

ACTIVITY

Recharge - Discharge

Introduction

Recharge is the addition of water to an aquifer. Recharge can occur from precipitation or from surface-water bodies such as lakes or streams. Water is lost from an aquifer through discharge. Water can be discharged from an aquifer through wells and springs, and to surface-water bodies such as rivers, ponds, and wetlands. The following activity is designed to demonstrate the recharge and discharge of water to a model aquifer.

Objectives--Students will:

1. Identify several sources of recharge for ground water.
2. Identify several sources of discharge for ground water.
3. Discuss how water moves from recharge to discharge areas.
4. Discuss the connection between surface water and ground water.

Materials

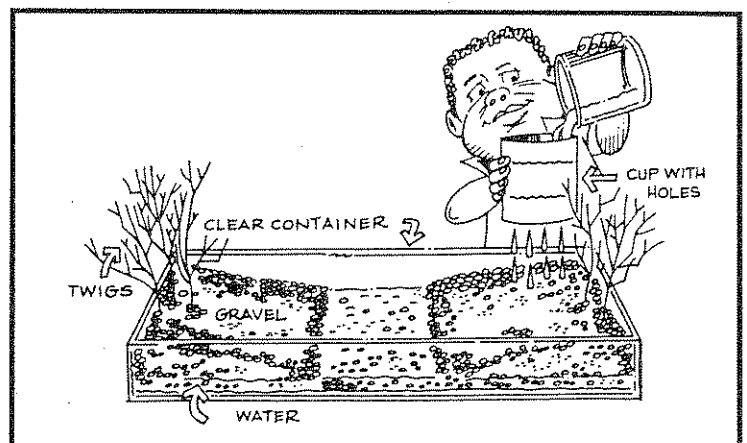
1. One clear container at least 15-cm wide x 22-cm long x 6-cm deep for each group. Possible containers include clear plastic salad containers or clear baking pans.
2. Sufficient pea-size gravel to fill the container approximately 2/3 full.
3. Two 472-mL paper cups for each group.
4. One pump dispenser from soft-soap or hand-lotion containers for each group.
5. 472 mL of water.
6. Grease pencils, one for each group.
7. Twigs or small tree branches, to represent trees on the model (optional).
8. Colored powdered-drink mix or food coloring (optional).

Teacher Preparation

1. Display a copy of the poster titled "Ground Water: The Hidden Resource" on the classroom wall several days prior to conducting this activity.
2. Using an ice pick or awl, punch 8 to 10 small holes in the bottom of one of the paper cups. When filled with water, this cup will be used to simulate rain.
3. Fill the clear containers 2/3 full with pea-size gravel.

Procedure

- Divide the class into small groups. Provide each group with one clear container filled 2/3 with pea-size gravel, one 472-mL cup with holes punched in the bottom, one 472-mL cup with no holes, and one pump dispenser.
- Students make models to represent hills and a valley. One student from each group fills the 472-mL cup without holes in the bottom with water. Each group makes a valley in the center of the model by pushing gravel to the farthest opposite ends of the container so the valley extends completely across the width of the container. About 2 cm of pea-sized gravel remains in the bottom of the valley.



- Explain to the students that the gravel mounds on both sides of the container represent hills with a valley in between. The students can place twigs or small branches on the hills to represent trees. Instruct a student to hold the 472-mL cup with holes over the model. Then add 472 mL of water to this cup. Tell the students that they are simulating rain. Have the students observe how the water infiltrates into the gravel and becomes ground water.
- Introduce the word recharge — the addition of water to the ground-water system. Observe that water is standing in the valley. Have the students use a grease pencil to draw a line identifying the water level in the container. The line should traverse the entire model, identifying the water level under the hills and in the valley. There will be a pond in the valley.
- Explain that they have just identified the top of the ground water in their model. The top of the ground water is called the water table. Discuss with the students how the ground water becomes a pond in the valley. This is because the water table is higher than the land surface (gravel) in the valley.
- Have the students insert the pump into one of the hills on the side of the valley, pushing the bottom down to the ground water. Allow each of the students in the group to press the pump 20-30 times after the water in the pump has begun to flow. Catch the water in the paper cup with no holes in the bottom. After each student takes a turn pumping, instruct them to observe the location of the water table in relation to the grease-pencil line. Where did the water go? What happened to the pond? Discuss discharge, the removal of water from the ground. Discuss the effect of ground-water pumping on streams and lakes.

Interpretive Questions

1. Where does ground water come from?

Answer: Precipitation (rain, snow, sleet, etc.) Also, if the water table is at or below the surface of the water in a stream or pond, water can move from the stream or pond to recharge the ground-water system.

2. What would happen in the students' neighborhood (name a local stream or pond) if a well was drilled near stream or pond and enough water pumped to lower the water table around the stream or pond?

Answer: Some water from the stream or pond would be removed by the pump through the well. If enough water is removed, a pond or small stream could go dry.

Extension

Sprinkle a colored powdered-drink mix or food coloring on top of one of the hills and repeat the above activity by having it rain on the model. Discuss the movement of "pollution" from the hill to the ground water to the lake.

ORDERING INFORMATION

Single copies of the first three posters in the series (see Poster Series panel) and a limited supply of the "Ground Water" poster (color for grades 3-5 and 6-8 or black and white) can be obtained at no cost from the U.S. Geological Survey.

U.S. Geological Survey
 Box 25286
 Denver Federal Center
 Denver, CO 80225
 Telephone: (303) 236-7477

Also, the poster entitled "Water: The Resource That Gets Used & Used & Used for Everything!" has been translated into Spanish. A limited supply of color or black-and-white copies can be obtained at no cost from U.S. Geological Survey at the above address.