

RESOURCE LIBRARY | ACTIVITY : 15 MINS

Marine Debris

Investigate marine debris, the role of ocean gyres, and how humans impact trash accumulation.

GRADES

6 - 12, Higher Ed

SUBJECTS

Earth Science, Climatology, Oceanography, Geography, Human Geography

OVERVIEW

Investigate marine debris, the role of ocean gyres, and how humans impact trash accumulation.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/marine-debris/>

DIRECTIONS

Have students follow the directions below using the premade ArcGIS map to explore the currents that accumulate ocean trash and how humans impact trash accumulation.

Engage students by asking: *What are the major ocean currents?*

1. Click [this link](#) to open the map
2. Zoom and pan the map to see all the ocean currents.
3. Turn off the layer, Prevailing Winds. Optionally, change the base map to Dark Gray Canvas.
4. Wind patterns interact with water and land, globally.

Ask: *Why are some currents marked red and some marked blue?* [Answer: Temperature Differences.]

Ask: *What is the cause of the global pattern of water currents?* [Answer: General, continental winds.]

Help students explore the question, *Will an ocean current trap marine debris?*

1. With the Details pane visible, click the button, Show Contents of Map.
2. Click the checkbox left of the layer, Pacific Markers. Click the Hawaii marker. Click the link to enlarge.
3. Gyres are large circular ocean currents that redistribute heat and can trap marine debris.
4. Zoom out and pan the map.

Ask: *Where are other gyres, potentially trapping debris?* [Answer: North and South Atlantic, South Pacific, Indian Ocean.]

Explain the answer to the question, *Where does the trash come from?*

1. Researchers estimate that 80 percent of trash comes from land and 20 percent comes from marine sources.
2. Click the button, Bookmarks. Select Spokane.
3. From the Details pane, click the button, Show Contents Of Map.
4. Click the checkbox to the left of the layer name, Spokane Downstream Trace.

Ask: *What are the main sources of land-based trash?* [Answer: Litter; industrial discharges, such as microplastics; garbage transport; and landfills.]

Ask: *How can trash from inland areas, such as Spokane, reach the ocean?* [Answer: Trash and litter flow down rivers to the ocean.]

Elaborate on the question, *Why are "garbage patches" filled with plastic?*

1. Pan the map to see the Pacific Ocean, and click the map marker near the Midway Atoll.

2. In the popup window, click the animation of Trash Accumulation.
3. Trash from the United States coastline may take six years to reach the Eastern Pacific Garbage Patch, while Japanese trash takes about one year.
4. Click the Spokane map marker to see one common source of plastic pollution.

Ask: *Why is plastic the main trash found in this area?* [Answer: Plastic floats; biodegradable material decomposes while plastic only breaks into smaller pieces but does not decompose.]

Evaluate students' understanding of the topic by asking, *What is the impact of marine debris?*

1. Turn on the layer, Blue Whale Concentration.
2. Click the Blue Whale area in the map for more information.

Ask: *How could the ingestion of microplastics, such as nurdles or other plastic trash, impact whales?* [Answer: It can cause malnutrition or intestinal blockage.]

Ask: *How can you prevent additional marine debris?* [Answer: Recycle; Reduce plastic that ends up in the waste stream; educate others to prevent coastal pollution; and/or participate in beach cleanups.]

This activity has been adapted slightly to fit the National Geographic Education format. Please find the original here.

OBJECTIVES

Subjects & Disciplines

Earth Science

- Climatology
- Oceanography

Geography

- Human Geography

Learning Objectives

Students will:

- Investigate marine debris, the role of ocean gyres, and how humans impact trash accumulation.

Teaching Approach

Teaching Methods

Skills Summary

This activity targets the following skills:

National Standards, Principles, and Practices

Preparation

What You'll Need

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per learner, 1 computer per pair

PHYSICAL SPACE

- Classroom
- Computer lab

BACKGROUND & VOCABULARY

Background Information

Prior Knowledge

Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
decompose	<i>verb</i>	to decay or break down.
litter	<i>noun</i>	trash or other scattered objects left in an open area or natural habitat.
microplastics	<i>noun</i>	piece of plastic between 0.3 and 5 millimeters in diameter.
nurdle	<i>noun</i>	small pellet of plastic that is eventually melted and molded into a plastic product.
ocean gyre	<i>noun</i>	an area of ocean that slowly rotates in an enormous circle.
pollution	<i>noun</i>	introduction of harmful materials into the environment.
prevailing wind	<i>noun</i>	wind that blows from one direction.
redistribute	<i>verb</i>	to give away an amount of something in a different way.

For Further Exploration

Maps

- [Mining the World's Most Used Minerals Map](#)



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