

LAND FORM GEOGRAPHY AND LAND FORM DESCRIPTION

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In his presidential address before the Association of Pacific Coast Geographers in 1950,¹ John Kesseli vigorously challenged geographers to discard their traditional approach to the study of land form and to replace it with "a geomorphology a geographer can really use." Classical geomorphology, he declared, "stresses the geologist's interest in diastrophism and in evolution during the geologic past," and does not reflect the geographer's interest in the use of the land, "which demands that principal attention be paid to lithology and to the landforms of today." He recommended that geographers embark upon "an intensive search for regions of similar and of different landform types." He further advocated "clear empirical descriptions of these geomorphic landscapes, descriptions which provide a lucid picture of the scene upon which the human drama is to be unfurled."² Thus he called for a study almost wholly descriptive, and much of his address dealt with the process of empirical description itself, its values, its difficulties, and the steps needed to overcome these difficulties.

Kesseli's plea was not a solitary and unique cry, nor were the thoughts that produced it wholly without antecedents. Dissatisfaction with traditional geomorphology was then and is now widespread among professional geographers, being perhaps most expressively, if mutely, manifest, in this country at least, in the dwindling number of geographers choosing land form study as a field for research specialization. Specific, constructive, and public expressions of opposition to the traditional approach have been relatively few, though a significant number have been important and influential. Of these, in addition to Kesseli's address, two seem especially pertinent to a discussion of the concept of a geography of land form and the place and purpose of description within it.

The first of these is R. J. Russell's presidential address, delivered before the Association of American Geographers in 1948.³ Here we have a prominent geomorphologist issuing a strong indictment of the classical approach to the study of geomorphology on the grounds that it is unrealistic, too much concerned with structure, process and time, and not sufficiently attentive to the question of "what, where, and how much." The address has attracted wide attention and provoked considerable discussion among American geographers. Kesseli, speaking a year and a half later, used Russell's papers as a point of departure, underscoring his criticisms of classical method, but proposing a distinctly different approach to the problem.

In *Perspective on the Nature of Geography*, appearing in 1959,⁴ Richard Hartshorne added his voice to those of Russell and Kesseli in main-

¹ John Kesseli, "Geomorphic Landscapes," *Yearbook of the Association of Pacific Coast Geographers*, XII (1950), pp. 3-10.

² All quotations *Ibid.*, pp. 3-4.

³ R. J. Russell, "Geographical Geomorphology," *Annals of the Association of American Geographers*, XXXIX (March, 1949), pp. 1-11.

⁴ Richard Hartshorne, *Perspective on the Nature of Geography*, Monograph Series of the Association of American Geographers, I (Chicago, 1959).

taining that for geographical purposes the study of land form concentrate upon the facts that may be construed as geographically significant. Even more valuable is his lucid analysis of the nature of topical studies in geography, for it is from these considerations that a logically-conceived geography of land form may be constructed, parallel to other topical geographies, some of which are already soundly established and broadly developed.

Hartshorne characterizes a topical subdivision of geography as one in which the areal variation of a limited group of closely related elements "is studied in terms of the interrelations of its elements among themselves and with those of other areal features or elements." By this concept the geography of land form would be the study of the place-to-place variation of the land's surface form in its relationships to the distribution of other phenomena, as a part of the total significant variation of areas.

The center of attention in such a study is the nature and pattern of variation of existing surface configuration. The aspects of land form to be stressed are those that are most significantly related to other geographical elements. The variation of these aspects are to be studied not only for their own sake, but in terms of their functional interrelationships with those of other phenomena. Studies of the genesis of land form variation lie in the zone within which the weight of emphasis passes from the chorologic science of geography to the systematic science of geology. They have a distinct geographical flavor, however, if they are concerned with some part of the actual pattern of variation of existing land form, are directed toward the understanding of that existing character, and emphasize those aspects of the surface that are significant in the total variation of the areas of which they are a part.

All three of these writers have emphasized the importance of careful factual description of the land surface as it varies from place to place, and all have emphasized the importance of centering attention upon those characteristics of the surface that contribute most significantly, in the eyes of man, to the totality of areal character. Kesseli's particular contribution was to stress the importance to geography of the empirical description of land form, which he perceived to be in itself an arduous task. It is the purpose here to develop further the function and the most useful methods of description in a geography of land form that is conceived along the lines sketched in the preceding paragraph.

DESCRIPTION IN THE GEOGRAPHY OF LAND FORM

The traditional core of the discussion of method in land form description is, "shall the description be empirical or shall it be explanatory?" This well-worn argument is taken up again here for two reasons: (1) that the explanatory case has received a disproportionately large share of space for several decades, and (2) that it seems that part of the inconclusive jousting has arisen from certain misunderstanding concerning the place and purpose of descriptive analysis, especially in geographical study.

Traditionally the advocates of genetically-oriented description have rested their case upon three arguments: (1) that explanatory description is more satisfying to the natural curiosity of the student, who wants to know the "why" of things; (2) that description organized on a genetic basis has a higher scientific status, because it considers cause and effect, not merely characteristics; and (3) that by using genesis as an organizing

principle description is made more systematic and less repetitive and is able to convey a more complete picture with fewer words. These points were offered repeatedly by W. M. Davis in his effective and authoritative style,⁵ and, like much that he wrote, became accepted as doctrine and have been quoted and paraphrased with remarkable frequency.⁶

The proponents of empirical description have maintained chiefly (1) that an explanatory description can be no more accurate than the genetic theory upon which it is based and no more complete than the genetic understanding of the surface being described; and (2) that an explanatory description is actually an explanation, and not properly a description at all. To these arguments Kesseli, supported by Hartshorne and others, has added the point that the functional significance of the terrain is based upon actual properties of the land surface, and not the way in which the surface developed.

In the remainder of this paper it will be the contention (1) that the arguments just presented in favor of empirical description are sound; (2) that there are yet other significant points in favor of empirical description based in part upon the function of description in geographical method; and (3) that the principal arguments advanced in favor of explanatory description are in part irrelevant, in part based upon a faulty conception of the purposes of description, and in part unsupported assertions of faith.

In the introduction the case was made for a geography of land form that, at its core, is concerned with the existing pattern of land variation as a component of the significant variation of areas and with the relations of the areal variation of land form to that of other geographical phenomena. It seems unavoidable that a first step in any study so oriented must be a systematic inventory or descriptive analysis of what is actually there, the character of the existing surface. This preliminary analysis, undertaken for the benefit of the investigator himself, is the first of two principal places in which descriptive analysis necessarily appears in studies of the geography of land form.

It is almost inconceivable that this "investigator's description" should be compiled on any but an empirical basis. If the study is investigating land form as something that affects the variation of other physical elements or as something evaluated or utilized by man, the necessity of an initial empirical analysis seems patent. It is the existing land form, not its history or mode of development, that is directly significant in these functional relationships. Relations of climate or agricultural land utilization to the land form are relations with a surface geometry and with (largely) surficial materials, not with developmental sequences or sculpturing agencies.

In a geographically oriented study in land form genesis, to use explanatory description at this stage would be to answer the questions before they have been asked, that is, to imply the genetic relationship before they have been established by the interpreter's study that is to be made. Admission of genetic concepts at this stage is likely to prejudice the investigator's view of the problem in such a way that he readily sees and considers those features that fit into the assumed system of genetic theory while overlook-

⁵ Note especially "Methods and Models in Geographical Teaching" in: W. M. Davis, *Geographical Essays* (Boston: Ginn and Company, 1909), pp. 193-209.

⁶ Cf: Kirk Bryan, "The Place of Geomorphology in the Geographic Sciences," *Annals of the Association of American Geographers*, XL (1950), pp. 196-208.

ing or subordinating those that do not fit the anticipated pigeon holes. A geomorphologist who is committed to a strongly cyclic theory of erosional development, for example, makes much of those bits of bench, shoulder, and flat that bear upon his conception, but may give little attention to the valley sides and rolling upland slopes that occupy the majority of the area. Both Russell and Kesseli have noted this danger and have called for realistic description as its antidote.⁷ If the problem is to explain what is there, let the first task be to find out and set forth in systematic, balanced and unbiased fashion what is *in fact* there. It is by this step that the problem becomes defined. One may at this point venture the opinion that a slighting of the gathering of unbiased empirical observation data has been a major factor retarding real progress in geomorphological theory and favoring the growth and maintenance of the elaborate and stultifying structures of hypothesis that both Russell and Kesseli condemn.

The second place in which descriptive method comes to the fore in a geographic study of land form is that in which the surface is finally described for the benefit not of the investigator but the reader. Here the problem is chiefly one of communication; to convey effectively to the reader an accurate and useful portrayal of the land-form.

It seems clear that it is this second descriptive phase, and not the first, to which the arguments in favor of explanatory description are intended to apply. For if applied to the preliminary analysis, certain of the points become irrelevant or absurd. That concerning satisfaction of natural curiosity, for example, does not apply, for it is from the facts of primary description that many of the questions arise. And since initial observation of fact is basic to nearly all scientific investigation, the gathering of fact in this particular field can hardly be labeled unscientific. As applied to the second descriptive phase, however, the arguments can be meaningfully discussed. Evaluation of them demands an understanding of the purpose for which the description is composed, and it should be remembered that we are here concerned with geographical purposes.

Following the concepts outlined earlier, it will be useful to consider two types of studies that are geographical or at least geographically flavored: those involving the land form as something functionally related with other phenomena in areal variation, and those genetic studies centered upon the explanation of significant aspects of land form variation.

For either type of study it may be argued that the first two points advanced in advocacy of explanatory description (that it is more satisfying to the curiosity of the student and that it has a higher scientific status) are in considerable part irrelevant and are based upon a misunderstanding of geographical purposes. A description does its job and possesses scientific value if it conveys effectively to the reader the observed facts that are the very basis of the inquiry at hand.

If the study treats of the functional significance of land form, the bringing of genesis into the picture simply introduces irrelevancy and obscures the relationship involved, for as previously mentioned it is through characteristics and not developmental processes that land form is functionally significant, except in certain situations in which the surface is undergoing unusually rapid change.

⁷ Note especially: Russell, *op. cit.*, pp. 4-8; Kesseli, *op. cit.*, pp. 4-5.

If the study deals with the genesis of existing variation, one may object if the only description offered to the reader is an explanatory one, for in that event the reader has no opportunity to visualize in unbiased form the landscape that is being explained nor to judge fairly the adequacy and validity of the interpretation provided. For the genetic description is perforce itself an interpretation. Davis' statement that "a genetic classification of geographical forms is, in effect, an explanation of them"⁸ is a more cogent argument *against* the substitution of explanatory for empirical description than *for* it.

An explanatory description might however be usefully introduced in a geographically oriented study of land form genesis in the form of a summary toward the end of the interpretative section. At that stage it might well prove interesting and effective to restate the initial empirical characterization of the surface form in explanatory terms, but only as a device to help sum up the genetic conclusions and to make clear that they encompass the characteristics that originally demanded explanation.

But what of the argument that only by the explanatory approach can conciseness, system and clarity be brought to description? For all the logical arguments that can be advanced in its favor, is empirical description really unequal to the task?

System in any expository presentation requires the use of some sort of organizing principle, but genesis is not the only such device available. Function, for instance, is an equally valid one. Another is to hold to inherent characteristics, resolving the complexity of the phenomenon into elements, component parts or attributes that can be characterized separately. This a familiar scheme, regularly utilized, for example, in the description of climates, plants, and, to an increasingly exclusive degree, of soils. Indeed at the moment land form description stands almost alone in its stubborn adherence to a genetic rather than a component-characteristic organization. Possibly this slowness to venture into empirical description stems in part from the fact that land form data are not normally assembled in specific or numerical form, element by element. However, they can be collected in such form, and numerous examples are already available. The literature of morphometry is extensive, though thus far a disproportionately large number of the properties selected are useful only to highly detailed studies of small areas.⁹ Arthur Strahler and his associates have assembled and experimented with an especially large collection of characteristics and indices that are highly useful in the systematic description of drainage basins.¹⁰ Various others have suggested characteristics applicable to more varied styles of terrain.

In earlier essays the writer has suggested that the characteristics of land form can probably all be grouped under the general headings of (1) slope or inclination, (2) surface materials, (3) dimensions, and (4) arrange-

⁸ W. M. Davis, *op. cit.*, p. 252.

⁹ An excellent bibliography is provided in G. Neuenchwander, *Morphometrische Begriffe*, "Arbeiten aus dem Geographischen Institut der Universität Zürich," Serie A., No. 2, Zürich, 1944.

¹⁰ Note, for example, the lists of properties assembled in A. N. Strahler, "Dimensional Analysis Applied to Fluvially Eroded Landforms," *Bulletin of the Geological Society of America*, LXIX (March, 1958), pp. 279-300.

ments.¹¹ Under each of these heads might be compiled long lists of properties or indices, comparable to many items that might appear under the broad headings of temperature or precipitation in an analysis of climate. Some properties, such as inclination and dimensions, are readily handled in numerical form; others, most notably arrangements (such as patterns and profiles), are less readily quantifiable.

By resolving the land form into such components, a systematic and balanced description may be achieved, possessing the virtues of precision and comparability, free from the uncertainties of genetic interpretation, and stated in a form well fitted to the study of relationships with other phenomena of geographic interest.

The notion that the genetic approach is inherently capable of presenting a clearer picture with fewer words is an article of faith that does not bear scrutiny. The image conveyed by an explanatory description is no more detailed, full or precise than the explanation is detailed, full or precise. Genetic terms such as "marginal moraine," "naturally dissected plateau," or "cirque and glacial trough" are generalized and weak in genetic content. Any impression there may be of more specific implied descriptive detail arises from the filling in, by the reader, of the image of an example with which he is personally familiar, but which may be quite unlike the example being described. If an explanatory description is to be precise and detailed, then it must include those details and that precise measure of development that have produced the specific existing qualitative and quantitative attributes of the landscape. This, it is submitted, cannot be done concisely, either by genetic or empirical description. If conciseness is desired, it can be achieved only by generalization, using the usual techniques of limiting the number of kinds of information given, grouping data into larger classes, using various types of summaries, employing numerical expression where feasible, and by letting pictures, diagrams and maps do the work of many words. These techniques are, if anything, more readily adaptable to empirical than to explanatory description.

The picture, sometimes presented, of empirical description as "an endless and easily forgotten repetition"¹² is a straw man. There is no more need for endless cataloguing of features in empirical description than in genetic. The techniques of generalization just mentioned, the summarizing of the repetitive occurrence of characteristics over broad areas, the various illustrative techniques, and verbal virtuosity are all available to the employer of empirical method. In the hands of a careful, ingenious and gifted expositor there is no reason why an empirical description cannot be rendered highly palatable.

Kesseli has pointed out a definite problem that the user of empirical description does face, namely the lack of an adequate empirical terminology, partly the result of the turning of originally empirical terms to genetic purposes by geomorphologists.¹³ This is obviously remediable, though the coinage of new terms needs be approached with care and a sense of pro-

¹¹ E. H. Hammond, *Procedures in the Descriptive Analysis of Terrain*, Final Report, Office of Naval Research, Geography Branch, Project No. NR 387-015, Contract No. Nonr-1202 (01) (Madison, Wisc., 1958), pp. 5-57.

¹² Bryan, *op. cit.*, p. 204.

¹³ Kesseli, *op. cit.*, pp. 5 and 9.

portion lest a deluge of jargon be the result.¹⁴ Perhaps it is not yet too late to repossess some of the honest descriptive words upon which explanatory limitations have been placed. It would be well to add here a note of warning against regarding genetic terms as inherently dirty words. There is neither virtue nor common sense in avoiding the use of a genetic term for a feature of which the general origin is clearly established. It is only necessary to warn against assuming that these generalized genetic terms convey much of descriptive value.

In the last analysis, the test of any description is whether it has adequately served its purpose. It does not seem to be an obvious truism that the purpose of a description is to describe, while the purpose of an explanation is to explain. An explanation can serve as a description only if the origins of all the significant characteristics of the landscape are *known* and *specified* in the explanation. In the present state of knowledge of geomorphic processes and of past developmental environments this is simply not possible. But if that is true, then an "explanatory description" is not only, as Kesseli has termed it, "an explanation lacking a description;"¹⁵ it is not even, for geographical purposes, likely to be more than a tentative and incomplete explanation. For many purposes, functional and explanatory, students with a geographical point of view need to know the empirical facts about the land form of areas. Let these then be set forth in the most effective manner possible, free from the uncertainty and irrelevancy of genetic interpretation. If the study is one of genesis of existing form, then let the existing form be factually portrayed at the outset, permitting that portion of interest that is derivable only from explanation, to lure the reader on to the following interpretative section wherein his curiosity may be in part appeased, though never, in geomorphology, wholly assuaged.

¹⁴ An admirable example of an important move in the direction of empirical description, but a frightening example of the results of untrammelled coinage of terms is provided by U.S. Department of Agriculture, Soil Conservation Service, Soil Survey Staff, *Soil Classification, A Comprehensive System, Seventh Approximation* (Washington: Government Printing Office, 1960).

¹⁵ Kesseli, *op. cit.*, p. 5.