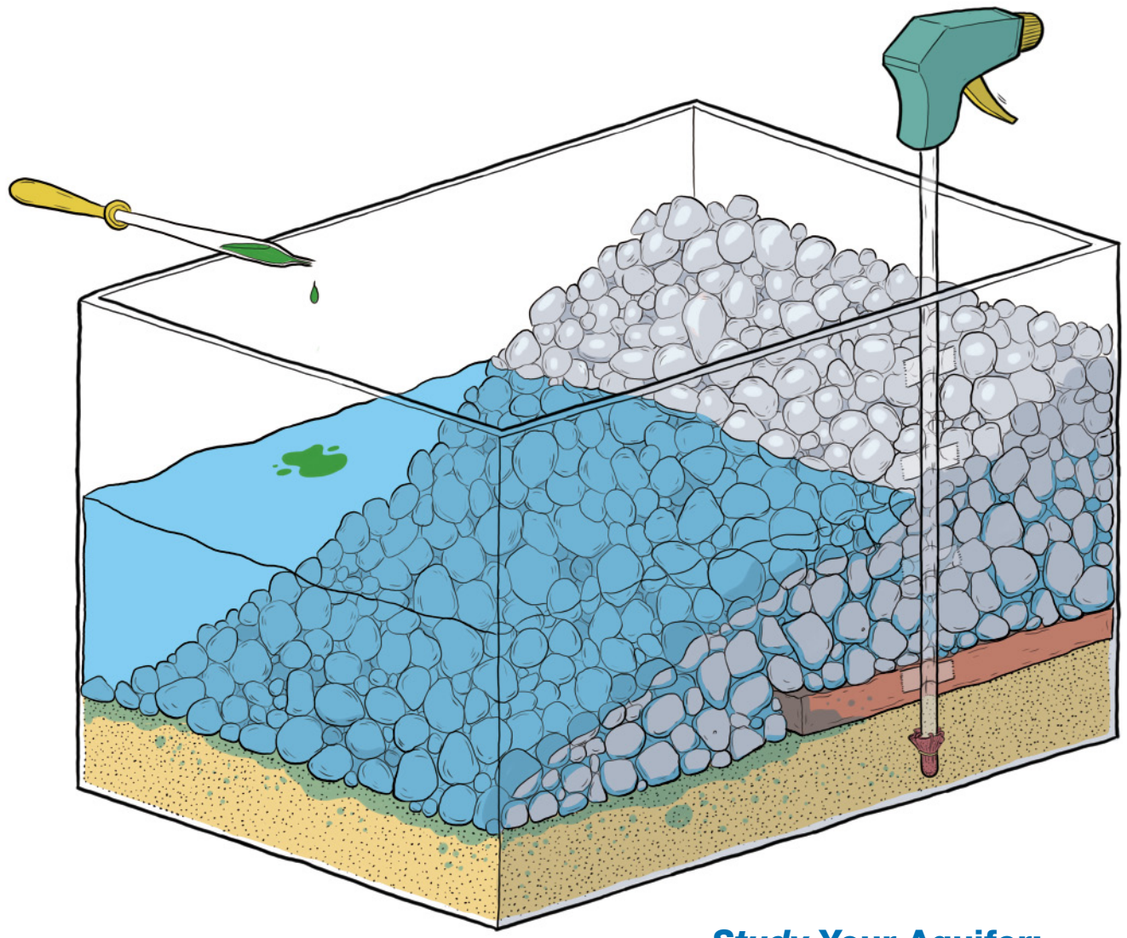
Build a Model Aquifer

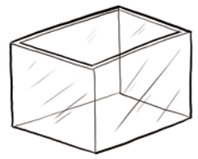
Help your class build a model of the groundwater under its feet!



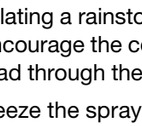
OBJECTIVE:
Use what students have learned to build a working model aquifer.

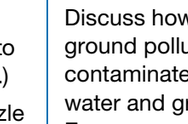
TIME REQUIRED: 90 minutes

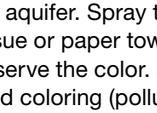
Materials

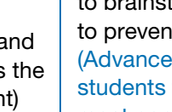

clear plastic box or small aquarium

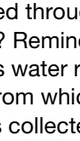

spray bottle

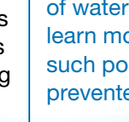

Scotch tape


sand


modeling clay


small aquarium rocks or gravel *(rinsed and dried)*


food coloring


water bucket


rubber band


white tissue or paper towel


nylon stocking


cup

Illustrations by Danesh Mohiuddin; background photo, © Plainview/iStockphoto.

Make Your Aquifer:

STEP ONE:
Remove the spray nozzle and tube from a clean spray bottle. Cover the bottom of the tube with a bit of nylon stocking and a rubber band to create a screen.

Tape the tube to the inside of the long side of a clear box. It should extend to about one-eighth of an inch from the bottom. (Position the nozzle so that you'll be able to spray it later.) This tube represents a well drilled into the underground aquifer. (Advanced classes: Rather than creating one large model aquifer, students may create their own individual aquifers using clear plastic cups or trays. Follow the remaining steps as described.)

STEP TWO:
Fill the bottom of the box with about 1 inch of sand. Use a cup to slowly pour water on top of the sand, wetting it thoroughly. (There should be no standing water atop the sand layer.)

STEP THREE:
Flatten a piece of modeling clay and place it in the box, covering half of the sand. The clay acts as a "confining layer" through which water cannot pass. Pour a small amount of water on top of the clay to demonstrate that water cannot pass through all types of soil and rock.

Pour rocks or gravel into the box to completely cover the sand and clay. Mound the rocks to the side of the box containing the spray bottle to create a hill.

Study Your Aquifer:

STEP ONE:
Pour water into the box until the water level reaches 1–2 inches from the top of the hill. Point out that surface water has formed in the valley. This water is equivalent to a lake or pond. Ask students to observe how water fills the gaps between the rocks, just as it does in underground aquifers. This represents an important source of New Jersey's drinking water.

STEP TWO:
Now put several drops of food coloring on top of the rock hill. The food coloring represents pollutants such as farm and garden chemicals or used motor oils that are disposed of improperly. Observe how the color spreads into the rocks and into the surface water. (Note: You may need to splash a small amount of water on top of the food coloring, simulating a rainstorm, to encourage the color to spread through the box.)

Squeeze the spray nozzle to draw water from within the aquifer. Spray the tissue or paper towel and observe the color. Has the food coloring (pollutant) extended through the aquifer? Remind students that this water represents a well from which drinking water is collected.

STEP THREE:
Discuss how above-ground pollution can contaminate both surface water and groundwater. Encourage students to brainstorm ways to prevent pollution. (Advanced classes: Invite students to research the most common sources of water pollution and learn more about how such pollution can be prevented or regulated.)