

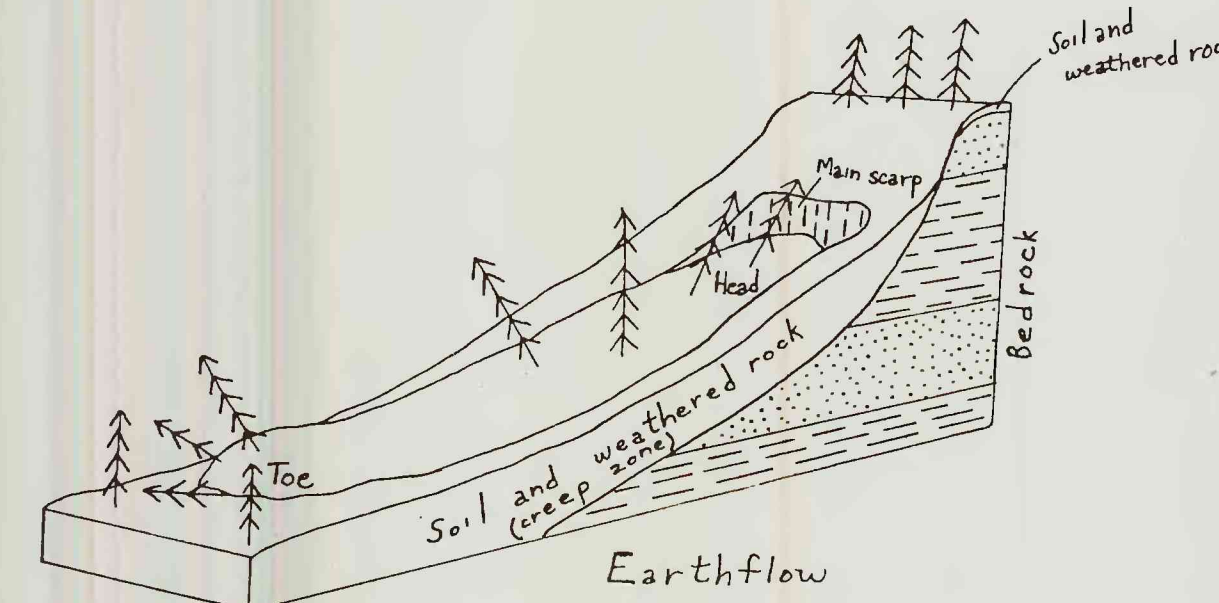
PRELIMINARY MAP SHOWING RECENTLY ACTIVE LANDSLIDES IN THE MARIETTA AREA,
WASHINGTON COUNTY, SOUTHEASTERN OHIO

by John S. Pomeroy

U.S. Geological Survey Open-File Report OF85-4

EXPLANATION

Recently active landslide including head scarp and deposit. Most prevalent type is an earthflow (see diagram) with main scarp, head, and toe. Other types include slumps, debris slides, and complex forms. Designation includes areas of coalescing movements. The main scarp and toe commonly measure 0.5 m to 1.5 m in height. Surface of landslide is hummocky, frequently cracked, and poorly drained with tilted trees. Most landslides shown are less than 20 years old; probably, few exceed 40 years in age. Landslides less than 10 m in maximum dimension are not shown. Designation does not include rockfall or creep. Creep is prevalent on all slopes in area. All slopes can be presumed to be unstable to some extent, even in the absence of recently active landslides.



Introduction

This map is the first in a series of maps based on a field study of landslides in the Marietta, Ohio area. The area involves most of the Marietta 7 1/2 minute quadrangle and parts of the Belmont, Willow Island, Valley Mills, Fleming, and Parkersburg 7 1/2 minute quadrangles.

The Marietta area on the southwestern side of the Dunkard basin shows a high incidence of landslides typical of the southeastern Ohio - western West Virginia - southwestern Pennsylvania region. Relief generally is only 300 to 400 feet, markedly less than that in other areas of the Dunkard basin which have an average relief of 500 to 600 feet.

The area was investigated in the springs of 1983 and 1984 and in the fall of 1983 to obtain data related to the topographic and geologic setting of landslides (Pomeroy, 1984). Field data were obtained by closely-spaced traverses over a period of approximately 75 to 80 days. A better understanding of slope movement processes is acquired through a detailed inventory of landslides. Few maps of this type have been made (U.S. Geological Survey, 1982).

Undoubtedly, many small slope movements have been overlooked during the investigation. Several landslides probably originated during the spring of 1984 in areas traversed in 1983. As landsliding is a continuing dynamic process, the present map will become outdated in a few years if normal or above normal precipitation continues in the region.

Relation of geology and precipitation to landsliding

A thick sequence of subhorizontal red shale and mudstone interbedded with intermittent thin to thick sandstone beds of Pennsylvanian and Permian age is conducive to the development of landslides. Earthflows, slumps, debris slides, and complex forms (Varnes, 1968) take place within the overlying mantle of weathered rock and soil.

Lithologic and geomorphic factors play an important role in the origin and distribution of slope failures. Seeps are common at the contact of permeable cliff-forming sandstone and underlying less permeable, poorly-exposed shale and mudstone that form more moderate slopes. Movements in the loose mantle originate below the seeps along slopes of low permeability.

Precipitation is the major factor in the initiation of slope failures. The Marietta area (like other areas in adjacent western West Virginia and southwestern Pennsylvania) has been subjected to greater than normal precipitation beginning in 1970. During the 1970-1983 period, the record for 10 years shows above normal rainfall and in seven of these years the rainfall was greater than 10 percent above normal. Conversely, the four years with below normal rainfall were all within 10 percent of the normal amount. Ground-water levels have been high during this period. Pore-water pressures in soils have been relatively high at times, resulting in landsliding. Long-time residents have remarked about an increase in landslides in recent years. The field investigation has confirmed the presence of fresh scars above hummocky ground along slopes.

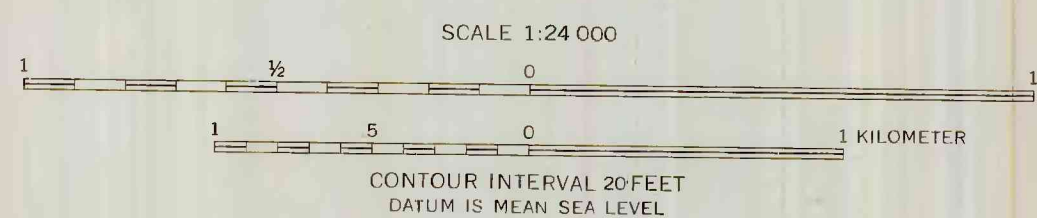
Most recent movements in the Marietta area are caused by natural events such as precipitation rather than by construction and other man-created slope modifications. Of course, land modification can initiate landsliding even where recent landslides are absent (and compound the problem where slides are present).

Use of map

Although slope movements are widespread within the study area, certain areas are more sensitive than others because of factors such as slope angle, lithology of underlying bedrock, poor natural drainage, and slope modification. This map shows those areas where the problem is particularly acute. A lack of recently active landslides along some slopes, however, does not imply that these slopes are "safe" to build upon. All slopes in the Marietta area are subject to extremely slow movements such as creep. When creep becomes accelerated either by natural events or by man-created activities, landsliding commonly results. Detailed geotechnical investigations of specific sites are recommended wherever slope modification is contemplated.

References Cited

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This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.