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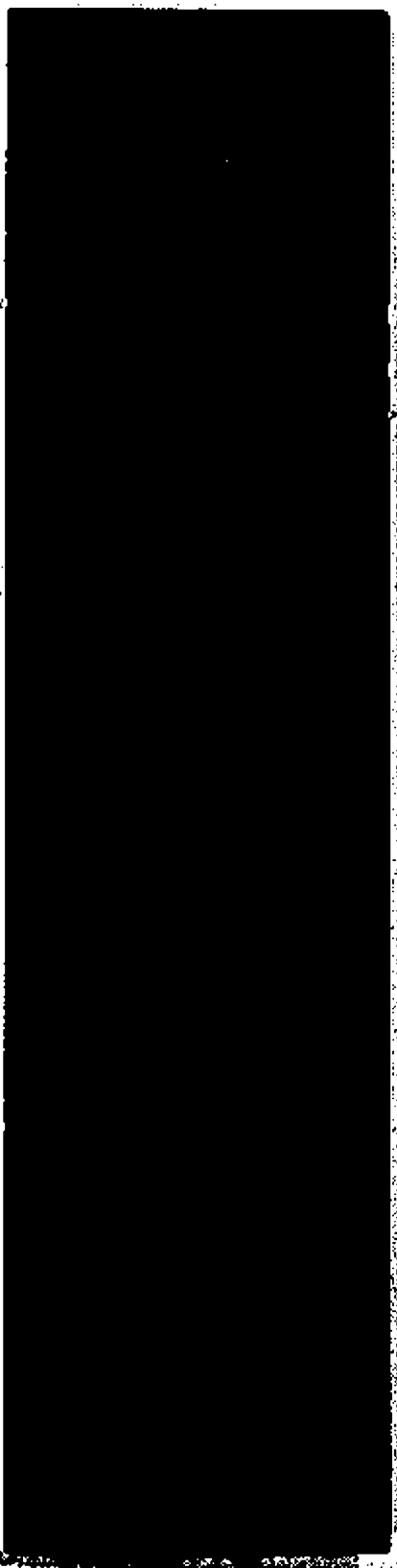

Ecuador

July 1973

NATIONAL INTELLIGENCE SURVEY

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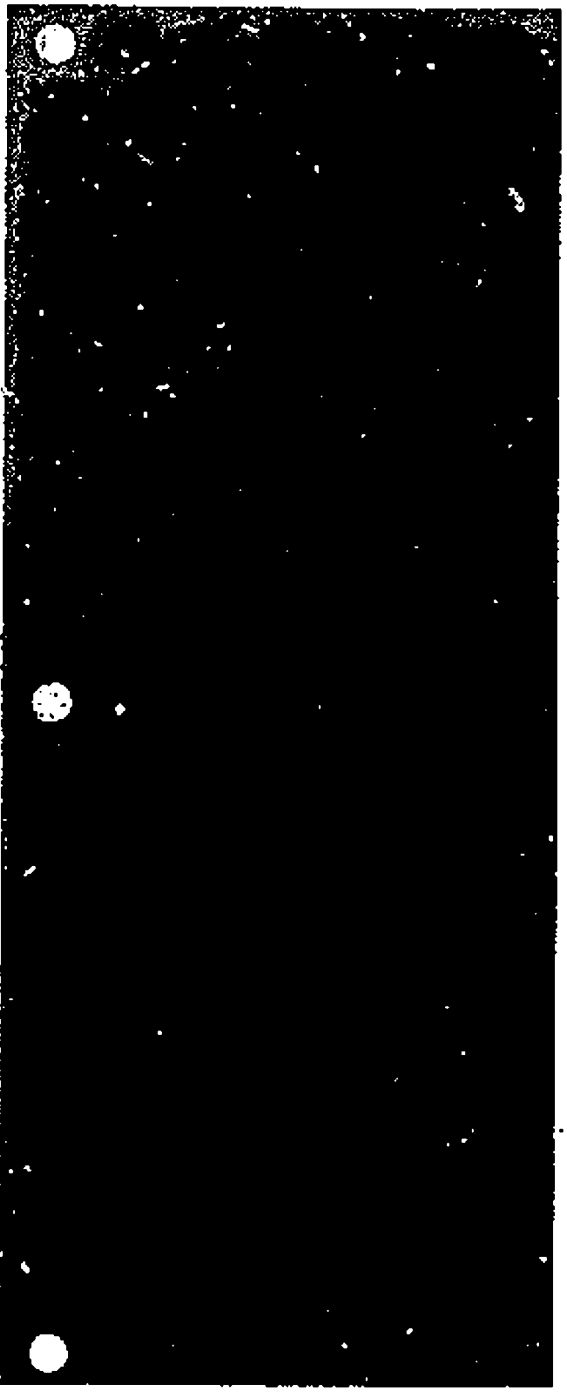

ECUADOR

CONTENTS

This chapter supersedes the transportation and telecommunication coverage in the General Survey dated September 1964

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FIGURES

Transportation and Telecommunications

A. Appraisal (C)

The transportation and telecommunication (telecom) systems of Ecuador are sparse and generally of low quality. Hardly adequate for present needs, they are a chronic handicap to the development of the nation. Transportation and telecom facilities are found almost exclusively in the western half of the country (Figure 10), habitat of essentially the entire population and locale of almost all economic activity.

The main transportation artery runs through the middle of the country, the Andean highlands or Sierra, on a north-south axis. It interconnects the principal cities and consists of the Pan American Highway, the Guayaquil–Quito–Sibambe railroad line, and a number of airfields. In the coastal area (the Costa), facilities vary widely, but during the rainy season transportation is generally difficult. Highways and inland waterways are the major modes of transportation, but heavy rains render many roads impassable, and some communities that lack access to inland waterways are isolated for extended periods. In the Oriente region air and waterways are virtually the only forms of transportation. However, there is a road from the north–south through route, the Pan American Highway, to a river port on the Río Napo.[1]

The government owns and operates the rail system, most of the telecom facilities, most of the merchant fleet (some of the ships are jointly owned with Colombia), and, through the air force, a civil air transport service of growing proportions. All other Ecuadoran transportation and telecommunication facilities are privately owned. Generally the transportation and telecom facilities are comparable to those of neighboring countries. The great development of these facilities needed throughout Ecuador is made extraordinarily difficult by the nature of the terrain, the climate, and the occasional earthquakes. In addition, adequate financing is a major problem.

Highways are by far the most important medium of transport, despite the sparsity and general inferiority of the network. Reaching far more of populated Ecuador than any other mode, the highways are especially important for serving agriculture, mainstay of the economy. Highway transportation has increased significantly, but the general situation of the railroads has steadily declined. Inland waterways serve as feeders for the highway net and the maritime port systems in the coastal area and in the rainy season afford the only usable routes of transportation in parts of that area; in the Oriente region they provide almost the only surface routes.

Most Ecuadoran foreign commerce moves through the major port of Guayaquil, but only a small percentage of the maritime commerce is carried by the small Ecuadoran fleet. Civil air, uniquely suited to overcome the transportation problems posed by the terrain, carries a small but significant and increasing number of passengers. The Pan American Highway affords the only surface international connections of any significance, but very little international trade passes over them. The inland waterways in the east are headwaters of the Amazon and potential gateways to the Atlantic, but they are scarcely used.

Telecom services vary widely; the best are in Guayaquil and Quito. Most telephones are in these two cities. Radio is the best developed service.

[1] For discussion on place names see the list of names on the reverse of the Terrain and Transportation map and the map itself.

Adequate international communications are available to the other South American countries, to Central America, to the United States, and to Europe.

B. Strategic mobility (C)

The transportation and telecom systems of Ecuador would not permit ready movement of a sizable military force. Virtually all significant facilities are located in the west, leaving a large part of the country without modern means of communication. The rail network, small, inefficient, and in very poor condition, would be of limited value in military operations. The two principal urban centers are connected by rail, but only 2 of the 11 minor ports have rail clearance. Use of the highway network by military forces would be severely limited by the large number of bottlenecks (narrow roadways, steep grades, narrow and low-capacity bridges, and fords) and by the low density and poor quality of roads. The large number of bridges, deep chasms, and roads built on steep hillsides and the scarcity of alternative routes would make highways vulnerable to interdiction, the nature of the terrain would make repairs or construction of bypasses very difficult.

Inland waterways are little developed but could provide the means of moving military materials to the eastern part of Ecuador. The major maritime ports and most of the minor ports are adaptable to military use.

Ecuador's seven cargo ships (five dry cargo and two refrigerator) totaling 51,476 d.w.t. represent a considerable military capability for short haul (up to 48 hours' steaming), troop lift, and sustained logistics support in seaborne operations. These units have a military lift and supply transport potential of about 45,760 cargo deadweight tons; their military utility would be enhanced by one ship that has a heavy-lift-boom capacity of 60 long tons and one ship that has a boom capacity of 80 long tons and at least one hatch more than 50 feet in length. These cargo-type units are government owned and operated and thus, if accessible at the time of emergency, would be assured for military support. The two small tankers have an estimated capacity of 19,849 U.S. barrels of petroleum and related products and could provide at the outset of an emergency some military support capability.

Many of the country's 164 active airfields are located near major population and economic centers and would be highly useful in military operations. Airfields at Quito and Guayaquil have facilities capable of supporting operations of modern military jets. Three other fields could support C-118 to C-135 type aircraft. Taura, the only significant military airfield, supports fighter and medium bomber operations. Ecuador has no specific plan for mobilizing civil aviation craft or personnel, but the 43 major transports and 300 indigenous pilots would be available for emergency service.

Conduct of military operations would be hampered by the uneven telecom pattern and the limited traffic-handling capacity of open-wire and telegraph systems. The concentration of most of the important facilities in two cities, Quito and Guayaquil, makes the telecom system highly vulnerable to interdiction.

C. Railroads (C)

Ecuador has 600 route miles of narrow-gage single-track nonelectrified rail lines. The network is owned and operated by the government's National Enterprise of State Railroads (*Empresa Nacional de Ferrocarriles de Estado*—ENFE), which is responsible to the Ministry of Public Works and Communications. There are no international railroad connections with bordering countries. The ENFE is inferior in condition and extent to the rail networks of both neighboring countries, Colombia and Peru, and is barely adequate for Ecuador's economic needs.

The ENFE consists of 615 miles of 3'6"-gage lines and a 45-mile 2'5½"-gage line. The network is comprised of two interconnected systems. The Central Railroad system totaling 600 miles of 3'6"-gage track extends from Guayaquil (Alfaro) to Quito and San Lorenzo and from Sibambe to Cuenca. Rail ferries and barges connect the Guayaquil piers with the rail facilities at Alfaro. The Golden Railroad system totals 60 miles and is comprised of a 3'6"-gage 15-mile line between Puerto Bolivar and Pasaje and a 2'5½"-gage 45-mile line between Puerto Bolivar and Piedras. Track on a 50-mile 2'5½"-gage line between Bahia de Caraquez and Chone has been dismantled.

The Central Railroad traverses the very rugged Andes Mountains at elevations ranging from 8,000 to almost 12,000 feet and has numerous steep grades and sharp curves. One 49-mile section ascends to an elevation of 10,600 feet on an almost continuous 3% to 3.5% grade and includes a double switchback cut in the solid rock of a steep mountainside. The minimum radius of curvature is 518 feet; grades of from 3.5% to 4% and curves of less than 300-foot radii are common. The Golden Railroad and part of the Central Railroad lie in the level portions of the coastal plain and have moderate grades and curves. During the rainy season (early April through May and early October through November) the mountain lines are especially

vulnerable to landslides and washouts and segments of the coastal lines are flooded frequently. Flash floods may rise so rapidly that they may even endanger the lives of repair crews. Earthquakes occasionally damage rail lines.

ENFE track structure is light and in poor condition. Rails all imported, are of the standard T-section type and range in weight from 35 to 70 pounds per yard on the 3'6"-gage line and from 25 to 35 pounds per yard on the 2'5½"-gage line. Ties, in generally poor condition, are of untreated native hardwoods, nearly 75% of guayacan and the remainder of eucalyptus. Over one-half of the network lacks prepared ballast and uses whatever local materials are available. River gravel and crushed stone are the principal materials.

The manual block system of train control is used on the ENFE. Colored lights and flags are used for signaling, and all switches are operated manually. Communications between stations are maintained by telegraph, supplemented by telephone at some stations and, to a very limited degree, by radiotelephone. ENFE structures are maintained in fair condition for the most part. The network has about 180 bridges that are 16 feet or more in length. They have an estimated total length of about 13,000 feet. Most bridges are steel with masonry or concrete piers and abutments, but there are some masonry and concrete bridges, generally less than 75 feet long. Of the 78 tunnels on the network, 60 have an aggregate length of about 10,400 feet. Most of the tunnels and all of the four galleries are located on the Central Railroad between Ibarra and La Boca. Most tunnels are bored through solid rock and require only partial lining; portals are of masonry construction, as are the galleries.

Because of long-deferred maintenance of lines and facilities, antiquated equipment, and bad management, the ENFE is in poor condition and has lost to highway transport a large amount of its former traffic as well as the new traffic that is developing in the awakening economy. Maintenance work has been done on a haphazard basis, and line maintenance is performed mostly by manual labor. This situation has been compounded by several adverse factors, including poor original construction, weather and terrain conditions, and shortages of materials, skilled supervisory personnel, and funds. As a consequence, much of the track structure is in such poor condition that it presents a constant operating hazard, and quite frequently long sections become inoperable.

The ENFE is overstaffed by nearly 50%, but the staff is being reduced each year. In 1970, full personnel numbered 3,250. Efficiency is generally low because of inadequate training and poor supervision. Most training is on-the-job, but a few managers study in Europe and in other Latin American countries.

In 1969 over 5 million passengers and over 325,000 short tons of freight were carried on the Central Railroad. Almost half the total freight tonnage carried by the ENFE consists of petroleum products hauled from Alfaro for distribution in Quito and other highland centers; rates are kept below cost by the government in order to hold down the price of gasoline. A petroleum pipeline being built by Spanish interests between Guayaquil and Quito will be owned by the railroad and will speed petroleum transport through the difficult Andean terrain. Other principal commodities hauled are lumber and agricultural and manufactured products. All lines operate at a substantial loss covered by government subsidy. This continues to put the ENFE in an increasingly critical situation.

For present traffic needs, ENFE equipment is adequate in quantity but is generally in poor condition. No formal maintenance program is in effect, and the poorly equipped repair shops face chronic shortages of replacement parts. At times almost 50% of the equipment is out of service, either being repaired or awaiting repair. The ENFE has major shops at Alfaro and Quito and smaller shops at Bucay, Riobamba, and Sibambe; the important yard facilities are at the same locations.

The 1971 equipment inventory for 3'6"-gage was as follows:

Locomotives:	
Steam	12
Diesel-electric	14
Freight cars:	
Boxcars	302
Flat cars	60
Gondolas	31
Tank cars	70
Stock cars	68
Diesel railcars	25
Passenger cars	46
Gasoline rail buses (Figure 1)	3

There is no available equipment inventory for the 2'5½"-gage line. Spain has recently delivered 10 diesel-electric locomotives and 120 freight cars. All equipment is hampered greatly by the bad track condition.

Fuels used in order of amount are fuel oil, diesel oil, wood, and gasoline. Most fuel oil and other petroleum products are produced domestically; the remainder is imported, mostly from the United States. The supply of native wood is abundant and readily available.

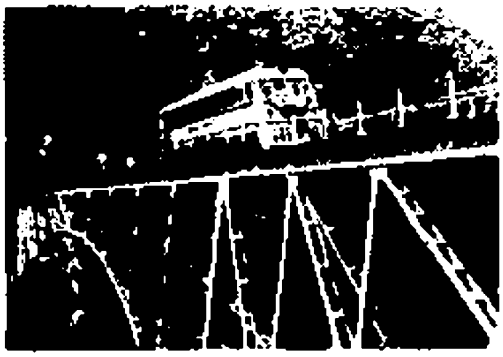


FIGURE 1. Gasoline railcar on the main line between Ibarra and Salinas (U/OU)

Stream water requiring no treatment is abundant. The greatest known distance between watering points is about 30 miles.

All of the ENFE network needs rehabilitation, but a lack of money limits activity. A program equivalent to US$20 million covered purchase of the new Spanish equipment, the oil pipeline, and some track renewal on the Guayaquil–Quito line. Scheduled rehabilitation of the Quito–San Lorenzo line is to be covered by a proposed $20 million loan from Japan. The line is to be improved mainly to transport sulfur from a suspected large deposit in Carchi Province. Work is to begin after the deposit is verified. Ecuador is also negotiating with Hungary for rehabilitation funds.

Figure 2 lists characteristics of the Central Railroad system.

D. Highways (C)

Highway transportation in Ecuador is by far the most important mode of land transportation, despite the fact that the network is sparse and generally constructed to low standards intended for small traffic volumes. Use of highway transport has increased greatly in the last two decades, mostly because of the decline of facilities and service provided by other modes. Highways are especially important for agriculture, the backbone of the national economy, substantial volumes of tropical products are hauled annually by truck to domestic and export markets.

The highway system is adequate for the relatively light volume of traffic now handled but could not accommodate increased traffic volumes economically. Additional traffic volumes would be accompanied by increased maintenance requirements, traffic delays, and rising vehicle operating costs.

Roads are concentrated almost entirely in the western half of the country. The network pattern consists essentially of the Pan American Highway traversing the entire north–south length of the country and a number of east–west roads from maritime ports on the Pacific to various centers in the interior.

In Ecuador the Pan American Highway runs for 705 miles, following in large part an old Inca trail; all of it is surfaced, most with cobblestone or gravel and crushed stone, and the remainder with bitumen.

The road density of Ecuador, 0.13 mile of highway per square mile, compares favorably with that of Peru and Colombia, which is 0.05. The highway system provides three international connections: one with Colombia and two with Peru; however, these routes are used chiefly by local traffic.

Ecuador has about 14,200 miles of public roads, including tracks. Of this total, 1,000 miles are paved mostly with bituminous surface treatment but some bituminous and concrete. 3,100 miles are otherwise surfaced, including crushed stone, gravel, and some cobblestone or stone blocks. 3,500 miles are improved earth, and 3,400 miles are unimproved earth.

The condition of the network varies from poor to good. On some roads, ditches are clogged and culverts deteriorated, so that flooding occurs. In some areas of the coastal region, drainage facilities are insufficient for the rapid dispatch of heavy rainfall, again resulting in flooding. Roads in and near urban areas are normally maintained to a higher standard than those in rural areas. Almost all earth roads are in poor condition and are usually passable only during the dry season (June through November). Surface widths range from 8 to 30 feet. Divided highways are common on sections of roads entering urban areas; on such highways roadway widths range between 15 and 30 feet, and medians between 3 and 19 feet. Base courses generally consist of crushed stone and gravel. Shoulders range in width from 1 to 13 feet. Types include earth, gravel, crushed stone, sand, cobblestone, and bituminous. Some of the narrow surfaced roads in the mountainous region have no shoulders, and on other roads the shoulders are overgrown with vegetation. Road alignments are poor along many mountain roads, where steep grades and sharp curves, including many hairpin curves, are common.

The system has two tunnels and numerous fords, and it is estimated that there are between 1,200 and 1,300 highway bridges. About 100 bridges are known to be 99 feet or more in length, the longest being the 2-mile bridge over Rio Guayas near Guayaquil. Reinforced-concrete structures have either beam or

FIGURE 2. Characteristics of the Central Railroad system (C)
(System is 3'6" gage, single track, steam and diesel operated)

TERMINALS	ROUTE MILES	MAXIMUM GRADE Going	MAXIMUM GRADE Coming	MINIMUM RADIUS OF CURVATURE	PASSING TRACK Maximum interval	PASSING TRACK Minimum length	MAXIMUM AXLELOAD	REMARKS
		Percent	*Percent*	*Feet*	*Miles*	*Feet*	*Short tons*	
Guayaquil (Alfaro)-San Lorenzo	510							
Guayaquil (Alfaro)-Quito	290	[illegible]	[illegible]	197	5.0	96	10.5	From Bucay (MP 54) to Palmira (MP [illegible]) line climbs steeply into Andes. Double zig-zag switchback located at Sibambe (MP 81).
Quito-San Lorenzo	230	3.3	3.3	201	11.9	--	16.5	
Sibambe-Cuenca	90	3.3	3.3	118	--	--	16.5	

-- Data not available

slab spans and others, deck-arch spans (figure 3), including open-spandrel types. Steel bridges are mainly the half-through and through-truss types, but some have suspension and cantilever spans. Stone-masonry deck-arch bridges are common in the mountainous regions. Timber beam bridges, fewer in number than the concrete and stone-masonry, and timber bridges are narrow, permitting only single-lane traffic, but the newer concrete and steel structures are generally of sufficient width for two-way traffic. Horizontal clearances generally range from 9.5 to 32 feet but exceptions up to 74 feet occur. Restrictive vertical clearances of from 9 to about 23 feet are found on 20 bridges; these include the steel suspension and through-truss as well as timber-covered structures. Load capacities of bridges are generally undetermined, but bridges of recent construction probably have capacities of at least 20 short tons. Condition of most concrete and steel bridges is good, that of stone-masonry structures, fair to good; and, with few exceptions, that of timber bridges, generally poor.

The government is the final authority on all highway construction and maintenance activities. The national highways are the responsibility of the Directorate of Public Works, a unit of the Ministry of Public Works and Communications, except in Guayas Province where highways are administered by the Guayas highway commission under the Guayas Prefecture. The construction and maintenance of provincial roads are, in general, the responsibility of the provincial councils. Municipal governments plan and supervise highway construction and maintenance within their jurisdictions. Among others, the National Board for the Oriente and the Ministry of National Defense are also engaged in road programs. Responsibilities are not always clearly defined, and some duplication of effort results.

When funds are insufficient to provide for both new construction and maintenance, maintenance is usually deferred. New road construction is normally performed by private contractors but occasionally by government road gangs. Mechanized equipment is generally used in road construction, but some work is done with handtools. Highway maintenance is accomplished by road gangs employed by the national, provincial, and local governments, by traditional voluntary Indian community labor, and by engineer units of the army. Maintenance work is done primarily with handtools. Except for Guayas Province, maintenance is inadequate, mainly because of poor organization and insufficient mechanized equipment and funds.

Construction and maintenance problems stem from the nature of the topography, the effects of rainfall, and occasional earthquakes. In the coastal region road construction across low-lying areas generally requires embankments and many culverts and bridges. Unstable soils of the coastal lowlands necessitate the use of suitable fill material, which is available only from distant interior sources. Torrential tropical rains undermine roads and cause flash floods that wash out roads and bridges. In the tropical area vegetation grows very rapidly and must be cleared continually from shoulders and ditches; if unchecked, it will soon destroy even a newly built road. Road construction in the mountainous interior region is very difficult and costly, requiring extensive blasting through rock, excessive amounts of through and sidehill cuts, and many culverts and retaining walls. Extensive maintenance work is required on these mountain roads as a result of the rainy season, which frequently brings landslides (figure 4) and clogged culverts and ditches.

Construction materials, including steel and most bitumen, are imported. Steel products are supplied by West Germany, the United States, and Belgium. Bitumen is obtained mainly from the United States, Venezuela, the Netherlands Antilles, and Peru, but small amounts are produced in local refineries. Ecuador is almost self-sufficient in the production of portland cement. Rock, sand, gravel, and timber are usually available locally, but in some cases long hauls are necessary.

A highway development plan for the 1960's was extended through 1972. Some accomplishments include a bridge over the Rio Guayas at Guayaquil and a new road from Alfaro to Cajabamba on the Pan American highway. Other projects consisted of improving and paving existing roads. The government is negotiating with consultants to prepare a master transport plan for the late 1970's. Any new plan will probably consist mostly of establishing priorities for improvement of existing facilities, such as completing the paving of the Pan American Highway. The only plans for new roads known to be under consideration are those established by international agreements. One is a 600-mile marginal highway extending from Colombia to Bolivia on the eastern slope of the Andes Mountains to provide access to a vast underdeveloped area. This is considered a long-range project because none of the countries involved has the financial resources necessary to proceed expeditiously. The second is an agreement between Ecuador and Brazil to connect the port of San Lorenzo with Manaus, a river port in Brazil, by way of Quito, Baez, and Putumayo.

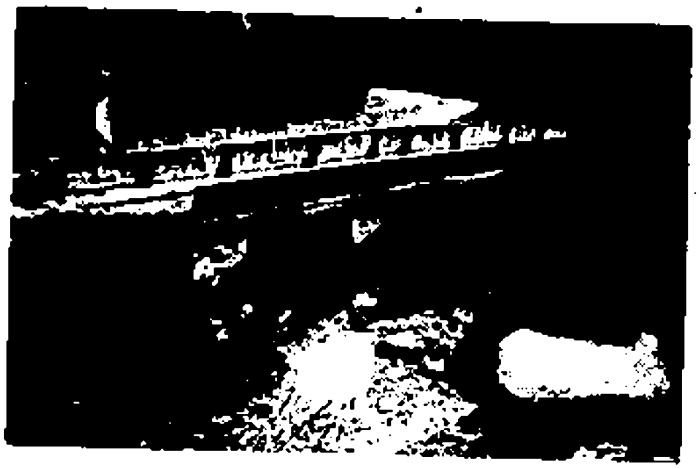


FIGURE 3. Reinforced-concrete arch bridge over a deep ravine (C)

FIGURE 4. Road on a steep hillside subject to landslides (C)

on the Río Napo, then by river to Manaus. This would provide Brazil access to the Pacific and Ecuador access to the Atlantic.

To finance highway projects Ecuador depends heavily on foreign loans, drawn from the World Bank and its affiliate the International Development Association, U.S. Agency for International Development (AID), and the Inter-American Development Bank.

Highway transport is impeded by various bottlenecks such as numerous steep grades, sharp curves, and hairpin curves along mountain roads, numerous fords, narrow streets in some cities and towns, some washed out bridges that must be bypassed by fording, narrow and low-capacity bridges, tunnels, underpasses, archways, and overhead aqueducts and pipelines. Sight distances are restricted along winding stretches of mountain roads. Animals straying on the highways are hazards to vehicular traffic. In some areas highway traffic is interrupted by heavy rainfall. During the rainy period many of the poor-quality roads become impassable or washed out, and some communities without access to other transportation may be isolated for long periods. Rainfall affects even some surfaced highways, especially in the mountains, along the coast, and

FIGURE 5. Selected highways (C)

[illegible]	Distance	Surface type	Surface width	Shoulder width	Remarks
	Miles		*Feet*		
Macara (at Peru border) to Tulcan (at Colombia border)	703				Pan American Highway
Macara-Riobamba	125	Mostly gravel	18 to 20	0 to 6	Improvements, including bituminous surface treatment, in progress near Loja and Cuenca. Some narrow bridges, sharp curves, steep grades. Subject to landslides
Riobamba-Quito	112	Bituminous treated	18 to 20	0 to 6	Good alignment
Quito-Tulcan	166	do	18 to 20	6	Reconstruction in progress; completion probable in 1971
Esmeraldas to Jct. with Pan American Highway S. of Quito via Santo Domingo	177	do	18 to 20	0 to 6	Subject to landslides in mountains E. of Santo Domingo
Babaho to Guayaquil	83	do	18 to 20	0 to 6	
Guayaquil to Santo Domingo via Duale and Quevedo	178	do	18 to 20	0 to 6	

along some rivers or marshes. Landslides block highways, and torrential or prolonged rains cause flooding that results in surface inundation or washouts. Swollen streams render fords impassable or difficult to traverse, and wash out bridges. During dry periods visibility is restricted by dust conditions on poor-quality roads and by dust storms in arid and semiarid areas. Ground fog, which occurs along the coast and more frequently on the slopes of the Andes, also seriously restricts visibility.

Buses run on a scheduled basis, and most bus services are provided by individually owned and operated vehicles. *Mixtos*, vehicles that transport both passengers and freight, carry passengers at fares generally lower than those charged by the bus firms. Freight services are provided mainly by individuals operating a single truck or *mixto*; so numerous are these operators that competition is cutthroat and charges are very low, resulting in turn in poor maintenance and high accident rates.

A considerable amount of freight movement is accomplished by agricultural and industrial establishments providing their own trucks to transport their products. Pack animals are widely used for transport, especially in the interior, and portage is common practice among the Indians. Traffic volume is heaviest on the road net in the west-central part of Ecuador. Within this network the most heavily traveled routes are between Guayaquil, Quevedo, and Quito.

In 1971 the vehicle inventory totaled 90,000 units: 39,650 passenger cars and 31,250 trucks and buses. Bus bodies usually exceed the width best suited to the chassis, they usually seat about 30 passengers. *Mixtos* carry varying amounts of cargo and 8 to 15 passengers. Truck capacities are usually from 5 to 10 tons. The useful life of a truck in intercity service is 3 to 4 years, after which it is used in local operations. Rapid vehicle deterioration is attributed to poor-quality roads, overloading, and inadequate vehicular maintenance.

Except for a small automotive parts industry and a number of local plants that fabricate bus and truck bodies, all motor vehicle equipment is imported. Western Europe and Japan are replacing the United States as the major supplier of motor vehicles.

Figure 5 lists characteristics of selected highways.

E. Inland waterways (C)

Inland waterways of Ecuador, although little developed and secondary in importance to highway and rail transportation, provide about 960 miles of routes that are important in meeting national transportation requirements. The Andes Mountains divide the two main watersheds, the coastal plains on the west and the upper Amazon Basin on the east. Throughout the eastern watershed, which consists of tropical jungles threaded by large rivers, waterways offer the only practicable means of surface transportation. In the western watershed, waterways

complement the highway and port systems and in large areas provide the only usable transportation routes during the rainy season.

River traffic, which is sporadic, consists principally of downstream movement of bananas, cocoa, and coffee, the combination of which makes up 80% of the national exports. Balsa wood and toquilla straw (Panama) hats also account for significant shipments. Upstream traffic consists of foodstuffs, supplies, and miscellaneous materials. Transport operations are by private interests; traffic statistics are not available.

The Ecuadoran inland waterway system is comprised of the Rio Guayas system (Rio Daule, Rio Vinces, Rio Babahoyo, Rio Guayas, and the Canal Guayas-Salado), three coastal rivers (Rio Chone, Rio Esmeraldas, and Rio Santiago), and four rivers of the eastern lowlands (Rio Putumayo, Rio Napo, Rio Morona, and Rio Namangoza). The eastern lowlands rivers provide Ecuador with potential international connections, and their exploitation could provide the country with useful routes to the Atlantic via the Amazon. The area through which the rivers flow is primitive but potentially rich. With the exception of the Rio Guayas and its tributaries, Ecuadoran rivers are used in their natural state with little or no improvement. Characteristics of the principal waterways are given in Figure 6.

Navigability varies from oceangoing cargo vessels on the Estero Salado to log rafts on the eastern waterways. River craft of less than 100-ton capacities operate on the lower Rio Daule and Rio Babahoyo. Navigation is restricted to small launches, motorboats, and dugout canoes on most other waterways.

The foremost interruption factor on the inland waterways is the low-water periods, which are mid-June through November on the western rivers and mid-August through mid-September on the eastern rivers. Silting is an additional problem at the mouths of most coastal streams, and dredging is necessary on the Rio Guayas and its tributaries. Inadequate handling facilities at inland transshipment points cause slow and delayed movement of river traffic. Relatively few structures span the navigable waterways, and the only lock is on the Canal Guayas-Salado.

The port of Guayaquil is the terminus of most of the inland waterway traffic. The old port area on the Rio Guayas, although restricted to ships drawing no more than 23 feet, is still the busiest banana port in the world and should continue to handle a large part of the banana exports, as well as cocoa, rice, and oranges. All other river ports are of minor importance and are not equipped with mechanical handling facilities. Borbon, on the Rio Santiago, has a wharf about 600 feet long with alongside depths of about 8.5 feet. Facilities at other river ports consist of rock ramps, barges, and bamboo or log rafts.

Craft generally employed on the inland waterways are launches, dugouts, motorboats, and barges. In some instances log rafts being floated downstream to sawmills carry produce. Several ferries are in use, including the 300-ton-capacity car ferries operating between Guayaquil and Alfaro.

All Ecuadoran rivers are under the control of the Ecuadoran Navy, which maintains navigability and regulates shipping. Waterway development is carried out by the Ministry of Public Works and

FIGURE 6. Characteristics of the principal inland waterways (C)

Name	Type	Navigable length	Depth restrictions LW	Depth restrictions HW	Structures	Remarks
		Miles	Feet			
Rio Guayas	Improved estuary	55	14	23	None	Cargo transferred from larger vessels to lighters in midstream.
Canal Guayas-Salado	Canal	6.5	14	14	Lock at mile 0.5 from Rio Guayas.	Single chamber lock 600 ft by 75 ft.
Estero Salado	Improved estuary	18	31	42	None	Dredging carried on in most restricting sections.
Rio Daule	Natural stream	93	3	6	Bridge 0.5 mile S of Daule.	Bridge not restricting in any season.
Rio Babahoyo	do	62	3	6	Bridge about 1.5 mile N of Babahoyo	Information not available on underbridge clearance.

Communications. Long-range plans call for developing the eastern rivers to improve navigation and improving certain river ports on several waterways.

F. Pipelines (C)

Until quite recently petroleum pipelines were limited to a few short crude oil lines along the Peninsula de Santa Elena and a refined products line near the center of the country. In 1972, however, a major crude line in the northeast area of the country was completed. Ecuador now has 387 miles of crude oil lines and 50 miles of refined products lines in service.

The most important crude oil line is the newly completed line between Lago Agrio in the Oriente region and the marine terminal near Esmeraldas, a distance of slightly over 300 miles. This line, owned and operated by a Texaco/Gulf consortium, is made up of 20- and 26-inch pipe and has a daily throughput capacity of 250,000 barrels. Five pump stations are required to push the oil in its westward flow up the eastern slope of the Andes where it reaches an altitude of 13,371 feet; from this pinnacle, four decompression stations are used to slow the oil's descent down the western slope. Construction of additional pump stations in 1973 are to increase capacity of the line to 400,000 barrels per day. Meanwhile, the line is expected to have a significant impact on the economy.

Two other crude lines are located along the southern coast 70 miles west of Guayaquil. One 6-inch line, 10 miles long, owned by Anglo-Ecuadorean Oilfields, Ltd., extends from Ancon to the La Libertad refinery. The other line, 11 miles long and 3 inches in diameter, extends from Tigre to the Cautivo refinery; it is owned by Cautivo Petroleum Company of Ecuador.

The country's only refined products line starts at Bucay at the foot of the Andes and ascends east to Sibambe and then northeast to Paluzia on the crest. This 6-inch line has a daily capacity of 100,000 barrels and is served by three pump stations. Owned and operated by the State Railways Enterprise, the line transports gasoline for Anglo-Ecuadorean Oilfields, Ltd.

In 1968 work began on the extension of the refined products line toward Alfaro in one direction and Quito in the other; construction was to have been completed by the end of January 1971. Construction was halted late in 1970 while changes in the original plans were being negotiated. Construction has not resumed because of the lack of funds to finance the changes. When completed the line is to be a 232-mile refined multiproducts line. An additional pump station will boost daily capacity to 54,000 barrels.

G. Ports (C)

Ecuador has two major ports, Guayaquil (Figure 7) and Manta, and 11 minor ports, one of which is in the Galapagos Islands. A new facility at Guayaquil, Puerto Nuevo, provides one of the best natural harbors on the west coast of the Americas, and eliminates the need for lighterage. A large canal connects Puerto Nuevo with the old river port of Guayaquil, which continues to handle a large part of the country's banana exports. Most of Ecuador's foreign trade moves by sea, through Guayaquil, which handles over 90% of the imports and 65% of the exports. Manta, located in the Bahia de Manta, is principally a coffee port, but it does export other products. Esmeraldas and the improved Puerto Bolivar are essentially banana-exporting ports; and La Libertad is an oil port. The seven remaining ports, scattered along the coastline, generally have meager facilities.

About 50% of the planned improvements at Puerto Nuevo have been completed, including construction of a deepwater pier, new warehouses, and other waterfront facilities. At Manta a second major deep-water pier and warehouses are scheduled for construction in early 1973. A major development program underway at Esmeraldas is scheduled for completion in late 1973. Improvements include construction of a deep-water port with protected alongside berthing for general cargo vessels, two breakwaters, two deep-water piers with cargo warehouses, and the dredging of an entrance to the new harbor. In addition the Texaco/Gulf oil consortium is constructing an oil terminal which comprises a large tank farm about 3 miles south of Esmeraldas and, for tanker loading, a submarine pipeline to two offshore single-point mooring buoys about 4 miles from shore.

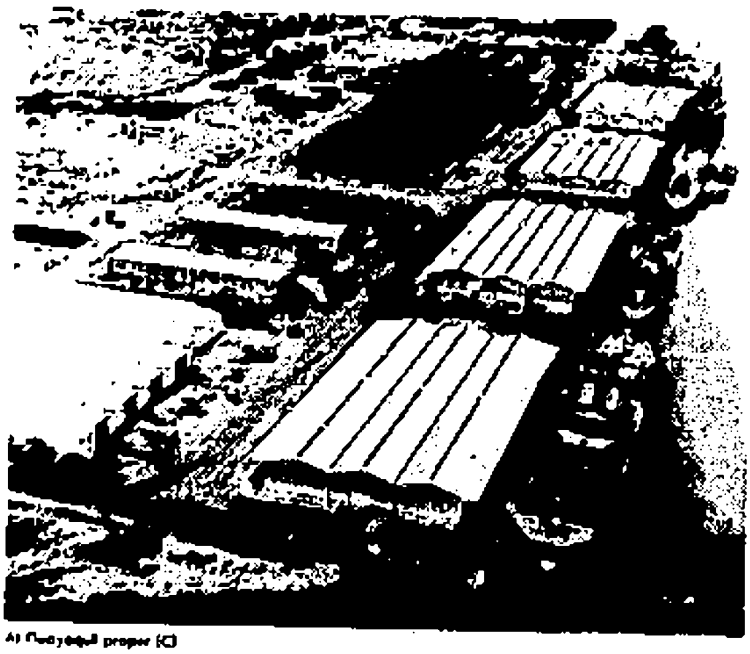
Ecuadorean ports are owned by the government and operated by the Ministry of Public Works and Communications. They are adequate for normal requirements.

Characteristics of the two major ports are listed in Figure 8.

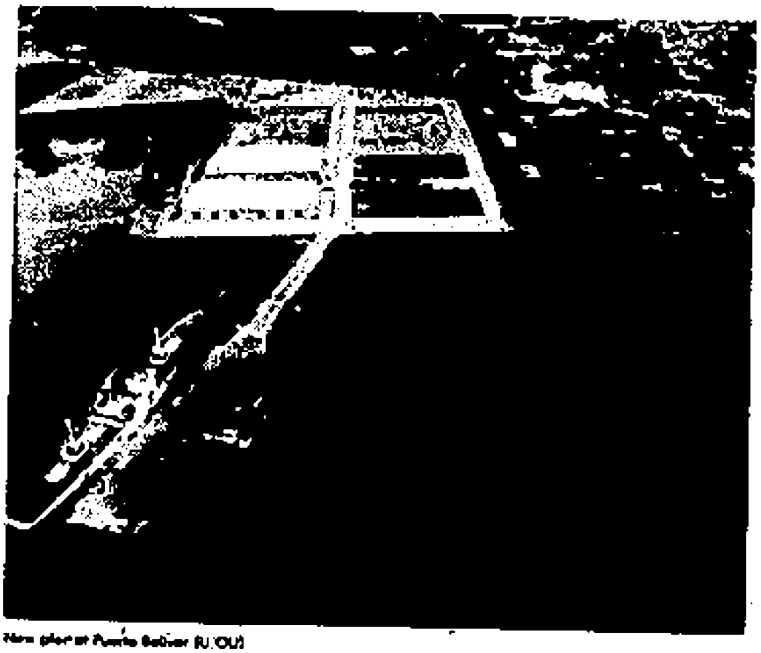
H. Merchant marine (C)

Merchant shipping provides the major transportation link between Ecuador and foreign markets and

FIGURE 7. Port facilities



A) Puerto Cabello proper (C)



Naval station at Puerto Cabello (U/OU)

FIGURE 8. Major ports (C)

NAME; LOCATION; ESTIMATED MILITARY PORT CAPACITY*	ACTIVITIES	HARBOR	BERTHS
Guayaquil. 2°16'S., 79°53'W., on W bank of Río Guayas, about 8 nautical miles SSW of city. 6,400	Most important and chief port in Ecuador. Entrance and exit of greatest proportion of commercial movement of country. Receipts: textiles, machinery, manufactured products. Shipments: bananas, rice, sugar, coffee, cocoa, balsa, Panama hats. Several small shipyards build and repair steel and wooden lighters; largest drydocking facility, 3,500-ton floating drydock. 2 marine railways, larger has 1,200-ton hauling capacity. Major base of Ecuadorean Navy in S portion of port, important training and shipyard facilities; landing facilities and components for ordnance repair, supply, communications, administration.	Natural estuarial. Consists of old port, about 5-mile length of Río Guayas, and new port (Puerto Nuevo), at head of Estero Salado, W. of the Guayas. General depths 21 to 37 ft. at old port, 30 to 35 ft. at new port. Controlling depth to new port 31 ft. at low tide; to old port, 23 ft. at high tide.	Alongside: 5 large ocean-type cargo vessels at new port; 2 small ocean-type, 1 standard coaster-type cargo vessels, 13 lighters at old port. Anchorage: 5 large passenger ships or aircraft carrier downstream from port, 10 coaster-type vessels or small naval vessels in midriver at old port.
Manta. 0°57'S., 80°44'W., on S. shore of Bahía de Manta. 2,400	Leading commercial port on central coast; outlet for agricultural province of Manabí, also entry port for imports. Receipts: manufactured products, machinery, household goods. Shipments: coffee, balsa, canned fish products. Boatyard in SW area of harbor for construction and repair of fishing boats and small craft.	Small, natural, breakwater protected; general depths 17 to 50 ft. Depths leading to berths exceed depths in berths.	Alongside: 2 large, 3 small ocean-type cargo vessels; 1 small coaster-type cargo vessel; 3 lighters; 1 standard coaster-type tanker (offshore pipeline). Anchorage: For large numbers of vessels of all sizes in lee of breakwater.

*The estimated military port capacity is the maximum amount of general cargo — expressed in long tons — that can be unloaded onto the wharves and cleared from the wharf apron during the period of one 24-hour day (20 effective cargo-working hours). This estimate is based on static cargo-transfer facilities of the port existing at the time the estimate is prepared and is designed for comparison rather than operational purposes; it cannot be projected beyond a single day by straight multiplication.

supplies. Most of the international seaborne imports and exports are carried by ships of foreign registry.

Ecuador's merchant fleet consists of nine diesel-powered ships of 1,000 gross register tons (g.r.t.) and over, totaling 80,773 g.r.t. or 57,385 deadweight tons (d.w.t.) as follows:

Type	Number	G.R.T.	D.W.T.
Dry cargo	5	34,858	49,456
Tanker	2	2,205	1,109
Refrigerator	2	13,250	11,020

Fleet tonnage is controlled by three beneficial owners entities which take the profit or loss from operations. *Flota Mercante Grancolombiana, S.A.*, Bogota, a joint shipping company in which the Colombian Government owns the majority of shares and the Ecuadorean Government the remaining shares, operates about 75% of the total deadweight tonnage (five dry-cargo ships). These ships serve Ecuadorean and some Colombian trade interests between Ecuadorean and Colombian ports and some of the major ports in Western Europe, Latin America, Canada, and the United States. *Flota Bananera Ecuatoriana, S.A.*, Guayaquil, a government-owned shipping company, operates two refrigerator ships between Ecuadorean ports and some of the major ports in Latin America, Northern Africa, Western Europe, the United States, and Japan. *Compania Anonima Transpetrolera*, Guayaquil, a privately owned shipping company, operates two small tankers in Pacific coastal transport.

There is an overall merchant fleet expansion program, however, the Ecuadorean Government has plans for developing a sizable tanker fleet to transport the major portion of anticipated crude oil exports. In September 1971 *Transportes Navieros Ecuatorianos* (TRANSNAVE), a commercial ocean-transport company, was established under the administration of the Ecuadorean Navy to transport both commercial cargo and passengers. TRANSNAVE has its own funds and autonomous administration and is empowered to establish and incorporate other ocean-transport companies. In June 1972, TRANSNAVE established a joint oil-transport company to which the Ecuadorean Government holds 55% of the capital shares and a privately owned Japanese shipping company, *Kawasaki Kisen Kaisha*, 45%. The new company, *Flota Petrolera Ecuatoriana*, is to develop and operate an Ecuadorean-flag tanker fleet having sufficient capacity to carry at least 30% of Ecuador's crude oil exports to world markets. Other characteristics are as follows:

	Number of ships (percent of d.w.t.)
Age (years):	
Under 10	4 (61)
10-20	2 (23)
Over 20	3 (16)
Size (d.w.t.):	
5,000-12,000	*6
Under 5,000	**3
Speed (knots):	
19-21	***4
13-17	3
Under 10	2

*4 dry cargo, 2 refrigerator.
**1 dry cargo, 2 tankers.
***2 dry cargo, 2 refrigerator.

No one government agency is vested with complete authority to administer all merchant marine matters. However, among those agencies most prominently concerned with implementing maritime laws and regulations are the National Council of the Merchant Marine and Ports, Directorate of the Merchant Marine and the Coastal Region, Central Bank of Ecuador, and the Ecuadorean Navy.

The government imposes a minimum of regulation on shipping, and no direct subsidies are provided for shipping operations. Ecuador's cargo preference law provides that the following percentages of certain waterborne import-export cargo are to be reserved for Ecuadorean-flag ships: general cargo, 30%; refrigerated, vaulted, or frozen cargo, 20%; and solid or liquid bulk cargo, exclusive of petroleum, 30%. At least 50% of imported or exported crude petroleum and related products is reserved for government shipping companies or shipping companies in which the government's participation is more than 50% of the total capital investment. Coastal and river cargo and passenger trade, as well as mail, is reserved exclusively for carriage by Ecuadorean-flag ships.

Ecuadorean-flag ships are manned primarily by Ecuadoreans trained in foreign merchant marine schools.

I. Civil air (C)

The mountainous terrain and relatively undeveloped surface modes of transportation make domestic air service the only rapid means of transport available to carry passengers and freight between the

coastal areas and the population centers in the mountains. However, the weak economic structure of Ecuador is incapable of creating a substantial demand for domestic air service.

Regularly scheduled international flights are provided by eight foreign air carriers and Ecuador's own national airline, *Ecuatoriana de Aviación*. These carriers, operating through Quito and Guayaquil, link Ecuador with 20 cities in 21 countries.

Ecuador has 46 major civil transport aircraft of at least 20,000 pounds gross weight; most of these are piston-driven aircraft such as the Douglas DC-3 and DC-6. The major civil aircraft inventory consists of the following:

4 BAC Viscount	2 Douglas DC-4
1 Douglas B-23	14 Douglas DC-6
2 Curtiss Wright CW-20	3 Hawker Siddeley HS-748
3 deHavilland DHC-4B	5 Lockheed L-188
10 Douglas DC-3/C-47	3 NORD Noratlas

About 450 pilots are engaged in civil aviation activities, nearly 300 are indigenous personnel, and the remainder are foreign pilots based in the country. Of the 450 pilots, 165 are qualified for major transport aircraft.

Recently, *Ecuatoriana de Aviación*, which was privately owned, merged with *Transportes Aereos Militares Ecuatorianos* (TAME), the commercial airline of the Ecuadorean Air Force. Under this agreement the government is to hold 52% of the reorganized company's stock, and private interests are to control the remainder. Also, TAME is to provide only domestic service, and *Ecuatoriana* is to provide only scheduled international service.

The inventory of the merged company is as follows:

1 Douglas B-23
1 Douglas DC-4
8 Douglas DC-6
1 Hawker Siddeley HS-748
5 Lockheed L-188

Aerolineas Nacionales del Ecuador (ANDES), established in 1961 as a domestic charter operator, now has a license to operate international scheduled services. Its fleet includes one Curtiss Wright CW-20, three Douglas DC-3's, and three Douglas DC-6's.

Sociedad Ecuatoriana de Transportes Aereos (SAETA) formerly provided scheduled domestic services from Quito but is now providing charter service only. SAETA operates two BAC Viscounts and three Douglas DC-3C-47's.

In addition to the services provided by these carriers, a few smaller companies provide unscheduled passenger and cargo service.

The Directorate General of Civil Aviation (DGCA), under the control of the Ecuadorean Air Force, has primary responsibility for civil aviation operations. The DGCA is responsible for the administration, regulation, operation, and technical aspects of civil aviation. The DGCA is also responsible for air safety, the operation of navigational aids, air traffic control, communication services, and all facilities associated with civil air activities.

Flight instruction and aircraft maintenance capability are limited. Except for that provided by the Ecuadorean Air Force, flight instruction is given by Ecuador's only aeroclub, *Aeroclub de Ecuador*. Minor routine aircraft maintenance can be performed at the limited maintenance facilities of the airlines, but major overhaul is contracted for in the United States.

Ecuador is a member of the International Civil Aviation Organization (ICAO) and is a signatory to the major international civil aviation conventions. Agreements and arrangements on air services are in effect with at least 21 nations.

J. Airfields[2] (C)

The air facilities of Ecuador consist of 184 active airfields, five closed but usable fields, 23 sites, and three seaplane stations. Only one civil, one military, and five joint civil/military airfields are significant, and the remainder have few or no facilities. General distribution of the airfields coincides with major population centers and areas of economic activity along the Pacific coast and in a north-south central highlands band 60 to 150 miles inland. Fields are located along rivers in the eastern foothills and jungles to support mission activity, and a few fields are used solely for oil exploration and development. All major cities have airfields, and air transportation is vital to the economy.

Mariscal Sucre at Quito and Simon Bolivar at Guayaquil, the international airports, are the two most important fields. Mariscal Sucre has equipment to support moderate-to-sustained fighter and medium bomber operations, and field facilities include adequate maintenance shops, parking area, and fuel. Navigation and communication aids include an approach control tower and VHF omnidirectional range (VOR). Instrument approach minimums are severely limited because of surrounding mountainous terrain. Equipment, fuel, and facilities at Simon

[2] For detailed information on airfields in Ecuador, see Volume 8, *Airfields and Seaplane Stations of the World*, published by the Defense Mapping Agency Aerospace Center, for the Defense Intelligence Agency.

Bolivar are sufficient for heavy bomber operations, and the field has an approach control tower, two nondirectional radio beacons (NDB), and a VOR. There are complete refueling, meteorology, repair, and cargo handling facilities.

Paved runways in fair to good condition are found on 13 airfields, nine of which have hard-surface taxiways and aprons. Runway weight-bearing capacity generally is consistent with the length and significance of the field. Major fields have adequate to good taxiway and apron systems for existing traffic and aircraft types. The smaller fields have few or no taxiways and one or two clay or gravel aprons. Cargo-handling equipment varies from adequate to nonexistent according to need. Airline operations number from a few charter flights from fields in outlying areas to 250 scheduled weekly departures plus charter flights from Simon Bolivar.

Five of the 154 usable temporary-surface runways suitable for light transport and Italian aircraft are closed and abandoned. About 25% of the temporary-surface runways are gravel, 25% are of graded earth, and the remainder, grass. Condition varies from poor to good, depending on location, weather, and maintenance. Lengths vary from 1,200 to 6,300 feet, dependent partly on elevation. Atahualpa and El Rosal, 6,562-foot gravel strips, are at 7,200- and 9,700-foot elevations.

The three seaplane stations, Isla Baltra, Manta, and Salinas, have virtually no facilities and are rarely used. The 23 airfield sites are deteriorated or have returned to their natural state and have little or no potential unless cleared and graded.

Maintenance is fair to good for major fields supporting international, military, and domestic traffic and for those supporting oil production and exploration. Minor and temporary-surface fields receive barely enough maintenance to keep them usable. Support and service facilities are adequate according to field significance and existing traffic. None of the major fields has hydrant refueling.

Expansion and improvement are concentrated primarily on existing fields serving major population centers. Construction of a runway and additional facilities is progressing at Eloy Alfaro, C. Ponce Enriquez, and San Lorenzo, but completion dates depend on slow and irregular allocation of funds.

Figure 9 lists characteristics of selected airfields.

FIGURE 9. Selected airfields (C)

NAME AND LOCATION	LONGEST RUNWAY, SURFACE, DIMENSIONS, ELEVATION ABOVE SEA LEVEL	RATE*	LARGEST AIRCRAFT NORMALLY SUPPORTED	REMARKS
	Feet	*Pounds*		
Cotopaxi 0°55'S., 78°36'W. At Latacunga	Asphalt 9,718 x 150 7,972	35,500	C 130	Joint. Planned to be major air force supply and maintenance depot.
El Carmen 2°01'S., 79°28'W. At Mastalvo	Macadam 4,593 x 92 1,001	35,500	Hercules	Civil. Most important field in support of oil production in E. Ecuador
General Ulpiano Paez 2°12'S., 80°59'W. W. of Balzas	Asphalt 7,546 x 98 13	56,607	C 135	Joint. Air force training base
Mariscal Lamar 2°53'S., 78°39'W. At Cuenca	Concrete 8,234 x 99 8,356	31,000	DC-6	Civil. Serves Ecuador's third largest city
Mariscal Sucre 0°08'S., 78°29'W N. of Quito	Asphalt 10,249 x 151 9,220	56,607	C 135	Joint. International airport serving capital
Seymour 0°27'S., 90°18'W. On Isla Baltra	Asphalt 5,250 x 150 63	56,607	C 135	Joint
Simon Bolivar 2°09'S., 79°53'W. N. of Guayaquil	Asphalt 9,055 x 151 12	55,100	C 141	Joint. Major international airport. Highest traffic volume
Taura 2°16'S., 79°53'W.	Asphalt 9,848 x 196 56	56,607	C 135	Military. Air force primary jet base

*Equivalent Single-Wheel Loading. Capacity of an airfield runway to sustain the weight of an, multiple wheel landing-gear aircraft in terms of the single-wheel equivalent.

K. Telecommunications (C)

Ecuador's telecom systems do not meet public and government needs despite considerable expansion of intercity circuit capacity and a 45% increase in telephone sets since 1967. The few modern telecom facilities are concentrated in the central Andean ranges and the Pacific coastal areas, where nearly all economic activity takes place. The eastern half of the country, largely Amazonian jungle, is inadequately served by a scattering of high-frequency (HF) radiocommunication stations. Growing radio-relay systems are assuming increased importance as primary means of intercity communications. The open-wire telephone and telegraph systems are more extensive but have limited traffic-handling capacity. Quito and Guayaquil are primary telecom centers. Cuenca, Ambato, and Manta are secondary in importance. The domestic telecom system does not provide adequate service, and many private firms have developed their own systems. Broadcast facilities are numerous but are overconcentrated in a few cities and are relatively low in power. Generally, the telecom network is considered to be more effective than that of Bolivia or Paraguay but not equal to that of Colombia or Venezuela.

All public telecom facilities are administered by the Ministry of Public Works and Communications (MOPC). Domestic and international telecom operations are delegated to the Northern Telecommunications Company, serving the Guayaquil area. A Department of Radioelectric Frequencies and Stations is responsible for licensing communication and broadcast stations and assigning frequencies.

The public intercity network consists of radio-relay radiocommunication and wire facilities, of which the expanding radio-relay systems provide the most efficient service. Two trunk routes extend from Quito to Guayaquil. The Marconi very-high-frequency (VHF) system via the Andean range has a capacity of 96 channels, and the newer, super-high-frequency (SHF) system has 300 channels and uses repeaters near Santo Domingo and Quevedo. Numerous VHF and ultra-high-frequency (UHF) spur routes of 24 to 60 channels extend to Tulcan, Cuenca, Machala, and several coastal cities. HF radiotelephone and radiotelegraph facilities, mostly in need of modernization, provide additional circuits to six key cities as well as to isolated towns in the eastern jungles and the northwest. The open-wire system is extensive but is limited in circuit capacity because of widespread use of obsolete equipment and poor maintenance practices. Carrier-equipped intercity cable systems are installed only in the immediate suburban zones of Guayaquil and Quito. Modern automatic telephone exchanges are installed in all major cities; about 90% of the estimated 105,000 telephones are connected to exchanges in Quito and Guayaquil. Swedish and West German switching equipment predominates. Direct-distance-dial service is available only between Quito and Guayaquil and their suburbs, but this service is soon to be extended to Cuenca. Domestic telex service is a small-scale operation, having only 200 subscribers in the two major cities.

International service has greatly improved since inauguration in October 1972 of telephone and telex service from the ground station for satellite communications located in the Valle de los Chillos, about 8 miles southeast of Quito. The station was built by a Japanese firm and initially has 96 circuits. Direct HF telephone and telegraph circuits are operated from modern facilities near Quito to six Latin American countries and the United States, and a single radiotelegraph channel is in service between Guayaquil and Lima, Peru. An interim UHF radio-relay system having a capacity of 60 telephone channels interconnects Quito with Pasto, Cali, and Bogota, in Colombia. Minor open-wire telegraph lines into Colombia and Peru generally provide service only to nearby border communities.

Special-purpose networks operated by various government agencies and commercial firms have developed as the result of the failure of public systems to provide adequate facilities. The most important of these largely low-capacity open-wire and HF radio systems are operated by the government railroad, the police, and the army. A radio-relay system has been completed parallel to the trans-Ecuadorean pipeline system between Lago Agrio and Esmeraldas.

Ecuador has about 220 AM stations, but a significant number of these are low-power facilities designed to serve a local audience. Broadcast coverage is negligible in the eastern and northwestern regions. Quito and Guayaquil combined have about two-thirds of all AM and FM stations in operation; are 20 FM and 33 TV stations, the latter in Quito, Guayaquil, Cuenca, Manta, Loja, and Ambato. An estimated 650,000 radiobroadcast receivers and 120,000 TV receivers were in use in mid-1972. The *Voice of the Andes* station in Quito offers a wide variety of programs over high-power transmitters to listeners in Europe, Asia, and the Americas.

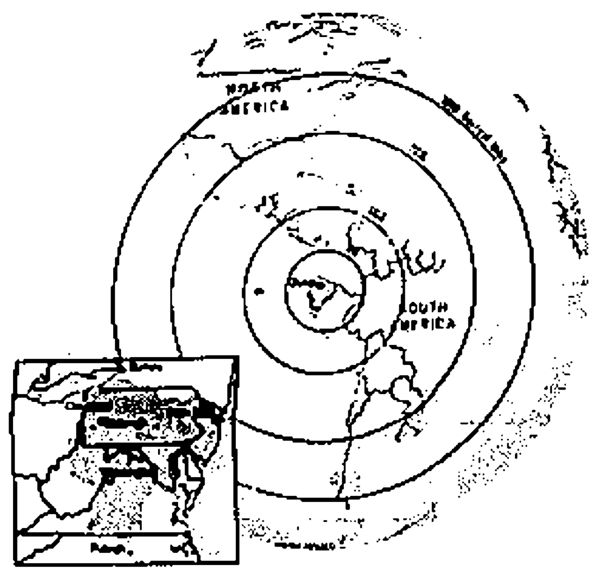
Using imported parts, Ecuador assembles a small number of radio and TV broadcast receivers. All other types of telecom equipment are imported fully assembled. Sweden consistently has been the most important source in terms of value of equipment; it is also the supplier of most wire (line equipment. Japan

has supplied substantial quantities of landlead wire and has become the most important source for radio-relay equipment. Other countries which are intermittently important suppliers are West Germany, the United States, the United Kingdom, and the Netherlands. All major contracts for telecom projects have provision for technical services and on-the-job training of indigenous personnel. Facilities for training professional telecom engineers are extremely limited.

Telecom plans in progress or contracted include the following: a fully automatic telex network of 800 lines installed in 14 new switching centers; localized plans for a tropospheric-scatter link to the Galapagos Islands; expansion of facilities at Manabi Province, including radio-relay links and new telephone exchanges; and, by 1974, construction of high-capacity links into southern Colombia and northern Peru as parts of the Inter-American Network.

Glossary (u/eu)

Abbreviation	Spanish	English
ANDEC	*Aerolineas Nacionales del Ecuador*	National Airline of Ecuador
ENTA	*Empresa Nacional de Transportes de Estado*	National Enterprise of State Railroads
SAETA	*Servicio Ecuatoriano de Tierra*	Ecuadorean Air Transport
TAME	*Transportes Aereos Militares Ecuatorianos*	Ecuadorean Military Air Transport Service
TRANSNAVE	*Transporte Naviero Ecuatoriano*	Ecuadorean Shipowners Transport
	Compania Nacional Transportadora	Petroleum Transport Company
	Flota Mercante Grancolombiana, S.A.	Ecuadorean Banana Fleet
	Flota Mercante Grancolombiana, S.A.	Greater Colombian Merchant Fleet
	Flota Petrolera Ecuatoriana	Ecuadorean Petroleum Fleet



Places and features referred to in this General Survey (u/ou)

	COORDINATES			COORDINATES	
	° ′S.	° ′W.		° ′S.	° ′W.
Alfaro	2 12	79 50	Palmira	2 05	78 43
[illegible]	1 00	74 50	Pasaje	3 20	79 47
Ambato	1 15	78 37	Pasto, Colombia	1 13 N.	77 17
Andes (mts)	2 00	78 40	Península de Santa Elena (peninsula)	2 15	80 50
Babahoyo	1 49	79 31	Piedras	3 38	79 55
Baeza	0 27	77 53	Playas	2 38	80 23
Bahía de Caráquez	0 36	80 25	Portoviejo	1 03	80 27
Bahía de Manta (bay)	0 51	80 42	Puerto Bolívar	3 16	79 59
Bogotá, Colombia	4 36 N.	74 05	Puerto Nuevo	3 13	79 55
Borbón	1 06 N.	78 59	Putumayo	0 07 N.	75 51
Bucay	2 10	79 06	Quevedo	1 02	79 27
Cali, Colombia	3 27 N.	76 31	Quito	0 13	78 30
Cajabamba	1 42	78 45	Río Babahoyo (strm)	2 10	79 52
Canal Guayas-Salado (canal)	2 17	79 55	Riobamba	1 40	78 38
Canelos	1 33	77 43	Río Chone (strm)	0 35	80 25
Cautivo	2 13	80 58	Río Daule (strm)	2 10	79 52
Cayambe	0 03 N.	78 08	Río Esmeraldas (strm)	0 55 N.	79 35
Cerros de Colonche (mts)	2 00	80 20	Río Guayas (strm)	2 36	79 52
Chimborazo (mt)	1 28	78 48	Río Morona (strm)	2 41	77 24
Chone	0 41	80 06	Río Namangoza (strm)	3 00	78 13
Coca	0 28	76 58	Río Napo (strm)	3 20	72 40
Cordillera Occidental (mts)	1 30	78 55	Río Putumayo (strm)	3 07	67 58
Cordillera Oriental (mts)	1 30	77 30	Río Santiago (strm)	1 05 N.	78 46
Costa (region)	1 00	80 00	Río Vinces (strm)	1 39	79 47
Cotopaxi (mt)	0 40	78 26	Salinas	2 13	80 58
Cuenca	2 53	79 00	Salinas	0 30 N.	78 09
Daule	1 50	79 56	San Cristóbal	0 55	89 31
Esmeraldas	0 59 N.	79 42	Sangolquí	0 19	78 27
Estero Salado (estuary)	2 27	80 02	San Lorenzo	1 17 N.	78 50
Galápagos Islands (isls)	0 30	90 30	Santa Cecilia	0 03 N.	76 58
Guayaquil	2 10	79 50	Santa Cruz	0 37	90 21
Golfo de Guayaquil (gulf)	3 00	80 30	Santo Domingo	0 15	79 09
Hoya de Carchi (basin)	0 45 N.	77 45	Seymour	0 25	90 17
Ibarra	0 21 N.	78 07	Sibambe	2 13	78 53
Isabela	0 56	91 01	Sierra (region)	2 00	78 30
Isla Baltra (isl)	0 26	90 16	Sullana, Peru	4 53	80 41
Isla Fernandina (isl)	0 25	91 30	Taura	2 18	79 41
Isla Isabela (isl)	0 30	91 06	Tenguel	3 00	79 46
Isla Santa María (isl)	1 17	90 26	Tigre	3 19	80 40
Jipijapa	1 20	80 35	Tixán	2 09	78 49
La Libertad	2 14	80 57	Tufiño	0 48 N.	77 51
Latacunga	0 56	78 37	Tulcán Base	0 49 N.	77 43
Lima, Peru	12 03	77 03	Zumba	4 52	79 09
Loja	4 00	79 13			
Macará	4 23	79 57			

Selected airfields

Places and features referred to in this General Survey (U/OU)

	coordinates			coordinates	
	° ′ N	° ′ W		° ′ N	° ′ W
Alfaro	2 12	79 50	Palmira	3 43	76 18
Amazon Basin (basin)	1 00	75 00	Pasaje	3 20	79 47
Ambato	1 13	78 37	Pasto, Colombia	1 13 N	77 17
Andes (mts)	2 00	78 00	Peninsula de Santa Elena (penin)	2 15	80 50
Babahoyo	1 49	79 31	Pedras	3 38	79 53
Baeza	0 27	77 53	Playas	2 38	80 23
Bahia de Caraquez	0 36	80 25	Portoviejo	1 03	80 27
Bahia de Manta (bay)	0 54	80 42	Puerto Bolivar	3 16	79 58
Bogota, Colombia	4 36 N	74 05	Puerto Nuevo	2 13	78 55
Borbon	1 06 N	78 59	Putumayo	0 05 N	75 32
Buna	2 10	79 06	Quevedo	1 01	79 29
Cali, Colombia	3 27 N	76 31	Quito	0 13	78 30
Cajabamba	1 42	78 15	Rio Babahoyo (strm)	2 10	79 32
Canal Guayas-Salado (canal)	2 [illegible]	79 55	Riobamba	1 40	78 35
Candelo	1 33	77 45	Rio Chone (strm)	0 33	80 25
Casilico	2 12	80 54	Rio Daule (strm)	2 10	79 52
Cayambe	0 03 N	78 08	Rio Esmeraldas (strm)	0 54 N	79 39
Cerro de Colonche (hill)	2 00	80 20	Rio Guayas (strm)	2 38	79 52
Chimborazo (mt)	1 28	78 48	Rio Macuma (strm)	2 41	77 21
Chone	0 41	80 06	Rio Namangosa (strm)	3 00	78 15
Cora	0 20	78 58	Rio Napo (strm)	1 20	77 50
Cordillera Occidental (mts)	1 33	78 53	Rio Putumayo (strm)	0 07	67 36
Cordillera Oriental (mts)	1 38	78 20	Rio Santiago (strm)	1 03 N	78 36
Costa (region)	1 00	80 00	Rio Vinces (strm)	1 39	79 47
Cotopaxi (mt)	0 40	78 26	Salinas	2 13	80 58
Cuenca	2 53	78 59	Salinas	0 30 N	78 08
Daule	1 50	79 58	San Cristobal	0 53	89 38
Esmeraldas	0 58 N	79 42	Sangolqui	0 19	78 27
Estero Salado (estuary)	2 27	80 02	San Lorenzo	1 17 N	78 50
Galapagos Islands (isls)	0 30	90 30	Santa Cecilia	0 05 N	76 54
Guayaquil	2 10	79 56	Santa Cruz	0 32	90 21
Golfo de Guayaquil (gulf)	3 00	80 30	Santo Domingo	0 15	79 09
Hoya de Caceli (basin)	0 15 N	77 45	Seymour	0 25	90 11
Ibarra	0 21 N	78 07	Sibambe	2 02	78 55
Isabela	0 58	91 01	Sierra (region)	2 00	78 30
Isla Baltra (isl)	0 26	90 16	Sullana, Peru	4 53	80 41
Isla Fernandina (isl)	0 23	91 30	Tarqui	2 54	79 21
Isla Isabela (isl)	0 30	91 00	Tenguel	3 00	79 46
Isla Santa Maria (isl)	1 17	90 26	Tigre	3 19	80 49
Jipijapa	1 28	80 35	Tiwia	3 05	78 48
La Libertad	2 14	80 57	Tulcan	0 48 N	77 43
Latacunga	0 58	78 37	Tulcan (fault)	0 48 N	77 43
Lima, Peru	12 03	77 00	Zumba	4 52	78 00
Loja	4 00	79 13			
Manare	1 23	79 37	Selected airfields		
Manbala	3 16	79 54			
Manta	0 57	80 41	Cotopaxi	0 55	78 36
Mendez	2 43	78 19	El Carmen	3 01	79 59
Milagro	2 07	79 36	General Ulpiano Paez	3 12	80 00
Montalvo	2 01	79 38	Mariscal Lamar	2 53	78 59
Nueva Rocafuerte	0 56	75 24	Mariscal Sucre	0 08	78 29
Oriente (region)	2 00	77 00	Seymour	0 27	90 16
Orito (oilfield)	0 15 N	76 53	Simon Bolivar	2 00	79 53
Otavalo	0 14 N	78 16	Taura	3 16	79 43

NOTE: All latitudes are South unless otherwise indicated