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Latin American Vegetation: Work by American Geographers in the Sixties and Prospects for the Seventies

The purpose of this paper is to summarize a decade of American work on the geographic description and explanation of the vegetation cover of Latin America. It will not attempt to offer a full account of the vegetation itself, nor a survey of all the various related work in ecology, nor a coverage of studies made by non-American geographers or by non-geographers. It will even slight, unfortunately, the work of geographers published elsewhere than in the standard geographical literature.

Plant cover, "natural" or otherwise, not only possesses intrinsic interest as a major variable element of visible landscapes, but also may serve as a fairly sensitive indicator of fine environmental differences and of the fate of past human ventures in land utilization. The distribution and especially the dynamics of spontaneous vegetation are in themselves of increasing importance for planning future resource policies, and yet are often poorly understood. The consequences of disturbance or destruction of existing cover, in particular, cannot always be foreseen. The daily lives of many of the people of tropical communities in Latin America, furthermore, are closely involved with the neighboring *bosque* or *montaña*. The entire operation of the various "shifting cultivation" systems still so vary prevalent in tropical America revolves around adequate natural restocking of the "wild" phase of their cycle in order to replenish soil fertility. The woods are exploited, too-often more heavily than may be prudent -- for firewood and charcoal in great quantities. Yet other of their uses merit notice, such as in the gathering of numerous field and forest products for food, for employment in handicrafts, or for use in ritual. Likewise, there is considerable attrition on materials used in construction: timber, thatch, and *bejucos* for binding frames.

An account of "The Contribution of Geography to Latin American Studies" by Parsons (1964) and the "Review of Ecological Research in Middle America" by

Bennett (1967) will provide orientation in the broader background of the present topic. Earlier work on the vegetation of Middle America is considered in Wagner (1964), and that on South America in Hueck (1966).

It is all too easy to summarize the decade's work: it has been sparse, and concentrated very largely on problems of tropical savanna distribution and development.

The character and dynamics of vegetation have undoubtedly received at least perfunctory consideration in much of what geographers have written, from pale textbooks to specialized research reports. In certain studies of land use and settlement, vegetation looms especially important as witness to change; indications of the impact of burning, overgrazing, shifting cultivation, are properly sought in the spread of some vegetation types, and notably in the various sorts of cover called "savanna". There is a good deal of agreement on what constitutes the ideal savanna type, but much less on what permissible variety it may embrace, to say nothing of the actual distribution of savannas and what controls it. Likewise, many geographers concur in visualizing an ideal "shifting cultivation", for example, but it has not been possible so far to boil down the innumerable local instances to one general pure form. The problem of geographical distribution is complicated from the start by the shakiness of classification systems, and that of generalizing interpretation is understandably even worse off. A vast lack of firsthand knowledge of most of the continent is just as serious a limitation on our understanding.

Nonetheless, maps of vegetation get published. It would seem easy to map simply what one sees, and so develop an areal picture. But how does one subdivide the totality into meaningful units What characters are chosen as diagnostic? And how does one fill in the areas one has not personally visited? Taylor (1963) produced a largely firsthand map of Nicaraguan vegetation -- something just not possible for larger areas. As area increases, the problems mentioned soon become insurmountable. Systematic extrapolation must then be attempted.

One approach to extrapolation, developed primarily by British plant scientists, relies on the structure of vegetation, i.e., the metrical descriptive features of individuals and localized agglomerations; see, for example, the authors rather unsatisfying attempt to map Middle American vegetation (Wagner, 1962). An

older and ancestral kind of classification based on life forms still guides most vegetation mapping as in the usual textbook or research report. This other approach relies upon inferred climatic zonation and broad generalities of life form distribution, assumed to be mutually dependent, thus giving rise to very familiar hybrid terms such as "savanna climate", "rain forest", "monsoon forest", and so on. Sometimes the evidence used for establishing a vegetation distribution is a very long way from actual observed structure. In a recent series of maps of vegetation for various Latin American countries, developed at the Inter-American Institute of Agricultural Sciences at Turrialba, Costa Rica, the boundaries have been drawn according to a predictive climatic model created by the ecologist Leslie R. Holdridge. The Holdridge system is described in Tosi and Voertman (1964).

The study of vegetation has always called for some kind of "model building". It requires the imposition of discrete categories of some kind upon a sort of natural continuum. Furthermore, its categories ought faithfully to reflect the underlying natural controls that affect plant distribution and agglomeration. And finally, it has to predict plausibly what grows in unvisited areas. The newfangled idea of the model can actually hold few terrors for anyone who has stood out in the woods somewhere in the tropics, trying to "see" the ideal type embodied in a scrubby lot of trees; and whoever has tried to map honestly his jumbled impressions of real life vegetation knows the "model" as his inevitable compromises. Nonetheless, those who study vegetation have only lately become aware of their reliance on models (cf. Kellman, 1969). The pity is that models do not really increase our knowledge of vegetation -- they only reassure us about our guesses.

One thing about models (whether or not the schemes one encounters are called by that name) is that they tend to fall down on the job. Reality outwits them. Thus, obviously, grasslands have perennially baffled climatic-model makers trying to predict vegetation. Perhaps this is why savannas have so long and deeply fascinated us (see the long history of savanna studies nicely evoked by Denevan, 1965, and Hills, 1965, for example). On the other hand, the dissatisfaction with climatic controls alone as sufficient to predict savannas -- a direct fruit of the use of the model -- illustrates one of the useful jobs of models: to be wrong, and thus to stimulate inquiry. A vague sense of outrage makes geography time and again, gravitate to the savannas. In late years, W. M. Denevan, C. L. Johannessen, and J. J. Parsons have devoted important research

to the savanna question.

The savannas prove, upon investigation, to be almost always a complex distribution of rather disparate elements, and frustrate any simple single explanation. A major geographic fact at world scale, savannas really local scales are elusive and inconstant. Edifice, microclimate and relief factors have to be invoked in accounting for their patterns but neither one of these nor all together gives a clue to all savanna The role of fire in creating or at least in maintaining, some savanna seems unquestionable; but it may not enter into every case. Grazing animals and wild birds and beasts appear to have an influence in favor of savannas, sometimes -- but not always.

Human influence alone is certainly not enough to explain the tropical savannas. And savanna vegetation is clearly not the only sort of plant cover that arises in response to human interference. A sad miscellany of tropical scrub, rather consistent in its makeup over large areas of the Americas, attests to the attrition brought by farming an grazing use. This residual brushland seems not to have been studied often -- perhaps because it is so drab and unspectacular. In studies of Latin American rural land use systems by geographers, the process of incidental degradation of plant cover is frequently alluded to, but the character and composition of the resultant vegetation at different stages are seldom explicitly described. Wagner (1902) made a not entirely successful attempt to outline the spatial characteristics of this process a fairly typical case in southern Mexico.

If some sort of model is needed to account for the "natural" development and distribution of vegetation, an orderly way of thinking -- tentatively, at least -- about what happens when the plant cover is damaged destroyed by burning, pastoral use, cutting and culling of wild species or clearance for farming, would be equally desirable. Models of expendable secondary successions, articulating with those for normal or "zonal" vegetation, would help both to summarize what is reliably known (comprising very little, at that) and to structure further investigations for greatest productivity. How similar at the second-year recovery stage say, are aggregations developing respectively on former plowland and tracts rapidly burned over by a running fire? How uniformly does intermittent non-plow *roza* farming, clearing by fire, affect a given broad type of vegetation, or rather the secondary regrowth in a given zone? More generally, if we are to conceive of edaphic-climate vegetation zones and types, does each of these have

its own secondary vegetation type? Or does each kind of plant-destroying land use have a characteristic regrowth sequence? As far as the reviewer knows, nothing of any great scope has been written on this particular problem, although several students of vegetation are admittedly well aware of it.

The relationships of vegetation cover with land use constitute one worthy subject of research, obviously, which can stand much further development. But as the case of the savannas shows, the attempt to correlate vegetation and other natural features is itself a challenge. Apart from work on the savannas already mentioned, the chief contributions surely been those of J. Vann (1959, 1960) who demonstrated the use of existing vegetation cover as indicator of former landform patterns in reconstructing old levee distributions in deltas from painstaking observations on Caribbean coast and in Brazil. Mangrove, like savanna, is discrete enough and striking enough to come in for frequent comment, but few American geographers beside Vann have studied it in much detail. In fact few major vegetation types, in and for themselves, have apparently interested geographers in the United States.

Apart from cartography, there is probably but little incentive within geography for study of very broad questions of vegetation classification and distribution. Despite a clear interest in general patterns, geographers tend to fix upon the local and concrete in this age of "quantification", "behavioral science", "policy-oriented research", and "relevancy". In fact, one might argue that these traditions preclude the grandiose conceptions frequent in the past. The model-building tendency of the current generation will, however, have to provide some ways of visualizing broader systems of vegetation, and of man-plant interaction, if the results of numerous local investigations are to complement each other.

The ecological viewpoint will surely grow yet more within American geography. It will probably continue to outreach the comprehensive "global" geographic view of things, so that we shall still have better information about the complicated, jagged local situations than about the smooth, broad universal patterns. This will be so of our knowledge of vegetation and also of our understanding of the influence of man upon it. The proclaimed "spatial" character of geography thus will assume an unexpected guise. For like ecology itself, which while eminently spatial is micro-spatial, future geography may bring to bear more precision, and even more formidable mathematical armament, within close local confines on highly and closely at things.

It is to be hoped that within the coming decade a more patient and searching investigation of local ways of rural life will reveal broad truths still unsuspected or misconstrued, about the role of man in shaping the development of tropical American plant cover, and also about the vital part played by vegetation in the "economic" of livelihood metabolisms of human communities. Careful measurement and recording of all possible aspects of the basic interaction will no doubt be called for, if new insights are to be gained and their range of application rightly estimated. No doubt some sort of scheme of general vegetation analysis and description, suitable for use in studying man-related problems, and adapted for cartographical expression, will have to be developed by someone soon. It would be a good task for a geographer. Thereupon, it will become possible to focus the import of many individual and hitherto rather discrepant studies within a single, general frame, and so to conceptualize much better one of earth's most fundamental operating "systems".

Perhaps the efforts toward these several ends will occur within the ambit of two established traditions within geography: a reawakened and newly purposeful biogeography (which seems, in any case, portended), and a revitalized, much more precise and through "cultural" kind of field study of communities and regions, probably more in their own terms than ever before. Geography seems now to be right on the verge of manifesting both of these developments on a rather large scale.

To summarize only a doughty few American geographers have worked much in recent years with the vegetation of Latin America. Their main emphasis has lain upon the savanna question. Further study will likely frequently concern relationships between rural populations and local vegetation, and will benefit from greater comparative understanding as well as more precise and through methods.

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