

EnviroScape®

Oil Spill Activities

What you will need for this demonstration:

- EnviroScape® model (can be used with any EnviroScape® model®)
- Cooking oil (any kind – soy, vegetable, canola, etc.)
- Cocoa or cocoa mix
- Two to three feathers (from a craft store).
- Absorbent materials (at least three of these) which can include: bits of rags, sponge & sponge pieces, pieces of string, paper towel, pipe cleaners, cotton balls.
- Small cup
- Syringe, eyedropper or baster
- Dishwashing detergent
- Handheld fan (optional)

Before you begin, set up your EnviroScape® model and make sure you have added water to the waterbody.

► Discuss the importance of oil in our everyday lives...

People like you and I use oil in our everyday lives. Think of ways we use oil... (ask your audience to participate in this!)

- Fuel for transportation (cars, trucks, buses, airplanes)
- Fuel for heating homes and offices, for energy to provide electricity
- To make things we use every day: roads, plastics, even some medicines

Activity 1 – Clean Water

- ▶ Show the audience a bird feather and dip the feather in the clean waterbody and show how the feather will repel water (not absorb the water)
- ▶ Drop the feather in the waterbody and let the audience see it float.

Discuss: A bird's feather helps protect the bird by repelling water and allowing it to float and not be weighted down in flight.

Activity 2 – What Happens to Oil in Water?

- ▶ In a cup mix ½ cup vegetable oil and 1 Tablespoon cocoa (this will simulate crude oil)
- ▶ Pour a little of your oil mixture in the waterbody.

Discuss. This show what happens when oil hits water. This could be an oil spill. Large oil spills are caused by accidents that may involve tankers, barges, pipelines, refineries, and storage facilities -- usually while the oil is being transported to us, its users. But small oil-spills occur when people illegally dump their used oil, or spill it, or if they have a leak in the engine of their car or boat.

- ▶ Point to the oil in the water – our simulated “oil spill”.

Discuss. Oil and water don't mix. The oil will stay at the top and water at the bottom.

The oil is on top of the water: what do you think will happen when the wind blows, or waves come through?

- ▶ Make the wind blow over the water by blowing on the water, or using a hand-held fan or fanning the water with paper.

Discuss. The oil moves, spreading out and breaking up into blobs on the surface of the water. When oil is spilled in the ocean, it will be pushed and spread by currents and tides, but because it is sitting on top of the water, wind will also carry the oil to different locations.

Activity 3: How Oil Spills Affect Marine Life

► Dip the feather in the oil floating on the top of the water and hold it up for the audience to see.

Discuss. See how the oil clings to the feather? The feather is heavier now; it looks matted. When the water was clean, we saw the feather repel the water and float.

Oil spills can be very harmful to marine birds and mammals. Marine life, including fish, could accidentally ingest the oil while in the water. Mammals and birds might also eat the oil while trying to clean themselves. Mammals with fur and birds with feathers might get soaked with the oil, making it hard for them to keep themselves warm. Birds also need their feathers to repel the water and help them float and to remain light enough to fly.

► Put the feather back in the waterbody and observe it sinking

Discuss. What would happen to a bird whose feathers are soaked in oil? Birds need their feathers to keep warm, and to be waterproof, and so they can fly and not be weighted down.

Now the feather is soggy and heavier. It might be hard to stay warm, and the bird could also try to clean himself and eat the toxic oil. Birds won't be able to fly. They might drown.

During a large spill, organizations usually set up areas where they can clean and rehabilitate wildlife. You may have seen commercials that show volunteers washing the birds and aquatic animals to try and remove the oil.

Activity 4: Cleaning up an Oil Spill

Let's try to clean up our oil spill.

► Get your audience to experiment with different absorbent materials and *Observe & Record* what effect these different materials have on cleaning up the spill. *(for example, does the paper towel absorb the oil or does it make it spread out and move away from the paper towel?)*

String – audience can try to contain the oil with the string (like a boom would)

Does the boom (string) keep the oil confined to one area? Why or why not? Which materials worked the best?

Cup – audience can try to collect the oil

Does the oil spread out more? Why would this be a problem?

Sponge & Other Materials - audience can try to absorb the oil

Does the oil cling to some materials? which ones?

Syringe, eye dropper or baster – audience can try to siphon oil from the water's surface – what all does it pick up? What will you do with this?

Dishwashing detergent (our chemical dispersant)– audience places a drop of dishwashing detergent on the oil in the water.

Discuss. We've tried capturing the oil, keeping it in one spot, and absorbing the oil. This dishwashing detergent simulates a chemical dispersant. A "dispersant" is a chemical used to try to break up the oil.

What happens?

What effect did detergent (dispersant) have on the oil?

Did the detergent break up the oil but also make the oil spread out?

► **Use a spoon – or your finger – to stir the water as the ocean would mix because of currents, waves and wind**

What is happening?

Is the ocean clean now?

Where does this dispersed oil go? Does the dispersant also move?

What problems might occur because of using a dispersant? Will it affect wildlife and aquatic life the same as the oil?

Discuss the use of fire to clean up an oil spill

For a small surface spill, fire may at times be used to clean it up.

The oil is ignited and burns off; this is an effective method of cleaning up a spill but...

Where did the oil that was burned go?

It turned to smoke and went into the air.

Is fire a good solution to an oil spill?

When oil reaches the shore, what problems might occur?

When oil spills reach the shoreline, there are environmental and economic impacts. The oil will cling to sand and a rocky shoreline; this is unsightly and may cause tourists to stay away. Tar balls also appear in the sand, as well as floating oil near the shore, making swimming and wading unsafe. Marshes and estuaries near the shore are greatly impacted by oil spill

contamination as these areas are teeming with life and a delicate balance exists there.

What could be done to clean up the shoreline? The shoreline is cleaned up using manpower, but the majority of the floating oil must be cleaned up first or the shoreline will become re-contaminated. After the oil in the water is cleaned up or contained workers and volunteers can begin to remove contaminated sand (proper disposal methods are needed for sand contaminated with oil); the sand can be shoveled out and replaced with clean sand. Rocky coasts can be power washed and scrubbed; absorbent materials between the rocks on the shore may help absorb the oil. Marshes and estuaries are the most severely impacted regions; the slow moving waters typical to the regions don't have the wave action to draw the oil out. Oil is absorbed into the plant life and soil and can greatly harm this valuable ecosystem. Gentle oil skimming from the early stages of the spill may be very important for these marshlands. The oil that accumulates in these wetland areas is broken down by the naturally occurring microbes but this takes decades. Aggressive cleaning efforts in marshes may do more harm than good as this is a delicate area.

Summary Discussion

Oil spills threaten humans, animals, and the environment.

It is important to begin cleaning up an oil spill as quickly as possible.

Clean-up crews made up of various government agencies, corporations, and volunteer organizations respond to the incident, often using various tools to clean up spilled oil, including placing long floating barriers (booms) around the spill, so it cannot spread further. They may have special machines that vacuum up the oil. People may try to absorb the oil, using sponge-like pads. Or break it up using chemicals. These chemicals (called chemical dispersants) are controversial because the chemical used to break up the oil can also be toxic to marine life and the environment. Some biological cleanup using oil-eating bacteria is also being investigated; small spills have been cleaned with bacteria that break up the oil and kill the toxins. New ways of cleaning up spills are being developed, including a machine that separates oil and water.

We have learned that oil spills are a serious threat to our environment, aquatic life and even our economy. Oil spills mean that fishermen can't catch fish to sell for eating, and tourists might not visit a beach with oily water and a dirty shore.

We also learned that we use oil and things made with oil every day.

We saw how oil spreads out and breaks apart on the surface of the water. How the wind and waves can spread the spill even further. We saw how marine life can be harmed by the oil, and how hard it is to clean up a spill after it happens.

You can prevent small oil spills by never dumping oil in a waterbody or storm drain: always dispose of used oil in the appropriate way. Encourage people you know to have oil leaks in their car or boat fixed right away.

When accidents happen on a larger scale society needs to be prepared with new and better ways of cleaning up oil. Maybe you will think of something!