INSTITUTE OF CURRENT WORLD AFFAIRS

GSH-5: Travels in Bolivia

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Dear Peter:

I recently returned from one month in Bolivia, where I did a fair bit of traveling to see some of Bolivia's heterogeneous forests and land use. During my first visit to Bolivia in October 1977, I was in Santa Cruz, Cochabamba and Pando--the northernmost department (see map). For my recent visit I used Cochabamba as a logistic base, with major field trips to Chimanes and Chapare. I also spent a few days in La Paz for discussions with government forestry officials.

Although it is commonly referred to as the Altiplano Republic, 62% of Bolivia is less than 600 meters above sea level. The 1976 census indicates only 17% of Bolivia's 4.7 million people live in the lowlands, slightly above one inhabitant per square kilometer. Fifteen percent of the population lives on the Altiplano, the high plateau that includes Lake Titicaca, and 68% in the intermountain valleys between 1700 and 3000 meters. This concentration of population in the highlands is typified by a comment I recall hearing in a seminar by Saulo Bastos, director of the Organization of American States' Rio Pilcomayo project, that 65% of Bolivia's population lives in the upper watershed of the Pilcomayo.

The high, dry intermountain valleys are quite broad with excellent alluvial soils covering the valley floors. Irrigation (by gravity flow) makes these soils very productive. The combinations of hospitable climate and excellent soils have made the intermountain valleys the predominant population centers since pre-Colombian times. Of course the development of population centers also contributed to the demise of the natural forest vegetation in the valleys. I did not see a single remnant of undisturbed forest in the entire Cochabamba valley. Elias Meneces (in charge of the forestry herbarium in the botanical garden of Cochabamba) showed me the only individual tree of a native *Ceiba* species that he has found in the entire Cochabamba valley.

These old population centers in the intermountain valleys developed in spite of very meager, if any, forest products such as firewood and construction timber; houses were made of adobe, while grass straw served as fuel. Fast-growing eucalyptus trees introduced during the past two decades have provided a good source of firewood and coarse construction poles. The opening of roads into forested valleys and lowlands (particularly La Paz-Yungas, Cochabamba-Chapare) has provided the main population centers with adequate supplies of good quality construction timbers.

There is some interest in reforestation of the denuded and overgrazed hills around the major cities, but so far only a few small plantations of trees (mostly eucalyptus and pines) have been established. The grass-covered steep slopes of the highlands are used as open rangeland for grazing sheep. While I was in Cochabamba, a major grass fire burned a substantial area near the Tunari National Park. The fire had been set by a shepherd to stimulate new growth of grass prior to the spring rains, but due to strong winds the fire burned out-of-control for several days. While the slopes burned, the major Cochabamba newspapers published feature articles on a civil engineering project to contain the flooding of an arroyo in the area of the fire. According to newspaper reports, this particular arroyo was the source of a very destructive flood in 1977. I was amazed that no mention was made of the major fire burning in the upper watershed of the same arroyo. Although the local foresters I talked to expressed concern about the runoff of rainwater on the burned area, it is obvious that the general public, including the civil engineers, does not understand the ecologic principles of watershed protection and management. I expect the same arroyo to be the source of another destructive flood when the spring rains come. The education of the public to the holistic relations between lack of watershed protection and destructive spring floods will be extremely difficult and lengthy.

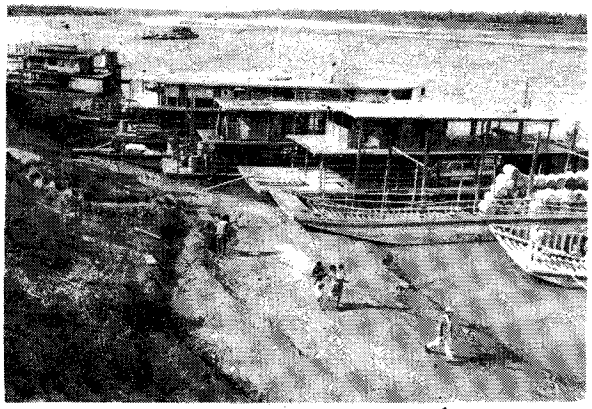
Before moving on to the lowland forests, I want to give you an overview of the ecological conditions of Bolivia. With a latitudinal extension from 9° S to 23° S, only a small northern band (3.4%) is truly tropical, while the subtropical latitudinal region (about 50%) extends from roughly 11-12° S to between 16-18° S. The remainder of the country is in the warm temperate latitudinal region. The ecology of the subtropical and warm temperate regions is immensely complicated by the eastern range of the Andes, resulting in extremely wet climates on the windward northern face of the mountains and very arid conditions in the rainshadows and intermountain valleys. Of the 48 ecological life zones in Bolivia, 22 are warm temperate, and 22 are subtropical; only four are tropical. Virtually all of the tropical and subtropical lowlands, plus about 40% of the temperate lowlands lie in the moist humidity province of the Holdridge life zone system (see GSH 3:5).

A great expanse of subtropical moist life zone covers the Beni plain, a very flat, poorly-drained area dissected by major tributaries of the Amazon, such as the Madre de Dios, Beni and Mamoré rivers. More than half of the Beni plain is a grass-covered savanna. Forests occur closer to the Andean foothills where the drainage is slightly better. The subtropical moist forests are characterized by an appreciable quantity of mahogany. (Later on in this newsletter I will have more to say on my visit to a mahogany logging area.)

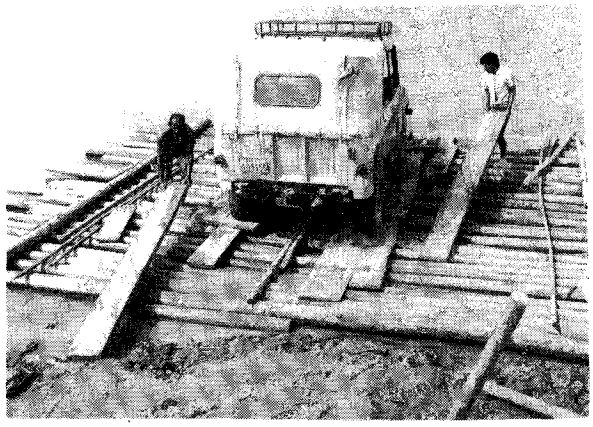
The tropical moist forests of Pando are much more impressive than the subtropical moist forests. The forests south of Cobija on rolling, well-drained sandy soils are very tall and rich in tree species. One of the well-represented tree families is the Lecythidaceae, one of whose members is the Brazil nut tree, which grows wild in the Pando region. Wild rubber trees also occur in these tropical moist forests. At the height of the rubber boom after the turn of the last century, Cobija was a major exporting city; now it is just a dusty little town, largely surviving on a small processing plant for Brazil nuts.

The warm temperate dry forest and thorn woodland life zones in southeastern Bolivia are part of the Gran Chaco that also covers vast areas of northern Argentina and western Paraguay. The Chaco is famous for its "quebracho colorado" wood, the source of tannin used in the leather tanning industry. I did not have time to visit these warm temperate regions of Bolivia.

My friend and colleague, Elias Meneces, and I made a one-week field trip into the Chimanes region, south of San Borja. The region is named for the extensive group of Chimán Indians inhabiting the forests of the area. After flying from Cochabamba to Trinidad (capital of Beni department), we found that Lloyd Aereo Boliviano suspended its "irregular" flights to San Borja because the new road to San Borja was now open. Elias and I therefore booked passage for Sunday on the only microbus making the trip from Trinidad to San Ignacio de Moxos (100 km), with the driver's complete assurance we would easily find a vehicle to take us from San Ignacio to San Borja (150 km). The first microbus took us the short distance to the Mamoré River where passengers, luggage and cargo were ferried to the other side of the large river. I was pleasantly surprised when the second microbus arrived within half an hour to take us the rest of the way to San Ignacio.



Cargo boats on the Rio Mamoré that bring virtually all commercial goods to Trinidad, Beni Department, Bolivia



Crossing the Rio Maniqui on a "callapo" made of balsa wood

Upon arrival in San Ignacio we immediately searched for transportation to take us on to San Borja, only to find that we would have to wait until the next morning for the vehicle making the trip. "Panchito", the owner of a Datsun pickup, makes a daily round trip, except on Sunday, carrying passengers for $5/person for a one-way trip. Panchito agreed to take us to San Borja Monday morning as regular passengers, then hire out to us for 3-4 days starting at 2 p.m. Monday.

While killing time Sunday afternoon in San Ignacio, I found out more about the town. Both San Ignacio and San Borja are at the tips of two fingers of savanna vegetation extending south from the vast Pampas de Moxos and owe their existence to the daily air freighting of meat to the big cities in the

mountains. Cattle raised on the savannas are brought to these small towns for slaughter during the night and the sides of beef are flown out early in the morning in vintage DC-3's. When you fly over the savannas, several cargo planes that didn't make it can be seen "parked" eerily on the savanna.

We showed up extra early at Panchito's on Monday morning to ensure seats in the pickup crew-cab. By the 7 a.m. scheduled departure, twelve people and at least 300 kg of cargo were loaded for the 4½ hour ride to San Borja. I'm certain we were way over the theoretical ½ ton capacity of the little pickup. As I expected, the overload contributed to a flat tire about 2/3 of the way to San Borja. Good ol' Panchito carried neither a jack nor a proper lug wrench, but he did manage to come up with a simple wrench to break loose the lugs. To change the wheel, the passengers had to lift the left rear of the pickup with the two 2 x 6 planks that served as benches in the back of the pickup. We managed to lift it without unloading the 300 kg of cargo.

The spare turned out to be somewhat low in pressure, so Panchito got out his trusty manual air-pump, which was not very successful in increasing the tire's roundness. So off we limped for a few kilometers, until a loud banging noise indicated the wheel lugs had not been sufficiently tightened. This time we lifted the pickup to permit better tightening of the lugs. We continued stopping every 15 minutes to try to squeeze more air into the tire. During one of these stops, Panchito left without two passengers who had gone to a nearby house for water.

Another problem with Panchito's pickup was that the starter didn't work, which was no difficulty for the many passengers. But then Panchito didn't pay attention to the road and got stuck in deep wheel tracks in the sand--and stalled the motor. It took several herculean tries but we finally pushed it free.

We limped into San Borja 2½ hours late, and I immediately started searching for someone else to drive us around the area. Fortunately I found two alternatives, so at 4 p.m. I informed Panchito we no longer required his pickup. I didn't like breaking our verbal agreement, but I decided it was justified since Panchito was to have been ready to drive us around starting at 2 p.m. and his pickup was still perched on a borrowed jack at 4 p.m.

After a very good dinner in such a small town, Elias and I were walking back to our rustic hotel, when a National Guardsman intercepted me and asked me to go into the Captain's office. Panchito showed up as the captain informed me that Panchito had made an oral claim against me for breach of contract. It was quite apparent the captain had heard only Panchito's side of the story, so I calmly explained Panchito's failure to comply with our agreement to start at 2 p.m. But Panchito countered that the bad road had delayed him with a flat tire and getting stuck. I then proceeded to explain that I had lost all confidence in Panchito and his pickup because of the overload, lack of a jack, non-functional starter, etc. My complaints struck a responsive chord inthe captain, who then berated Panchito for not providing better and more dependable service to his passengers.

In order to resolve our differences, the captain suggested I pay Panchito $75 as compensation for one day lost. I responded by calmly asking the captain if he would suggest when the lost day should start since the pickup was still on the jack at 4 p.m. The captain then compromised by asking if I would pay $25, which I agreed to do and did. Although I was pleased with not having to write this newsletter in the San Borja jail, I do regret that Panchito will take out his ire on the next foreigner who seeks a ride with him in San Igancio.

On Tuesday, we finally got to see some relatively undisturbed forest along a new road under construction that will eventually connect San Borja with La Paz. We also spent two days at Triunfo, a logging camp and sawmill of the Bolivian Mahogany Co. I was really surprised by how few tree species occur in the Triunfo region--there is some mahogany and practically not much else. Only along the Rio Maniqui is there richer forest, probably because of better drainage and more fertile soil. The logging operation is a selective system where each and every mahogany tree is cut. Although the logging company has a timber concession from the government, none of the local representatives had any idea of the size of the concession nor knowledge of any restrictions, such as leaving an occasional seed tree as a source of mahogany regeneration. The amount of excellent mahogany wood left as branches and buttressed bases in the forest to rot is very wasteful.

Bolivia has long thought her natural resources were virtually inexhaustible and that development has been largely hindered by a low rate of population growth. An article in a local paper bemoaned the fact that Bolivia's rate of population growth is only 2.1%; for example, the 1976 population is 20% below the estimate based on the 1950 census.

Through her National Institute of Colonization (INC), Bolivia is very actively encouraging colonization of the lowlands. Although the INC director told me that colonizable areas are based on detailed soils studies, my impression is that INC has failed to carry out or simply ignored land use capability studies. My observations in Chimanes, Chapare and Pando suggest that the sandy soils cannot support permanent agriculture using annual crops. The colonists start out in typical shifting cultivation pattern, i.e. clear a small area for crops and abandon the clearing after two or three crops, but after a few years return to the original clearing. Such a short fallow period does not allow for the natural reestablishment of soil fertility; consequently, you see a tremendous amount of worthless scrub vegetation along the roads.

I sat in on a meeting of World Bank representatives with INC, the Ministry of Agriculture (MACA) and the Forest Service (CDF) where INC's colonization plans for many of the forest reserves were discussed. CDF, a dependency of MACA, is only two years old and has insignificant money or political power to protect its forest reserves. The common impression in Bolivia is that there are abundant forest resources that will last well into the next century. Even competent Bolivian foresters told me that mahogany will last into the 1990's; however, I have some doubts about the mahogany supply. I met an American businessman who had just signed a $100 million, ten-year contract for purchasing 250,000 mahogany tables per year! The tables will require 17 million board feet per year, which is roughly equivalent to logging 10,000 ha of

mahogany forest. I seriously doubt that Bolivia's forests and sawmills can supply that much mahogany.

It is public knowledge that there are tremendous volumes of contraband timber and animal skins going from Bolivia's forests to Brazil. The forest service has made some feeble but ineffective attempts to slow down the contraband. I was told that the illegal export of live animals from the Santa Cruz zoo is a very lucrative business. The zoo director is said to have a legal document stating that all animals in the zoo and all offspring produced in the zoo are his personal property. The head of the wildlife department in the forest service characterized the zoo as a "switching station" where wild animals captured in Bolivia's forest spend a few weeks before being sold to foreign zoos, laboratories and private collectors. I was unable to check these allegations with the zoo director, but during an interview with the Minister of Small Farmers' Affairs and Agriculture, the minister promised to end the illegal export of wild animals from Bolivia.

A few enlightened Bolivians are aware that their natural resources are not inexhaustible. Bolivia's diminishing reserves of petroleum, which are no longer adequate for export after this month, will help increase public awareness of the need for conservation and rational use of natural resources. Yet the need for foreign currency to pay for Bolivia's development projects will put increasing pressure on Bolivia's forest resources as an increasingly important source of foreign exchange. Without protection and wise management, even the bountiful and renewable forest resources of Bolivia will disappear at an alarming rate.

Sincerely,

Gary

Gary S. Hartshorn
Forest & Man Fellow

MAP OF BOLIVIA SHOWING PROVINCES
AND MAJOR FEATURES DISCUSSED IN NEWSLETTER