How do You Clean Up an Oil Spill?

Objective:
Students will learn about the consequences of oil spills and they will evaluate different methods used to clean up oil spills.

Background Information:
This activity and much of the information below came from the website: http://sealevel.jpl.nasa.gov/education/activities.html. Oil is one of the most common pollutants in our water. Scientists estimate that over 700 million barrels of oil enter the ocean every year. It can enter our watersheds through a variety of paths. Sometimes cars drip oil onto a parking lot, and rainstorms quickly deliver that oil to nearby streams. Unfortunately, oil tankers occasionally spill their oil into the sea, releasing millions of barrels. This occurred during the late eighties in the Exxon Valdez Oil Spill in Prince William Sound in Southeastern Alaska. An extensive clean up operation occurred shortly after the oil spill to minimize the extent of the damage on the marine ecosystems.

Ducks naturally waterproof their feathers by spreading oil from a special gland onto their feathers. However, if excess oil gets into streams, lakes, or oceans, as in an oil spill, it can be harmful to ducks and other water birds. When ducks and other waterfowl come into contact with oil floating on top of the water, their feathers become matted. Oily, matted feathers lose their ability to insulate. Because of this, the birds can die from the cold. Also, when the bird tries to clean the oil off of its feathers, it may swallow some of the oil, which may lead to stomach ulcers. The only way to save the oil-covered birds is to scrub them with detergent, like you might scrub a greasy pan.

In this activity you will try several ways to clean up an oil spill. These methods are similar to the ones used by clean-up crews in real life spills. Scientists use materials to absorb the oil and cause the oil to drop down onto the floor of the lake or ocean. Furthermore, they may introduce chemicals called sinking agents to disperse the oil. Bacteria may be introduced to eat the oil. Sinking agents operate by causing the oil to clump together, and then the oil droplets fall to the floor. This negatively impacts any organisms that live on the seafloor, so this technique is now illegal in the United States.

Materials:
Six clear large bowls 3/4 full of water
One measuring cup
Cooking oil
Cocoa powder
Dishwashing detergent
Paper towels
Styrofoam
Sponges
String
Sand

Preparation:

1. Find a location to place the six large bowls full of water. Everyone should be able to see these bowls. Cover the surface of the table with newspaper and fill the bowls with water.
2. Mix a cup and a half of oil with 1/8 cup of cocoa powder. Set a side.
3. Put the dishwashing detergent, paper towels, styrofoam, sponges, string and sand in a common area where the students can easily reach them.

Procedure:

1. Inform students that they are going to try to clean up an oil spill today. Ask the students the following questions: What is an oil spill? Why are they bad? How do they affect the wildlife in the surrounding area? What can be used to clean up oil spills?
2. Tell students about the materials that they are going to use to clean up the oil spill: Sand, string, dishwashing detergent, paper towels, sponges, and styrofoam. Discuss the mechanisms of each (sand acts as a sinking agent; paper towels, sponges and styrofoam act as absorbents; the dishwashing detergent acts as a chemical agent to disperse the oil. Which mechanisms do they think will work? Which do they think will not work well?
3. Select a student to spill the oil. Have him/her add the cocoa/oil mixture to the first bowl.
4. Gently shake the bowl to create "waves". Did the oil and the water mix?
5. Now try to clean up the oil using a paper towel. How much time did this take? Write the method of clean up on the board (in this case “paper towel”) and record the amount of time that it took to clean up the oil spill on the board.
6. Repeat steps 3-5 in the other bowls, using the dishwashing fluid, styrofoam, string, sponge, and sand. Remember to record the amount of time that each substance takes on the board.
7. Clean up. It is OK to pour the vegetable oil down the sink.
8. Close by asking the students the following questions:
    - Which method of cleaning up the oil worked the best? The worst?
    - Would it be realistic to use these methods to clean up the oil during an actual oil spill? How would these methods impact the surrounding ecosystem? Explain how real oil spills are cleaned up by using the material in the “background” section.

Source:

http://sealevel.jpl.nasa.gov/education/activities.html