Objectives
The mixture of mineral material and organic material that covers much of the surface of the Earth is called soil. It is a necessary resource for the production of the majority of our food supply. Soils vary in their utility for agriculture, construction, and other purposes, and soil type can be very different from place to place, depending on a number of factors. Although there seems to be no shortage of soil across the planet, overuse and erosion are real problems. This exercise is designed to inform you of soil differences across the U.S., plus we will examine why soil is generally considered a non-renewable resource.

Assignment
Please read all of the instructions carefully!

Part I
This part involves a web-based activity with a series of questions. Answer the questions as indicated (the ones that you need to answer are listed below). Please type your results, and answer everything in complete sentences.

Go to http://earthsci.terc.edu/navigation/investigation.cfm, and scroll down to the section labeled “Chapter 12: Weathering, Soil, and Erosion.” Click on the link “How Does Soil Vary from Place to Place?” Navigate through the activity, using the navigation bar at the bottom of the screen. You are to answer questions 1 through 11 as written in the exercise. Please carefully read and follow all instructions given to you on the web site. Here is some useful information on each of the steps.

Page 1: Answer question 1.

Page 2: This step requires that you have a computer with Shockwave Player installed. If you don't have it, there is a link to download this application on the left side of the page. Your computer may automatically give you the opportunity to download it. If you cannot get it to download and run, please see me right away. Answer question 2 and report on how closely the layers you identified compared with what the soil scientist identified.

Page 3: Examine the photographs of soils from different parts of the U.S. Then, answer questions 3 and 4.

Page 4: Question 5 requires that you use the tool on the left side of the page to measure the thickness of topsoil in different parts of the U.S. You will need to write down your measurements for each. You may use the table below, or make your own.

<table>
<thead>
<tr>
<th>State</th>
<th>Topsoil Thickness (in)</th>
<th>Rainfall (in/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>PA</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>MT</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>GA</td>
<td></td>
<td>43</td>
</tr>
<tr>
<td>MA</td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>HI</td>
<td></td>
<td>150</td>
</tr>
</tbody>
</table>
Page 5: Plot your measurements on the graph. Do this by entering each measurement in the table to the left, then clicking on the “plot” button. Answer questions 6 and 7. For question 6, sketch the curve on the blank graph included in this handout.

Page 6: Answer questions 8, 9, 10, and 11. Don’t worry too much about the figure on the top of the page - it is somewhat hard to read.

*IMPORTANT NOTE ABOUT PAGE 6 – the first link on this page does not work. It is supposed to take you to information about the representative soil of Ohio (its called Miamian). Here’s another link to try: http://www.oh.nrcs.usda.gov/technical/soils/state_soil.html. I have also included a picture and description at the end of this handout. You can estimate the depth of the topsoil for question 8 using the fact that the hammer in the soil profile photo is approximately 13 inches in length.

For question 9 you need to find the rainfall amount for the general area around Hamilton, OH. The link to answer question 9 worked when I checked it. The key to the figure may be difficult to read if your web browser has reduced the size of the figure (as sometimes happens with Internet Explorer). I have included a black-and-white version in this handout so you can at least see the key (it’s the map of Ohio). If you don’t know here on the state map where Hamilton is located, look it up on another map (use an atlas, or website, etc.)!

When answering question 10, include other factors that can control soil depth in an area. Use your book to help you (of course, using your own words).

Part II
Again, type your answers, showing ALL calculations. You may include this on the same pages as your answers to Part 1.

1. Consider the following: A soil is 1.5 m thick, new soil typically forms at the rate of 2.5 cm per century, and the erosion of this soil is 4 mm per year. Assuming that these rates remain constant, how much soil will remain at this location in 100 years?

2. What does your answer to the above question tell you about the practicality of soil as a renewable resource?
Miamian -- Ohio State Soil

Gently rolling field of a recently harvested crop

Miamian Soil Profile

**Surface layer:** dark grayish brown silt loam  
**Subsoil - upper:** dark yellowish brown clay loam  
**Subsoil - lower:** yellowish brown clay and clay loam  
**Substratum:** yellowish brown loam

Taken from the Ohio Natural Resources Conservation Services (http://www.oh.nrcs.usda.gov/technical/soils/state_soil.html).
Average Annual Precipitation
Ohio

The latest PRISM digital data sets created by the SCAS can be obtained from the Climate Source at http://www.climatesource.com

For information on the PRISM modeling system, visit the SCAS web site at http://www.ccor.oregonstate.edu/prism

This is a map of annual precipitation averaged over the period 1961-1990. Station observations were collected from the NOAA Cooperative and USDA-NRCS SMOTel networks, plus other state and local networks. The PRISM modeling system was used to create the gridded estimates from which this map was made. The size of each grid pixel is approximately 4x4 km. Support was provided by the NRCS Water and Climate Center.

Copyright 2000 by Spatial Climate Analysis Service, Oregon State University

Legend (in inches)
- Under 36
- 36 to 38
- 38 to 40
- Above 44

40 to 42
42 to 44