on the part of the international community could play a very relevant role in this respect. The impact of the damages caused to different elements, such as the physical and social infrastructure of the area, as well as the directly productive units of the agricultural, industrial and services sectors, in terms of unemployment of a labour force already affected by underemployment and open unemployment, cannot be ignored as a socio-economic harm of great magnitude and long-term effects.

4. Damage to transport

The rains, flooding of rivers and high tides caused great damage to the transport infrastructure and services. Large sections of primary, secondary and local road networks were affected, as well as a significant number of bridges, all the railroad tracks and the urban street system. Significant damages did not occur to the ports and airports of the country.

/(a) Road

(a) Road transport

The principal difficulties in this category are undoubtedly due to the damage and destruction of bridges, the immersion and erosion of a part of the principal road network, and flooding and destruction of secondary and local roads and the urban street system.

Although the impact of the meteorological phenomenon was great, the damages cannot be qualified as catastrophic, although they should have been less. For the problems were aggravated by the following factors: often inadequate maintenance; use of infrastructure inappropriately with respect to its technical state and characteristics, and adoption of unsuitable hydraulic criteria for the design of bridges, sewers and drainage in general, which in some instances made the floods in adjacent regions worse.

(i) Bridges. Although there are no precise figures available, it may be stated that approximately 25 bridges and/or their containing walls were destroyed or damaged by the flooding rivers in the affected area.

The principal damage in this category was the blocking of the Guayaquil-Machala highway, on which seven bridges either collapsed or were damaged. Temporarily, the navy used two small boats for sailing between these two cities. In mid-February the traffic of heavy cargo made transshipments necessary, increasing the unit cost of transport by approximately 200%; all bridges had been built for the crossing of pedestrians, and some for light vehicles. Six Bailey-type bridges were under construction.^{7/} This damage to the bridges is especially important because it prevents or hinders the export of bananas, which are produced on a large scale in the region.

The other bridges which were destroyed or damaged were located along the local roads or secondary network. Bailey bridges are also expected to be used in some of these areas to reestablish crossing, but it will take at least three months to acquire and install them. Considering this delay, it would perhaps be better to start definitive reconstruction immediately, especially in cases where the damages are not serious or where there is little traffic.

The cost of all the Bailey bridges required, including emergency repair work, is estimated at US\$ 3.2 million, while definitive reconstruction of the bridges would cost US\$ 7.5 million. If a more simple design were adopted for the bridges and related structures, it would be necessary to make a much larger investment, but there would be a greater degree of security against floods.

Provisional calculations indicate that there will be an additional cost of US\$ 8.8 million for transport and to pay for the losses due to the use of other means or routes (or a reduction in the volume of transport) as a result of the collapse of the bridges (see table 3).

(ii) Primary highway network. The greatest damage in this category was the collapse of the bridges, as mentioned. However, other types of damages occurred which are also important and which could cost more to correct. First, some sections of roads were under water or surrounded by water at various times, and it may be

Table 3

ECUADOR: ESTIMATE OF LOSSES CAUSED BY FLOODS TO
THE TRANSPORT SECTOR a/
(Millions of dollars)

Damage category and detail	Direct damages	Indirect effects	Import component
<u>Total</u>	<u>63.9</u>	<u>11.8</u>	<u>22.8</u>
<u>Bridges</u>	<u>10.7</u>	<u>8.8</u>	<u>3.3</u>
Emergency repair	3.2	-	1.0
Replacement of lost bridges	7.5	-	2.3
Additional transport costs	-	8.8	-
<u>Primary highway network</u>	<u>22.2</u>	<u>1.4</u>	<u>9.4</u>
Emergency repair	2.3	-	1.4
Definitive repair	19.9	-	8.0
Additional transport costs	-	1.4	-
<u>Secondary highway network</u>	<u>9.4</u>	<u>0.2</u>	<u>3.9</u>
Emergency repair	1.2	-	0.8
Definitive rehabilitation	8.2	-	3.1
Additional operation costs	-	0.2	-
<u>Local roads</u>	<u>6.5</u>	<u>0.1</u>	<u>2.1</u>
Emergency repair	0.5	-	0.3
Rehabilitation	6.0	-	1.8
Increase in cost of operation	-	0.1	-
<u>City streets</u>	<u>9.0</u>	<u>0.7</u>	<u>2.1</u>
Emergency repair	1.0	-	0.3
Definitive rehabilitation	8.0	-	1.8
Increase in costs of operation	-	0.7	-
<u>Railway transport</u>	<u>6.1</u>	<u>1.3</u>	<u>2.0</u>
Rehabilitation of tracks	6.1	-	2.0
Net additional transport costs	-	1.3	-

Source: ECLA estimates, based on information provided by the Ministry of Public Works and Communications, the National State Railway Enterprise, the Transport Planning and Research Institute, the Inter-American Development Bank and other sources.

a/ Estimates up to 15 February 1983.

/necessary to

necessary to reconstruct them in order to avoid their possible deterioration. Second, the strong currents eroded the paved surface and shoulders, because the drainage system was inadequate. And third, some landslides occurred, temporarily obstructing the roads. It is provisionally estimated that the cost of temporarily repairing the damages would reach US\$ 2.3 million (see table 3).

Although even before the beginning of the rainy season a large part of the network was in relatively poor condition for lack of adequate maintenance, the intense rains and high waters described above made the situation worse. The Ministry of Public Works estimates that nearly 1 300 kilometres of the primary road system require repair and improvement at a cost of nearly US\$ 66 million. Provisional estimates made by the mission, however, place at approximately 30% of this amount, or US\$ 19.9 million, the cost of repair which can be attributed directly to the atypical meteorological phenomenon, excluding the costs of all improvements and repairs required for other reasons (see table 3).

The use of highways with pavement in poor condition will obviously imply greater operation costs for vehicular transport which are difficult to calculate. Gross estimates in this respect indicate an additional cost of US\$ 1.4 million in 1983 (see table 3).

(iii) Secondary highway network. The secondary network of the country is approximately 3 000 kilometres of gravel roads or roads with similar surfaces. Although in mid-February an inventory of the damage caused to this network was not yet available, provisional calculations indicate that about 20% of the network would have to undergo various types of repair.

Emergency work, which includes the repair of containing walls and the cleaning of drain pipes, could require an investment of nearly US\$ 1.2 million. The cost of rebuilding the road surface, enlarging the sub-base, treating the walls, etc., which might be attributed directly to the meteorological phenomenon could reach some US\$ 8.2 million.^{8/} In addition, the use of the damaged secondary network would increase the operation cost of vehicles by some US\$ 200 000 during the six-month period when repair work is being done (see table 3).

(iv) Local roads. The strong rains and high waters had a severe effect on parts of the local road network, due to the lack of drainage systems or very rudimentary ones; many sections were under water for long periods, and in other sections potholes were formed which were enlarged by the transit of vehicles. These roads are particularly important for the shipping of agricultural products to the centres of consumption or export.

It is estimated that between 200 and 250 kilometers of local roads were affected; the cost of their emergency repair is estimated at US\$ 1 million, while that of their rehabilitation is calculated at approximately US\$ 6 million. The impossibility or difficulty of transporting some agricultural products has undoubtedly caused considerable damage to production -which is estimated in the following section. The increased cost of operating vehicles using these roads is estimated at US\$ 130 000 (see table 3).

/(v) Urban

(v) Urban streets. The rains and floods caused damage to the surface and sub-base of some urban sections of paved streets, and much longer sections of unpaved roads. In some populations near the coast, the high tides destroyed entire sections of roads located along the beach.

A very arbitrary and provisional estimate (since there is no inventory of the damages) would situate the clean-up and emergency repair work in this category at US\$ 1 million, and US\$ 8 million more for definitive rehabilitation 9/ (see table 3).

(b) Railway transport

The Ecuadorian railway system has three principal metric gauge tracks. It operates at a deficit because of the transport competition -partly subsidized- from heavy trucks, and the difficult trajectory, with very steep slopes and very narrow curved sections.

The damage caused by the rains and floods refers to the collapse or damage of about 10 bridges and their containing walls, the destruction of various wood supports, landslides of the track and undermining, although there was no loss of rolling stock. These problems interfered with traffic on all tracks, but in mid-March only the section between Palmira and Cucay was out of service. However, without this section, the trains still could not run between Durán (Guayaquil) and Quito, which resulted in a substantial reduction in the total income of the National State Railway Company (ENFE). The latter estimates that service may be restored within six months; it is felt, however, that the magnitude of the rehabilitation projects, the difficulty of beginning them before the rains end and the need to import heavy material may extend this period even further.

The ENFE calculates that the costs of rehabilitating the Durán-Quito track will be about US\$ 5.3 million, excluding the cost of rails because used units are available. The damages to the Quito-San Lorenzo track have been estimated at US\$ 500 000, while the rehabilitation of the Sibambe-Cuenca track would require US\$ 300 000. Total cost of rehabilitation of the railways would reach US\$ 6.1 million, a sum which represents double ENFE's anticipated 1983 income before the rainfalls (see table 3).

The loss of income to the company, if the rehabilitation takes place within a period of six months, would total around US\$ 1.7 million. The cargo which would normally have been carried by rail, however, is being sent by land, at a greater cost, considering that the ENFE continues to pay its staff and maintain all its equipment, etc. It is estimated that the net increase for the national economy in the cost of cargo transport, after discounting variable costs corresponding to the railway, would total US\$ 1.3 million if the repairs to the railway are done in the period of time anticipated by ENFE (see table 3).

(c) Summary of the damages in the sector

From the above analysis and estimates it can be seen that the transport sector as a whole has suffered losses totalling nearly US\$ 76 million. Of these, US\$ 64 million correspond to direct damages from the floods, whereas an additional US\$ 11.8 million would correspond to indirect effects resulting from the former.

/In addition,

In addition, provisional estimates indicate that a total amount of around US\$ 23 million would be required in foreign exchange for the import of material not available locally (see table 3).

5. Damages to agriculture, livestock and fishing

As explained above, the Ecuadorian coast is subject to a cyclical variation in precipitation throughout the year which conditions the agricultural activity, especially for short-cycle crops. Besides the variation during the year, more prolonged cycles occur when several consecutive dry years occur followed by others when the rainfall is above normal (see figure 2).

In addition, drainage -natural and artificial- of the coastal region is frequently insufficient for evacuating the excess water during the rainy years, with floods occurring in the lower lying areas.

The early beginning of the rainfall in October 1982 and the continued and persistent rains in the following months resulted in the loss of some harvests; the floods which followed destroyed other crops and delayed the planting of still others. Besides this, the recent construction -during the last few drought years- of roads without adequate drainage systems and of containing walls in the shrimp-raising tanks, pools and riverbeds, helped aggravate the situation of the sector.

In mid-January 1983, the extent of the surface covered by waters made it seem likely that the loss in this important productive sector would be very great. However, the waters began to recede, until in mid-February a large portion of the land was able to be harvested and/or planted again, and thus the initially anticipated damages were reduced significantly. In addition, wide expanses of the Peninsula of Santa Elena and the Province of Manabí, which for lack of water had remained idle for many years, now had enough moisture in the soil so that they could be planted.

In any case, the meteorological phenomenon of 1982/1983 has pointed up the fragility of the regional agricultural system and its great dependency on climatic variations. It is important, therefore, to adopt measures and take actions designed to regularize the availability of water in the region and thus ensure the production of the sector.

Although the present rainy season is not yet over and new, intense precipitation could occur, generating more floods, an estimate of the damages of the situation in the sector until mid-February 1983 is presented below, under the assumption that the rest of the rain will keep within normal limits.

(a) Agriculture

The rains and floods affected the production of harvests for both domestic consumption and export.

(i) Products for domestic consumption. The situation of the production of these articles varied according to the product in question.

/Maize is

Maize is generally planted on the high and intermediate slopes, which were not affected by the water because of their position. On the contrary, higher yields are anticipated, due to the greater moisture now available in the soil. Moreover, in the Province of Manabí and in the Peninsula of Santa Elena (Guayas), more than 6 000 additional hectares of maize have been planted on land that was never before cultivated because of lack of sufficient water, and so it is anticipated that there will be surpluses of this product. These could be exported or industrialized to substitute for part of the sweetener products which, as will be seen below, were lost with the sugar cane harvest.

Soya was ready to be harvested, or was being harvested, when the intense rainy season of 1982 began; the production of 12 000 hectares which could not be harvested at that time is estimated at 19 000 tons, and should be counted as a net loss directly imputable to the meteorological phenomenon. As for winter harvests, it is now possible to undertake them in the intermediate and high zones of the Province of Los Ríos especially, since the excess of water there has been virtually evacuated.

The losses in the harvest at the end of 1982 is estimated at US\$ 7.3 million for the producers.^{10/} The delay in the "winter" planning should represent only a further delay in the gathering of the product, although a better harvest could be produced, given the moisture conditions (see table 4).

Rice was one of the crops which was initially considered to be most affected, because most of the cultivated areas which were still to be harvested were flooded, and the winter planting was delayed. However, now that the waters have partially receded it can be seen that -since rice has a great resistance to flooding, even for relatively long periods- a large part of the area which was considered lost is being recovered, and in some areas the winter planting has already begun.

It is estimated that approximately 11 000 hectares of the current crop will not be harvested, representing a loss of 33 000 tons, at an approximate value for the producer of US\$ 6.9 million. The new harvest will merely be out of phase, and, if meteorological conditions remain normal during the rest of the rainy season, there will be even higher yields than those of previous years.

From the above-mentioned losses it will be necessary to discount the production of approximately 7 100 hectares recently planted in regions of the Province of Manabí, in the area of the Babahoyo Project and in the Peninsula of Santa Elena, which now have sufficient moisture thanks to the rains. The net damage to rice, caused by rains and floods, after subtracting the production of these new areas, would actually total US\$ 2.5 million.

Apart from this, provisional estimates indicate that a great deal of damage occurred to the infrastructure of the areas dedicated to rice -canals, drains, terraces, etc.- whose replacement would require an investment of around US\$ 13.1 million, which clearly exceeds the value of the lost production (see table 4).

(ii) Export products. Various products destined for external markets were affected in different ways and to different degrees.

/No cotton

No cotton was lost as a result of rains or floods; in fact, there was a slowdown in production last year caused by the lack of rain. During the present year it is anticipated that the production in this category will recover its normal levels, due to the presence of more moisture in the soils, an especially important situation in the Province of Manabí.

In the case of bananas, due to the floods and the prevailing humidity, there was a drop in the yield and quality of the product. Because of the interruption of the road system, the collapse of bridges and damages to secondary and tertiary roads in the Province of El Oro, a part of the banana harvest was either affected by greater transport costs to points of export, or was spoiled due to the impossibility of shipping the bananas out on time. There was also a loss of around 5 200 hectares of plantation and its product because of the floods. Finally, the greater humidity in the region used for this type of planting could favour the occurrence of diseases which might affect productivity in the future.

It is estimated that the production directly lost because of the floods, as well as the reduction in exports due to problems of transport and quality of product -which will make it necessary to consume domestically and industrialize part of the production- would amount to 35 000 tons, representing a net loss of US\$ 2.9 million. The restitution of the lost planting would require an investment of US\$ 1.4 million, which would make total losses in this category US\$ 4.3 million (see table 4).

As for cane sugar, because of the rains and floods it was not possible to complete the harvesting of some 9 600 hectares, and thus some 700 800 tons of the product were not harvested. This figure is 20% lower than that estimated previously by the Ecuadorian authorities, due to the recovery in mid-February after the receding of the waters. This loss has been calculated at US\$ 5.1 million.

Apart from the above, there was damage to the irrigation and drainage infrastructure and other related facilities for the raising of sugar cane, whose cost is estimated at an additional US\$ 1.2 million.

Thus, total losses and damage related to cane sugar would be around US\$ 6.3 million (see table 4). As mentioned above, however, based on the glucose which can be extracted from the greater production of maize, it will be feasible to reduce the deficit of sweeteners which this damage has caused in some food and beverage industries.

(iii) Food supply and import needs. Damages to agriculture from the floods will obviously affect the availability of food for the normal supplying of the population. The products in which this situation is reflected are rice, soya and sugar. An estimate of the import needs to ensure consumption and to replace intermediate stocks under a criterion of food security yields the following figures: rice, 51 000 tons; soya, 19 000 tons and sugar 62 700 tons. For the first product it has been felt advisable to maintain stocks to cover three months of consumption, and for the other two, for two months of consumption.

(iv) Summary of losses in the agricultural subsector. Total net losses corresponding to the subsector, measured at the producer level, are thus estimated at US\$ 20.4 million. In reality, the direct damages from the rains and floods represent US\$ 23.8 million; however, the indirect benefits from the new areas available for cultivation (US\$ 3.4 million) reduce this figure (see table 4).

/(b) Livestock

(b) Livestock

It is estimated that around 500 head of cattle were lost because of the floods, and that there will be a significant reduction in the weight of the animals because of their transfer to safer areas, the reduction in the availability of food, and the anxiety suffered by the animals because of the high waters. These losses have been estimated at US\$ 3.8 million (see table 4).

Apart from the above damage, 32 000 hectares of drought-resistant grassland, which had been planted in previous years, were lost due to the excess water produced by the rains and floods. Lesser damages also occurred to other sector infrastructure. The cost of replacement under this heading would amount to US\$ 2.1 million.

Thus, total loss in livestock would be US\$ 5.9 million (see table 4).

(c) Fishing

The fishing subsector in Ecuador has grown rapidly, rising in the past ten years from a catch of 100 000 tons annually to nearly 800 000. This production is fundamentally directed towards export, generating foreign exchange of over US\$ 200 million in 1982.

Ninety percent of the total catch is accounted for by sardines and similar species, used for the making of meals and oils for foreign markets. Shrimp-raising -which has shown a spectacular rise in recent years- represented around 60% of the foreign exchange generated by the subsector in 1982.

In relation to the raising of shrimp, it should be noted that the State has granted land with an area of nearly 45 000 hectares, located principally in the Provinces of Guayas and El Oro, and that nearly half of the production is carried out in areas fluctuating between one and 50 hectares, with a very intensive use of capital. There is great concern in this respect over the effects which the explosive growth of the areas used for raising shrimp may have on environmental conditions of the ecosystem of the mangrove swamps and estuaries.

Fishing is carried out in Ecuador nearly all year long, with a greater catch in certain periods. Availability of the species is affected by environmental conditions including, inter alia, variables such as temperature and salinity of the waters. The occurrence of the El Niño phenomenon appears to have a considerable effect on the presence and catch of some species on the high seas.

The meteorological phenomenon of 1982/1983 affected the subsector in two principal categories: the infrastructure and production of shrimp-raising and the artisanal level fishing fleet and catch. There is no evidence that the high sea catch has declined, at least for the time being.

Damages to shrimp-raising include the collapse of containing walls in a small percentage of the tanks, especially because of the strong surf; the mortality or stunted growth of species due to sudden changes in salinity, and the increase in the cost of transport of the product, due to the damage or destruction of access roads leading to centres of consumption, processing or export.

/Table 4

Table 4

ECUADOR: LOSSES IN AGRICULTURE, LIVESTOCK AND FISHING
DUE TO THE RAINS AND FLOODS a/

(Millions of dollars)

Subsector and category	Direct damages	Indirect effects
<u>Total</u>	<u>41.7</u>	<u>0.2</u>
<u>Agriculture</u>	<u>23.8</u>	<u>(3.4)</u>
Soya (12 000 hectares)	7.3	-
Rice (3 900 hectares) <u>b/</u>	6.9	(4.4)
Bananas (5 200 hectares)	3.3	1.0
Sugar cane (9 600 hectares)	6.3	-
<u>Livestock</u>	<u>5.9</u>	
Loss of meat production	3.8	-
Loss of pasture land	2.1	-
<u>Fishing</u>	<u>12.0</u>	<u>3.6</u>
Damages to fishing fleet	0.0	3.6
Loss of shrimp-raising tanks	12.0	-

Source: ECLA estimates, based on official figures and its own calculations.

a/ Until 15 February 1983.

b/ Losses of 11 000 hectares occurred, but 7 100 hectares were planted in new areas, so there is a positive indirect effect which reduces the net losses.

/In respect

In respect of damage to less securely built tanks, the costs of repair or replacement of the damaged infrastructure is estimated at some US\$ 4 million. Assuming that production could have been affected in approximately 3 000 hectares of tanks, the losses in this category are estimated at an additional US\$ 8 million. Since this is a highly profitable product, the higher costs of transport necessarily incurred were felt to be totally marginal and were not quantified.

In the case of artisanal fishing, the material damages are actually much more modest. However, due to the socio-economic marginality of workers in this activity, the effects are extremely important. It is known that approximately 15 small boats were lost, with a total value of nearly US\$ 20 000. A more serious effect, however, is the income that these fishermen can no longer earn because of the loss of their boats until they can be replaced, and the lost profit of most of the total artisanal fleet, which was prevented from going out to fish because of the adverse weather during a period of three weeks. This category could mean an indirect loss estimated at US\$ 2.6 million.

In summary, the damage to the subsector would amount to an estimated total of US\$ 14.6 million. Of this amount, US\$ 12 million would correspond to direct damage to infrastructure and loss of production, and US\$ 3.6 million to lost profit due to the impossibility of producing because of the bad weather and the loss of boats 11/ (see table 4).

(d) Summary of losses in the sector

Total losses for this productive sector, which is so important to the country, were estimated at US\$ 42 million. Of this amount, US\$ 41.7 million correspond to direct damages. There were US\$ 4.6 million worth of indirect losses in production due to the damages to the transport infrastructure and loss of profit for the artisanal fishing fleet; but there were US\$ 4.4 million worth of indirect benefits to agricultural production in areas which were not cultivated before and where there is now sufficient moisture to do so (see table 4).

6. Damages in the industrial sector

With regard to this sector, some damages occurred in the physical plant of some industries and production was reduced, especially that based on the products of the agricultural and fishing sectors.

In the low-lying areas of Guayaquil and Portoviejo, damages occurred to the infrastructure of various metal products and machinery, beverage and poultry-raising industries which do not seem to have been very significant and in which the affected facilities have already been rehabilitated, with production returning to normal. According to the available information, these losses due to damage to the infrastructure and brief suspension of production reached a total of approximately US\$ 3 million.

In the rest of the affected region there are many agroindustrial establishments, mainly sugar mills, rice, coffee and cocoa mills and cotton gins. These installations are located in high-level areas, so they did not suffer damage to their infrastructure as a result of the floods. Nevertheless, their levels of production were slowed down insofar as the harvesting of the products they process was reduced.

/Based on

Based on the reductions in the volumes of rice, sugar and shrimp, the drop in the production of sugar mills, rice processing plants and shrimp packing plants were estimated. No provision was made in this calculation for the lower levels of production in the cotton gins, since this product was not affected by the rains and floods but rather by the drought of the previous year, as mentioned above. Nor was account taken of the decrease in the industrialization of oil because of the losses of soya, since it is understood that this product is being imported and other oils are being processed.

Specifically, it is estimated that the losses in the sugar cane harvest meant a reduction in sugar production amounting to 67 000 tons, or a decrease in the value added estimated at US\$ 16.2 million. On the other hand, the decrease in the rice harvest would mean a net loss of US\$ 1 million for the processing plants of this product. It was estimated that the shrimp packing plants would cease to process around 2 300 tons of the product, which would represent a drop in added value of US\$ 5.1 million for these industries.

In brief, it may be stated that the industrial sector suffered losses of approximately US\$ 2.5 million in infrastructure and equipment, and showed a decline of US\$ 22.3 million in value added due to the decreased agricultural and fishing production. Moreover, it suffered a loss of profits because of temporary paralysation of activities whose value is estimated at US\$ 500 000 more. The total losses in the sector would thus amount to US\$ 25.3 million.

7. Losses and damages in other sectors

Although the disaster did not cause significant damages to the systems of production and distribution of electricity, telecommunications, and the production and piping of hydrocarbons, it did produce losses and damages in other activities which must be taken into consideration for a better assessment of total damage.

First, there was an expenditure of US\$ 5.1 million which had to be made for the urgent acquisition of medicines and curative material, as well as for providing food to the victimized families. Although a part of this expenditure -now estimated at US\$ 2.3 million- is financed by international aid in kind and in cash, the rest has had to be financed from the national budget.

Second, it is necessary to include US\$ 3.7 million in additional losses not accounted for as value added in the industrial sector, which result from reduced agricultural and fishing production and which correspond strictly to other sectors of the economy.

Finally, the commercial sector has been affected by the temporary lack of supply of some articles during the most critical period of the floods, for which there was certainly a reduction in income which is impossible to quantify for the time being, but which would to some extent be included in the losses mentioned in the previous paragraph.

8. Recapitulation of damages

The precipitation, floods and high seas which occurred -until mid-February 1983- in the rainy season of 1982/1983 produced considerable material damage to

/the transport

the transport infrastructure and agricultural and fishing production in the coastal region; also affected significantly was the agroindustrial sector. Although of less material value, the damages to the social infrastructure and services led to a serious deterioration of the living conditions of the regional population.

Specifically, the total damages caused by the natural phenomenon were estimated provisionally -on 15 February 1983- at US\$ 165 million. Of that amount, 87% (US\$ 144 million) corresponds to damages caused directly by the phenomenon, and the remaining 13% (US\$ 21 million) to losses in income or greater expenditures in some sectors and services which arose as an indirect consequence of the disaster (see table 5).

Obviously, within the national context, the amount of damages represents a situation which could not be considered catastrophic. For the affected region, however, this atypical meteorological event represents a veritable disaster, and it has brought to light the vulnerability of the productive and social structure of the coast, a situation which should be resolved as soon as possible.

Although 89% of the damages correspond to the sectors of transport infrastructure and agricultural, fishing and industrial production, the effects on the social sectors -although they are of a modest amount- have a very special impact, since they affect the most marginated strata of the population and make their already precarious living conditions even worse. This worsening of the situation results not only from the destruction or deterioration of the physical components of works, installations and buildings which provide services for the production and circulation of goods, but also from the suspension of payment of wages and salaries to workers who lost their jobs as a result of the destruction or deterioration and to small producers who suffered this loss directly. It would not be too much to say that the events have a specific dimension in the social field -because of the low level of income of the most affected groups- in addition to that which was accounted for on a sectoral basis from the strictly economic point of view. On the contrary, the principal losses in production were suffered by social sectors with a high economic capacity, which are able to deal, almost by themselves, with the effects of the disaster.

The above general analysis indicates the urgent need to attend immediately to the basic problems of the affected population, undertaking programmes of basic sanitation, reinitiating production and generating employment. Also foreseeable is the need to reduce and even eliminate, on the medium term, the structural vulnerability of the region in the face of climatic variations, seeking a way of regularizing the water supply in order to avoid floods and droughts and ensure production and the welfare of the population.

Table 5

ECUADOR: SUMMARY OF DAMAGES CAUSED BY THE NATURAL
DISASTER OF 1982/1983 a/
(Millions of dollars)

Sector and subsector	Damages		
	Totals	Direct	Indirect
<u>National total</u>	<u>164.87</u>	<u>144.18</u>	<u>20.72</u>
<u>Social sectors</u>	<u>13.14</u>	<u>10.08</u>	<u>3.09</u>
Housing	4.90	4.90	-
Environmental sanitation	1.45	1.45	-
Health	3.94	1.38	2.56
Education	2.85	2.35	0.53
<u>Transport</u>	<u>75.73</u>	<u>63.90</u>	<u>11.83</u>
Bridges	19.50	10.70	8.80
Primary highways	23.60	22.20	1.40
Secondary highways	9.60	9.40	0.20
Local roads	6.63	6.50	0.13
Urban infrastructure	9.70	9.00	0.70
Railways	7.40	6.10	1.30
<u>Agriculture</u>	<u>41.90</u>	<u>41.70</u>	<u>0.20</u>
Crop raising	20.40	23.80	(3.40)
Livestock	5.90	5.90	-
Fishing	15.60	12.00	3.60
<u>Industry</u>	<u>25.30</u>	<u>24.80</u>	<u>0.50</u>
Infrastructure	2.50	2.50	-
Production	22.80	22.30	0.50
<u>Other sectors</u>	<u>8.80</u>	<u>3.70</u>	<u>5.10</u>
Emergency expenditures	5.10	-	5.10
Other losses	3.70	3.70	-

Source: ECLA estimates.

a/ Until 15 February 1983.

III. EFFECTS ON THE ECONOMY

1. The economic situation in 1982

In 1982 the gradual deterioration in the growth of the Ecuadorian economy since 1979 was accentuated even further. The international recession accelerated and widened the external imbalance, which had an immediate repercussion on the various sectors and variables of the national economy, contributing also to the slowdown and maladjustments of recent years. Not all the deceleration of economic growth was caused by the international crisis, however.

The rate of growth of the global product, which had been declining gradually since 1979 (between 1976 and 1978 it reached an average rate of 7.4% annually), fell from 4.3% in 1981 to approximately 2% the past year. This represented a decline in the per capita product of about 1%, something which had not occurred since 1969 (see table 6).

The growth of nearly 5% in the agricultural product was due mainly to the vigorous growth in fishing, since agricultural production had declined slightly, affected by a drought and by various other, old problems. The generation of electricity and gas and water services grew by 12%, but this was offset by the by the stagnation in the petroleum and mining activities, by an increase of less than 4% in the manufacturing product -substantially less than the previous year- and by an estimated drop of 4.4% in construction.

Manufacturing suffered the effects of the rise in the cost of production, the higher price of the dollar -which made imports expensive- and the general economic slowdown which contracted demand. Construction also suffered from similar problems, although the most important were the restriction of public expenditure and the postponement of projects.

The low rate of growth in the gross domestic product and a significant decrease in the quantum of imports of goods and services led to the virtual stagnation of total supply. On the demand side, there was a decline in fixed capital formation of nearly 8%, which in the case of public investment was as high as 15%. Exports, on the other hand, increased slightly by nearly 3% in quantum terms, and it is estimated that consumption increased slightly over 1% in real terms. Already in 1981, fixed gross investment had shown only a very slight increase.

A devastating event for the economy was the fall in the value of exports of goods by 8%. The production of crude oil dropped slightly in 1982 (0.6%); however, the volume of its exports dropped from 45.4 to 42.7 million barrels between 1981 and 1982. This fact, added to the decline in its average selling price from US\$ 34.30 to US\$ 32.50 per barrel meant a lower export value of US\$ 172 million, or a reduction of 11%. There was also a significant decrease in the export of petroleum derivatives, processed sea products and processed cocoa, inter alia. On the contrary, coffee sales rose by 27%; those of cacao 43% and those of sea products 54%. The latter reached a total of US\$ 128 million, thanks to the extraordinary increase in the raising of shrimps.

Table 6

ECUADOR: SOME MAIN ECONOMIC INDICATORS

Concept	1980	1981	1982 _{a/}
		<u>Growth rates</u>	
Gross domestic product	4.8	4.3	2.0
Per capita gross domestic product	1.6	1.1	-1.1
Export of goods, FOB	16.5	1.4	-8.3
Import of goods, FOB	5.1	7.1	-7.5
Terms of trade	12.1	-7.1	-1.0
Consumer prices			
December-December	14.5	17.9	24.3
Variation between annual averages	13.0	16.5	16.1
Money	28.3	11.5	19.7
Current income of government	62.8	4.6	10.7
Total expenditure of government	63.7	28.7	10.9
Fiscal deficit/gross domestic product (percentage)	3.0	6.0	5.7
		<u>Millions of dollars</u>	
Balance on current account	-616	-939	-1 050
Variation in international reserves	291	-381	-222
Total external debt	4 667	5 871	6 314
Public	3 530	4 416	4 699
Private	1 137	1 455	1 615
Servicing of external debt	1 409	2 130	2 745
Percentage of exports of goods and services	49.2	73.1	100.1

Source: ECLA, based on information provided by the Central Bank of Ecuador.

a/ Preliminary information.

/On the

On the other hand, imports of goods showed a slightly lower decrease than that of exports (7.5%) as a result of the restrictive measures which began to be taken in the second half of the year, due to the growing seriousness of the loss of foreign exchange reserves. The rise in the price of the dollar from 25 to 33 pesos in May also helped reduce imports, by making them more expensive.

Despite the circumstances in which the trade of goods evolved, the trade balance showed a less unfavourable balance than the previous year; however, US\$ 230 million more were paid in interest on the external debt than the previous year, which raised to US\$ 1 050 million the current deficit in the balance of payments, exceeding for the first time the US\$ 1 000 million mark. It should be recalled that in 1976 the current imbalance was US\$ 29 million.

During the year there was a net inflow of capital of approximately US\$ 860 million (US\$ 577 million in 1981), lower than the total current imbalance, and thus for the second consecutive year use had to be made of international reserves, this time for a total of approximately US\$ 220 million.

Between the end of 1981 and December 1982, international reserves, not counting gold reserves which were revaluated in October, declined from US\$ 632 million to US\$ 304 million.^{12/} The greatest decrease occurred in the period between June and September.

At the end of 1982 the country was in a very difficult situation in terms of external indebtedness, although after August the flow of external loans to the public sector practically stopped, and loans to the private sector were restricted. The year closed with a total external debt of US\$ 6 314 million (US\$ 5 871 at the end of 1981). Of this amount, 86% was for a period of over one year, and 74% was public sector debt.

Leaving out the size of the external debt, the most striking amount is the cost of its servicing. Amortization payments amounted to US\$ 1 967 million in 1982 and US\$ 778 million in interest, sums which are equal to the total amount of exports of goods and services. Two years ago this relationship was 49%, and in 1981, 73%.

The widespread slowdown in levels of economic activity was accompanied by a resurgence of inflation beginning in October. The consumer price index increased 24.3% from December to December and 16.1% on average annually. This latter figure is slightly lower than that of 1981, in that it was influenced by the abundant supply of some agricultural products for basic consumption which became available in the first months of the year.

From the first to the third quarter, the average monthly increase in the price index rose from 1.2% to 1.7%. However, in the last three months of the year, this figure rose to 3.2% monthly. This was a result of the devaluation of the sucre which took place in May, whose effect on consumer prices was felt several months later; the widespread effects of the rise in the prices of liquid fuels in October, and the withdrawal of the wheat subsidy. In addition, prices rose somewhat more rapidly in the sierra than on the coast, mainly in the fourth quarter.

/The rise

The rise in inflation unleashed a wave of strikes and labour conflicts in demand of higher pay, which had various results. The minimum wages of workers in general were raised in November from 4 000 to 4 600 sucres.

As for the evolution of the means of payment, by the end of the year money had increased by nearly 20% (after an increase of only 11.5% in 1981), which represented a relative improvement compared to the lack of liquidity from which the economic activity had been suffering.

The government, in mid-year, took various austerity measures in order to contain the rapid growth in public expenditure and reduce the fiscal deficit. These measures had fairly positive effects, since government expenditures, which in 1980 and 1981 had shown increases of 64% and 29% respectively, rose approximately 11% in 1982, and the fiscal deficit in relation to the gross domestic product dropped from 6% to 5.7% between 1981 and 1982.

2. Possible economic repercussions in 1983

Even before considering the effects which the floods might have on the evolution of the economy in 1983, the prognoses were not favourable. The first projections of the gross domestic product made by the Central Bank of Ecuador in November 1982 indicated an increase of 1.9% in the global product, valued at producer prices, or even less than the slight increase recorded in 1982.^{13/}

According to these projections, the growth of all the productive activities -except the oil industry, which will probably rise significantly by nearly 8%- would considerably slowdown during 1983, in response to a depressed domestic demand and a worsening external imbalance.

With such unfavourable prospects, losses in production caused by the floods in agriculture, fishing and industry, as well as the extensive damage to the road system, installations, buildings and housing, appears small in comparison with the size of the macro-economic variables on the one hand and the magnitude of the problems facing the current economy on the other.

A first evaluation of the effects of the disaster on the economy, made with all the limitations inherent in a study done prematurely and while the events motivating it are still going on, indicates, first of all, that the impact on the evolution of the global product could be minimal. This is because the decline in production which would have occurred in agriculture, fishing and manufacturing and in the commercial activity will be partly offset by the stimulus to the stagnant construction activity provided by the reconstruction of the damaged or destroyed infrastructure.

In addition, the losses of incomes and wages resulting from the impossibility of harvesting or planting the flooded land or of going out to fish because of the high tides, or because of the temporary paralysation of work in the affected industries, although they have had serious and painful social repercussions in the affected regions, are actually of little significance when compared with the magnitude of the major components of domestic demand.

/Similarly, there

Similarly, there will probably be little stimulus to public investment represented by the reconstruction of works destroyed by the floods, and even less so if in order to carry them out the work on other projects has to be postponed or delayed. These slight effects will occur despite the sharp decline of 15%, in real terms, in public investment in 1982 and the 20% foreseen for 1983.

On the other hand, the loss of exportable production due to the floods and tides, or the need to import more goods to cover the production shortages, will apparently have a greater relative impact on the balance-of-payments situation. The current account deficit, which according to estimates before the floods would have been reduced from US\$ 1 050 million in 1982 to around US\$ 480 million, despite the expected decline in the price of oil, now seems likely to rise by some US\$ 600 million.

These are some of the conclusions to be drawn from an analysis of the possible effects of the floods on the principal variables of the economy.

(a) Effects on production

The losses caused by the floods will probably not have major consequences in respect of the gross domestic product of 1983. The projected 1.9% growth of the latter would fall to 1.7% for these reasons (see table 7). The decline in agricultural, fishing and manufacturing production would be partially offset by the stimulus to the construction activity provided by the rehabilitation of the infrastructure, buildings and houses which were damaged or destroyed.

The losses in agricultural production, in terms of value added, are estimated at approximately 650 million sucres, representing a decrease of 2.8% in the product of the sector, instead of the -0.2% which had been estimated in November 1982. Losses in livestock would result in a drop in their product of one half a point (see table 7).

The greatest loss would occur, however, in the fishing activity, primarily in the production of cultivated shrimp. Fishing, particularly artisanal fishing, also suffered the effects of the high tides and abnormal sea conditions. It was thus estimated that there was a drop in the value added by fishing of 280 million sucres, which would result in a decline from 15% to slightly under 9% in the growth of the product which had been estimated for this activity.

Thus, agriculture, as a result of the heavy rains and floods, showed a minimal increase of 0.8% this year, substantially less than the 3.4% anticipated.

As for the manufacturing sector, the decreases in the volumes processed by sugar mills, rice mills and shrimp packing plants as a result of the losses in the harvests of the basic products due to the climatic phenomena could only be estimated. It was calculated that the value added by these industries dropped by some 730 million sucres as a result, meaning that the product of the manufacturing sector, rather than growing 2% in 1983, as had been anticipated, would do so by only slightly over 1%.

It was impossible to determine the extent to which the commercial activity was affected by the disaster. Apart from the loss of stocks, which must have occurred but which is unverifiable, there was certainly a momentary drop in

Table 7

ESTIMATE OF EFFECTS OF THE FLOODS ON GROSS DOMESTIC PRODUCT
(Growth rates)

	1982	Projection for 1983	
		Before flood	After flood
Agriculture	4.8	3.4	0.8
Agricultural product	-1.0	-0.2	-2.8
Animal product	4.5	2.0	2.5
Forestry product	10.0	5.0	5.0
Fishing and hunting	25.0	15.0	8.9
Petroleum and mining	-	7.9	7.9
Manufacturing	3.7	2.0	1.1
Construction	-4.4	-7.9	-3.6
Commerce	3.5	3.0	2.3
Other activities	3.3	1.0	1.0
Gross domestic product	2.5	1.9	1.7

Source: ECLA estimates, based mainly on projections made by the Central Bank of Ecuador, without taking into account the possible effects of the floods.

/sales, primarily

sales, primarily because of the lack of normal supply of merchandise, due both to the losses in production and to the difficulties of transport. However, these problems were soon solved, either by the use of the stocks of basic commodities held by ENAC or by the products imported to cover the shortages. Moreover, it is a fact that the shortage -mainly of food- which occurred not only in the affected regions, was not due exclusively to losses in production but also to hoarding, with or without intention to speculate. For lack of further investigation, which was impossible due to time limitations, it was estimated that there was a slight drop in levels of commercial activity proportional to the loss of production of goods, taking into account that these goods were partly replaced by imports.

The cost of repairs to the road infrastructure has been estimated at 275 million sucres, and approximately 1 840 million more for the reconstruction of highways, bridges, local roads and railroads. To these totals would have to be added some 500 million additional sucres for the reconstruction of housing, repair and rehabilitation of schools, hospitals and health centres, aqueducts and sanitary works, industrial establishments, etc. The needs for repairing and reconstructing housing and damaged infrastructure on farms themselves, which represents a sizeable amount, have only been considered partially among the factors which would contribute to reactivating construction, since these works generally have little impact on the construction activity because of the difficulty in accounting for them.

Due to the sharp contraction in public investment in 1982 and to the problems suffered by private construction that year, the activity level of construction declined 4.4%, and for 1983, since the general economic situation has worsened, a decline of 7.9% was anticipated. Plans to repair and rehabilitate the works destroyed by the floods this year, if they are carried out, would mean an increase of 4.3 points in the product of the sector, or in other words, the product would decline by 3.6% in 1983 instead of the anticipated decline.

(b) Effects on domestic prices

In the last quarter of 1982 inflation rates rose as a result of the escalating prices which resulted from the sharp rise in the price of gasoline (that of extra gasoline, which is the most consumed, doubled), the elimination of the wheat subsidy and the increase in various taxes. The monthly average increase in the consumer price index, which until September was 1.4%, rose to a monthly average of 3.2% in the last quarter.

To the previously mentioned causes may be added others, for example, the early onset of the rain and the intensity it reached in December and January. In the Province of Guayas, it normally begins to rain in December, whereas this time there were rains in October, 260 mm fell in December, and 600 mm in January (normal figures for those months would be 40 and 120 mm).

Along with the increase in the rainfall and the occurrence of the floods, with all their well-known consequences, there was a temporary shortage of some basic consumer products, occasioned by the losses in the harvests, the interruptions in the transport facilities which blocked the shipment of these goods from unaffected regions, and the hoarding of food and other basic products which occurred in response to the possibility of the products becoming scarce in the market.

/In January

In January prices rose 5.1% on the coast and 3.4% in the sierra. However, prices of food in the three most important cities of Ecuador increased 9.6%. Eloquent examples of this increase are the following: in Guayaquil, rice rose 19% between October and December and 26.6% in January; sugar 6% between October and December and 29% in January. The price of meat rose 13% between October and December and 6.2% in January, and chicken and fish rose 18% and 15% in the last month alone.

In addition, vegetables such as haricot beans, broad beans and onions showed price rises of 23%, 11% and 50%, respectively -which were certainly affected by seasonal variations.

It is hoped that in March the supply of food will become normal again when the waters have receded, and that this will ease the pressure on prices.

(c) Effects on the balance of payments

The only export products which suffered direct losses due to the floods or tides were bananas and sea products, mainly shrimp. However, only the latter product will affect total exports.

It is estimated that 35 000 tons of bananas were lost, a figure which represents only 2.3% of the production anticipated for this year (1 530 000 tons); thus, the export volume would not be adversely affected and would total 1 360 000 tons. However, the damages suffered by the communication networks in the Province of El Oro, including the collapse of several bridges, make it unfortunately likely that the shipping of bananas will be difficult, that the volume of sales will decrease and that these same transport difficulties and the excess of rain and floods will affect the quality of the fruit and thus the possibilities for exporting it and its price.

On the other hand, it is estimated that approximately 2 200 tons of cultivated shrimp tails would be lost, which would probably reduce the export volume by the same amount, and its value by US\$ 16 million.

As for the fishing of other species destined primarily for export, the amount of damage is not known, but it appears they are not very significant.

On the import side, a balance of the availabilities and needs for supplying consumption and replace minimal stocks of agricultural products affected by the floods indicates that it will be necessary to import 50 700 tons of rice, 19 000 tons of soya and 62 700 tons of sugar this year for a total value of approximately US\$ 31 million.

In addition, repairs and reconstruction of damaged and destroyed infrastructure and the need for certain equipment and materials would require imports (imported component) at an additional estimated value of US\$ 25 million.

Before considering the possible effects of the floods on foreign trade, it was expected there would be a slight decline in exports caused by the drop in prices of petroleum and its derivatives, which would be partly offset by the rise in the exported volume of crude oil and by more sales of other products.

/For imports,

For imports, a drastic reduction of around 18% was foreseen, as a result of the series of measures adopted in 1982 to correct the serious external imbalance which was exhausting international reserves, and the reduced demand for imports on the part of a depressed economic activity.

There would thus be a positive trade balance of US\$ 347 million (compared with US\$ -179 million in 1982) with a current deficit of US\$ 483 million, less than half of that of 1982. This takes into consideration a slight decrease in remittance of profits and payment of interests (see table 8).

As a result of the floods, the export of goods and derivatives would fall by some US\$ 35 million, and total imports would increase by US\$ 76 million. The positive trade balance would thus be reduced to US\$ 236 million and the current account deficit would rise to US\$ 594 million.

It is premature at this time to estimate how much the net inflow of capital will be this year. If it is a net amount similar to that of 1982, or some US\$ 830 million, the international reserves would recover from the loss suffered the previous year.

(d) Effects on public finances

It has been estimated that it would cost the State approximately 2 300 million sucres to repair and rehabilitate the public infrastructure damaged or destroyed by the intense rains, floods and currents. Obviously this sum does not take into account the new works and projects which are being studied to improve the design and location of the current infrastructure, and works designed to attenuate the effects of possible future disasters.

Most of these investments correspond to the repairing and reconstruction of bridges, highways and local roads (1 610 million sucres). The rest refer to improvement of the highway network, city streets, systems of drinking water and sewerage disposal and repair of health and welfare centres and schools.

For 1983 a fixed public investment of only 21 400 million sucres (20% lower in real terms than that of 1982 and 32% lower than that of 1981) has been projected. The 2 300 million to be spent in 1983 corresponds to 10.7% of this sum.

For the financing of these projects, of which the imported component -approximately one-third- would be of external origin, the formation of a reconstruction fund has been recommended, especially for implementing the most urgent projects.

Unfortunately, the total expenditures incurred by the government to deal with the emergency are unknown. It has only been possible to obtain isolated data, which together could amount to about 450 million sucres, not counting the external aid received. If this is true, and adding this amount to the cost of repairs and construction, a total of 2 750 million sucres is arrived at, which represents 3.6% of the total expenditures of the general budget for 1983. This could raise the budget deficit projected for this year from 14 600 to 17 400 million sucres (see table 9).

Table 8
 PROJECTION OF BALANCE OF PAYMENTS
 (Millions of dollars)

	1982	1983	
		Before floods	After floods
Total exports	2 742	2 711	2 676
Goods, FOB	2 334	2 308	2 278
Services	408	403	398
Total imports	2 921	2 364	2 440
Goods, FOB	2 181	1 784	1 840
Services	740	580	600
Trade balance	-179	347	236
Remittance of profits and payment of interest	-891	-850	-850
Transfers	20	20	20
Balance on current account	-1 050	-483	-594

Source: ECLA, on the basis of provisional, unpublished data provided by the Central Bank of Ecuador.

Table 9

PROJECTIONS OF THE GENERAL BUDGET OF THE STATE
(Millions of sucres)

	1982	1983
<u>Current income a/</u>	<u>43 505</u>	<u>60 991</u>
Taxes (traditional)	24 110	32 114
On foreign trade	8 170	11 553
Domestic taxes	15 940	20 561
Non-tax income	1 578	2 585
Petroleum income	19 325	27 193
Total outlay	65 895	75 624
Deficit	-22 390	-14 633
Financing:		
Domestic (net)	4 279	4 389
External (net)	11 637	3 555
Use of special resources	1 575	2 287
Use of cash balance	899	989
Unfinanced	4 000	10 522

Source: Central Bank of Ecuador.

a/ Excluding the issue of tax credit and bonds of the Agrarian Reform Institute (IERAC) in the amount of 1 590 million sucres in 1982 and 900 million in 1983.

IV. NEW INTERNATIONAL CO-OPERATION NEEDS

1. General considerations

As described in the preceding chapters, the weather phenomenon caused considerable damage in the transport infrastructure and a drop in agricultural production and brought about a deterioration in the living conditions of the coastal population of Ecuador. It will make it necessary to rehabilitate or restore (rather than increase) the country's capital holdings at a higher cost than its original value, and it will also be necessary to import some basic commodities for the population. The present capacity of the national economy, both on the savings side and in the external sector, will be affected in the near future.

Some emergency and rehabilitation measures, such as repairing the channels of communication and the city drainage system and agricultural recovery measures can and should be undertaken as soon as circumstances permit. In addition there is an urgent need to instrument projects which will make it possible to generate employment in the short term in order to provide the afflicted portion of the population with income.

In spite of what has been said above, observations made in the field concerning the kind of damage which occurred show that the construction of certain infrastructure works, such as highways, roads and pools for shrimp farming in the least affected areas should be considered carefully and monitored by the State since they contributed to the scope and impact of the floods. In addition, the analysis of the data obtained has made it clear that the construction of individual or partial works for flood protection located in the lowlands are not sufficient to prevent flooding. There is a vital need to seek a comprehensive and permanent solution to all the water development and supply problems of the area affected, bearing in mind the needs of all water users and the development of water works in the headwaters and high areas of the watersheds. The State needs to adopt this integral approach to the problem immediately and not to allow partial solutions, which may solve the problems of some users while adding to those of other users, to be sought.

This task, which will be described in greater detail below, can only be tackled in the medium and long term, calls for considerable research and planning and requires big investments.

Ecuador has already embarked on the initial stages of these tasks, but it will not be possible to make practical progress until a political undertaking has been adopted and the indispensable resources are obtained. In the study stage, the country has the international support which is needed; however, for the construction of the works, it will be necessary to obtain external financing, at favourable terms, at a time when the international scenario is not very promising.

Moreover, both the emergency measures and efforts to correct the damage on the one hand and the long-term programmes or projects to effect a definitive solution of the problems of the area subject to recurrent meteorological phenomena on the other must be articulated within the national development plan, giving them the priority they obviously deserve.

/It would

It would therefore seem that international assistance would have to share up the government's efforts to take care of these short, medium- and long-term needs.

2. International assistance requirements

Since the meteorological phenomenon has not ended and some of the damage has still not been evaluated, it is very difficult, if not impossible, to evaluate the international assistance which might be required and the expenditure which the Government of Ecuador will have to make to correct the damage done and design and construct works which will make it possible to solve the water problems of the area affected. It is, however, possible to say something about the form which this co-operation should take.

First, since the aim is to attend to problems which were not explicitly included in the development plans, it is immediately apparent that the efforts called for to solve those problems must be backed by additional external aid rather than by assistance given in substitution for what the country is now receiving.

Secondly, the loans to finance the large-scale works should be obtained not only on concessionary terms but also in sufficient quantity to cover a relatively high percentage of the cost of the projects.

With regard to the rehabilitation tasks, the country might negotiate the redirection of the unused portions of existing loans towards the restoration and repair work of the highest priority.

Finally, insofar as technical co-operation is concerned, the country might have recourse to the contingency reserve of the United Nations Development Programme in order to obtain resources in addition to those allocated in the indicative Planning Figures and might also tap the installed technical capacity of other United Nations bodies and agencies and other international and regional institutions.

3. Practical fields in which there is priority need for international financial co-operation

Although this document is based on estimates, the damage estimates make it possible to identify the fields, sectors or geographical areas which require priority attention on the part of the government and those where co-operation from the international financial community is needed.

These areas of need are summarized below and are broken down in table 10, in which the possible source of co-operation are also indicated. In the annex a more detailed description is given of the scope of each of them. The criterion used in grouping them together have been the activities which would produce immediate effects and those which would be effective in the medium and long term although it may be necessary to initiate or undertake some of them simultaneously.

/Table 10

Table 10

SUGGESTIONS CONCERNING POSSIBLE INTERNATIONAL ASSISTANCE TO ECUADOR TO DEAL WITH THE DAMAGE CAUSED BY THE FLOODS

	Financial co-operation		Technical co-operation	
	Description of programme or project	Possible sources of co-operation	Description of programme or project	Possible sources of co-operation
(a) <u>Immediate action</u>				
Support for production	Enlargement of the programme to finance inputs for small producers of rice and other basic products	WFP Governments		
	Reforestation campaign in the coastal area using native plants species	IDB IFAD Governments	Assistance in making an inventory of plants species and setting up nurseries	IDB FAO WFP Governments
	Repairing the agricultural infrastructure at predial and extra-predial level	IDB World Bank ADC Governments	Assistance in connection with project formulation and repair of estate and extra-estate infrastructure	FAO UNDP Governments
	Purchase of seeds and other inputs to restore and diversify the plantations affected	IDB IFAD Governments	Identification and evaluation of areas to be replanted and diversified	FAO UNDP Governments
	Financing the transfer of technology appropriate for production	IDB World Bank IFAD Governments	Identification of technologies appropriate for production and their transfer to farmers	FAO UNDP
	Restoration and improvement of the fishing fleet, implementation of small projects to improve the facilities and equipment used in the informal fishery sector	IDB IFAD Governments	Formulation of projects for improving the facilities and equipment of the informal fishery sector	FAO Governments

Table 10 (cont. 1)

	Financial co-operation		Technical co-operation	
	Description of programme or project	Possible sources of co-operation	Description of programme or project	Possible sources of co-operation
Rehabilitation of transport	Purchase of equipment and reconditioned machinery for the repair and rehabilitation of highways	IDB ADC Governments		
	Purchase of a shipment of Bailey bridges for use in future emergencies	IDB World Bank ADC Governments	Transfer of technology used in construction of wooden, small span Bailey bridges for light loads	UNIDO
			Review of water supply and development criteria used in designing bridges and culverts	WMO UNDP Governments
			Study of alternative designs and location of damaged or destroyed bridges	IDB World Bank UNDP
			Studies on methods of designing and constructing highways in flood-prone areas	IDB World Bank UNDP Governments
			Adaptation of mathematical models to optimize standards of highway construction and maintenance	World Bank Governments
		Re-equipment and modernization of the rail system	IDB World Bank ADC	Study on the feasibility of re-equipping and modernizing the national railway
Better living conditions	Financing programme to supply the population affected by the floods with food and medicine	WHO/PAHO WFP UNICEF Red Cross Governments	Assistance in improving the system in which medicine and food are provided in exchange for work	FAO WHO/PAHO UNDP UNICEF Red Cross Governments NGOs

Table 10 (cont. 2)

Financial co-operation		Technical co-operation	
Description of programme or project	Possible sources of co-operation	Description of programme or project	Possible sources of co-operation
Programme for repairing housing, roads, latrines, wells and other family infrastructure	ADC IDB Governments	Evaluation of the living conditions of the families affected by the flood and design of a programme to return family life to normal	IDB UNDP UNICEF Governments NGOs
Financing repairs and expansion of the system for supplying rural and small urban centres with drinking water	ADC IDB Governments	Design of programme for repairing and expanding drinking water systems in rural and small urban areas	WHO/PAHO UNDP UNICEF Governments NGOs
Programme to create employment with a view to reincorporating the victims gradually into productive activity	IDB World Bank Governments	Diagnosis of the employment situation of the victims and design of special mechanisms and projects which will enable them to resume productive activities	ECLA/ILPES ILO UNDP
Financing the implementation of a home construction programme to be carried out in suitable environmental conditions with appropriate technology used	IDB ADC Governments	Study to define the most appropriate way of re-establishing minimum housing conditions, including the analysis of sites and services schemes, the standardization of housing design calling for appropriate technologies, the creation of a stockpile of building materials, etc.	IDB United Nations OAS UNDP Governments
Sewerage programmes in urban and rural areas	IEB World Bank Governments	Design of programmes and projects for putting the sewerage system back into operation; reconstructing septic tanks and latrines, garbage disposal, etc.	WHO/PAHO UNICEF Governments

Table 10 (cont. 3)

Financial co-operation		Technical co-operation	
Description of programme or project	Possible sources of co-operation	Description of programme or project	Possible sources of co-operation
		Analysis of the situation as regards health assistance and design of programme to strengthen it	WHO/PAHO UNICEF Governments
Campaign to prevent disease and epidemics by fumigating and spraying	WHO/PAHO Red Cross Governments	Identification of geographical areas requiring protection and formulation of programme to prevent disease and epidemics	WHO/PAHO UNDP Governments
Re-equipping and improvement of health stations and substations	IDB Governments	Study on the infrastructure and movables of the health sector which were affected by the disaster, and design of rehabilitation programme	WHO/PAHO UNDP Governments
		Standardization of design of school infrastructure and equipment	UNESCO
Creation of fund for repairing and reconstructing educational centres	IDB World Bank ADC	Analysis of the present state of the educational infrastructure and design of minimum programme for classroom repair and reconstruction	UNDP UNESCO
Sweeping procurement programme to establish a building-materials and equipment bank to be used in re-equipping and reconstructing educational institutions	IDB ADC	Organization and training of parents committees to facilitate the task of re-equipping and reconstructing educational centres	ILO UNESCO
		Assistance for the establishment of a system of centralized supervision of the available manpower and job opportunities	ILO

Table 10 (cont. 4)

	Financial co-operation		Technical co-operation	
	Description of programme or project	Possible sources of co-operation	Description of programme or project	Possible sources of co-operation
	Establishment of a State credit fund and system for the informal sector	IDB ADC Governments		
(b) <u>Medium term</u>				
Flood control and irrigation	Construction of dams and diversion of rivers to solve the problem of floods in Babahoyo and increase the irrigated area	IDB World Bank ADC Governments	Design for the construction of civil works needed to prevent or minimize floods in Babahoyo	IDB Governments
Human settlements	Drainage of the El Guasmo area and resettlement of the inhabitants of Mapasingue in safer areas with better environmental conditions	IDB World Bank ADC Governments	Assistance in design of human settlements and in basic urban sewerage	DTCD Habitat WHO/PAHO UNDP Governments
Preparation for and forecasting of disasters	Establishment of computerized warning system against floods and for alerting the population to them	IDB ADC WMO Governments	Formulation of emergency plans and strengthening of the civil defence organization	UNDP UNDRO Governments
	Creation of minimum stores of food and medicine and establishment of emergency fund for coping with disaster	ADC Red Cross Governments	Zoning of the area on the basis of vulnerability to disaster, especially floods	IDB ECLA/ILPES DTCD UNEP UNDRO
	Integral multi-purpose development of water resources in the area affected		Finishing inventory of water resources, the water capacity of the drainage network and sites for development	IDB ECLA/ILPES DTCD UNDP

Table 10 (conclusion)

Financial co-operation		Technical co-operation	
Description of programme or project	Possible sources of co-operation	Description of programme or project	Possible sources of co-operation
		Determination and projection of demand for water and related developments for purposes of flood control, irrigation and drainage, generation of electricity, road construction, navigation, fishing and breeding of aquatic plants, human settlements, drinking water and sanitation, industrial development, coastal development, etc.	IDB ECLA/ILPES DTCD FAO Habitat WHO/PAHO UNDP
		Harmonization of the aforementioned demands with the availabilities of water, in terms of storage facilities and run-off in an attempt to formulate the master plan for integral development	IDB ECLA/ILPES UNDP
		Establishment of an authority responsible for the operation and expansion of the integral development system	IND ECLA/ILPES UNDP
Implementation of the phased, multi-purpose master plan for the development of the resources of the coastal area	IDB World Bank ADC IFAD Governments	Incorporation of the master plan for the development of the coastal area into the national development plans	ECLA/ILPES DTCD UNDP

(a) Tasks with immediate effects

As has already been pointed out, these tasks are aimed at rehabilitating or restoring the infrastructure and production damaged by the meteorological phenomenon as soon as possible, in an effort to use labour intensively in generating the employment and income which many thousands of Ecuadorians need.

Before going into the matter, the framework in which these tasks must be developed should be established, drawing attention to the kind of projects which should be carried out both in areas containing a concentration of people who are either destitute or cannot perform their usual work and in agglomerations in which the welfare of the population is threatened.

The projects should preferably be located in the immediate vicinity of the centres inhabited by the affected or jobless population in order to keep to a minimum problems related to transport or to the resettlement of people in places far from their original homes. The projects also call for managerial and supervisory personnel at different levels who can provide orientation and an overall approach.

After these minimum prerequisites have been noted, priority should be assigned to the projects under the following broad headings:

- high-risk zones affected by epidemics or individual or family tragedies;
- flooded crop lands which may be recovered if they are not left under water too long (rice paddies for example);
- areas which are no longer flooded and, on account of their moistness, offer favourable conditions for crops with a short growing season; other areas which had previously been left to lie fallow and can be planted;
- public services which if left out of operation may cause major economic and social damage;
- urban areas in which the effects of the flood may be corrected through mop-up, drainage and repair action, with an effort being made to improve the conditions which were obtained previously;
- destroyed or partially damaged housing which will be relocated or reconstructed in the same place with flood-control works provided;
- damaged public buildings which can be repaired using simple reconstruction and cleaning operations;
- industrial buildings and their annexed facilities and services which have had to suspend their operations.

Once the basic criteria of selection have been established and the guidelines for the establishment of priorities have been set, those projects which might require immediate international financial assistance may be assigned priority. These projects might be grouped under broad headings corresponding to support relating to production, better living conditions and the reconstruction of roads and highways.

With regard to support for the reestablishment of production, a number of programmes, projects or tasks requiring international assistance may be suggested.

/In this

In this connection mention should be made of the expansion of the existing programme to provide inputs for small rice producers, increasing the number of beneficiaries and extending it to include producers of other basic commodities.

There would also seem to be a need to purchase seed and other inputs needed to restore and diversify the farms affected and also a need to transfer technology appropriate for production in the coastal area.

There is also a need to repair the agricultural infrastructure, at and beyond the estate level, which has been damaged or destroyed by the rains and flooding.

A reforestation campaign should be undertaken covering the entire coastal area and making use of native species, which adapt more readily to the weather conditions in the area.

It would also seem necessary to set to work immediately on the tasks of restoring and improving the fishing fleet in the informal sector and establishing mini-projects to improve the docks and the facilities for processing the catch in this sector.

As for the rehabilitation of transport, three projects are suggested. The first would consist in the purchase of some reconditioned machinery for road maintenance and repair. The second, in the purchase of a number of Bailey bridges for use in future emergencies and the third, in a study on the rehabilitation and modernization of the national rail system.

The promotion of better living conditions includes a large number of programmes and projects of different types.

There is need to ensure the provision of food and medicine for the population affected by the flood throughout the emergency period (this has already been earmarked as international assistance), establishing the food-for-work system as a norm.

The instrumentation of a programme designed to create employment with a view gradually to reincorporating the destitute into the production process would seem to be of special importance. Such a programme would reduce the requirements of the aforementioned food programme.

A programme should be undertaken for repairing dwellings, roads, latrines, wells and other family infrastructure, and another one for repairing and expanding the drinking water supply systems in rural areas and small urban centres.

A programme for the relocation and reconstruction of dwellings, using appropriate technology in suitable environmental conditions, should also be initiated. At the same time, it would seem necessary to instrument a drainage programme in urban and rural areas.

In order to prevent epidemics and disease when the level of the water has dropped, a preventive campaign involving the fumigation and spraying of the area affected should be initiated.

/The very

The very nature of the work to be performed means that even if it is initiated immediately, its effects will be seen only in the medium and long term. In the last analysis, these are large-scale projects with a relatively long period of maturation, requiring big investments and possibly extending beyond the year 2000. In any case, the projects would be carried out in stages, in accordance with the financial possibilities of the country, and security and well-being in the region would gradually increase.

Although the solution to the structural problem of the area calls for integral development plans, there are projects or schemes which must be initiated before such plans can be completed; and those projects or schemes should be embarked upon in the near future.

In this connection mention should be made first of all of the partial and transitory solution of the flooding and sewerage problems of the city of Babahoyo and the areas outside of Guayaquil (El Guasmo and Mapasingue), under the integral plan which will be described below.

Floods occur in Babahoyo because the water capacity of the Babahoyo river bed is limited owing to its shallow gradient. It may well be possible to attenuate the flooding significantly in this city by constructing two dams (one on the Sibambe River and the other on the Pijullo River) which will control the flow of these two rivers while still providing water for irrigation, and by constructing two bypasses for rivers which now empty out above the city. Specifically, this would involve diverting part of the Catarama river to the Pueblo Viejo River by rehabilitating and expanding an old natural bed, and also diverting the San Pablo River, so that both of these rivers would meet the Babahoyo above the city. It is believed that it would be feasible to reduce the Babahoyo to about 500 cubic metres a second opposite the city, which would mean that the river would not attain critical levels. This solution is advanced in studies being carried out by the Research Commission for the Development of the Río Guayas Basin (CEDEGE), but so far the idea has received low priority; however, in the light of the recent disaster, it would be advisable to review the allocation of priorities and to accelerate the execution of these works.

The Guasmo and Mapasingue districts in the suburbs of Guayaquil need first to be provided with minimum basic services and second to be permanently relocated in safer areas with adequate environmental conditions.^{14/} In this respect, it should be borne in mind that they are inhabited by close to half a million people who live in very unsound conditions and that the solution to their housing and sewerage problems can no longer be delayed.

Secondly, attention should be drawn to the question of preparations for and warnings against natural disasters. In view of the frequencies with which they occur, especially in the case of floods, it seems vital to strengthen the machinery of civil defence, and also to establish at least a minimum supply of food and medicine and a special fund to take care of the needs which arise in future disasters. It would also be a good idea to install a computerized warning system in respect of floods which would make it possible to evacuate the population rapidly and keep future damage to a minimum.

/In addition

In addition to these two emergency measures, it is necessary to draw attention to the final solution of the development problems of the whole area affected, i.e., the formulation and implementation of a master water development plan for the watersheds involved and its incorporation, with the priority it deserves, in national development plans.

The adoption of such a plan would align all the water supply and development problems of all potential users or beneficiaries of the resource (flood control, irrigation and drainage; generation of power; road construction; navigation; fishery problems and breeding of marine and river species; human settlements, drinking water and sewerage; industrial development; coastal development and other uses) with the water capacity of the rivers and the stored and run-off water supply existing in the area. Only in this way would it be possible to ensure that the resources develop as they should, in view of the importance of the uses co-ordinating with and complementing one another so as to avoid the present problems of incompatibility and interference between the various ways in which water resources are employed.

This plan would necessarily have to be implemented in stages, in accordance with the capacity of the country, but with priority attached to the safety of the population, production and communications. In view of the long maturation period of this kind of project, its duration should be set at 20 or 25 years.

It should be pointed out that this plan would not involve the initiation of a new activity in the country since it is in fact now being formulated by CEDEGE and INERHI. Thus, all that would be needed would be to strengthen and accelerate its implementation, programming it in the following successive phases and stages:

- Phase I:
- (a) Review and alignment of all the data and existing knowledge on the topography, geology, meteorology and hydrology of the watersheds; quality and present use of the soil; location and characteristics of the population agglomerations.
 - (b) Evaluation and analysis of these data and preparation of a comprehensive study relating to the use of the data and the addition of new research to the studies with a view to formulating a physical planning programme for each watershed.
 - (c) Programming and carrying out of new priority research for rapid inclusion in the plans.
- Phase II:
- (a) Preparation of mathematical hydraulic models of the watersheds so that the conditions can be simulated on the basis of very specific variables and the impact of the waterfall and its runoff or accumulation in the area.
 - (b) Planning of the human settlements and economic activities in all the sectors, showing the location, size and functional equipment which will ensure maximum yield from the regional economy as reflected in the welfare of the population.

4. International technical co-operation

The implementation of the financial co-operation projects referred to in the preceding section calls for international technical assistance in addition to that already being received by the country. This is true both of the projects for immediate execution, which are aimed at solving the problems which resulted from the rains, floods and high tides and the problems related to the structure and vulnerability of the coastal area.

As soon as the government is able to handle the emergency situation, with the help of friendly governments and entities and multilateral and private organizations, it will have to devote itself to the task of setting priorities and determining the periods in which the action and projects described will have to be embarked upon and completed.

As for the immediate future, it seems that one of the main fields of action in respect of technical co-operation would in fact be for the government to support the setting of priority fields of action, formulate projects for immediate execution and establish a schedule of relevant activities. The objective of such co-operation would be to make the scope of action already demonstrated by various public agencies and civic entities responsible for aiding the population affected using the country's own resources and the resources received from abroad more flexible and compatible.

The action priorities and the implementation of emergency projects depend on criteria with a technical and also a political component, and these priorities and projects must be decided upon and applied systematically. The establishment and operation of a suitable machinery for decision-taking could benefit by the co-operation of experts from outside the country with experience in tasks of this kind. The techniques involved in project formulation should be adapted to the emergency nature of the situation, and technical co-operation in adapting them would also be very useful. The country has a permanent inventory of projects, which provides a framework in which investments can be safely programmed since it provides information concerning the total national public investment. International co-operation would also be welcome in connection with incorporating the emergency projects into this general framework.

In addition to the important task referred to above, technical co-operation projects grouped in the same way in which the financial co-operation projects are organized (see table 10) are also suggested.

With regard to support for productive activities, technical assistance would probably be needed to carry out a series of basic studies, including one on the preparation of an inventory of native plant species and the creation of nurseries as a starting point for a possible reforestation project; to formulate projects to rehabilitate the predial and extra-predial infrastructure; to identify technologies appropriate for production and their transfer to farmers and areas in which plantations could be renewed and diversified. Finally, it would help to have assistance in formulating small projects for improving the docks and processing facilities of the informal fishery sector.

/With regard

With regard to transport, it is suggested that assistance should be obtained for the transfer of technology related to wood Bailey bridges which can be used over relatively narrow passages where traffic is light; that the water development and supply criteria used in designing bridges and culverts should be reviewed; that studies should be carried out on alternative designs for and location of the bridges affected; that methods of designing and constructing highways in areas subject to flooding used in countries with similar conditions should be studied; that an existing mathematical model should be adapted for purposes of optimizing highway construction and maintenance standards and, finally, that the advisability of restructuring and modernizing the rail network should be studied.

With regard to better living conditions, it would be helpful to have technical assistance for improving the existing system for the provision of food and medicine in exchange for work; for evaluating the situation in which the families affected are living and designing a programme to bring family life back to normal; for studying the job situation of the flood victims and designing machinery and projects for reintegrating them into productive activity.

There would also seem to be a need for technical co-operation in formulating a programme for preparing and expanding systems of water supply in rural and small urban areas; studying and defining the most appropriate way of reestablishing minimum housing conditions, including consideration of site-and-services projects; activities related to the standardization of housing designs using appropriate technologies and the formulation of a programme for the renovation of sewerage systems, the reconstruction of septic tanks and latrines, the establishment of sanitary garbage disposal facilities, etc.

Advice may well be needed in analysing the situation in respect of health personnel and preparing a programme to strengthen the health sector within the area affected, identifying those geographical areas which should be protected against epidemic disease and determining the extent to which the infrastructure, equipment and furniture of the health sector was affected by the floods.

Recourse should be had to technical co-operation in connection with setting standards for the design of school infrastructure and equipment, analysing prevailing conditions in the educational infrastructure and establishing a minimum programme for the repair and reconstruction of classrooms.

Finally, advisory services will probably be required in connection with the organization and training of parents committees so that they can re-equip and reconstruct the educational centres and also in connection with a centralized system for supervising the availability of and demand for labour.

With regard to the tasks which are expected to produce results in the medium and long term, it should be noted that it will be necessary to obtain additional technical co-operation from a number of sources to meet the needs of new projects and to strengthen and supplement the co-operation now extended by a few international bodies, such as IDB and ECLA/ILPES, in connection with works or projects whose implementation should be accelerated (see table 10).

/Assistance will

Assistance will be necessary in connection with a basic sanitation system for the El Guasmo area and human settlements in which to resettle the inhabitants of Mapasingue in Guayaquil.

Technical co-operation will also be required in connection with the preinvestment studies and the design of works for diverting rivers and the construction of dams to reduce the flooding of the Babahoyo and to increase the irrigated area. With regard to those dams, it might be possible to increase the assistance which CEDEGE is already receiving from the Inter-American Development Bank.

There can be no doubt that external co-operation will be required in connection with the formulation of emergency plans and the strengthening of the civil defence capacity as well as for the zoning of the coastal area on the basis of vulnerability to various kinds of disaster, with special emphasis on flooding.

More technical assistance will be required for the formulation of the Master Plan to Develop the Resources of the Coastal Area, and especially in connection with contingency recovery measures. This assistance might be spread out over the following stages: inventory of water resources, the capacity of the natural drainage system and possible areas for development; determination and forecast of water demand and related development of all the economic sectors and activities present in the area; the comparison, for purposes of formulating the Master Development Plan, of water demand and supply and of storage facilities and run-off and the consideration of the legal and organizational aspects of the establishment of a centralized authority for the operation and expansion of the integral development system.

Finally, external co-operation will be needed to support the Government in the incorporation of the Master Plan and its investment requirements into the national development plans.

The actions of the Government in this complex context of problems to be solved jointly will need to be carried out through a centralized authority, without which it will not be feasible to co-ordinate these actions and make them efficient in dealing with the emergency and taking effective measures to eliminate the periodic occurrence of such disasters. The functional location and structure of this authority, as well as its jurisdiction and other institutional aspects, should be the subject of a serious study whose conclusions will be used to guide the appropriate establishment of the authority.

Notes

1/ There was also considerable flooding on the northwest coast of Peru.

2/ Some authors cite a periodicity of nearly seven years. See, for example, C. Blandín Landívar, Características del Fenómeno de "El Niño" y la influencia de la corriente de Humboldt en las costas del Ecuador, National Meteorological and Hydrological Institute, Quito, 1979.

3/ Note, however, the previous paragraph in reference to the probability that this moisture may not be renewed and that this land may not be cultivated again next year.

4/ Thirty-three sucres are equal to one US dollar.

5/ See the statements by the Government Minister published on 10 February 1983 in the magazine Hoy.

6/ Actually, the assessment of the damages should have been made after the high water period had ended. However, the urgent need for Ecuador to establish an order of priority for soliciting international co-operation and guiding its own actions has made it necessary to proceed in the manner explained.

7/ These six bridges were to be used in the Province of Manabí. Since some complementary works were not ready, an agreement was made with the Ministry of Public Works to use them temporarily in the Province of El Oro.

8/ As in the case of the primary highway network, it was estimated that only part of the investment which the Ministry of Public Works calculated as being necessary to rehabilitate the secondary highways could be directly attributed to the disaster. The rest would be used for improving the roads to make up for the lack of maintenance and other factors.

9/ These costs do not include the possible repair of the Babahoyo viaduct, which suffered from structural defects even before the floods.

10/ The calculations of agricultural losses are made at the producer level. Under the industrial sector, losses were calculated with respect to their processing by agroindustries and their marketing.

11/ This estimate does not include a calculation of the possible decrease in the catch of some high seas species due to the presence and prolongation of the El Niño phenomenon, since there is no available information for this purpose.

12/ See IMF, International Financial Statistics, February 1983.

13/ The rate of 1.9% projected for 1983 compares with the 2.5% recorded in 1982 and not with the 2% which figures in other parts of this report for that year and which refers to the gross domestic product at buyer prices.

14/ As mentioned above, the 1982/1983 precipitations pointed up the fragility and insecurity of the high slopes of Mapasingue, making it seem likely that new rains will provoke landslides and massive destruction in this marginal housing zone.

Annex

1. Introduction

The report submitted to the Government of Ecuador by the ECLA and ILPES missions focuses mainly on technical co-operation which can be obtained from United Nations bodies, financial institutions and governments of other countries. In conducting the studies used in preparing the report and consulting with experts from national, provincial and civil bodies which were endeavouring to solve the problems created by the floods on the coast of Ecuador, the mission was also able to examine aspects more closely related to the activities of the national entities which will complete the tasks of the international experts and to go a little further than the text of the report into the problems presented. Actually, the report had to be drafted very cursorily so that in general it was unable to go into detail concerning the action proposed nor was it possible in all cases to examine the questions dealt with in depth.

This annex contains data on which the ideas put forward in the report were based. Reference is made primarily to problems which will be encountered in preparing and submitting to the financial institutions projects for obtaining help in the immediate emergency and, in the longer term, assistance in the effort to ensure that the recent disasters do not recur periodically.

This data has been organized on the basis of the programmes and projects suggested in the report and ranging from those of an urgent nature to those for which provision is made in the long term and a considerable preinvestment effort is required.

2. National mobilization

The disasters caused by the floods on the coast of Ecuador unleashed a truly notable collective effort on the part of bodies and institutions from all over the country. The participation and effort of public services and national, regional and local civil defence and other groups working with considerable efficiency and timeliness were of help in successfully coping with the complex and urgent problems of the emergency. The result was that human lives and economic and social values were preserved, which has helped to keep every kind of damage inflicted on the region down to a minimum. This work continues, and a healthy concern to assess it while it is underway and eliminate any bottlenecks or defects in the distribution of the aid received and the existing resources shows that the humanitarian nature of this complicated task has not kept it from being performed efficiently in operational and organizational terms.

The continuation of the work in the future with more systematic international co-operation directed towards the financing of projects and the provision of technical assistance for their implementation will require, once the emergency is over, a form of collaboration which is perhaps more advanced from a technical point of view and compatible with the standards of the

/international co-operation

international co-operation entities. The technical skills shown by the national experts should be applied now to the formulation and preparation of the projects to be implemented and, once the technical and financial co-operation sought has been obtained, to the collection and analysis of the data needed if such co-operation is to be used efficiently and appropriately.

The country has a considerable number of governmental experts of proven experience in the preparation and implementation of public investment projects and in the orientation and supervision of private investment under the National Development Plan. The series of inquiries carried out to bring the national projects inventory up to date every year take the actual public investment into account and provide valuable technical and financial data for use in the economic calculation of future projects.

The list of projects proposed in the report includes ideas for investment which are in different stages of fulfilment. In order to finalize the studies and put projects which can be financed by some international credit institution into final form it will be necessary to collect data for a preliminary approximation compatible with the initial stages of preparation of the document and to cement the decision to invest, by applying the necessary resources. The analysis of such data will in the end make it possible to assess each project from the financial, economic and social points of view. It will be necessary to allocate tasks of data collection, of organization and analysis with a view to turning the investment ideas suggested into projects likely to attract international co-operation, the technical aspects of which can be extended even in the project preparation phase.

In order to mobilize the national technical capacity as smoothly as possible, it will be necessary to adopt flexible standards of work and eliminate red tape which makes it difficult to exchange information and make appropriate use of the experts available in their respective capacities. This calls for extraordinary flexibility in the inter-sectoral relations of the technical areas of the public administration.

The ability to obtain the necessary amount of international financial and technical assistance will depend on the timely availability of well-prepared projects presented with the necessary attention to detail. This in turn will also depend on the flexible mobilization of all the technical capacity available in Ecuador's public service. It will, however, be necessary to ensure that the emergency effort does not interfere too much with the ordinary work of the national and provincial governments. An appropriate solution may be the organization of special technical-administrative committees for programmes or groups of activities related in their territorial or functional aspects. Such committees would suggest the general approach to be taken to the work, allocate specific duties and supervise the preparation of the projects and their negotiation with the entities providing financial or technical assistance.

3. Categories of projects suggested for international co-operation

The different situations resulting from the floods on the coast suggest different categories of projects, whose individual characteristics determine what data are needed, the processing to which those data should be subjected and the conclusions and recommendations which will define the project as such. Its formulation should take such characteristics into account and they should be considered in detail and with the exactitude which the available data permit if the project is to be appraised by the possible financial institutions on the basis of their standards of evaluation.

(a) Projects for which there is immediate need and short-term projects

Projects classified in the report as being needed immediately and short-term projects relate to definite situations which given them a specific character to be taken into consideration when they are identified and prepared and their implementation is organized. The situations referred to correspond to the following characteristics:

(i) Projects to be carried out in areas where there is a high risk of epidemics and personal disasters. In emergency situations where immediate attention must be paid to the endangered population and to the damage produced, there is no time to prepare projects as such. Opinions are formed on the basis of common sense and experience with similar situations in the past, and decisions are taken on the spot and are immediately reflected in action. The national experts from the public services and the civil institutions which have operated in these areas have shown not only humanitarian dedication but also considerable efficiency in handling and resolving the serious problems presented.

If the rains recur in the next few months, further emergency action will be needed. However, for now it is necessary to carry out works in the short term to meet certain urgent needs due to the floods, such as to see that the stagnant water in some areas drops immediately. Short-term projects are needed to eliminate or reduce the danger in these situations.

(ii) Projects for saving crops which can be recovered if the flood period is not unduly prolonged (rice and other crops). The immediate and central objective of these projects is to accelerate the drop in the water in areas where crops can be recovered. From the technical point of view, the problem is one of ensuring rapid drainage by finding some unused land at reasonable distances where the water levels are lower and draining the water flooding the cultivated areas onto it using emergency canals or pumps. If these channels can be opened by using hand-operated tools, abundant employment for unskilled labour will be generated. Topographers will be asked to determine whether it is possible to move the water from the flooded area to the area of destination, by verifying the relative heights and the possible slope of the emergency canals whose course would have to be decided upon. The project would normally be implemented in the following phases:

/(1) Topographical

(1) Topographical work to identify areas of destination and to determine the relative heights and the route of the canal.

(2) Excavation of the canal with the work organized in such a way that it can be performed as rapidly as possible by using quantities of labour.

(3) Harvesting of the crops when appropriate, as soon as the waters have dropped.

(4) The performance of some kind of quality control of the harvested crop.

Experts from INERHI, CEDEGE and other bodies active in the area will be needed to direct and supervise this category of emergency project.

The formulation of the project documents is necessarily affected by the emergency nature of these cases and thus must be limited to the presentation of the parameters essential for justifying the investment to be made and its financing. These parameters would include, for example:

(1) Identification and preparation of an inventory of the areas where this category of work may be performed.

(2) Measuring each area to be rehabilitated, estimating the volume of water accumulated for the global project and its subprojects and specifying the crop now grown in each area.

(3) Distance to the low lands where the accumulated water is to be channelled, capacity of the land to accumulate water and characteristics of the emergency canal to be opened or the pumping to be done:

- (a) length, breadth, height and profile of the transversal section;
- (b) slopes;
- (c) soil to be excavated, type, strength and capacity of pumps to be used and their energy needs.

(4) Plan of work specifying labour and tools and equipment to be used and the general organization of the services.

(5) Total cost of the work and estimated value of the harvest to be realized.

(iii) Projects relating to crops in soil which is very wet owing to the flood. The specific characteristics of these projects include the relative urgency of their implementation and the fact that they concern crops with a short growing season. After the commodity market has been taken into account, the selection of the species must be based in particular on the suitability of the soil used and the crops traditionally grown in the area. Thought can be given to new crops only after studies showing their advantages and disadvantages have been carried out. (The Pichilingue Experimental Station and other research centres should give their opinion on the matter.)

/For programming

For programming these projects, it is necessary to locate areas which are very wet and lying idle so that they can serve as a territorial base for implementing this kind of project whose impact on the growth of the product and yield of the afflicted areas could be considerable.

Before carrying out a complete survey of the areas of this kind, estimating their size and indicating the quality of their soil and their general gradient, action of an institutional nature will be necessary to ensure the actual employment of capital resource in the implementation of such projects. Production potential generated in this way will attenuate the damage caused by the excessive rains and the resulting floods. Such potential exists even in areas normally affected by prolonged drought -in vast areas of Manabí Province, for example- and it would not make sense to underestimate it in the present effort to cope with the calamity which affected the coast of Ecuador with such considerable economic damage.

After land suitable for this type of project has been identified, it is necessary to determine who forms it and who owns it and to establish the most appropriate institutional and financial alternative in each case (co-operative, entrepreneurial or semi-public organization).

Where projects which are directly productive are concerned, it will be necessary to define the technical and economic parameters on which to make them viable, taking into account the fact that the emergency makes them predominantly social in nature.

To put it more precisely, the implementation of projects of this kind could be partly costed by the community as a whole even if their economic returns were not high. They are, however, expected to generate a liquid income which would justify them as a purely economic undertaking whose value added would contribute to the national income.

To justify the financing of a project, its formulation should include a short analysis of the following factors:

- (1) Location of the project and its institutional type;
- (2) Present market for the commodity (should include all information concerning levels of demand, supply and price and marketing characteristics; in the emergency, an effort to project these data is not justifiable);
- (3) Farming and harvesting methods, in which pre-eminence will be given to those which will be labour intensive;
- (4) Area farmed, volume of production foreseen and its specifications and physical yield;
- (5) Supplementary or auxiliary efforts which might be necessary (e.g., local access road);
- (6) Plans for organizing the farming, harvesting and marketing;

(7) Schedule of work;

(8) Analysis of production cost, broken down into capital, labour, financial and other expenses;

(9) Manner of financing, giving budget and table showing source and uses of funds, to assist in calculating the profitability;

(10) Economic justification of the project on the basis of its direct and indirect effects.

Although these data can be considered to be only rough estimates in view of the emergency situation, their inclusion in the project document is indispensable to the implementation of production programmes which must obtain external financing.

In the provinces of El Oro (where a project has been outlined by PREDESUR), Guayas (where CEDEGE has studies which will also be included in the programme), Los Ríos, Cañas, Manabí and Esmeraldas, there is suitable land for projects of the type considered, which may be identified in preliminary surveys.

(iv) Projects for rehabilitating damaged public works. This heading covers a wide variety of projects whose urgency and importance vary. The works affected by the floods are diverse in nature and therefore present different problems:

- They include roads of various classes, bridges, supply works and systems (water, energy, food), health, education and basic sanitation and installations and services.
- The works affected are different in size, ranging from small ones to those which may be considered to be big public works of their kind.
- The damage caused by the flood in these works varies in its impact; its results range from total incapacity for the provision of services to easily mended flaws of little importance.
- The extent to which the works were maintained and the efficiency of the services provided by them before the floods also varied widely.

For all these reasons, the projects for the rehabilitation of damaged public works in general have two alternative formulations:

(1) One whose objective is to restore the pre-flood conditions and

(2) Another which seeks to achieve a higher level of service by reconstructing the work, correcting its design, or at least by attempting to restore the conditions which existed when the work was just constructed.

/In each

In each of such projects, therefore, a choice must first be made between these two formulations. Of course each formulation involves different costs and leads to different results in terms of the kind of attention paid to the relevant public needs.

Although in the most urgent cases some steps had to be eliminated and works of extreme emergency carried out, the following steps are necessary in proposing projects in this category:

- (1) Characterization, enquiry into and assessment of the damage.
- (2) Programming the demolition, reconstruction, substitution or repairs of damaged constructed elements.
- (3) Estimation of costs and requirements in terms of material, labour, equipment and working time.
- (4) Determination of the specific conditions in which the work will have to be carried out and the kind of organization to adopt for the provision of services by the public work while it is being restored (detours, variants, etc.).
- (5) Presentation of schedule of expenses to be made and phases of work.

All the public services, organs and institutions for which the damaged works are responsible should participate in the definition of the respective projects and in the work related to the rehabilitation.

(v) Projects for cleaning and restoring city streets. This kind of project which will have to be carried out in cities or large towns which have been subject to flooding in their urban area and now have people sheltering in them or near them who have been deprived of their means of livelihood by the rains, will be phased in a very special way because of their special characteristics.

Their main objective is actually to generate provisional employment for people who must return to their normal productive tasks as soon as farm work can be performed; more rapid street repairs constitute a byproduct of the project.

The organization for the implementation of projects of this kind should reflect such special conditions by allowing for flexibility and great spatial mobility. An attempt will be made rapidly to remove the solid deposits left by the floods and consisting mostly of mud and clay mixed in varying degrees with sand and various organic detritus. On asphalt roads, damage to the carriage way caused by the water on it will undoubtedly be detected, and this will necessitate additional services by more highly skilled labour. In any case, the drainage elements, when they exist, will also have to be restored by reconstructing pipelines or open sewerages along the entire road system. Some of the work could be done by unskilled labour and the rest by bricklayers and other skilled labourers.

/Each project

Each project will be formulated in such a way as to take into consideration the probable duration of the emergency operations, according to their magnitude and the weather forecasts. The number of workers needed will be estimated on the basis of these two factors, and that will determine the type and number of tools to be used. In order to generate as much labour employment as possible, the use of machinery should be limited to transport vehicles, i.e., trucks and hand-operated trolleys. In programming their work on the basis of the priorities referred to below, it will be necessary to minimize the distances over which the material taken from the streets must be transported. That material will be assigned an appropriate destination, depending on whether it can be used as filling, or as material in the construction of holding walls or is merely waste, in which case it should be deposited in places previously selected, where it is thought that it will be most useful.

On unpaved streets, a curved transversal section with clearly defined gradients and its vertex on the road axis must be established after the material deposited by the floods has been removed, to ensure more rapid lateral drainage towards the longitudinal gutters. The gradient of the gutters will also be taken into consideration as will the final destination of the water carried by them. This work must be defined by the supervising technicians, probably engineers, and the orders given and the work supervised by the skilled labourers and foremen on the site. This will ensure that the services performed result in a more marked improvement in the urban drainage conditions than would otherwise be the case.

As for the work priorities, the sequence in which the work is performed in the areas affected shall be as follows:

- (1) Access roads leading to the urban district of the city or town from the exterior;
- (2) Access roads to hospitals and health services, schools and public markets;
- (3) Access roads to public utilities;
- (4) Access roads to the sites of works related to the emergency;
- (5) Access roads to high-density residential agglomerations and areas where large numbers of workers are employed.

It might be possible to establish a comprehensive road reconstruction programme for each province and a project for each city or town affected. The project document will indicate the location and volume of the services to be provided (extent of the road repair work and estimates of the volume of material to be removed and the distance they must be transported); the number and qualification of the workers to be employed with an estimate of their wages in money or in kind and other labour expenses, including those relating to management and supervision; the number and specifications of the necessary

/tools and

tools and vehicles; the overall operating budget and the sources of its financing and the programming provided for the services. All this naturally refers to the services which must be organized and financed more systematically to supplement the extremely urgent work already performed. Work of this type is envisaged, inter alia, cities such as Babahoyo, Daule, Vinces and Manta; in a number of towns and in districts of other cities such as Guayaquil and Manta. The list should include every agglomeration which has suffered from prolonged flooding.

(vi) Projects for restoring public building damaged by the flood. There is also an extremely wide variety of situations with regard to the damage caused to public buildings. Such differences are the result first of the different topographical locations in relation to the rainfall, the water courses and the drainage conditions in the areas in which they are located (conditions which are either natural or the result of works designed on the basis of dubious hydrological criteria). Secondly, the nature and extension of the damage caused depends on the type and quality of the buildings affected by the waters and their state of maintenance at the time of the rains. Finally, there is some damage to auxiliary installations and services, such as access roads and drainage and other works. It is therefore necessary to draw up a detail inventory of the buildings damaged indicating the nature and extent of the damage and the type or repair service which is being provided. Here again a choice must be made between restoring the buildings to their pre-flood conditions or putting them back into the condition they were in when they were constructed. Once the inventory is in hand and the expenses have been estimated, it would be advisable to programme the works to be carried out, grouping them on the basis of geographical proximity with a view to placing them under the same administration and technical management. Taking advantage of the restoration operations to improve the original design is probably more feasible in buildings than in bridges and other works.

(vii) Projects involving the reconstruction or relocation of rural and urban housing. The restoration of damaged dwellings without changing their location is of course a simpler task and can be performed by organizing self-help, mutual or collective programmes which will make it possible to employ the people affected and have the members of the victimized families help in the restoration of their own houses. An attempt will be made to prepare an inventory of houses of this type containing an estimate of the kind and quantity of the materials which will be needed for the repair work and also of the necessary skilled or unskilled labour. First it will be necessary to formulate appropriate standards for regulating the temporal and spatial distribution of the materials and the labour according to the programme drawn up for all repairs of this kind. It will be necessary to determine the aspirations of each family regarding the restoration of their dwelling, and a parallel programme may become necessary in order to supply household effects lost as a result of the floods.

The help of social workers in this programming will be indispensable.

The case of dwellings which should obviously not be reconstructed in loco is more complicated. It is expected that some work will be required to persuade

/the families

the families that they ought to agree to change the location of their dwellings. The problem of making a wise selection of new sites on which to locate the dwellings moved is really extremely complicated. In solving it, it would be a good idea to weigh questions relating to the services to be provided to the dwellings and to the families very carefully; in that connection and in respect of residential environment, there can be no question of offering conditions which are less advantageous than those offered by the reclaimed land. Consideration must also be given to job opportunities and pay in those cases in which the area proposed for resettlement is quite far from the old neighbourhood. Although it may be difficult to bring all the interests involved into absolute harmony, the well-being of the family must be sought whenever possible.

It will be necessary to formulate a general policy regarding the selection and acquisition of the land for the new sites, which it is hoped will come equipped with services, access roads and drainage facilities and be located in an appropriate environment. The situation will differ depending on whether it is a matter of urban or rural housing and this policy will have to take this fact into account, providing for a different line of action for each of the two cases. In this case also, projects must be arranged by groups of dwellings (although they may not always be adjacent), for purposes of organizing the construction work and its administration. Grouped in programmes on the basis of geographical or other valid criteria, the projects must, insofar as possible, be typed and modulated in such a way as to promote savings in their implementation, while at the same time preserving the architectural style which has come to characterize the region.

(viii) Projects for restoring industrial buildings and their auxiliary installations and services. The industrial enterprises whose buildings, installations or auxiliary services have been affected by the floods have undoubtedly already made their plans and formulated their projects for restoring these elements, especially in those cases in which the damage suffered has delayed normal production considerably.

It seems neither viable nor appropriate for the public authority to intervene in the material implementation of these plans for restoration except in those cases in which the works programmed by the enterprises interfere with the effective solution of problems of public concern which have been created or aggravated by the floods. It would, however, be feasible to examine these projects in each case and perhaps obtain some financing for them on appropriate terms with a view to ensuring that abnormal conditions in the industrial plants affected do not result in unemployment, higher production costs which would be reflected in prices or other economic setbacks to the community. To organize and monitor such financing, select its sources and determine the terms on which it can be obtained, it would also be a good idea to have an inventory of the damage in this area which will be corrected by works of replacement, restoration or reconstruction which the enterprises will carry out individually. The inventory would specify the work to be done and estimate its cost; appropriate programming would be based on the data provided by this inventory so that a

/schedule for

schedule for disbursing the resources obtained could be established. It seems reasonable to think that some of this work could be financed by loans from national funds which normally give credit assistance to Ecuador's industry since in spite of the emergency character of such loans, they would still basically be investments to improve the conditions of industrial production.

(b) Medium and long-term projects

Projects of this kind are devised in consideration of the fact that it is not reasonable for an entire region of a country to go on periodically enduring such substantial damage to its economy and its population as has the coast of Ecuador, which has densely settled areas and intensive activity at both rural and urban levels. This consideration by the fact that generally speaking and as a rough approximation, the apparent cause of this damage -the hydrology of the coastal region- offers global possibilities for resolving or relieving the problems in certain areas, which give rise to the periodic disasters. In addition, experts who know the region and have examined the meteorological and other data used in analysing the phenomena produced in general feel that the overall water balance of the region is positive, so much so that the entire coast of Ecuador can be assured of being constantly supplied with water for the normal everyday uses to which its people and economic activities put it. Even at first sight, the topography characteristic of the region, which bears some responsibility for the extent and severity of the present floods will probably ensure that the physical magnitude and permanence of the water works for transferring water from one basin to another and for the controlled containment of a localized and temporary surplus supply of liquid (such as reservoirs, for example) can be economically borne by the country within a reasonable period of time.

Of course this view, which is widely held in the country's engineering circles, needs to be proved -as it already has been in the case of a few specific areas- in detailed and objectively established technical terms based on observation and certain measurements. Independently of this, however, it is possible to argue from the basic premise that the extent and complexity of the water problem of the coast and the sequence in which hydraulic conundrums recur in connection with all of the watersheds dividing the region make it necessary for all projects designed for containing the floods and ensuring that the water cycle of the area is used appropriately in technical and economic terms to be carried out within a framework of correct, systematic and complete knowledge of each watershed in topographical, hydrological, demographic, socioeconomic, political and cultural terms. Moreover, it is essential for absolute priority to be given to the acquisition of this knowledge in advance and to its translation into a master plan for water development as a preliminary base for a regional physical planning scheme, within the context of the National Development Plan.

The priority given to these studies should be subject of a basic political decision since the country has suffered too much from a natural phenomenon which, from all indications, can be controlled, thereby avoiding tremendous periodic damage to the national economy.

/This priority

This priority implies a need for an institutionally-backed adaptation of the design of all the other projects to be carried out in the area (whether they relate to physical and social infrastructure or to units and systems for the direct production of goods and services) to the conclusions and proposals relating to physical planning as contained in the two documents mentioned above. The location of the region's human settlements and productive activities and their infrastructures cannot continue to be decided on the basis of a purely local conception of the problems involved. Nor can no attention be paid to the impact had on the regional hydrology by the mistaken siting and sizing of structures which affect the natural run-off of water as determined by the topography, the soil structure and general weather conditions. These factors have aggravated the damage resulting from the floods caused by the annual concentration of the rains in very short periods of time and by the lack of good slopes in nearly all the country's coastal region.

Some basins, such as the Guayas basin, for example, have already been the subject of studies and information on other water sheds has also been obtained and analysed when big water works are planned; but all these studies have not been put together, reconciled and supplemented in order to obtain a global, systematic and detailed view of the coast's general water problem. In the case of the Guayas basin, recent studies carried out by CEDEGE in co-operation with ILPES ended in the formulation of a regional plan for the development of the basin and of the Santa Elena peninsula and of an integrated diagnosis and large project proposals. There is a need for studies and proposals of this type to be conducted in the other watersheds in the region, for which the study referred to might serve as a model which could be adapted to each case; at the same time, all these studies could be considered globally in order to obtain an integrated view of the water problems of the coast and of the regional ecological balance. That balance must be respected in decisions relating to physical planning and to the location, sizing and functional equipping of human settlements and socioeconomic activities without losing sight of the cultural context. Because of the limitations placed on the solution of the other problems by the water phenomena of the area, a realistic attitude towards them and the ways for controlling them is the best starting point, not only because of the disasters caused by the lack of such control but also because water is obviously vital for the development of the region.

Taking into account the programmes under way or projected for the affected area, the report deals with two categories of projects: the emergency projects (many of which have already been undertaken by various authorities in the area) and the pre-investment and investment projects which deal globally and definitively with all the phenomena observed. Because of the convergence of certain factors, both the effects of the seasonal flooding and the periodical occurrence of a higher order of damage to the regional economy cumulatively help to magnify the consequences of the hydrological phenomena on the coast of Ecuador.

A mere glance will show that the population of the area has become accustomed to the floods and has gradually prepared for them. This is confirmed even by the predominant architecture of the houses, which are built like palafittes and are frequently mounted on surprisingly high pilings and provide against both the floods and the snakes and other dangerous animals.

It might also be said that a general attitude of unconcern towards the elementary problems of local drainage is proof of a certain tendency to adapt to the flood phenomenon and causes its general effects to be more strongly felt. This is seen in the construction of roads, gutters and other small works in which hydraulic aspects are almost systematically overlooked. In actual fact, as has already been mentioned, the region's topography is typified by very gentle inclines. There are data which show that there is still a rather shallow impermeable layer of subsoil and therefore a very superficial ground-water table, which is probably under marked pressure from below. As these layers of subsoil are relatively close to mountainous terrain of the Cordillera and must certainly fold under the land as it rises, they increase the pressure of the water on the surface from beneath.

To complete this geo-topographical picture, in some years the distribution of the rainfall on the coast is frequently characterized by a highly intense concentration in extremely short periods with repeated occurrence of the disastrous effects recently observed.

As noted in the report, when exceptionally high tides coincide with the rains, the hydrological picture described has even worse consequences. This is what happened at the end of 1982 and beginning of 1983 when the floods were intense in each of the basins affected. Thus, the most important medium- and long-term projects will be those aimed at attenuating the overflow of the rivers and keeping them from flooding in the future through local or general public works for disciplining the drain-off of water by keeping it in big enough channels and making the best of its potential for the production of electric power, for drinking water supplies and industrial purposes or for irrigation, always ensuring that the area is rationally drained in terms of the location of the region.

In this way it will be possible to avoid the disastrous effects of the floods which, as far as can be seen, are the result not only of the overflow from rivers but also of the failure of rain water to run off, possibly owing to the pressure applied by the ground-water table. This impedes normal infiltration so that evaporation is the only factor which causes the waters accumulated in inhabited areas and farm lands to drop.

/This summary

This summary analysis of the hydraulic problems studied must be completed as rapidly as possible by measuring the parameters of the facts referred to so that detailed and quantified knowledge may be made available concerning the behaviour of the water covering each area once the phenomena of run off, infiltration, etc., as well as the amount of water found in the water flows from the region's watersheds. Without this technical and comprehensive picture of the situation, it will be very difficult to keep local works designed to solve problems which are also local from causing more problems downstream and perhaps from ruling out a broad and rational solution to the flood problems of the region as a whole, the water in each of whose main watersheds and rivers must be controlled.

The study described above, which should constitute a long-term project on which all the other projects will be based, must be carried out at the same time as an analysis of all the various water needs of the population of the coast -drinking water supplies, industrial uses, irrigation of crops and other purposes- so that a reliable water balance may be obtained. The latter is indispensable for any effort with regard to any regional socioeconomic development planning effort so vital for the country's progress.

There is no need to point out that all this must be done while maintaining a dynamic and organic vision of the needs of the future of the region and the country in which short, medium- and long-term views of the questions analysed are brought into harmony.

The country cannot afford the luxury of periodically losing a considerable portion of its agricultural and fishery production as a result of floods or of having its population subject to the risk of violent death, epidemic disease and serious economic damage with serious social, economic and political consequences. It is necessary (and a considerable effort is already being made in this direction) to plan for parallel action at national level to implement a programme of action relating to the organization and construction of public works for the coast of Ecuador with the central objective of establishing an effective control over the characteristic water cycle of the region. This objective may be achieved by ensuring that the water which falls on, runs off of, infiltrates, evaporates from or is deposited on the surface of land or sea in the area in question is put to the service of the people who live there and does not continue to constitute a permanent cyclical threat to human life and progress.

The need for the problem of flooding on the coast of Ecuador to be viewed within a general context in which each of the principal watersheds of the region is considered to be a planning unit is confirmed by the following facts:

(1) The phenomenon is highly complex.

(a) It depends on a considerable number of variables which relate to different fields of knowledge (mechanics of fluids and soils, climatology, sociology, economics, pedology, ecology) and

/engineering techniques

engineering techniques (hydraulic, storage, public health, industrial, transport, agronomic, town planning).

- (b) Because the political, social, economic and technical variables involved are inevitably interrelated, it is a good idea to assemble a mathematical model for the simulation of their behaviour and consequences.

(2) The water projects serve many purposes.

- (a) Flood control and prevention;
- (b) Supplying drinking water and water for use in industry and irrigation;
- (c) Internal navigation;
- (d) Fish breeding and fishing;
- (e) Recreation and landscaping.

(3) The viable solutions proposed for solving local water problems along the water courses and the corresponding projects are sequential in nature. This is because of the physical characteristics of the water in its natural state and the way in which it is used in technical and economic terms on the basis of the following factors:

- (a) The principle of the continuity of water in which the volume, transversal section and velocity of the flow are correlated.
- (b) The principle of less action, which governs the behaviour of liquids thrown freely on a geodesic surface and determines the direction the water will take, given the topography of the area.
- (c) The way in which the volume adapts not only to the topography but also to the structure of the soil and its ability to absorb water, and to meteorological variables such as rainfall, temperature, humidity, pressure and penetration of the sun.
- (d) All the uses which human groups make of the water available in each locality, removing variable quantities of water and sometimes returning it to the rivers in other forms.

(4) From all this it may be seen that what is considered to be a good solution to a local water problem may cause bigger problems downstream or make it difficult to find a better solution to all the water problems related to a watershed or its main water outlet or to the water cycle considered as a determinant.

/Thus, there

Thus, there are factors involved which relate to: (a) the physical determinism in the behaviour of the water; (b) the continuity of the phenomena and sequence of the hydraulic conditions along the water courses; (c) the savings involved in using the water for more than one purpose; (d) the need for overall rationalization of public and private activities in the use of water; (e) the right of the entire population to enjoy the services and benefits which the water may provide and (f) the aleatory and stochastic nature of the phenomena involved, which means that there must be a margin of flexibility in the solutions proposed in order to take into account the probable range of fluctuation of the parameters used.

These factors make it imperative to give priority to the study of the behaviour of the water in the region, on the basis of the following concepts:

(1) The degree of basic natural unity of the physical planning in a region as shown by the watershed.

(2) The global treatment interrelated to the plans and programmes which will be included in the projects covering public and private water activities and works in the area (canals, dams, dikes, irrigation and storage systems and works for protection) and the advisability of finding a mathematical simulation model for the performance of each watershed.

(3) The adaptation of the projects relating to other kinds of works and systems (highways and roads, electric power lines, piping, depots for goods in bulk and detached or agglomerate dwellings in towns and cities) to the global concept of water control in each basin and the rational use of its waters, which leads to a Regional Physical Planning Scheme. (The layout and technical specifications of these works and systems cannot be prepared without considering the basic data relating to the topography and the solutions to the problem of water control.)

(4) The need for systematic and comprehensive knowledge of the natural phenomena which determine the hydrology of each watershed and its appropriate representation in planimetric and altimetric topographical maps; measurement and statistical analysis of precipitation and other climatic data relating to the corresponding run off, penetration, evaporation and vaporization and final destination of the waters using pluviometric and general meteorological observations, measuring the rivers and smaller water courses and using other measurements.

(5) The necessity for surveying and estimating the water requirements of the agricultural sector, storage and other purposes with a view to establishing the water balance of each basin, identifying not only dry-farming and low-irrigation areas but all the uses to which the water is put.

All these considerations show how essential it is to have a general hydrological frame of reference for any effect to solve the problem of flooding on the coast of Ecuador, that frame of reference consisting in a Master Plan

/for Water

for Water Development and its extension into a Regional Physical Planning Scheme, which calls for the siting, sizing and specification of the functional equipment of the human settlements and socioeconomic activities in the area.*/

This general framework, arranged according to the watersheds comprising the region affected by the floods, will be the result of a considerable pre-investment effort in terms of basic studies and multipurpose projects. Unless water works and other public works and infrastructure services relating to energy, transport and communications, production and housing in the area are designed within such a framework, it will be impossible to ensure that their location, sizing and functional equipment are rational and hence to monitor the impact they have on floods and flood damage.

A considerable part of this knowledge has already been obtained thanks to the efforts of the Government. In this respect, meteorological observation over long periods of time plays an important role. There remains, however, the task of assembling and systematizing this knowledge, classifying it by uniform categories which are technologically and scientifically precise and reliable, and using it to shed light on the questions that must be resolved before preparing plans, programmes and projects for works and services.

This huge collective effort will have the co-operation of the universities, research institutes and public enterprises connected with the problem, and it assumes the mobilization of large- and small-scale management from the private industry sector. Obviously needed will be co-ordination and centralized control -overall and according to basins and courses of water- of all the studies to be made in the field and in the office, ensuring the convergence of the information obtained and its appropriate circulation. There is also a need for an authority with jurisdiction over the projects of the area in order to make them compatible with the general public interest involved in the action proposed.

International aid from bodies such as the United Nations, OAS, IDB and the World Bank, as well as co-operation from universities and research institutes of other countries in the setting up and carrying out of projects appear to be feasible, in view of the interest shown in the proposed task.

The strategy for implementing this programme of studies over the long term could involve several successive steps, as follows:

First phase: Gathering of all the information already obtained on the problems relating to the programme from previous studies done by various bodies, services and institutions.

This phase would be developed as follows:

*/ This Regional Planning Scheme must of course be reconciled with the National Development Plan, which in its socioeconomic aspects is its natural complement, as a technical instrument for physical planning.

/- Compiling

- Compiling of data by obtaining copies of the texts and annexes of all existing studies on the areas of interest.
- Classification of the studies into uniform categories, according to their degree of coverage, precision and relationship with the problems under study.
- Assessment of the information obtained and reconciliation of the data.
- Analysis of the data and preparation of appropriate summaries for their use in the new studies.

Second phase: Immediate complementation of the necessary information in order to draw up general guidelines, as a first approximation in outline form.

In this phase the information gaps will be filled fairly rapidly by using methods such as correlation, analogy and direct observation techniques where necessary.

Third phase: Programming and implementing of the studies and research to be done over a longer period, in an order of priority which will gradually provide the studies with a more solid basis for interpreting the hydrological phenomena in the region, basin by basin.

From these research projects and studies there should result topographical, high plateau relief maps of the basins in satisfactory scales; systematic and sufficiently approximate measurement of all the basic hydrological and climatological data necessary; soundings and gauging of rivers; survey of the existing water works and verification of their effects and those of other works on the behaviour of water in the area, presented coherently and compatibly with the concept of projects of works and services obviously needed.

Fourth phase: Joint analysis of the results of the previous phase, establishment of priority objectives to be pursued and standards to be adopted in the treatment of problems, preparation of general action guidelines and formulation of proposals for works, with their anticipated location, size and characteristics.

This phase will result in mathematical hydraulic simulation models and action plans for the various basins. Actually, in certain cases, there will be a review, updating and improvement of data on programmes already outlined for the area, which will become investment programmes and hydraulic works or infrastructure projects to be brought into line with projects of other types such as those of energy, transport and communications, social services and urban and rural housing, as well as those aimed at direct production of goods in all economic sectors.

In brief, it is a question of balancing the socioeconomic planning of the region with the physical planning, on the more firm basis of finding a preliminary solution to the hydrological problems, using previous, systematic knowledge of the phenomena which condition or determine them.

4. Summary description of projects which could receive international co-operation

By including the concrete fields where financial co-operation is needed with immediate priority (chapter IV, paragraph 3), or international technical co-operation (chapter IV, paragraph 4), the report refers to the immediate projects, on the short, medium and long terms, which are proposed in the transport, agricultural production and social sectors, covering technical, financial or both kinds of aid simultaneously.

The report groups together the immediate or short-term projects into programmes which are defined according to their functions: (a) support for the re-establishment of production, (b) rehabilitation of transport, and (c) improvement of living conditions.

As for the programmes planned for the medium and long terms, the report includes among the former the "partial and interim solution to the problems of floods and environmental sanitation of the city of Babahoyo and the marginal areas of Guayaquil" and the "preparation for and precautions against disasters", while on the long term it includes the implementation of the Master Plan for Water Development of the basins, which must be carried out by stages according to the capacity of the country. The programmes mentioned according to their functional relationships, on which spatial or geographical factors must be superimposed, are composed of a series of projects whose proposal as investment ideas arose in the course of the studies done by the mission to Ecuador with the collaboration of the national experts in each of the sectors analysed.

Below are presented some preliminary descriptions of these projects, with clarifying notes about certain characteristics of each of them, in a summary description of their nature and objectives, possible sources of financing and important stages in their execution. They have been classified by sector, and they distinguish between immediate and short-term projects and medium and long-term ones.

The report contains an ordered sequence of these projects in table 10, classified by the same criterion. In the references below, an operative point of view is taken, of interest to the national experts, although in the current stage of analysis the proposals are very brief. Complementary studies should gradually define more precisely and completely the parameters of each project.

(a) Transport sector

PROJECT 1: Acquisition of reconditioned equipment for construction of highways

Various countries have surpluses of road construction machinery, used and reconditioned, which are significantly less expensive than the corresponding machines sold new, and which are advantageously loaned for use in the carrying out of work programmes whose duration does not exceed their remaining useful life. There is a good possibility that they could be given as a form of aid by these countries to Ecuador in the current emergency.

/This would

This would be an immediate financial aid project which would correspond to the possible areas of co-operation of the Inter-American Development Bank and/or the Andean Development Corporation, and requests could be directed to the United States, England and other countries which have such surpluses (surplus equipment, in some cases in the possession of the armed forces of those countries).

The project would be carried out in the following stages:

- (a) Organization of an inventory of the need for equipment which would correspond to this specification (used and reconditioned), and planning of its use;
- (b) Diplomatic contacts through the embassies of the supplier countries, possibly in the military area;
- (c) Agreements with the countries which have such surpluses;
- (d) Financing of transporting the equipment to Ecuador.

Approximately 25 highway construction machines would be acquired by this means, most of them bull-dozers which could eventually be donated.

PROJECT 2: Building up a stock of Bailey bridges for future emergencies

The use of Bailey bridges in the current emergency has been a helpful solution to some cases of damage to the bridges of the principal road network of Ecuador. The building up of a stock of metallic bridges of this type, of similar ones, for cases of emergency would make it possible to meet the urgent need in case of future disasters, locating them conveniently according to where the bridges with the most probability of suffering damage are, and their conditions of access in case of exceptional future floods.

This financial and technical aid project is to be begun immediately for the medium term, and could be prepared by consultants approved by the World Bank, IDB and ADC through a study of the probabilities of occurrence of new damages to the bridges in the next five years. Its stages would be the following:

- (a) Assessment of needs;
- (b) Presentation to the World Bank, IDB and ADC;
- (c) International bidding for bridges and equipment for setting them up.

PROJECT 3: Reconstruction of damaged bridges

This would be a short-term project of technical co-operation, directed by the World Bank through UNDP or IDB. Its stages would be the following:

- (a) Study of alternative designs for damaged bridges and their specific locations;
- (b) Development of corresponding construction programmes;
- (c) Study of the need for international financial co-operation, and initiation of procedures.

/PROJECT 4:

PROJECT 4: Study of methods for designing and building highways in regions subject to floods

This is a medium-term technical co-operation project in which the UNDP-World Bank programme, the IDB or the governments of other countries such as the Netherlands, where there is considerable experience in this field, might be interested. The project would incorporate the most recent solutions to problems of hydraulics, soil mechanics and other disciplines, by designing and constructing highways in the prevailing situation on the Ecuadorian coast, making them resistant to the effects of the periodic floods in the regions crossed by these same highways. It would be developed in the following stages:

- (a) Submission of the idea to UNDP or another international body to obtain financing;
- (b) Negotiating the financing and bidding for carrying out the study.

PROJECT 5: Study of mathematical model to optimize the standards of construction and maintenance of highways

Nearly 15 years ago the Massachusetts Institute of Technology set up, for the World Bank, a model for optimizing the operation of the highway sector, which is known as the Road Transport Investment Model. Subsequently the Bank studied the version of this model called the HDM (Highway Design Model), which was perfected through successive applications, one of which was carried out by the Governmental Group of Studies and Control of Transport Systems (GEIPOT) of Brazil. The project would consider the adaptation of the model to the Ecuadorian case, in order to modernize the road construction and maintenance standards in the country. This is a technical co-operation project which could be initiated immediately, although it is not urgent, and which is a feasible way for UNDP to co-operate. It would be developed in the following stages:

- (a) Contact between the Government of Ecuador and GEIPOT; with the World Bank and the Transport and Road Research Laboratory (TRRL) of Great Britain, in order to check out the conditions for applying the model to Ecuador;
- (b) Contact with UNDP to evaluate the possibility of financing;
- (c) Operative contact with the World Bank, GEIPOT and TRRL to choose which body will do the work.

PROJECT 6: Rehabilitation and improvements of national railways

Studies done by various bodies at the request of the Ecuadorian government on the future of the national railway system, although they did not adopt the same approaches or make the same proposals, may contribute to the current analysis of the problem which may lead to conclusions which could guide the final decision-making about how to solve it. There are two basic choices to be made: first, to maintain, with improvements to be defined and localized, the present framework of the existing railroads, or begin to construct a new railroad, and, second, to choose the form of energy to be used to pull the railway cars, new or rehabilitated, and the technical characteristics of the infrastructure and rolling stock to be established and operated.

Each of these studies approaches the problems mentioned in a different way, but from their conclusions and recommendations some elements may be inferred which

/will condition

will condition the way of approaching these issues now. To begin with, the study done in the 1970s (1973-1975) by the French consulting firm Sofrerail concludes that the present railway system should not be done away with, but if it is not rehabilitated in time it will have to be closed by the mid-1980s because it is not economical. This conclusion obviously gives a character of extreme emergency to the solution to the problem. The work done by the Hungarian experts of GANZ-MAVAG and by the Italians of SNAMPROGETTI led to the formulation of various investment plans, based on the pre-feasibility studies done by each separately, on the assumption that a new railroad would be built in various parts of the sierra and the coast, using electric traction (with a Hungarian variety of diesel traction). The choosing of routes, gages, types of trains, some of the technical standards and the projection of demand adopted in the two pre-feasibility studies differ considerably from one another, but both are apparently based on very optimistic hypotheses about the economic and financial success of the projected railroad.

As a part of their technical assistance programme to the Office of Planning and Co-ordination of Transport of the MOP, the Israeli Transport Planning and Research Institute, advised by the Canadian Pacific Consulting Service, carried out and published a comparative analysis of the above pre-feasibility studies.

The Institute's report proposes the consideration of two courses of action:

- (a) Conducting a study of an electrified railroad in a network whose extension is limited, although this would probably not be economically or financially profitable; or,
- (b) Rehabilitating the existing railroad.

In view of these conclusions in the review of the above studies, it would be recommendable to approach the problem according to the following guidelines:

(a) To assign high priority to a final study intended to update the previous analyses which would allow for a definitive decision to be made, taking into account the present objectives of the national development policy of the Government, the strategy adopted to implement it and the plans, programmes and projects of other sectors foreseen in the national development plan.

(b) To place the Government in contact with UNDP to obtain immediate technical aid in the preparation of the terms of reference of this study, which should be completed definitively in no more than six to nine months in order to permit a viable choice.

(c) To request financial aid from UNDP to carry out the work, considering the possibility that the World Bank might intervene as the executive agency.

(c) Agricultural sector

PROJECT 1: Rehabilitation of small rice producers who were victims of the Flood

The production of rice in small family-based units now constitutes a substantial part of the activities which generate employment in the region, as well as supplying food products. There is already a programme in progress supported by the World Food Programme (WFP), and the project proposal is to extend it to the provinces of Guayas, Los Ríos and Manabí. This is a project of financial aid to be implemented immediately, which could be taken care of by the WFP itself.

/It would

It would also be helpful to analyse the feasibility of extending the programme analogously to the small-scale maize, bean and soya producers on the same terms as proposed for rice producers.

PROJECT 2: Reforestation of the coast with autochthonous species

The plant coverage of the region, particularly with species which provide high quality wood or wood for specific uses, has been damaged in the past by a misled and predatory extractive activity. As a result, some of these species, which were abundant on the coast, are threatened by extinction and are now rarely found.

The project proposes to recover the forestry potential of the region by promoting extensive reforestation using these autochthonous species threatened by extinction, and with other useful species still existing in the area. This is a technical and financial long-term assistance project whose various aspects could interest international organizations such as FAO, WFP and IDB.

In this context and in order to carry out a more prompt and indirect action, the possibility could be explored of initiating a general effort at reforestation by using species already available, independently of the previous establishment of three nurseries, which could take some time.

Also, the project should be guided by an integrated planning and programming approach, simultaneously including hydrological management of basins, use of the natural resources of the area, and protection of the environment.

The stages of development of the project would be:

- (a) Inventory of the plant species and the best ecological and soil conditions corresponding to them.
- (b) Establishment of nurseries.
- (c) Organization and implementation of forestation projects.

The importance of this project lies in its multiple impact on the betterment of economic and social conditions in the region, through its effects on the employment of the permanent labour force, the ecological recovery of the environment, control of soil erosion in the coastal zone and the possibility it provides for the establishment of a lumber industry in the future.

The first step should perhaps be a pilot project from which experience could be gained and which would produce a demonstration effect.

PROJECT 3: Repair of infrastructure

- (a) intra-predial
- (b) extra-predial

In the context of integrated rural development programmes, such as those directed and financed by the large international banks, it is sometimes necessary to pay special attention to the projects for recovering the infrastructure of agricultural production regions and units. This includes repairing or reconstructing various types of small civil works, such as roads, dikes, irrigation or drainage

/canals, small

canals, small dams, wells, installations for storing agricultural products and equipment at the two levels mentioned: intra-predial, with elements which directly serve the damaged agricultural enterprise, and extra-predial, with the local roads, collective protection works and community or co-operative installations in each area.

This is a technical and financial assistance project to be executed immediately on the short term, in view of the urgent need to recover productive capacity, which could interest the World Bank, IDB or both.

Its stages will be the following:

- (a) Survey of the affected regions, with the existing data;
- (b) Campaign to let producers know about possibilities for assistance;
- (c) Design of modules, and assistance in preparation of individual projects for roads, irrigation, drainage, etc.

PROJECT 4: Replacement and possible diversification of plantations

The banana and sugar cane crops and the pastures were the most extensively damaged by the floods. This project visualizes financial assistance for the replacement of these crops, with the possibility of promoting agricultural diversification in the area through the introduction or expansion of cultivation of species such as soya, fruit trees, etc. This is a financial and technical assistance project for immediate execution and lies within the areas of interest of FAO and the International Fund for Agricultural Development (IFAD), in conjunction with the World Bank and IDB.

Its stages are:

- (a) Identification and appraisal of the areas to be replanted and diversified;
- (b) Acquisition and distribution of seeds and other physical inputs;
- (c) Organization of credit, technical assistance and marketing of products.

PROJECT 5: Development of appropriate technologies

The use of technologies appropriate to the constellation of factors of production and their relative abundance or scarcity, and to the structures of production and consumption, appears to be one of the basic conditions of a healthy economic and social development. This condition is applicable to all sectors of the economy, but has a special meaning in the agricultural sector.

The adaptation of technologies in this case includes the production of agriculture as such, the agroindustrialization of the products and the techniques for constructing rural housing, water works, roads and other projects, and small-scale services in general.

A systematic and objective study of the problem will require a financial and technical assistance project to support research and experiments based on regional and local economic and technical information.

/The project

The project visualizes co-operation in technical assistance to small-scale producers and co-operatives by organizations dedicated to this special type of studies.

It is recommended that the governments of the Netherlands and Canada should be consulted to obtain such assistance. Moreover, the Latin American experience with projects of this nature should be taken advantage of, such as that of the successful use of solar rice dryers in Nicaragua. With respect to water resource management technology for small-scale producers, training of peasants would have to be carried out through the National Peasant Training Institute, the INERHI and the CEDEGE. The project, which would be developed on the medium term and would begin immediately would have the following stages:

(a) Delineation of the fields of action in research and experiments.
Planning and organization of the transfer of technology;

(b) Obtaining of financing;

(c) Operative organization to carry out the programme according to flexible formulas which respond to the conditions in each area or come from the coastal region.

(c) Fishing sector

In a similar way to the other productive sectors affected, it is essential to rehabilitate as soon as possible the infrastructure and production of the fishing sector.

In the raising of shrimp, financial assistance is required to repair the damages. Given the great economic capacity of the sector, difficulties are not anticipated in this area.

In sardine fishing, it would be necessary to grant aid to replace the lost fleet.

As for artisanal fishing, the most affected sector, emergency aid would have to be given to overcome in some way the losses suffered by the lack of income due to the impossibility of fishing.

This situation could also lead to an immediate plan for helping the sector through the formulation and implementation of a series of small projects to raise the productive capacity, to the social and economic betterment of the fishermen.

These projects could be carried out with the support of agencies such as FAO, which could collaborate on request in the technical and economic preparation for multilateral or bilateral financing.

There is already experience in this area with the co-ordination of the Secretariat of Integrated Rural Development (SEDRI) and the work of bodies such as the Ecuadorian Agricultural Service Centre (CESA) and the National Fishing Enterprise (EPNA). The management of EPNA already has an outline of what might be done. These projects would be complemented by the EPNA/IDB/IFAD project on fish for human consumption.

A programme of this type will require between 5 and 10 million dollars.

/(d) Social

(d) Social sector

This last part centres on the basic characteristics of international aid which might be channelled to programmes and projects of immediate assistance to the victim populations or, on a longer term, in the organization of family life, environmental sanitation, housing, health, education and employment. The anticipated actions will require emergency aid and social projects to be undertaken immediately, on the short and medium term.

(i) Programmes aimed at normalizing the system of family life

PROJECT 1: Strengthening of medical and food assistance

This project attempts to consolidate the system of distribution of this type of aid through the co-ordination of the locations of storehouses and the review of the composition of rations distributed and the forms of distribution, free or against services provided, to follow the evolution of the disaster, with emphasis on the control of the use of the victims' labour. It is directed to families who lost all possibility of obtaining income because their normal work was interrupted due to the floods.

This includes short-term financial aid and could interest the bodies already at work in emergency activities, such as the Government through CEPI and the co-operation of the Red Cross, the World Food Programme (WFP) and UNICEF. Technical co-operation could be given by FAO, the Office of the United Nations Disaster Relief Co-ordinator, WHO/PAHO, and the Red Cross itself. The stages of its implementation would be:

- (a) Survey and balance sheet of the present conditions of emergency assistance;
- (b) Identification of the points where action needs to be improved, streamlined or consolidated;
- (c) Organization and implementation of relevant action.

PROJECT 2: Normalization of the system of family life

This project is directed towards resolving the situation of the families affected by the floods which were left isolated or gathered in refuges and other institutions.

It seeks to re-establish normal conditions of housing, including rebuilding or replacement of houses and access roads, or relocation in safer areas.

This project is needed immediately and on the short term, and may possibly interest the agencies mentioned in the previous project, such as the Red Cross, the Office of the United Nations Disaster Relief Co-ordinator, the WHO/PAHO and UNICEF.

Its stages would be:

- (a) Survey and appraisal of situations;
- (b) Design of expedient solutions;
- (c) Repair of houses, roads, wells and other small works.

/PROJECT 3:

PROJECT 3: Repair of the drinking water supply system

This project takes on one of the most serious and urgent problems caused by the flood. It visualizes technical and financial assistance, involves the provincial and canton governments and CEPI, and might request technical co-operation from WHO/PAHO and the United States Agency for International Development (AID) and financial co-operation from international banks.

The future damages which may be caused by the contamination of sources of drinking water supply are immeasurable, and thus help should be initiated immediately, in the following stages:

- (a) Survey of local situations;
- (b) Formulation of solutions for each case;
- (c) Financing and implementing of anticipated works.

(ii) Programmes aimed at the rehabilitation of the regional economy

PROJECT 4: Gradual replacement of in-kind aid by the creation of employment and income

The project would be carried out through an aid organization which would locate the beneficiaries of in-kind donations and organize paid activities for them, thus providing income to those who currently receive material aid.

This would require an employment programme, achieved through the reactivation of the economy and normalization of the marketing mechanisms. It could also imply a transfer of resources from international in-kind aid to other types of aid.

This is a technical and financial aid project for immediate initiation, which could seek the financial co-operation of governments of other countries, IDB and the World Bank, and technical aid from the Office of the United Nations Disaster Relief Co-ordinator, the Regional Employment Programme for Latin America and the Caribbean (PREALC), the ILO and the World Bank. The stages of the project would be:

- (a) General description of the problem and identification of action guidelines
- (b) Contact with the bodies which could provide co-operation, identifying how each would participate;
- (c) Signing of an agreement with these bodies;
- (d) Setting up progressive changes in the present system.

(iii) Programmes aimed at restoring the environment

PROJECT 5: Urban reconstruction and construction of urban and rural housing

Actually, as in other cases, this is a programme of action divided into various types of projects which converge for the rebuilding and rehabilitation of residential space destroyed by the flood. The various types of projects under this heading are:

- (a) Setting up of lots with services, and distributing them for the construction of housing;
- (b) Normalization of housing, establishing adequate standards of construction;

- (c) Study of a minimum housing model to be constructed on the lots with services;
- (d) Repair, reconstruction and relocation of damaged houses;
- (e) Organization and operation of a system of supply of construction material;
- (f) Expansion of the financing system.

PROJECT 6: Environmental sanitation

In a region affected by disasters such as the floods which occurred on the Ecuadorian coast, the damages done to the environment are infinitely multiplied. Measures for rehabilitating environmental sanitation are needed immediately and should be carried out on the short term through a programme in the rural areas which includes three types of projects:

- (1) Revision and rehabilitation of the general drainage system;
- (2) Repair and rehabilitation of wells and sewages;
- (3) Drinking water supply.

In the urban areas three other categories may be added:

- (4) Waste disposal;
- (5) Drainage of stagnant, used water;
- (6) Installation of water-purifying plants.

The first, third and sixth category of the project will perhaps require some kind of technical co-operation; these and the rest require financial aid, in view of the total amount and exceptional nature of the works. PAHO, IDB and the World Bank could provide the first type of aid, and the two banks mentioned the second.

The implementation of all these categories of projects would occur in the following stages:

- (a) General inventory of the situation;
- (b) Study and preparation of specific projects;
- (c) Obtaining of financing;
- (d) Contracting of services;
- (e) Implementation of works.

On the medium term, consideration could be given to the definitive construction of installations and consolidation of the public services of water, sewage and garbage collection, whose immediate rehabilitation will have been undertaken in the form of emergency projects.

(iv) Health programmes

The prevention of damage to public health has generally been well handled during an emergency. In the immediate future, health brigades must be organized to deal with the emerging needs with maximum flexibility and mobility, especially because of the threat of new rainfall in the near future. Commando activities, as a substitute for the traditional organization of services, manage to deal with the most urgent problems. What must still be dealt with is the supply of drugs and food during the months when the water is receding.

/The immediate

The immediate projects of the sector will be the following:

PROJECT 7: Reorganization of health brigades

This implies expanding the organization of groups to deal with the problems of the sector, whose tasks would include the distribution of medicines. Help would be needed in providing these medicines, which could be given by the Pan American Sanitary Bureau (PASB) and UNICEF, and which could be carried out simultaneously with the distribution of food with the aid of WSP and UNICEF. The stages of the project would be:

- (a) Making an evaluation of the situation and estimating the needs in the near future;
- (b) Routing the perceived requests to the bodies which could provide the elements necessary, either national or international;
- (c) Reorganization and mobilization of personnel and distribution of service instructions;
- (d) Setting up the tasks in stages.

PROJECT 8: Fumigation and petrolization programme

Various preventive measures to decrease the possibility of pollution of stagnant waters must be taken in the next month. The project should be carried out immediately, might be aided by WHO/PAHO, and would have the following stages:

- (a) General planning of activities;
- (b) Inventory of necessary equipment and material, and their distribution in the area;
- (c) Contact with international aid organizations;
- (d) Collection and distribution of in-kind aid received;
- (e) Personnel mobilization and training;
- (f) Carrying out of work.

PROJECT 9: Strengthening of clinics and health subcentres

These were the elements whose installations were most affected by the floods. It will be necessary to strengthen them by dealing with the future emergency during and after the periods when the waters are receding.

This is a short-term, immediately needed project. The contribution of external aid could come from governments of other countries and international and regional health organizations (WHO/PAHO). The stages of the project are:

- (a) Inventory of the situation;
- (b) Specification and cost of services and necessary materials and equipment;
- (c) Bidding and request for equipment and materials from possible suppliers;
- (d) Supplying of services, reception and distribution of equipment and material.

In the context of this programme for strengthening the clinics and health subcentres, the vaccination programme against diseases which have a higher incidence because of the floods must be expanded.

/(v) Education

(v) Education programmes

This is perhaps the social sector which presents the most complex and difficult problems, because of the need to reinitiate the school year at the beginning of May. To meet this need, projects must be formulated for immediate implementation, and the following is proposed:

PROJECT 10: Establishment of a fund for the recovery and reconstruction of schools

For setting up this fund it would be necessary to obtain the financial aid of international bodies such as the World Bank and IDB, and the technical co-operation of UNESCO. The stages of the project would be:

- (a) Inventory of the damaged schools;
- (b) Obtaining of financing;
- (c) Bidding and carrying out of works, and acquisition of materials and equipment.

In principle, it would be necessary to plan actions aimed at ensuring the reinitiation of the school year.

As a complement to this project, the following would need to be carried out on the medium term.

PROJECT 11: Determination of standards of school construction and equipment

Technical aid, and perhaps financial aid, might be obtained from UNESCO. The sequence of stages would be:

- (a) Observation of regional parameters;
- (b) Study of rational standards adopted in similar regions;
- (c) Design of modules and determination of guidelines;
- (d) Proposal of norms and standards.

PROJECT 12: System of logistical support to schools

This is an attempt to rationalize the allocation, collection, storage and distribution of school materials and equipment to maximize their use in cases of emergency, taking into account the location and needs of all the schools in the region, as well as the regional transport system.

Technical co-operation could be obtained from UNESCO for this medium-term project, which would be developed as follows:

- (a) Studies and research;
- (b) Formulation of plans;
- (c) Setting up of installations and services.

/PROJECT 13:

PROJECT 13: Organization and training of parents' committees

With the technical assistance of UNESCO, a general effort would be made to organize these committees and train their members. The results could be useful in times of emergency, since the committees could aid the teachers and staff of the schools in dealing with the problems created by floods. This is a medium-term project and it would be developed as follows:

(a) Proposal of a suitable type of organization and membership of the committees;

(b) Choosing of members;

(c) Planning of training programmes;

(d) Holding of meetings and courses.

(vi) Programmes aimed at generating jobs

In order to systematize the effort to expand the generation of employment and make it more efficient, it would be helpful to centralize the study of the problem in a specialized office which would be adaptable to emergency situations. This would lead to the following project:

PROJECT 14: Centralized office for control of employment

This office would be in charge of statistics on the labour force and on the employment of labour in the area, and of maintaining a permanent inventory of job opportunities offered at any particular time. It would also provide contacts between supply and demand in the labour market, guiding the unemployed to activities needing personnel.

The project could receive technical assistance from ILO, and it would follow the current procedures for establishing a public service.

PROJECT 15: System of credit for the informal sector

This would meet the need for financing the informal sector, facilitating its access to credit and providing guidance in financial matters. It would have the characteristics of a development bank in its specific area.

Its formulation could receive the technical assistance of the international agencies which have been concerned with the problem of the subsector, and its establishment would follow the normal procedures for the creation of a State financial enterprise.