

Lesson 8

Water Absorption

What is the difference between a pervious and an impervious surface?
How does the type of surface in a watershed impact water quality?

GOAL To understand that the type of surface affects the flow and quality of water

OBJECTIVES Students will:

- ✓ conduct an experiment demonstrating pervious and impervious surfaces
- ✓ determine how surfaces affect water quality

MATERIALS three aluminum trays (with drainage holes cut on one side), bricks or boards to prop trays, soil, grass, leaves, hay (optional), paper, pencils, clipboards, two cups, measuring cup, watering can, water

CORE CURRICULUM CONTENT STANDARDS

- Language Arts 2(4)
- Math 1(1), 2(1)
- Science 1(1,6), 3(4), 7(15,6), 8(2-4,6)
- Social Studies 10(1,3), 12(3, 5)

VOCABULARY pervious, impervious, run-off, infiltration, orient, buffer zones, storm drain

PROCEDURES

1. Conduct a demonstration on pervious and impervious surfaces. Have three aluminum trays set up with drainage holes on one side of the trays. Prop up the trays so that water will drain.
2. Explain to students that when precipitation falls on a woodland, grass or field, it filters through a “pervious” surface into the soil. When water falls on the road, parking lots or pavement, then the water “runs-off” the “impervious” surface into the storm drains.
3. The three trays each have a particular type of surface: one tray is empty, the second one has soil in it and the third has soil with grass, hay or leaves on top of it.
4. Ask students to predict which surface will shed the most water and which will absorb the most water. Assign students to pour a measured amount of water from a watering can onto the surfaces. Another student can collect the water coming out of the hole of the aluminum tray.
5. Have students measure the amount of water collected from each tray. Determine the percentage of runoff by dividing the original amount of water into the amount collected and multiply by 100. Conduct this calculation for each of the three types of surfaces.
6. The amounts will provide the level of infiltration from least to most. Discuss how water infiltrates through the soil and recharges the ground water aquifer.

7. Lead a discussion on how real surfaces in the natural environment and man-made environment would react in the same manner as the trays (empty tray – pavement; soil – bare surfaces; covered tray – grass, etc.)
8. Inform students that they have been asked to recommend ways to increase the amount of pervious surfaces at a shopping mall. Recently, after rains, the parking lot has become flooded and the shoppers have been complaining. It is particularly a problem with runoff. There are many cars parked and there is a potential hazard for that amount of water to flow into the storm drains.
9. Instruct students to come up with ways to reduce the flow of water in the parking lot and present to the merchants.
10. Break students in groups. Students may conduct research on the web. A potential site is http://www.nemo.uconn.edu/reducing_runoff/index.htm.
11. Have students develop exhibits and diagrams to present their ideas to the class.

EXTENSIONS

1. Have students walk around school yard and list pervious and impervious surfaces. Have them make recommendations to the local administration.
2. Ask students why wetlands are able to filter the runoff.
3. Ask how floods are prevented.
4. Ask if there is anything designed to curtail the flow of water down the storm drain.

RESOURCES

Rosselet, Dale A., *New Jersey WATERS, A Watershed Approach to Teaching The Ecology of Regional Systems*, 1999, New Jersey Audubon Society, Bernardsville, New Jersey 07924.

GLOSSARY

buffer zones - an area that lessens or absorbs a negative environmental impact

impervious - incapable of being penetrated

infiltration - the act of permeating (a porous substance) with a liquid or gas

orient - to align or position with respect to a point or system of reference

pervious - capable of penetrating or pervading

run-off - rainfall not absorbed by soil

storm drain - a storm sewer