Geomorphology: Definition, Nature and Scope: A Review

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Abstract - Geomorphology is the study of landforms, their processes, form and sediments at the surface of the Earth (and sometimes on other planets). Study includes looking at landscapes to work out how the earth surface processes, such as air, water and ice, can mould the landscape. Landforms are produced by erosion or deposition, as rock and sediment is worn away by these earth-surface processes and transported and deposited to different localities. The different climatic environments produce different suites of landforms. The landforms of deserts, such as sand dunes and ergs, are a world apart from the glacial and periglacial features found in polar and sub-polar regions. Geomorphologists map the distribution of these landforms so as to understand better their occurrence. Earth-surface processes are forming landforms today, changing the landscape, albeit often very slowly.

Keywords: Geomorphologists, Environments, Deserts, Landforms, Climatic etc.

I. INTRODUCTION

Geomorphology is concerned with the nature and origins of Earths surface features. Literary a study of Earth form. Geomorphology is generally understood to embrace the study of land forms and landscapes. As long as man has walked the earth, tilled the ground and sailed the seas, he has formed ideas about the origin of the Earth and its landscapes. And as landforms are the most widespread geomorphic phenomena, speculation as to their origin has gone on since the days of the ancient philosophers

II. DEFINITION OF GEOMORPHOLOGY

Some authors have however, defined geomorphology so broadly as to include the Earths configuration as a whole and the dynamic processes that shape its surface .In fact, Thornbury in 1969 suggests that the term geomorphology should be extended to include submarine forms, while Chorley et al 1984 defines geomorphology as the scientific study of the geometric features of the earth surface. The latter asserts that although the term is commonly restricted to those landforms that have developed at or above sea level, geomorphology includes all aspects of the interface between the solid earth, the hydrosphere and the atmosphere. Therefore, the term is not only about the landforms of the continents and their origin of concern, but also the morphology of the sea floor. Other writers have restricted geomorphology to the study of sub-aerial landforms of erosional or depositional origin or only to the genesis and history of such landforms.

III. NATURE AND SCOPE OF GEOMORPHOLOGY

There are three major aspects of the study of geomorphology

Firstly, it is the study of the relations between landforms and the underlying rocks i.e**.** Geological Geomorphology. Thus, geomorphology is concerned with the interactions between denudation processes and the rock strength. Hence, in the precise investigation of the resistance of rocks to denudation, detailed experimental work on rocks must be carried out.

In its second sense, geomorphology is the study of the evolution of landscapes. Such studies have been termed denudation chronology. Such studies attempts to reconstruct succession of pictures of the relief at different times. Alterations of relief are usually believed to have been caused by changes of base level and climate.

The third aspect of geomorphology is the study of the actual process of erosion which gives rise to landforms. Unlike the first two aspects of Geomorphology, which are essentially regional in approach, this third aspect is systematic. It aims to understand the action of waste movement of water movement, ice, and wind as well as the processes of weathering.

IV. APPROACHES TO GEOMORPHOLOGIC STUDIES

Geomorphologic studies comprise a spectrum of approaches between two major interrelated conceptual bases, namely: historical studies and functional studies. To these two may be added a third, the Climatic geomorphology approach.

V. THE HISTORICAL APPROACH

Historical studies attempts to deduce from the erosion and depositional features of the landscape evidence relating to the sequence of historical events. For example, tectonic, sea level, climatic through which it has passed. Such studies explain the existing landform assemblages as a combination of effects resulting from the vicissitudes (changes) through which it has passed. Historical explanation is reserved for landforms whose features have evolved slowly and which bear witness to the super imposed effects of climatic and tectonic changes. It relies retro diction, the derivation of

chronology of a sequence of past landscape forming events. Historical approaches comprise of two related approaches namely the cyclic approach and the denudation chronology approach.

1. **Cyclic Approach**: the cyclic approach was initiated and established by W.M Davis (1850- !9340), who summarized the basic thesis of his work in the phrase Landforms are a function of structure process and stage. Although he concentrated on the sequence of events in explaining the evolution of landforms, this evolutionary sequence he termed the cycle based on his conceptualization that landforms like the human life pass through the stages of youth, maturity and old age. A major feature of any cycle is that the end position should be similar to the initial one. Thus, the end product of Davisian cycle of erosion, the peneplain is about the same as the initial land surface.
2. **The Denudation Chronology Approach**- the mainstream of geomorphological thought particularly in Britain from about 1930- 1950 was denudation chronology. This was the deliberated attempt to make use of erosion surfaces at different attitudes to reconstruct the geomorphological history of a region. An erosion surface is an extensive flat area known to have been produced by erosion and representing the product of a cycle denudation chronology is thus, not concerned about the origin of just one landform, but an assemblage of landforms or surface. The main roles of denudation chronology are the identification, dating and interpretation of Planation surfaces. In addition, it has the subsidiary aim of studying the way in which the drainage system of an area has evolved. However, denudation chronology involves the absolute or relative dating of erosional and depositional events occurring under the influence of tectonic, eustatic, climatic, or other variations. The techniques used to identify erosion surfaces comprising a combination of field observation and analysis of contoured map.
3. **Climatic Geomorphology Approach**
   In Europe, outside Britain and France, Geomorphology progressed more or less without to reference to Davis erosion cycle or to denudation chronology. Their criticism of these historical approaches reduced to its simplest was that different climates produce different processes which in turn produced different landforms. In place of these historical approaches, they adopted an alternative theoretical approach which has been called Climatic Geomorphology. The theme of the approach is that distinctive climates possess distinctive assemblages of processes which result in different assemblages of landforms. According to this approach, every phenomenon or process whose global extension is more or less comfortable to latitude is termed zonal. The end product of the climatic approach is the identification of a number of so called morph climatic zones of the earth, each with its distinctive climate processes and landforms. Thus, the identification of regions where climate may determine the dominant geomorphic processes and therefore significantly influence landform production is one of the goals of climatic geomorphologists. However, the development of climatic geomorphology has been traced to Von Richthjofen who at the close of the 19th century was developing his ideas of climatic geomorphology. This early start was continued much later by J. Budel followed by such worker as Birot, Tricart and Cailleux and Derbyshire, a Briton. The climatic geomorphology has been gaining strength not only in Europe, but also in North America since 1950 and it is still applied in elucidating the origin and evolution of regional landform assemblage's world-wide.

4. **Modern Functional Approaches**
   Modern functional approaches generally aim at explaining the existence of landforms in terms of the circumstances which surround them and allow them to be produced, sustained, or transformed such that the landforms function in a manner which reflect these circumstances. Such studies usually involve reasonably contemporary processes and the behaviour of earth materials which can be directly observed, measured and analysed to enable the geomorphologist understands the maintenance and changes of landforms. Most functional explanations of landforms are directed towards prediction, the deducing of effects produced by causative factors. Modern functional approaches are therefore, process-form oriented. However, an understanding of the erosional and depositional processes that fashion the landform, their mechanics and their rates of operation are obtained in order that the past evolution can be explained and the future evolution predicted. The modern-functional approach to geomorphology comprise of two related methods, namely:

- Direct field observation and measurement and
- Simulation modelling. Both involve the observation, measurement and mathematical/statistics analyses of both process and form in order to objectively explain landform evolution.

VI. AIMS AND OBJECTIVES OF GEOMORPHOLOGY

There have always been controversy and confusion about the nature of Geomorphology, these reflects the fact that historically, Geomorphologists have at one time or another attempted to answer three basic sorts of questions about the Earths landforms and landscapes, the questions are:

1. How can these features and processes be described?

2. How can they form and changed through time?
3. What processes are responsible for them and how do these processes work?

The first three lines of inquiry would seem to be a function of physical demography, one goal of which is commonly understood to be an accurate comprehensive and comprehensible description of the earths surface. The term physiography has come to be used for such descriptive studies through the mistaken impression that the word was originally coined as a contraction of physical geography however, originally used this term in its literal sense for the study of natural phenomena in general. Later, Powell (1895) restricted it to the surface features of the earth with an emphasis on their mode of origin; and as such the term is approximately synonymous with geomorphology which has largely superseded it while W.M Davis used the term Geomorphography for the descriptive study of landscapes. To most Geomorphologists, the ultimate aim of landform study is to explain how individual landforms and landform assemblages have originated and developed. Geomorphology was concerned primarily with the second line of inquiry i.e. the study of landform origin and change which Davis and other early authors sometimes called Geomorphology. In fact, argued that the: essential and critical distinction between Geomorphology and Dynamic geology is: the recognition of landforms or the ruminants of landforms produced by processes no longer in action, thus, in its essence and in its methodology, Geomorphology is historical. This is the true function of the study of landforms within the generous and inclusive arms of the mother science of Geology. According to Small (1978), landforms and landscapes are so complex and pose such a variety of problems that several genetic approaches exist. The third line of inquiry into the nature and the result of the processes that shape the earths surface is sometimes called process Geomorphology, although the principles and methods of study are borrowed directly from the soil science and rock mechanics: hydrology and geophysics, Kirk Bryan however term such studies Dynamic Geology and emphatically excluded them from his Geomorphology. Process Geomorphology is concerned with the investigation of the relationship process and form. This involves in the first instance a careful analysis of weathering, transport of sediments, erosion and deposition processes both as regards their mechanism and as regards rate of operation.

And secondly, relating casually, individual processes and groups of processes to particular forms. A typical example is the attempt by fluvial geomorphologists to casually relate such fluvial processes as stream discharge, bed and bank erosion, sediment transport and sediment deposition to river channel form and pattern. Despite Bryans restriction, geomorphology is nowadays generally understood to cover all the three lines of inquiry or aspects of landform study: description, genesis and history, and process. In parts, this reflects the interdependence of all three sorts of investigations. For example, a sound reconstruction of the history of a particular landform requires both a clear picture of what that landform is today and clear understanding of the operation and results of the various processes that may have shaped it. On the other hand, a sound description of a modern landform should take into account not only its present form and structure but its antecedents as well. Finally, geomorphic studies of earth forming processes necessarily include the effects such processes have on earth materials and landforms. Such study in turn provides information needed to describe and interpret the histories of existing landscapes that may have been affected by these processes. Thus, each line of geomorphic inquiry serves the other and in turn depends on the others for fresh input observations and ideas.

VII. Conclusion

Geomorphologists are also “landscape-detectives” working out the history of a landscape. Most environments, such as Britain and Ireland, have in the past been glaciated on numerous occasions, tens and hundreds of thousands of years ago. These glaciations have left their mark on the landscape, such as the steep-sided valleys in the Lake District and the drumlin fields of central Ireland. Geomorphologists can piece together the history of such places by studying the remaining landforms and the sediments – often the particles and the organic material, such as pollen, beetles, diatoms and macrofossils preserved in lake sediments and peat, can provide evidence on past climate change and processes. So geomorphology is a diverse discipline. Although the basic geomorphological principles can be applied to all environments, geomorphologists tend to specialise in one or two areas, such aeolian (desert) geomorphology, glacial and periglacial geomorphology, volcanic and tectonic geomorphology, and even planetary geomorphology. Most research is multi-disciplinary, combining the knowledge and perspectives from two contrasting disciplines, combining with subjects as diverse as ecology, geology, civil engineering, hydrology and soil science.

VIII. REFERENCES

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