

Depletion of Natural Resources and the Status of Conservation in Latin America

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ABSTRACT

During the 1980s Latin American nations ravaged their forests in a way reminiscent of the deforestation of North America during the last century, but the world-wide consequences now appear greater. Demographic pressures in Amazonia and Central America are the driving force behind land clearing that is accelerating and poorly managed if at all. Reserves of non-renewable resources are generally declining because exploration has not produced enough to offset increased consumption. Many fisheries are expanding without benefit of baseline data on population dynamics and further collapses of stocks are to be expected. While the value of long-term conservation efforts is understood by the technocrats, it is not supported by millions of poverty victims and enforcement of conservation laws is poor.

It was with considerable interest that I accepted the assignment to prepare a summary of resource depletion and conservation in Latin America for this twentieth anniversary CLAG meeting. Since 1956 I have been continuously involved in Latin American field work in remote areas where there were opportunities to observe the exploitation of natural resources by national and foreign entities. Although my own work has been directed primarily toward the earth sciences, my field notes incorporate many data on the life sciences as well. Some very rapid developments are taking place in these areas and, as they say, there is both good news and bad news.

First of all, we need to recognize the fact that our North American perception of the environment and its resources is not shared by the Latin American population as a whole. They have an entirely different culturally inculcated attitude that has evolved over a much longer period of time. They view a cultured urban life style as the epitome of civilized living. The wilderness with its savages and wild animals is regarded as a thing to be avoided by intelligent people. This contempt for rusticism throughout the long colonial era has had an interesting effect. Many of the natural resources located in the frontier areas of Latin America have remained substantially intact while those of North America have long since been squandered, first by our pioneers and later by the development of industrialization. As a consequence, North American conservationists suffer a chronic credibility gap as we continue to demonstrate our own inability to achieve in the United States the preservation of the very same natural resources we expect struggling Latin American nations to protect. The historic parallels between despoilation of the North American wilderness during the past century and the same process that is underway today in Brazil is striking (Szulc 1986).

The historic record leaves no doubt that more aggressive nations have long looked upon Latin America as a kind of poorly guarded treasure chest to be plundered at will. Most Latin American nations were slow to defend themselves against this unwanted attention, although Costa Rica promulgated conservation legislation as early as 1850 (González Ballar 1981). Now every country has laws reflecting the best long-term interests of the nation, particularly regarding oil and other non-renewable mineral resources that tend to be strictly regulated. Unfortunately, the same

cannot always be said of renewable biotal resources.

DEFORESTATION

No topic has been of greater world environmental concern than deforestation of Amazonia during the past decade. Literature citations on this subject now number in the hundreds and there are dire predictions that if continued unchecked, this unmanageable felling of rainforest trees will lead to disastrous changes in the Earth's atmosphere and a dramatic rise in sea level. Although there are many conflicting estimates, remote sensing surveys make it very clear that explosive rates of deforestation are occurring in Latin America and that global consequences may result (Sioli 1985; Allen and Barnes 1985; Guppy 1984, etc.). World demand for forest products has decimated the more accessible Asian resources with the result that attention now focusses on the trees from Quintana Roo to [end p. 61] the Magallanes. The situation is worst in Amazonia (Dourojeanni 1986, 240; Fearnside 1982; Caufield and Pino Zambrano 1985, 134) where intense government efforts at colonization have resulted in fragmentation of the vast rainforest with severe impacts on fauna (Lovejoy 1986). Others predict continued Amazonian deforestation will, among other things, cause changes in the hydrology, alter the albedo, distort the climate, convert the area into a savanna-parkland and accelerate the global greenhouse effect (Salati and Voce 1983; Gentry and López-Parodi 1980; Alho, Lacher and Gonçalves 1988).

Of equal, if not greater, concern are the biological consequences of the Amazonian deforestation free-for-all. Simberloff (1986) has predicted a worst-case scenario with eventual loss of 66 percent of all plant species in Latin American forests; by the year 2000 he expects a 12 percent reduction in Amazon bird species to eventually reach 70 percent if estimates of forest clearing continue unchecked. Prance (1985) also is concerned with species diversity and genetic variability in the disappearing habitat. Meanwhile, the exportation of Amazonian monkeys, birds, fishes and animal products has reached levels that has aroused the wrath of conservationists world-wide (Terborgh, Emmons and Freese 1986). Specialists at the Pymatuning Laboratory of Ecology stated their concern for all South America (Mares and Genoways 1981) in a plea for increased research and conservation efforts by collaborating scientists.

From Table 1 we see the importance of Brazil, 52 percent of the surface area of South America, and its forests.

Table 1: South American Tropical Forest Countries by Area in Square Kilometers

<u>Country</u>	<u>Area</u>	<u>Undisturbed Forest</u>	<u>World Total Forest</u>	<u>Percentage</u>
Brazil (1)	8,811,965	2,886,300	3,562,800	30.68
Peru (4)	1,285,215	373,200	693,100	5.97
Colombia (5)	1,138,914	386,000	464,000	3.99
Bolivia (7)	1,098,580	177,600	440,000	3.79
Venezuela (9)	912,050	76,000	318,000	2.74

Source: Guppy 1984, 930. Numbers in parentheses indicate world ranking for total forest area.

Brazil has long recognized the Amazon as an essential resource area and established the world's leading rainforest research center at Manaus to function as INPA (Instituto Nacional Pesquisas Amazonicas) where more than 115 scientists and technicians are based. Another important research station has been established recently at Maracá in Roraima (Heming 1989) where detailed ecological studies are being conducted through programs of international cooperation.

Costa Rica has an even longer record of environmental concern for the humid tropics (Leonard 1985; Gudmundson 1986, 204) with the agricultural station at Turrialba as its principal research center. It is now possible to say that Costa Rica has arrived at the most sophisticated level of forest management in Latin America with its plan to restore depauperate habitats within the new Guanacaste National Park (Allen 1988), using techniques that may have widespread application to other devastated habitats in Latin America.

Peru, with the world's fourth largest tropical forest, has a similar system of national parks (Dourojeanni 1978, 224) and a growing cadre of graduate foresters (López Cabrejos 1989), but it is clear from Rössl's address (1989) that scientific forestry management has been a long and frustrating struggle. Total deforestation of the Upper [end p. 62] Huallaga Valley has spread over the past decade as a result of the highly publicized increase in cocaine traffic (Echavarría 1989), guerrilla warfare and the slide into national chaos.

Chile has a similar, if smaller, well-trained professional forest service whose efforts are concentrated on facilitating exploitation of the Austral forests (Jelvez et al. 1989a, b) although interesting experiments in reforestation and afforestation in the Atacama and Andean park systems are encouraging.

However, the outlook for the over-all problem of deforestation in Latin America remains grim indeed. The next decade will almost certainly tip the balance irrevocably in the direction of large scale environmental collapse for many areas.

SOILS

Comparatively little attention has been given in the literature to soil erosion, an inevitable consequence of the uncontrolled deforestation that we have seen occurring at an accelerating rate throughout much of Latin America. Semi-arid parts of northern Mexico and northeastern Brazil continue to suffer from this chronic problem, deeply rooted in culturally ingrained agricultural practices that are slow to change.

Widespread tropical cattle raising with its expansion of pasture land at the expense of forest cover is the long-recognized primary cause of soil erosion in many parts of Central and South America. The trend that began shortly after 1950 has continued and shows no signs of decreasing. Laterization is an accompanying problem in some tropical areas with pronounced dry seasons.

Increasing soil erosion has even been documented for uninhabited areas in the interior of Guyana where gullying of savanna lands is taking place (Ebisemiju 1989). Another case of

widespread erosion independent of cultural interference can be seen in the satellite images of the high Andean *salares* of Chile and Argentina that show massive dust clouds entrained in the strong westerlies that sweep across these dry lake beds, suggesting similar conditions during the Pleistocene may account for the loess-like deposits of the Pampas.

FISHERIES

It is not possible to conduct a survey of Latin American fisheries in terms of absolute stock depletion when so little basic research on population dynamics has been performed. Only in a few high-value fisheries are enough data available to create meaningful regulatory management. Nothing approaching plans for a scientific MSY (maximum sustained yield) or even the more politically oriented OY (optimum yield) have been devised as yet, but these same comments apply equally well to many of the directed fisheries in the United States where these ideal concepts originated. Nevertheless, Brazil has done extensive research on its spiny lobster and shrimp resources, resulting in effective regulation and monitoring of these stocks.

The collapse of the Peruvian anchovy resource has caused a spectacular slide in the nation's premier position as the world's leading fish meal producer. In spite of repeated warnings from its biologists and oceanographers, the government allowed gross overfishing to occur, then nationalized the industry, and finally abandoned it in a moribund condition from which it has yet to recover.

Market demand, especially from France, Japan and the United States, has generated great activity in Chilean fisheries. In the far south the catch of *centolla* (king crab) remains tightly controlled through limited entry and gear regulations. Verbal reports (Pacific Science InterCongress 1988) indicated the first successful sea returns of the Pacific cherry salmon have occurred in Chilean rivers and subsequent air cargo iced container shipments have arrived in south Florida together with Chilean "albacora" (swordfish). Sport fishing in both the Argentine and Chilean Lake District for exotic trout remains carefully regulated for its important tourist value. Meanwhile, overseas demand for Chilean sea urchin gonads and various shellfish has caused severe depletion by *hookah* divers of these stocks along the narrow continental shelf. This has resulted in a series of emergency closed seasons to maintain stocks of these Chilean staples in viable condition.

Argentina has traditionally ignored its marine resources and tended to view seafood as something almost unpatriotic. Foreign distant-water fleets operate offshore under license and the activities of the Malvinas War have focussed attention on the enormous potential of the broad continental shelf that extends eastward to the islands themselves. Basic research by staff of the Puerto Madryn oceanographic center has identified several Patagonian shellfish now only casually exploited (Zaizo 1980).

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Ecuador has been uniquely successful in shrimp mariculture using tides and mangroves of the Guayaquil area to achieve efficiency levels not possible elsewhere. In a coals-to-Newcastle move, Ecuadorian dolphin-fish are now (1990) flooding the south Florida market, but the conditions

behind this sudden influx are not clear. Foreign tuna seiners no longer challenge Ecuador's licensing of its offshore fisheries and the "Tuna Wars" hopefully are a thing of the past.

Colombia, Panama and Costa Rica continue to harvest their wild shrimp resources without any management plans based on careful stock assessment, or even understanding of the factors that contribute to good and bad recruitment years in these areas. Overcapitalization, particularly in Colombia, seems to have occurred and limited entry may be the only stop-gap strategy available. Snapper fisheries along the western Caribbean are unregulated and so poorly known that the causes of fluctuations in exports are difficult to assess.

Mexico has made substantial progress over the past decade in obtaining data on basic population dynamics for several directed fisheries and research on estuarine and marine biology is being conducted from field stations on both coasts. Especially noteworthy is the establishment of Siam Ka'an, an ecological preserve protecting some of the lagoonal environment of Quintana Roo. It is no longer accessible to commercial fishermen and is now available for the entertainment of foreign sportsmen who fly in to exclusive fishing resorts.

MINING

Depletion of mineral resources occurs in any nation when extraction exceeds the discovery of new reserves, and this is the situation in virtually all Latin American countries. High grade ores in the traditional metal producers of Peru, Bolivia, and Chile are exhausted and most companies have turned to large-scale mining of low grade ores in order to stay in operation. In spite of substantial foreign subvention (largely Japanese), no really significant additions to reserves have been made in the past decade; most production comes from earlier discoveries, some of which date back to the colonial era.

An exception is the spectacular Cerra Pelada gold strike in Brazil where 80,000 *garimpieros* toil in ant-like lines to haul ore out of the gargantuan open pit to the surface. In Roraima these tough prospectors have made several new placer discoveries resulting in gold rushes into remote areas to the great detriment of aboriginals and the wildlife. These activities have elevated Brazil to its position as the world's third largest gold producing nation. It also has blocked out the world's largest high-grade iron ore deposit at Carajas, not to mention substantial untouched reserves of manganese, bauxite and nickel. In fact, one of the few mineral resources that Brazil has not been endowed with is petroleum, which continues to be elusive in spite of vigorous exploration efforts.

Petroleum reserves and exports have become curiously distorted from the patterns we are accustomed to seeing. After decades of heavy imports, Argentina is now almost self sufficient. Venezuela has increased reserves by successful step-outs and by reducing production as part of price structuring. Both Colombia and Ecuador have made important Amazonian discoveries but in the case of Ecuador, its ability to export the oil was destroyed overnight by a major earthquake that wrecked the trans Andean pipeline. Peru and Bolivia and Chile all continue to have declining reserves. Mexico has maintained an aggressive exploration program and now exports to a number of Caribbean countries and to the United States where we pump it back

into the ground, into abandoned salt domes, as a strategic reserve. Now that the geology of the Amazon Basin is increasingly well known, it appears unlikely that any "elephant" fields remain to be discovered and in acknowledgement of this fact of life, Brazil and Paraguay are committed to alternative fuels.

STATUS OF CONSERVATION

The decade of the 1980s has seen surprising advances made in the struggle to introduce environmental conservation in Latin America. Virtually every country not actively convulsed by warfare has made some significant progress. The support for increased conservation is directed toward concern for special habitats and endangered wildlife, particularly when tourism is involved, as in the case of the Galápagos where the internationally supported Darwin Research Station is located. Much of this momentum has been generated by direct aid from organizations such as World Wildlife Fund, The Nature Conservancy, UNESCO and agencies of the governments of France, West Germany, Switzerland and the United States, among others.

But we must remember that the factors determining the level of environmental consciousness in Latin America are unique and we cannot dictate to them conservation strategies based on our own sorry record. For [end p. 64] example, we need to recognize that Brazilian demographic imperatives point to the inevitable development of Amazonia as the only practical alternative for its millions of underemployed, many of whom are now caught up in their *second* migration away from the blighted Northeast. In Brazil, the world's fifth largest nation, frantic efforts at industrialization have failed to provide a decent living for these refugees, and in a surprising turn of events, they have left the urban centers of the South to revert to traditional agriculture as a means of subsistence in the large government-induced land clearing tracts along the trans-Amazonian highways (Szulc 1986). These millions of enthusiastic farmers are indifferent, or even hostile, to the ecological value of the forest they must cut down and burn in order to feed their families. They are typical of other millions to be found throughout Latin America and their numbers are growing at a rate many orders of magnitude greater than the ranks of concerned conservationists.

Brazil's planners have adhered to the traditional concept of salvation-through-industrialization, but this approach has failed. The highly publicized murder of an obscure Brazilian conservationist in 1989 has raised a great foreign outcry that seems to have been counterproductive in terms of shaping the government's attitude: Brazil has indignantly invited the rest of the world to attend to their own conservation problems and leave the problems of the Amazon for Brazil alone to solve.

Argentina has developed a number of carefully selected faunal reserves, particularly in Patagonia, where government sponsored research is conducted and the resources comparatively well guarded. Outstanding among these is the increasingly popular Valdés Peninsula where affluent foreigners come for whale watching. Chile has created similar preserves, particularly in the extreme south where the spectacular Torres del Paine serves as a refuge for one of the largest remaining guanaco populations. Venezuela has made great strides in the protection and study of its unique *tepuis* of the Guyana Highlands where highly endemic biotal communities have been

discovered on top of these isolated mesas.

Less cheerful reports come from Panama where mangrove forests critical to the support of many marine resources are under relentless attack. Nicaragua, Honduras, El Salvador and Guatemala all have rather dismal conservation records as a result of myriad unresolved socio-economic problems that occupy higher governmental priorities. Mexico has channeled much of its efforts toward the protection and preservation of its many archaeological resources in an attempt to curtail the increasing international traffic in antiquities. Peru has made a more feeble effort, but scandals surround dramatic discoveries made in the desert North.

SUMMARY AND CONCLUSIONS

The most egregious example of resource depletion in Latin America involves the uncontrolled destruction of Amazonian rainforest by pioneer settlers. The potential scale is so great it may have global consequences and this has become a deep concern of many environmentalists. There are no effective in-place plans for a rational development of Amazonia by any of the nations involved, and the process of deforestation seems inexorable. The socio-economic factors that drive it in Brazil are the same at work elsewhere in Latin America.

Fisheries are for the most part still in a primitive state of poorly managed exploitation due to the chronic lack of basic biological data from which plans for maximum sustained harvests can be obtained. The mariculture of shrimp has spread along the mangrove coast of Ecuador with considerable success, as has the introduction of salmon into southern Chile. Other fisheries are so poorly known by resident biologists that it is difficult to determine in some cases whether catch fluctuations are due to natural mortalities or overfishing.

Mining and petroleum production show a general decline in the traditional producing nations, although there are some noteworthy exceptions. The economies of Venezuela, Ecuador, Peru, Bolivia and Chile have all been seriously affected during the 1980's by world price structuring beyond their control. Regional reserves of these resources are slowly declining and Brazil has turned sharply to biogases and hydroelectric power as alternatives. The past decade has been one of great awakening to the importance of ecologically oriented conservation and the concept is now well rooted in the professional ranks of Latin America. They have been responsible for the selection of parks, faunal reserves and endangered habitats. Unfortunately, the value of conservation is not equally clear in the minds of many millions on the verge of poverty who assign very different priorities to their needs.

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