

**Overview:**

Students will explore (through video) the way trash travels through the watershed, how long trash stays in the water, and its impact on the water.

**Learning Objectives:**

Students will be able to ...

- Understand their connection to a local watershed.
- Understand that debris that enters the watershed has a negative impact on the ecosystem. They will recognize the connection between land-based litter and debris in the marine environment and how long that impact can last.
- Demonstrate understanding of how to positively impact the environment through individual actions.
- Be prepared to consider an action project with their classmates or in their community.

**Sequencing:**

This supports the outdoor field experience element of the Meaningful Watershed Educational Experience (MWEE). During distance learning, this lesson will serve as background for watershed topics. Alternatively, this lesson could serve as an introduction to watershed and pollution concepts.

**Lesson Components:**

Grade(s)	4-5 <sup>th</sup> grade science
Time Required	30 minutes
Location(s)	Classroom or virtual lesson at home
Materials	Watershed Video Kahoot Link (Teachers will need to email <a href="mailto:campfraser@livingclassroomsdc.org">campfraser@livingclassroomsdc.org</a> to request the link for the Kahoot pictures and questions.)

**Next Generation Science Standards** supported by this lesson:

Performance Expectation:

4-ESS3-2	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.* [Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]	
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><u>Constructing Explanations and Designing Solutions</u></p> <p>Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.</p> <ul style="list-style-type: none"> <li>Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.</li> </ul>	<p><u>ESS3.B: Natural Hazards</u></p> <ul style="list-style-type: none"> <li>A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (Note: This Disciplinary Core Idea can also be found in 3.WC.)</li> </ul> <p><u>ETS1.B: Designing Solutions to Engineering Problems</u></p> <ul style="list-style-type: none"> <li>Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary)</li> </ul>	<p><u>Cause and Effect</u></p> <ul style="list-style-type: none"> <li>Cause and effect relationships are routinely identified, tested, and used to explain change.</li> </ul> <p>-----</p> <p><i>-Connections to Engineering, Technology, and Applications of Science Influence of Engineering, Technology, and Science on Society and the Natural World</i></p> <ul style="list-style-type: none"> <li>Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands.</li> </ul>

**Preparation:**

Students in the Washington DC metropolitan area recognize that rivers are polluted, but many do not understand the larger impact that has on ocean ecology. Students who have seen rivers or learned about watersheds will make this connection faster.

Teachers will need to email [campfraser@livingclassroomsdc.org](mailto:campfraser@livingclassroomsdc.org) before presenting this lesson to request the link for the Kahoot pictures and questions.

**Vocabulary:**

Term	Definition
Watershed	An area of land that drains into a particular body of water.
Habitat	The natural home or environment of an animal, plant, or other organism.
Ecosystem	A biological community of interacting organisms and their physical environment.
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.
Biodegradable	A substance or object capable of being decomposed by bacteria or other living organisms.

Degradable	A substance or object that breaks down into smaller and smaller pieces but never actually disappear completely from the environment.
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**Procedure:**

Action	Notes
<b>Engage</b>	
1 Before watching the video, remind students of any Issue Definition lessons you have already completed about watersheds. Check for understanding on definition of watershed. Today we are watching a video from Camp Fraser that was made in the city.	Video shows the path of trash from neighborhood to ocean.
2 Watch the very short video - Watershed from Living Classrooms.	
<b>Explore</b>	
3 We just saw how human actions can impact our watershed. We may not think we have a big impact individually on our watershed, but we do! Why do we think this is important? How does this impact the habitats and ecosystems around the water? Where does most pollution in the water start? <i>On the land.</i>	
4 Let's talk about Marine Debris. What does that even mean?  Marine = ocean Debris = trash So marine debris = ocean trash!  What did our video show us about how trash finds its way into the ocean? <i>Kid littering, street, storm drain, stream, river, bay, ocean.</i>	
5 80% of trash found in our oceans comes from land at first, not directly thrown in the ocean. And 80% of this trash is made of plastic. Why is plastic such a huge component of the trash found in the ocean? <i>Because it's a huge component of our lives.</i>	
<b>Explain</b>	
6 Before starting Kahoot, define some terms. We're going to look at how long it takes trash to break down in the water until we can't see it anymore. But, even if we can't see it, does that mean it is necessarily gone? <i>No, there can be traces of the material or toxins left behind from the trash breaking down.</i>  Some trash is <b>biodegradable</b> . What does this mean? <i>It breaks down until they are no longer visually distinguishable, but they can leave behind toxins.</i>	Kahoot has questions about trash and relative time of biodegradation . Teachers must email <a href="mailto:campfraser@livingclassroomsdc.org">campfraser@livingclassroomsdc.org</a> to request

<p>Some trash is just <b>degradeable</b>. What does this mean? It <i>breaks down into smaller and smaller pieces but never actually disappear completely from the environment.</i></p>	<p>the link for Kahoot.</p>
<p><b>Elaborate</b></p>	
<p>7 Open Kahoot. Students will engage in a game to learn about how long it really takes trash to biodegrade or degrade. Use teacher notes in step 8 to help elaborate on the information.</p>	
<p>8 Teacher notes for after each question:</p> <ul style="list-style-type: none"> <li>• After Question 1: You might be surprised about aluminum and plastics. While cardboard and leaves take only a few weeks or months to break down, aluminum and plastics will break down eventually over hundreds of years.</li> <li>• After Question 2: Yes, cardboard is closer to its natural state of wood, so it will biodegrade faster.</li> <li>• After Question 3: No explanation (let students think about this one).</li> <li>• After Question 4: Styrofoam degrades into smaller pieces that stick around and never go away entirely.</li> </ul>	
<p><b>Evaluate</b></p>	
<p>9 What did you notice about things that took only a few weeks to break down versus hundreds of years? <i>Things made with more natural materials, like wood, paper, or fruit, break down faster. Manmade materials like glass, metals, and plastics take longer.</i></p>	
<p>10 Could we reuse any of the items we saw again and again?</p> <p>Could anything in those pictures have been recycled? <i>Aluminum cans, paper, etc.</i></p> <p>How much less trash would be in our waterways if everyone made reusing and recycling a priority?</p>	
<p>11 How can you help to keep the water clean for both people and wildlife? Think about people you have seen in your community.</p> <p>MWEE students – Brainstorm new solutions that you can do by yourself and solutions that you would need help to do.</p>	<p>Make connections to rest of the MWEE project.</p>