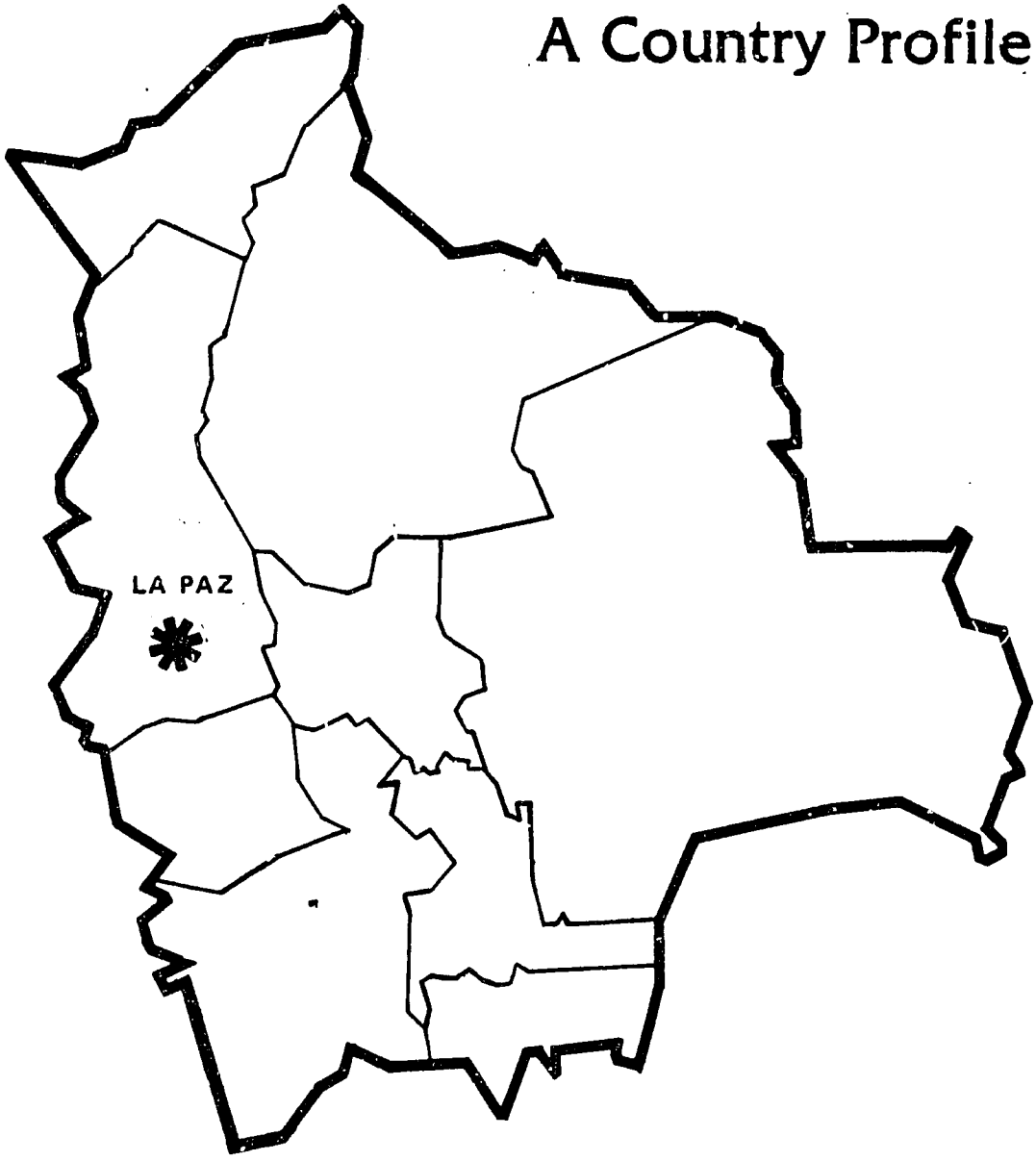
PN-AAO-454

Bolivia

A Country Profile



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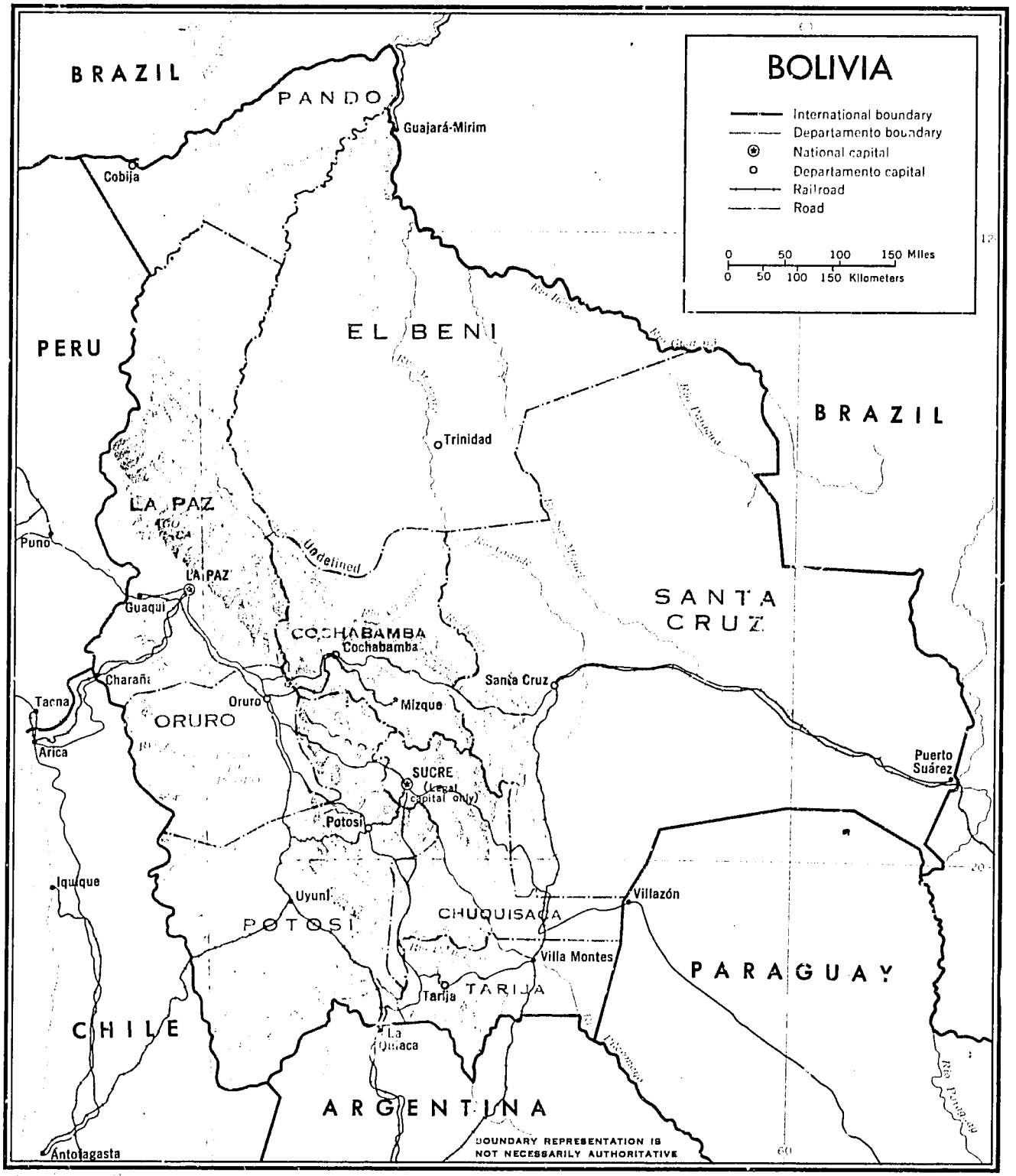
Agency for International Development
Washington, D.C. 20523


BOLIVIA
International boundary
Departamento boundary
National capital
Departamento capital
Railroad
Road
0 50 100 150 Miles
0 50 100 150 Kilometers
BRAZIL
PANDO
Guajará-Mirim
Cobija
PERU
EL BENI
Trinidad
BRAZIL
LA PAZ
Puno
Undefined
LA PAZ
Guaqui
SANTA CRUZ
COCHABAMBA
Cochabamba
Charaña
Santa Cruz
Tacna
Oruro
Mizque
ORURO
Arica
Puerto Suárez
SUCRE
(Legal capital only)
Potosi
Iquique
Uyuni
Villazón
CHUQUISACA
POTOSI
Villa Montes
PARAGUAY
Tarija
TARIJA
CHILE
La Quiaca
ARGENTINA
Antofagasta
BOUNDARY REPRESENTATION IS NOT NECESSARILY AUTHORITATIVE

BOLIVIA: A COUNTRY PROFILE

prepared for

The Office of U.S. Foreign Disaster Assistance
Agency for International Development
Department of State
Washington, D.C. 20523

by

Cynthia Davis

of

Evaluation Technologies, Inc.
Arlington, Virginia
under contract AID/SOD/PDC-C-2112

The profile of Bolivia is part of a series designed to provide baseline country data in support of the planning and relief operations of the Office of U.S. Foreign Disaster Assistance (OFDA). Content, scope, and sources have evolved over the course of the last several years; the relatively narrow focus is intentional. To avoid redundancy, some topics one might expect to find in a "country profile" are not covered here.

We hope that the information provided will also be useful to others in the disaster assistance and development communities. Every effort is made to obtain current, reliable data; unfortunately it is not possible to issue updates as fast as changes would warrant. A cautionary note, therefore, to the reader: statistics are indicators at best, and if names and numbers matter, the bibliography will point to a current source.

We invite your comments and corrections. Address these and other queries to OFDA, A.I.D., as given above.

June 1984

OFDA COUNTRY PROFILES: MAY 1984

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1. General Information

1.1 Geographic Codes

AID Standard	511
AID Regional	LAC/SA
State Region	ARA/AND

1.2 Host Mission in U.S.

Embassy:

Embassy of Bolivia
3014 Massachusetts Avenue, N.W.
Washington, D.C. 20008
Phone: (202) 232-4828 - consulate
(202) 483-4410 - chancery

Bolivia also maintains consulates in twelve other U.S. cities. For current information on Bolivian Embassy staff in the United States, consult the U.S. Department of State, Diplomatic List.

1.3 U.S. Mission in Bolivia

Embassy:

Embassy of the United States
Banco Popular del Peru Building
Corner of Calles Mercado y Colon
P.O. Box 425
La Paz
Tel: (591)(2) 350251, 350120
Telex: BX5240

Consulate:

Calle Bolivar 342
Santa Cruz
Tel: (591)(3) 330725

25 de Mayo 365
Cochabamba
Tel: (591)(4) 221288

APO:

Miami 34032

1.4 Time Zones

EST + 1 hour
GMT - 4

1.5 Currency

In May 1984, the exchange rate was 2,000 Bolivian pesos = US $1.00.

1.6 Travel and Visa Information

A valid passport is required. Visas are not needed for visits of three months or less.

1.7 Holidays

New Year's Day	January 1
Good Friday	*
Easter Sunday	*
Labor Day	May 1
Corpus Christi	*
La Paz Day (La Paz only)	July 16
Independence Day	August 6
All Souls Day	November 2
Christmas	December 25

* Dates vary annually

Fiscal year: calendar year

1.8 Treaties and Agreements

Agricultural Commodities
Aviation - Air Transport Agreement
Defense
Economic and Technical Cooperation
Extradition
Informational Media Guaranties
Investment Guaranties
Air Force and Army Missions

1.8 Treaties and Agreements (cont'd.)

Relief Supplies and Packages - duty free entry
Telecommunications - reciprocal permits for licensed radio operators

1.9 International Organization Memberships

ALADI (Latin American Integration Association), Andean Group, FAO, Group of 77, IADB (Inter-American Defense Board), IDB (Inter-American Development Bank), International Association of Tungsten Producers, ICAO, INTELSAT, International Coffee Organization, IFAD (International Fund for Agricultural Development), International Sugar Organization, International Tin Council, International Wheat Council, ILO, IMF, OAS, PAHO, SELA (Latin American Economic System), UN, UNESCO, UPU, World Bank (IBRD, IDA, IFC), WHO, WMO, World Tourism Organization.

1.10 Government

Official Name: Republic of Bolivia (Republica Boliviana)

Political Background: Bolivia has had countless coups, a revolving-door presidency, and 17 constitutions since its independence in 1825. This chronic instability and governmental weakness has contributed markedly to the lack of effective economic development and to the loss of one-fourth of its territory in border wars.

Bolivia's defeat by Paraguay in the Chaco War (1933-35) shocked the country and gave impetus to many new political currents. The next decade saw the beginnings of unionization of the tin mines and improvement of Indian living conditions. In 1952, the

Nationalist Revolutionary Movement (MNR) party, a champion of the miners, came to power and quickly passed a series of laws that transformed Bolivia. Land reform and the expropriation of major tin mining companies were its major accomplishments.

The MNR stayed in power until the mid-1960's when Bolivia again returned to frequently alternating governments, some civilian, but the majority military. In July 1980, a faction of the military carried out one of Bolivia's bloodiest coups because it did not like the results of the election. The new government gained international notoriety for the unprecedented level of corruption, the flourishing cocaine trade, and the rapid decline of the economy. In October 1982, the military handed the reins of government back to the Congress, which elected as president the man who had won a plurality in elections two years before.

Government Structure: Bolivia is a democratic centralist republic in which a president and vice president are elected for non-renewable four-year terms by direct universal suffrage and by a simple majority. Presidential power is virtually unrestricted.

For administrative purposes, Bolivia is divided into nine departments, 98 provinces, and 1,272 cantons. Each department is administered by a prefect, who is appointed by the president. There are no local legislatures. Departmental capitals control their own revenues and expenditures and have municipal councils elected by popular vote, but mayors are appointed by the president.

1.11 Ethnic Groups

Indians constitute the ethnic majority in Bolivia and comprise an estimated 55% to 70% of the population. Mestizos, those of mixed blood, make up about 30% to 35%, and whites

(mostly of Spanish descent) about 5% to 15% of the population.

The two largest Indian groups are the Aymara and Quechua, both of which live in the altiplano, or highlands. The Aymaras are probably the oldest inhabitants of the country. Quechua-speaking Indians, who are now the largest Indian group, came to the area about 1200 A.D. as part of an expanding Incan Empire. In addition to these two large groups, there are many other Indian tribes living in isolated parts of the lowland Oriente.

The Revolution of 1952 lessened the rigidity of Bolivia's social system and gave some political power to the Indians. However, the whites, or blancos, continue to dominate the political and economic life of the nation.

1.12 Language

The official language of Bolivia is Spanish, but only about 40% of the population speak it as their native tongue. The principal Indian languages are Quechua, Aymara, and Guarani, of which Quechua is the most widespread.

1.13 Religion

About 95% of Bolivia's population is nominally Roman Catholic. However, the Catholic Church exercises real influence only in urban areas. In rural areas, Catholicism is mixed with many elements of Indian beliefs.

Church and state were formally separated in 1961, though the Church continues to receive some financial support through the national budget.

1.14 Geography

Location and Area: Bolivia is a landlocked country in the southwestern part of South America. It extends 1,529 km north to south and 1,448 km east to west, and has an area of 1,098,579 sq. km. Bolivia shares its 5,532 km border with five countries: Brazil to the north and east; Paraguay to the southeast; Argentina to the south; and Chile and Peru to the west.

Topography: Bolivia is divided into three topographical zones: the highlands, the steep valleys of the eastern slopes of the Andes, and the tropical lowlands. The highlands consist of two chains of the Andes bisected by a high plateau called the altiplano, and they cover about one-third of the land area. Marking Bolivia's border with Chile is the Cordillera Occidental, where the Andes reach their greatest width (about 650 km). The peaks in this chain often reach 4,900 m, and the highest one, called Sajama, is 6,519 m. The range also contains volcanoes, some of them active.

The Cordillera Occidental gives way to the altiplano, a cold, treeless, windswept plateau, 98,500 km in area. Its elevation ranges from 3,620 m to 4,270 m, and it contains some of the world's highest cities. The length of the altiplano cuts an 835-km swath through Bolivia from La Paz south to Argentina, while its width averages 135 km.

The eastern part of the altiplano then gradually rises to the Cordillera Real, a mountain chain with even higher peaks than the Cordillera Occidental. Their peaks have an average elevation of over 5,500 m. The Nevado Illimani, at 6,402 m. high, towers over La Paz.

The next geographical region of Bolivia is the area between the highlands in the west and the tropical lowlands of Bolivia's frontier. From the Peruvian border to just north of Cochabamba, the eastern slopes of the Cordillera Real descend steeply, falling 4,350 m in 80 km. This densely forested region contains the yungas (which means

"warm lands" in Aymara), which are isolated valleys with steep slopes and deep canyons. This remote region extends 320 km and has few roads or market outlets.

Following the rest of the length of the Cordillera Real from just north of Cochabamba are the valles, sometimes considered a part of the yungas. These valleys are broader, less steep, and more densely populated than the yungas.

The third area of Bolivia is its vast, sparsely settled eastern region, called the Oriente, which varies in climate and topography. A tropical rain forest covers the northeastern section with tributaries of the Amazon River, making the area marshy and muggy. The Santa Cruz region further south contains savanna and subtropical forest land. The savanna gradually gives way to the Bolivian portion of the Gran Chaco, an extensive and generally dry plain.

Rivers and Lakes:

Straddling the border of Peru and Bolivia, high up on the altiplano, is Lake Titicaca, South America's largest, and the world's highest, navigable lake. It is 3,658 m high and surrounded by some of the highest peaks of the Cordillera Real.

The rivers in the altiplano form an internal, closed system with all of them flowing into Lake Titicaca, Lake Poopo, or the salt flats further south. The largest river is Rio Desaguadero, which drains Lake Titicaca to the southeast for 300 km and empties into the shallow and salty Lake Poopo. This lake occasionally overflows into the salt flat of Salar de Coipasa, 80 km to the southwest. South of that is another salt flat, Salar de Ulyuni.

Most of the rest of Bolivia's rivers are found in the Oriente, which is drained by tributaries of the Amazon River and feeders of the Paraguay River. The country has a total of about 14,000 km of navigable rivers, which connect much of Bolivia with the Amazon Basin. The rivers used the most are the Beni and the Mamore, followed by the Guaporo, Chapare, and Ichilo.

Climate:

Temperature and rainfall vary with the altitude. In general, the weather is cold and dry in the west and becomes warmer and wetter in the east. The Andean ranges and the altiplano have a harsh, dry, generally cold climate, with low levels of rainfall. While there is little seasonal variation in the temperature on the altiplano, there is great contrast between the day and night: the average temperature ranges from 10° C to 16° C in the day, and from -1° C to 4° C at night, with frosts occurring all year. Bitter winds frequently sweep down from the Andes and can bring the temperature down to as low as -20° C. Lake Titicaca, however, has a moderating influence on the climate in the surrounding area.

The yungas are warm and subtropical, and receive rainfall year round. The departments of Beni and Pando in the northern Oriente are also relatively hot and humid. The Chaco region has a number of rivers flowing through it during the rainy season, but it is practically a desert the rest of the year.

1.15 Population

Total (mid-1982 est.):	5,915,844
Density/sq. km:	5.4
Density/sq. km arable land:	160.7
Pop. growth rate (197 -81):	2.6%

Population by Departments
(mid-1982 estimates):

Department	Population	Capital
Beni	217,703	Trinidad
Chuquisaca	435,406	Sucre
Cochabamba	908,674	Cochabamba
La Paz	1,913,184	La Paz
Oruro	385,121	Oruro
Pando	42,594	Cobija
Potosi	823,485	Potosi
Santa Cruz	942,986	Santa Cruz
Tarija	246,691	Tarija

The departments of the altiplano (most of La Paz, Oruro, and Potosi) support 53% of Bolivia's population, though they cover less than a third of the territory. The yungas (Cochabamba, Chuquisaca, and Tarija) contain 27% of the population, while the Oriente (Santa Cruz, Pando, and Beni), accounting for 65% of the land area, supports only 20% of the population. However, the fastest growing area during the past decade has been the lowlands in Santa Cruz.

Urban population (1981):	45%
Av. annual growth rate (1970-81):	6.9%
Percent of working-age population:	53%
Adult literacy rate (1980):	63%
Primary-age children in school (1980):	84%
males:	90%
females:	78%
Secondary-age children in school (1980):	36%

1.16 Health

Life expectancy/birth (1981):	51 yrs.
Crude birth rate/1,000 (1981):	42
Crude death rate/1,000 (1981):	16
Change in crude birth rate (1960-81):	-9.4%
Change in crude death rate (1960-81):	-29.0%
Infant mort. (aged 0-1)/1,000 (1981):	129
Child mort. (aged 1-4)/1,000 (1981):	23
Population/physician (1980):	1,850
Population/nurse (1980):	3,070
Number of hospital beds/1,000 (1975):	1.6
Daily per capita calorie supply (1980)	2,084
Percent of daily requirement:	87
Central government expenditure (1975 dollars) per capita on health (1979):	$5

Bolivia remains one of the poorest countries in South America despite social and economic progress since 1960. Medical care in Bolivia is expensive and there is no well-developed rural health care delivery system. The rural population continues to rely on traditional medicine and witchcraft. Most services are curative with little investment in preventive medicine. Many of the trained medical personnel leave Bolivia.

The most common diseases are malaria, influenza, dysentery, tuberculosis, and venereal diseases. Mortality is highest among the very young. There is some regional variation in the causes of death, though in all nine departments, respiratory ailments ranked either first or second in incidence. In the 1970s, violence and accidents were the other major causes of death in La Paz, Chuquisaca, and Oruro. In Potosi, Tarija, Cochabamba, and Pando, digestive and intestinal tract disorders were the most common ailments, while intestinal parasites were endemic in Beni, and bacterial infections in Santa Cruz.

1.17 Economy

Overview:

GDP, at constant 1978 dollars (1981):	$4.12 billion
GNP per capita (1981):	$601
Annual rate of growth (1980-81): (Real GDP growth rate for 1982 estimated at -7.4%)	-0.6%
Balance of payments (1981):	-$367 million
External debt (1981):	$2.4 billion
Debt service ratio (1981):	27%

Bolivia is currently undergoing severe economic difficulties. Since 1979 the country has been facing serious foreign exchange constraints caused by declining prices for its mineral exports and the increasing cost of its foreign debt service. In 1982, this debt equaled about two years of export earnings and its service represented approximately 66% of export earnings.

Exports and Imports:

Exports (1981): $909 million
Imports (1981): $931 million
Major exports: tin, natural gas, zinc, tungsten, antimony, lead, silver, coffee, sugar, and cotton
Major imports: food, chemicals, capital goods, pharmaceuticals, and transportation equipment
Major export markets are the U.S. (26%), Argentina (24%), and the EEC (23%).

Major sources of imports are the U.S. (32%), the EEC (17%), Japan (15%), Argentina (12%), West Germany (9%), and Brazil (9%).

The minerals extracted from the altiplano (today primarily tin, antimony, zinc, and tungsten) have been the mainstay of Bolivia's exports for centuries, and in the late 1970's, accounted for 70% of Bolivian exports. The major agricultural exports, which amounted to 10% of the total in 1980, were sugar, coffee, and timber. Exports of natural gas (from the Santa Cruz area) began in 1972 when a pipeline to Argentina was completed.

Bolivia's general export performance during the 1970s was poor, and imports doubled in real terms from 1970-72 to 1978-80. In addition, Bolivia's petroleum resources were over-estimated and new markets for its considerable gas reserves are needed, as Argentinean demand for Bolivian gas is not likely to increase.

Mining:

Mining is Bolivia's major industry and has been since the Spanish arrived to exploit the fabulous silver deposits in the altiplano, particularly at Potosi and Sucre, in the 1500s. After the silver veins were exhausted at the end of the 19th century, tin became the principal mineral export, and hence a preponderant force in Bolivian life; and for many years, mining interests controlled the government. One of the main objectives of the 1952 Revolution was to nationalize the mines and to thereby force them to pay taxes. Today, the mining industry is beset by several problems. Because of the deterioration of ore grades, lack of systematic exploration and mine development, overtaxation, mismanagement, political instability, and high wage increases, profitability has declined and the volume of tin exports in real terms was 11% lower in 1978-80 than in 1970-72. Despite its important role in the nation's economy, the mining industry only employs about 80,000 people (about 30,000 of whom work for COMIBOL, a

state mining enterprise), or 10% of the labor force living on the altiplano, and 3.5% of the nation's total.

Agriculture:

The agricultural sector comprises 16% of the GDP and employs over 45% of the nation's labor force. Bolivia has both a traditional and modern sector of agriculture, but in different regions. Farming methods have changed little during the last two centuries in the altiplano: about 50% of the population farm on marginal land in a harsh climate to feed themselves and urban dwellers. In the lowlands of Santa Cruz and Beni, however, market-oriented enterprises specializing in the production of cash crops for export or import substitution have developed. This type of agriculture has grown rapidly since the early 1970s, and the commercial crops grown for both the domestic market and for exports include sugar, rice, cotton, corn, coffee, and tropical fruits.

The growth rate of the agricultural sector over the past twenty years has lagged behind the overall economy. Agriculture's share of the GDP declined from 29% in 1960 to 16% in 1980. In the early 1980s, the agricultural growth rate fell below that of population.

One other crop, though illegal in most countries, is grown in such large quantities that it has an important impact on both the economy and Bolivia's relations with other countries. This crop is coca, from which cocaine is manufactured. The value of Bolivia's cocaine traffic is believed to reach more than $1 billion annually, and the Bolivian government estimates that more than 20,000 people are involved in the cultivation and processing of coca plants. Most of the coca cultivation is in the yungas and northern Oriente (in the departments of Santa Cruz, Cochabamba, Beni, La Paz, and Pando), with the Chapare region in the Department of Cochabamba a prime growing area and a magnet for migrants.

1.18 Communications

Telephones: Bolivia has 135,000 telephones, or 2.6 per 100 inhabitants.

Radio: There are 142 AM and 29 FM radio stations, the majority of which are commercial. Broadcasts are in Spanish, Quechua, and Aymara. In 1982, there were an estimated 475,000 radio receivers in Bolivia.

Television: There are two television networks in Bolivia. The first of which is Empresa Nacional de Television, a government network which operates stations in La Paz, Oruro, Cochabamba, Potosi, Sucre, Tarija, and Santa Cruz. The other network is Television Universitaria, which airs educational programs on stations in Oruro, Cochabamba, Potosi, Sucre, Trinidad, Tarija, Beni, and Santa Cruz. In addition to the two networks, there are also 27 low-power relay stations. In 1982, Bolivians had an estimated 250,000 television sets (50,000 of them color).

1.19 Transportation

Roads: Bolivia has a total of 38,164 km of highways and roads of which 1,200 km (3%) are asphalted, 6,112 km (16%) are gravel, and 30,853 km (81%) are dirt. The asphalt and gravel-surfaced roads can carry traffic year round, but vehicular traffic over gravel roads is sometimes interrupted during the rainy season. Dirt roads can carry vehicular traffic only during the dry season.

There are three different road networks. The primary network links the economic centers of the country, and its principal artery is the La Paz-Cochabamba-Santa Cruz highway. This network contains 5,366 km: all the asphalt roads, 3,275 km of gravel-surfaced, and 891 km of dirt. A feeder network connects the major production regions to the economic centers and has 3,855 km of roads: 2,837 km are gravel-

surfaced and 1,048 are dirt. Finally, the local network contains 28,915 km of dirt roads.

Railroads: Bolivia has two major railroad systems, each with several lines, totalling 3,572 km. The western system provides access to the Pacific ports of Matarini in Peru and Arica and Antofagasta in Chile, and Atlantic ports in Argentina. The eastern system has two lines, one going from Santa Cruz to Yacuiba on the Argentine border, and the other going from Santa Cruz to Corumba on the Brazilian border. The two systems are not currently linked.

Ports: Since it is landlocked, Bolivia is dependent on free port privileges granted by its neighbors. Bolivia has outlets by treaty rights on the Paraguay and Parana Rivers, which gives it access to the Rio de la Plata and out to the Atlantic. Most of Bolivia's foreign trade is handled through eight free ports: Rosario and Buenos Aires (in Argentina), Antofagasta and Arica (in Chile), Matarani (in Peru), and Santos, Belem, and Porto Velho (in Brazil).

Airports: Bolivia has 30 airports, two of which have international service: these are in La Paz (El Alto) and Santa Cruz. Seven of the 30 airports have permanent-surface runways, one of which has a runway longer than 3,700 m. Nine more runways have lengths greater than 2,440 m. There are also at least 100 clandestine airstrips in the northern part of the Oriente.

Airlines: The principal Bolivian airline is Lloyd Aereo Boliviano (LAB), a partly state-owned company. It operates internal services linking the major towns of Bolivia, and joint services with other national airlines to Argentina, Brazil, Chile, Peru, Panama, Venezuela, and the U.S. Another Bolivian company, Transportes Aereos Miliares, operates internal passenger and cargo flights.

Other international airlines that serve Bolivia are Eastern, Lufthansa, Viasa, Avianca, and LAN Chile.

2. Disaster Vulnerability

2.1 Overview of the Physical Environment

Bolivia can be divided into three distinct geographical regions: the highlands, consisting of two chains of the Andean mountains and the altiplano, a high, cold, windswept plateau; the yungas and valles, intermediate level, warm and humid valleys; and the lowlands in the eastern part of the country (the Oriente), which range from tropical rain forests in the north through savannas to the dry plains of the Gran Chaco in the south.

Altiplano: The highlands make up only about 30% of Bolivia's land area but contain over half its population. Subsistence agriculture, livestock raising, and mineral extraction are the primary activities. All areas of the highlands have a pronounced dry season that lasts over six months of the year; however, the influence of Lake Titicaca makes the northern altiplano much less dry than the southwestern part. The region near the lake receives about 650 mm of rainfall per year while the southern altiplano gets only 250 mm. The driest months are June and July -- sometimes there is no rainfall at all in that time -- and the rainy season is from about December to February. Frequent hailstorms are a threat to crops; frost is also common, particularly in the southern region.

Yungas and Valles: These steep valleys are at elevations ranging from 300 to 2,800 m and generally have a warm, humid, subtropical climate. Average temperatures are close to 18° C and annual precipitation can reach 1,300 mm in some areas. The yungas and valles, with their characteristic heavy rainfall, are suitable for food production.

Oriente: The topography and climate of the Oriente change as one moves from north to south. Northeastern Bolivia is a tropical rain forest and part of the Amazon Basin. Brazil nuts and rubber are extracted here. It is a very humid region with an average annual precipitation of 2,500 mm. South of this area are the Beni plains, which receive an average of 1,800 mm of rainfall per year and are suitable for cattle raising. Further south is the excellent agricultural land of the Santa Cruz region, which consists of subtropical forest and savanna. The average annual rainfall is 1,150 mm and the dry season is from May to October. Finally, in the extreme south is the semiarid Bolivian Chaco. This region endures a prolonged dry season of seven to eight months (from approximately April to November) and receives an average annual precipitation of 750 mm.

There are three river drainage basins in Bolivia. About 14% of the rivers are part of the closed system in the altiplano; and because it is a closed system and in the mining area, water pollution is a big problem. Another 21% form part of the Rio de la Plata drainage basin.

The remaining 65% of the waterways are part of the system which ultimately drains into the Amazon.

Bolivia's water resources, though abundant, are not evenly distributed. Some areas, such as the populous altiplano, face critical water shortages, while other regions are susceptible to seasonal flooding. Furthermore, because of Bolivia's high mountain chains and steep plunges from mountains to plains, rivers cannot serve as a link between the altiplano and the eastern lowlands. Figure 1 shows the vast differences in elevation among the regions.

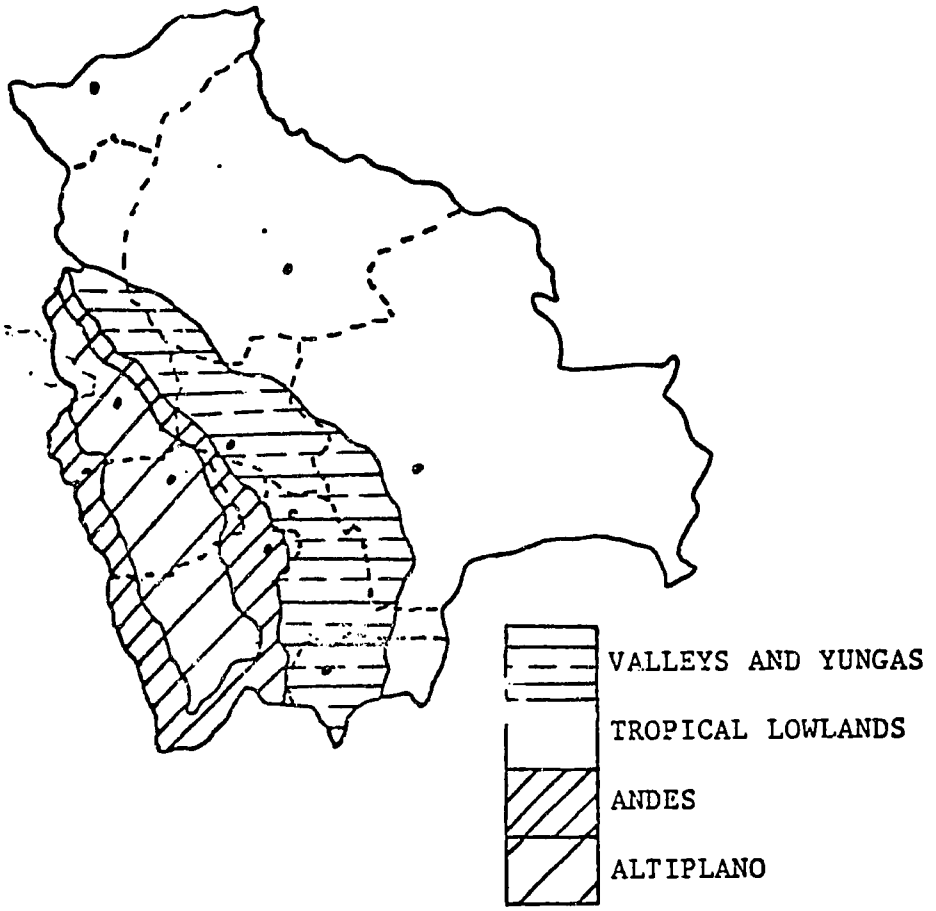
2.2. Floods

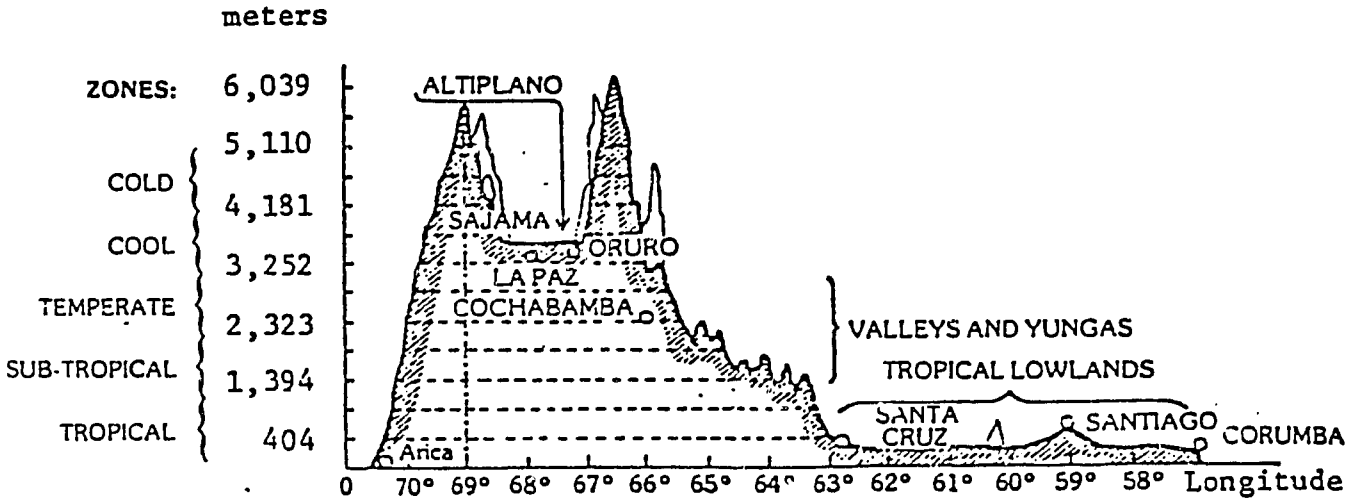
The eastern slopes of the Andes receive very high rainfall brought by the prevailing easterlies, or trade winds, which move inland through the Amazon Basin. Heavy precipitation during the rainy season in the Oriente lowlands frequently results in flooding and landslides. Sections of the departments of La Paz, Beni, and Santa Cruz are regularly flooded and often require emergency assistance.

Seasonal flooding in the Oriente has been caused in large measure by land clearing for agricultural colonization. Forest clearing has led to soil erosion and loss of wildlife, and is particularly severe at the base of the Andes in the Chapare (northeast of Cochabamba) and Alto Beni (southern Beni department). Numerous landslides deposit debris in rivers and build up large dike-like impoundments. When these break, high walls of water, known as turbios, move rapidly downstream and destroy everything in their way. Moreover, the increase in runoff volume and velocity causes streams to clog with silt and overflow their banks. Tributary streams often cannot discharge their load into the main channels because of a rise in the base level and volume of water being carried. This also causes flooding.

In addition to flooding caused by heavy seasonal rains and environmental problems, a weather phenomenon known as El Nino periodically causes disastrous inundations. Normally, usually in December, the warm but weak equatorial current (known as the Warm Intertropical Covergence Zone-ITCZ) displaces the cold, highly saline Humboldt current from its stationary position north of the equator off the western coast of South America. The resulting movement of warm tropical water along the coast brings in vast convective air movements which produce rainfall. However, every few years--no exact pattern has yet been discerned--a much higher than normal sea surface temperature occurs. This phenomenon, called El Nino, can significantly affect weather patterns. It has been observed in 1917, 1925, 1932, 1939, 1953, 1966, 1972, and 1982-83. Even though Bolivia is

Figure 1 Geographic Profile of Bolivia





not on the coast, El Nino still causes distinct and often disastrous variations in precipitation levels. For example, during 1982-83, the Pirai Valley region, where the city of Santa Cruz is located, received record high rainfall. As can be seen from the following table, actual rainfall greatly exceeded historic averages. The intensity of the rain also contributed to the flooding.

Rainfall (mm) in the Oriente
(Santa Cruz, elev. 437 m)

Month	Mean Rainfall 1943-1983	Actual Rainfall 1982-1983	% of Average
July	49.0	73	149
August	42.0	100	237
September	70.8	200	282
October	101.3	283	279
November	120.1	290	241
December	168.6	300	178
January	176.7	200	113
February	129.5	195	151
March	120.1	314	261
April	101.1	211	209
May	82.6	110	133
June	73.4	245	334

Source: Inter-American Development Bank.

2.3 Drought

Winds which blow across the 80-116 km-wide Humboldt current bring little moisture and produce lower than average temperatures for the latitude. The dry conditions of this coastal desert extend to the altiplano, particularly the southern part, which receives little precipitation. The El Nino phenomenon in 1982-83, in addition to causing extensive flooding in the Oriente, also caused one of the worst droughts in decades in the altiplano. The chart on the next page shows how sharply the actual rainfall varied from the norm between November 1982 and April 1983.

Rainfall (mm) in the Altiplano

	Oct. 1982	Nov. 1982	Dec. 1982	Jan. 1983	Feb. 1983	Mar. 1983	Apr. 1983	May. 1983	Jun. 1983
La Paz (Elev. 3,623 m)									
Rainfall (mm)	51	60	58	73	15	39	29	19	8
Mean 1952-82	32.1	44.8	81.3	106.4	77.7	63.8	24.7	9.7	3.3
% of Aver. Month	159	134	71	69	19	61	117	196	242
Potosi (Elev. 3,980 m)									
Rainfall (mm)	25	60	80	60	30	30	10	0	0
Mean 1943-82	20.7	29.9	71.9	72.2	63.7	57.0	10.8	6.1	1.6
% of Aver. Month	121	201	111	83	47	57	93	0	0
Cochabamba (Elev. 2,560 m)									
Rainfall (mm)	18	41	98	49	34	14	6	0	0
Mean 1963-82	16.2	44.2	87.3	121.6	98.1	59.4	16.5	3.8	1.5
% of Aver. Month	111	93	112	40	135	24	36	0	0
Sucre (Elev. 2,750 m)									
Rainfall (mm)	10	10	97	44	46	18	2	3	0
Mean 1943-82	37.2	59.6	114.7	152.5	120.4	97.2	24.2	6.5	2.0
% of Aver. Month	27	84	85	29	38	19	8	46	0

Source: Inter-American Development Bank.

The period from January to March is a critical phase in the growing season of tubers (principally potatoes) and cereal grains in the altiplano. Precipitation was much lower than usual during that time and the added occurrence of frost and hail in February and March virtually destroyed all the crops. The most serious loss was the potato crop, the country's staple, which fell to only 303,000 MT, or 34% of the previous year's yield.

The southern part of the Oriente, the Bolivian Chaco, is the other region of Bolivia which has a significant dry season, often making the Chaco a parched desert between April and November. But during the rainy season, the region can be turned into a swamp. The area, however, is isolated and sparsely populated and droughts there cause considerably less hardship than in the altiplano.

2.4 Civil Strife

Bolivia's political instability has not infrequently led to civil strife. Some coup d'etats have had little effect on Bolivians other than a shuffled leadership, while other changes of government have been accomplished only after considerable bloodshed. If a conflict does ensue, it is usually in the cities and mining areas.

The United States government has sometimes sent emergency supplies to Bolivia in response to civil strife. This aid usually takes the form of medicines and drugs, which are often in limited supply in Bolivia.

2.5 Vulnerability of Agriculture

The tables below list Bolivia's major agricultural areas and principal crops, as well as the planting and harvesting dates for the staple crops by region.

Principal Crops by Region

	Average Elevation(m)	Average Temperature(°C)	Precipitation (mm)	Principal Crops
Altiplano Norte	3,900	12°	650	Potatoes, onions, quinoa, barley
Altiplano Central	3,500	10°	350	Potatoes, other tubers, barley, quinoa
Altiplano Sur	3,030	8°	249	Potatoes, other tubers, barley, quinoa
Valleys	1,500-2,700	14°	800	Bananas, coffee, citrus, maize, wheat, fruits, coca
Oriente	120-727	24°-28°	749-2,500	Rice, yucca, citrus, sugar cane, maize, cotton, bananas, cocoa

Source: Inter-American Development Bank

Estimated Regional Crop Calendar for Subsistence Farming

P=Planting, V=Vegetative/Flowering, H=Harvesting

Region	Crop	J	F	M	A	M	J	J	A	S	O	N	D
Eastern Lowlands	Corn	V	V	V	H	H				P	P	P	V
	Beans	H	H							P	P	V	V
	Rice	V	V	H	H	H					P	P	V
	Sugarcane	V	V	V	V	H	H	H	H	H	V	V	V
Yungas	Corn	V	V	V	H	H				P	P	P	V
	Potatoes	V	V	H	H	H	H		P	P	P	P	V
Valles	Corn	V	V	V	H	H				P	P	P	V
	Potatoes	V	V	H	H	H			P	P	P	P	V
	Wheat	V	V	V	V	H	H					P	P
Altiplano	Corn	V	V	V	H	H				P	P	P	P
	Potatoes	V	V	H	H	H			P	P	P	P	P

Source: Climate Impact Assessment Methods (NOAA 1983)

Potatoes are the most important food crop and the staple in the highlands, and in most years production is self-sufficient. Maize is the second most important food crop in Bolivia and is grown mostly in the valleys and lowlands, while rice has become a standard item in the diet of the lowland and valley population.

In the altiplano, over half the population relies on subsistence agriculture and livestock for their livelihood. A particularly severe or long drought, such as the one in 1982-83, can have devastating immediate and long-term consequences. In the 1982-83 drought, an estimated 80%, or over one million metric tons, of the normal fall harvest of staple crops, particularly potatoes, were lost. Livestock losses were also high, in some cases as much as 30-40% of the cattle, sheep, and llama herds. Crop losses were estimated at $277.7 million and livestock losses at $139.5 million. Aggravating the situation was the disproportionately high (85%) loss of livestock offspring: herders were forced to slaughter the young when their mothers could no longer sustain them. In addition, crop losses were so severe that there was a shortage of seeds, and many farmers could not afford to buy enough for the next season's planting. These critical shortages hindered recovery.

Even with favorable weather, droughts are a frequent occurrence in the altiplano and add to the hardships of the subsistence farmers and herders. However, the 1982-83 drought was of a greater magnitude and its effects are likely to be felt for many years to come. Not only did the drought extend beyond normal geographic and seasonal limits, but the flooding in the Oriente wiped out alternative food sources and transportation networks.

Of the areas prone to flooding, the department of Santa Cruz with its large agricultural settlements is subject to the greatest crop damage. The torrential rainfall of 1982-83 caused flash flooding when the Rio Pirai overflowed its banks. Nearly 86,400 hectares under cultivation were submerged during the critical harvest period and crop losses were estimated at $13.2 million. Flooding and landslides also occurred in major river systems north of the city of Santa Cruz and caused damage to crops of the San Julian colonization project located between the Rio Grande and the Rio San Julian.

2.6 Vulnerability of Infrastructure

Because dirt roads cannot be used by vehicular traffic during the rainy season, asphalt and gravel-surfaced roads are all important. Sections of this vital primary and feeder network are highly vulnerable to flooding. Large parts of the embankment of the highway which links Santa Cruz with Cochabamba, the principal economic artery of Bolivia and the only paved road linking the altiplano with the lowlands, were washed away by the floods in 1982-83. About 20 km of the highway was almost completely destroyed and another 70 km was seriously affected. The road damage isolated the high production areas of the department of Santa Cruz. The flooding also destroyed many drains and several bridges, the most important being the Taruma and La Beligca bridges. Finally, about 1,200 km of feeder network roads, mostly gravel-surfaced, in northern Santa Cruz were seriously damaged as embankments were washed away and the culverts destroyed.

Water is often scarce in the dry altiplano, but the 1982-83 drought severely depleted supplies. The most adversely affected area was Potosi, a city of nearly 104,000 people, where water sources became contaminated or dried up. To alleviate this situation, Argentina loaned Bolivia railroad tank cars to transport water from rivers about forty km away. The government of Bolivia also provided transportation facilities and well-drilling equipment.

In other provincial capitals and cantonal centers, water was rationed. Towns which normally had piped water systems provided such service for only one to two hours a day. Other towns discontinued piped distribution to houses and used public standpipes instead. Water consumption in the southern altiplano during the drought was estimated at six to twenty liters per day per person for all purposes, an amount which the local

residents felt was low but adequate. The shortage of potable water has caused health conditions to deteriorate. In the department of Potosi, malnutrition has increased dramatically among rural children, while intestinal disorders have increased among both adults and children.

Severe droughts in the altiplano increase the net out-migration from the area. Even in the best of times, about six persons per thousand permanently leave the departments of Potosi and Oruro per year, while seasonal migration is also common. During the 1982-83 disaster, however, about 75% of adult men migrated from the most affected areas of Cochabamba to the Chapare region and Santa Cruz. About 30% of the men left Oruro--20% to cities and 10% to the Oriente--to look for cash employment, while 30% left eastern Potosi and more than half quit southern Potosi. Many of those who left southern Potosi took their families and went further away (to Argentina).

The problem with this increase in migration is that the absorption capacity of many areas within Bolivia has been surpassed. Cash employment opportunities in the cities no longer exist--urban unemployment is already high--while in the Chapare region migrants must settle on marginal lands and national forests (on which they will probably grow coca). Mortality and disease rates also increase dramatically among the migrating population, and the upsurge in migration due to the 1982-83 drought put new strains on health services.

2.7 Disaster History

Date	Disaster Type	Location	Number Killed	Number Affected	Damage ($'000)
11/04/64	Civil Strife	La Paz	0	160	n.a.
12/22/65	Flood	Beni Dept.	40	500	100
02/00/66	Flood	Rio Mamore (Beni)	0	5,500	500
06/29/66	Flood	Santa Cruz Dept.	14	500	100
12/09/66	Hailstorm	Oruro Dept.	0	n.a.	8
03/12/67	Flood	Rio Bermejo (Tarija Dept.)	0	100	10
02/11/68	Flood	Rio Grande (Beni)	24	20,000	3,000
02/00/69	Epidemic	Magdalena (Beni)	16	24	n.a.
11/00/69	Epidemic (polio)	Cochabamba, Sucre	2	53	n.a.
08/19/71	Civil Strife	Major cities	200	700	n.a.
02/00/74	Flood	Beni, La Paz, Oruro Depts.	31	18,000	10,500
10/13/76	Plane Crash	Santa Cruz city	112	n.a.	2,200
00/00/77	Drought	Altiplano	0	n.a.	n.a.
01/03/77	Flood	Santa Cruz Dept.	10	70,000	10,000
02/00/78	Flood	Santa Cruz, Beni	0	63,000	n.a.
12/00/78	Flood	Santa Cruz Dept.	40	100,000	n.a.

Date	Disaster Type	Location	Number Killed	Number Affected	Damage ($'000)
00/00/80	Flood	Beni Dept.	n.a.	15,000	n.a.
03/00/82	Flood	Beni/Santa Cruz	n.a.	30,000	400,000
00/00/83	Drought	Altiplano	0	1,583,049	417,200
03/17/83	Flood	Santa Cruz Dept.	250	50,000	48,400

Source: OFDA Disaster History on file at the Office of U.S. Foreign Disaster Assistance in Washington, D.C. Covers 1900 to the present.

3.1 Host Country Disaster Organizations

The Government of Bolivia issued its National Emergency Plan for Reconstruction and Rehabilitation in April 1983. The primary objectives of the plan are to avoid widespread starvation and to help Bolivia return to self-sufficiency in basic food crops (such as potatoes) after the devastating effects of the recent floods and droughts. The six components of the emergency plan with their estimated costs are as follows:

1) Increased agricultural production - $60 million
2) Provision of emergency food supplies - $219 million
3) Potable water projects - $43 million
4) Logistical support for food distribution - $27 million
5) Infrastructure rehabilitation - $84 million
6) Flood prevention - $37 million

TOTAL: $470 million

The government entity responsible for the design and implementation of the Plan is the National Civil Defense Committee. The Committee is chaired by the Minister of Defense and the executive working group includes the Ministers of Interior, Planning, Health, Transportation, Housing, Industry, and Agriculture, and the Commander of the Armed Forces.

The Secretary for the working group is the National Director for Civil Defense, who is also responsible for implementing the group's policy decisions. The Director has the authority to call on the material and human resources of all government-affiliated organizations to respond to disasters.

The role of the Civil Defense Committee at the national level is to establish priorities for the government's Emergency Recovery Plan, and at the departmental level, to coordinate rehabilitation assistance from various donors. Much of the Committee's funds come from the monetization of P.L. 480 Title II commodities for disaster assistance.

Bolivia's ability to implement its plan is limited because of the country's economic crisis. However, the government has managed to undertake small-scale efforts in response to the 1983 floods and drought. In the Santa Cruz region, the government helped establish emergency housing for flood victims. This project, called Plan 3000, has been transformed into a viable permanent settlement. Repairs on the vital Cochabamba-Santa Cruz highway have been started by the National Road Service. In the drought-stricken altiplano, the government has concentrated on restoring the potable water system of Potosi and on providing credit to farmers.

For further implementation of the Emergency Plan, assistance must be provided by the international community. Several countries and international organizations (including the United States and the Inter-American Development Bank) are carrying out projects which have been designed to fit into Bolivia's Emergency Plan. (For more detailed information, see Section 3.12, Mitigation and the Development Process.)

The Bolivian permanent disaster coordination center is located at:

Direccion General de Defensa Civil
Calle Ballivian No. 1427
La Paz
Tel.: (591)(2) 367093

Since the late 1970s, approximately six Bolivian government employees have received training in disaster preparedness in the U.S. The United Nations has also sponsored several disaster conferences. However, political reappointments and personnel transfers have left few of these people in direct contact with disaster relief efforts in Bolivia.

The National Community Development Service (NCDS) is an arm of the Bolivian government which participates in USAID Food for Peace projects. It works primarily in the city of La Paz.

Bolivian Voluntary Organizations

There are two national relief organizations (in addition to Caritas Boliviana which works with Catholic Relief Services) which respond to emergencies: the Bolivian Red Cross and the Junta Nacional de Accion Social. The Red Cross collects medicines, clothing, and food, requests assistance from its counterparts in other countries, and distributes relief supplies. The Junta Nacional de Accion Social is a small charity organization which is always headed by the wife of the President. Its activities mostly involve collecting public donations of cash and materials.

Bolivian Red Cross
Avenida Simon Bolivar 1515
La Paz
Tel.: (591)(2) 340948
President: Dr. Alvaro Carranza

Junta Nacional de Accion Social
Avenida Mariscal Santa Cruz
Edificio Loteria Nacional, Piso 5°
La Paz
Tel.: (591)(2) 376864
President: Wife of President of Bolivia

3.2 Health Resources

Bolivia is one of the poorest countries in South America and thus its health status is also one of the worst in the hemisphere. Accurate and comprehensive statistics are very hard to come by in Bolivia but those that are available indicate a low standard. Life expectancy at birth is 51 years, the crude death rate is 16 per thousand, the infant mortality rate is 129 per thousand, and the child (ages 1-4) mortality rate is 23 per thousand. (All figures are from 1981.)

The major causes of morbidity and mortality are respiratory, gastrointestinal, and parasitic ailments, along with trauma, pregnancy complications, and malnutrition. The topography of Bolivia causes great variance in the climate and hence in the prevalence of certain diseases. In the tropical lowlands of the Oriente the endemic diseases are malaria, yellow fever, hemorrhagic fever, leprosy, leishmaniasis, hookworm, and Chagas' disease. The yungas and valles are particularly susceptible to Chagas' disease and leprosy -- malaria has been eradicated -- while the altiplano has a high incidence of typhus and scabies. Respiratory and diarrheal diseases, venereal diseases, tuberculosis, and intestinal parasites (other than hookworm, which is endemic only in the lowlands) are found throughout Bolivia.

Most of these problems could be drastically reduced through the provision of standard public health measures, such as potable water and sewage disposal systems, vaccination programs, health education programs, maternal and child care services, and improved housing. Nevertheless, Bolivia's health care system concentrates on curative medicine in the urban centers. Rural areas, in contrast, have been largely ignored by the health system. One of the main problems is that the rural population is so widely dispersed, with about 60% of the population living in groups of less than 200 inhabitants. Therefore, providing basic sanitation services, such as sewage disposal, is both difficult and costly.

The consequence of having a curative-oriented, urban-based health system is that it reaches only about 50% of the population while the other 50% rely on traditional medicine. There have been few studies conducted to investigate the extent and substance of traditional medical practices; however, it is known that they are a mixture of religion, herbology, magic, and colonial medicine. "Specialists" range from witch doctors (brujos) to folk healers (curanderos) and midwives (parteras). Herbal medicines and treatments are often used for minor ailments while magical-religious treatments are carried out to cure major illnesses, which are usually thought to be caused by supernatural forces or witchcraft.

In the rural regions of the altiplano, among both the Aymaras and Quechuas, health is viewed as a balance in the relationships among the individual, his neighbors, the environment, and the spirits. When the balance has been disrupted, illness results. Treatments often correspond to theories of "hot" and "cold". These characteristics, which have

nothing to do with temperature, usually apply to food, drink, and herbs. A traditional practicioner must treat the malady with an item of the opposite characteristic to restore a balance. Other diseases are explained in terms of metaphysical relationships. Malnutrition, for example, is often associated with fright, and its treatment involves dealing with spirits. Folk medicine is also prevalent in urban areas such as La Paz, where health care is a mixture of indigenous practices and modern medicine.

Bolivia is divided into eleven regional health offices which correspond to departmental boundaries with the addition of a jurisdiction called Riberalta (which contains parts of the departments of Pando and Beni) and one called Tupiza (containing the southern half of Potosi Department). Each is organized and functions as a microcosm of the Ministry of Health (MOH). There is a general hospital in each departmental capital plus ones in Riberalta and Tupiza. The MOH also operates several specialized hospitals: two tuberculosis hospitals in La Paz, one in Cochabamba, and one in Potosi; children's hospitals in La Paz and Cochabamba; and two psychiatric hospitals, both in Sucre.

Each regional health unit has at least one health center in each urban area. In addition, medical posts are located in marginal neighborhoods on the edge of large cities. Health centers and posts are outpatient clinics which are designed to supplement the outpatient services at the general hospitals. The services provided usually involve primary care, maternal and child health services, or vaccination. Health centers also usually have special outpatient services for tuberculosis patients.

The MOH's rural care system is divided into three levels: health center hospitals, medical posts, and sanitary posts. There has been constant growth in the number of health posts, but services have remained minimal, with low utilization rates and low quality of care.

There are several other government agencies which provide health services: the Social Security System, which covers approximately one million people mostly in urban areas; the National Institute of Colonization, which provides health services in the colonized areas in Santa Cruz and Beni; the National Railroad Company and National Road Service, which provide services for their employees; and the National Community Development Service, which sponsors programs to improve rural conditions.

In the mid-1970s, there were 285 health facilities with beds in Bolivia, 175 with 20 or fewer beds, and only 23 with more than a hundred beds. Private hospitals are almost always small, while public facilities tend to be small in rural areas and large or middle-sized in urban areas. Facilities are generally considered sub-standard and inadequate.

To summarize, Bolivia has one of the lowest standards of health care in Latin America and relatively high rates of morbidity and mortality. However, many of these problems stem from a lack of development endemic in the Third World: inadequate infrastructure, overcrowded housing, lack of potable water and sewage systems, and lack of education. This is compounded in Bolivia by its political instability, which has resulted in very high turnover rates in the Ministry of Health and a lack of commitment--or ability--to follow through on programs.

3.3 Food Resources

Bolivia receives more than 25,000 metric tons (MT) of Food for Peace commodities per year. Most of the food arrives through the Pacific ports of Matarani, Arica, and Antofagasta (see Section 3.7 Ports). From there it is transported overland to Bolivia at U.S. government expense. It is warehoused in eight "gateway" cities, all of which are in the altiplano with the exception of Santa Cruz. La Paz has the most, approximately 30% of the total. Most of the food consists of non-fat dried milk, rice, wheat flour, and vegetable oil.

The two implementors of the regular program are Catholic Relief Services (CRS) and the Seventh-day Adventist World Services (SAWS). In fiscal year 1984, CRS received 21,720 MT to distribute to 395,000 people, while SAWS handled 5,629 MT which went to 60,000 recipients.

In fiscal year 1983, 177,000 MT of wheat was sent to Bolivia through the Title III regular program. For emergency Title III assistance, Bolivia received 29,000 MT of rice and 31,000 MT of wheat. These commodities were monetized by the government of Bolivia's National Rice Enterprise (ENA) to underwrite the added operating expenses of the voluntary organizations and government agencies implementing emergency programs, and to fund other disaster activities.

No information was available on food reserves of the Bolivian government or domestic voluntary agencies.

3.4 Housing

The traditional campesino house in the highlands is a rectangular adobe box about 3.0 m by 3.7 m, with walls 1.5 m to 1.8 m high and a steeply gabled roof. These dwellings are usually well-built and make effective use of the available raw materials. Houses are often used as workshop and storage space as well as for shelter. Cooking is usually done inside the house. Dried manure is used for fuel and is stored in corners.

Floors are made of unprocessed or pounded earth while walls are often made of adobe blocks with mud used as mortar. Sometimes the mud is poured into temporary wood frames and pounded into place with heavy wood mallets. Roofs are made out of thatch; near Lake Titicaca people use reeds, while scrub is the material in other parts of the altiplano. The roofs are steeply gabled to allow the heavy rains to run off.

Traditional houses in the tropical lowlands vary primarily in the construction materials available. Walls are often built with open bamboo or a bamboo framework, and palm fronds are frequently used for roofs. A common type of construction involves connected poles smeared thickly with straw-tempered mud. In general, housing in the Oriente is less durable and less permanent than in the highlands.

There are occasional modern variations in rural housing. Tile or metal sheets have often replaced thatch for roofing and a few concrete floors are found in areas closer to cities. Also, a number of dwellings now have windows, some with panes, and many families now have some furniture, such as tableware and kitchen equipment. Electricity still does not reach many rural homes and kerosene lamps are prevalent.

The urban poor also usually live in adobe dwellings. The main difference from rural housing is the greater use of corrugated roofing. In La Paz, most of the poor live in crowded neighborhoods on the steep slopes which descend from El Alto airport. Housing construction has not kept pace with urban growth, and overcrowding and a lack of services are serious problems.

In the highlands, the vulnerability of housing in disasters is due more to location and overcrowding than to structural deficiencies. In fact, Bolivian traditional adobe housing is considered to be well-constructed. However, the barrios in La Paz and other cities in the highlands are built on such steep slopes that the houses can be washed away from their foundations in heavy rains and landslides.

Damage to housing is more common in the Oriente because dwellings are less sturdy and the region is prone to frequent flooding. In the 1982-83 floods in Santa Cruz, 10,000 housing units valued at $11.8 million were damaged or destroyed.

3.5 Roads

Road transport is the dominant type of transportation and accounts for three-fourths of all internal ton-kilometers and 95% of all passenger traffic. Nevertheless, road networks have developed slowly because of Bolivia's very rugged terrain. Building transportation infrastructure is costly and many areas of the country remain isolated. Only 3% of the nation's 38,164 km of road is asphalted while 16% is gravel-surfaced.

The road system in Bolivia is divided into three main categories: a) the primary network, which links the economic centers of the country; b) the feeder network, which connects the major production regions to the economic centers; and c) the local network, which connects small production centers to each other.

The primary network consists of 1,200 km of asphalted highways, 3,275 km of gravel-surfaced, and 891 km of dirt. It has two main axes, one running north to south, the other west to east. The first is the Pan American Highway, the Bolivian section of which begins at the Peruvian border near Lake Titicaca and ends at Bermejo on the Argentine border. It links the cities of La Paz, Oruro, Potosi, and Tarija. The second major highway goes from Oruro through Cochabamba to Santa Cruz. The section from Cochabamba to Santa Cruz is 560 km and is the longest paved road in Bolivia. This road is particularly important because it is the only link between the major cities of the altiplano and the Oriente. Before this highway was built, the drive between La Paz and Santa Cruz took two to four days with frequent delays during bad weather or because of landslides. One other highway, though all dirt, is considered part of the primary network. It runs from Santa Cruz south along the edge of the Andes to Yacuiba on the Argentine border.

The secondary network consists of 2,837 km of gravel-surfaced roads and 1,048 km of dirt while the local network system's 28,913 km are all dirt. The dirt roads are generally only usable during the dry season. The asphalt and gravel roads, on the other hand, can carry traffic all year round though drainage problems occur in the more rugged terrains.

The northern and eastern plains in the Oriente remain isolated and the region east of Santa Cruz is completely inaccessible by road. This fact seriously hampers the implementation of development programs. Neither Cobija, Riberalta, nor Trinidad is linked with La Paz or any other part of the altiplano. And if the highway between Cochabamba and Santa Cruz is impaired, there is no connection between the Oriente and the highlands.

3.6 Railroads

Although road transport is the main mode of travel within Bolivia, railroads remain the primary method for transporting imports and exports. Bolivia has two railroad systems, which are unfortunately only connected in Argentina. The larger and older one is the Western System. The several lines of this system were built between 1870 and 1920 to carry ore to Pacific ports. The state-owned National Railways Company (Empresa Nacional de Ferrocarriles-ENFE) consolidated the system's six separate lines into an integrated system in 1964, which now totals 2,404 km. The altiplano is thus linked with the Pacific ports of Matarani in Peru, Arica and Antofagasta in Chile, and several Atlantic ports in Argentina.

The Eastern System is 1,168 km long and was built after 1937 with help from Brazil and Argentina. There are two lines: one runs from Santa Cruz to Yacuiba on the Argentine border; and the other goes from Santa Cruz to Corumba on the Brazilian border. This system is also under the operation of ENFE.

The construction of a railway line connecting Cochabamba with Santa Cruz is under study. If it were to be built, the Western and Eastern Systems would be connected and direct rail travel from Chile to Brazil would be possible.

3.7 Ports

Bolivia has been granted free port privileges by its neighbors to allow it access to the sea. Three ports in Chile and Peru give Bolivia--particularly the altiplano--outlets to the Pacific. All three of these ports, Arica, Antofagasta, and Matarani, have railway links to the altiplano. In Argentina, Bolivia has port privileges at Buenos Aires and Rosario, the latter of which is on the Rio Parana, 375 km north of Buenos Aires. Also on the Atlantic side are the ports of Santos and Belem in Brazil. The port of Santos is used for much of Bolivia's exports. Finally, Bolivia has access to Porto Velho, which is in Brazil on the Rio Madeira (a tributary of the Amazon), close to Bolivia's northeastern border.

Antofagasta, Chile has an excellent artificial harbor. The anchorage is in about 27.5 m to 74 m with an uneven and rocky bottom. The entry to the port is 150 m wide and the minimum depth at approaches is 18 m. The depth inside varies from 9.1 m to 27.4 m. There are two quays for ocean-going vessels 350 m and 370 m long and both are served by roads and rail. There is also a new quay 750 m long which provides three additional berths for ocean-going vessels. There are three storage sheds: two are 5,000 sq. m and one is 4,000 sq. m. There is also one Bolivian transit shed of 3,100 sq. m.

Arica, Chile has five berths for ocean-going vessels. The depth alongside ranges from 6.1 m to 10.4 m. There is adequate storage space for all types of cargo.

Matarani, Peru is the port for Arequipa, with which it is connected by rail, and with Bolivia via Lake Titicaca. Three vessels up to 170.7 m long can be accommodated alongside the wharf. There are excellent warehouse facilities.

Rosario, Argentina has safe anchorage in the outer roads, but vessels must have both bower anchors out. Sheds 23-26 are reserved for Bolivian cargo.

3.8 Airports

Bolivia has 30 main airports. Seven of these have permanent-surface runways, and one is longer than 3,700 m. La Paz and Santa Cruz are the two airports with international service, and Cochabamba and Trinidad have the next largest airports. There are also at least 100 clandestine airstrips in isolated regions of the country which are used in the coca trade.

Characteristics of Bolivia's Four Major Airports

Airport	Aircraft	Length (m)	Strength (kg)
La Paz (El Alto)	DC10-30	4,000	175
Santa Cruz	B727-100	2,580	70
Alternate aircraft	B707-320	2,050	112
Cochabamba	B707-300C	2,050	112
Trinidad	B707-300C	2,050	112

Radio Aids: The Santa Cruz and Trinidad airports have Facility Performance Category I instrument landing systems while La Paz has Category II. All four airports have a very high frequency omni-directional radio range with distance measuring equipment.

Lighting Aids: La Paz has a Category I precision approach lighting system, whereas the others all have simple approach lighting systems. All four have visual approach slope indicator systems, with La Paz's suitable for long-bodied aircraft. All four airports also have runway edge, threshold, and runway end lighting; taxiway lighting; airport or identification beacons; and obstruction lighting.

Marking Aids: All four airports have the following markings: runway designation, runway center line, runway threshold, runway side stripe, fixed distance, taxiway center line and holding position, and obstruction. The La Paz airport also has runway touchdown markings.

The national airline of Bolivia is called Lloyd Aereo Boliviano, or LAB Airlines. It is a mixed state-private enterprise and it operates about 30 aircraft on domestic routes and international flights to Argentina, Brazil, Chile, Peru, Paraguay, Panama, and the United States. In addition to LAB, there are seven unscheduled airlines, 31 air taxi companies, private airplanes operated by COMIBOL (the state mining industry) and YPFB (the state petroleum enterprise), and a commercial branch of the armed forces called Transportes Aereos Militares (TAM). Six of the seven unscheduled airlines primarily move beef from Beni to the altiplano.

3.9 Energy Resources

Bolivia is an exporter of energy with a large resource base relative to its current internal needs. Energy's share in foreign trade increased throughout the 1970s, but in the 1980s, Bolivia no longer had an exportable oil surplus and had only one customer for its natural gas.

The urban population and the energy-intensive mining and metallurgical industries depend on liquid fuels and consume 65% of Bolivia's supply. The cities and mining areas get their liquid fuel through a well-developed system of pipelines from the Oriente. The rural population, however, uses much less, only about one-fourth the amount of the cities, and the energy sources consist mostly of non-commercial fuels such as firewood and charcoal.

Though Bolivia has enough energy for its needs, there is a wide disparity of availability and types among the three geographic regions. The altiplano currently has a large energy deficit because of the almost complete absence of forest cover, which has been depleted since colonial times. The rural population therefore relies on shrubs and animal waste. The lowlands, on the other hand, are energy rich. In fact, the area's rapid economic growth in the 1970s was largely based on the exploitation of its hydrocarbon resources. This relatively sparsely settled region also has the bulk of Bolivia's forest reserves.

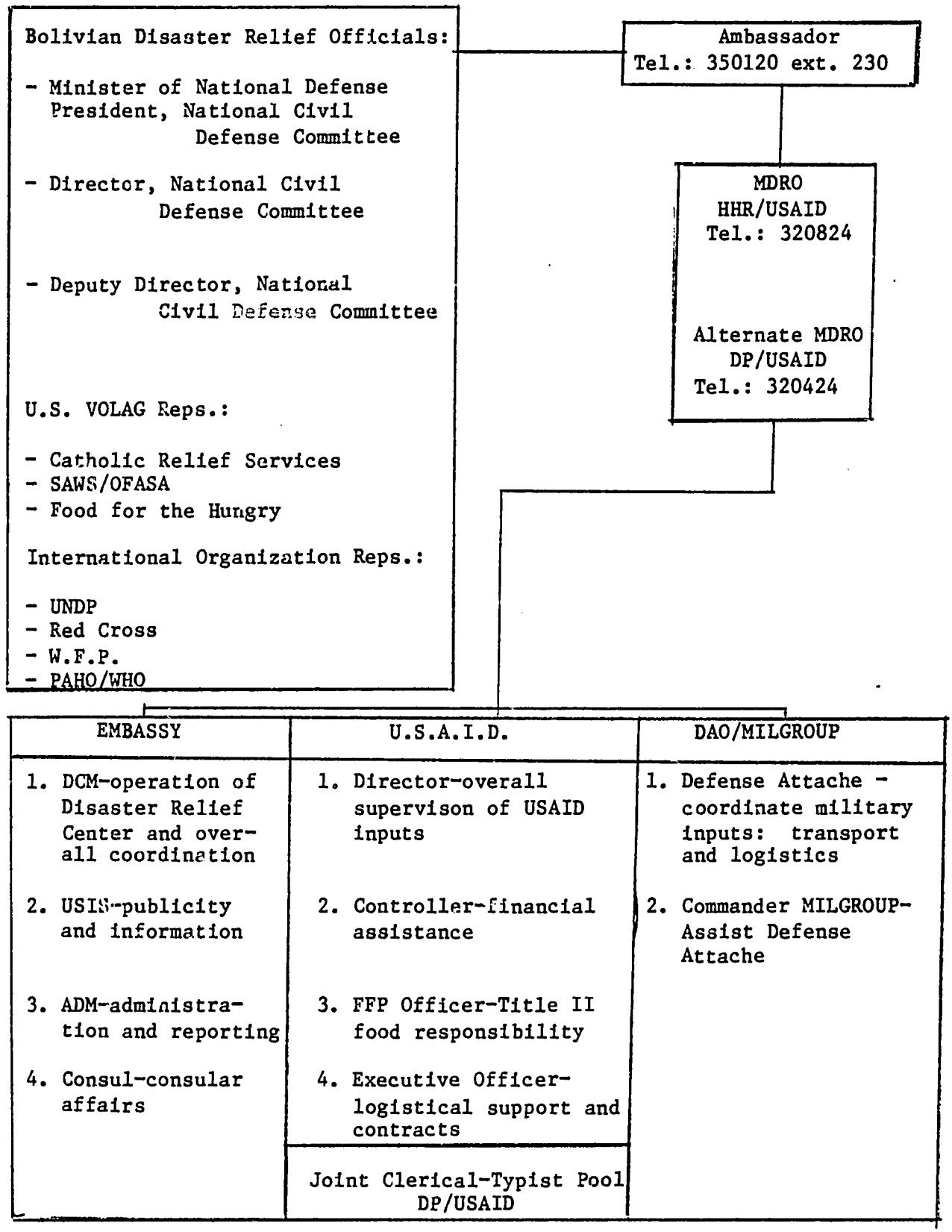
3.10 U.S. Mission Plan

The U.S. Mission in Bolivia has a standing Disaster Relief Committee to respond in case of disaster. This Committee can call on the resources of USAID's Office of Foreign Disaster Assistance (OFDA), the Department of Defense, the Center for Disease Control, and other federal civilian agencies. The Mission Disaster Relief Organization Chart lists the key mission staff which have formal roles in implementing disaster preparation and recovery activities.

The typical requests received by the Mission are in response to the recurring natural disasters of flooding and hailstorms. The Mission's response in 90% of these cases has been to authorize the distribution of P.L. 480 Title II food through Food for Work projects.

Copies of the Disaster Relief Plan, most recently updated in February 1984, are on file at the U.S. Mission in Bolivia and in the Washington office of OFDA.

U.S. Mission Disaster Relief Organization Chart



3.11 Voluntary Agencies and International Organizations

Catholic Relief Services (CRS), Caritas, Seventh-day Adventist World Services (SAWS), and the Bolivian organization, National Community Development Services (NCDS), carry out the Food for Peace regular program and CRS, Food for the Hungry International (FHI), and NCDS distribute the commodities of the Food for Peace Title II emergency program, usually through Food for Work projects. CRS and Caritas are the major participants in the emergency program.

CARE works directly with the Water Resource Division of the Potosi, Oruro, and Chuquisaca Department Development Corporations and helps select, plan, and build small rural potable water and irrigation systems. CARE has been involved in constructing rural water systems since 1976.

Several religious organizations run health or social welfare programs. Most of these are limited to local or single purpose programs. The Mennonites in particular have been involved in colonizing the Oriente.

CARE
Casilla 6034; La Paz
Tel.: (591)(2) 363270 ot 363227
Country Director: Stanley Dunn
Street address: Avenida Arce 2684

Besides CARE's central office in La Paz, it has division offices in La Paz, Sucre, and Tarija. Each office is managed by local-hire directors, all of whom are engineers. Its current staff in Bolivia consists of 26 employees: 14 technical or promotional workers, and twelve administrative or support employees.

CRS
Casilla 2561; La Paz
Tel.: (591)(2) 323335 or 352995
Representative: Dr. Eduardo Bracamonte
Street address: Calle Corneta Mamani 1973

CRS has the resources to provide supervisory personnel for distribution of relief supplies and food commodities; to contribute disaster relief materials (such as blankets and drugs); and to loan up to four vehicles.

Caritas Boliviana
Avenida 6 de Agosto 2864
La Paz
Tel.: (591)(2) 353748 or 341767 or 342402
Representatives: Fernando Argandona
Adhemar Penaya

Caritas Boliviana can provide supervisory personnel for the distribution of food commodities.

Foster Parents Plan, Inc.
Casilla 1401; La Paz
Tel.: (591)(2) 357955 or 356668
Country Director: Sam Johnson

FHI
Calle Montevideo 125
La Paz
Tel.: (591)(2) 351873 or 321414 or 326455
Representative: David Belz

FHI can provide supervisory personnel for the distribution of relief supplies and food commodities; contribute food; and loan vehicles. It started its food distribution activities in Bolivia with the 1983 emergency program. It has six regional offices with a Bolivian core administrative staff to complement the U.S. volunteers.

Heifer Project International
Casilla 434; Santa Cruz
Tel.: (591)(3) 322206
Project Director: Walt Henry

Heifer Project International is working to improve farm techniques and cattle management in the department of Beni.

International Voluntary Services, Inc.
Casilla 20190; La Paz
Tel.: (591)(2) 359889
Country Director: Barbara Roose

This organization works among the Aymara and Quechua Indians in the altiplano. Its projects include technical support for handicraft cooperatives, and veterinary services.

Mennonite Central Committee
Casilla 213; Santa Cruz
Tel.: (591)(3) 43773
Project Representatives: Bruce and Helen Glick

SAWS
West Bolivia Mission
Casilla 355; La Paz
Tel.: (591)(2) 361521, 352843, or 360627
President: Miguel Salomon
Street Address: Avenida 6 de Agosto 203
La Paz

SAWS
East Bolivia Mission
Casilla 2495; Santa Cruz
Tel.: (591)(3) 2200
Secretary-Treasurer: Manuel Egas

SAWS provides supervisory personnel for distribution of relief supplies and contributes food. It concentrates on Food for Work projects and maternal and child health programs.

International Organizations

Inter-American Development Bank
Edificio Bisa 5° Piso
Avenida 16 de Julio No. 1628
La Paz
Tel.: (591)(2) 370293, 370294, or 356901

The IDB is involved in two projects of Bolivia's emergency program: importing and distributing potato, wheat, and maize seeds, and repairing 70 km of the Chochabamba - Santa Cruz highway and 500 km of secondary roads in Santa Cruz Department.

World Food Program (WFP)
Edificio Santa Isabel C-2M
La Paz
Tel.: (591)(2) 358596
Representative: Luigi Di Maio

WFP can contribute food commodities.

Organization of American States (OAS)
Avenida 16 de Julio 1490
La Paz
Tel.: (591)(2) 327668 or 322738
Representative: Dr. Samuel Echalar

The OAS provides supervisory personnel for the distribution of relief supplies.

Pan American Health Organization (PAHO)
Edificio Gamarra 4° Piso
Calle Landaeta No. 221
La Paz
Tel.: (591)(2) 371644 or 364757
Representative: Dr. Gustavo Mora
Mailing address: Casilla 20094; La Paz

PAHO can provide the services of a sanitary engineer, a physician, and other public health personnel as needed. It also contributes medical supplies and lends vehicles during emergencies.

United Nations
Avenida Arce 2525
La Paz
Tel.: (591)(2) 358589 or 358594
Representative: Juan Blanch-Soler
Mailing address: Apartado Postal 686

The U.N. office in Bolivia will provide the services of the U.N. Disaster Relief Organization if requested; donate relief materials, vehicles, and personnel; and mobilize other U.N. organizations in Bolivia such as PAHO, WFP, and the U.N. Development Program.

3.12 Mitigation and the Development Process

Bolivia's geographical barriers and historically weak, unstable governments have severely hampered development efforts. A particularly corrupt regime combined with falling demand for tin and natural gas in the beginning of the 1980s contributed to one of Bolivia's worst economic crises. The El Nino-induced calamities of flood and drought in 1982 and 1983 led to widespread misery.

The emergency response to the 1982-83 disaster involved distributing emergency food commoditites and bringing in water to drought-stricken areas. However, several projects, if implemented successfully, not only could lead to fully recovery from the disaster, but also could contribute to development efforts. These projects involve road rehabilitation and the provision of potable water. The importance of the 560-km paved highway from Cochabamba to Santa Cruz should be reiterated as it is the link between the altiplano and the eastern frontier. The destruction of sections of this road curtailed food transport and thereby aggravated the disaster-related food shortages. Finally, the repair and improvement of this road could encourage migration from the relatively overcrowded highlands to the potentially rich eastern lowlands.

The road rehabilitation program is divided into two phases. The first will be financed by USAID and will repair bridges and the section of highway destroyed by flooding (between Santa Cruz and Samaipata) by 1986. The second phase, financed by the IDB, will restore the road to its pre-disaster condition.

The other relief project which could lead to a more permanent improvement in living standards involves the provision of potable water to part of the drought-stricken altiplano. Water is the most limiting factor in achieving realizable crop and livestock production, and consequently, reasonable living conditions, in the highlands. A major drought pushes the majority of subsistence farmers into a bare survival position. The areas most affected by the 1982-83 drought and subsequent deletion of water supplies were the southern part of the department of La Paz, all of the departments of Potosi and Oruro, southern Cochabamba, and northern Chuquisaca.

There are three components to the A.I.D.-financed project: repair of the urban water supply systems in Potosi and Sucre; potable water and small-scale rural irrigation projects to be carried out by CARE; and small to medium-scale irrigation projects to be handled by selected Departmental Development Corporations. If these projects are successful, the water supply and food production in these areas will be less affected by the vagaries of rainfall.

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