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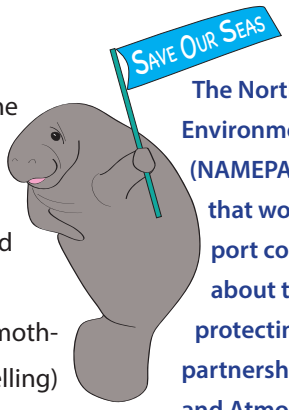
An Educator's Guide to Marine Debris

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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Let's Talk Trash

Grade Level: K-5

Time: 1 hour

SUMMARY

Students are introduced to marine debris and participate in a role-playing exercise acting as beachgoers, seafarers (or crewmembers on a boat), homeowners, factory managers, or managers of a waste disposal company. Students discuss their role and how they can manage or prevent marine debris. Students then make a commitment to decreasing their plastic consumption by signing the NAMEPA Plastics Pledge.

OBJECTIVES

- Identify different types of marine debris
- Categorize and tally different forms of marine debris, according to its prevalence, type, mode of travel, origin and degradability.
- Learn and use the term "marine debris"
- Assess their role in creating marine debris by playing members of society and industry
- Collaborate in the role-playing exercise to create a plan to prevent and reduce the impact of marine debris
- Students commit to reducing their plastic consumption with the NAMEPA "Plastics Pledge"

STEM APPLICATIONS

- Students identify and tally debris items (Math)
- Students learn about buoyancy and types of debris items (Science)

VOCABULARY

- **Marine:** Of, found in or produced by the ocean
- **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)
- **Trash:** Discarded materials; garbage or waste
- **Buoyancy:** The ability to float in water

MATERIALS

- PowerPoint with marine debris definitions and images*
- Pieces of debris for students to see and touch.
- Optional: plastic tub with water
- NAMEPA Plastics Pledge (page 26)
- Optional: NAMEPA "Do You Know Where Your Litter Is?" Poster*

**Available on NAMEPA website*

SAFETY PRECAUTIONS

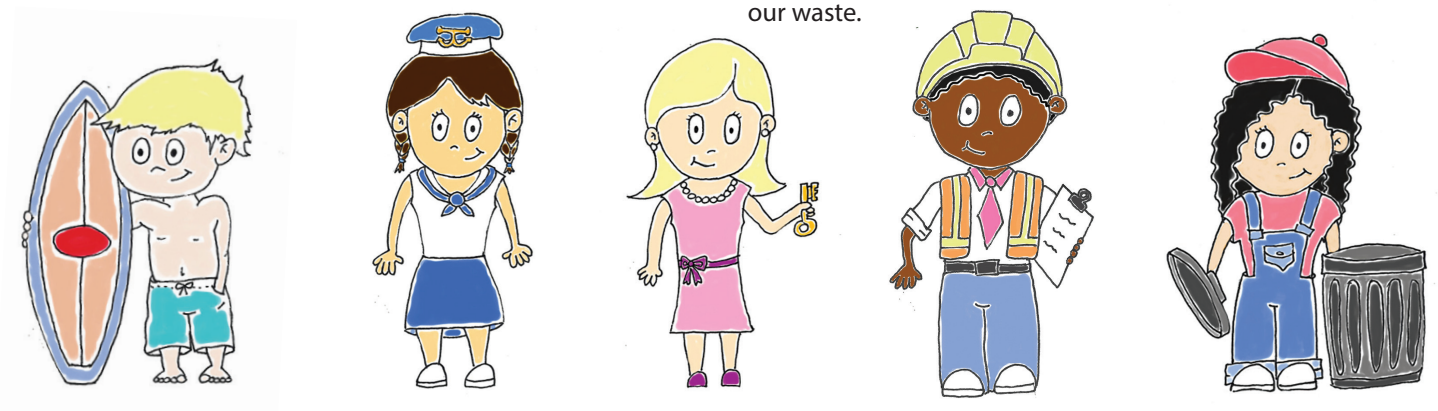
All trash objects should be cleaned and checked by teacher prior to being handled by students. Avoid sharp objects or materials containing harmful chemicals.

BACKGROUND

Marine debris is defined as '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). The most common categories of marine debris are: plastic, glass, rubber, metal, paper, wood, and cloth.

During the international coastal clean-up of 2012, the most commonly collected items during beach clean-ups were cigarettes, food wrapper/containers, plastic beverage bottles, bags, caps/lids, forks/knives/spoons, straws/stirrers, glass beverage bottles, cans, and paper bags (Ocean Conservancy, 2013).

Debris enters marine environments through improper disposal of trash on land and in the water (ships and other vessels, including offshore oil and gas platforms), storm drains, industrial facilities, waste disposal activities, etc. It travels to the oceans through waterways and wind, and once it has found its way into the ocean, it is very difficult to trace the source and can be expensive to remove. Massive amounts of marine debris end up in our oceans and affect marine wildlife and habitats. Education of civilians and various industries increases awareness about our roles in this issue, and encourages us to reduce the amount of trash we generate by using reusable materials, recycling, and properly disposing of our waste.



ACTIVITY

1. Engage (5 min):
Ask students to think about a time when they were at a beach, on the water, near a river, etc. Do they remember seeing anything that did not belong there? Ask them to create a list of debris items they have noticed, as well as their possible origins. Are these things that could harm wildlife or people? Choose volunteers to share their thoughts.

2. Explore (10 min):
Open the PowerPoint presentation and go the slide entitled "Activity." Have students identify different marine debris items in the photograph. What are these objects made from (plastic, glass, wood, etc.)? Have students tally items made from each type of material. What is most of the marine debris made out of (plastic)?

3. Explain (15-20 min):
Continue presenting the PowerPoint, describing a basic overview of marine debris and buoyancy. If you have examples, present actual marine debris items for students to see. Ask the students if they use any of the items you're showing them. How often do they use them? What effects can this debris have on the environment, wildlife, and people? Be sure to mention entanglement of and ingestion by wildlife, smothering of habitat (i.e. coral reefs), unsightliness, expensive clean up, ect.

Once you reach the slide entitled "Buoyancy," present the Optional Extension (below) if you are choosing to do so. If not, ask the students what types of debris they think are more buoyant (i.e. plastic) than others (rubber tires, fishing net, driftwood, etc.). Ask the students how they think these things become marine debris. Responses you are looking for include littering, transportation via water and wind, runoff to storm drains, trash getting dumped overboard from ships, and storms.

OPTIONAL EXTENSION
If you have physical examples of marine debris and a plastic tub, perform a buoyancy demonstration. Fill two thirds of the plastic tub with water. Ask students to make predictions, either on paper or verbally, about which items will sink and float. Place items in the water and have students come up to view the results. Which objects would travel greater distances than others? What objects would be most likely to impact remote areas uninhabited by people? Be sure to mention that because plastics are very buoyant, they often travel farther than other marine debris items.

4. Extend (20 min):
Present the last slide of the PowerPoint. Tell students they are going to participate in a role-playing exercise and divide them into groups. Assign each group one of the following roles: beachgoers, seafarers (or crewmembers on a ship), homeowners, factory managers and managers of a waste disposal company. For 7-10 minutes, they should discuss the impact they have on producing marine debris and what they can do to reduce or prevent marine debris.

Try asking each group the following questions to help get them thinking:

• Beachgoers: What are some things you can do when you go to the beach to help reduce/prevent marine debris (i.e. clean up the trash you see and don't leave trash behind)?

• Seafarers: What are some ways you can decrease the waste you produce onboard? If you were a crewmember on a cruise ship, what are some ways you can help get passengers to decrease their waste and not litter?

• Homeowners: What changes can you make everyday to help reduce the trash you produce? What products should you stay away from (i.e. single use water bottles)? What are some alternative products you can use?

• Factory Managers: How can you go about disposing of the waste your factory produces properly? What are some things you want to avoid (i.e. dumping/littering, sending things to landfill)? You may want to explain what a landfill is (a way to dispose of waste by burying it in the ground).

• Manager of a Waste Disposal Company: What are some things you want to make sure your employees are doing properly so that trash does not enter the environment or get sent to landfill (i.e. properly separating materials for recycling, ensuring materials aren't blown away by wind?

After, divide students so that each group has a member from each role. For the next 7-10 minutes, they should come up with a plan as a community to reduce and prevent marine debris. Each group should try to make a list of at least 5 things they plan to do to reduce their impact. Have students share their ideas as a class.

5. Evaluate/Wrap-Up (5 min):
To wrap up the lesson, mention some of the following ways the students can help prevent marine debris: reducing their waste, reusing materials, recycling, participating in cleanups, etc. Then, hand out copies of the NAMEPA Plastics Pledge (on page 26), and have students commit to decreasing their plastic consumption. You can also show the students the NAMEPA "Do You Know Where Your Litter Is" brochure to give them a better idea of how long it takes for certain debris items to break down (available on NAMEPA website).

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.