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Animal Geography in Latin America

The field of animal geography is broad and overlaps several disciplines. Geographers have been inconspicuous in this subject area and it follows that work by American geographers in Latin American zoogeography has been limited.

The subject matter of animal geography has been summarized (Bennett, 1960) and it will suffice here to indicate that the sub-discipline can be divided into four non-exclusive units, namely, descriptive zoogeography; historical zoogeography; ecological zoogeography; cultural zoogeography (or ethnozoogeography).

Before presenting a brief review of zoogeographical research in Latin America, a few comments on the importance of zoogeography should be made.
The fauna of any region is an integral part of the ecosystems comprising the region and requires as much consideration and study as does any other of the biophysical elements. From an anthropocentric point of view, the faunas of Latin America play important roles in human alimentation, economics and in health. In the general realm of human culture one is also impressed by the host of significant phenomena relating to animal domestication, pet keeping and the use of animals for ritualistic purposes. Beyond the cultural questions are those relating to human influences upon animal population sizes, animal genetics, distributions and habitats.

The first significant scientific work on descriptive zoogeography in Latin America was done in the 18th century by Linnaeus who was less a biogeographer than a taxonomist. By his time the broad picture of mammalian and avian components of the Latin American fauna was known as is demonstrated by the large number of birds and mammals described by him. Of course, additions to the list of Latin American birds and mammals and other vertebrates have continued to the present day although much of the work involves taxonomic revisions of forms long known to scientists.

Knowledge of the occurrence and distribution of invertebrates in much of Latin America is incomplete and there remains the task of collecting and describing

new forms not to mention the need to accumulate more information on the geographic distributions of forms already known to science. This is a task largely for specialists and will not appeal to many geographers.

Historical zoogeography, which attempts to recreate the zoogeographic past of the areas, has been cultivated chiefly by paleontologists and other individuals trained in geology and biology. Studies by such persons usually are not brought forward beyond the Pleistocene. Foremost among the historical zoogeographers working in Latin America are G. G. Simpson (1950), P. J. Darlington (1965), A. Cabrera (1947), and P. Hershkovitz: (1958).

If historical zoogeography may be made to include the late Pleistocene to the present day then such studies as done by Harris (1965), Gordon (1957), and Bennett (1968) should be included. Each person in this last group is a geographer.

The ecological aspects of zoogeography in Latin America have received uneven attention. No general summary yet exists although some facets of the Middle American situation have been summarized by Bennett (1967). Geographers have made only limited contributions to animal ecology per se in Latin America but some of their published research provides critically useful data for biologists as for example the work of Johannessen (1963) in Honduras and Denevan (1961) in Nicaragua. A recent two volume work on the ecology of South America provides useful data but also points up the obvious need for major research efforts in this extremely important subject area (Fittkay, et al., 1969).

Cultural animal geography comprises many subjects and includes consideration of the myriad of phenomena associated with human interactions with other animal taxa. Of the four major divisions of animal geography this last is the most amenable to treatment by geographers. However, thus far most of the work has been accomplished by non-geographers as for example the study of ethnozoology, in South America by Gilmore (1950).

Turning to the core of this paper which is a general review of the status of zoogeographical research in Latin America it should be kept in mind that not all possible topics for study are mentioned. The list is confined to those subjects which the author believes to be most useful at this time. The order in which the topics appear is no intended indication of relative importance.

Animal domestication

The subject of animal domestication has occupied the attention and interest of scholars in many disciplines. Major emphasis has been traditionally given to problems associated with the origins of domestications in the "Old World" and Latin America has been under-investigated. As an example of this one need look no farther than Zeuner's history of animal domestication (1963). In his book, Latin American domestications are scarcely given mention and this was not entirely the fault of the author since it derives from the general paucity of published information. Edward Hahn, a major pioneer in studies of animal domestication devoted only a few of his remarks to Latin America (1896). The first and as yet the only general work treating with animals domestication in Latin America was that of Ricardo Latcham (1924) and his study provides the essential starting point for present-day efforts. Many new data have become available since Latcham wrote and a new synthesis is needed.

This is not to say that studies of limited scope have not been made they have been and the data are widely scattered in the ethnographic literature. Geographers have also made contributions to this subject area among which are: Sapper (1935-1936); Sauer (1952); Bennett (1964, 1965); Brand (1964). However, we are still far from achieving more than tentative answers to basic questions relating to causes and motivations behind animal domestication in Latin America and why so few animal taxa figured in the process. Related to these questions is the almost ubiquitous pre-Columbian phenomenon of pet-keeping in Latin America.. Although Hahn rejected pet-keeping as being significant in the process of animal domestication he was in error and pet-keeping in Latin America deserves close scrutiny. No general study on Latin America Amerind pet-keeping has been published.

It might be asked by the pragmatic what value the study of animal domestication in Latin America has beyond a pure scholarly satisfaction. The answer is that the total potential for the domestication of economically useful animals has probably not been realized in Latin America that further study might lead to the identification of potentially useful candidates which might include tapirs (*tapirus* sp.) peccaries (*Tajacu* sp.) *pacas* (*Cunieulus* sp.) and iguanas (*Iguana* sp.).

As a subdivision of animal domestication one should also considered is the subject of animal husbandry the study of which in Latin America has been

neglected and the published information is frequently vague. Geographers and some ethnographers have been given to lumping native and introduced animals together in discussions of husbandry practices and this tends to confuse the scholar who is interested in the origins of the described practices. When domesticated animals of "Old World" are treated the assumption is frequently made that the associated techniques were borrowed from Iberian or other European sources. How African influences may be of importance and should be given attention should be kept in mind that black slaves and Amerinds were likely to been in more frequent and prolonged propinquity than were Spaniards and Amerinds.

Wild animals as sources of raw materials

Most of the facts relating to pre- and post- conquest Amerind exploitation of wild animal populations for raw materials are beyond because of the destruction of Amerind culture systems. Archaeology will continue to provide some information and the few remaining Amerind so must be studied although none cannot hope for pristine ecological data Geographers should assist in such efforts as the time is very short a cultural changes have already obliterated much of what would have bee invaluable to know.

Another aspect of this topic demanding attention is the commercial exploitation of wild animals in Latin America (for purposes other than food). These activities cut across racial, cultural, and political lines and are necessary to understand if sound laws governing commercial exploitation of animals are to be promulgated. The published data are few and scattered. As an example of just how imprecise and sparse this data are on this subject one need only examine the sections dealing with hunting and fishing in Latin America in the nine volume work published by the IPGH on the natural resources of the Americas (1953-1956). The poor showing in that work was not evidence of inadequate editorial attention. It reflects the paucity of data pertaining to this ecologically sensitive subject. We are aware, however, that there is a trade in animal skins, live mammals, birds and fish and there is reason to believe that certain if not all of the exploited animal species may be in danger of complete elimination. Field studies in carefully selected parts of Latin America are urgently needed.

Wild animals as food sources

The exploitation of the wild animal resources base by Amerinds as a source of

food has received inadequate attention from scholars who have studied Amerind societies. Too often a list of animals said to be eaten by the group investigated is offered as sufficient information. This clearly inadequate treatment is further exacerbated, in some cases by inaccurate names of the animals said to be obtained and this makes the entire list suspect. One is generally told little or nothing about the quantities of a given taxon taken, seasonal aspects (quantitative and qualitative) of hunting and fishing activities, the nutritional contribution made by such animal foods to human diets and the details of meat and fish storage and/or preparation. A limited attempt along these lines was made by Bennett (1962, 1969) but studies in much greater depth and precision are required. An important step in this direction has been taken recently with a study of ecology of the subsistence food system of certain Amerinds in Nicaragua (Nietschmann, 1970).

The exploitation of the wild animal resource for food by non-Amerind groups has received brief and generally inadequate attention. It even comes as a surprise to some Latin Americans that meat and fish derived from the wild animal resource base frequently figure importantly in the diets of rural and some urban people. There are few sources of information that inform as to the species of animals taken and one seeks almost in vain for the quantities eaten and the nutritional contributions made from such protein sources. One such study by Bennett (1959) lists correctly certain animal species which figure in rural and urban Panamanian diets but the study lacks quantitative and nutritional information. Here it should be re-stressed that non-Amerind subsistence hunting and fishing over much of rural Latin America is an important aspect of the ecological scene yet we know very little about such activities.

Commercial hunting and fishing

Market hunting varies widely in its importance from one part of Latin America to another and national or local laws governing these activities are also varied and are frequently maladministered. Few reliable published data are available for many Latin American countries and when there are laws prohibiting commercial hunting, as is the ease in Mexico, one is left to surmise what the actual conditions are. The only way such data are going to be obtained is to conduct well planned field investigations in selected areas of Latin America. It is a sound generalization that market hunting for meat should be prohibited in all but a relatively few special cases because experience elsewhere has shown that most wild animal

populations cannot long withstand such exploitive pressure. However, until in situ studies are made legislation restricting such activities will be dangerously slow in enactment.

Of all aspects of commercial exploitation of wild animals in Latin America fishing provides the greatest quantity of numerical data but this must not obscure the fact that there are major gaps in our understanding of this important activity. Major saltwater fisheries are frequently the object of close governmental scrutiny for fiscal purposes and are thus productive of fairly accurate data as with the case of the Mexican shrimp fishery and the anchovy fishery of Peru. Economically minor saltwater fisheries, however, are frequently not reported upon in any useful detail. However, for ecological reasons such fisheries demand study. Because these last are frequently what might be termed "folk" fisheries the approach of the geographer to their study should yield useful results. Even the major saltwater fisheries have received little attention from geographers and again the geographer's approach should yield extremely useful insights.

Commercial freshwater fishing has been largely ignored as an object of study even though it is of varying importance in much of Latin America. The major area for this activity is the Amazon Basin and here the most important fish appears to be the *pirarucu* (*Arapaima gigas*) which is sold both fresh and salted. In the latter form it is known as the *bacalao* of the Amazon. Although referred to in many publications (for example, Couto de Magalhaes, 1931) I have been unable to locate a published geographic study of the *pirarucu* or other freshwater commercial fisheries in the Amazon area.

In parts of South America river turtles are commercially significant and some of the pertinent data has been summarized by Parsons (1962).

Ecological effects of exploitation

Interwoven into most of the topics discussed above is the question as to what are the ecological concomittants of the exploitation animal populations by man in Latin America. Here we are concern with the recent past and the present both because of data availability and because the size of the human population has reached levels that are ecologically critical to the continued survival of exploited A fundamental aspect of this issue relates to our need to know what to an ecosystem when a vertebrate species or subspecies is completely removed from it. Something occurs, that we may be sure of, but nature of the ecological trauma

so induced now largely evades our ability to comprehend. The great complexity and species diversity in animal America ecosystems should signal caution to us when we permit alterations to occur more or less unimpeded and unstudied. Many larger vertebrates are being eliminated over much of their recent range as for example whitetail deer, pacas, agoutis, the larger carnivores and the eaten iguanas.

Effects of habitat changes on animal distribution

One of the more significant questions to be answered in Latin America is how has man, through his clearing of vegetation, influenced the distribution of animals. Although the time span for man in Latin America appears to be modest as compared with Africa it has been of sufficient length to have permitted major human-induced ecological changes past five or six thousand years (Bennett, 1966). Studies focus on the issue of habitat change and zoogeography are few and most of have been done by geographers as for example Harris (1965); Gordon (1957); Daugherty (1969); Bennett (1968). All of these studies were essentially of a reconnaissance nature and prepare the groundwork for the local studies to follow.

Animals and health

Animals play important roles in the health of man and other in many parts of Latin America. In the main, Geographers have to leave issues involving health to persons in the medical arts fields. However, there is clear indication that some younger geographers turning their attention to such interests and very successfully be seen in the work of Fonaroff (1968).

As an example of the kinds of problems to which geographers direct their attention is that of the detailed analysis of the conditions in which live the animal reservoirs and vectors of disease. This might appear best suited to the biologist but it should be noted that there is an increasing tendency not to teach the fundamentals of physical ecology today to biologists (see, for example, MacArthur and Connell, 1966). A basic need here is for bioclimatological studies such as is detailed elsewhere in this publication by Daugherty.

There is a need for many evaluations of cultural features relevant to the ecology of disease in Latin America. Such features include house types and construction materials and details, the kinds of animals which occur (as comensals) in and

around the human-modified ecological conditions, farming practices and many other cultural phenomena.

Summary

Although animal geography in Latin America has not received major attention from geographers it has long been accorded some interest by the discipline. There are many aspects of animal geography which will yield useful results to those geographers trained to work in this broad area.. The most promising aspects of zoogeography are those in which attention is focused upon the interactions between man and other animals. This human dimension gives geography and the geographer the most obvious raison d'etre for undertaking research in animal geography in Latin America. Further, it is just this human dimension that is so glaringly missing from much of the work that has been done in the past by non-geographers.

REFERENCES CITED

Bennett, C. F. "Notes on Choco Ecology in Darien Province, Panama." *Antropologica*. No. 24 (1968), pp. 26-55.

_____. "Human Influences on the Zoogeography of Panama." *Ibero-Americana*. Vol. 51 (1968).

_____."A Review of Ecological Research in Middle America." *Latin American Research Review*. Vol. 2 (1967), pp. 3-27.

_____. "Algunas Consideraciones Sobre El Hombre Como Agente Ecologico En America Latina." *UGI Regional Conference. Tomo I*. (1966), pp. 22-30.

_____."Beekeeping with Stingless Bees in Western Panama." *Bee World*. Vol. 46 (1965), pp. 23-24.

_____."Stingless-Bee Keeping in Western Mexico." *The Geographical Review*. Vol. 54 (1964), pp. 85-92.

_____."The Bayano Cuna Indians, Panama: An Ecological Study of Livelihood and Diet." *Annals of the Association of American Geographers*. Vol. 52 (1962), pp. 32-50.

_____."Cultural Animal Geography: An Inviting Field of Research." *The Professional Geographer*. Vol. 12 (1960), pp. 1-2.

_____. *The Procurement and Utilization of Native Animals by Three Different Culture Groups in the Republic of Panama: A Study of an Aspect of Tropical Biogeography*, Ph.D. Dissertation, UCLA (1959).

Brand, D. D. "The Status of Ethnozoologic Studies in Meso-America." *Actas y Memorias del Congreso Internacional de Americanistas*. 1962 (1964), pp. 131-1401.

Cabrera, A. and J. Yepes. "Zoogeografia," in *Geografía de la República Argentina*, B. A. (1947).

Couto de Magalhaes, A. *Monografía Brazileira de Peixes Fluviales*, Sâo Paulo (1931).

Darlington, P. J. *Biogeography of the Southern End of the World*. Harvard University Press (1965).

Daugherty, H. E. *Man Induced Ecologic Change in El Salvador*. Ph.D. Dissertation, UCLA (1969).

Denevan, W. M. "The Upland Pine Forests of Nicaragua: a Study in Culture Plant Geography." *University of California Publications in Geography Vol. 12* (1961), pp. 25l-320.

Fittkau, E. J. et al. (eds.) *Biogeography and Ecology in South America*. (The Hague: W. Junk, 1969).

Fonaroff, L. S. "Man and Malaria in Trinidad: Ecological Perspectives of a Changing Health Hazard." *Annals of the Association of American Geographers*. Vol. 58 (1968).

Gilmore, R. "Fauna and Ethnozoology of South America," in J. H. Steward (ed.), *Handbook of South American Indians*. Vol. 6 (1950), pp. 345-464.

Gordon, B. L. R. Human Geography and Ecology of the Sinu Country of Colombia. *Ibero-Americana*. Vol. 39 (1957).

Hahn, E. *Die Haustiere und ihre Beziehungen zur Wirtschaft des Menschen*. (Leipzig,

1896).

Harris, D. R. Plants, Animals and Man in the Outer Leeward Islands, West Indies, *University of California Publications in Geography*, Vol. 18 (1965).

Hershkovitz, P. "A Geographic Classification of Neotropical Mammals." *Fieldiana, Zoology*. Vol. 36 (1958).

Instituto Panamericano de Geografía e História. *Proyecto 29 Del Programma De Cooperacion Técnica de La Organización De Los Estados Americanos*. Vol. 9 (Mexico: 1953-1956).

Johannessen, C. "Savannas of Interior Honduras." *Ibero-Americana*, Vol. 46 (1963).

Latcham, R. *Los Animales Domesticos de la America Precolumbiana, Publicacion del Museo de Ethnologia y Antropologia*, Santiago, Chile, Tomo 3 (1924).

MacArthur, R. and J. Connell. *The Biology of Populations*. (New York: John Wiley and Sons, 1966).

Nietschmann, B. *The Ecology of the Subsistence Food System of the Miskito Indians, Eastern Nicaragua*, Ph.D. Dissertation, University of Wisconsin (1970).

Parsons, J. *The Green Turtle and Man*. (Gainesville: University of Florida Press, 1962).

Sapper, K. "Bienenhaltung and Bienenzucht in Mittelamerika und Mexico." *Ibero-Americanisches Archiv*. Vol. 9 (1935-1936), pp. 183-198.

Sauer, C. 0. *Agricultural Origins and Dispersals*. (New York: American Geographical Society, 1952).

Simpson, G. G. "The History of the Fauna of Latin America." *American Scientist*. Vol. 38 (1950), pp. 361-389.

Zeuner, F. *A History of Domesticated Animals*. (London: Hutchinson, 1963).