**Discover how farmers care for water sources by preventing water pollution.**

Unit: Pillar 1 C (4th – 8th Grades)

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| **Hands On**:**Activity**: From storm water website, do the activity titled “Surface-Water and Groundwater Pollution” <http://www.stormwater.ucf.edu/toolkit/vol3/Contents/pdfs/Student%20Activities/student_activities.pdf> **Video**: Ecosystems: Working with farmers to decrease Nitrogen pollution <https://www.youtube.com/watch?v=IgetNYzlwas>  |

Ways farmers care for the land by preventing water pollution

* Use fertilizers sparingly. Test the soil to see the amount of fertilizer needed.
* Don't fertilize before a rainstorm.
* Use organic fertilizers that release nutrients more slowly.
* Use compost. For instructions on how to compost, which materials to use, and how to deal with common composting problems, click here: [http://www.compostguide.com](http://www.compostguide.com/)
* Recycle oil, antifreeze, batteries, fertilizer, pesticides and other chemicals and materials as much as possible.
* Control runoff from exposed soil, feedlots and barnyards so that it doesn't get into drinking water, streams and lakes.
* Keep barnyards clean, and routinely pick up livestock waste and dispose of it properly.
* Maintain proper storage of fertilizers, pesticides and other chemicals and monitor containers for leaks.
* Maintain farm equipment and monitor for leaks. Use rags to soak up oils and other chemicals when making repairs. Never let any toxic materials flow into the ground or water.

**Show the video:** Ecosystems: Working with farmers to decrease Nitrogen pollution<https://www.youtube.com/watch?v=IgetNYzlwas>

Now we’re going to do an activity that will give you a chance to experience the difficulty in cleaning polluted water while observing the connection between surface water and groundwater.

**Surface-Water and Groundwater Pollution Activity**

Student Learning Objectives

1. Observe the connection between surface water and groundwater.

2.     Experience the difficulty in cleaning polluted water.

Time Total time for this lesson: 20 minutes

Pre–Program Preparation

Materials Needed

1. One 266 ml clear plastic cup
2. Sufficient clean pea-sized gravel to fill the 266 ml clear plastic cup 3⁄4 full
3. Three 240 ml paper cups
4. One pump dispenser from soft-soap or hand lotion containers
5. 3.9 L of water
6. One bottle of food coloring

Instructor Script

**Surface-Water and Groundwater Pollution**

Surface waters (rivers, streams, lakes, ponds) and groundwater are interconnected in some areas. That is, water can move from surface water bodies to groundwater bodies and vice versa. If surface waters become polluted, this pollution can also affect the area’s groundwater system.

Likewise, polluted groundwater can move into lakes, streams, or rivers. The following activity demonstrates the movement of pollutants from surface water to groundwater as well as the difficulty in
cleaning up the pollution.

Procedure

* 1. Divide class into groups of three. Provide each group with one clear plastic cup 3⁄4 full of pea sized gravel, one paper cup with holes in the bottom, one paper cup with no holes in the bottom, and one paper cup 3⁄4 full of water, and one pump dispenser.
	2. Instruct the students to hold the 240-ml cup with holes in the bottom over the cup containing the pea-sized gravel. Then add the water contained in the other 240 ml cup. Ask the students what they think the water simulates (rain).
	3. Explain to the students that rain enters the gravel and becomes groundwater. This process is called infiltration.
	4. Instruct the students to dig a hole in the center of the gravel. Ask them what the hole simulates. (Answer: lake or pond). Have students observe the connection between the level of water in the lake and how it corresponds to the level of water in the gravel.
	5. Add two drops of food coloring (to simulate pollution) to each model lake. Have the students place the pump dispenser in the gravel beside the lake and pump water into the paper cup with no holes. Observe the color of the water in the cup.
	6. Have students add small amounts of clean water to their models while pumping. Continue to add water and pump out polluted water until it becomes clear.

Evaluations

Where does the pollution pumped from the ground water come from?

How can pollution from a lake get into the ground water?

Was it easy to clean up all the pollution in the water? Describe.

Alternate Activity:

Activity 3.5.3 The Spread of Pollutants

Purpose:

There are multiple forms pollution can take, and in this lesson we will focus on water pollution and its effect on surface and ground water. We will take a look at point source and non point source pollution. Point source pollution is a single source for pollution, and non-point source are multiple sources of pollution.

Materials:

* Water
* 30 ml syringe
* Contaminant plume tray
* 2 pieces of filter paper
* Ground water contaminant

Procedures:

1. Students will read through the activity sheet, and set up their contaminant plume tray with filter. After set up, they will then compare the components to natural components found in nature.
2. Students will begin trial 1 by dropping five drops in the middle of the filter and using the syringe pour 5ml of water on it. Wait 30 seconds and sketch the amount of pollution on the filter paper, the basin at the bottom, and the water left under the filter. Have the students identify the pollution as point source and non-point source.
3. Students will then start trial 2 by placing 5 drops on each corner and one on the center, and will squeeze 5 ml of water all around the filter paper. Please sketch all of the effects of the pollution, and try to predict whether it is point source or non-point source pollution.