

THE ROLE OF THE GEOLOGIST IN SOIL CONSERVATION

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A question frequently asked is, "Why are geologists needed in soil conservation work?" Since erosion is a geologic process, it is obvious that geologists or those with adequate geologic training are best able to study the fundamentals of the development and erosion of soil. The action of wind, frost heave, running water, and gravity or mass movement are the chief erosional processes. Glacier action is not important as a present factor, but the development of soil from glacial debris makes the consideration of glaciation important in soil work.

The action of the erosive processes is accelerated and assisted by man when he plows, removes vegetation, or otherwise alters the equilibrium between slow normal erosion and the stabilizing conditions set up by Nature. The closer the equilibrium between required soil usage and the erosive processes, the more the rate of erosion is reduced. The destruction of natural equilibrium has accelerated erosion to a rate many times greater than in the normal geologic process. The results have been gullies, loss of topsoil, and exposure of nonvegetated areas to the action of runoff. Runoff has increased with the removal of water-absorbent topsoil and leaf litter, and floods are more disastrous as well as more frequent. Infertile silt and sand have buried good soil and choked stream channels. The lack of absorption of precipitation has decreased ground-water storage and further aggravates the lowering of the water table caused by increases in public and industrial uses.

Gullying in the crystalline rock areas of the Piedmont is controlled by the saprolitic friable "C" horizon below the resistant clayey "B" horizon of soil. Caving undermines the gully heads and walls and enlargement of gullied areas is rapid. The fundamentals of soil erosion in this area were not known until geologists studied the conditions. It was long thought that Piedmont soils were residual, but many of them overlie organic deposits in buried channels of Pleistocene age and have definitely been transported.

In Caddo County, Oklahoma, deep vertically walled canyons were buried during the Pleistocene. Due to improper land use accelerated erosion has re-excavated many of these canyons within 25 years, while canyons of similar size in the same area required thousands of years for re-excavation.

Water-conservation and ground-water studies in connection with soil conservation are becoming more important, especially since flood control is part of the program. The work in the Muskingum basin of Ohio shows how geology and physiographic history are important to the basic knowledge of the hydrologic and physiographic conditions affecting runoff and ground-water storage. The Muskingum basin served as a "test plot" for principles applicable to an area of 70,000 square miles in the Ohio valley having about equal areas of glaciated and unglaciated topography.

A geologist trained in petrography can recognize constituent minerals in the rocks and determine how they decompose and become soil. He can account for some of the differences in soil texture, structure, and vulnerability to erosion. Sediments in reservoirs can be traced to their original sources and areas of erosion hazard identified. The geologist can see and interpret many problems for which most soil scientists have had inade-

quate training in geology. Geological consideration of internal and external drainage of soil with respect to slope is important.

The action of the natural erosive processes is greatly accelerated by unwise land use. Their importance varies in different areas. The interrelations of all factors of erosion determine the soil conservation measures which can most successfully be applied. It is essential that these natural forces of erosion and their associated relations be investigated by trained geologists. As the processes, rates, and conditions of erosion are understood it will be possible to foresee where hazards of erosion will destroy good land. In addition to geology, a thorough knowledge of soil and a working knowledge of climatology, plant ecology, agronomy, and hydrology are needed.
