THE APPRECIATION OF LANDSCAPE IN MODERN PHYSICAL GEOGRAPHY

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The purpose of this essay is to explain the relevance of an appreciation of landscape in physical geography. It begins with introductory remarks on what we mean by 'landscape' in physical geography and then argues for the need to study the processes that produce landscape, as opposed to the descriptive approach of nineteenth century physical geography.

Western thought has always displayed a curiosity about landscape. Homer, Hypocrates and Aristotle all had something to say about the land and waters of the earth. Artists, poets, physicists and geographers each have their unique perspectives on landscapes. The geographer's view of the landscape is one that focuses on the natural and manmade features of the earth's surface and on the interactions between processes that create and modify earth surface features over time. In *A Portrait of a Planet*, Muller argues that physical geography is both a description of that which exists at the surface of the earth and an explanation of how and why physical processes have acted to produce areal differention of physical phenomena (Muller and Oberlander, 1978). He goes on to say that the scope of physical geography extends from the atmosphere to the upper portions of the lithosphere, and that landscape is of primary interest because it is here that land, air and sea meet and where life occurs. Sauer defined landscape as the natural features of an area and the forms superimposed on it by human activities (Sauer, 1956). To most of us the landscape is what we have learned it to be. To an Eskimo it is an expanse of ice and snowfields in winter and treeless coastal lands in summer. To a European it conveys a romantic image of rugged coastlines and cultivated plains.

The relevance of landscape to physical geography lies in the interaction between causal physical processes and the resultant features which make up the landscape. Physical geography not only defines physical processes as involved in the making up of landscape, but evaluates the importance of each of these and predicts changes in landscape over time. So an appreciation of landscape encourages us to look at the interacting processes that have shaped the landscape. The physical landscape would appear to be simple to define as it comprises the totality of landforms, climate, soils and vegetation in any particular region. In the nineteenth century physical geography emerged as a field of study in North America and Europe and its chief accomplishment had been to describe and map landscape features over broad regions. Today, in order to appreciate the importance of landscape in physical geography, Marsh and Dozier insist that it is not enough to describe the landscape but we must also appreciate the nature of the forces that create it (Marsh and Dozier, 1981). They argue that an appreciation of the driving forces of nature is fundamental to an understanding of processes and changes in the making of landscape. This raises three basic questions. How is the landscape formed? Of what is it composed? What are its geographic characteristics? To answer these questions it is important to realise that processes shaping the earth's surface operate over time at irregular intervals and in a variety of ways. This in turn brings us to the question of energy, the driving force of nature. One way of addressing the energy question in this context is to use a simple balance of energy model based on the flow of energy to and from a system.

According to Muller, earth surface features are best explained in terms of inputs and transformations of energy (Muller, 1978). The interaction of processes set in motion by energy produces the physical features of the earth's surface. The processes that give rise to the landscape's highly variable configuration are set in motion by three kinds of forces. Firstly, they include solar radiation which is received at the earth's surface. This varies with place and over time, thereby giving rise to inequalities of energy flows which in turn set other processes in motion. Solar energy creates photosynthesis in flowering plants thereby enabling plant life, growth and reproduction to occur. The rooting system that result there-from forms a net-like mesh on the land surface keeping soil and sediment in place, preventing erosion and mass movement and thus limiting the transportation of material and controlling the characteristic shape of river valleys and hill slopes. Secondly, earth-structuring processes include tectonic forces that derive their energy from within the earth. Thirdly, they include gravity forces related to the earth's mass. Tectonic forces create continental platforms, basins and initial relief from which evolve hills, mountains and plateaux. They produce earth-surface depressions which become collecting basins for debris from upland areas operating with unequal impact in different parts of the earth's surface and at different times. Tectonic forces not only create the framework of the major landforms but also determine differences in rock type and provide the basic

structural variations of the landscape. All of these forces influence the physical features with which a geographer is concerned and contribute to some degree to the areal variation of the physical landscape. Variations can also result from the operation of a single force. Thus differences can arise from the action of the sun whereas others stem largely from tectonic forces and gravity.

All of the forces mentioned above contribute to the development of vegetation and soil patterns and consequently contribute to the making of what we term landscape. Thus it can be argued that the way in which we perceive the landscape will influence our ability to change or control it.

Climate, rock structure and vegetation all are factors in the formation of the natural landscape. They condition the rate at which the basic processes operate, and the degree of interdependence between those processes that contribute to the making of a landscape. Thus we need to study every aspect of the natural environment in order to understand any single element of the environment, including the physical landscape. Thus we speak of geographic factors determining landscape in physical geography (Patton and Kramer, 1974). The following is an example of internal processes that combine to produce a landscape and which emphasises the importance of an appreciation of landscapes in physical geography. Take the example of the movement of air over the great plains of the United States and its effect on the surface plains. The basic force that sets air in motion is that derived from differences in air pressure resulting from complex, atmospheric processes, including the effects of different types of ground surfaces and the nature of the air above them. The direction of this surface wind depends not only on the direction of the pressure gradient but also on wind deflection resulting from the rotation of the earth. Friction between the air particles, and particularly between the air and ground, affect wind direction as well as wind speed. Similarly the strength of frictional forces is determined by the character of the air flow and by the nature of the surface over which it passes. Thus, for example, rugged terrain and forested land will slow down the horizontal movement of air. In addition, wind may be forced in a particular direction by the shape of the land. Similarly, the content of moving air will depend on its past history and on the nature of the surface over which it has recently blown. The effect it will have on the landscape will also depend on its content and speed and on the nature of the landscape over which it passes. In short, in the case of a simple phenomenon like local wind and its effect on a local landscape, this cannot be understood unless one considers not only the atmospheric processes at work but also the landforces, vegetation and even the soils that have affected its movement.

Muller, in *A Portrait of a Planet*, argues that the study of landscape is a mixture of the physical sciences — climatology, biology, geology and other earth sciences (Muller, 1978). Marsh and Dozier argue that physical geography is a field of the natural sciences. It is held together by a set of perspectives at the centre of which is the study of landscape (Marsh and Dozier, 1981). These definitions emphasise the relevance of the landscape to physical geography. This is an area of geography which has been responsible for both advanced research and elementary teaching in many earth science subjects. It is also required to play a role in human geography which is becoming even more economic and social in its research orientations. Even though our landscape can only be fully appreciated when viewed in the light of cultural and man-made influences, it is first and foremost relevant in physical geography.

Landscape is man's physical environment and man alone must understand it if he is to survive. With the mounting concern about environmental destruction, pollution and the growing problems of "environmental backlash" it seems essential that physical geographers should remain within the discipline of geography. They explain the manner in which the physical processes of the planet operate and the nature and complexity of the linkages between the inanimate and animate sectors of the world with which all geographers are concerned.

It could be argued that the nineteenth century approach to the landscape is no longer of value to modern physical geography. Derbyshire and others acknowledge that a complete understanding of geomorphological processes is necessary for our understanding of landscape (Derbyshire, 1979). Although the need to study environmental problems has been stated throughout the history of science, the record of achievement in different subjects shows that until 1960 there was very little substantive investigation of the processes by geomorphologists. Only when the need arose did a greater concern for the study of processes become more generally accepted.

The existence of a variety of approaches to the landscape in physical geography has also been recognised by Butzer who concluded that pluralism in physical geography was inevitable (Butzer, 1973). It has been the existence of a variety of approaches in the study of landscape that has caused recent achievements to be made in geography.

Since the mid-twentieth century it has been argued that geomorphologists must be more aware of the physical characteristics of materials as a basis for understanding the behaviour of particular materials when subjected to the influence of specific earth-structuring processes. It has also been argued that the greater emphasis on processes has been feasible because of developments in monitoring systems which can record the characteristics of earth-structuring processes. Process response models have featured prominently in recent literature and demonstrate the way any particular stimulus provokes a specific response which may have predictable effects.

From the argument outlined above it could be emphasised that understanding the processes of interaction that form the landscape is a pre-requisite for understanding changes in the past history of landscape. It also reveals the potential for development in physical geography in the future. Therefore, I have to support the contention that understanding and evaluating the causal physical processes which result in landscape formation are a pre-requisite to an appreciation of landscape in physical geography.

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