

Plastic in the Sea

Discuss plastic pollution and interpret data about plastic dumping in the ocean.

Objectives:

- 🌿 Identify several ways ocean dumping harms wildlife.
- 🌿 Describe several ways people can cut back on their use of plastic.
- 🌿 Analyze ocean health data.
- 🌿 Create a tool to raise awareness about ocean pollution.

Grades:

3-8

Modify expectations and level of questioning to fit your grade level.

Materials:

- 🌿 Copies of pages 3 and 4 for each student-print front back to conserve resources.
- 🌿 Chalkboard/whiteboard/ or interactive whiteboard
- 🌿 Graph paper
- 🌿 Science notebook and pencils
- 🌿 Informational/non-fiction texts associated with ocean pollution

Subjects:

Science and Social Studies

Every year, approximately 14 billion pounds of tires, cardboard, plastic cups and bottles, and other trash are dumped into the ocean. Some of the trash sinks, some of it is eaten by marine animals, and a lot of it – especially the plastic – floats. All trash can create problems for wildlife and people.

But the floating plastic, most of which takes decades to break down, can be especially harmful. Your class can find out why plastic dumping is a problem by interpreting data from a beach cleanup and by investigating their own use of plastic.

PART 1: PUTTING PLASTIC IN PERSPECTIVE

ENGAGE

To find out what your students already know about ocean dumping and to get their brains working, divide the group into teams of three or four and give each team the following questions to consider:

- 🌿 What types of trash have they seen washed up on the beach? What's the most common material? (If they haven't been to a beach, ask them to list things they think might wash up onto beaches.)
- 🌿 How do they think the trash got on the beach?
- 🌿 How do they think their community disposes of trash?
- 🌿 What are some ways that ocean dumping harms people and wildlife?

After the teams have had a chance to discuss these questions, have each team present their answers to the rest of the students.

EXPLORE

Using the pictures on page 5 have your students write about the images in their science notebook. How does it make them feel? What do they see? What do they think it smells/sounds like? Do you have to live on, near, or have visited the coast to have contributed to ocean pollution? Explain. Do you think ocean pollution is a problem? Explain.



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EXPLAIN

Then lead a discussion about wastes and waste dumping, using the following information.



Trash is disposed of in several different ways. Some trash is burned in incinerators and some is carted away to landfills. And garbage on ships is often simply dumped into the ocean.



Plastics, metals, chemicals, paper, food, and many other types of wastes are dumped into the ocean.



Ocean dumping can harm wildlife in many ways. For example, dumping toxic chemicals into water can poison fish, shellfish, and other creatures. And plastic waste can cut, tangle, poison, and strangle turtles, seabirds, sea mammals, and other marine life. (See page 4 for more about the ways plastic can harm wildlife.)



More than half of the trash that washes up on beaches is plastic. (Many plastics float, and many don't break down for hundreds of years or longer.)

PART 2: PLASTIC IN OUR LIVES

ELABORATE

Now tell the students they're going to take a statistical look at some trash that ended up on a Texas beach.



The data can be found on page 7. Project the data on your screen or write the data on the chalk/whiteboard. This is actual data from the 2010 International Coastal Cleanup. For older students, leave out the percentages and have them calculate them instead. Then have your students graph their results in a bar or pie graph. (See circle graph on page 7).



Next pass out copies of page 6 and have your students use the graphs to answer the questions on the side of the page. (See answers on page 8.)

To help get your students thinking about how prominent plastic is in our daily lives, try these activities.

Plastic Supermarkets:

Take your students on a trip to a supermarket (this could also be an independent homework assignment) to have them "check out" food packaging. Divide the group into teams of three and assign each team a different aisle to investigate. Have them make a list of the types of grocery items they see and how each one is packaged. To show your students that plastic wrapping is often "hidden", you might want to buy one or two items that are packaged in cardboard with plastic liners inside. (Examples include certain types of cereals and frozen meals.) If it's too difficult to get your group to the supermarket, you can make assignments and have the kids go to the store with their parents or just look at products they have at home.

Plastic Journals:

Have each person keep a journal for several days. Ask your students to keep track of the types of products they use every day, and what types of plastic products they throw away. Also have them note how other people use and dispose of plastic.

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Things to Think About:

After doing the two previous activities, have your students break up into groups of three (or their original grocery story groups). Then pass out copies of the plastic facts on page 4. Have the kids use the facts on the sheet, as well as the information they gathered in the supermarket search and by keeping journals, to help them brainstorm some ideas about the following:

-  What are some ways that people can cut down on the amount of plastic they use? What are some alternatives to plastic products?
-  What are some ways plastic is harmful to wildlife?
-  Will sponsoring beach cleanups solve the problem of plastic pollution? Explain.
-  If you could pass a law in your community about plastic trash disposal or cleanup, what would the law say?
-  What type of plastic-related research would you like to see conducted?

EVALUATE

Have students create a tool or resource to raise awareness about plastic pollution in our oceans. Student products can be created digitally or via traditional mediums. Along with factual information students will include action ideas for those who live within an hour's drive from a beach and for those who live further away and may not have the opportunity to participate in beach cleanups. Content for student's work will come from materials provided as a part of this lesson as well as from supplemental materials such as, library books, internet research, etc.

BRANCHING OUT: CLEAN UP YOUR BEACH

Sponsoring a beach cleanup is a terrific way to introduce your community to the problems of ocean dumping. Many coastal states have regular beach cleanup programs and Adopt-A-Beach programs that you can get involved with. In addition, many communities sponsor cleanups of stream, river, and lake shorelines.

For more information about cleanups in your state or for information about how your students might initiate its own cleanup, contact one of these organizations:

California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105
<http://www.coastal.ca.gov/>

Marine Conservation Institute
2122 112th Ave NE, Suite B-300
Bellevue, WA 98004
<http://www.marine-conservation.org/>

Chesapeake Bay Foundation
725 8th St. SE, #A
Washington, D.C. 20003
<http://www.cbf.org/>

Clean Ocean Action
18 Hartshorne Drive, Suite 2
Highlands, NJ 07732
<http://www.cleanoceanaction.org/>

Oregon Department of Fish and Wildlife
3406 Cherry Ave. NE
Salem, OR 97303
<http://www.dfw.state.or.us/>

Sea Wolf Coastal Protection
PO Box 929
Marysville, WA 98270
<http://www.projectseawolf.org/>

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JUST THE FACTS

STUDENT PAGE-1

 Young seals often play with plastic six-pack rings and get the bands caught around their necks. These bands can strangle them as they grow.

 Over 14 billion pounds of trash is dumped into the ocean every year. A large percentage of this trash is plastic.

 Small pellets, beads, cylinders, and other types of raw plastic are dumped or spilled into the ocean. Seabirds often mistake this plastic for fish eggs, or plankton and sometimes die from eating it.

 Some states have banned non-biodegradable plastic six-pack rings.

 Some plastics contain PCBs – chemicals that cause some birds to lay thin-shelled eggs that break easily.

 In late 1988, an international treaty took effect that restricts plastic ocean dumping by the nations that ratified it – including the United States.

 Sea turtles often feed on plastic bags, mistaking them for jellyfish. Many of these turtles eventually starve to death because the plastic clogs their digestive system.

 Over 30,000 northern fur seals die each year after becoming entangled in plastic nets and plastic six-pack rings. They die of strangulation, starvation, drowning, or exhaustion.

 Most plastic is not biodegradable. That means it takes many years for the plastic to break down, or disintegrate.

 Scientists have developed some biodegradable plastics. However, not enough research has been done to know if these biodegradable plastics break down into safe substances.

 Every year, millions of pounds of fishing nets, buoys, lines, and other gear are lost at sea.

 Recycling 1 ton of plastic saves 7.4 cubic yards of landfill space.



Plastic in the Sea



Photo 1



Photo 2



Photo 3



Photo 4

Plastic in the Sea

NOTE

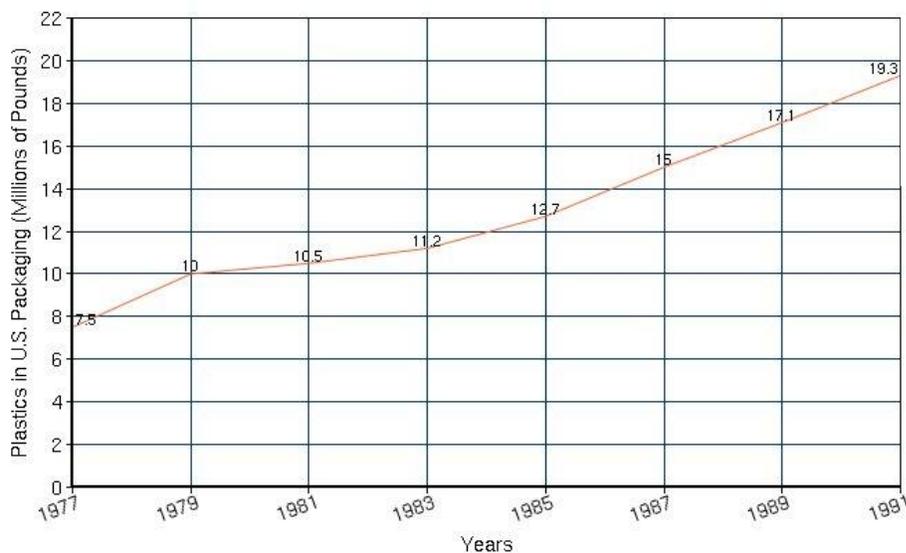
The amount of plastic produces from 2000-2010 exceeds the amount produced during the entire last century.

<http://www.surfrider.org/programs/entry/rise-above-plastics>

Answer these questions in your science notebook.

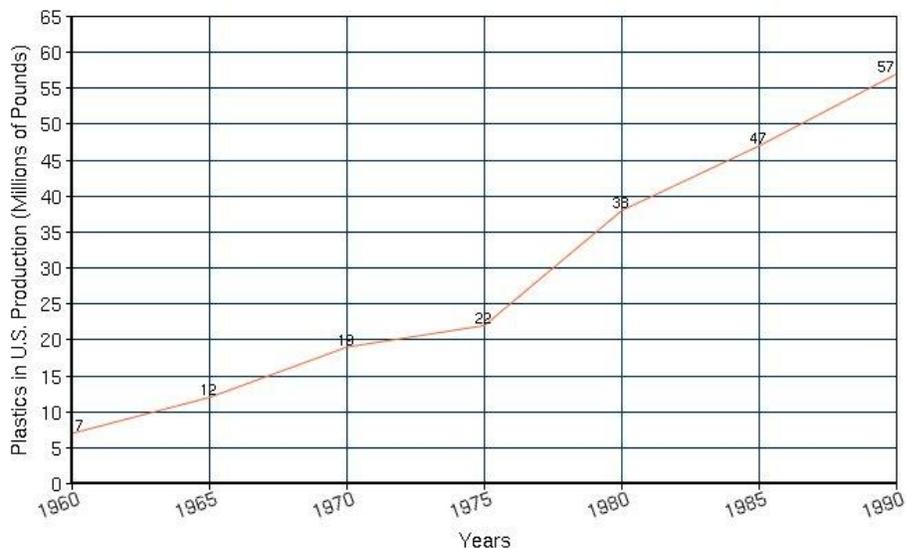
1. During which five-year period did the greatest increase in plastic production occur?
2. Compare the plastic production in 1990 and 1960. How much higher or lower was it in 1990? Why do you think this is?
3. How much did plastic production increase from 1975 to 1990? Why do you think this happened?
4. Compare graph 1 and 2. Between the years of 1977 and 1987, which graph shows a greater increase? Explain why you think the rate of increase is different between the two graphs.
5. Given the trends you see in graphs 1 and 2 and the note at the top of the page, predict what each graph will look like ten years from now.

Increase in U.S. Plastic Packaging



GRAPH 1

Increase in U.S. Plastic Production



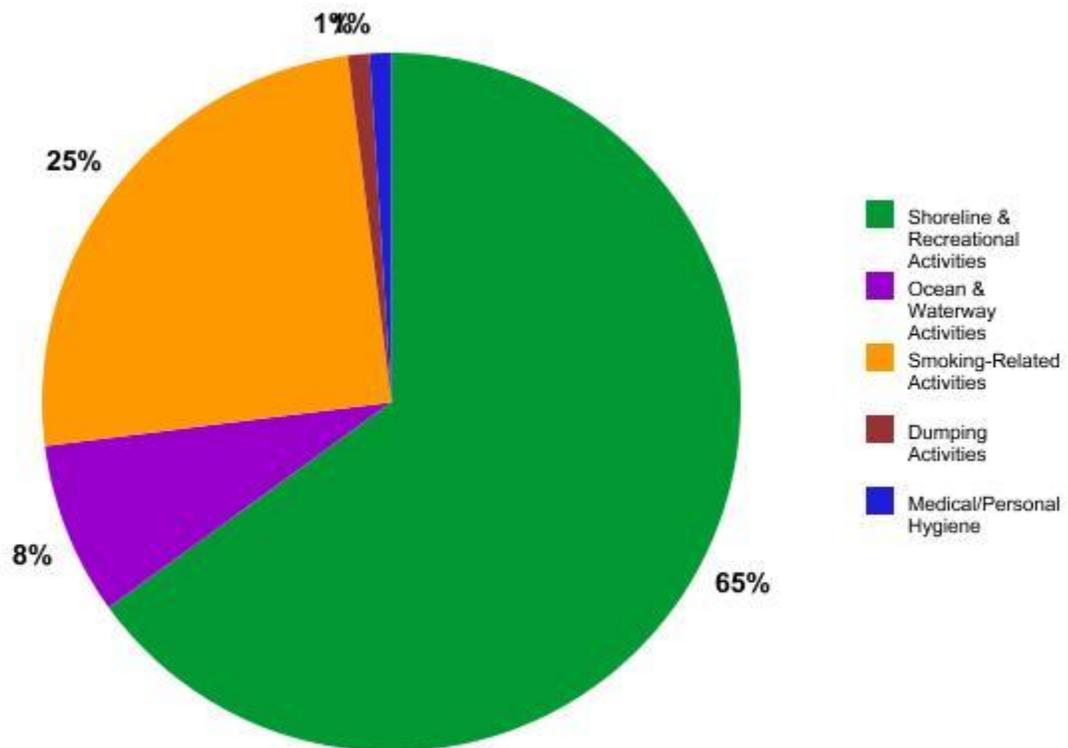
GRAPH 2

Plastic in the Sea

OCEAN DEBRIS BREAKDOWN

Ocean Debris Type	Worldwide	United States	Texas
Shoreline & Recreational Activities	6,641,294 = 65%	2,345,730	179,189
Ocean & Waterway Activities	783,543 = 8%	222,351	17,901
Smoking-Related Activities	2,511,788 = 25%	1,526,251	61,999
Dumping Activities	198,063 = 1%	79,298	4,635
Medical/Personal Hygiene	104,850 = 1%	28,332	2,234
Total	10,239,538	4,201,962	264,958

Worldwide Ocean Debris Breakdown



Trash Travels: Ocean Conservancy 2010

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Answers to Student Page 2

1. 1975-1980
2. About seven times higher or about 50, 000 million (50 billion)
3. Roughly 143% or approximately 35, 000 million pounds (35 billion)
4. Graph 2 (Production of Plastic); plastic is being used to make other products besides packaging.
5. Will continue to show an increase. If people change their plastic-use habits, the rate might not increase as dramatically as it has in the past. If new types of synthetic materials are developed to replace plastic, plastic production might decrease accordingly.