



Classroom Teacher Preparation

Engineering 10: Plastic in the Ocean

Please use the following to prepare for the next SfS lesson.

Description:

In this lesson, students learn about the abundance of plastic in the ocean. For their Exploration, students design and build a filter to remove pieces of plastic from an ocean model. If there is time, once students have filtered the plastic from their ocean model, they will conduct a test to determine whether they successfully removed all plastic from their filtered water. Afterwards, students discuss solutions to reduce and remove plastic from the ocean.

Lesson Objectives – SWBAT (“Students Will Be Able To...”):

3rd – 8th

- Design and build a filter to remove pieces of plastic from an ocean model
- Discuss solutions to reduce plastic use or to remove plastics from the environment

Disciplinary Core Idea (DCI)

ESS3 Earth and Human Activity - ESS3.C Human impacts on Earth Systems

- (3rd-5th) Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth’s resources and environments.
- (6th-8th) Human activities have altered the biosphere, sometimes damaging it, although changes to environments can have different impacts for different living things. Activities and technologies can be engineered to reduce people’s impacts on Earth.

Science & Engineering Practice (SEP)

Developing and Using Models

- (3rd-5th) Develop a diagram or simple physical prototype to convey a proposed object, tool, or process
- (6th-8th) Evaluate limitations of a model for a proposed object or tool.

Constructing Explanations and Designing Solutions

- (3rd-5th) Use evidence to construct or support an explanation or design a solution to a problem.
- (6th-8th) Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system.

Crosscutting concepts

Structure and Function

- (3rd-5th) Substructures have shapes and parts that serve functions.
- (6th-8th) Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

Preparation:

This lesson serves as an introduction to the topic. No prior knowledge is necessary.



Room Set Up for Activities:

Students will work in groups of 3-5 at their desks or tables. This lesson requires access to sink or water and a space to lay out supplies. If completing the Elaborate activity, the room must be dark. Each group will receive a worksheet and 1 ocean model. Materials to build filters are listed on the worksheet and laid out for visual display on the supply table.

Safety:

Students will need safety glasses and gloves if performing the Testing for Microplastics Elaborate activity, as they will be using a Nile Red Dye and acetone solution.

Related Modules:

This lesson may be taught as part of a sequence or group of related modules on **Human Impact**. Modules include:

Earth Science 1: Oil Spill – Students explore the issues surrounding an oil spill, particularly the methods of environmental cleanup. Students act as environmental engineers to test different methods for effectively cleaning up a model oil spill and determine the harmful effects that oil spills and their cleanup cause for animals and the environment.

Earth Science 20: Our Carbon Footprint – Students learn what a carbon footprint is by playing the Carbon Footprint game and learning about different human activities that increase and decrease our carbon footprints.

Engineering 6: Saving the Beach – Students work in small groups to engineer solutions to beach erosion through brainstorming, planning, and designing prototypes for their model beaches.

Life Science 10: Sustainability – Fishing for Answers – This lesson uses a fishing game to explore the concepts of sustainability and the tragedy of the commons.

Technology 5: e-Trashing our Future – Students examine the increasing volume of e-waste in society and what happens with it after people get rid of it.

For other module sequences and groups, look here: www.sciencefromscientists.org/sequences

Standards Covered:

Please click the following link to our website to review the standards covered by this lesson, listed by state: www.sciencefromscientists.org/standards/. Lessons are matched to both national NGSS and local state standards.

After Our Visit:

Extend this lesson by making your own paper straws in the classroom or at home (with the help of an adult!). Details here: <https://kids.nationalgeographic.com/explore/nature/kids-vs-plastic/paper-straws/>

Access this Extension activity by visiting the Classroom Post found on our website at sciencefromscientists.org/cohorts. Use the name of your school/cohort and password to log in. To help Evaluate, check out our Open Response questions online at sciencefromscientists.org/open-response-questions. They are freely available for all of our lessons for current teachers. Use the password supplied by your instructor to log in.

Additional Resources:

- *Final Straw – 7 Billion Straws Commercial (0:18):* <https://www.youtube.com/watch?v=OQLKiNshZVM>
- *How Big The Great Pacific Garbage Patch Really Is (3:18):* <https://www.youtube.com/watch?v=vrPBYS5zzF8>
- *How We Can Clean Up The Oceans? – SciShow (4:22):* <https://www.youtube.com/watch?v=7i8pjniZcF8>
- *Solutions for Plastic Pollution (4:12):* <https://www.youtube.com/watch?v=RXRMuorEAVI>
- *The Great Pacific Garbage Patch Is Not What You Think It Is | The Swim (7:50):*
<https://www.youtube.com/watch?v=6HBtl4sHTqU>
- **Caution: sensitive content:** *Plastic Oceans | What is the impact of pollution in the sea?:*
<https://www.youtube.com/watch?v=cwTDvqaqPIM>

