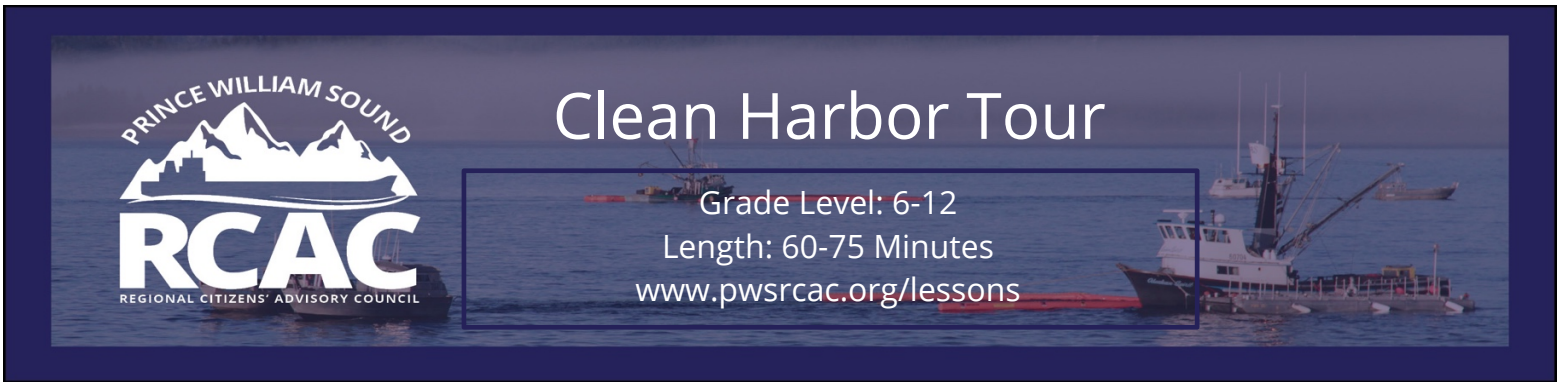

Clean Harbor Tour

Grade Level: 6-12
Length: 60-75 Minutes
www.pwsrcac.org/lessons

NGSS Standards

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-PS-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

Crosscutting Concepts

Stability and Change For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.

Related Resources

Worksheets Pollution Data Sheet

Overview

Preventing and cleaning up small amounts of pollution can make a difference for animals, people, and ecosystems.

Objectives

- Students will identify and analyze non-point sources of pollution in a local area.
- Students will learn about efforts to minimize pollution.
- Student will create an action plan to prevent and clean up pollution.

Materials

- ☐ Clipboards (1 per group)
- ☐ Pollution Data Sheet
- ☐ Pens or Pencils
- ☐ Poster Paper or Reused Cardboard
- ☐ Markers

Background

Although major oil spills have devastating impacts on ecosystems, as much as 10 times more oil makes its way into the oceans each year from improper disposal of motor oil and oil leaks. In coastal areas, oil from tiny spills, leaks, and bilge water from recreational, subsistence, and commercial vessels can be a major problem. Oil is just one type of pollutant that can have adverse short and long-term effects on animals, people, and ecosystems. For example, concentrations of mercury can be magnified as you go up the food chain. Mercury pollution, which is released by the burning of coal as well as many other sources, is concentrated in upper trophic level predatory fish.

Notes

Preparation

This activity works best as a field trip to a local harbor or port, especially if you are able to meet with the Harbormaster or other official or volunteer who works to keep the harbor clean. If you have no harbor or port to visit, a quick trip to the school parking lot will probably yield evidence of motor oil. Try to time your visit when there won't be much traffic.

Introducing the Lesson

Explain to students that you are going to be investigating the local harbor (or school parking lot), looking for evidence of oil pollution and other types of pollution. Set expectations for safe and respectful behavior, being mindful that it is a working harbor (or busy parking lot).

Activity

1. When you arrive at the harbor divide students into groups of 4-6 and provide each group with a clipboard, data sheet, and pencil.
2. Instruct the students to examine the area and look for evidence of pollution. Any pollution they find, whether it be oil, litter, etc. should be recorded and described on their data sheet. If they can't identify the pollution, direct them to sketch it. If you have enough adults for each group (or if students are mature and harbor is especially safe, small, and not busy) assign each group a section of the harbor to examine. If you have to keep the groups closer together, spread out a bit but move through the harbor as a larger group.
3. After 15-20 minutes, have the groups analyze their data and present the most common type of pollution. Discuss any differences in the data sets.
4. If students have not been introduced to the idea before explaining to them that many objects are made from petroleum oil. This includes solid objects like plastic bottles, polystyrene foam, plastic bags, synthetic rope, etc. It also includes liquids like motor oil, gasoline, diesel, hydraulic fluid, etc. Explain that in order for all of these things to be produced, the crude oil has to be removed from the ground and transported to a place to be refined. Refined oil is distilled and sometimes chemically altered into different oils that are used for different things, like motor oil and gasoline. Refined oil can also be formed into polymers, which create plastics.

5. Ask students to consider the origins of the pollution they found. How much of it is made up of petroleum products?
6. Have students annotate their data sheets to indicate which types of pollution originated as petroleum.
7. Before you leave the harbor, look for proper oil disposal sites and posters about clean boating.
8. If possible, meet with the Harbormaster or other harbor employee/volunteer at the harbor or invite them back to your classroom. Ask them to explain a little bit about efforts to keep the harbor clean. Provide a chance for students to ask questions.

Wrap-up

1. Discuss possible impacts of pollution in the harbor. How does it affect the students? Ask students how the pollution gets there. Who is responsible for it? Have students raise their hands if they know someone who has had an accidental fuel spill, oily bilge, or oil leak before. Make sure to raise your hand too, assuming this is true for you. Explain that this is a small mistake that many, many people make, but that all those small spills can start to add up.

2. Ask students to think to themselves for 1-2 minutes about the following questions, pair with another student to discuss their thoughts, and then discuss as a larger group of 5-6 students:
   - How can we monitor pollution in the harbor, parking lot, or other parts of the environment?
   - How can we prevent pollution in the harbor, parking lot, or other parts of the environment?
   - How can we minimize the negative impacts of pollution in the harbor, parking lot, or other parts of the environment?

3. Have each group choose one project design that can be used for monitoring, prevention, and/or minimizing negative impacts. Instruct them to draw and/or describe their project design on a poster and work together to present it to their classmates. Make sure they highlight at least one scientific idea(s) that support their project design.

>> *Educator Tip: Scientific ideas that might support their project design include things like using buoyancy or density to separate materials, using hydrophobic materials to attract oil, predicting currents or tides, etc.*

4. Work as a class to implement one idea for action, such as providing oil adsorbent pads to boaters, or have each student create a poster or radio public service announcement about preventing pollution.

Assessment

Review each data sheet for completeness and accurate annotation of pollution that originated as a petroleum product. Listen during discussion for thoughtful responses to questions. Evaluate the posters and presentations on the quality of the ideas, the clarity of their presentation and a demonstration of understanding:
(1) ways pollution can impact ecosystems and (2) that humans can use scientific ideas to minimize negative impacts on the environment.

Harbor Pollution Data Sheet

Type (litter, oil, fishing gear, other)	Description	Location	Size or Amount	Sketch	Other

Where did you find the most pollution?

How could this pollution be prevented?