



LESSON 5: Keeping Our Water Clean

OVERVIEW

Students will use models to identify common sources of pollution and explore how it gets into waterways. Students will then brainstorm and design ways to remove or reduce the pollution.

Learning Targets

- Litter doesn't stay in place. Most of the trash that ends up in our waterways travels from the places we live, work and play through storm drains or open ditches on the street. If we can pick up litter, we can keep most of it from going into our waterways.
- Students will model how water pollution occurs when pollutants such as chemicals, trash or other substances are discharged into the water.
- Students will demonstrate that fresh water is a precious, limited resource that is important for people and the environment.

GLEs

See attachment

Materials Needed

- Small rectangular (2½ gallon) aquarium, or clear plastic container
- Foil bread loaf pan to fit inside aquarium
- Metal 1 ½ inch sink strainer basket
- Duct tape
- Vegetable oil mixed with red food coloring (to represent motor oil)
- Soil, sand, and pebbles (to represent erosion)
- Grass clippings, twigs, leaves (to represent yard and natural waste)
- Bits of Styrofoam cups, cardboard containers and other non-food trash
- Banana peels, apple cores, coffee grounds and eggshells to represent food waste
- Cup
- Water
- Food coloring
- Watering can
- Towels for cleanup

Background Information

Importance of Water

All life as we know it uses water as part of its cellular metabolism. Water is home to many of Earth's organisms, and even some land-dwelling species require water to lay their eggs in. Humans use water for a variety of purposes, including drinking, irrigation, washing, transportation, industry, and food processing.

Water covers about 71% of the surface of the earth, but most of this is saltwater. Saltwater is not suitable for many of the uses humans need water for. Only about 2.5% of the water on Earth is freshwater. Most freshwater (about 69%) is frozen in glaciers and ice caps, while another 30% is groundwater. Only about 1% of freshwater is available as a liquid on the surface of the Earth. Water truly is a precious resource.

Water Pollution

Sometimes human activities contaminate our water resources. This is water pollution. Pollution that comes from a single, identifiable source is known as point source pollution, while non-point source pollution comes from a variety of different sources. For more information, see the background info for "What is a Watershed." Pollution in water supplies can have serious health and safety consequences. Water can become unsuitable for fishing, swimming, result in fish kills, or become unsuitable for drinking.

The Environmental Protection Agency is the federal agency responsible for setting water quality standards. These standards show what levels of contamination from different pollutants are considered unsafe. For example, zinc should not exceed 5,000 parts per billion while lead is not to exceed 50 parts per billion. Many of the chemicals used to manufacture plastics and other products have unknown health effects or are difficult to test for and therefore have no established "safe level."

Sources of Pollution

Examples of activities that cause water pollution are oil leaking from your car, pouring leftover paint down the drain, or washing your car in your driveway. Some activities (like the leaking oil) are unintentional, but all contribute to water pollution.

Most people don't realize that trash dropped on our streets, parks and schools will end up going down the storm drain when it rains. Storm drains are designed to drain excess water from impermeable surfaces when it rains. Unlike sewer systems, the water in storm drains is not treated and filtered for pollutants. This trash ends up in our local waterways, polluting our water.

Strategies to Prevent Pollution

You've heard the expression, "An ounce of prevention is worth a pound of cure?" The same applies to water pollution. It is much easier to prevent pollution than to clean it up.

A lot of focus on pollution prevention is given to sequestering the pollution after it has occurred, but before it enters a watershed. This is often done through the use of riparian buffer zones, retention ponds, or pre-treatment of effluent. Much water pollution can be eliminated by preventing littering. Properly disposing of our garbage and hazardous materials, and picking up litter on the street, can have a huge impact.

Sources

- https://en.wikipedia.org/wiki/Water_distribution_on_Earth
- <https://web.archive.org/web/20131214091601/http://ga.water.usgs.gov/edu/earthwherewater.html>
- <https://www.epa.gov/sites/production/files/2014-12/documents/lawqs.pdf>
- https://en.wikipedia.org/wiki/Water_pollution#Contaminants_and_their_sources

ACTIVITY (Suggested for grades K to 4)

Part I – Engage

1. Have your class watch the following video of a Louisiana kindergartner on her quest to learn about trash in our waterways. There is a five-minute and a 15-minute version of the mini-documentary for you to choose from. After the video, ask students what Amelie learned in her quest to find out about trash in the river? Explain to students that they are going to use a model to explore how trash and pollution ends up in our waterways.

Amelie's River Report: Keeping the Vermilion Clean

<https://vimeo.com/138525999> (5 minute)

<https://vimeo.com/138526225> (15 minute)

Part II – Understanding Water Pollution

1. Partially fill the aquarium with water and place it on an area where students can easily view it. Take the foil pan, and cut a hole in the middle of it so that the drain can fit inside it. Be careful to accurately measure the size hole needed. Use duct tape to secure the drain so that it hangs below the pan. The drain represents the storm drain and the aquarium represents the waterway that the storm water mixes into after entering the storm drain.
2. Ask students, "What is water pollution?" After a couple of responses, mix water and a scoop of dirt (pollution) in a cup. Ask the students if they would drink this. A little dirt isn't harmful, but some of the stuff that gets into our water could be very harmful. Ask students, "How could pollution get into our water?" Responses might include dumping directly into rivers or lakes, while some students may recall that pollutants on the surface can be carried by runoff into storm drains that lead to other bodies of water.
3. Assign student groups and explain that they will each be brainstorming different pollutants that they may create while at home. You may decide to show younger students the picture of a home to have them identify different pollutants. Alternatively, you may decide to have students choose another significant location such as school, the park, mall, etc.
4. At the end of your brainstorming time, ask each group to discuss the pollutants they identified. Provide each student with the pollutants they identified (different color food dye for chemicals vs. pesticides, wadded up paper for trash, etc.). Have students discuss the pollution's origin and ways they could enter the storm drain.
5. One at a time, have each group of students place their materials into the foil pan. (It's suggested to add liquid "chemicals" before solid materials.)
6. Using the watering can, create rain to wash the materials down the drain into the waterway.
7. Have students observe the water now that the pollutants have run down the drain. Would they want to drink this water? How would these pollutants hurt the environment and wildlife? What are some actions the students could take to help prevent these pollutants from entering our waterways?

Part III – Digging Deeper (Suggested for grades 2 to 4)

1. Have student groups think of ways to remove the pollution from the aquarium. Have them write these down and create an illustration, if necessary, to show how they would work.
2. Have students gather materials to test their ideas.
3. Have students create a data collection sheet to record what they tried and how successful they were. Students will try to remove the pollution and record their results.
4. Students share their results with the class.
5. Using the groups' data, determine as a class: Which pollutants were easily removed? Which were more difficult to remove? Which could not be removed?
6. As a final question, ask students to discuss whether keeping pollutants out of our waterways or removing them after the fact is the best choice, and why.

CALL TO ACTION

1. Develop a storm drain awareness campaign in your school to teach other kids about what happens when trash goes into our storm drains or open ditches.
2. The Louisiana Department of Environmental Quality maintains a storm drain marker program. Visit <http://nonpoint.deq.louisiana.gov/images/education/storm/STORM%20BROCHURE.pdf> to obtain storm drain markers that you and your students can install around their school and neighborhoods.

OTHER RESOURCES

- **Trash Down the Storm Drain Video** <https://www.youtube.com/watch?v=L1eHvJ1UhfU->
- **Interactive Storm Drain Model** <http://www.onlyraindownthedrain.com/interactive-model>
- **Keep Louisiana Beautiful Website** <http://keeplouisianabeautiful.org/>
- **Keep America Beautiful Website** <https://www.kab.org/>
- **Water Pollution Activity adapted from "Keep Iowa Beautiful" Education Curriculum**