

## 2007 Soils Concepts

### Soils/Land Use Key Points

- 1S Recognize soil as an important and dynamic resource.
- 2S Recognize and understand the features of a soil profile.
- 3S Describe basic soil properties and soil formation factors.
- 4S Understand the origin of soil parent materials.
- 5S Identify soil constituents (clay, organic matter, sand and silt).
- 6S Identify and list soil characteristics (e.g., texture, structure, etc.) and their relation properties.
- 7S Determine basic soil properties and limitations (e.g., mottling and permeability) by observing a soil pit or a soil profile.
- 8S Understand the nature of plant nutrients, and how they are held by soil.
- 9S Recognize the characteristics of wetland (hydric) soils.
- 10S Understand soil drainage classes and know how wetlands are defined.
- 11S Understand soil water, its movement, storage, and uptake by plants.
- 12S Understand the effects of land use on soils.
- 13S In land use planning discussions, discuss how soil is a factor in or is impacted by non-point source pollution.
- 14S Identify types of soil erosion and discuss methods for reducing erosion.
- 15S Utilize soil information, including a soil survey.

### Suggested Core Activities/Test Material

- Students should read "Why Do We Study Soils" (from Globe) and perform the three suggested learning activities. 1S
- Using soil sifting screens or the Soil Particle Size Distribution Lab Guide from Globe, students should separate the clay, silt, sand, and organic matter from samples collected locally. By using a soil triangle, students should determine the soil classification of each sample. Students should then follow the Globe soil characterization protocol field guide to measure the soil texture of each sample, and record the data. It is suggested that the students collect their soil samples from the following sources: agriculture crop land, wetland, forest, and urban area, and analyze the differences in data. 3-S 5-S 6-S
- Soil Pit - Students should dig a soil pit approximately 1 meter deep and about 1.5 meters wide. They should then record their observations of the soil profiles including color, temperature, moisture, structure, density, organic matter, and microorganisms. 2-S 3-S 4-S 5-S 7-S
- Drainage/Percolation- Students should make an erosion demonstration table to determine the effects of water run-off on various soil types and ground covers. Using the Globe Infiltration Field Guide, students should determine the rate at which water soaks into the ground as a function of time. 8-S 9-S 10-S 11-S 14-S

- Chemical Soil Tests: Students should conduct soil test experiments to determine the amounts of N, P, K, and pH. The samples will come from different locations in the local area including a forested site, an open field, and near a stream. Students should record their data, and analyze and compare their results. 8-S
- Soil Survey Map: Using the NRCS web site or the National Soil Survey Center, students should download their local area's soil survey map to learn how land use effects soil, and the limitations their local soils have for septic systems, foundations, agriculture, and future development. 12-S 13-S 15-S

Top Resources:

- A complete glossary of soil terms can be accessed at:  
<http://www.hwr.arizona.edu/globe/soilwords.html>
- Globe  
<http://ltpwww.gsfc.nasa.gov/globe/pvg/chartoc.htm> (All)
- NRCS  
<http://www.nrcs.usda.gov> (12S, 13S, 15S, 9S, 10S, 11S)  
<http://www.soils.usda.gov/survey/WSS-Brochure.pdf> (12S, 13S, 15S, 9S, 10S, 11S) How to use NRCS' Web Soil Survey program.  
<http://websoilsurvey.nrcs.usda.gov/app/> (12S, 13S, 15S, 9S, 10S, 11S)

NRCS'

Web Soil Survey. This is the online source students should use for NRCS' survey data.

[http://www.soils.usda.gov/survey/how\\_to/](http://www.soils.usda.gov/survey/how_to/) (12S, 13S, 15S, 9S, 10S, 11S)

This

link will provide information to on what is contained in, and how to use a Soil Survey Report.

- Canada Science and Technology  
[www.science.gc.ca](http://www.science.gc.ca) (All)
- Conservation Technology Information Center (CTIC)  
<http://www.ctic.purdue.edu/ctic/ctic.html> (All)
- Wetlands  
<http://www.epa.gov/owow/wetlands/> 9S, 10S
- Canada Wetlands  
[http://www.ec.gc.ca/water/en/nature/wetlan/e\\_protect.htm](http://www.ec.gc.ca/water/en/nature/wetlan/e_protect.htm) 9S, 10S
- National Soil Survey Center  
<http://soildatamart.nrcs.usda.gov/> 12S, 13S, 15S
- Power point soils lab curriculum  
<http://ltpwww.gsfc.nasa.gov/globe/charts/charts.htm> (All)
- AAFC Canada Erosion

[http://res2.agr.gc.ca/publications/hs/chap07\\_e.htm](http://res2.agr.gc.ca/publications/hs/chap07_e.htm) 14S

- School of Geography  
<http://soilerosion.net/> 14S

#### Soils and Land Use Extended Studies

Students should participate in a debate using one of the soils issues from the website found below. Eco-links are provided for student research.

- Botkin, Keller Environmental Science  
<http://www.wiley.com/college/environet/CH11FAQ.HTM>

Students should build a watershed model and locate regional wetland types in the U.S.

- U.S. Environmental Protection Agency (wetlands)  
<http://www.epa.gov/owow/wetlands/>

Using the National erosion map from the NRCS, students should identify the most erodible crop lands, and give soil conservation solutions for improving them.

- <http://www.nrcs.usda.gov/technical/land/meta/m5083.html>

Students should create a wetland mitigation map using a future land development planned for their local area as an example.

- <http://www.epa.gov/owow/wetlands/guidance/index.html#mitigation>

The Environmental Literacy Council has developed an excellent on-line classroom resources website for environmental education. Non-point pollution fact sheets and examples, land use activities, and many labs and activities for soils curriculum are available. Students and teachers can choose from a variety of hands-on lessons. A link to Advanced Placement lessons is also available.

- <http://www.enviroliteracy.org/index.php>

#### On-line Sample Tests

The Canon Envirothon web site contains sample tests for each of the Envirothon topics and a list of issues. Many state and provincial Envirothon Web sites also contain sample tests.

<http://www.envirothon.org/competition/tests.php>  
[http://www2.jklasser.com/college/bcs/redesign/student/0%2C%2C\\_0471389145\\_BKS\\_1215\\_\\_%2C00.html](http://www2.jklasser.com/college/bcs/redesign/student/0%2C%2C_0471389145_BKS_1215__%2C00.html)

#### Energy and Solid Waste

- Students should be able to outline Albuquerque's solid waste management department, and how it continues to implement the Comprehensive Integrated Solid Waste Management Program.  
<http://www.cabq.gov/aes/s5swm.html>
- After studying the following web site, students should be able to create a presentation detailing the effects of solid waste on soil contamination, and provide solutions for dealing with the problem.  
<http://www.sp.uconn.edu/~an226vc/classroom/swsc.html>

- Solid waste in landfills could be reduced between twentyfive to forty percent by composting. Students could be able to describe and outline the steps for this process, as well as the effects of the compost on soil properties, and plant growth responses to landfill compost.  
<http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-19/>
- Students should be able to discuss the minimum standards for California's handling of solid waste.  
<http://www.ciwmb.ca.gov/Regulations/Title14/ch3a56.htm>
- Students should be able to create an educational display detailing the benefits of composting and vermicomposting in our communities.  
<http://www.epa.gov/epaoswer/non-hw/muncpl/reduce.htm>
- Students should be able to list the benefits of using Geothermal Heat Pumps for heating and cooling, and explain how the soil plays an important role in this technology.  
<http://www.eere.energy.gov/geothermal/heatpumps.html>
- Students should be able to create an educational display explaining the effects of coal mining on the environment, and give detailed examples of reclamation projects for surface and underground coal mines.  
<http://www.coaleducation.org/lessons/sec/illinois/corecky.htm>
- A good place to start for looking up info on alternative energy.  
<http://www.aresearchguide.com/energy.html>

#### EarthColors Soil Color Book (Alternate for Munsell Book

- The following is the reference for the EarthColors soil color book. Did not check on the price but this is a viable alternative to the Munsell Book. The following link is for your interest in comparing the two books.  
<http://www.patrickgarner.com/earthcolors.html>.
- Color Communications, Inc. 1997. EarthColors Soil Color Book. Color Communications, Chicago, IL.

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