

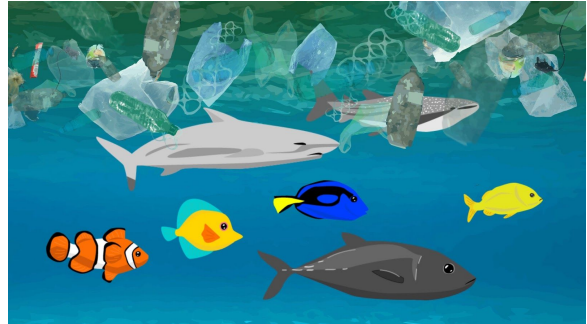
Lesson Plan: Plastic, Plastic Everywhere

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Featured Resources

Above the Noise: [Is Your Fleece Jacket Polluting The Oceans?](#)

The Lowdown: [How Plastic Took Over The World: A Disposable History](#)



Opening Quick-Write Prompt

Plastics are a huge part of our everyday lives. Many of the products we use are made out of or contain plastics. What do you know about what happens to plastics after they are disposed of? How do they affect the environment?

A quick write allows students to write down their thoughts before discussing the opening question in order to increase participation and make the discussion more accessible to English Language Learners.

Objectives

- Students will analyze the history of plastics, their effects on the environment and regulatory efforts to address those effects.
- Students will evaluate the role of microplastics in their lives and reflect on their willingness to change their behaviors to help reduce plastic pollution or if regulation should play a role.

Essential Question and Lesson Context

What are microplastics and how do they impact the environment? What can we do to reduce microplastic pollution?

Plastics can be made in almost any shape for almost any purpose. They are shaped to make car parts, bottles and toys, and rug and clothing fibers. Plastic polymers don't occur naturally; we create them. And since they aren't found in nature, no organisms exist to break them down completely. Plastics don't biodegrade, they just break into smaller and smaller pieces. And this is a problem.

Plastics smaller than 5mm are called microplastics. They're pieces of a plastic item that has broken apart, microbeads found in face washes, pre-production plastic beads called "nurdles,"

and microfibers. Microfibers are tiny strands of plastic that are woven together to create synthetic fabrics. They've been around for decades, but we've only recently realized their negative impacts. Synthetic fabrics, including nylon, polyester and polypropylene, shed these tiny fibers into the air when we wear them or walk on them (rugs!) and into the water when we wash them. Since many microfibers are too small to get caught in washing machine or wastewater treatment plant filters, they wind up in our waterways, where they are eaten by marine life, such as invertebrates and fish. Scientists are still researching all of the effects of microfibers in the environment, but we know that some plastics release chemicals which are harmful to human health.

Key Vocabulary

Pre-teach key vocabulary before students do the activity, especially if you have English Language Learners. After going over the simple definition, consider providing a visual aid or having students draw one. More ideas for how to pre-teach vocabulary can be found [here](#).

Word	Simple definition
Carbon footprint (n.)	The total amount of greenhouse gas emissions produced to support an individual's activities, both directly and indirectly <i>I reduced my carbon footprint by not purchasing new clothes last year.</i>
Commission (v.)	To give an order to produce something <i>The clothing manufacturer commissioned a study on the impacts of microfibers on marine life.</i>
Polymer (n.)	A large molecule made up of shorter repeating subunits called monomers <i>Scientists created new polymers, called plastics, that are used to make many items we use every day.</i>
Synthetic (adj.)	Made from a chemical reaction; not natural <i>Most athletic clothing is made from synthetic materials.</i>
Water treatment plant (n.)	A facility that processes water to remove contaminants <i>Water treatment plants remove harmful substances from water but often can't remove microfibers.</i>

Investigate

- Discuss the quick-write prompt as a class. What do students know about what happens to plastics after they are disposed of and how they affect the environment? Ask if anyone has an example about how they changed their behavior or stopped using

any plastic items because of something they learned about plastics and the environment.

- Have students individually or in pairs read [The Lowdown post](#) and the interactive timeline about how plastics came to be so ubiquitous, the damage they've caused to the environment and regulatory efforts to control their negative impacts.
- Ask students to choose the entry on the timeline that was most interesting to them. Place students in groups of 2 or 3 to share with each other why that entry stood out to them.
- Have students watch the [Above the Noise episode](#) as a class.
 - **Stop the video at :53 and study the graphics:** What do they mean? (Note: MT stands for metric tons)
 - **Stop at 1:20:** Review what microfibers are and where they come from.
 - **Stop at 1:44 and ask:** What are microplastics and where do they come from?
 - **Stop at 2:03:** Discuss why plastics (and microfibers) don't break down completely.
 - **Stop at 3:07 and ask:** How do microfibers affect marine life?
 - **Stop at 4:41 and ask:** What are some ways that microfiber pollution could be prevented through regulation? Make a list of the ideas that were presented.
 - **Stop at 5:15 and ask:** How could bacteria play a role in reducing microfiber pollution?
 - **Stop at 5:31 and ask:** What are some ways that individuals could help prevent microfiber pollution?
- Ask students what most surprised them from the [Above the Noise episode](#). In pairs, have students take turns sharing their thoughts and concerns about microfiber pollution by answering the following questions: "What did you learn? What concerns you most about microfiber pollution?"
- **Transition to the Make and Share:** Tell students they will have a chance to share their concerns about microfibers in the comments section of The Lowdown. The first time they comment, students must sign in to [Disqus](#), a free discussion app embedded in The Lowdown.
 - To sign in to [Disqus](#), click the "Comments" button at the bottom of The Lowdown.
 - Click the blue "Get Started" button in the gray "Welcome to Disqus" box.
 - Students will need to enter a username. We recommend first name, last initial.
 - After signing in for the first time, students must verify their email address before commenting. A verification email will appear in their inbox once they sign in to Disqus.

Make and Share

- Individually or in small groups, students post responses in the comments section answering the following question:
Now that you know more about plastics and microfibers, is there anything you're willing to do in your daily life to help reduce microfiber pollution? Do you think regulation should play more of a role? How?
 - Responses should be supported by evidence from the Above the Noise episode, The Lowdown post, or other research on the topic. (See source list)
 - Encourage students to reply to other comments after posting their response. Remind them to use evidence to support their claims and respectful language when replying to others.

Assessment/Reflection

- Students reflect on what they have learned through a class discussion or in writing:
 - What is your biggest takeaway from the content presented in the video and article?
 - What was it like to post your responses publically and reply to other posts? What did you learn from other students? What do you hope they learned from you? What will you do the next time you post a comment in response to The Lowdown?

[Circle chats](#), small-group discussions and [think-pair-share](#) provide a safer space for students to practice speaking and listening, and also boost participation during whole-class discussions.

Extension/Homework

Write/speak locally: Students turn their response to this issue into a letter, short speech or presentation, then research ways to make their voice heard in their community. (Example: Speaking during the public comment section of a city council meeting, posting in an online forum, etc.) For a list of how to contact local officials in your area, check out [KQED Learning's Local Election Toolkit](#).

Design a solution: [Engineering for Good](#) is a three-week, project-based learning unit for middle school classrooms focused on developing solutions for negative impacts of plastics on the environment. In these NGSS-aligned lessons, students use the engineering design process to define a problem, brainstorm solutions, develop prototypes and iterate on their designs. The project culminates with students producing videos about their solutions to share with the community.

Common Core Standards and NGSS

CCSS.ELA-Literacy.CCR.A.R.1	Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
CCSS.ELA-Literacy.CCR.A.R.7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
CCSS.ELA-Literacy.W.1	Write arguments to support claims with clear reasons and relevant evidence.
NGSS.SEP.7	Engaging in argument from evidence
NGSS.SEP.8	Obtaining, evaluating and communicating information
NGSS.ESS3.C	Human impacts on Earth systems
NGSS.PS1.B	Chemical reactions
NGSS Appendix J: Core Idea 2	Influence of engineering, technology and science on society and the natural world