

Soils Study Guide



Key Topics

1. Geomorphology - Understand the concept of geomorphology and how geomorphic processes created present landforms and landscapes. Be able to relate these landforms and landscapes to soilformation and soil physical and chemical characteristics.
2. Soil Formation - Understand how the 5 soil forming factors affect soil development process and the type of soil that would be present on a given landscape position (hill, terrace, ridge, slope, etc.).
3. Basic Soils Knowledge - Understand basic physical properties of soils. Understand soil texture and particle size distribution and how they affect fertility, water movement, available water holding capability, and chemical properties of soils.
4. Basic Map Reading and Interpretation - Understand and use topographic and soil maps to gather information.
5. Soil Erosion - Wind and water and Best Management Practices (BMPs) to control erosion.
6. Use of Soil Survey Publication - Find field locations in question and determine types of soils and their interpretation for given use.
7. Hands-On - Texture soils and Identify A, B & C (different) soil horizons in a pit.

Learning Objectives

1. To learn the importance of geology, geomorphology, and hydrogeology in natural resource studies and management planning.
2. To broaden student understanding of the interconnectedness of environmental physical characteristics with biological and even sociological characteristics. Why are industries located where they are? In many cases it is due to geological characteristics of the area. Why are farms located where they are? Soil type plays a critical role in agricultural production.
3. To learn basic geological and soil identification methods so that field site characterization can be performed at a variety of sites.
4. To develop an ability to determine physical site characteristics from maps, soil surveys and other methodologies common to geology and soil science.
5. To develop an understanding of the concept of Best Management Practices and learn how to identify practices which are most compatible with specific soil and substrate types.
6. To broaden awareness of the varied human demands on physical resources and address conflicting land use demands with regards to best suitable uses.

Basic Skills

1. Soil Texturing
2. Identification of major soil horizons
3. Use clinometer, compass, or similar instruments for determining slope percent & aspect.
4. Basic plant identification of key plants associated with major land types.
5. General map reading skills on primarily aerial photography and USGS topographic surveys to delineate land forms, contours, slope, aspect, floodplains, etc.
6. Basic skills in use of a stereoscope for aerial photography interpretation.

*****Assistance with equipment and resource instruction is available through local Natural Resource Conservation Service field offices and area Soil Specialists. Call your local Conservation District office.***

Critical Facts

1. All soils are derived from underlying parent materials which are affected by geological processes.
2. Water quality is directly related to sediment types. Sediment types affect the impact of pollution on water quality. Groundwater moves through a clay layer at a rate as low as one inch per two years, while water moving through beach sand can travel up to five feet per day. Groundwater pollution in the former situation is much slower to recover. Although the polluted plume does not spread quickly, the clay makes it impossible to pump out.
3. Soil stewardship became a national issue in the 1930's with the Dust Bowl. Erosion problems began in colonial times. Farmers did not adapt European farming methods to the different climate in North America where water events occur more frequently as storms producing greater volumes of precipitation during shorter time intervals. Farmers also grew the same cash crop every year until the soil was depleted. Then they moved on and farmed elsewhere due to the cheapness of land. Later, more industrial-sized equipment such as the tractor was developed, enhancing the depletion of the soil layer. By the late 1940's nearly all privately owned land in the Nation was part of a conservation district designed to promote soil stewardship.
4. Soil erosion continues to be a serious problem in Montana. Wind and water erosion are occurring on Montana cropland at a rate of 132 million tons per year.
5. Scobey Clay Loam is the unofficial State Soil for Montana., representing over 750 different soils found in Montana.

Publication

1. Published Soil Surveys by County Contact Local NRCS Office For Availability.
2. Soil Quality Information Sheets Available at NRCS Offices
3. Munsel Color Book Contact Local NRCS Office For Availability.
4. Fertilizer Guidelines for Montana MSU Extension #EB 104 1992
5. Fundamentals of Soil Science Local Library, college text
Roth, Henry D. John Wiley & Sons, N.Y.
6. Soil Sampling MSU Extension#MT8602AG 1993
7. Soil Testing Procedures, Interpretation MSU Extension#MT8704AG
and Fertilizer Sources. 1987
8. Geologic Parent Materials of Montana MSU Extension #1B721 1980 (\$5.00)
9. Soils of Montana MSU Extension #1B744 1982 (\$5.00)
10. Soils and People MSU Extension #2F093
11. Protect Soil with Vegetative Residues
MSU Extension#MT8362AG 1984
12. Saline Seep in Montana MSU Extension#MT8310AG 1983
13. The Nature & Properties of Soils Local Library, College Text
Brady, Nyle C. 8th ed. 1974
14. Soil Science Simplified Local Library
Harpstead, Milo I. 1980 Iowa State Univ. Press
15. Roadside Geology of Montana Local Library or Bookstore
Alt, David & Hyndman, D. W. 1986 (\$12.95)
16. Montana In the Geologic Past MT Bureau of Mines & Geology
Bulletin #26 Perry, Eugene S. 1962
17. Northwest Exposures: A Geologic Story Of The Northwest.
Local Library or Bookstore (\$24.00)
Alt, David & Hyndman, D. W. 1995