

# THE SOILS

## *Soil Properties*

The factors influencing soil formation have been listed by Jenny (1941) as climate, parent material, organisms (which includes both animals and vegetation), relief or topography and time. Because of the complex interaction of all of these factors, it is often difficult to assess the importance of any particular one.

The length of time during which a ground surface has been exposed to soil-forming processes has been found to be of particular importance in determining the soils formed. The principles developed by Butler (1959) and van Dijk (1959), which make it possible to relate soils to ground surfaces of differing age, have proved very useful in this area. These relationships affect the distribution of the soil groups and are discussed later.

Topography plays a dominant, though somewhat indirect part in soil formation in this area because of its effect on climate, and also on the stability of soil mantles and drainage through and over the soils.

The mountainous topography, which produces steep climatic gradients, provides an opportunity for the study of the effect of climate on soil formation. The water available for leaching, that is precipitation in excess of evapo-transpiration, and soil and air temperatures are important. As both soil moisture and temperature strongly influence the organisms, the direct influence of climate on the soils may be masked by their interactions.

Most of the rocks of the catchment are quartz-rich and poor in calcium and ferro-magnesian minerals. The basalts are the main exceptions and these are not extensive. The texture of the rest of the rocks is their most important feature because this governs the texture of the soils derived from them. Coarse-textured soil parent materials result in more free leaching and lower moisture retention, and the converse applies to the fine-textured parent materials. The differences in soil-moisture availability result in differences in the organisms, which also have their effect on the soil. The effect of texture of parent materials, however, is not generally as important as the other factors mentioned.

The soils range from predominantly organic profiles at the highest elevations, through deeply weathered mineral soils in areas having high rainfall but milder temperatures, to relatively shallow soils on the drier and steeper slopes. Soils formed on alluvium range from strongly differentiated profiles to undifferentiated stratified deposits in the valleys. In general, because of the relatively high rainfalls received over most of the catchment, leaching is a major process in soil formation and secondary chemicals such as lime occur only in soils in areas with restricted drainage.