

THIRSTY, ANYONE?

Lesson Focus: The effect of humans on our water supply and environment, specifically non-point source pollution.

Learning objectives:

- Students will learn how humans effect the environment and its influence on the plants and animals that share it with us.
- Students will be able to identify sources of non-point source pollution.
- Students will be able to describe how that pollution affects the plants and animals that live in our environment.
- Students will be able to name ways that non-point source pollution can be controlled.

Enduring Understandings for the lesson:

- All living things need water.
- Our earth is made up primarily of water, but only a small percentage can be used by humans for drinking.
- Our actions as humans effect the cleanliness of the water that exists.

Georgia Performance Standards Addressed:

S3L2. Students will recognize the effects of pollution and humans on the environment.

- a. Explain the effects of pollution (such as littering) to the habitats of plants and animals.
- b. Identify ways to protect the environment.
 - Conservation of resources
 - Recycling of materials

S3CS1. Students will be aware of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.

- c. Offer reasons for findings and consider reasons suggested by others.

S4L1. Students will describe the roles of organisms and the flow of energy within an ecosystem.

- c. Predict how changes in the environment would affect a community (ecosystem) of organisms.

- d. Predict effects on a population if some of the plants or animals in the community are scarce or if there are too many.

S4CS1. Students will be aware of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.

- c. Offer reasons for findings and consider reasons suggested by others.

Grade level: Third or fourth grade

Materials:

- Copy of Oil Spill by Melvin Berger,
- Large clear drinking glass
- Cold water
- Tablespoon of chemical fertilizer (such as, Miracle Grow)
- Tablespoon of soil, sand or silt
- Tablespoon of cooking oil or baby oil
- Hot water
- Tablespoon of a foul smelling liquid such as alcohol or vinegar to represent insecticides
- Tablespoon of detergent
- Tablespoon of instant coffee to represent manure or dog waste
- Tablespoon of grass clippings and some cut up paper and other small pieces of trash
- Poster board
- Crayons or markers
- Copy of The Wump World by Bill Peet
- An Earth ball
- 6" paper circles

Time needed: 45 minutes

Background information:

There are many different kinds of water pollution: chemical, thermal, and organic. Pollutants that enter from a localized source, such as discharges from factories directly into a river, are called *point source pollution*. We can establish where they are coming from and identify them. Those that enter from a less easily identified source are called *non-point source pollution*. According to the U. S. Environmental Protection Agency, non-point source pollution is the leading cause of water pollution in the U. S. today. Runoff from agriculture (soil, fertilizers and pesticides) is the primary cause, but other sources include stormwater runoff, animal wastes, sewage, and forestry practices.

Urban runoff also adds significant amount of pollutants to our water, in the form of oil, fertilizers and lawn chemicals. As rainfall and melting snow run over and through the ground, it picks up natural and man-made pollutants and carries them into our rivers, lakes, wetlands and oceans.

Examples:

- ✓ *Sediment*, silt and solids, come from construction sites, eroding stream banks and bare land.
- ✓ *Phosphorus*, a natural nutrient, which in excess in freshwater, can lead to algae blooms and low levels of dissolved oxygen in the water.
- ✓ *Nitrogen* is also a nutrient, but when in excess it can cause an increase in algae and diatoms (unicellular algae). The decomposition of these autotrophs consumes oxygen and can also lead to low levels of oxygen.
- ✓ *Bacteria* can be carried into the water by faulty septic systems, livestock, and pet wastes.

Learning Procedure:

1. Ask the students if they know what percentage of the earth's surface is water. Play the Earth Ball game, using their fingers to figure the percentage of the earth that is water, and discuss how all living things need water. (As you toss the ball, list the number of fingers on land and the number on water, then add up and figure the percentage. Tossing ten times works well. It should be close to 70 or 80%.)
2. Read the book, Oil Spill, as a class and discuss with the students the affect that a disaster like this has on the plants and animals that live in that water.
3. Bring out a large clear glass of clear, fresh water. Ask is anyone thirsty? Take a sip.
4. Then tell a story and with each example add a tablespoon of the representative substance to the water. After each addition, discuss how the contaminant gets into our water system (wind, rain, run-off, etc.), how it affects us and the plants and animals in our environment and what can be done to prevent it.

Example story:

- My grass was not green enough, so I put fertilizer on it. I put a little extra to make it *really* green. (add a Tbls. of Miracle Grow) Now it's growing so fast that I have to mow it often. I just use my leaf blower and blow the clippings into the street. (add the grass clippings)
- I noticed when I got home from work yesterday that there was a dark spot in my driveway. I guess my car is leaking oil. (add a Tbls. of cooking oil)
- The farmer down the road was having an insect problem so he sprayed insecticide on his crops (add a Tbls. of vinegar) and his cows, like all living things, have to get rid of waste, I wonder what happens to that

waste and insecticide when we get a heavy rain? (add a Tbls. of coffee grounds)

- Next to our school, a developer has cut down all the trees to build new houses; I noticed that the last time it rained there was a large amount of red clay washing across the street and into the storm drain. (Add a Tbls. of soil)
- Over the weekend I went to the park by the lake for a picnic. I noticed that people had left trash on the ground and it was blowing around. (Add the trash)
- When I got home I had to do the laundry. I wonder where the water goes after I wash clothes or dishes. (Add detergent)
- Stir the glass of water; hold it up and ask, “Who wants a drink now?”

5. Read the book The Wump World by Bill Peet as a class and discuss the affects of the pollution on the Wumps in the story and then in small groups have the students make lists of how the “pollution” in the activity affects the plants, animals and people in our community.

Evaluation: Have students make a poster encouraging people to practice positive habits that would protect our water resources. It should convey one source of non-point source pollution and ways that it could be prevented.

Extensions:

- Activities from the Project Wet Activity Guide
- Contact your local water authority to find out about available outreach programs.

Resources:

Berger, Melvin, Oil Spill. Harper Collins Publishers, NY (1994) ISBN # 0-06-022909-8

Peet, Bill. The Wump World. Houghton Mifflin Company, Boston. (1970). ISBN # 0-395-31129-2

Project Wet Curriculum and Activity Guide (1995) www.projectwet.org

State Botanical Gardens of Georgia: Garden Earth Curriculum Guide

Surface Water Video, Groundwater Video, Saving Water: The Conservation Video, The Water Environment Federation, www.wef.org

Environmental Protection Agency - www.epa.gov

National Oceanic and Atmospheric Administrations (NOAA) -
<http://oceanservice.noaa.gov/education/kits/pollution/>

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This activity is a product of the Rivers to Reef Teacher Workshop sponsored by the Georgia Aquarium and Gray's Reef National Marine Sanctuary that the author participated in. For more information about this workshop, Georgia Aquarium, or Gray's Reef National Marine Sanctuary, please visit our websites at www.georgiaaquarium.org or <http://graysreef.noaa.gov/>

