Exploring Marine Transportation

How Did That Get There?

Marine Pollution Due to Watershed Runoff

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Synopsis

This activity will use a model of a watershed to show how oil spills and other forms of pollution can occur. It will also be used to demonstrate how various forms of pollution can affect the ocean environment differently.

Activity Goals

- Provide a hands-on method of learning to show participants how pollution can affect an environment.
- To help people understand the concepts of point and non point source pollution and how each relates to marine pollution
- To clear up misconceptions about how pollution gets into a marine environment and the impact that humans have on it.
- Concepts:
- Oil and other forms of pollution can enter the ocean environment in many different ways
- A big part of marine pollution comes from land sources. This includes oil as well as any type of trash.
- Misconceptions:
- More oil enters the ocean through oil spills during transportation of oil. (not true: More oil actually enters the ocean from runoff from land than it does through spills by oil tankers)
- Most of the garbage in the ocean comes from people throwing it off of ships, or people littering on the beach. (not true: Most of the trash in the ocean is actually from land sources, and gets into the ocean by being transported by streams and rivers.)
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Ocean Literacy Principles

- The Earth has one big ocean with many features.
- The ocean and humans are inextricably interconnected.

Vocabulary

- **Pollution**: The contamination of air, water, or soil by substances that are harmful to living organisms.
- **Oil spill**: A layer of oil floating on water or covering the shoreline of a body of water; – usually petroleum which has leaked from an oil tanker.
- **Watershed**: a place, such as a river or stream, where all of the water that falls into that area of land will collect. This also includes groundwater.
- **Runoff**: term used to describe the water from rain, snowmelt or irrigation that flows over the land surface and is not absorbed into the ground, instead flowing into streams or other surface waters or land depressions.

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Developed by COSEE Networked Ocean World and
Communicating Ocean Sciences to Informal Audiences 2010

- Point source pollution: a type of pollution that can be identified to a single place- you know exactly where it is coming from
- Non-point source pollution: pollution that cannot be traced back to a single place

Guiding Questions

- What is pollution?
- Where does Oil come from?
- How does trash get into the ocean?
- How do you think oil is transported from one place to another?
- What do you think an oil spill is?
- Do you believe oil is harmful to the environment?
- Have you ever seen a storm drain that is labeled "leads to the ocean"?-What do you think this means?

Materials

- Glitter
- Long/Shallow container (Ocean)
- Trash/Litter
- Clay
- Large Rock
- Spray Bottles (Rain)
- tiny pieces of paper

Set-up

Create a watershed model (this can be done by scrunching up newspaper into large balls and placing them in a large plastic container such as those used to store clothes under a bed. Cut a large white trashbag so that it will lay flat over the newspaper. Remember to create a large ocean at one end of the container.) If you would rather use a more realistic model, contact your Watershed Ambassador (http://www.nj.gov/dep/watershedmgt/ambassadors_index.htm). They will come to your classroom and run the watershed activity using a large plastic model with buildings and roadways.

Activity Description

Guiding Question: How does pollution get into the ocean?

Watershed Demonstration: During this activity we hope to show that pollution from the land can, and most likely will, make its way to the ocean. To begin this activity we will begin by asking questions about watersheds. The actual activity will involve the participants placing trash and other pollutants around the land area of the model. These pollutants (fertilizer, paper trash, dog feces, oil) will be represented by different colors of glitter and tiny pieces of paper. What will happen when it rains? It will then begin to "rain" which will be accomplished by participants using spray bottles to mimic rain. We will then ask questions such as where does the pollution flow to? What happens once it reaches the ocean? Does it spread out?

Oil Tanker Spill Demonstration: We will ask them questions about oil and how we get oil to different areas. Through these questions we will guide them towards the knowledge that oil is often transported to different areas by oil tankers. We will then ask what happens if the oil taker gets into trouble while it is full of oil. We will then use a demonstration to show what may occur when an oil tanker gets into trouble. This demonstration will involve a clay boat filled with "oil", or black glitter; there will be a rock in the ocean. The participants will then be asked to scrape the bottom of the boat over the rock; this will simulate an oil tanker running aground. Since the boat is made of clay the bottom will tear releasing the contents of the boat. This will mimic an oil spill. The participants will then be asked questions such as "What happened? Where

did the oil go? Does it spread out like it does when it come from land?" This will help show that while an tanker oil spill releases more pollutants at once, it affects a smaller area than watershed runoff from land.

Background and Additional Resources

Ways that oil enters the ocean:
- Natural seepage: 46%
- Runoff from land: 37%
- Production: 5%
- Accidents (oil spills): 12%

Some notable oil spills:
- Gulf war oil spill: (1991): 780,000-1,500,000 Tonnes
- Exxon Valdez: (1989):37,000 Tonnes
- Prestige Oil spill: (2003): 63,000 Tonnes

Currently ask risk of occurring: Shen Neng 1 (2010); Great Barrier Reef, Australia. : At risk of 1,100 Tonnes

One Tonne is about 380 US Gallons, or 7.33 barrels

Most human-made oil pollution comes from land-based activity, but public attention and regulation has tended to focus most sharply on seagoing oil tankers.

40% of America's rivers and 46% of America's lakes are too polluted for fishing, swimming, or aquatic life.*

The Mississippi River – which drains the lands of nearly 40% of the continental United Sates – carries an estimated 1.5 million metric tons of nitrogen pollution into the Gulf of Mexico each year. The resulting dead zone in the Gulf each summer is about the size of Massachusetts.*

1.2 trillion gallons of untreated sewage, storm water, and industrial waste are discharged into US waters annually.*

*facts on pollutions were found at this website: http://www.dosomething.org/tipsandtools/11-facts-about-pollution

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This activity was developed by students in the Spring 2010 Communicating Ocean Science for Informal Audiences (COSIA) class at Rutgers University.