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## **Mapping Spatial Factors for Development Planning**

The mapping of spatial factors for purposes of development planning should, one might expect, be an endeavor to which many geographers would apply themselves. Regrettably, this has not been the case in Latin America (or to any great extent elsewhere in the world), except for the commendable work carried out during the past decade by Brazil's Conselho Nacional de Geografia and the O.A.S.'s Natural Resources Unit. Unfortunately, the commitment of both these organizations to demands for official information has restricted their capability of exploring methodological frontiers.

For instance, the 1967 Organization of American States survey of the Dominican Republic (O.A.S., 1967) adds little to the methodology of an earlier study of Honduras (O.A.S., 1962). Similarly, a recent Conselho Nacional de Geografia computer analysis or regionalization (Faissol, 1968) appears to be dealing with the same kind of data as that accumulated for the Municipal Encyclopedias (I.B.G.E. , 1957) and was carried out within the same conceptual framework of aggregation as the C.N.G.'s past studies (C.N.G., 1966). The question arises whether these, and other similar public bodies, are in fact producing the kind of information that might be most useful for development purposes.

Private contractors operating in the field of development planning have, despite many operational breakthroughs (see for instance D.A.S. P. , 1957), also suffered from the constraints imposed by governmental terms of reference. For example, the Chilean and Panamanian cadastral and land potential surveys (Vera, 1964 and O.A.S. , 1968) were limited to specific, traditional objectives. Methodological contributions by academic geographers have also been minimal, perhaps because of their employment as consultants to government agencies or private contractors.

Most of the information gathered in these surveys has concerned natural resources, land use, and population distribution. However, these are only a small part of the spatial knowledge required for development planning. Also needed is data on human resources, mapped compatibly with that of physical resources. There must, furthermore, be a means for the meaningful regional evaluation of

this information.

Although geographers should have important contributions to make in both these areas, judging from recent trends in geographical research interests this very real challenge is also among the least likely to be met. On the one hand, those in official agencies will probably not be in a position to introduce new approaches, especially in human geography; while on the other hand, those academic geographers who are concerned with socioeconomic matters are unlikely to be interested in the attainment of compatibility with the work being done by natural resource investigators. Yet until such compatibility is achieved, it will be impossible to obtain a complete regional-analytical perspective, which is essential to rational development planning.

As a framework within which to collect the kind of data that might be useful for an analysis of human resources, one might refer to the three basic characteristics of underdevelopment mentioned by Seers (Seers, 1969): poverty, unemployment, and inequality (for instance, disparities in the size, technological levels, and living conditions provided among rural land holdings). Information on these, and especially the last, if it exists at all for Latin America, is buried among the averages presented by the censuses. Thus, even where the information may have been collected, it is unavailable for spatial analysis on a scale or at a level of detail comparable to that normally employed for mapping natural resources. However, there is no reason why we should be resigned to doing without this kind of geographical information, since it is available for large portions of Latin America if we are prepared to derive it from the extensive aerial photographic coverage that is available.

This writer has pointed out elsewhere (Momsen, 1969), some of the techniques for extracting socio-economic data from aerial photographs. Suffice it to point out here that poverty is easily pinpointed through the photo-analysis of architectural and related phenomena, whether in a rural or an urban setting. Unemployment -- or, at least, underemployment -- may be measured indirectly in an agricultural environment by considering effective farm size measured against technological levels. And inequalities, whether physical or economic, stare one in the face during even the most elementary analysis of sub-regional patterns. A wide range of other facts which are directly relevant to the evaluation of human resources are also easily ascertained through photo-interpretation.

Despite the fact that even the best development plans cannot be entirely

successful without such information, innumerable schemes and plans have been put forward in which locational data about the people who inhabit an area are sketchy or non-existent. It is, therefore, no wonder that so many development plans have foundered when one considers that as Tulippe pointed out nearly twenty years ago (Gottman et al., 1952, 45), "un grand nombre de problèmes que pose l'aménagement d'un territoire sent, qu'on le veuille ou non, des problèmes de géographie et surtout de géographie humaine". The suggestion, then, is that some of our social and economic geographers could profitably reduce their reliance on questionnaires and computer programs in order to devote themselves to the important, and very geographic task of mapping, in their specific locational context, spatial factors relating to human resources.

Obviously, this lack of spatially-ordered information on socio-economic factors has made it virtually impossible to analyze total regional differentiation for planning purposes, except in a most general way. As a result, much of the thoroughly recorded physical data has gone to waste for lack of a suitable human framework within which its significance could be measured and its context analyzed. An attempt was made by the O.A.S. half a dozen years ago, to combine physical and human data into meaningful regional patterns for the establishment of development priorities within Ecuador's Guayas Basin (O.A.S., 1964). The success of the approach in this case was, however, due not to the completeness of the socioeconomic information, but rather to the fact that the physical aspects were recorded at the reconnaissance level which made them, by default, compatible with the coarseness of grain that characterized the material on human matters. And, while physical data gathering has become more and more refined, social and economic analyses have remained as ill-defined as before.

It is essential that human and physical data be brought to the same level of detail (for an attempt at this, see Momsen, 1970). Only then will development planning be able to move into its final phase: truly integrated regional planning in which, as Handler points out (Handler, 1968, 96), "some system of structural relationships (can) knit together its many facts and the various kinds of problems with which it deals." Using a regional methodology for this purpose, geographers would be in a position to make perhaps their greatest contributions to applied science in Latin America.

Paradoxically, these ends will only be achieved by turning back our methodological clock to the concepts of an earlier era, when regional geography was the sine qua non of research in our discipline. This does not imply that we

should approach the task in an old-fashioned way, piling a series of verbal descriptions one upon the other. It does mean, however, that the regional concept, defined by Broek and Webb (Brock and Webb, 1968, 14) as a "mental construct formulated to arrange earth features in some abstract order," be used as a "tool to bring order into the infinite variety of ... conditions", the analysis of which is essential to sound development planning. Yet even so-called "development regions" are seldom based upon the sum total of development factors or processes, but are arbitrarily constituted out of political units, drainage basins, or physical provinces, or else are functionally defined in terms of such elements as agricultural programs, conservation areas, power networks, or urbanization zones.

A second suggestion, therefore, is that geographers who are interested in the field of development planning must return and address themselves to the concept of the region as the sum total of all its measureable, mappable parts. Only in this fashion can a meaningful ordering of all possible relevant spatial factors be achieved. And until this goal is attained, whatever steps may be taken to analyze an environment for development purposes are bound to be halting, incomplete, and in all likelihood incorrect. At the very least, they will fail to achieve all that may be possible in the way of rational development, at worst, unforeseen factors may render the plans and recommendations that are made, actually detrimental to social and economic evolution.

We have on hand today, the analytical tools needed to make such a regional approach to the geography of development both feasible and relevant. The utilization of aerial photography (and in the near future, perhaps, other forms of remote sensing) to obtain the necessary data is now well-established, and the processing and mapping of the results of such analysis will be greatly advanced as the orthophoto map comes more and more into use (Momsen, 1968). The computerization of location-specific resource mapping, with its versatile storage, retrieval, and collation possibilities is advancing rapidly, thanks particularly to the Pioneering work lately carried out by the Canada Land Inventory (Tomlinson, 1967). And, finally, the quantitative tools and concepts are being developed, for example using factor analysis (Berry and Pyle, 1969, Gauthier, 1968, Jeffrey et al. 1969, Henshall and King, 1966, and Momsen and Momsen, 1968), which may serve as the basis, or at least the point of departure, for more sophisticated analytical techniques applicable to the total regional concept.

The full scope of Geography would be slighted -- and geographers will miss

exciting fields of future research -- if this opportunity to contribute to the advancement and systematization of development planning is neglected. In Latin America particularly, where a large amount of unutilized and underutilized data awaits mapping, interpretation, and analysis, and where development planning will be carried out whether the necessary information is on hand or not, new approaches by geographers toward a better conceptualization of spatial factors will assuredly be warmly welcomed.

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