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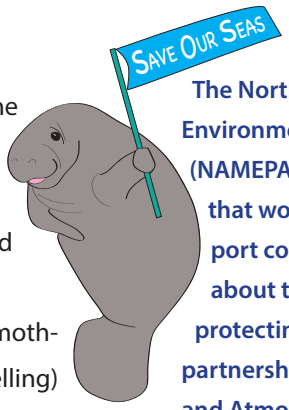
An Educator's Guide to Marine Debris

AN EDUCATOR'S GUIDE TO MARINE DEBRIS

Introduction



Marine debris is a problem that plagues coastlines around the world. In the past, it was considered primarily an eyesore. Today, through research, we know how seriously marine debris impacts marine habitats, marine wildlife, human health and safety, navigation and the economy.

Plastic bags, abandoned fishing nets and other debris can smother sensitive coral reef habitats as well as benthic (bottom-dwelling) ecosystems. Each year, many marine mammals, birds, and other organisms become entangled in or ingest various forms of debris. Fishing and shipping industries are also impacted by marine debris, as they pay vessel repair costs and must replace any damaged gear to continue working. In addition, coastal communities spend millions cleaning up their shorelines every year.

Despite its prevalence, marine debris is a problem that each individual citizen can help prevent. Education is the first crucial step in mitigation. Through the use of this guide, we can help foster environmental stewardship and create advocates for the marine environment. With every person that participates in a cleanup, uses a reusable bag or water bottle, or spreads the word about marine debris, we move one step closer to creating a more beautiful and healthy marine environment. *Source: NOAA, 2007*

The North American Marine Environment Protection Association (NAMEPA) is an industry-led organization that works to educate seafarers, port communities and students about the need and strategies for protecting the marine environment. In partnership with the National Oceanic and Atmospheric Administration (NOAA), NAMEPA has created *An Educator's Guide to Marine Debris* to provide educators with a tool to help students become more informed on marine debris and encourage environmental stewardship.

This easy-to-use guide is designed to provide maximum flexibility for educators in both formal and informal settings. It may be used as a standalone teaching tool, or to supplement lessons in other areas. This guide includes information about marine debris and useful lessons for students grades K-12, with a focus on STEM (Science, Technology, Engineering, Mathematics) objectives.

This guide is based on NOAA's "Turning the Tide on Trash: A Learning Guide on Marine Debris" and was published in 2014. To access presentations referenced in this guide and for additional information, visit www.namepa.net/education or our junior website, www.namepajr.net. We hope to continue to update this guide with new lessons and resources.

Acknowledgements

This learning guide is a collaborative effort between the North American Marine Environment Protection Association (NAMEPA) and the National Oceanic and Atmospheric Administration (NOAA). It was created using content from the "Turning the Tide on Trash" marine debris curriculum developed by NOAA.

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View this publication online at: www.namepa.net/education and http://marinedebris.noaa.gov.

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It's All Downstream From Here...

Grade Level: K-5

Time: 1 hour (minimum)

SUMMARY

In this lesson, students make observations about what is in their classroom trash receptacle (or various trash items brought by instructor). Students then go outside to collect trash from the surrounding area and record what they find using the NAMEPA Trash Data form. The class then looks at the data they have collected and makes inferences about sources, origins and most common types of marine debris. This is a great lesson to do in a coastal area or near a waterway!

OBJECTIVES

- Collect data from 2 locations
- Analyze data to make inferences about sources, origins and most abundant types of debris
- Consider personal impact on marine debris
- Formulate a plan to reduce and prevent marine debris

STEM APPLICATIONS

- Collecting and analyzing data (Science, Math)
- Understanding marine debris origins and effects (Science)
- Creating a plan to address an identified problem (Engineering)

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 the Great Lakes' (NOAA, 2007)
- **Data:** Facts or information, usually used to calculate, analyze, or plan something
- **Litter:** Trash, wastepaper, or garbage lying scattered about
- **3 R's:** Reduce, Reuse, Recycle
- **Biodegradation:** The process by which a substance or an object that came directly from a living thing is broken down, or decomposed, by living things (bacteria and invertebrates) and is turned back into a usable product
- **Photodegradation:** The process by which a substance or object is broken down via sunlight

MATERIALS

- PowerPoint presentation on marine debris (on NAMEPA website)
- Various trash items – go through ahead of time to make sure all of the items are safe and clean
- Gloves for every student
- Trash bags
- NAMEPA Trash Data Form (page 25)
- A clipboard and writing utensil for each group
- Area outside to collect trash
- Blackboard, whiteboard, or chart paper and appropriate utensil
- NAMEPA Plastics Pledge (page 26)

SAFETY PRECAUTIONS

All trash objects should be cleaned and checked by teacher prior to being handled by students. Avoid sharp objects or materials containing harmful chemicals.

A portion of this lesson requires students to go outside. Review with students the expectations about going outside. Remind the students that they should not handle sharp objects; do NOT touch broken glass or needles!! All students should wear gloves when handling trash.

ACTIVITY

1. Elicit (5 min):
Ask students if they have ever been to a beach, river or general coastal area and saw something that did not belong there (questions included in PowerPoint presentation). They can silently write their thoughts for a few minutes, or discuss with classmates in small groups. After a couple of minutes, ask if they have ever seen trash on the ground and where they think it comes from. How does it get transported from one location to another? After a minute of discussion, present the PowerPoint on marine debris. Once you get to the "You Can Make a Difference" slide, wait to present the next (last) slide until the end of the lesson. The last slide has the top ten marine debris items found in beach cleanups (data taken from the Ocean Conservancy). This will be compared to the debris the students collect.

2. Explore & Engage (30 min):
Take out the various trash items you brought, or take a look through the classroom trash can (make sure all items are safe). Have each student look at the items and write down what they see, making note of multiples. Then, as a class, make a master list of the items.

Tell the students you will all be going outside to collect trash from the surrounding area. This serves two purposes. First, data will be recorded on the types of items collected outside using the Trash Data forms and compared to those inside. Second, trash will be removed from the grounds!

Go over expectations with the students. Let them know they should stay within sight of an adult, stay away from trash that looks dangerous, and always wear their gloves.

Students can work in small groups of 2-3. Each group should have a trash bag and one student in each group should be recording what items are collected. After about 10 minutes, have the students come back inside to take a look at what was found.

3. Explain (15 min):
Each group should present the data they collected outside. A great way to do this is to have a student from each group put the totals for each item on the board, so that all the totals can be summed. Compare this data with what was found in the trashcan earlier. Most likely the results will be similar. Are there any items you expected to find but did not? What could be a reason for this? What items were recorded both indoors and outdoors? Based on the data collected, what do the students think are the most common types of marine debris found during cleanups? Present the last slide from the PowerPoint, which has the top ten debris items found in cleanups worldwide, based on data from the Ocean Conservancy. How does the class data compare to this list?

5. Wrap Up (5 min):
A great way to end this lesson is by having the students sign the NAMEPA Plastics Pledge (page 26) to demonstrate their commitment to reducing their plastic consumption.

DIVE DEEPER

For additional information about NAMEPA's educational programs and materials, visit www.namepa.net/education. NOAA's Marine Debris website: marinedebris.noaa.gov.

Top Ten Items Over 25 Years

RANK	DEBRIS ITEM	NUMBER OF DEBRIS ITEMS	PERCENTAGE OF TOTAL DEBRIS ITEMS
1	CIGARETTES/CIGARETTE FILTERS	52,907,756	32%
2	FOOD WRAPPERS/CONTAINERS	14,766,533	9%
3	CAPS, LIDS	13,585,425	8%
4	CUPS, PLATES, FORKS, KNIVES, SPOONS	10,112,038	6%
5	BEVERAGE BOTTLES (PLASTIC)	9,549,156	6%
6	BAGS (PLASTIC)	7,825,319	5%
7	BEVERAGE BOTTLES (GLASS)	7,062,199	4%
8	BEVERAGE CANS	6,753,260	4%
9	STRAWS/STIRRERS	6,263,453	4%
10	ROPE	3,251,948	2%
	TOP TEN TOTAL DEBRIS ITEMS	**132,077,087**	**80%**
	TOTAL DEBRIS ITEMS WORLDWIDE	**166,144,420**	**100%**

SOURCE: OCEAN CONSERVANCY/INTERNATIONAL COASTAL CLEANUP

Did you know that cigarettes are the most commonly found trash item during the Ocean Conservancy's International Coastal Cleanup?

Did you know that cigarettes contain plastic?