Basic Concepts of Geomorphology: A Review

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Abstract - Geomorphology is more challenging beneath than above sea level, because visual observations are limited by water turbidity. The development of the subject of submarine geomorphology has therefore more closely followed the development and deployment of new technology than subaerial geomorphology. Thus, whereas in subaerial geomorphology, hypothesis and inquiry have been prompted by structures that have always been visible, in submarine geomorphology, advances of understanding have tended to occur when new features have been discovered or imaged with instruments at higher resolution. Also, because of the limited accessibility, our knowledge of the marine geologic processes creating these morphological features has relied mostly on a forensic type of analysis rather than by monitoring of processes more directly, although monitoring has been possible in some instances, in particular in the more accessible shelf seas.

Keywords: Geomorphology, turbidity, physical etc

I. INTRODUCTION

In the term geomorphology 'geo' means earth and 'graphos' means landforms, which basically means that it is a systematic and organized description and analysis of the landforms of earth. It has resulted in the development of the Basic concepts in geomorphology which has a crucial impact in today's world.

Geomorphology has resulted a great change from ancient days till now, resulting in the generation of The Basic concepts in geomorphology that which are been discussed below.

There are ten basic concepts in geomorphology. Each concept differs from the other in various aspects. Let us now look upon these ten basic concepts.

1. The same physical processes and laws that operate today operated throughout geologic time, although not necessarily with the same intensity as now. This is the important principle of geology and is known as the principle of uniformitarian's. It was first enunciated by Hutton in 1785. According to Hutton "the present is the key to the past". According to him geologic processes operated throughout geologic time with the same intensity as now. We know that it is not true. Glaciers were much more significant during the Pleistocene and during other periods of geologic time than now; world climates have not always been distributed as they now are, and, thus, regions that are now humid have been desert and areas now desert have been humid. There are numerous examples which shows that the intensity of various geologic processes has varied through geologic time.

2. Geologic structure is a dominant control factor in the evolution of landforms and is reflected in them. The major controlling factor in land form development is structure and process. Here the term structure includes not only the folds, faults etc. but all those ways in which the earth materials out of which land forms are carved differ from one another in their physical and chemical attributes. it includes such as rock attitudes; presence or absence of joints, bedding planes, faults, and folds; rock massiveness; hardness of constituent minerals; the susceptibility of the mineral constituents to chemical alteration; permeability and impermeability of rocks; and various other ways by which the rocks of the earth crust differ from one another. The term structure also has stratigraphic implications, and knowledge of the structure of a region implies as appreciation of rock sequence, both in outcrop and in subsurface, as well as regional relationship of the rock strata. In general the structures are much older than the geomorphic forms developed upon them. Such major structural features as folds and faults may go back to far distant periods of diastrophism.

3. To a large degree the earth's surface possesses relief because the geomorphic processes operate at different rates. The rocks of the earth's crust vary in their lithology and structure and hence offer varying degrees of resistance to the gradational processes. Differences in rock composition and structures are reflected not only in regional geomorphic variability but in the local topography as well. The local intensity of particular processes may change notably in response to differences in such factors as temperature, moisture, altitude, exposure, topographic configuration, and the amount and type of vegetal cover. The microclimatic conditions may vary markedly between a valley floor and a hilltop, between a northern and a southern exposure, and between bare ground and that with a heavy vegetal cover. The rate of all weathering, all mass-wasting, all erosion, and all deposition varies appreciably within rather narrow limits in relation to the influence of local conditioning factors.

4. Geomorphic processes leave their distinctive imprint upon land forms, and each geomorphic process develops its own characteristic assemblage of land forms. The term process applies to the many physical and chemical ways by which the earth's surface undergoes modification. In general end genetic processes (originate from forces within the earth crust such as diastrophism and volcanism) tend to build up or restore areas which have been worn down by the exogenesis processes (results from external forces like weathering, miscasting, erosion); otherwise the earth's surface would finally become largely featureless. Just like plants and animals land forms have their individual distinguishing features depending upon the geomorphic process responsible for their development. A proper appreciation of the significance of process in land form evolution not only gives a better picture of how individual land forms develop but also emphasizes the genetic relationships of landform assemblages. Land forms are not haphazardly developed with respect to one another but certain forms may be expected to be associated with each other. Thus the concept of certain types of terrain becomes basic in thinking of geomorphologies. Most landscape are the products of a group of processes. The complex of geomorphic processes and agents which operates under a particular set of climatic conditions has been termed a morphogenetic system.

5. As the different erosion agents act upon the earth's surface there is produced an orderly sequence of land forms. The land forms possess distinctive characteristics depending upon the stage of their development. This idea was most stressed by W. M. Davis and out of this idea grew his concept of geomorphic cycle and its concomitant stages of youth, maturity, and old age culminating in a topographic surface of low relief called pen plain. Use of the term geomorphic cycle will carry with it implication of orderly and sequential development but there will be no implication that designation of the topography to a certain area as youthful, mature or old means that the topography of another region in the same stage of development has fully comparable characteristics. Under varying conditions of geology, structure, and climate land form characteristics may vary greatly even though the geomorphic processes may have been acting for comparable periods of time. Partial cycles are more likely to occur than completed ones, for much of the earth's crust is restive and subject to intermittent and differential uplifts.

6. Complexity of geomorphic evolution is more common than simplicity. Usually most of the topographic details have been produced during the current cycle of erosion, but there may exist within as area remnants of features produced during prior cycles. Commonly we are able to recognise the dominance of one cycle. Horberg (1952) divided the landscapes into five major categories: (1) simple, (2) compound, (3) monocyclic, (4) multicyclic and (5) exhumed. Simple landscapes are those which are the product of a single dominant geomorphic process, compound landscapes are those in which more than one geomorphic process have played major role in the development of existing topography. Monocyclic landscapes are those that bear the imprint of only one cycle of erosion; multicyclic landscapes have been produced during more than one cycle of erosion. Much of the earth's topography bears the imprints of more than one period of erosion. Exhumed or resurrected landscapes are those which were formed during some past period of geological time, then buried beneath a cover mass of igneous or sedimentary origin, then still later exposed through removal of the cover. Topographic features now being exhumed may date back as far as the Precambrian or they may be as recent as Pleistocene.

7. Little of the earth's topography is older than tertiary and most of it no older than Pleistocene. Most of the details of our present topography probably do not date back of the Pleistocene, and certainly little of it existed as surface topography back of the tertiary. Himalayas were probably first folded in the Cretaceous and later in the Eocene and Miocene but their present elevation was not attained until the Pleistocene and most of the topographic details in Pleistocene or later in age.

8. Proper interpretation of present-day landscape is impossible without a full appreciation of the manifold influences of the geologic and climatic changes during the Pleistocene. Pleistocene have had far-reaching effects upon present-day topography. Glaciation directly affected many million square miles, perhaps as much as 10,000,000 square miles, but its effects extended far beyond the areas actually glaciated. Glacial outwash and windblown materials of glacial origin extended into areas not glaciated, and climatic effects were probably worldwide in extent. In the middle latitude regions the climatic effects were profound. There is indisputable areas evidence that many regions that are today arid or semiarid had humid climates during the glacial ages. Although glaciation was probably the most significant event of the Pleistocene, we should not lose sight of the fact that in many areas the diastrophism which started during the Pliocene continued into the Pleistocene and even into the Recent. Around the Pacific Ocean, Pleistocene diastrophism has played a most significant role in shaping of presentday landscapes.

9. An appreciation of world climate is necessary to a proper understanding of the varying importance of the different geomorphic processes. Climatic variations may affect the operation of geomorphic processes either indirectly or directly. The indirect influences are largely related to how climate affects the amount, kind, and distribution of the vegetal cover. The direct controls are such as the amount and kind of precipitation, its intensity, the relation between precipitation and evaporation and daily range of temperature, whether and how frequently the temperature falls below. There are, however, other climatic factors whose effects are less obvious, such as how long the ground is frozen, exceptionally heavy rainfalls and their frequency, seasons of maximum rainfall, frequency of freeze and thaw days, differences in climatic conditions as related to slopes facing the sun and those not so exposed, the differences between conditions on the windward and leeward sides of topographic features transverse to the moisture-bearing winds, and the rapid changes in climatic conditions with increase in altitude.

10. Geomorphology, although concerned primarily with present day landscapes, attains its maximum usefulness by historical extension. Geomorphology concerns itself primarily with the origins of the present landscape but in most landscapes there are present forms that date back to previous geological epochs or periods. A geomorphologist is thus forced to adopt an historical approach if he is to interpret properly the geomorphic history of a region. The paleo-geomorphology covers the identification of ancient erosion surfaces and study of ancient topographies.

II. CONCLUSION

Geomorphology plays a major role in the processes that dictate the distribution of soils on the landscape. Conversely, pedologic processes can be considered an integral part of landscape evolution. The relationship between geomorphic surfaces and soils has been tested and found useful in many parts of the United States. The hill slope model has proven to be a good framework for testing the interaction of pedogenic and geomorphic processes. To adequately utilize the model for field predictions it is necessary to visualize the landscape in terms of the soil catena. The morphology and processes of each member of the catena is related to every other member of that catena. Concatenation of soils on the landscape is the result of lateral surface and subsurface movement of materials.

III. REFERENCE

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