



Marine Debris Clean Up

Grade Level: 6-12
Length: 90-120 Minutes
www.pwsrcac.org/lessons

Adapted from Patrick Chandler & Katie Gavenus, Center for Alaskan Coastal Studies

NGSS Standards

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

MS-PS1-3 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

Supporting Materials
International Coastal Clean Up Data Sheet; Marine Debris Vectors and Effects Notecards

Websites

- <http://www.oceanconservancy.org/our-work/international-coastal-cleanup/>
- <http://www.akcoastalstudies.org/coastal-monitoring/international-coastal-cleanup.html>

Overview

Preventing and cleaning up marine debris is critical to the health of coastal and marine ecosystems.

Objectives

- Students will gather, identify, and analyze marine debris in a local area.
- Students will learn about and participate in international efforts to minimize marine debris.
- Students will understand the effects of marine debris on ecosystems, communities, and economies.

Materials

- Clipboards (1 per group)
- International Coastal Clean Up Data Sheet
- Pens or Pencils
- Garbage Bags
- Rubber Gloves
- Variety of Marine Debris
- Notecards with Marine Debris Vectors and Effects
- Scale
- Whiteboard or Posterboard
- Dry Erase Markers or Colored markers
- Cardstock
- Tape, Glue, String, Staples

Related Resources

Extension Activities

<http://www.akcoastalstudies.org/Pdf/CoastWatchProgram.pdf>

Video

<http://www.youtube.com/watch?v=GLgh9h2ePYw>

Pair With Clean Harbor Tour

Notes

Background

Millions of pounds of trash, much of it petroleum-based, makes its way into coastal and marine ecosystems every year. This marine debris poses a variety of threats to ecosystems, as well as human health, communities, and economies. Marine and coastal organisms are endangered by entanglement in, ingestion of, and smothering by marine debris. In addition, some of the marine debris contains dangerous toxins that leach into the marine environment, and many debris such as Styrofoam act as sponges to soak up, transport, and concentrate dangerous pollution. While marine debris and oil spills are different challenges for the marine environment, they both can negatively impact organisms, ecosystems, economies, and communities. The International Coastal Cleanup event takes place in late September every year, but you can gather data for ICC at any time. Students can participate in an international monitoring program, gain a better understanding of the marine debris issue, and make a difference in their local area and beyond by picking up, recording, and analyzing marine debris. This works best at a beach, coast, or inland waterway. However, students can also take part in a “pre-marine debris” cleanup in any outdoor location.

Preparation

1. Create notecards that name different vectors for marine debris. Write one vector per card: terrestrial trash; objects from commercial, industrial, and pleasure boats and marine vessels; container-ship spills; natural disasters; rivers; and any other vectors you would like to include.
2. Create notecards with the different types of impacts on marine organisms. Write one impact per card: entanglement, ingestion, smothering, toxins, etc.
3. If you would like your data to be included in the International Coastal Cleanup database, please be sure to use the data card included in this curriculum and submit it to a regional coordinator or the address provided. Visit the ICC webpage for updates and more information: <http://www.oceanconservancy.org/our-work/international-coastal-cleanup/>
4. The Center for Alaskan Coastal Studies has a portal for Alaskans participating in the ICC clean up: <http://www.akcoastalstudies.org/coastal-monitoring/international-coastal-cleanup.html> CACS can also loan teachers a kit containing a variety of marine debris for teaching purposes, and the CoastWatch Program provides a variety of

extension activities relevant to coastal monitoring

<http://www.akcoastalstudies.org/Pdf/CoastWatchProgram.pdf>

5. Be sure students are safe during the clean-up process. Provide each student with gloves and remind them not to pick up potentially dangerous objects.

Introducing the Lesson

Explain to students that they will be participating in a project to clean up and document marine debris. Ask them what marine debris is. NOAA defines marine debris as any man-made object discarded, disposed of, or abandoned that enters the coastal or marine environment. Brainstorm pathways, or vectors, that this trash enters these environments. This mockumentary documents the journey of a plastic bag to the ocean:

<http://www.youtube.com/watch?v=GLgh9h2ePYw>

Activity

1. Display a variety of marine debris at the front of the classroom. Divide students into teams of 4-6 for a relay race. Place notecards with labels for marine debris vectors about ten steps away from each relay team. The first member of each team should run or speed walk to a piece of marine debris, place it with the correct (or most plausible) vector label, and return to tag their next teammate. Continue until all of the marine debris has been sorted. The group with the most marine debris in the correct category wins.

>>Homeschool Adaptation: Individually or in a small group, sort the marine debris into the vector categories. If you are working in a small group, encourage students to talk about why they are putting the debris pieces into each category. Do the same later with the effects of marine debris categories.

2. Then briefly discuss ways that marine debris affects animals, plants, and people. Move on to round two, replace the vector labels with likely effects on marine and coastal organisms and mix the marine debris back up for a second relay.
3. Finally, provide students with a copy of the ICC data card and have them practice sorting the debris. Explain that their data will be combined with data from around the world. Share with them some of the ICC data from 2019: <https://oceanconservancy.org/wp-content/uploads/2019/09/Final-2019-ICC-Report.pdf>

4. Take students to a local beach, coastal area, waterway, or location where there is litter. Divide students into groups of 4-6 (you may choose to stick with the relay teams) and provide each group with an ICC data card, clipboard, pencil, and garbage bag. Give each student gloves. Remind them of safety precautions. They should not pick up anything sharp or potentially harmful like broken glass, syringes, or dog poop. Have students come get you if they find something dangerous or too large to pick up.
5. After 20-45 minutes of cleaning up, reconvene students. Weigh the marine debris collected before taking it to be disposed. In the classroom, have each group analyze their data. They should identify their total count, as well as totals for each category, the most frequently encountered type of marine debris (mathematically, this represents the mode) and the strangest object found. Have each group share their data and compile it on the board. Work together to create a simple pie graph or bar graph illustrating the different types of marine debris found. Discuss the likely sources of the most frequently found marine debris. Ask students to brainstorm how this marine debris might affect marine and coastal ecosystems as well as human health, communities, and economies. Then discuss how this type of marine debris could be prevented.

Wrap-up

Have each student pick one piece of marine debris that they collected and glue, tape, staple, or tie it to a piece of cardstock. Then, each student should write a plausible story for that marine debris, including its origins, journey through the ocean to the beach, and at least three potential impacts on ecosystems. Have each student share their story with the class. As a group, brainstorm ways that these stories of marine debris could be rewritten; what can be done to minimize the amount of trash in the ocean and the amount of damage it causes? Have students create and present a poster to go along with their story illustrating way(s) to address the problem of marine debris, based on scientific ideas and their own experiences with marine debris and local ecosystems. Encourage them to think through the entire life of the object. For example, is it possible to rewrite the story by not producing the plastic item in the first place? Display these posters in visible places, and consider submitting them to the annual NOAA Marine Debris Art Contest:

<http://marinedebris.noaa.gov/outreach/artcontest.html>

Assessment

Review each student's marine debris story for evidence that they understand the origin of these synthetic marine debris items and at least three possible negative impacts on ecosystems. Evaluate the posters and presentations on the quality of the ideas, the clarity of their presentation and a demonstration of understanding (1) ways marine debris can impact ecosystems and (2) that humans can use scientific ideas to minimize negative impacts on the environment.

Pair With

- Clean Harbor Tour Lesson
- <http://www.akcoastalstudies.org/Pdf/CoastWatchProgram.pdf>