

COMMENTARY

The biodiversity issue and Latin America

Latinoamérica y el tema de la biodiversidad

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ABSTRACT

Latin America is a center for much of the world's biotic diversity, with an impressive variety of plants and animals occurring from Mexico's northern border to the tip of South America. Over most of this region habitats are being threatened due to burgeoning human populations, uncontrolled habitat conversion, commercial hunting, and other factors that adversely affect ecosystems. This assault on biodiversity has alarmed people throughout the world and led to a great concern among scientists. This concern has resulted in various efforts to discuss or limit environmental degradation in Latin America, with a good deal of criticism of Latin American governments being voiced by people living in developed nations. Curiously, the natural habitats of most developed countries have been greatly modified in the process of their economic development. Entreaties to Latin American countries to preserve their ecosystems can appear shallow when they are made by scientists living in nations that were built on the principle of development of "unused" lands.

Latin America has developed an extensive infrastructure of scientists, private foundations and governmental agencies that is equipped to deal with many of the problems that negatively affect biodiversity. However, there is often a lack of adequate funding available to support long-term research and training in disciplines related to biodiversity. There is a great deal of expertise on the biology of Latin America's flora and fauna that is shared between scientists living in developed and underdeveloped countries. The expertise for the successful implementation of conservation plans or the integration of research results into a society's understanding of the biodiversity problem, however, resides principally with the scientists of Latin America themselves. Successful reversal of trends in species loss will only occur through real and extensive cooperation between scientists from underdeveloped countries and those living in developed nations, but the final responsibility for the implementation of effective plans of conservation resides with the governments and scientists of Latin America. Their preeminent role in large-scale conservation plans must be recognized, for they are the "front-line soldiers" in the global battle against species loss.

Key words: Conservation, development, degradation, species loss, habitat loss.

RESUMEN

América Latina es un centro que contiene gran parte de la diversidad biótica del mundo, con una impresionante variedad de plantas y animales que se encuentran desde el límite norte de México hasta el extremo sur de Sudamérica. La mayoría de los hábitats de esta región están siendo amenazados por el crecimiento demográfico de la población humana, modificación descontrolada de los ambientes, caza comercial y otros factores que afectan negativamente los ecosistemas. Este asalto a la biodiversidad ha alarmado a los pueblos a lo largo de todo el mundo, conduciendo a los científicos a interesarse en el tema. Como consecuencia, numerosos esfuerzos se han realizado para discutir y limitar la degradación ambiental en América Latina, con una buena cantidad de crítica a los gobiernos Latinoamericanos, siendo advertidos por numerosos países desarrollados. Curiosamente, los ambientes naturales de los países más desarrollados han sido enormemente modificados durante el proceso de su desarrollo económico. La solicitud a los países de América Latina para que preserven sus ecosistemas puede parecer superficial cuando proviene de científicos que viven en naciones que fueron construidas sobre el principio del desarrollo de las tierras "sin uso".

Latinoamérica ha desarrollado una extensa infraestructura de científicos, fundaciones privadas y ministerios de gobierno equipados para tratar los numerosos problemas que afectan negativamente a la biodiversidad. Sin embargo, a menudo faltan los recursos económicos necesarios para mantener investigaciones a largo plazo y entrenamiento adecuado en las disciplinas vinculadas a la biodiversidad. Existe ya un cierto conocimiento sobre la biología de la flora y fauna de América Latina, compartido entre los científicos de los países desarrollados y los de los países en desarrollo. Este conocimiento para la implementación exitosa de planes de conservación, o para la integración de los resultados de investigaciones y la comprensión por parte de la sociedad, reside en los propios investigadores de América Latina. La

reversión exitosa de la tendencia a la pérdida de especies, solamente será posible a través de una amplia y real cooperación entre los científicos de los países en desarrollo y los desarrollados. La responsabilidad final para la implementación de planes efectivos de conservación reside, sin embargo, en los gobiernos y científicos de América Latina. Su papel preeminente en los planes de conservación a gran escala debe ser reconocido, porque la gente de Latinoamérica son "los soldados de la primera línea" en la batalla global contra la pérdida de especies. Hay que asistirlos y apoyarlos.

Palabras claves: Conservación, desarrollo, deterioro, pérdida de especies, pérdida de hábitats.

The topic of global biodiversity and the attendant concerns over the disappearance of species due to environmental deterioration are among the most widely discussed and misunderstood issues in ecology today. Both the scientific and popular media have devoted a great deal of attention to species loss, especially in the Neotropics (e.g., Time Magazine 1989a, 1989b). Edited volumes have been published, and workshops and international conferences have been held, to discuss whether or not tropical forests are being irreversibly converted to agricultural or pasture lands, and to determine whether such habitat conversion will be accompanied by massive extinction of organisms (e.g., Soulé & Wilcox 1980a, National Academy of Sciences 1982, McNeely & Miller 1984, Norton 1986, Soulé 1986, Wilson 1988). Few of these conferences have proceeded with the active participation of more than a token number of Latin Americans, yet Latin America is widely regarded as the principal geographic location for the battle against species disappearance, given its broad array of habitats and elevated botanic and zoologic diversity. In two recent and well known books on conservation biology (Soulé 1986, Wilson 1988), for example, the contributors from Latin America represent barely 3-6 percent of the authors. Paradoxically, many of the topics discussed are intimately associated with Neotropical ecosystems. Given the diversity and extent of habitats in Latin America, and the associated taxonomic and ecological complexity of the flora and fauna, we doubt that the problems associated with the biodiversity issue can even be adequately described, much less solved, without the active participation of the Latin American scientific community (Spotorno 1982) and those areas of scholarship that are strongly related to conservation biology (e.g., sociology,

anthropology, economics, political science, see, for example, Soulé & Wilcox 1980b, Alho 1982a, Mares 1982a, Ojeda 1982, Spotorno 1982, Soulé 1986).

Latin America has developed an extensive infrastructure to deal with conservation issues. Many governmental agencies (e.g., universities, research centers, national park services, floral and faunal protection agencies), as well as private organizations, are committed to reversing or at least slowing environmental deterioration (e.g., see arguments in Mares 1986a). University programs at the masters and doctoral levels dealing with environmental topics have been instituted throughout Latin America (e.g., Kormondy & McCormick 1981, Power 1987, Rabinovich 1988, Lacher *et al.* in press). There are numerous examples of attempts to restore both tropical and extratropical ecosystems. In the western thorn scrub, or Chaco, of Argentina, for example, an active association between private landowners, the local inhabitants, and forest managers has led to the recovery of the flora and fauna of the area, while making some logging and cattle grazing possible as well (Bucher & Schofield 1981, Solbrig 1988). This is significant, for the Chacoan scrub forest has been assaulted by forestry, hunting, ranching, and agricultural activities for centuries (Morello & Saravia Toledo 1959, Bucher 1987). The participation of local populations as integral components of ecosystem protection in the high Andean habitats of Bolivia, Peru, Chile, and Argentina is the result of years of effort by field biologists, zoologists, botanists, ecologists, and sociologists (Franklin 1982, Cajal & Amaya 1985, Cajal in press). A similar program exists in Costa Rica for recovery of the dry tropical forest (Janzen 1986, Lewin 1988). Recovery of arid and semiarid ecosystems in Man and Biosphere Preserves such as Ñacuñán in Argentina or Mapimí in Mexico,

and the implementation of the extensive system of national parks in Latin America, are examples of a fundamental change that is slowly occurring throughout the region in the extent and diversity of conservation activities (Roig 1971, Halffter 1978).

The strengthening of Latin American ecological research (*i.e.*, *Revista Chilena de Historia Natural* 1987) in recent years, the development and expansion of scientific societies in biology, ornithology, mammalogy, botany, ecology, herpetology, entomology, and other disciplines, the increasing number of workshops, symposia and meetings, and the development of quality Latin American scientific publications in Chile, Brazil, Venezuela, and other countries, are indicators of an infrastructure for conservation biology. These accomplishments are all the more significant because they have been made in the face of what could legitimately be considered widespread economic collapse. Given this fact, the flowering of ecological and related field sciences indicates an extensive and active community of environmental researchers throughout Latin America, one that must be considered a major participant in environmental protection plans concerned with the biodiversity issue (e.g., Ojeda 1982, Spotorno 1982, Gill 1989). Indeed, without the participation of local environmentalists (used in the broadest sense to include all disciplines concerned with reversing habitat and species loss), we doubt that most large-scale conservation plans will succeed. In order for a conservation plan to be implemented successfully, it is imperative that it have broad support from the highest governmental levels to those of the local population. In-country expertise is required to garner such support and to make sure that realistic plans are developed that can be implemented in particular habitats with the participation and understanding of the people of the country.

How to go about chronicling diversity and providing baseline data for habitat management are major challenges facing environmental scientists. Whatever the

scientific, political, or philosophical motives of scientists who live in developed countries calling for the people of underdeveloped countries to limit habitat exploitation, the pleas of the former are open to several interpretations, not all of them positive. A great part of the wealth of developed nations resulted from the conversion of their natural ecosystems into productive farmland, timberland, ranchland, and space for the construction of factories, cities, and so forth. For the wealthiest nations to request that the poorest countries forgo a similar developmental stage based on habitat conversion can appear sophistic; such entreaties have a hollow ring. It was less than ten years ago that the United States trembled at annual inflation rates that were barely double digit and the then newly elected Reagan Administration responded by relaxing environmental restrictions on development (e.g., *Defenders of Wildlife* 1984). This occurred in the richest country on earth, whose *yearly* inflation at that time is exceeded by the *monthly* inflation in many Latin American countries today. The recent Alaskan oil spill (Lemonick 1989) has shown that the United States is not willing to forgo potentially dangerous drilling practices inside national parks and reserves. The perceived national interests (*i.e.*, more oil) dictate that the possible risks of environmental damage are outweighed by the possible economic benefits of finding and pumping additional oil, even if the Alaskan oil fields are projected to contain only six months of petroleum reserves based on current consumption in the United States (Lemonick 1989).

Latin American countries are not only requested to protect their natural resources for themselves and for the benefit of developed countries, they are also asked to repay massive and questionable national debts, freeze salaries, reduce the standard of living for most citizens, and employ other economic restrictions that impede, rather than foster, economic development (e.g., Roche 1986, Ramos 1988). Requests by developed nations for Latin Americans to conserve resources, when coupled with

the foregoing list of economic demands that adversely affect entire societies and may lead to governmental instability, can be interpreted by Latin Americans in the following manner: "We (the developed countries) destroyed our ecosystems and adversely affected the global climate and the oceans, and by doing so became rich. Now you must preserve your species and ecosystems for our future use and aesthetic and moralistic principles".

The battle against species loss will be fought principally within the territorial limits of Latin America's countries; this will be won or lost primarily by the people of Latin America themselves. Understanding this simple observation is crucial if biotic resources are to be conserved over the long term. Latin American scientists and other professionals are aware of the complexity of the biodiversity issue and its societal ramifications (e.g., Interciencia 1984, Infante 1985, Valenzuela 1985, Jordan 1987, Bisbal 1988, Lugo 1988). In the face of the enormous economic, political, and societal difficulties that beset most Latin American countries today, the efforts of Latin American scientists, governmental organizations, private foundations, and individuals to reverse environmental deterioration are extensive, although monetary support for their work is minimal.

Some people may believe that the biodiversity problem can be solved largely outside Latin America, without the full support of the Latin American intellectual and political communities. We believe that such views, where they exist, are in error. Clearly, the scope of the environmental problems that are facing mankind today will demand cooperative efforts among the governments of all countries, as well as among scientists, academics, members of the media, and other major components of modern societies. Few countries would readily accept having conservation plans imposed on them that have been developed outside the country by people unfamiliar with the problems of the society that will be affected by such plans.

In order to reverse habitat loss, a long road remains to be traveled, and environmentalists from all nations must travel

it together. Habitat conversion and species commercialization are two processes that have been amply documented (e.g., Myers 1980, Smith 1980, Ojeda & Mares 1982, 1984, Mares & Ojeda 1984, Cajal 1986, Iriarte & Jaksic 1986, Alho *et al.* 1988). Mammal exports from Argentina give a good example of the magnitude of the problems concerning species exploitation in Latin America. Over 13 years (1972-1984) Argentina alone exported 38,041,494 wild mammals or their products (skins, etc.) having a value of \$ 1.5 billion. During the same period, 8,620,069 skins of wild foxes or cats were shipped to the skin markets of the developed countries of the northern hemisphere. This is equivalent to 663,000 carnivore skins per year, or 1,816 per day! The decrease in exports we have documented (Mares *et al.*, in prep.) in the last few years is likely due to the decline in population levels of most furbearers. New collecting and export laws in Argentina have been passed to deal with the situation (Conservación de la Fauna 1981a, 1981b). What the ultimate ecological effects of elimination or diminution of an entire trophic level might be are yet to be determined. We note that the major consumers of wildlife products are the developed nations of the world, including the United States (King 1978).

Clearly, protecting biological diversity requires a great deal of work and imagination. The needs at the broadest levels have been enunciated (e.g., Mares 1986a). We must gather fundamental data on natural history, taxonomy, and distribution of species (e.g., Alho 1982b, Eisenberg 1982, Pearson 1982, Mares & Braun 1986). We must be cognizant of the different ecological processes that may obtain in very different habitats (e.g., rain forest, desert). We must remember that Latin America contains primarily extratropical habitats, and that the Amazonian rain forest depends upon these habitats for its functioning. No macrohabitat stands alone; all are united in the global ecosystem. As Jaksic (1987) has noted, some broad ecological generalizations that have emerged from northern hemisphere research sometimes do not apply in South America. The

history of the biota of a region, as well as any special adaptational problems of that biota, must be considered in understanding ecosystem structure and function (e.g., Mares 1986a, 1986b, Patterson 1986, in press).

Over the last 25 years, ecology in much of the Northern Hemisphere has been heavily influenced by the "MacArthurian Revolution" (Hutchinson 1975). This has had both positive and negative impacts, especially in Latin America. Although hypothetico-deductive research is rewarding in Latin America, and contributes to general theory, it is not the only kind of research that is needed in the region. We know of excellent descriptive studies that have not been accepted for graduate credit because they were not based on hypothetico-deductive methodology. It is important to remember that modern ecology in North America and Europe is built upon a foundation of a hundred years of descriptive studies in natural history, taxonomy, distribution, and behavior (Mares 1982b, Pine 1982). Without its descriptive foundations, modern ecology could not exist (Ehrenfeld 1989, Mares 1989). Most of Latin America's biota lacks the descriptive foundational work that will support a broad understanding of ecological structure and function (Mares 1982b, Mares & Braun 1986). Foundational studies and experimental research are not incompatible and can be carried out by the same research teams. Only through such integration will we be able to adequately describe, understand, and deal with the biodiversity problem in Latin America.

The biodiversity crisis may be the most complex issue facing mankind today. It is not an abstraction and it is not a romantic emotional issue. It will not be solved by poetry, although poetry may help in the development of a conservation ethic (McClure 1988). If Latin America continues to make its natural resources available on an unlimited basis to developed countries, Latin American dependence will continue, and environmental deterioration will not be halted.

Because the Latin American biodiversity problem is such a widely discussed topic—one that may be overstated given our present data base (Mares 1986a)—some scientists have reacted to potential species loss in a panicky manner. If one believes that we are on the verge of a cataclysmic extinction episode (e.g., Myers 1980), then it is of primary importance to identify species and ascertain their limits of distribution. Given the vast biotic diversity of Latin America, it has been suggested that rapid and cursory surveys be undertaken throughout the region before species begin to disappear. "Quick and dirty" surveys (Roberts 1988) are not the answer. There is still time to do proper surveys of flora and fauna, time to identify and catalogue, and to describe distribution patterns. The biological expertise for such surveys exists within the ranks of Latin American biologists and among a number of their colleagues from the developed nations. Up to this point, however, developed countries have been unwilling to offer adequate support for scientific surveys (Nash 1989). Moreover, many "modern" ecologists, a number of whom have been trained only in well-studied regions, do not view such surveys as valuable or worthy of financial support. In this they are incorrect. We have the knowledge and ability to reverse a possible trend in massive species loss, but we do not yet have the cultural, political, or scientific will to act. There is a race underway between the development of real and effective collective action by society to preserve nature, and the steady conversion of Latin America's habitats. It is a race that the ecologically concerned people of all countries can win if they work together and act swiftly. Latin Americans, together with people from developed countries, can reduce the rates of environmental degradation. We all share the same environment. Our environmental dilemma will be solved in the houses of government of our countries, in our international banks and corporations, and in our collective societies. Most important, they will be solved in the field.

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