

## ECUADOR - Floods

Date: November 1982 - June 1983 (FY 83)

Location: Coastal and Sierra regions of Ecuador encompassing the provinces of Guayas, Los Rios, El Oro, Manabi, Esmeraldas, Canar, Azuay, Loja, and Pichincha

No. Dead: 307

No. Affected: Four million (48% of total population); 700,000 (8% of total) severely affected (loss of home or livelihood)

Damage: Agricultural losses including livestock totaled \$111.5 million; crop losses were estimated at 1.35 million metric tons. Damage to infrastructure including housing, utilities, transportation, and irrigation systems totaled \$60.0 million. Industrial losses in the commercial fisheries and petroleum production sectors totaled \$60.6 million. Total economic losses due to flooding and flood-induced landslides were estimated at \$232.1 million as of June 30, 1983. Massive social disruption was caused by the involuntary unemployment of thousands of individuals who depend on agriculture and related activities for their livelihood. Contamination of community water systems and damage to sewerage systems aggravated health problems.

### The Disaster

Normally, the rainy season in the coastal region of Ecuador runs from January to May with precipitation for the four months totaling 796.8 mm (Guayaquil station). The rainy season of 1982/83 started in November, two months early, and lasted through June 1983. Total rainfall for the eight month period was 3,962.4 mm. In March alone, 779.6 mm of rain fell in Guayaquil, an amount nearly equal to that which normally falls in an entire rainy season.

This unusually heavy and prolonged period of rainfall has been attributed to El Nino, a climatic phenomenon which affected not only Ecuador, but also Peru, Bolivia, Brazil, Paraguay, and Argentina. Annual rainfall variations along the Pacific coast of South America are a function of the relative positions of the cold northward-flowing Humboldt current and the warmer equatorial current brought about by a shift in air masses. The moisture-laden winds that accompany the equatorial current prevail during the rainy season whereas the winds of the Humboldt current are dominant during drier months. At irregular intervals - about every six to eight years - a particularly strong encroachment of the equatorial current, known as El Nino, results in a rainy season of exceptional duration and intensity.

The rain which fell in Ecuador during 1982/83 caused widespread flooding in coastal regions and landslides in the Sierra. In mid-December, reports of extensive flooding along major rivers, particularly the Guayas River Basin and the Esmeraldas River, began to reach the capital. By January, approximately 75% of the farmland in Guayas and Los Rios Provinces was under water and the remaining land was saturated. Many rural villages were inundated as were the port city of Guayaquil and Babahoyo, the provincial capital of Los Rios. Rural flooding isolated many small communities and rendered thousands homeless. The transportation system sustained heavy damage, causing serious commodity distribution problems. Roads in many urban areas and those connecting population centers were submerged, 25 bridges were washed out, and landslides halted virtually all railroad traffic. As the rains continued into the spring, a total of nine provinces were declared disaster areas. A summary of damages by sector is presented below.

Agriculture: Crop losses included 816,332 MT of bananas valued at \$39.0 million, 108,463 MT of rice valued at \$12.6 million, 288,000 MT of sugar at 0.7 million, 58,375 MT of corn at \$5.6 million, 30,907 MT of cocoa at \$30.0 million, 21,140 MT of coffee at \$16.8 million, 19,200 MT of soybeans at \$3.3 million, and 14,760 MT of cotton at \$3.5 million. Approximately 500 head of cattle were lost and 32,500 hectares of pastureland were inundated.

Infrastructure: Approximately 2,750 houses were destroyed and 11,000 damaged for a total of \$2.45 million in repair or replacement costs. Schools and health facilities sustained damage totaling \$2.8 million. Damage to the transportation system totaled over \$54 million. Of this, damage to 1,400 km of roads accounted for \$40.7 million, 25 bridges were washed out for a replacement cost of \$9.75 million, and the railroad sustained landslide damage estimated at \$3.7 million. Damage to irrigation systems totaled \$600,000.

Industry: Lost production value of oil and gas totaled \$25.9 million. In commercial fishing, a total of \$34.7 million was lost in fishmeal and fishoil production due to a substantially diminished catch.

In addition to the direct material losses which resulted from the flooding, the disaster caused large-scale social disruption in the form of lost earning power and increased health problems due to water contamination.

Action Taken by the Government of Ecuador (GOE) and the Local Red Cross Society

The Government of Ecuador took an active role in providing relief to the flood victims and coordinating outside assistance. Overall coordination of the relief effort - both national and international - was the responsibility of the Ministry of Social Welfare; however, other GOE agencies had responsibility for implementing specific programs within their sectors.

During the initial emergency phase of the relief operation, the GOE Civil Defense airlifted and coordinated the distribution of relief supplies. Civil Defense also participated in a multi-donor food program by providing emergency food aid to 50,000 persons. In response to fears of a major epidemic from contaminated water, the Ministry of Health initiated a surveillance program to monitor the incidence of disease. Transportation links were restored by the Ministry of Public Works, and the Ministry of Agriculture sponsored food and agricultural rehabilitation projects. Coordination of these activities and those of voluntary agencies and the international community was conducted through a series of interministerial meetings held in Quito.

As additional provinces were declared to be in a state of emergency by the President, the GOE increased its commitment to the relief effort. To offset agricultural deficits caused by the flooding, the GOE authorized the importation of 20,000 tons of rice and 20,000 tons of corn. In addition, \$10 million was made available in the form of credits to farmers and rural workers.

On the local level, a number of provincial and municipal agencies were involved in providing support services to flood victims and giving technical assistance to various disaster relief projects. For example, the local water authority in Babahoyo provided personnel and facilities in support of an A.I.D.-sponsored water purification program in the town. Another A.I.D. project located in the Guasmo section of Guayaquil was conducted under the technical coordination of the Empresa Municipal de Alcantarillado de Guayaquil (municipal sewerage utility) and the Ecuador Corps of Engineers.

The national Red Cross society worked closely with the GOE, particularly Civil Defense, to provide assistance to flood victims. From its own resources, the Red Cross distributed blankets, medicines, and food through its local branches. This agency was especially active in rural food distribution. Red Cross operations in all provinces were conducted by the Guayas chapter under the direction of a League of Red Cross Societies delegate.

### Assistance Provided by the United States Government (USG)

In late December 1982, the Government of Ecuador notified the U.S. Mission in Quito of the severe flooding in Guayas and Los Rios provinces and requested United States assistance in providing relief to the disaster victims. On December 30, 1982, U.S. Ambassador Samuel F. Hart determined that U.S. disaster relief assistance was warranted and authorized \$25,000 to be contributed to the immediate relief effort.

As the extent of the flooding became known, the Ecuadorean Government requested additional USG assistance in providing potable water to the city of Babahoyo, a community of 40,000 which had been without safe drinking water for three weeks. This request was transmitted by the U.S. Mission to the Office of U.S. Foreign Disaster Assistance (OFDA) in Washington where immediate action was taken to transport four water purification units to Ecuador. Within 24 hours, the four water units, 20 inflatable water tanks, eight 100 lb. drums of HTH (chlorine), and 2,000 wool blankets had arrived in Guayaquil by charter aircraft. Four technicians from the A.I.D. Water and Sanitation for Health (WASH) project accompanied the water purification units.

On January 1, 1983, two water purification units were delivered to Babahoyo where they were deployed at a site adjacent to the Babahoyo River. By the next day the units were producing 3,600 gallons of clean water each hour for the residents of Babahoyo. To ensure continuous and proper operation of the water purification units, teams of Ecuadoreans from the local water authority and the Civil Defense were trained in their operation and maintenance. The blankets and other relief supplies shipped to Ecuador with the water units were turned over to the Civil Defense and Red Cross for distribution.

The water purification program eventually included three units operating in Babahoyo. One of these units was later moved to the nearby community of Baba. The fourth unit, along with two additional units which had been shipped from an OFDA stockpile in Panama, were kept in a Guayaquil warehouse in the event that new water contamination emergencies developed. Additional technical personnel, including an environmental engineer on loan from the Pan American Health Organization, arrived to supplement the original support team and complete the training of the Ecuadorean technicians.

The water purification units remained in operation until mid-April at which time four units were shipped back to the manufacturer in Baltimore, MD, for overhaul and two were returned to the stockpile in Panama.

It soon became apparent that the disaster was of such a magnitude that additional technical assistance was required to supplement U.S. Mission resources. On January 3, an OFDA officer arrived in Ecuador to advise the Mission and provide guidance in responding to GOE requests, deploying USG resources, and coordinating USG relief with other international donors. Shortly thereafter, two additional disaster specialists under personal services contracts with A.I.D. arrived to assist in the relief operation.

Because the most serious flooding was occurring in the Guayas River Basin and areas southeast and northwest of Guayaquil, the U.S. Mission established the disaster coordinating center at the Consulate General in Guayaquil. From there a series of aerial surveys were conducted to pinpoint the areas most in need of assistance. In addition to confirming the extent of the rural flooding, the aerial surveys identified a severe disaster situation in the Guasmo, a large squatter settlement on the outskirts of Guayaquil. Water up to one meter deep had covered the area, flooding residents' wood and bamboo houses; semi-elevated dirt roads, acting as dams, blocked any flow of water out of the area. Health risks to the population increased and all transportation, except by canoe, had come to a standstill.

The U.S. disaster team headquartered in Guayaquil, in cooperation with the GOE Ministry of Social Welfare, Civil Defense, and the Army Corps of Engineers, determined that a permanent solution to the problem could be achieved only by the construction of drainage canals. Such a project would not only remove the accumulated water, thereby solving the immediate crisis, but would also provide a long-term improvement to the community. The project design provided for 10 km of principal drainage canals to be dug by the Ecuadorean Corps of Engineers. This was accomplished using 15 pieces of heavy equipment and 30 engineers and machine operators who worked up to 16 hours a day to complete the job. Funding for the project, which included the services of Ecuadorean topographers to survey the land, equipment rental, purchase of culverts, piping and tools, and management and administration costs, was shared by the USG and the GOE. In addition, a local voluntary agency in the Guasmo, Plan de Padrinos (Foster Parents), contributed some of the concrete pipes.

A.I.D. capitalized on the community spirit that had developed in response to the drainage project when, in cooperation with Plan de Padrinos and Norwegian Church Aid, it offered to provide concrete pipes, tools, and technical assistance to any neighborhood cooperative willing to construct tertiary canals. Coordination and management for this part of the drainage project was provided by Plan de Padrinos. By mid-April, when the program was phased out, 15 neighborhood or tertiary canals which connected into the primary system had been dug.

Another project undertaken by the A.I.D.-sponsored disaster team was a series of rural surveys to assess damage and identify flood victims' needs. The survey results were also helpful in confirming or denying media and local politicians' reports regarding the severity of the situation. A total of three surveys, conducted by a Peace Corps volunteer and members of the disaster team, covered 30 communities in four provinces (Guayas, Los Rios, El Oro, and Manabi). One finding of the survey was the urgent need for bridge repair, an area in which the USG was already providing technical assistance.

At the request of the GOE Ministry of Public Works, a team of A.I.D. engineers had been sent to assess the bridges threatened or destroyed by the flooding and to make recommendations concerning their replacement or reconstruction. Subsequently, one of the engineers also conducted an evaluation of landslide damage to the railroad network. The engineers' reports were presented to the Ministry of Public Works and the railroad authorities respectively. In connection with the assessment, A.I.D. provided 100 cable clamps to temporarily secure damaged sections of the bridges.

As the rains continued into the spring, further saturating the ground, the danger of landslides increased. In April the A.I.D. Mission arranged for a landslide expert from the United States to inspect vulnerable areas around Guayaquil and present a briefing on the subject to the local Society of Engineers. Landslide areas in Chimborazo Province and the capital city of Quito (particularly Pichincha volcano) were also inspected and recommendations made to the GOE on ways to reduce the landslide threat to populated areas.

To mitigate the severity of future flooding along the Babahoyo River, A.I.D. agreed to purchase spare parts needed to rehabilitate a river dredge located in Babahoyo. The reconditioned dredge will be used to maintain the river free of mud and debris. Title to the spare parts was given to the Civil Defense of Los Rios Province.

The USG, through Catholic Relief Services, also provided partial funding for three agriculture and infrastructure rehabilitation projects. The projects encompassed approximately 13,500 families in Manabi, Guayas, and El Oro Provinces and were designed to provide the financial and technical resources required to restore community infrastructure and agricultural production. (See also the listing for Catholic Relief Services under Assistance Provided by U.S. Voluntary Agencies.)

Summary of USG Assistance

Ambassador's authority for the provision of immediate relief supplies.....\$25,000

Water Purification Project - including transport of four water purification units, 20 inflatable water tanks, eight 100 lb. drums of HTH, 2,000 wool blankets, and four technicians to Guayaquil by charter aircraft (\$63,000); transport of two water units, 20 rolls of plastic sheeting, two chainsaws, and two felling saws from Panama (\$2,900); return shipping costs (to Baltimore and Panama) for six water units (\$5,681); and technical services provided under the WASH contract (\$74,543).  
Total cost.....\$146,124

Replacement costs for the 2,000 wool blankets and the 20 rolls of plastic sheeting totaled.....\$22,450

Funding for the Guasmo drainage project, the rural assessment surveys, the A.I.D. disaster team, and local administrative costs amounted to \$262,500. Because monies for these projects were distributed in block amounts, it is virtually impossible to itemize the costs.....\$262,500

TDY for the OFDA disaster officer, two A.I.D. engineers, and a representative from the manufacturer of the water purification units totaled.....\$7,504

Purchase costs for 100 cable clamps totaled..... \$545

Costs for the landslide assessment (fee, transportation and per diem for the landslide expert) amounted to.....\$7,782

Purchase and transportation costs for river dredge replacement parts totaled.....\$22,338

OFDA funding for the three CRS rehabilitation projects amounted to \$177,560; of this amount, \$80,000 was provided in FY 1983 with the balance to be paid in FY 1984.....\$177,560

TOTAL \$671,803

### Assistance Provided by U.S. Voluntary Agencies

CARE - provided \$50,000 in agricultural credit to assist small farmers; supplied 1,000 sheets of zinc for rebuilding homes in Azuay Province, value reported at \$2,500.

Catholic Relief Services (CRS) - contributed \$75,000 in cash to purchase food on the local market, transport donated foods, and purchase antibiotics, seeds, agricultural tools, and animals; made a cash donation of \$178,000. CRS also sponsored three long-term rehabilitation projects funded jointly by OFDA and CRS in conjunction with local dioceses: 1) in Manabi Province 1,200 families were provided with resources for infrastructure reconstruction and agriculture and livestock rehabilitation; 2) in Guayas Province over 13,000 people were assisted in restoring flooded fields to production through tool banks, revolving loans, credit, and technical support; and 3) in El Oro Province, 10,000 families were given technical and financial assistance to rebuild roads, village infrastructure, stores, medicine chests, and tool banks. The total cost for these projects was \$267,835, of which CRS and local dioceses paid \$90,275.

Church World Service (CWS) - sent a cash donation of \$22,000 to Fundaciones Bretheran y Unidas.

Direct Relief International - supplied 122 lbs. of pharmaceuticals valued at \$8,128.

World Vision - donated \$50,000 for the purchase and transport of food and medicines.

TOTAL \$475,903

### Assistance Provided by the International Community

#### International Organizations

European Economic Community (EEC) - supplied 1,000 tons of vegoil (\$487,723), 1,000 tons of sugar (\$265,957), and 5,000 tons of cereal (\$1,063,830); contributed \$200,000 to the voluntary agency Deutsche Welthungerhilfe; and donated \$97,600 through CESA, an Ecuadorean agrarian organization, for the local purchase of supplies.

Food and Agriculture Organization (FAO) - supplied emergency food aid consisting of 2,700 tons of rice/wheat/wheat flour, 360 tons of powdered milk and 270 tons of vegoil to feed 20,000 families in rural areas for three months (total value \$1,791,700); and contributed \$250,000 in cash for the purchase of 1,580 tons of fertilizer.

Inter-American Development Bank - organized an evaluation team to assess infrastructure requirements, value unknown.

League of Red Cross Societies (LORCS) - contributed \$100,502 in cash from the Relief Emergency Fund and maintained two delegates in Ecuador to coordinate LORCS relief activities.

Organization of American States - made a cash contribution of \$15,000.

Pan American Health Organization (PAHO) - funded a damage and needs assessment survey, value not reported; sent a sanitary engineer to assist the USG water purification program.

United Nations Development Program (UNDP) - made a cash donation of \$20,000 and funded a UNDP representative to survey the disaster areas.

United Nations Disaster Relief Organization (UNDRO) - served as coordinator for the international relief effort; funded an UNDRO representative to assess the flood-stricken regions; and made a cash contribution of \$20,000.

UNESCO - contributed \$40,000 in cash to rehabilitate schools.

UNICEF - contributed \$50,000 from the Executive Director's Emergency Fund to provide medical supplies and cooking and houseware sets for the homeless; also contributed \$20,000 in cash for medicines and health care needs.

World Council of Churches - issued an emergency appeal; as of April 28, 1983, \$155,458 in pledges and contributions had been received.

World Food Program (WFP) - provided 2,700 MT of rice, 360 MT of non-fat dried milk, and 270 MT of vegoil, value not reported; in conjunction with PAHO, conducted a damage/needs assessment.

#### Governments

Argentina - airlifted 40 tons of medicines, food, and tents to Guayaquil, total value of \$58,000; donated \$2,083 for food and medicine through the Argentina and Ecuador Chamber of Commerce and Industry; provided the services of a hydrologist, value not reported.

Austria - contributed \$60,000 in cash.

Belgium - donated \$21,777 in cash through the Belgium Red Cross.

Brazil - supplied 1,200 kg of medicines valued at \$3,355 and \$5,000 in cash.

Canada - contributed \$56,910 in cash through the Canadian Catholic Organization for Development and Peace; \$40,200 through the World Council of Churches; \$112,186 through LORCS; \$8,130 through PAHO and \$32,000 through the Canadian International Development Agency to PAHO; \$50,000 through CARE; and a direct cash donation of \$20,325.

Chile - donated \$15,000 through the Organization of American States; made a cash grant of \$9,000; and airlifted 13 tons of food, blankets, and bedding; value not reported.

China, Peoples Republic - contributed \$50,000 in cash.

Colombia - airlifted nine tons of food and medicine, value not reported.

Cuba - provided a camp hospital and medical brigade, value not reported.

Czechoslovakia - airlifted an unspecified quantity of skim milk powder and tents, value not reported. Air transportation was provided by the Soviet airline, Aeroflot.

Dominican Republic - made a cash grant of \$25,000.

France - contributed \$15,038 in cash.

Germany, Federal Republic of - contributed \$37,735 for the purchase of anti-malaria drugs and microscopes for vector control campaigns; donated \$41,666 to the German (F.R.) Red Cross for the purchase of medicines.

Hungary - supplied 1,685 kg of medicines valued at \$30,330 to the Ecuador Red Cross.

Israel - provided 350 kg of medicines to the Ecuador Red Cross, value not reported.

Italy - contributed \$140,000 in cash through UNDRO for the purchase of water pumps and equipment; provided a cash contribution through UNDRO of \$170,648 and a direct cash contribution of \$175,535; supplied 6,000 tons of rice (bilaterally and through WFP) valued at \$3 million; and provided technical assistance to repair road and railway networks, value not reported.

Japan - contributed \$610,000 in cash.

Korea - supplied six ambulances and two fire engines to the municipality of Guayaquil, value not reported; made a cash donation of \$30,000.

Netherlands - contributed \$57,692 to the cantons of Baba and Vinces for the purchase of food, medicines, and tools; provided the services of a water engineer, value not reported; contributed \$26,624 to Plan de Padrinos International for food, \$2,346 for agricultural rehabilitation projects in Manabi Province, and \$16,455 for road rehabilitation projects in Vinces and Baba Cantons.

Norway - contributed \$56,338 in cash through the Norway Red Cross and \$161,972 through Norwegian Church Aid.

Sweden - contributed cash grants totaling \$153,893 through Free Church Aid and Lutheran World Federation; provided 2,460 MT of urea valued at \$381,300 through FAO for a rehabilitation program for rice farmers.

Switzerland - donated \$25,126 in cash.

United Kingdom - contributed \$32,250 through PAHO/WHO for the purchase of insecticides; \$16,129 to the Ecuador Red Cross for the purchase of children's clothing; and a cash grant of \$8,064 to Unidos Somos Mas.

Venezuela - airlifted 15 tons of medicines, clothing, and cooking stoves to Guayaquil, value not reported.

#### Voluntary Agencies

Adveniat (F.R. Germany) - donated \$82,689 in cash.

American Private Sector - the company Pretty Please donated clothes valued at \$38,678 through CARE/Ecuador.

American Red Cross - provided 5,000 cases of refried beans, value not reported.

Argentina and Ecuador Chamber of Commerce and Industry and private Argentine firms - donated nine tons of food. Air transport was provided by Ecuatoriana de Aviacion; total value placed at \$60,000.

Australia Red Cross - contributed a cash grant of \$870.

Australian Catholic Relief - contributed \$9,900 in cash.

Belgium Red Cross - supplied 96 doses of anti-venom vaccine valued at \$3,125.

Bulgaria Red Cross - provided blankets, tents, and medicines valued at \$51,900.

Canada Red Cross - contributed \$8,291 in cash through LORCS.

Canadian Catholic Organization for Development and Peace - contributed \$12,195 in cash.

Caritas/Australia - contributed \$68,413 in cash.

Caritas/Belgium - donated \$2,000 in cash.

Caritas/Germany (F.R.) - contributed \$208,000 in cash.

Caritas Internationalis - contributed \$11,987 in cash.

Caritas/Italy - made a cash donation of \$7,407.

Caritas Japan - donated \$4,167 in cash.

Caritas Netherlands - made a cash donation of \$11,071.

Caritas Switzerland - contributed \$9,756 in cash.

COR UNUM - contributed \$25,000 in cash.

Denmark Red Cross - contributed \$27,665 in cash through LORCS.

Finland Red Cross - donated \$38,944 through LORCS.

German Democratic Republic Red Cross - provided medicines, value not reported.

Israel Red Cross - supplied 318 kg of medicines and antibiotics valued at \$5,000.

Korea (Republic) Red Cross - donated \$5,015 in cash through LORCS.

Luxembourg Red Cross - contributed \$962 in cash.

Misereor (F.R. Germany) - provided cash grants totaling \$11,425.

Munich Archdiocese - contributed \$82,689 in cash.

Netherlands Red Cross - made a cash grant of \$18,693 through LORCS.

New Zealand Red Cross - contributed \$502 in cash through LORCS.

Norway Red Cross - made a cash donation of \$20,804 through LORCS.

Norwegian Church Aid - provided an unspecified amount of financial assistance for the A.I.D.-sponsored drainage project in the Guasmo.

Oxfam - provided \$61,322 in cash.

Plan de Padrinos - provided concrete pipes and financial and managerial assistance to the A.I.D.-sponsored drainage project in the Guasmo; also provided medical and social service assistance to Guasmo residents affected by the flooding, value not reported.

Pont a Mousson (French Private Sector) - donated 107 tons of pipes and related equipment valued at \$84,908 to the Ecuador Institute of Sanitary Works.

Romania Red Cross - supplied 155 kg of antibiotics valued at \$6,000.

Soviet Union Red Cross - supplied 734 kg of medicines and 1,000 kg of baby food valued at \$30,470.

Spain Red Cross - provided 18,500 doses of medicine valued at \$3,431 and three inflatable rescue boats with outboard motors valued at \$18,000.

Sweden Red Cross - made a cash donation of \$27,000 through LORCS.

Switzerland Red Cross - contributed \$20,100 in cash.

Thailand Red Cross - donated \$100 in cash.

United Kingdom Private Companies - provided medicines valued at \$12,903.

United Kingdom Red Cross - contributed \$2,920 in cash.

Welt Hungerhilfe - provided rations to feed 25,000 persons for three months, value not reported; assisted in food distribution.

TOTAL \$11,530,191