WHAT'S THE LEVEL?

SUBJECTS:
Science (Environmental Science, Physical Science), Art
TIME:
1-2 class periods
MATERIALS:
For each group: List of terms and dictionaly and/or environmental glossaries 2 indentical sponges (4x6 is a goof size) 1 shallow pan large enough for the sponges to fit into lying flat 4 cups of water in a measuring cup or beaker index cards or construction paper markers or pens; colored pencils food coloring student sheets

OBJECTIVES

The student will do the following:

1. Describe, using scientific terms, the movement of the water table.
2. Locate the saturation zones and identify the function of each.

BACKGROUND INFORMATION

Conservation and protection of groundwater are vital issues. Before students can

understand the movement of water and other groundwater concepts, they must understand the role of the water table and the soil's ability to determine its rise and fall. This activity involves using researched material (vocabulary terms) and critical thinking skills to develop a model of this concept.

Terms

bedrock:
the solid rock that underlies all soil, sand, clay, gravel, and loose material on the Earth's surface; the bottom layer

impermeable (substance):
a substance through which other substances are unable to pass

percolation:
the downward movement through the subsurface soil layers to groundwater

unsaturated zone:
a portion of the soil profile that contains both water and air; the zone between the land surface and the water table. The soil formations do not yield usable amounts of free-flowing water. It is also called the zone of aeration and vadose zone.

waterlogging:
condition that occurs when the water table rises too near the surface causing plants to die as a result of water filling air spaces in the soil

water table:
upper surface of the zone of saturation of groundwater

zone of saturation:
that region below the surface in which all voids are filled with liquid

ADVANCE PREPARATION

A. Gather the materials.

B. Copy Student Sheets -- one per group.

PROCEDURE

I. Setting the stage

A. The purpose of this activity is for students to utilize information gained from defining terms and then discover answers on their own. Therefore, should be given additional suggestions until they have had time to figure out for themselves.

B. There are several ways to approach this lab. Usually the students will stack the two sponges on top of each other and pour the water over them until they become saturated. However, some students may pour the water into the pan, saturate one of the sponges, and set the dry sponge on top. And still others may dunk the sponges into the cup of water, wring them out, and then proceed.

C. The sponges represent the soil and are similar to soil because they have the ability to hold water and air within their pores, become saturated, and dry out. The sponges also allow for the percolation of the water down to the zone of saturation. The pan, being an impermeable substance, represents the bedrock and thus does not allow the water to penetrate but instead blocks its flow and starts the water table rising. The water will represent groundwater when it is held within a completely saturated sponge, soil water when it is held within a within a damp (but unsaturated) sponge and precipitation when it is poured over the top of the sponges.

D. It is important that the students define the terms prior to building the model and answering the lab questions. Remind students that they may have to use several sources to get a definition they understand.

II. Activity

A. Give each lab group of students the following materials:

1. List of terms and a dictionary and/or environment glossaries (on Student Sheet)

2. Two identical sponges

3. Shallow pan

4. Four cups of water in a measuring cup or beaker

5. Index cards or construction paper

6. Markers or pens; colored pencils

7. Student lab sheet

B. Tell students to read the directions on the lab sheet and complete the lab They may not work with or discuss this lab with another group. They are to turn in the lab sheet and model when they have finished.

III. Follow-up

A. Have each group orally explain its model to the teacher or to other groups.

B. Join two or more groups and let them go over their answers, adding or deleting information as needed, until they have a clear understanding of the materials.

IV. Extensions

A. Let students simulate climate conditions, such as drought or high temperatures,and note the changes.

B. Assign students to research the process of waterlogging and devise an experiment to test the procedure.

C. Have students research what happens to plants, homes, septic tanks, and roads when the water table is only one foot below the surface.

RESOURCES

Arms, Karen, Environmental Science, Holt, Rinehart, and Winston, Inc., Austin, TX, 1996.

Chiras, Daniel D., Environmental Science, High School Edition, Addison-Wesley, Menlo Park, CA.

Nebel, Bernard J. and Richard T. Wright, Environmental Science: The Way The World

Works,
4th Edition, Prentice-Hall, Englewood Cliffs, NJ, 1993.

NAMES OF GROUP MEMBERS:

_____

DIRECTIONS:

As a group, build a model that illustrates all of the terms listed below and then use this model to answer the statements in STEP FOUR.

STEP ONE: Define the following terms:

1. water table:

2. zone of saturation:

3. unsaturated zone:

4. impermeable:

5. permeable:

6. percolation:

7. bedrock:

STEP TWO: Construct a model that illustrates each of the terms defined above, using only the following materials:

2 identical sponges
1 shallow pan
4 cups of water in a measuring cup or beaker

STEP THREE: Draw a picture of your model and label all parts.

STEP FOUR: Answer the following by using the terms you have defined.

1. Does soil saturate from the top to the bottom or from the bottom to the top? Explain your answer.

2. Does the water table level change positions? If yes, what brings about these changes. If no, why not? Explain your answer.

3. Why is soil able to become saturated?

4. Compare and contrast the materials you were given to their natural counterparts.

5. Hypothesize what would happen to the plant life on the surface if the water table were to rise close to the surface.

6. Hypothesize what would happen to the plant life on the surface if the water table were to fall to the bedrock.