



What's in the Water? Lesson Plan

Lesson plan adapted from Slippery Shores: Oil Spill Clean-Up.

Age Group: 4th-7th grade

Time Frame: 45 minutes

Overview:

Comprising 71% of Earth's area, water serves as a fundamental resource for both human and wildlife alike. As the concentration of pollutants in many of Earth's waterways rise, the longevity of this important resource is in question. Perhaps the most infamous pollutant affecting Earth's waters is oil. Oil spills inflict damage upon wildlife, destroy ecosystems, and toxify drinking water. In this activity, students will have the opportunity to build their own marine ecosystem. Students will examine how oil interacts with water, and will explore methods for oil spill cleanup.

Objectives:

- Evaluate tools for their effectiveness in solving a problem.
 - Compare advantages and disadvantages of multiple solutions to a set problem.
 - Learn some of the reasons why oil spills are so disastrous.
-

Materials:

- Large plastic tubs (1 per team of 4 or 5 students)
 - Water- enough to fill each tub with a couple of inches of water
 - Small cups (1 per team of 4 or 5 students)
 - Dark olive oil – 3-4 tablespoons in each small cup
 - *Teacher tip: the darker it is, the easier it will be to see in the tub*
 - Habitat items for each group:
 - rocks (some large and some small)
 - sticks
 - feathers
 - moss or pieces of lettuce
 - pieces of faux fur or furry fabric
 - Cleaning tools for each group:
 - 12" pieces of string
 - sponges
 - cotton balls
 - spoons
 - dish detergent
 - optional: eye droppers
 - Paper towels – 1 for each student plus extras (to wipe their hands)
 - Oil Spill worksheets (1 per student)
-



Background:

Waterways such as rivers, lakes, estuaries, and the ocean are important to humans and wildlife alike. Waterways are used for drinking water, transportation, recreation, and habitat for many wildlife species. However, many of our nation's rivers, lakes, estuaries, and parts of the ocean are not fishable, swimmable, or potable because of pollution. Pollutants enter waterways from either point or nonpoint sources. Point sources are clearly defined, localized inputs such as pipes, industrial plants, sewer systems, and oil spills. Federal and state governments monitor and regulate pollution from point sources. Unfortunately, nonpoint sources are harder to detect and control; therefore they are the major source of water quality problems. Nonpoint sources are indistinct inputs that do not have a clearly defined source, for instance runoff of petroleum products from roadways or pesticides from farmlands. Nonpoint source pollution occurs when rainfall, snowmelt, or irrigation runs over land or through the ground, picks up pollutants, and deposits them into surface water or introduces them to groundwater.

Oil spills occur when a liquid petroleum is released into the environment (such as the ocean), and is most common in marine areas. Most oil spills are very small that we never even hear about them. Larger oil spills occur less frequently, but can be absolutely destructive to the ecosystem in several ways.

The main source of damage is the oil itself, as it covers the surface of water and nearby land (National Oceanic and Atmospheric Association, 2014). Spilled oil coats everything including birds' feathers, grains of sand, tree roots, and more. For birds, the oil on their feathers can prevent them from flying and can disrupt their natural waterproofing and insulation which regulates their temperature (West, 2014). Cetaceans (whales and dolphins) covered in oil may have trouble breathing as their blowholes are covered or oil seeps into their lungs (New England Aquarium, 2014). Ingestion and absorption of oil sickens both plants and animals in the area. After a spill, some of the oil eventually begins to sink into the deeper water. This damages underwater ecosystems and contaminates the fish and smaller organisms that are essential links in the global food chain (West, 2014).

The cleanup operations can also cause damage to ecosystems (National Oceanic and Atmospheric Association, 2014). Containment and cleanup methods can remove water, plant life, and sand from shores near the spill. Chemicals used to break down the oil can have harmful effects on wildlife and the health of response teams. Finally, the disposal of oil collected during cleanup activities has lasting effects on the environment. The oil must be reused or disposed of properly, using such methods as incineration or burying in a landfill (Environmental Protection Agency, 2014).



Lesson:

1. First, students need to create their habitats.
2. They will use the rocks to form an island that rises out of the water in the tub.
3. Next, add “plants” (sticks and lettuce or moss) and “animals” (feathers and fake fur). Some can be on the land, but most should be in the water.
 - a. Teacher tip: make sure students are taking turns building the island so everyone participates!
4. Pour the oil into the tub, spreading over the island, water and habitat items.
5. Observe and discuss: How is each material reacting with the oil? Have students record their observations on their worksheet.
6. One at a time, use each cleaning tool to remove, or barricade, oil from the rocks, water and habitat items.
7. Make notes about how each tool works on your worksheet.
8. After testing each tool, discuss your observations about the tool as a group.

Extension:

Now that students have some familiarity with the cleaning materials, repeat the experiment. This time, give students a chance to pre-plan the best way to clean up the spill so they can test their solutions. Allow students to research ways oil spills are professionally cleaned and, if desired, bring in or make other objects to test them out.

Wrap-Up:

Discuss findings as a class:

1. What happened to the land and habitat items when the oil spilled?
2. How did your group use different tools? Why?
3. Which tools worked best for cleanup? Why?
4. What was the hardest material in your habitat to get the oil off of? Why do you think this is?
 - a. It is hard to separate oil and water, so clean up processes can take a long time and a lot of effort. Oil sticks to fur and feathers and is hard to remove, which is why animals are affected during oil spills. The string can contain the oil to an area, but cannot clean it up. Different materials absorb the oil at different rates.
5. What does this tell us about real world oil spills? What are some other ways we could clean up oil spills?
6. Is there anything else we can do to minimize the impact of oil spills?



It is unrealistic to altogether stop using petroleum, but we can reduce usage, use safer transport methods, and engineer ways to more effectively clean oil spills. There are also [some newer ideas](#) being studied to clean up oil spills.

Lesson plan adapted from Slippery Shores: Oil Spill Clean-Up. (n.d.). California Academy of Sciences. Retrieved from <https://www.calacademy.org/educators/lesson-plans/slippery-shores-oil-spill-clean-up>.



What's in the Water?

Worksheet

Name: _____

Use this table to record how the habitat materials interact with the oil.

Material	Water	Rock	Feather	Stick	Fur	Plants
Reaction with oil						

Use this table to evaluate each cleaning tool.

Cleaning tool	Pros	Cons	What habitat material does it clean the best?	What effect does it have on the environment?
String				
Sponge				
Cotton ball				
Spoon				
Dish soap				
Eye Dropper				