

Education

Plastic, Plastic Everywhere!



Grade Level

- 4-8

Timeframe

- 1 week

Materials

- Computer(s) with internet access (Note: all information can be pre-downloaded and printed)

Key Words

- Marine Debris
- Entangle
- Ingest
- Degrade
- Recycle



Photos courtesy of NOAA's Marine Debris Program

Activity Summary

This lesson is intended to raise awareness of marine debris and its affect on our environment. Students will identify different types of marine debris and where they are likely to have originated, eventually focusing in on one of the most common types of marine debris—plastic bags.

Students will determine their own family's use of plastic shopping bags, and compare it with that of their classmates. They will calculate an estimate for total class, and possibly, total school usage. Students will then explore ways to reduce their use of plastic shopping bags.

Finally, students will complete independent research projects on plastics to share with their classmates and families. Armed with this information and insights gained from earlier activities, students will hopefully change their behaviors to reduce their impact the environment.

Learning Objectives

Students will be able to:

- Identify impacts of marine debris on the environment;
- Explore use of plastic shopping bags in their homes and school;
- Determine how they can change their behaviors to reduce their environmental impact.

Background Information

During the 2009 International Coastal Cleanup coordinated by Ocean Conservancy, volunteers picked up 7.4 million pounds of **marine debris** from the world's coasts.

Cleanup data showed that 60-80% of the debris that ends up on our coasts starts out as trash on land that isn't disposed of properly. Rivers, streams, and even storm drains, help carry this debris to the ocean where it may then be transported by winds and currents all across the globe.

Once in the ocean, many of these items remain for a very long time. While plastic bags may not be at the top of the list for longevity (estimates of 1-20 years), they are among the top three items collected during the Coastal Cleanup each year, and hence a major cause for concern.

Impacts from plastic bags in the ocean include:

- ❖ **entanglement** of wildlife
- ❖ smothering of wildlife (i.e. corals)
- ❖ **ingestion** by wildlife

In addition, plastic bags don't always remain in one piece. Like other plastics they **degrade** into smaller and smaller particles, but most never completely go away. How much they degrade depends on the density and type of plastic, as well

as their environmental exposure.

In the United States we use billions of plastic shopping bags each year. Only 1-12% of these are eventually **recycled**. The balance end up in our environment, either in landfills or floating around our land- and seascapes.

Replacing plastic shopping bags with reusable ones is a great way to reduce the number of bags getting into the environment.

Preparation

- Download Marine Debris Fact Sheets from NOAA's Marine Debris Program (<http://marinedebris.noaa.gov>).
- Download most recent International Coastal Cleanup report from Ocean Conservancy (www.oceanconservancy.org).
- Prepare copies of Student Worksheet

Learning Procedure

Opening:

Introduce students to the concept of marine debris. Once students understand what it is, have them brainstorm a list of items that might be considered marine debris.

Next, have them categorize the items as coming from land-based or ocean-based activities. Do they see any trends?

Vocabulary

MARINE DEBRIS – Any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or Great Lakes.

ENTANGLE – To twist together or entwine in a confusing mass, snarl.

INGEST – To take into the body by swallowing, inhaling, or absorbing.

DEGRADE – Break down in composition, deteriorate

RECYCLE – To treat or process in order to use again.

Share information about global marine debris statistics and have them evaluate how this compares to their own list.

Development:

Activity 1:

Discuss the environmental impacts of marine debris. What kinds of problems does it cause?

Start to focus student attention on the #2 marine debris item—plastic bags.

1. Estimate use of plastic shopping bags for one week:
 - a. Ask students to estimate the number of plastic bags used in their households each week. Be sure to include all types of shopping (i.e. for food, clothes, hardware, toys, shoes, sporting goods, etc.)
 - b. Based on this information, calculate an estimate for total class use each week. Then calculate an estimate for total class use over the course of a year.
2. Determine actual use of plastic shopping bags for one week:
 - a. Ask students to count and/or collect all of the plastic shopping bags that are brought into their households for one week. (Encourage them to bring the bags to school to be recycled at the end of the project.)
 - b. Based on the data collected, calculate a total for class use that week. Then, calculate a total for class use over the course of a year.
3. Discuss alternatives to using plastic shopping bags. Consider the purchase/donation of reusable shopping bags for distribution to the students for use in their households.

Activity 2:

Task students to conduct an independent project about plastics in the form of a poster, paper,

PowerPoint, or other approved presentation format.

Possible topics:

- ❖ Quantity of plastic produced
- ❖ Environmental impacts of plastics manufacturing
- ❖ Decomposition rate for plastics
- ❖ Impact of plastics on overall waste stream
- ❖ Animal impacts
- ❖ Plastic recycling process
- ❖ Plastic recycling options in the community
- ❖ Paper bags versus plastic bags

Have students share their projects with their classmates and families.



Photo courtesy of NOAA's Marine Debris Program

Closing:

Have students revisit their original list of marine debris items and their likely sources. Based on what they know now, would they alter this list? Which items would they consider the most threatening to the marine environment?

Extending the Lesson

- ❖ Involve the whole school in analyzing the use of plastic shopping bags. Calculate a yearly total. Share information through daily announcements and/or school programs.
- ❖ Challenge students to work with their families to make changes in their shopping habits over the course of a month. Then, have them track their use of plastic shopping bags for another week and compare the results with the data compiled earlier. Is there a noticeable decrease? How hard or easy was this to accomplish?
- ❖ Encourage students to educate the entire community about their efforts and motivate people to reduce their use of plastic shopping bags.

- ❖ Set up a plastic bag recycling location at the school or in cooperation with a local business.
- ❖ Coordinate with a local business to distribute reusable shopping bags emblazoned with the school logo. Work with the store to educate consumers about the impacts of plastic bags on the environment.

Connections to Other Subjects

- Ecology
- Biology
- Mathematics

Related Links

<http://marinedebris.noaa.gov>
<http://www.oceanconservancy.org>
<http://www.plasticbagfacts.org>

For More Information

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Education Standards

National Education Standards	<ul style="list-style-type: none">• Science: NS. K-4 Science in Personal & Social Perspectives – Types of resources• Science: NS. K-4 Life Science – Organisms and environments• Science: NS. 5-8 Science in Personal & Social Perspectives – Populations, resources, and environments
Texas Essential Knowledge and Skills (TEKS)	<ul style="list-style-type: none">• Science: 4.1B Make informed choices in the use & conservation of natural resources• Science: 4.3B Draw inferences & evaluate accuracy of services & product claims• Science: 4.7C Identify & classify Earth's renewable & non-renewable resources & the importance of conservation• Science: 5.1B Make informed choices in the conservation, disposal, & recycling of materials• Science: 5.3B Evaluate the accuracy of the information related to promotional materials for products & services• Science: 6.1B, 7.1B, 8.1B Practice appropriate use and conservation of resources• Science: 8.11D Recognize human dependence on ocean systems & explain how human activities have modified these systems
Ocean Literacy Principles	<ul style="list-style-type: none">• 6. The ocean and humans are inextricably interconnected. (e.g)



Acknowledgement

This lesson was developed from a reusable bag campaign initiated by Flower Garden Banks NMS research coordinator Emma Hickerson for school and scout groups in Austin, TX.

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STUDENT WORKSHEET PLASTIC SHOPPING BAG COUNTS

Category	Number of Bags
1. Estimate of household use for one week	
2. Estimate of household use for one year	
3. Actual household use for one week	
4. Revised household estimate for one year based on actual count for one week	
5. Percentage difference from original household estimate (#2)	
6. Estimate of class use for one week	
7. Estimate of class use for one year	
8. Actual class use for one week	
9. Revised class estimate for one year based on actual count for one week	
10. Percentage difference from original class estimate (#7)	
11. Estimate of school use for one week	
12. Estimate of school use for one year	
13. Actual school use for one week	
14. Revised school estimate for one year based on actual count for one week	
15. Percentage difference from original school estimate (#12)	

Plastic Project



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Additional Education Standards for K-3 and 9-12

Texas Essential Knowledge and Skills (TEKS)	<ul style="list-style-type: none">● Science: K.1B Demonstrate how to use, conserve, and dispose of natural resources and materials● Science: K.2B, 1.2B Plan and conduct simple descriptive investigations● Science: K.2C, 1.2C Collect data and make observations using simple tools● Science: K.2D, 1.2D, 2.1D Record and organize data and observations using pictures, numbers, and words● Science: K.2E, 1.2E Communicate observations about simple descriptive investigations● Science: K.3A, 1.3A Identify and explain a problem and propose a solution● Science: 1.1B Identify and learn how to use natural resources and materials, including conservation and reuse or recycling of paper, plastic, and metals● Science: 2.1B Identify and demonstrate how to use, conserve, and dispose of natural resources and materials such as conserving water and reuse or recycling of paper, plastic, and metal● Science: 2.3A Identify and explain a problem and propose a task and solution for the problem● Science: 3.1B Make informed choices in the use and conservation of natural resources by recycling or reusing materials such as paper, aluminum cans, and plastics● Science: 3.2F Communicate valid conclusions supported by data in writing, by drawing pictures, and through verbal discussion
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Plastic Project

	<ul style="list-style-type: none">● Science (Biology): 9.1B, 10.1B, 11.1B Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials● Science (Biology): 9.2H, 10.2H, 11.2H Communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports● Science (Aquatic Science): 10.1B, 11.1B, 12.1B Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials● Science (Aquatic Science): 10.11D, 11.11D, 12.11D Analyze and discuss how human activities influence aquatic environments● Science (Environmental Systems): 11.1B, 12.1B Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials● Science (Environmental Systems): 11.5F, 12.5F Evaluate the impact of waste management methods such as reduction, reuse, recycling, and composting on resource availability
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