



Taking a Bite Out of Lunchroom Waste

Lesson 1: What is trash? Where does it go?

1D: What is the fate of trash?

Anchoring Phenomena:

How can we **reduce** marine debris?

Investigative Questions:

How can we reduce the amount of trash going into landfills?

Lesson Goals:

What students will do: Students learn about what happens to plastic items and food we throw away. Students will use the 5Rs to think about ways to keep trash from the landfill.

What students figure out:

- What happens to plastic and food when it is thrown away
- Ways to keep trash from the landfill (ways to reduce marine debris).

NGSS alignments

| Investigative questions | Grade Level Performance Expectations | Disciplinary Core Ideas | Science and Engineering Practices | Cross-cutting concepts |
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| How can we reduce the amount of trash going into landfills? | <p>K-ESS3-3 Earth and Human Activity - Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.</p> <p>5-ESS3-1. Earth and Human Activity - Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.</p> | ESS3.C Human impacts on Earth systems | <p>1- Asking questions (for science) and defining problems (for engineering)</p> <p>3- Planning and carrying out investigations</p> <p>4 - Analyzing and interpreting data</p> <p>8 - Obtaining, evaluating and communicating information.</p> | <p>1- Patterns</p> <p>2 - Cause and effect</p> <p>7 - Stability and change</p> |

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| | <p>MS-ESS3-3. Earth and Human Activity -</p> <p>Human Activity - Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.</p> <p>HS-ESS3-4 Earth and Human Activity -</p> | | | |
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Materials: Trash samples, [5Rs Worksheet](#)

Lesson Prep:

1. Determine the trash/food items you want to use with students and the conversations you want to have.
2. Review 5Rs Worksheet

Lesson Steps:

1. Brainstorm with students what it means to biodegrade. Biodegradation is something's ability to disintegrate (decompose) by the action of microorganisms such as bacteria or fungi (with or without oxygen), and its assimilation back into the natural environment. Important note: there is no ecological harm with biodegradation.
 - a. Climate change connection: The anaerobic decomposition of organic matter, like food, releases methane gas which is 28 times more potent than carbon dioxide at trapping heat in our atmosphere. When we send food to the landfill it creates methane.
2. Discuss: do all items biodegrade? Why or why not? How long do you think it takes items to biodegrade?
3. Share the [Lifespan of Trash chart and graph](#) with students, showing how many weeks it takes items to [biodegrade](#). Note: we intentionally put question marks for the plastic items as

researchers are unsure of their complete lifeplan - while they break into small pieces they do not biodegrade or get reused in the nutrient cycles.

4. Ask students to record something they noticed in the graph. Use the following prompts to generate discussion.
 - a. What took the shortest amount of time to biodegrade?
 - b. What took the longest?
 - c. Why is there no data for plastics? There is much we don't know. Plastics are relatively "new". They have only been used widely in everyday life since about the 1950s. Our current understanding is that most plastics NEVER biodegrade into parts that can be used in an ecosystem.
 - d. What happens to plastic that is thrown away?
 - i. Plastics photodegrade or are mechanically broken into smaller and smaller pieces.
 - ii. Cookie example: Imagine or take a cookie and break it into pieces until it's cookie dust. The makeup of the cookie did not change, it's still a cookie, just in tinier pieces. The same thing happens with plastic. It breaks into smaller and smaller pieces.
 - iii. Almost everything else we throw away can biodegrade or chemically degrade into minerals and elements that exist naturally. These are used by plants and animals in nutrient cycles within our ecosystems.
5. *Grade 5-12 Extension: [A Degrading Experience](#), Lesson 3 (page 23) from *Turning the Tide on Trash*.*
6. *MS/HS Extension: [Plastics: Reduce, Use, or Recycle?](#) A Lesson from the Monterey Bay Aquarium*
7. *MS/HS Extension: Most plastics NEVER get reused by our ecosystem. How did use of plastic become so acceptable? Listen to [The Litter Myth](#) podcast from NPR.*
8. *MS/HS Extension: Read "[The many uses of plastic materials in medicine.](#)" in lesson resource folder*
 - a. *Are there places/times where plastic use is okay? Better or worse uses for plastic?*
 - b. *Are there things being done to regulate or reduce plastic?*
9. *MS/HS Extension and climate change connection: How can changing how we handle food waste impact climate change?*
 - a. *Read the [EPA's wasted food scale](#)*
 - i. *What opportunities exist in your community to divert food waste and other organic matter from landfills?*
 - b. *Read [Importance of Methane](#)*
 - i. *Why can diverting food waste and other organic matter from landfills have a significant impact on atmospheric warming?*

Application

10. Distribute new trash items to students OR ask students to start to think about how the trash item they used with the decision tree in Lesson 1C could be kept out of a landfill.
11. Have students use the 5Rs worksheet to brainstorm at least one different way (or up to 3 ways) their trash item could be diverted from the landfill. Then have students share their ideas with a partner.

Reflection

12. Ask students to turn to the page in their journal they split in half in Lesson 1A and answer “Why is understanding trash important?”
 - a. On the bottom half, have students reflect about trash now.
 - b. At the very bottom of the page, have students identify one way they will reduce the trash they produce.

[Great Lakes Literacy Principles Connections:](#)

- (1) The Great Lakes, bodies of fresh water with many features, are connected to each other and to the world ocean.
- (5) The Great Lakes support a broad diversity of life and ecosystems.
- (6) The Great Lakes and humans in their watersheds are inextricably interconnected;
- (8) The Great Lakes are socially, economically, and environmentally significant to the region, the nation and the planet.