Jean-Michel Cousteau OCEAN ADVENTURES

PBS

Debris Dilemmas

View the video "Trash on the Spin Cycle" to discover what causes huge quantities of garbage to end up on the most remote islands in the world and how this garbage affects wildlife.

SUBJECT
Science

GRADE LEVEL
5–8

STANDARDS
National Science Education Standards Grades 5-8
www.nap.edu/readingroom/books/nses/6d.html#ls

Life Science - Content Standard F:
Natural hazards

Ocean Literacy: Essential Principles and Fundamental Concepts
http://coexploration.org/oceanliteracy/

Essential Principle #1:
The Earth has one big ocean with many features.

Essential Principle #6:
The ocean and humans are inextricably connected.

TRASH ON THE SPIN CYCLE

Watch it online at
http://www.pbs.org/kqed/oceanadventures/video/gyre

Video length: 3 minutes 51 seconds

BACKGROUND

Marine debris is trash and other solid man-made material that has ended up in the ocean and that is washed up on beaches. Although some of it is waste from ships and seafaring activities, approximately 80 percent of marine debris comes from land-based sources. The debris comes from a variety of sources, including trash from the street that is carried out to the ocean through storm drains, streams and rivers, garbage that is dumped intentionally into waterways, and garbage that is simply left on a beach.

Much of the debris that ends up in the North Pacific Ocean gets drawn into the North Pacific Gyre by currents. The North Pacific Gyre is a swirling vortex of water made up of four prevailing surface currents that move in a clockwise direction: the North Pacific Current, the California Current, the North Equatorial Current and the Kuroshio Current. (A map of the world's ocean gyres is available at http://oceanmotion.org/html/background/wind-driven-surface.htm.) These currents trap and concentrate debris within the gyre. Comprising most of the northern Pacific Ocean, the North Pacific Gyre covers an area of about 10 million square miles. The large amount of debris that has accumulated in this area has given the North Pacific Gyre the nickname "the Great Pacific Garbage Patch."

Most of the marine debris in the ocean is not biodegradable. Plastic, instead of biodegrading, photodegrades—it breaks up into smaller and smaller pieces. These pieces of nondigestible debris are often mistaken for food by marine animals, including foraging birds such as the albatross. Adult birds gather these pieces and feed them to their chicks. Ninety percent of Laysan albatross chick carcasses are found with plastic inside of them. Derelict fishing nets and lines, another type of marine debris, can entangle and harm birds, seals and other animals.

Households and communities can prevent trash from getting into waterways and becoming marine debris by making sure that garbage is disposed of properly. Recycling bottles, cans and other products reduces the amount of trash headed for landfills. Reusable shopping bags and containers also decrease the amount of trash produced from single-use items.

PRE-VIEWING ACTIVITY

Bring in some items that are commonly found washed up on shores as marine debris, such as drinking straws, ballpoint pens, toothbrushes, cigarette lighters, caps from milk and soda bottles, plastic grocery bags, and film canisters. Have students brainstorm what all of the items have in common.

PRE-VIEWING QUESTIONS

- What is debris? What is marine debris?
- What are some ways that trash winds up in the ocean?
- What happens to debris in the ocean? Where does it go?
- Is marine debris harmful to marine life? What kinds of animals? How is it harmful?
- How long does marine debris last?

FOCUS QUESTIONS FOR VIEWING

- What are some of the items Jean-Michel Cousteau found on the beach on Laysan Island?
- Where did these items come from?
- How does garbage wind up on the beaches of the Northwestern Hawaiian Islands?
- What is the Great Pacific Garbage Patch?
- How much of the debris found in the ocean comes from land?
- Why do birds ingest plastic?
- How are birds affected by the plastic they ingest?

POST-VIEWING DISCUSSION QUESTIONS

- What kinds of trash are most likely to become marine debris? Why?
- What are some ways that we can prevent trash from getting into our waterways?
- How could we clean up the garbage patch in the North Pacific Gyre? Is it possible? Why or why not?
- What kinds of studies could scientists do to learn more about the effects of marine debris on ocean ecosystems?
- What types of scientists might do a study relating to marine debris?

RELATED LESSON PLANS FROM *JEAN-MICHEL COUSTEAU: OCEAN ADVENTURES*

Kure Waste Chase
Students take on the role of volunteer for the U.S. Fish and Wildlife Service and explore various habitats to collect marine debris in this lesson that accompanies the Web-based game Kure Waste Chase.
http://www.pbs.org/kqed/oceanadventures/educators/kure/gamelesson.html

You Are What You Eat: Plastics and Marine Life
Find out about different types of plastic and investigate their impacts on marine life.
http://www-tc.pbs.org/kqed/oceanadventures/educators/pdf/OceanAdv-WhatYouEat.pdf

ADDITIONAL RESOURCES

Marine Debris Module, Northwestern Hawaiian Islands Multi-Agency Education Project
http://www.hawaiianatolls.org/research/NWHIED2005/resources/MarineDebrisModule.php

Marine Debris from Land and Sea (A Biodegradation Timeline), South Carolina Department of Health and Environmental Control
http://www.scdhec.gov/environment/ocrm/outreach/docs/debris/SC_MARINE_DEBRIS_POSTER.pdf

Turning the Tide on Trash: Marine Debris Curriculum, U.S. EPA
http://www.epa.gov/owow/OCPD/Marine/contents.html

Marine Debris 101, National Oceanic and Atmospheric Administration
http://marinedebris.noaa.gov/marinedebris101/welcome.html

"Don't Be a Beach Bum" Curriculum, The Dow Chemical Company
http://www.doweducation.com/teachers/g58/bum.htm

International Coastal Cleanup Report 2007, Ocean Conservancy
http://www.oceanconservancy.org/site/DocServer/ICC_AR07.pdf?docID=3741

Wind-Driven Surface Currents: Gyres, NASA
http://oceanmotion.org/html/background/wind-driven-surface.htm

CREDITS

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